Contents

3 Custom Installation

How to Use This Manual

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Contents Overview

There are many steps to getting your NetWare® 4.2 server installed and operating with client workstations on a network. A diagram outlining the process is shown under the heading “Installation Process Diagram” on page xi.

Begin by reading Chapter 1, “Prepare to Install,” on page 1 to plan your network and prepare your equipment for installation. If necessary, read *Guide to NetWare 4 Networks* to plan your Novell Directory tree.

Next, install a new NetWare 4.2 server by following the installation procedures in Chapter 2, “Simple Installation,” on page 13, or Chapter 3, “Custom Installation,” on page 39.

You can also perform other installation options. Procedures for performing other installation options are included at the beginning of Chapter 3 and at the end of Chapter 2 and Chapter 3.

Next, install the Novell Client™ software on each workstation in your network by following the procedures in Chapter 7, “Installing Novell Clients,” on page 193.

Next, explore the online documentation located on the NetWare 4.2 Online Documentation CD-ROM.

Finally, administer the NetWare 4 network by reading *Supervising the Network*, which is available online.

Installation Options

You can install a NetWare 4.2 server using either the simple installation or custom installation option.

The simple installation is both quicker and easier to perform than the custom installation.

The custom installation option makes no assumptions and lets you customize your server installation. Additional options, such as spanning volumes across multiple drives and loading and binding TCP/IP and AppleTalk*, are available only in the custom installation option.

Procedures for installing using the simple installation are found in Chapter 2, “Simple Installation,” on page 13.

Procedures for installing using the custom installation are found in Chapter 3, “Custom Installation,” on page 39.

Installation Process Diagram

Plan Directory Tree

Read *Guide to NetWare 4 Networks* and plan your Directory tree.

Install New Server

Install a new NetWare 4.2 server. *(Optional)* Install NetWare 4.2 SFT III™ for mirrored servers.

Perform Other Installation Options

From the "Other Installation Items / Products" menu, create client diskettes and perform other installation options as you choose.

Install NetWare Clients

Install the Novell client software on each computer.

Set Up Documentation Viewer

Investigate the NetWare 4.2 online documentation found on the NetWare 4.2 Online Documentation CD-ROM.

Administer Network

Administer the network using the NetWare administration utilities.

User Comments

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Submit your comments by using the User Comments form provided or by writing to us directly at the following address:

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We appreciate your comments.

chapter 1

Prepare to Install

This chapter provides information and procedures necessary for preparing to install a NetWare® 4.2 server. The information in this chapter will help you to

- ❑ Meet the hardware requirements
- ❑ Ensure proper power and power conditions
- ❑ Set up computer and networking hardware
- ❑ Choose an installation method

Set Up Hardware

Prerequisite Tasks

- ❑ Plan your Directory tree. See *Guide to NetWare 4 Networks* for guidelines and suggestions.
- ❑ Run the computer's Setup program and set the computer's time to the exact local time. (The time synchronization feature in Novell® Directory Services® uses the computer's time setting.)
- ❑ If you install from another server, make sure the new server is cabled to the network and has the Novell Client™ software installed.
- ❑ If necessary, partition and format your hard disk. Create a DOS partition of at least 40 MB on your hard disk. Type FDISK and follow the screen prompts to repartition the hard disk. Reboot the machine and type FORMAT to format the partition.

In some cases, it is easier to troubleshoot server problems by increasing the DOS partition 1 MB for every 1 MB of server RAM. For example, if your server had 32 MB of RAM, you might want to increase the DOS partition from 40 MB to 72 MB (40 MB + 32 MB = 70 MB).

A 40 MB DOS partition should be sufficient for storing the files needed to boot your server. If you need to store additional files on the DOS partition, make the partition larger.

Reformatting your hard disk erases all stored files on the DOS partition. Be sure to back up your hard disk prior to partitioning and formatting.

- ❑ Check the list of hardware requirements below.
- ❑ To ensure that there are no conflicts between hardware devices, use unique interrupt request (IRQ) settings on the NetWare server board.

Hardware Requirements

You need the following hardware for installing a NetWare 4.2 server.

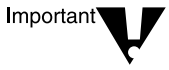
- ❑ A PC (or PC compatible) with a 386, 486 (SX or DX), Pentium*, or higher processor
- ❑ A minimum of 20 MB of RAM

If you are installing over the network using a Novell client, you need to set MAX CACHE SIZE less than or equal to 3 MB. If you do not, the client could allocate up to 8 MB on a machine with 20 MB of RAM. You could possibly run out of RAM during installation.

- ❑ At least one network board
- ❑ Network cabling (Ethernet, token ring, FDDI, ARCnet*, baseband, etc.)
- ❑ A CD-ROM drive that can read ISO 9660 formatted CD-ROM disks
- ❑ If installing from a remote network installation, an existing NetWare workstation (this will be the new server you install) and an existing NetWare server (this will be the host server)

- ❑ A hard disk with sufficient storage space for your network. The minimum amount of storage space required is 205 MB: 40 MB for a DOS partition plus 175 MB for a NetWare disk partition containing volume SYS:.

  However, if you choose to install other product options as explained in Chapter 3 under the heading “Perform Other Installation Options (Optional)” on page 104, you need a much larger volume SYS:. Check the disk space requirements for each product you will install and increase the size of volume SYS: accordingly.



Since NDS objects are stored on volume SYS:, make sure you leave adequate space for additional NDS objects if you anticipate growth of your network.

Hardware Compatibility

To be certain of hardware compatibility with NetWare, check the “Yes, Tested and Approved” site on the World Wide Web at http://developer.novell.com.

Calculate Necessary Server RAM

To calculate your server’s total RAM requirements, perform the following steps. (NetWare 4.2 can support up to 4 GB of RAM and up to 32 TB of disk storage space.)

These RAM calculations are only estimates. It might be necessary to adjust these figures for optimal performance. For more detailed information on calculating RAM requirements, see Appendix A, “Calculate RAM Requirements,” on page 211.

Procedure

1. **Make sure that you have a *minimum* of 20 MB of RAM.**

2. **Multiply the amount of your system’s disk space (in megabytes) by 0.008 and add this number to the number from Step 1.**

   For example, 200 MB multiplied by 0.008 equals 1.6 MB.

3. **Add 1 to 4 MB for additional cache buffer RAM to optimize performance.**

   The more RAM you provide for cache buffers, the better your system's performance will be.

   If you have a server that contains more than 20 MB of RAM, do *not* use anything less than 32-bit AT bus mastering or DMA boards in the server, unless the driver supports going above 20 MB of RAM. For more information, contact the computer manufacturer.

Important

If you have a 386 computer manufactured in 1987, it might not carry out some 32-bit instructions. This could adversely affect the functioning of NetWare.

If a problem exists, NetWare displays a message. You might be able to correct the problem by replacing a ROM chip on the board. For more information, contact your computer manufacturer.

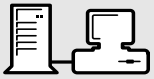
Choose an Installation Method

You can install a NetWare 4.2 server from a local CD-ROM drive or from a CD-ROM drive mounted on a remote network installation area.

If you are installing the first in a series of NetWare 4.2 servers on a new network, you must install from CD-ROM.

Figure 1-1 lists factors to consider before choosing an installation method.

Figure 1-1
Installation Method

	 **CD-ROM**	 **Remote network installation area**
Speed of Installation	Slower than from a network.	Faster than from a CD.
Hardware Configuration Requirements	Requires a CD-ROM player installed as a DOS device on the designated server.	Requires an existing network with either a server with sufficient disk space to store the NetWare 4.11 files, or the NetWare 4.11 CD-ROM mounted as a NetWare volume.
Ease of Installation	Requires setup of CD-ROM drive and drivers.	Simple. Must install as a NetWare client first.

If you are installing from a Windows* 95/98 machine, continue with "Prepare to Install on a Windows 95/98 Machine" below. Otherwise, go to "Install from a Local CD-ROM" on page 7 or to "Install from a Remote Network Installation Area" on page 8, depending on the install method you have chosen.

Prepare to Install on a Windows 95/98 Machine

If your machine is running Windows 95/98 pre-installed, or you have installed Windows 95/98 before planning a NetWare installation, you need to

Checklist

- ❑ Reduce the size of the Windows 95/98 partition to allow room for the NetWare partition. Otherwise, you need another hard disk for the NetWare partition, and the hard disk allocated to the Windows 95/98 partition will not be accessible to your NetWare server.

There are a number of tools that allow you to reduce the size of a Windows 95/98 partition. An alternative to using such a tool is to back up the Windows 95/98 information, repartition and reformat your hard disk to make the Windows 95/98 partition smaller, and then reinstall Windows 95/98.

- ❑ Boot your Windows 95/98 machine in MS-DOS command mode to launch the NetWare Installation program. (Although you can use the Windows 95/98 machine to boot to NetWare, you cannot launch the DOS-based NetWare installation program from a DOS box in Windows 95/98 because Windows 95/98 puts the CPU in protected mode.)

If you do not want to retain Windows 95/98 on your hard disk, you can repartition and reformat your hard disk with the DOS FDISK and FORMAT utilities that are on the NetWare License diskette. Your hard disk would then be prepared to run the DOS-based NetWare installation program.

Procedure

To boot your Windows 95/98 machine in MS-DOS command mode, perform the following steps.

1. **With the machine running Windows 95/98, choose “Start” on the Windows 95/98 taskbar, and then choose “Shutdown.”**

2. **Choose “Restart Computer in MS-DOS Mode,” and then choose “Yes.”**

3. **At the DOS command line, change to the root directory, and then use the ATTRIB command to unhide the file MSDOS.SYS by typing**

   ```
   CD\
   ```

   and then typing

   ```
   ATTRIB -R -S -H MSDOS.SYS
   ```

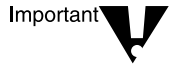
4. **Edit the file MSDOS.SYS to change the “BootGUI” option from “1” to “0”.**

   This will cause the system to boot in MS-DOS command mode.

5. **Reset the attributes on the file MSDOS.SYS by typing**

   ```
   ATTRIB +R +S +H MSDOS.SYS
   ```

6. **Reboot the computer.**



After booting in MS-DOS command mode, if you are installing NetWare from a CD-ROM drive, make sure that both the drivers and the CD-ROM extensions are being loaded in the CONFIG.SYS and AUTOEXEC.BAT files respectively. When Windows 95/98 runs in GUI mode, it might use 32-bit drivers that do not work in MS-DOS command mode.

7. **Continue with "Install from a Local CD-ROM" below or go to "Install from a Remote Network Installation Area" on page 8, depending on the install method you have chosen.**

Install from a Local CD-ROM

Procedure

1. **If you have not done so already, install the CD-ROM drive and drivers according to the manufacturer's instructions.**

   Usually, the installation program for your CD-ROM automatically updates the CONFIG.SYS and AUTOEXEC.BAT files to add the CD-ROM device driver.

   If not, follow the manufacturer's instructions to create or update these files.

2. **Insert the *NetWare 4.2 Operating System* CD-ROM into the CD-ROM drive.**

3. **Reboot the computer.**

   Rebooting executes the CONFIG.SYS and AUTOEXEC.BAT files and recognizes the CD-ROM drive as a DOS device.

4. **Change to the drive letter corresponding to the CD-ROM.**

   This is generally drive D:.

5. **Continue with "Where to Go Next" on page 12.**

Install from a Remote Network Installation Area

A NetWare 4.2 server can be installed over the network in two ways: from the CD-ROM mounted as a NetWare server volume or from CD-ROM files copied to a NetWare server volume.

In either scenario, a user logs in to a server with a remote network installation area and installs the workstation as a NetWare 4 server through the Installation utility.

Requirements and recommendations for a remote installation are outlined below.

Requirements for a Network Installation Area

- The server with the CD-ROM image should not be RIP-filtered from the server being installed. To find out if your network has RIP filtering, load FILTCFG.NLM at the server and view IPX protocol filters.

- The server being installed should use an IPX internal network number that is not RIP-filtered from the server with the CD-ROM image.

Recommendations for a Network Installation Area

- For better performance, the server with the CD-ROM image should have Packet Burst™ support. NetWare 3.12 and NetWare 4 servers have Packet Burst support built in. NetWare 3.11 requires PBURST.NLM for Packet Burst support.

- For better performance, the server with the CD-ROM image should have LIP (Large Internet Packet) support enabled. NetWare 3.12 and NetWare 4 servers have LIP support enabled by default (SET “ALLOW LIP = ON”). NetWare 3.11 requires LIPX.NLM for LIP support.

Remote Installation Areas

The remote installation area can consist of one of the following:

- A NetWare 4.2 CD-ROM mounted as a NetWare volume
- The NetWare 4.2 CD-ROM files copied to a volume on a NetWare 4 server

If you want to	Go to
Install from a NetWare 4.2 CD-ROM mounted as a NetWare volume	"Install from a CD-ROM Mounted as a NetWare Volume on a Network Server" below
Install from a NetWare 4.2 server volume containing copied NetWare files	"Install from a NetWare Volume Containing NetWare 4.2 CD-ROM Files" on page 11

Install from a CD-ROM Mounted as a NetWare Volume on a Network Server

Necessary Resources

Checklist

- ❑ An existing NetWare server. (This will be the host server.)
- ❑ An existing NetWare workstation. (This will be the server you install.)
- ❑ A CD-ROM drive that can read ISO 9660 formatted CD-ROM disks.

  This CD-ROM drive is mounted as a volume on the NetWare 4.2 host server.

Procedure

Procedure

1. **Cable the CD-ROM drive to the NetWare 4 server (host server).**

   Since you are installing the CD-ROM as a NetWare volume, you do not need to install any drivers at this time.

2. **Insert the *NetWare 4.2 Operating System* CD-ROM into the CD-ROM drive.**

3. **At the C:\NWSERVER directory, type**

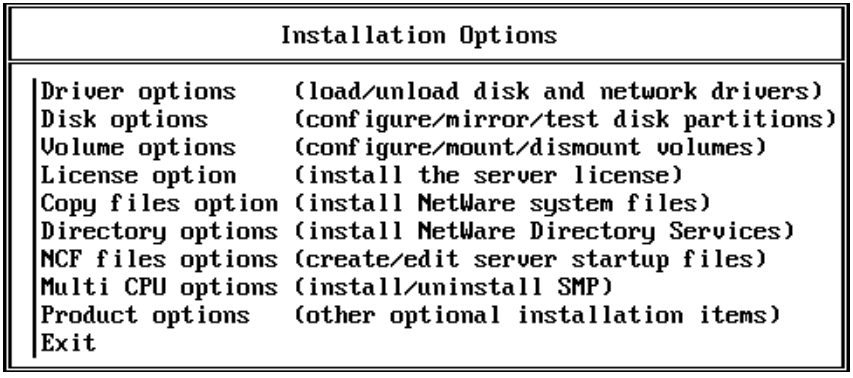
   SERVER <Enter>

4. **At the server console, type**

   LOAD INSTALL <Enter>

   The following menu appears:

Figure 1-2
The "Installation Options" Menu



5. **Choose "Driver Options."**

6. **Choose "Configure Disk and Storage Device Drivers."**

7. **Choose "Select an Additional Driver."**

   You are prompted to enter the path to the source directory where the NetWare 4.2 files are located.

8. **Choose the necessary CD-ROM drivers according to the documentation that accompanied your CD-ROM drive.**

   If the device drivers you need are not listed, press <Ins> and follow the prompts to access a new list of drivers.

Note

For information on the CD-ROM drivers that are shipped in the Red Box (NetWare 4.2 product package), along with their proper load order, see Appendix D, "Understanding Driver Architecture," on page 223.

9. **Once you have loaded all necessary drivers, from the "Additional Driver Actions" menu choose "Return to Previous Menu."**

10. **Press** <Alt>+<F10> **and choose "Yes" to exit INSTALL.NLM.**

11. **At the console prompt, type the following commands:**

    `LOAD CDROM` <Enter>
    `CD MOUNT NW411` <Enter>

12. **Go to the workstation that is to become a server and log in to the host server with the mounted CD-ROM NetWare volume.**

13. **Map a drive to the mounted CD-ROM volume.**

    For example:

    `MAP N NW411` <Enter>

14. **Continue with "Where to Go Next" on page 12.**

Install from a NetWare Volume Containing NetWare 4.2 CD-ROM Files

Necessary Resources

- ❑ An existing NetWare server with sufficient disk space to store all the NetWare 4.2 operating system files--an image of the CD. (This will be the host server.)
- ❑ An existing NetWare workstation. (This will be the server you install.)
- ❑ A CD-ROM drive that can read ISO 9660 formatted CD-ROM disks.

  This is used to copy the NetWare 4.2 files from the CD-ROM to the host server.

Procedure

1. **Create a NETWARE directory on an existing server and copy the files from the CD-ROM to that directory.**

   For example, to copy from CD-ROM drive D: to network drive K:, type

   K: <Enter>
   MD NETWARE <Enter>
   CD NETWARE <Enter>
   NCOPY D: /S /E /V <Enter>

2. **On every computer you want to make a NetWare 4.2 server, create a DOS partition of at least 40 MB.**

3. **On every computer you want to make a NetWare 4.2 server, install Novell DOS client software.**

4. **On every computer you want to make a NetWare 4.2 server, map a drive to the network server directory that contains the NetWare 4.2 files.**

5. **Continue with "Where to Go Next" below.**

Where to Go Next

With the initial hardware preparation completed, you are ready to install the NetWare server.

If you want to	Go to
Install a new NetWare 4.2 server using the simple installation option	Chapter 2, "Simple Installation," on page 13
Install a new NetWare 4.2 server using the custom installation option	Chapter 3, "Custom Installation," on page 39
Install NetWare SFT III™	Chapter 4, "Install NetWare 4.2 SFT III," on page 111

chapter 2

Simple Installation

The simple installation option allows you to easily install a NetWare® 4.2 server using a streamlined user interface.

The simple installation assumes that you have completed all prerequisites in Chapter 1 and that the following are true for your server:

- ❑ An existing DOS partition of at least 40 MB on the hard disk.

  A 40 MB DOS partition should be sufficient for storing the files used to boot your server. If you need to store additional files on the DOS partition, you might want to make the partition larger.

- ❑ DOS is installed on the DOS partition.
- ❑ Hard disks (including hard disk subsystems, if any), won't be mirrored or duplexed.
- ❑ All hard disk space not allocated to the DOS partition will be allocated to NetWare.
- ❑ Each disk will contain one NetWare volume.
- ❑ A randomly generated IPX™ internal network number.
- ❑ A default Novell® Directory Services® hierarchy with a single container for all objects.

If the "Simple Installation" option isn't possible in your environment, follow the procedures in Chapter 3, "Custom Installation," on page 39.

Suggested Resources

Checklist

- ❑ The NetWare Server Installation quick path card for an overview of the installation process.
- ❑ A copy of the NetWare 4.2 Server Worksheet (found in Figure 3-39 on page 109).
- ❑ The NetWare *License* diskette.
- ❑ *One* of the following:
  - NetWare 4.2 CD-ROMs.
  - Access to NetWare 4.2 installation files on a remote network installation area (the *NetWare 4.2 Operating System* CD-ROM mounted as a NetWare volume, or an image of the CD-ROM on another server).

Install Server Software

Install your NetWare 4.2 server software by completing the procedures in Chapter 1 and then continuing with the table and the procedures below.

Important

Before you install, be sure that the logical name of your CD-ROM driver in the AUTOEXEC.BAT file does not conflict with any Install file names. If you have changed the name of your CD-ROM driver to “Install” or to the name of any file that Install copies, Install will not work.

If you are installing from	You should be at
CD-ROM	The drive letter corresponding to the CD-ROM.
CD-ROM mounted as a NetWare volume	The drive letter mapped to the mounted CD-ROM volume on the workstation that is to become a server.
A NetWare volume with files copied on the server	The drive letter mapped to the network server directory that contains the NetWare 4.2 files.

Procedure

Procedure

1. Run Install.

If	Then
You want to enable hardware autodetection and automatic selection of drivers (For more information on autodetection, see "Load the Device Drivers" on page 16 or "Load the LAN Drivers" on page 19.)	At the mapped drive letter, type **INSTALL** <Enter>
You want to disable hardware autodetection and automatic selection of drivers	At the mapped drive letter, type **INSTALL /nad** <Enter>

A menu similar to the one below appears:

Figure 2-1
Choose the Desired Server Language

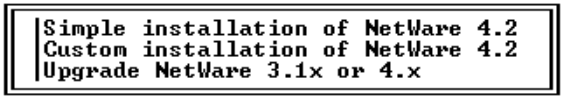
2. Choose the language in which you want the server installed and press <Enter>**.**

The "Select the Type of Installation Desired" menu appears.

Choose the Type of Installation

You can choose from three installation options as shown in Figure 2-2 below.

Figure 2-2
Choose the Type of Installation



If	Then
You want to install NetWare 4.2 on a new computer accepting the defaults of the installation program	Choose “Simple Installation of NetWare 4.2.” Continue with “Name Your Server and Copy Boot Files” below.
You want to install NetWare 4.2 on a new server making choices for such things as code page, network number, installation directories, etc.	Choose “Custom Installation of NetWare 4.2.” See Chapter 3, “Custom Installation,” on page 39.
You want to upgrade an existing NetWare 3.1*x* or NetWare 4.*x* server to NetWare 4.2.	Choose “Upgrade NetWare 3.1*x* or 4.*x*.” See Chapter 5, “Upgrade Using INSTALL.NLM,” on page 133.

Name Your Server and Copy Boot Files

Procedure

1. **After choosing “Simple Installation of NetWare 4.2,” press** <Enter>**.**

   A screen appears requesting a server name.

2. **Type the server name in the field provided and press** <Enter>**.**

   For help on rules for naming servers, press <F1>.

   The server boot files are copied to the server.

Load the Device Drivers

Install automatically detects the hardware devices on your machine, including hard disks, CD-ROM drives, network boards, etc. It then scans for and selects applicable drivers for the hardware.

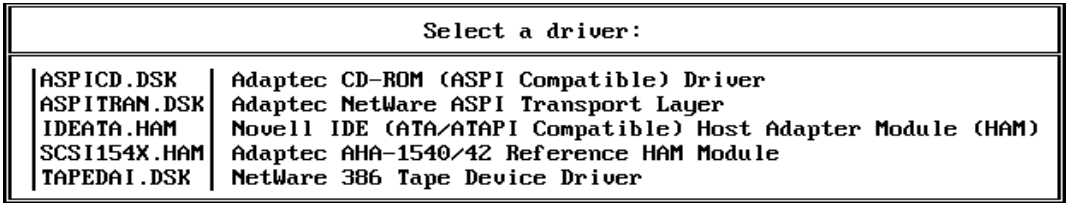
If	Then
Drivers are selected automatically	Proceed with “Load the LAN Drivers” on page 19. After the LAN drivers are loaded, a summary of selected drivers appears in Figure 2-5 on page 22. You can then continue with the drivers shown or you can modify the choices that have been made for you.
Drivers are not selected automatically, or if Install found more than one driver for your hardware or was unable to match a hardware device with a driver	Continue without choosing a driver or choose manually which driver to load by following the process below.

Your drivers might not be selected for the following reasons:

- Your machine does not have an advanced bus (EISA, PCI, PNPISA, MCA).
- Your hardware is non-Plug and Play ISA.
- The drivers you need are not included with this release, or they do not contain information needed by the autodetection process.

If you need to choose your drivers manually, the driver selection screen shown below appears:

Figure 2-3
Choose Your Disk Driver



If Install found more than one driver for your hardware or was unable to match a hardware device with a driver, a message informs you of the problem and allows you either to continue without choosing a driver or to choose which driver to load.

If you choose a driver to load, the process is the same as the manual selection process described below.

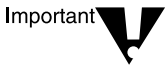
If you are installing from CD-ROM and the CD-ROM drive is connected to a SCSI adapter shared by another internal or external device (hard disk, tape device, etc.), you might experience a keyboard lockup problem while loading drivers or copying files. If this occurs, contact your SCSI adapter manufacturer for updated drivers.

Similar to a disk driver, a CD-ROM driver enables communication between the CD-ROM and the server's CPU. In some cases, you must choose a CD-ROM driver as well as a disk driver.

Disk drivers have a description that appears as you highlight the driver. The list of certified disk drivers is constantly changing. Refer to the on-screen descriptions to determine which disk driver to load.

For the most current information, refer to Novell's Web site at http:/ / developer.novell.com / devres / sas / driver / ddrivers.htm.

Besides Novell drivers, additional third-party drivers are included with NetWare 4.2.



If you experience problems with third-party drivers, contact the manufacturer listed in the driver description that appears as you highlight the driver.

Procedure

1. **Choose your disk driver.**

   The selected disk driver is then copied to the server boot directory before it is loaded.

   If more than one hard disk of the same type is installed in your computer, and if the disks are both connected to the same disk controller, load only one disk driver for that controller.

   If the disks are connected to different controllers, load the driver multiple times or load additional disk drivers.

If	Then
The driver is listed	Choose the appropriate disk driver and continue with Step 2.
The driver is not listed	Press <Ins> and follow the prompts. Then continue with “Load the LAN Drivers” below.

2. Verify that the displayed parameter settings are correct.

A prompt appears asking you either to choose and modify driver parameters or to continue and save the displayed parameters.

If you continue and save the displayed parameters, another prompt appears asking if you want to load any additional drivers.

If you want to	Then
Load additional disk drivers, or load separate CD-ROM drivers	Choose “Yes” and press <Enter>. Then repeat Step 1 and Step 2.
Proceed without loading additional disk drivers	Continue with “Load the LAN Drivers” below.

Load the LAN Drivers

Install automatically detects the hardware devices on your machine, including hard disks, CD-ROM drives, network boards, etc. It then scans for and selects applicable drivers for the hardware.

If	Then
Drivers are selected automatically	Go to the summary of selected drivers shown in Figure 2-5 on page 22. You can then continue with the drivers shown or you can modify the choices that have been made for you.

If	Then
Drivers are not selected automatically, or if Install found more than one driver for your hardware or was unable to match a hardware device with a driver	Continue without choosing a driver or choose manually which driver to load by following the process below.

Your drivers might not be selected for the following reasons:

- Your machine does not have an advanced bus (EISA, PCI, PNPISA, MCA).
- Your hardware is non-Plug and Play ISA.
- The drivers you need are not included with this release, or they do not contain information needed by the autodetection process.

Loading a LAN driver is needed to establish a network connection (if the server is physically connected to the network cabling). Your choice of LAN drivers depends on the cabling system and the network board you are using.

Most NetWare 4.2 LAN drivers have an individual description that appears on the screen when you choose the driver. Refer to the on-screen descriptions to determine which LAN driver to load.

The list of certified LAN drivers is constantly changing. For the most current information, refer to Novell's Web site at http://developer.novell.com/infosys/10042.htm .

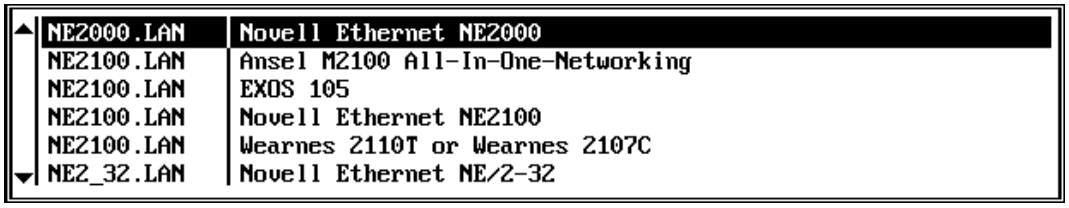
If you experience problems with third-party drivers, contact the manufacturer listed in the driver description that appears as you highlight the driver.

Procedure

1. Choose your LAN driver from the LAN driver screen in Figure 2-4 below.

If the LAN drivers are not selected and loaded automatically, the screen in Figure 2-4 below appears. The selected LAN driver is then copied and stored temporarily in the C: drive before it is loaded.

Figure 2-4
Choose Your LAN Drivers



If	Then
The driver is listed	Choose the appropriate LAN driver and continue with Step 2.
The driver is not listed	Press <Ins> and follow the prompts. Then continue with Step 2.

2. Verify that the displayed LAN driver parameter settings are correct.

A prompt appears asking you either to choose and modify driver parameters or to continue and save the displayed parameters. You can modify the driver frame types by pressing <F3>.

If you continue and save the displayed parameters, another prompt appears asking if you want to load any additional drivers.

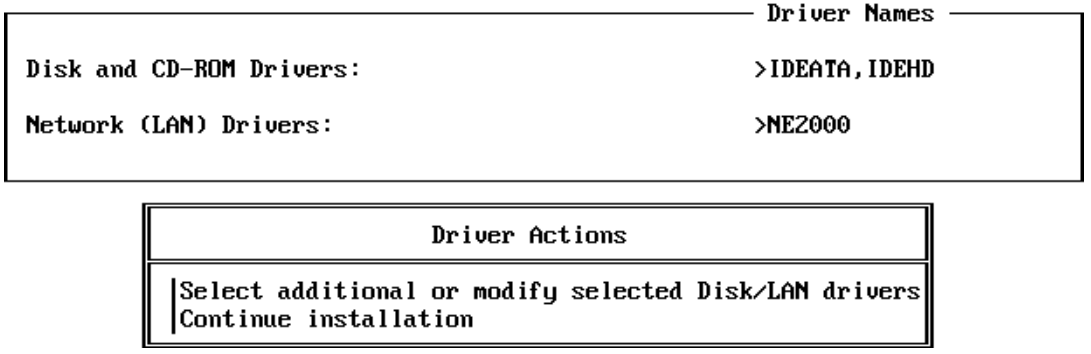
If you want to	Then
Load additional LAN drivers	Choose “Yes” and press <Enter>. Then repeat Step 1 and Step 2.
Proceed without loading additional LAN drivers	Continue with Step 3.

3. Verify selected Disk/LAN drivers.

If your drivers are automatically selected, the screen in Figure 2-5 below appears displaying the selected disk and LAN drivers, and a prompt asks you to select additional or modify selected Disk / LAN drivers or to continue the installation.

Verify that there is at least one disk driver per controller and one LAN driver per LAN adapter. Take into account controllers and adapters that are integrated into the computer's CPU and those on the computer's expansion cards.

Figure 2-5
Chosen Drivers Are Displayed Prior to Being Loaded



If you want to	Then
Load additional drivers or modify the settings of any previously selected drivers	Choose "Select Additional or Modify Selected Disk/LAN Drivers," and follow the screen prompts, repeating Step 1 through Step 3. Once all appropriate network drivers have been chosen, continue with Step 4 below.
Proceed without loading additional drivers	Continue with Step 4.

4. From the "Driver Actions" menu in Figure 2-5, choose "Continue Installation."

At this time, NetWare 4.2 loads the drivers that have been chosen. In the case of LAN drivers, all frame types are loaded and applicable frames bound to IPX.

Mount the CD-ROM as a NetWare Volume (Conditional)

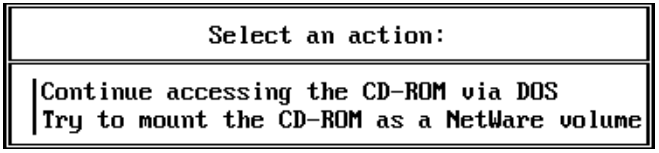
If you are installing from CD-ROM, the screen in Figure 2-6 appears if the CD-ROM device is not available to NetWare.

Procedure

Procedure

1. (Conditional) If you are installing from CD-ROM and the menu in Figure 2-6 appears, choose one of the menu options.

Figure 2-6
You Can Try to Mount the CD-ROM as a NetWare Volume



If a disk or CD-ROM driver you selected earlier conflicts with the DOS CD-ROM driver, your keyboard might lock up during installation. To avoid this, you can attempt to mount the CD-ROM as a NetWare volume. In doing so, you might be prompted to install new disk or CD-ROM drivers.

2. Continue with "Create the NetWare Disk Partition" below.

Create the NetWare Disk Partition

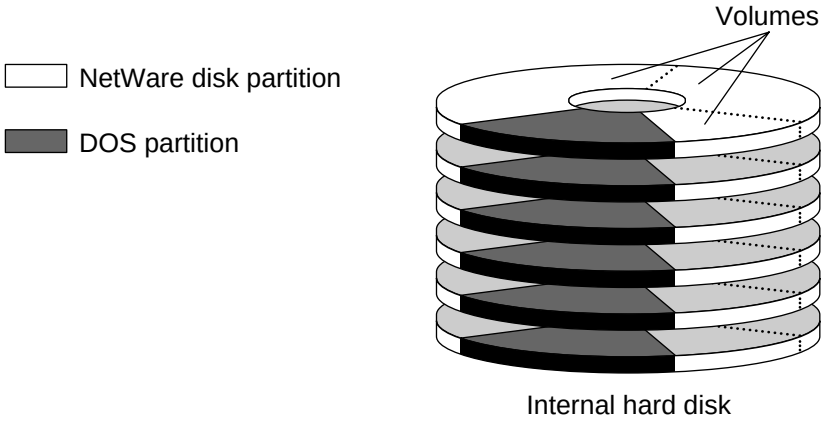
Every NetWare 4.2 server needs a disk partition for NetWare files and shared data. You can have only one NetWare 4.2 disk partition per disk, but you can have up to eight volume segments on the NetWare disk partition. In the process below, you choose to delete or retain nonbootable disk partitions. Install then automatically creates a NetWare disk partition.

If your server's hard disk contains existing nonbootable disk partitions, a message appears telling you so.

Decide whether you want to delete existing nonbootable disk partitions and make them part of the NetWare partition, or save them and exclude them from being part of the NetWare partition.

If your server's primary hard disk has a DOS partition, use the rest of the disk space as a NetWare disk partition.

Figure 2-7
Disk Partitions and Volumes on an Internal Hard Disk



Procedure

Procedure

1. **(Conditional) If prompted whether to delete existing nonbootable partitions, choose “Yes” or “No” and press** <Enter>**.**

Warning

Selecting “Yes” deletes any extended DOS partitions you might have.

Hint

To maximize your NetWare disk partition space, delete all nonbootable disk partitions. Press <Alt>+<F10> to exit the installation, then back up any files you want to keep and start the installation again.

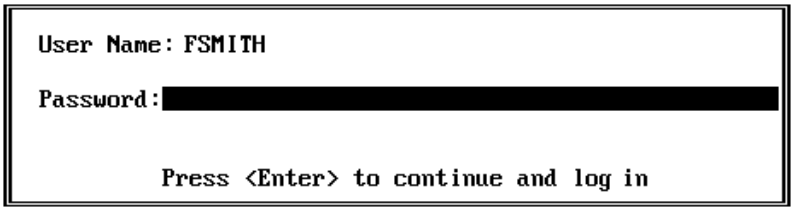
2. **If you are installing from a network volume, continue with “Establish the Server-to-Server Session (Conditional)” below; otherwise, continue with “Install Novell Directory Services” on page 26.**

   When installing from a remote network, you must establish the server-to-server session before files are copied.

Establish the Server-to-Server Session (Conditional)

If you are installing from a remote network installation area, the screen shown in Figure 2-8 appears:

Figure 2-8
Enter Your Password to Reconnect to the Source Server



Procedure

Procedure

1. **Reenter your password to reconnect to the source server, and press** <Enter>**.**

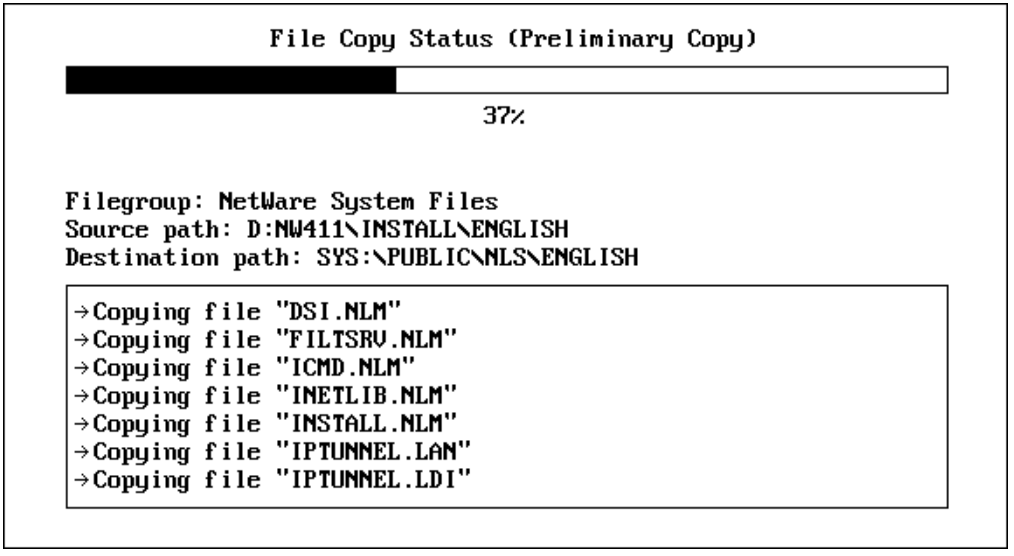
   When installing from a remote network installation area, a client connection to the source server is disrupted once the LAN driver is loaded.

   The path to the source server is saved in memory, but the password must be reentered.

2. **Press** <Enter> **again.**

   The copying process begins, and the screen in Figure 2-9 appears:

Figure 2-9
The Files Needed to Continue Are Copied



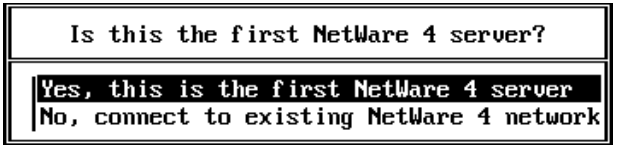
3. **Continue with “Install Novell Directory Services” below.**

Install Novell Directory Services

Once the preliminary files have been copied to the server, the network is scanned for Directory trees. Unless you are installing the first NetWare 4™ server in the network, you will most likely want to install the server into an existing Directory tree.

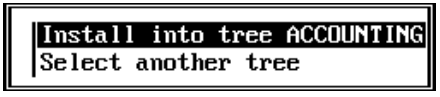
Based on your network configuration, one of the following screens appears:

Figure 2-10
When No Directory Tree Is Located



If no NetWare 4 server (and accompanying Directory tree) can be located on the network, the menu above appears.

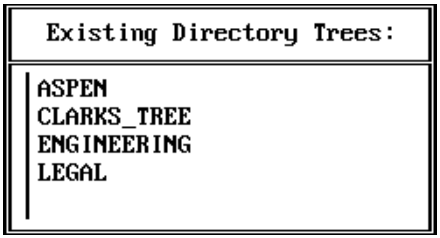
If you want to	Then
Install the first NetWare server	Go to “Install the First NetWare 4 Server” on page 27.
Connect to an existing NetWare 4 network	Go to “The Server Cannot Locate a Previously Installed Directory Tree” on page 29.



If a single Directory tree is located, the Directory tree name is displayed as in the menu above.

If you want to	Then
Install into the displayed Directory tree	Go to “Install into the Single Existing Directory Tree” on page 30.

If you want to	Then
Select another tree	Go to “Install the First NetWare 4 Server” on page 27.
Create a new Directory tree	Choose “Select another tree” and press <Enter>. Press <Ins>, and then at the confirmation prompt, press <Enter>. Follow the procedures under “Install the First NetWare 4 Server” on page 27.



If multiple Directory trees are located, they are displayed as in the menu above. If you want to install into one of the existing Directory trees, go to “Install into an Existing Directory Tree” on page 32.

Install the First NetWare 4 Server

Procedure

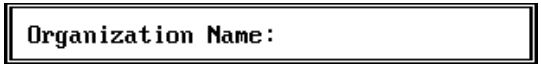
Procedure

1. **From the “Is this the First NetWare 4 Server?” menu, choose “Yes, This Is the First NetWare 4 Server” and press** <Enter>**.**

   A list of time zones appears.

2. **Choose the time zone where the server will be installed and press** <Enter>**.**

   The following screen appears, requesting your Novell Directory Services (NDS) Organization name:



If	Then
The time zone is listed	Move the cursor to the time zone and press <Enter>.
The time zone is not listed	Press <Ins> and fill out the “Verify/Enter Time Configuration Information for This Server” screen. An explanation of this screen can be found in Chapter 3, “Custom Installation” under the heading “Set Up Time Synchronization” on page 86, beginning with Step 2. Once entered, continue with Step 3 below.

3. **Enter the name of your organization and press** <Enter>**.**

   Your NDS Organization name can be your company, division or department name. It is also the name of your Directory tree.

   Once you have entered the NDS Organization name and pressed <Enter>, a screen appears requesting your administrator password.

4. **Enter the administrator password and press** <Enter>**.**

   You need this password later to log in and administer the network. If you forget the administrator password, you must reinstall.

   This password is also used for the user SUPERVISOR that is automatically created. The user SUPERVISOR allows you to access bindery information. If you change the administrator password later, the SUPERVISOR password does *not* change until you change it using either the NETADMIN or the NetWare Administrator utility.

5. **At the prompt, retype the password and press** <Enter> **to continue.**

6. **Go to “Install the License Server” on page 34.**

The Server Cannot Locate a Previously Installed Directory Tree

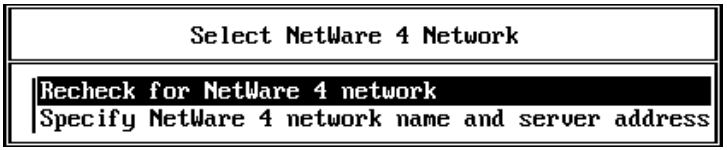
Procedure

Procedure

1. **From the "Is This the First NetWare 4 Server?" menu, choose "No, Connect to Existing NetWare 4 Network" and press** <Enter>**.**

   The following menu appears:

Figure 2-11
Select NetWare 4 Network Menu



   The network name is the same as the Directory tree name. You can determine the network name by typing **LOAD MONITOR** from any server console on the network.

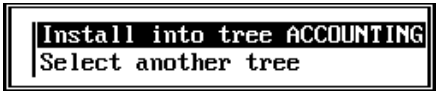
2. **Choose one of the menu options.**

If	Then
You have verified that an existing NetWare 4 server is up and physically connected to the network, and that both servers are bound to IPX with the proper LAN driver, frame type, and IPX external network number	Choose "Recheck for NetWare 4 Network" and press <Enter>. If a single Directory tree is located, go to "Install into the Single Existing Directory Tree" on page 30. If multiple Directory trees are located, go to "Install into an Existing Directory Tree" on page 32.

If	Then
Your network has SAP filtering and you know the IPX internal network number of an existing NetWare 4 server	Choose “Specify NetWare 4 network name and server address” and press <Enter>. Enter the name of the Directory tree and press <Enter>. Enter the IPX internal network number of an existing NetWare 4 server in the Directory tree and press <Enter>. If a single Directory tree is located, go to “Install into the Single Existing Directory Tree” on page 30. If multiple trees are located, go to “Install into an Existing Directory Tree” on page 32.

Install into the Single Existing Directory Tree

Install the new NetWare 4.2 server into the Directory tree displayed in the menu below:



Procedure

Procedure 1 2 3

1. **Choose “Install into Tree** *tree_name*”** **and press** <Enter>**.**

   A list of time zones appears.

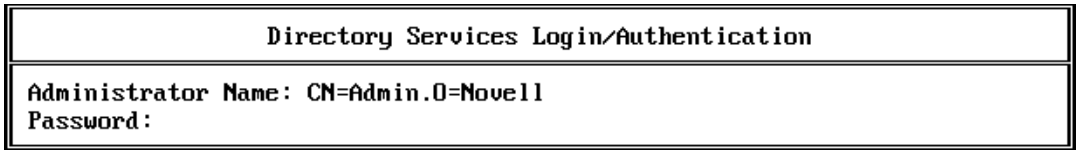
2. **Choose the time zone where the server will be installed and press** <Enter>**.**

If	Then
The time zone is listed	Move the cursor to the time zone and press <Enter>. Once entered, continue with Step 3 below.

If	Then
The time zone is not listed	Press <Ins> and fill out the “Verify/Enter Time Configuration Information for This Server” screen. An explanation of this screen can be found in Chapter 3, “Custom Installation” under the heading “Set Up Time Synchronization” on page 86, beginning with Step 2. Once entered, continue with Step 3 below.

After setting up time synchronization, the screen below appears:

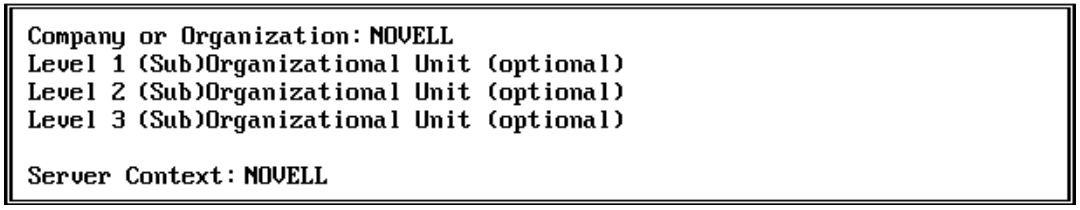
Figure 2-12
Directory Services Login/Authentication



3. **If necessary, type the administrator name and press** <Enter>**, and then type the administrator password and press** <Enter>**.**

   A server (name) context screen appears:

Figure 2-13
Server Context Screen for an Existing Tree



4. **Specify the server’s name context by filling out the screen above.**

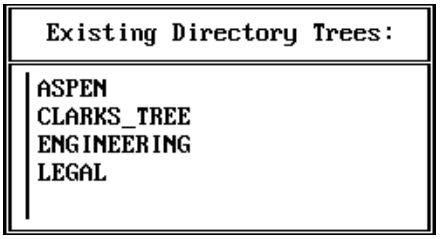
   An explanation of this screen and of a server’s (name) context is found in Chapter 3, “Custom Installation” under “Specify the Server’s (Name) Context” on page 91.

5. **Save and record the Directory information.**

6. **Continue with “Install the License Server” on page 34.**

Install into an Existing Directory Tree

Install the new NetWare 4.2 server into one of the Directory trees displayed in the menu below by completing the following procedure:



Procedure

Procedure

1. **Choose the Directory tree you want this server to be part of.**

   A list appears of all Directory trees that are visible from this server. Most organizations will have only one Directory tree. The tree name is established during the installation of the first NetWare 4.2 server in a tree.

Important

Make sure you choose the correct Directory tree name. If your organization has more than one tree, attaching to the wrong tree or creating a new Directory tree will prevent this server from sharing data within the desired Directory database.

Choosing an existing tree makes this new server part of that tree’s Novell Directory database.

After you choose a Directory tree, a list of time zones appears.

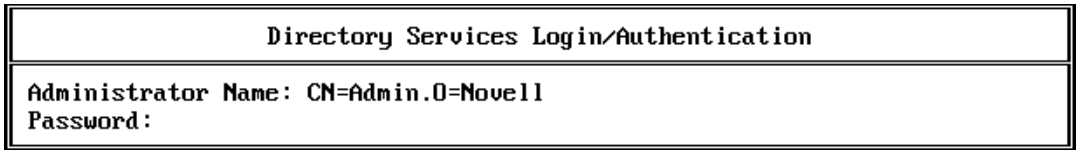
2. **Choose the time zone where the server will be installed and press** <Enter>**.**

If	Then
The time zone is listed	Move the cursor to the time zone and press <Enter>. Once entered, continue with Step 3 below.

If	Then
The time zone is not listed	Press <Ins> and fill out the “Verify/Enter Time Configuration Information for This Server” screen. An explanation of this screen can be found in Chapter 3, “Custom Installation” under the heading “Set Up Time Synchronization” on page 86, beginning with Step 2. Once entered, continue with Step 3 below.

After setting up time synchronization, the screen below appears:

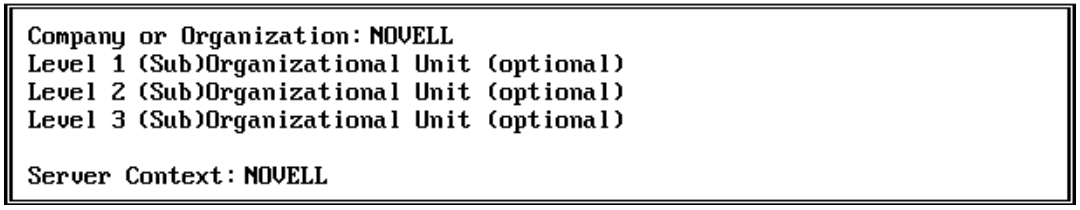
Figure 2-14
Directory Services Login/Authentication



3. **If necessary, type the administrator name and press** <Enter>**, and then type the administrator password and press** <Enter>**.**

   A server (name) context screen appears:

Figure 2-15
Server Context Screen for an Existing Tree



4. **Specify the server’s name context by filling out the screen above.**

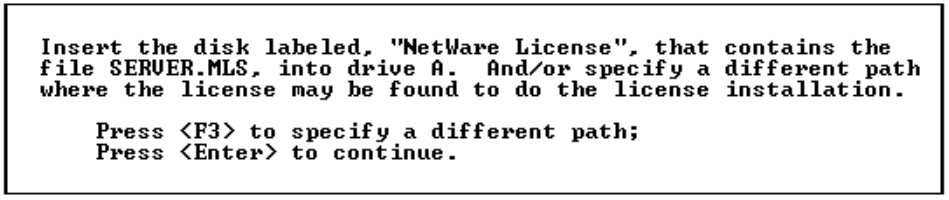
   An explanation of this screen and of a server’s (name) context is found in Chapter 3 “Custom Installation” under the heading “Specify the Server’s (Name) Context” on page 91.

5. **Continue with “Install the License Server” below.**

Install the License Server

After Directory Services has been installed, the screen below appears, prompting you to insert the license diskette and install the NetWare 4.2 license server.

Figure 2-16
Insert the *License* Diskette when Prompted



Procedure

Procedure

1. **Insert your *License* diskette into drive A:.**

   During the server upgrade, you must insert the *NetWare 4.2 License* diskette labeled "Server + 5 Connections." Additive licenses can be installed using INSTALL.NLM only after completing the server installation.

   A message appears that the server license was successfully installed. As you continue the installation, a prompt to log in as a network administrator or the equivalent appears.

2. **Remove the *License* diskette and store it in a safe place.**

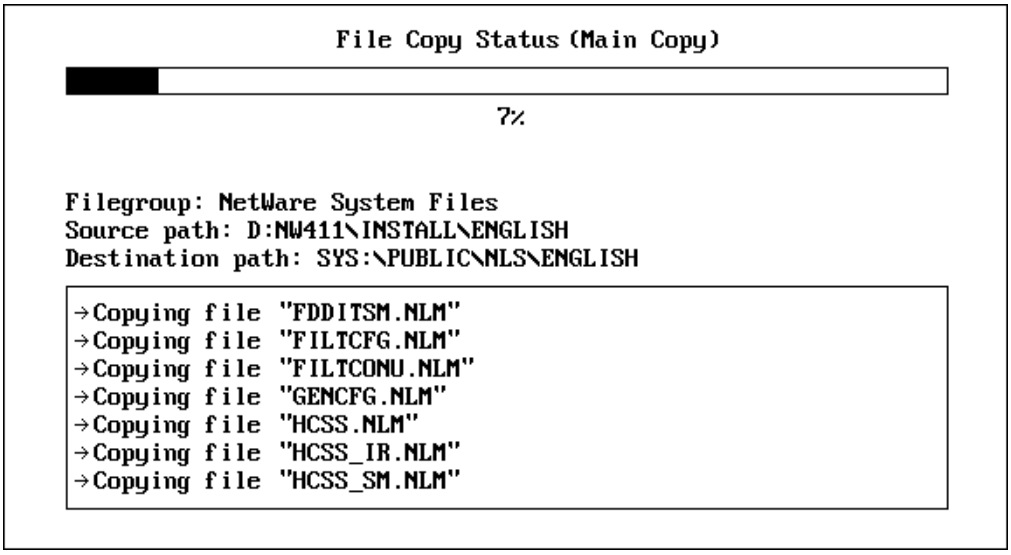
Important

Be sure to keep your *License* diskette as a backup. You will need it in the future if your installed license should get corrupted.

Copy Remaining NetWare Files

Once Novell Directory Services has been installed, NetWare begins copying the remaining NetWare files to volume SYS: as shown in Figure 2-17. The simple installation option copies all NetWare 4.2 files during installation; therefore, this could take a few minutes.

Figure 2-17
The Remaining NetWare Files Are Copied



While the remaining NetWare files are being copied, you can

- Continue with “Review the Created Directory Tree (Optional)” on page 36 and “Review the Created Trustee Assignments (Optional)” on page 36.
- Skip to “Exit Install” on page 37.

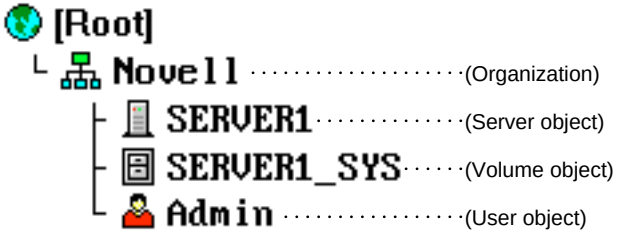
Review the Created Directory Tree (Optional)

The following objects were created in the Directory tree:

- Server object.
- Volume objects *(servername*_SYS and other volumes you specified).
- User object ADMIN (the administrator who has Supervisor object rights to this context). This object is placed directly under the Organization level.

  User object ADMIN is created only once, and only on the first server in the tree.
- User object Supervisor (for bindery services purposes only). This object is recognized only by pre-NetWare 4.11 utilities. User object Supervisor takes on User object ADMIN's password.

These objects are placed in the same context you defined for your server. The following illustration shows what your Directory tree might look like after you install your first NetWare 4.2 server.



Review the Created Trustee Assignments (Optional)

- User object ADMIN has the Supervisor object right on the [Root] object. By inheritance, ADMIN also has the Supervisor right on all Volume objects in the Directory.
- [Public] has the Browse right on the [Root] object.

  [Public] is equal to the group EVERYONE in the NetWare 3™ environment.

- Any container object has Read and File Scan rights to the PUBLIC directories of all system volumes in that container.
- The [Root] object (or security equivalent) of a tree has
  - The Browse right on all User objects in that tree. This can be blocked by an Inherited Rights Filter or removed from a container's Access Control List (ACL).
  - The Read right to the Member property of any Group object.
  - The Read right to the following properties of any Volume object: Host Server Name (the server that the physical volume resides on) and Host Resource (the physical volume).
- All User objects have the Read right to their own properties and to the properties of any profile they belong to. User objects also have Read and Write rights to their user login script.

For more information on rights and trustee assignments, see "Rights" and "Trustee" in *Concepts*, and Chapter 2, "Managing Directories, Files, and Applications," and Chapter 3, "Creating Login Scripts," in S*upervising the Network*.

Exit Install

The installation of the NetWare 4.2 server is now complete.

Procedure

1. **To exit Install and return to the server console, press** <Enter>**.**
2. **Continue with "Where to Go from Here" below.**

Where to Go from Here

If you want to	Go to
Install additional NetWare 4.2 servers	“Install Server Software” on page 14.
Install NetWare SFT III™	Chapter 4, “Install NetWare 4.2 SFT III,” on page 111.

chapter 3

Custom Installation

This chapter provides complete instructions for you to customize your installation of NetWare® 4.2 by allowing you to change the defaults for any of the following configuration options:

- ❑ Booting the server from boot diskettes or a DOS partition on the hard disk
- ❑ Assigning a specific internal network number yourself
- ❑ Partitioning hard disks
- ❑ Mirroring hard disks
- ❑ Specifying volume names
- ❑ Spanning volumes across multiple drives
- ❑ Modifying time zone parameters in Novell® Directory Services®
- ❑ Editing the AUTOEXEC.NCF and STARTUP.NCF files
- ❑ Choosing nonrouting TCP/IP or AppleTalk* protocols in addition to IPX™

If you determine that you don't need any of the options listed above, install NetWare 4.2 by following the procedures in Chapter 2, "Simple Installation," on page 13.

Suggested Resources

Checklist

- ❑ The NetWare Server Installation quick path card for an overview of the process.
- ❑ A copy of the NetWare Server Worksheet (Figure 3-39 on page 109).
- ❑ The NetWare *License* diskette.
- ❑ *One* of the following:
  - NetWare 4.2 CD-ROMs.
  - Access to NetWare 4.2 installation files on another server (the *NetWare 4.2 Operating System* CD-ROM mounted as a NetWare volume, or an image of the CD-ROM on another server).

Install the Server Software

Install your NetWare 4.2 server software by completing the procedures outlined in Chapter 1 and by following the table and procedures below.

Important

Before you install, be sure that the logical name of your CD-ROM driver in the AUTOEXEC.BAT file does not conflict with any Install file names. There will be no conflict unless you have changed the name of your CD-ROM driver. If you have changed the name of your CD-ROM driver to “Install” or to the name of any file that Install copies, Install will not work.

If you are installing from	You should be at
CD-ROM	The drive letter corresponding to the CD-ROM.
CD-ROM mounted as a NetWare volume	The drive letter mapped to the mounted CD-ROM volume on the workstation that is to become a server.
A NetWare volume with files copied on the server	The drive letter mapped to the network server directory that contains the NetWare 4.2 files.

Procedure

Procedure

1. Run Install.

If	Then
You want the filename format to default to DOS, and you want to enable hardware autodetection and automatic selection of drivers (For more information on autodetection, see “Load the Device Drivers” on page 45 or “Load the LAN Drivers” on page 48.)	At the mapped drive letter, type **`INSTALL`** <Enter>
You want to choose the filename format (DOS or NetWare)	At the mapped drive letter, type **`INSTALL /file_sys`** <Enter>
You want to disable hardware autodetection and automatic selection of drivers	At the mapped drive letter, type **`INSTALL /nad`** <Enter>
You want to choose the filename format (DOS or NetWare), and you want to disable hardware autodetection and automatic selection of drivers	At the mapped drive letter, type **`INSTALL /file_sys /nad`** <Enter>

Choosing the filename format allows you to indicate acceptable naming conventions for all files stored in the DOS name space on the server.

Choosing “DOS Filename Format” limits you to using valid DOS filename characters according to the country code and code page.

Limiting the server to valid DOS filename characters prevents workstations using NETX shells (rather than VLMs) from creating files using nonstandard DOS filename characters.

Choosing “NetWare Filename Format” allows you to use NetWare-acceptable characters that might or might not be valid DOS filename characters.

A menu similar to the one below appears:

Figure 3-1
Choose the Desired Server Language

2. **Choose the language in which you want the server installed and press** <Enter>**.**

   The "Select the Type of Installation Desired" menu appears.

Name Your Server and Assign an IPX Network Number

Once you've chosen the language in which the server will be installed, the following menu appears:

Procedure

Procedure 1 2 3

1. **Choose "NetWare 4.2" and press** <Enter>**.**

   A menu appears displaying additional installation options.

2. **Choose "Custom Installation of NetWare 4.2" and press** <Enter>**.**

   A screen appears requesting a server name.

3. **Type the server name in the field provided and press** <Enter>**.**

   For help on rules for naming servers, press <F1>.

   A new screen appears displaying a randomly generated IPX internal network number, an ID number that identifies and advertises this server on the network.

4. **Either accept the randomly generated IPX internal network number or enter a new one, and press** <Enter>**.**

   You can't assign an IPX internal network number of "0" or "FFFFFFFF."

Hint

For future reference, record your IPX internal network number on the NetWare 4.2 Server Worksheet (Figure 3-39 on page 109).

5. **Continue with "Copy Server Boot Files to the DOS Partition" below.**

Copy Server Boot Files to the DOS Partition

A screen similar to the one below shows the default path and destination directory that the server boot files will be copied to:

Figure 3-2
The Source and Destination Paths

```
Source path:  D:\NW411\INSTALL\ENGLISH
```

```
Destination path:  C:\NWSERVER
```

Procedure

Procedure

1. **Accept or change the default destination path and copy the files.**

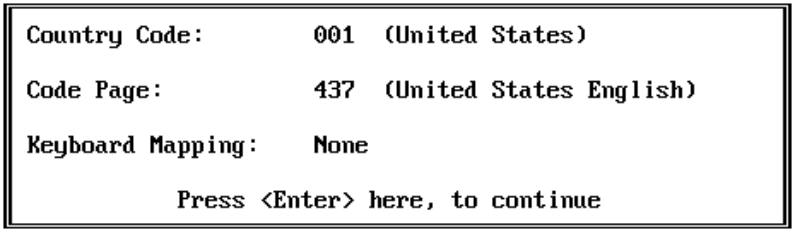
If you want to	Then
Copy the boot files to the default destination directory created for you	Press <Enter>.
Copy the boot files to a destination directory of your own choice	Press <F4>, type a directory path and name, press <Enter>, choose "Yes," and press <Enter> again.

2. **Continue with "Specify Language and Filename Format Information" below.**

Specify Language and Filename Format Information

Once the boot files are copied, the "Language Configuration" screen appears:

Figure 3-3
Language Configuration Screen



For information on any of the settings in this screen, press <F1> or refer to your DOS manual.

Procedure

Procedure

1. **Specify the country code, code page, and keyboard mapping.**

   Use the Up- and Down-arrow keys to maneuver through the screen.

   1a. (Conditional) If the country code setting is *not* correct, press <Enter> **to view options and choose an applicable country code.**

   The "Code Page" field is highlighted.

   1b. (Conditional) If the code page setting is *not* correct, press <Enter> **and choose an applicable code page.**

   The "Keyboard Mapping" field is highlighted.

   1c. (Conditional) If you do *not* have a standard U.S. English keyboard, press <Enter> **and choose an applicable keyboard type.**

2. **Press** <Enter> **to continue.**

3. **Specify startup SET commands by choosing "Yes" or "No."**

   Choosing "Yes" brings up an edit box for entering the startup commands.

If you have disk, CD-ROM, or other devices that use ASPI, you should add the following line to your STARTUP.NCF file:

```
SET RESERVED BUFFERS BELOW 16MB = 200
```

To see if your device uses ASPI, refer to the device documentation.

4. **(Conditional) If you specified any startup SET commands in Step 3, save them by pressing** <F10>**.**

5. **(Optional) Add SERVER.EXE to your AUTOEXEC.BAT file.**

   Install now executes SERVER.EXE and INSTALL.NLM.

If you choose	Then
Yes	SERVER.EXE runs automatically when you reboot the computer.
No	The DOS prompt appears whenever you reboot and you must type SERVER in the directory containing SERVER.EXE.

Load the Device Drivers

Install automatically detects the hardware devices on your machine, including hard disks, CD-ROM drives, network boards, etc. It then scans for and selects applicable drivers for the hardware.

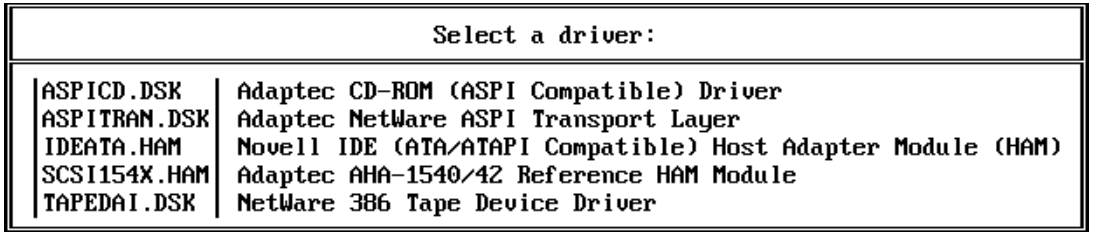
If	Then
Drivers are selected automatically	Proceed with “Load the LAN Drivers” on page 48. After the LAN drivers are loaded, a summary of selected drivers appears in Figure 3-6 on page 50. You can then continue with the drivers shown or you can modify the choices that have been made for you.
Drivers are not selected automatically, or if Install found more than one driver for your hardware or was unable to match a hardware device with a driver	Continue without choosing a driver or choose manually which driver to load by following the process below.

Your drivers might not be selected for the following reasons:

- Your machine does not have an advanced bus (EISA, PCI, PNPISA, MCA).
- Your hardware is non-Plug and Play ISA.
- The drivers you need are not included with this release, or they do not contain information needed by the autodetection process.

If you need to choose your drivers manually, the driver selection screen shown in Figure 3-4 below appears:

Figure 3-4
Choose Your Disk Driver



Warning

If you are installing from CD-ROM and the CD-ROM drive is connected to a SCSI adapter shared by another internal or external device (hard disk, tape device, etc.), you might experience a keyboard lockup problem while loading drivers or copying files. If this occurs, contact your SCSI adapter manufacturer for updated drivers.

Similar to a disk driver, a CD-ROM driver enables communication between the CD-ROM and the server's CPU. In some cases, you must choose a CD-ROM driver as well as a disk driver.

Disk drivers have a description that appears as you highlight the driver. The list of certified disk drivers is constantly changing. Refer to the on-screen descriptions to determine which disk driver to load.

For the most current information, refer to Novell's Web site at http://developer.novell.com/devres/sas/driver/ddrivers.htm.

Besides Novell drivers, additional third-party drivers are included with NetWare 4.2.

Important If you experience problems with third-party drivers, contact the manufacturer listed in the driver description that appears as you highlight the driver.

Procedure

Procedure

1. Choose your disk driver.

The selected disk driver is then copied to the server boot directory before it is loaded.

If more than one hard disk of the same type is installed in your computer, and if the disks are both connected to the same disk controller, load only one disk driver for that controller.

If the disks are connected to different controllers, load the driver multiple times or load additional disk drivers.

If	Then
The driver is listed	Choose the appropriate disk driver and continue with Step 2.
The driver is not listed	Press <Ins> and follow the prompts. Then continue with “Load the LAN Drivers” below.

2. Verify that the displayed parameter settings are correct.

A prompt appears asking you either to choose and modify driver parameters or to save parameters and continue. If you save the displayed parameters and continue, another prompt appears asking if you want to load any additional drivers.

If you want to	Then
Load additional disk drivers, or load separate CD-ROM drivers	Choose “Yes” and press <Enter>. Then repeat Step 1 and Step 2.
Proceed without loading additional disk drivers	Continue with “Load the LAN Drivers” below.

Load the LAN Drivers

Install automatically detects the hardware devices on your machine, including hard disks, CD-ROM drives, network boards, etc. It then scans for and selects applicable drivers for the hardware.

If	Then
Drivers are selected automatically	Go to the summary of selected drivers shown in Figure 3-6 on page 50. You can then continue with the drivers shown or you can modify the choices that have been made for you.
Drivers are not selected automatically, or if Install found more than one driver for your hardware or was unable to match a hardware device with a driver	Continue without choosing a driver or choose manually which driver to load by following the process below.

Your drivers might not be selected for the following reasons:

- Your machine does not have an advanced bus (EISA, PCI, PNPISA, MCA).
- Your hardware is non-Plug and Play ISA.
- The drivers you need are not included with this release, or they do not contain information needed by the autodetection process.

A LAN driver must be loaded to establish a network connection (if the server is physically connected to the network cabling). Your choice of LAN drivers depends on the cabling system and the network board you are using.

Most NetWare 4.2 LAN drivers have an individual description that appears on the screen when you choose the driver. Refer to the on-screen descriptions to determine which LAN driver to load.

The list of certified LAN drivers is constantly changing. For the most current information, refer to Novell's Web site at http://developer.novell.com/infosys/10042.htm.

Important If you experience problems with third-party drivers, contact the manufacturer listed in the driver description that appears as you highlight the driver.

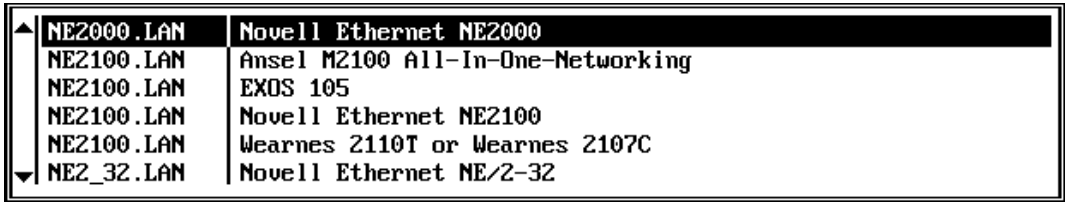
Procedure

Procedure

1. Choose your LAN driver from the LAN driver screen shown in Figure 3-5 below.

If the LAN drivers are not selected and loaded automatically, the screen in Figure 3-5 appears. The selected LAN driver is then copied and stored temporarily in the C: drive before it is loaded.

Figure 3-5
Choose Your LAN Drivers



If	Then
The driver is listed	Choose the appropriate LAN driver and continue with Step 2.
The driver is not listed	Press <Ins> and follow the prompts. Then continue with Step 2.

2. Verify that the displayed LAN driver parameter settings are correct.

A prompt appears asking you either to select and modify driver parameters or to save parameters and continue. You can modify the driver frame types by pressing <F3>.

If you continue and save the displayed parameters, another prompt appears asking if you want to load any additional drivers.

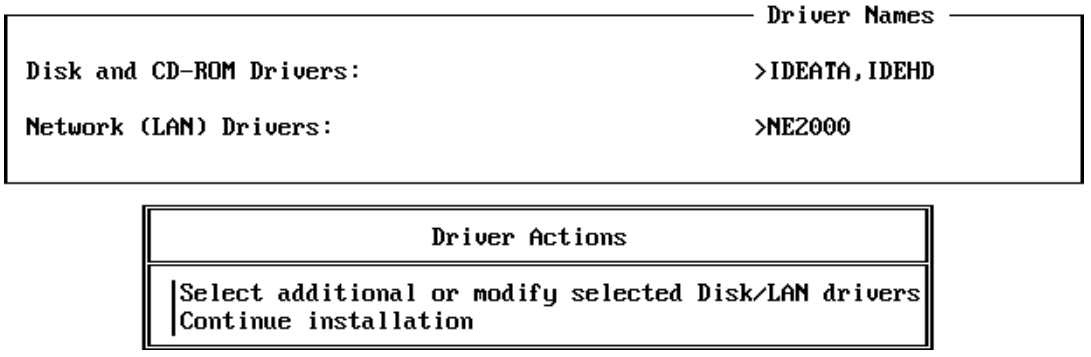
If you want to	Then
Load additional LAN drivers	Choose “Yes” and press <Enter>. Then repeat Steps 1 and 2.
Proceed without loading additional LAN drivers	Continue with Step 3.

3. Verify selected disk/LAN drivers.

If your drivers are automatically selected, the screen in Figure 3-6 below appears displaying the selected disk and LAN drivers. A prompt asks you to select additional Disk / LAN drivers or modify selected Disk / LAN drivers.

Verify that there is at least one disk driver per controller and one LAN driver per LAN adapter. Take into account controllers and adapters that are integrated into the computer’s CPU and those on the computer’s expansion cards.

Figure 3-6
Chosen Drivers Are Displayed Prior to Being Loaded

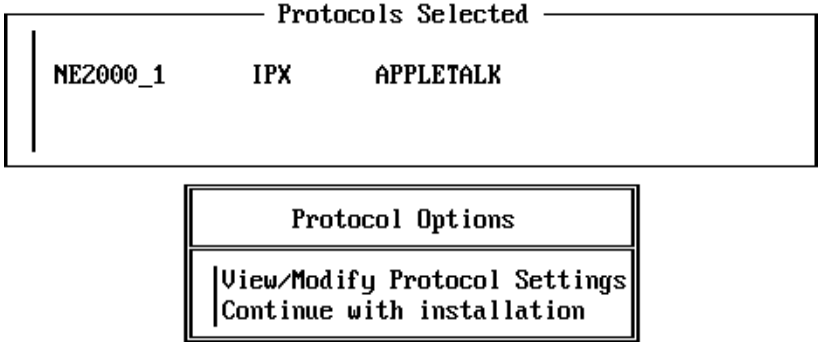


If you want to	Then
Load additional drivers or modify the settings of any previously selected drivers	Choose “Select Additional or Modify Selected Disk/LAN Drivers,“ and follow the screen prompts. Once all appropriate network drivers have been chosen, continue with Step 4 below.
Proceed without loading additional drivers	Continue with Step 4.

4. Verify selected LAN driver protocols.

The screen in Figure 3-7 appears displaying the selected LAN drivers and their protocols, and a prompt asks you to view or modify the selected protocols settings.

Figure 3-7
Selected LAN Drivers and their Protocols Are Displayed Prior to Being Bound

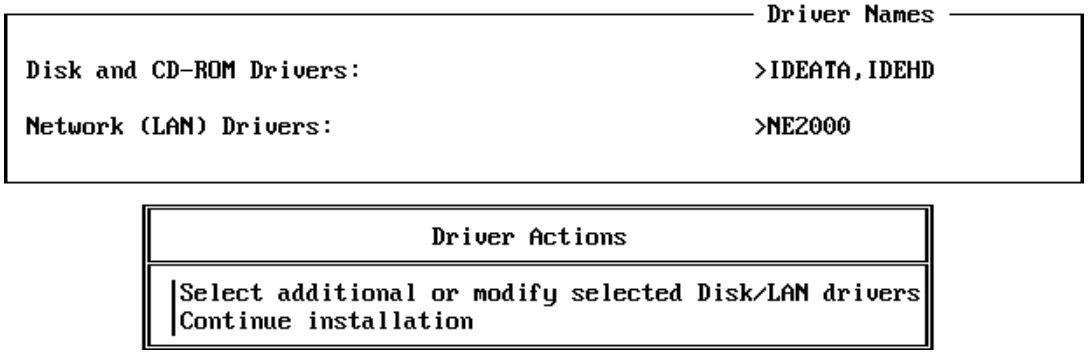


If you want to	Then
View or modify LAN driver protocol settings	Choose “View/Modify Protocol Settings,“ and continue with Conditional Steps 5 through 7. Once all protocol settings have been chosen, continue the installation process.
Proceed without viewing or modifying protocol settings	Continue installation in Step 8.

5. (Conditional) Choose “View/Modify Protocol Settings.”

After you press <Enter> to view or modify protocol settings, you are asked to choose the LAN driver for which you will modify the protocol settings. Choose your LAN driver, and the screen in Figure 3-8 appears, showing the previously selected protocol settings for that LAN driver.

Figure 3-8
Protocol Settings



6. **(Conditional) Press** <Enter> **to select or deselect protocols from the options shown in Figure 3-8.**

7. **(Conditional) If you chose TCP/IP, enter the IP address and IP mask numbers and press** <F10>**.**

   If you are installing NetWare/IP™, make sure that your IP address and netmask are correct. Typically, you enter the netmask in a hexadecimal format. For more information on NetWare/IP, see "Install NetWare/IP (Conditional)" on page 73.

   Protocols selected here are nonrouting. If you want to configure routing protocols, do so through the "Configure Network Protocols" option, which is available after the server is installed. See "Configure Network Protocols" on page 106.

8. **Choose "Continue Installation."**

   At this time, NetWare 4.2 loads the drivers that have been chosen. In the case of LAN drivers, all frame types will be loaded and applicable frames bound to IPX.

Mount the CD-ROM as a NetWare Volume (Conditional)

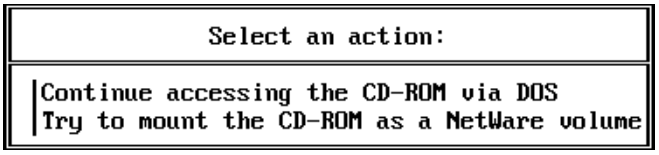
If you are installing from CD-ROM, the screen in Figure 3-9 appears if the CD-ROM device is not available to NetWare.

Procedure

Procedure

1. **(Conditional) If you are installing from CD-ROM and the menu in Figure 3-9 appears, choose one of the menu options.**

Figure 3-9
You Can Try to Mount the CD-ROM as a NetWare Volume



If a disk or CD-ROM driver you selected earlier conflicts with the DOS CD-ROM driver, your keyboard might lock up during installation. To avoid this, you can attempt to mount the CD-ROM as a NetWare volume. In doing so, you might be prompted to install new disk or CD-ROM drivers.

2. **Continue with "Create NetWare Disk Partitions" below.**

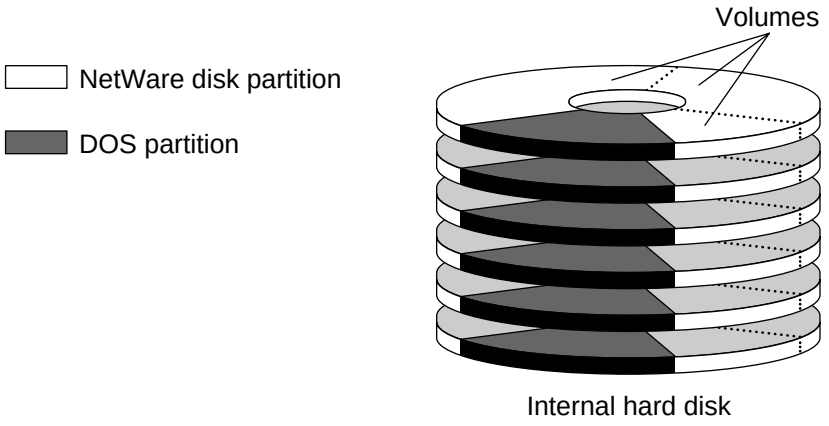
Create NetWare Disk Partitions

The following screen appears, ready for you to create NetWare disk partitions.

Every NetWare 4™ server needs a disk partition for NetWare files and shared data. You can have only one NetWare 4.2 disk partition per disk, but you can have up to eight volume segments on the NetWare disk partition.

If your server's boot hard disk has a DOS partition, use the rest of the disk space as a NetWare disk partition.

Figure 3-10
Disk Partitions and Volumes on an Internal Hard Disk



The custom installation option offers two ways of creating NetWare disk partitions, automatically and manually.

If	Choose
You want NetWare to create NetWare disk partitions in the available disk space without the option of mirroring or duplexing the disks	Automatically (see “Create NetWare Disk Partitions Automatically” on page 55).
◆ You want to specify the size of the NetWare partition ◆ You need room for other operating systems on the disk ◆ You want to mirror or duplex disk partitions (this is possible only if you have more than one disk and have more than one disk controller) ◆ You want to change the size of the Hot Fix™ Redirection Area ◆ You want to selectively delete current disk partitions	Manually (see “Create NetWare Disk Partitions Manually” on page 55).

Create NetWare Disk Partitions Automatically

This option automatically creates a NetWare disk partition in the available disk space on each disk.

- On the *boot* disk, a NetWare partition is created on the disk space not occupied by the DOS partition.
- On *other* disks, all disk space is allocated to the NetWare partition.

Procedure

1. **From the "Create NetWare Disk Partitions" menu, choose "Automatically."**
2. **Go to "Manage NetWare Volumes" on page 61.**

Create NetWare Disk Partitions Manually

This option allows you manually to create a NetWare disk partition in the available disk space on each disk. If you indicate you want to delete existing partitions, any existing NetWare partitions (but not DOS partitions) will be destroyed.

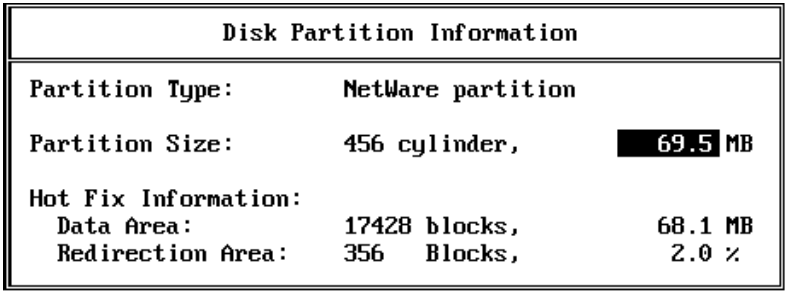
Procedure

1. **From the "Create NetWare Disk Partitions" menu, choose "Manually" and press** <Enter>**.**
2. **From the "Disk Partition and Mirroring Options" menu, choose "Create, Delete, and Modify Disk Partitions" and press** <Enter>**.**
3. **(Conditional) If you have more than one disk, from the "Available Disk Drives" menu, choose the disk you need to partition and press** <Enter>**.**
4. **From the "Disk Partition Options" menu, choose "Create NetWare Disk Partition" and press** <Enter>**.**

   NetWare allows only one NetWare partition per disk; however, multiple disks can be used to create a single partition.

5. **In the "Disk Partition Information" screen shown in Figure 3-11, specify the size of the NetWare partition (in megabytes) and press** <Enter>**.**

Figure 3-11
The "Disk Partition Information" Screen



The Hot Fix information is adjusted automatically. NetWare adjusts the percentage for Hot Fix according to the disk capacity.

For more information on Hot Fix, see "Data protection" or "Hot Fix" in *Concepts*.

Note

Many disk drive manufacturers advertise drive sizes in millions of bytes (for megabytes) or billions of bytes (for gigabytes). However, NetWare reports the drive size in true megabytes (1,048,576 bytes).

If the drive size for a NetWare partition appears smaller than expected, this is most likely the reason.

In addition, NetWare disk space does not show the disk space allocated for Hot Fix (the Hot Fix Redirection Area).

6. **(Conditional) If necessary, change the size of either the data area (in megabytes) or the Hot Fix Redirection Area (in percentage of disk partition size) and press** <Enter>**.**

   If you change one of the fields, Install calculates the space remaining for the other field.

7. **To save and continue, press** <Esc>**.**

8. **When prompted to "Create NetWare Partition?" choose "Yes" and press** <Enter>**.**

9. **(Optional) If you want to create NetWare partitions on multiple drives, press** <Esc> **and then repeat Step 3 through Step 8.**

10. **If you want to mirror or duplex disks, continue with "Mirror or Duplex NetWare Disk Partitions (Optional)" below. If you don't want to mirror disk partitions, choose "Continue with Installation," and go to "Manage NetWare Volumes" on page 61.**

Mirror or Duplex NetWare Disk Partitions (Optional)

NetWare 4 protects data from hard disk failure by letting you duplicate (mirror) one hard disk's data on one or more other hard disks. Then, if one of the disks fails and cannot be accessed by the server, you can continue to work from the functional disk.

You can safeguard your data in either of two ways:

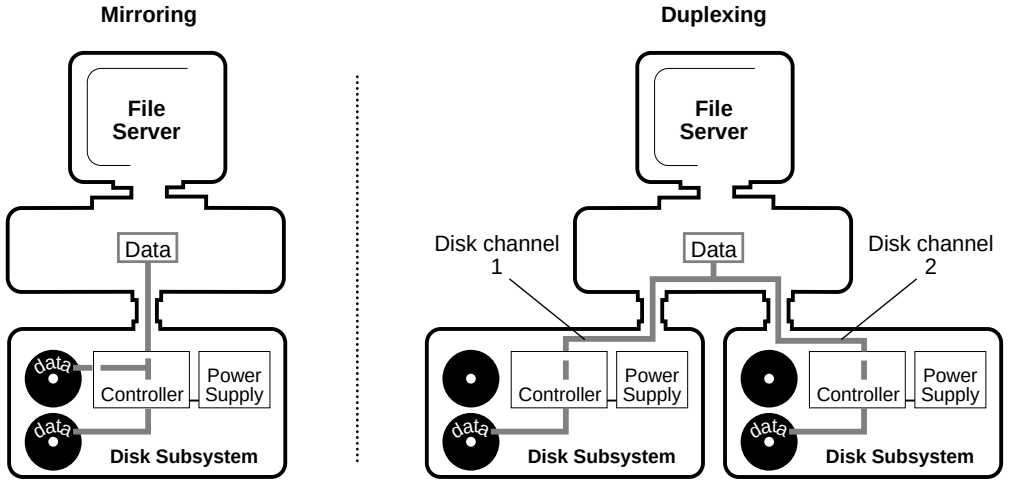
- **Mirroring**. The operating system stores duplicate data on two disks using the *same* controller.
- **Duplexing**. The operating system stores duplicate data on two disks using *different* controllers.

Duplexing offers better protection because losing two disk controllers simultaneously is even less likely than losing two hard disks.

Mirroring and duplexing options are available only on systems having more than one hard disk.

Mirroring and duplexing are illustrated in the following figure:

Figure 3-12
Mirroring and Duplexing



Consider the following as you mirror or duplex your hard disks:

- The installation processes for mirroring and duplexing are the same.
- Partition sizes of the mirrored or duplexed hard disks should be similar. Otherwise, any remaining space on the larger partition is wasted, since NetWare makes adjustments so that the mirrored partitions are exactly the same size.
- Two mirrored partitions are usually sufficient, but you can mirror as many as eight partitions.
- Which hard disks you mirror depends on how you decide to set up volumes on the server. See “Suggestions for Creating Volumes” on page 62.

Important

Before mirroring or duplexing a hard disk, back up your data.

Procedure

1. From the "Disk Partition and Mirroring Options" menu, choose "Mirror and Unmirror Disk Partition Sets" and press <Enter>**.**

The "Disk Partition Mirroring Status" screen appears and displays one of the following conditions for each disk partition:

Status	Explanation
Not Mirrored	The disk partition is not currently mirrored to another partition.
Mirrored	The disk partition is currently mirrored to another disk partition.
Out Of Sync	The disk partition was previously mirrored to another disk partition, but mirroring isn't currently active. The disk partition can't be accessed until mirroring is restored. Press <F3> to restore mirroring.
Remirroring	The partitions are being remirrored.

All disk partitions initially appear as "Not Mirrored."

2. Choose one of the disk devices (disk partitions) you want to mirror or duplex and press <Enter>**.**

The partition you choose becomes the primary partition of the mirrored set. (See "Device numbering" in *Concepts* for an explanation of how logical partitions relate to the installed hard disks.)

A list of disk partitions on the selected disk device appears.

3. Press <Ins> **to access the "Available Disk Partitions" list.**

4. **Choose the disk partition you want to mirror to the device (disk partition) you chose in Step 3, and press** <Enter>**.**

   If this disk partition is smaller or larger than the disk partition it will be mirrored to, the following message appears:

   ```
   The selected NetWare disk partition is larger/
   smaller than the original NetWare partition.
   These partitions must be the same size in order
   to be mirrored. Press <Enter> to continue.
   ```

   4a. (Conditional) Press <Enter> **to continue.**

   The "Change the Selected NetWare Disk Partition's Size?" prompt then appears.

   4b. (Conditional) Choose "Yes" to make the partitions the same size and press <Enter>**.**

   NetWare automatically adjusts the size of the larger disk partition to match that of the smaller partition.

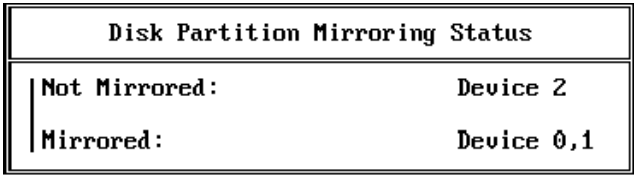
   The "Mirrored NetWare Disk Partitions" menu appears.

5. **Press** <F10> **to return to the "Disk Partition Mirroring Status" screen.**

   The "Disk Partition Mirroring Status" screen displays those disk partitions that are mirrored to each other.

   For example, if you mirrored disk (device) 0 to disk (device) 1, the "Disk Partition Mirroring Status" screen would appear similar to the one in Figure 3-13.

Figure 3-13
The "Disk Partition Mirroring Status" Screen



6. **Press** <F10> **to return to the "Disk Partition and Mirroring Options" menu.**

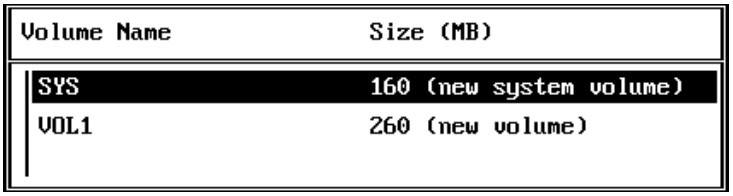
7. **Choose "Continue with Installation" and press** <Enter>**.**

8. **Continue with "Manage NetWare Volumes" below.**

Manage NetWare Volumes

The “Manage NetWare Volumes” screen shown in Figure 3-14 lists the volumes Install creates for you unless you change the defaults. The number of volumes listed depends on the hard disks.

Figure 3-14
“Manage NetWare Volumes” Screen



For servers with single hard disks, Install assigns all disk space (except for a DOS partition) to a single volume SYS:. In the “Volume Disk Segment List” (see Figure 3-15 on page 64), volume SYS: is displayed as “Device 0.”

For servers using several hard disks, Install creates one volume for each hard disk. In the “Volume Disk Segment List,” additional volumes appear as “Device 1,” “Device 2,” etc.

You can perform the following management operations on volumes before you save and mount the volume:

- Modify volume segment size
- Modify volume name
- Modify volume block size
- Enable / Disable file compression
- Enable / Disable block suballocation
- Enable / Disable data migration

Modify Volume Parameters

You can rename any of the volumes, except for volume SYS:. Having a volume SYS: is mandatory since it stores system information needed by NetWare.

You can also change the number and sizes of the volumes by deleting one or more of them and reallocating the resulting free space.

We recommend allocating at least 175 MB of disk space to volume SYS:. However, you might need to allocate additional space in the following situations:

- You plan to install several "optional" files. If not enough volume space is available when file copying begins (see "Copy NetWare Files" on page 78), you are prompted to resize the volume before continuing with the file copy.
- You plan to print large files. NetWare needs additional storage space to spool these files.

NDS and Volume SYS:

After you've installed Novell Directory Services (see "Installing Novell Directory Services" on page 79), each server's volume SYS: appears as *servername*_SYS in the Directory tree. This logical name is the name of the Volume object in the Directory tree.

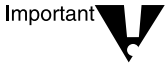
For example, if you named the server TECHSERVER, its volume SYS: would appear as Volume object TECHSERVER_SYS in the Directory tree. The name of the physical volume, as seen from the server, still remains SYS:.

Suggestions for Creating Volumes

- Reserve volume SYS: for the NetWare files and create one or more additional volumes for applications and data.

Since NDS™ objects are stored on volume SYS:, make sure you leave adequate space for additional NDS objects if you anticipate growth of your network.

- If fault tolerance is more important than performance, create one volume per disk.
- If performance is more important than fault tolerance, span one NetWare volume over many hard disks with one segment of the volume on each hard disk.



If any disk on a spanned volume fails, the whole volume is lost. Make sure you back up spanned volumes regularly so you can restore the entire volume (all its segments) from backup once the disk(s) is repaired or replaced.

- If both performance and fault tolerance are important, you can both span and duplex, but we recommend that you duplex *every* hard disk partition of the spanned volume. See “Mirror or Duplex NetWare Disk Partitions (Optional)” on page 57.

- For maximum fault tolerant protection, we recommend purchasing NetWare SFT III™.

- If your network includes workstations using an operating system that allows long filenames (such as Macintosh*), it is a good idea to create a separate volume for each operating system.

  Long filenames (filenames longer than those allowed by DOS) take up disk space that is not required for DOS files. Also, you can isolate network problems more easily.

  For example, if your network includes both DOS and Macintosh file types, you might want to create two volumes for data, DOSVOL: and MACVOL:. This way, you add name space only to those volumes whose files need it.

- If you are using the NetWare auditing feature and one volume will contain data to be reviewed by two or more auditors, you can (for security reasons) create a separate volume for each auditor.

  For example, assume you plan to audit a volume that contains accounting and sales data, but plan to have two auditors do the work.

  In this situation, if you are concerned about these auditors accessing each other’s audit reports, you should create two separate volumes, one for accounting data and one for sales data.

  Auditing rights for the file system are assigned per volume (after server installation) using the AUDITCON utility.

  For more information, refer to *Auditing the Network*.

Modify the Size of a Volume Segment (Optional)

If you do not want to modify the size of a volume segment, you can go to any of the optional procedures in this section, or you can continue the installation by going to "Save and Mount Volumes" on page 72.

You can modify the size of an existing volume (a volume that's been saved to disk) only by deleting and re-creating it.

To modify a volume segment size (for example, to decrease the size of volume SYS: in order to create another volume), follow these steps.

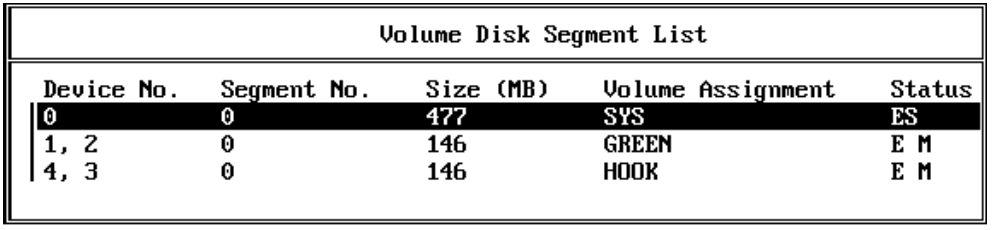
Procedure

Procedure 1 2 3

1. **In the "Manage NetWare Volumes" screen, press** <Ins> **or** <F3>**.**

   The "Volume Disk Segment List" screen appears:

Figure 3-15
The "Volume Disk Segment List" Screen



2. **Choose the device number whose volume size you want to modify and press** <Enter>**.**

   The "Disk segment parameters" list appears.

3. **In the "Disk Segment Size" field, type the new volume size in megabytes (or fraction thereof) and press** <Enter>**.**

4. **Press** <Esc> **to return to the "Volume Disk Segment List" screen.**

   If you decrease the size of the volume, the remaining space appears as "free space." You can assign it to another volume by highlighting the "free space" listing and pressing <Enter>.

5. **Modify other volume parameters, or press** <Esc> **and continue with “Save and Mount Volumes” on page 72.**

Modify Volume Name (Optional)

If you do not want to modify the volume name, you can go to any of the other optional procedures in this section, or you can continue the installation by going to “Save and Mount Volumes” on page 72.

Volume SYS: can’t be renamed.

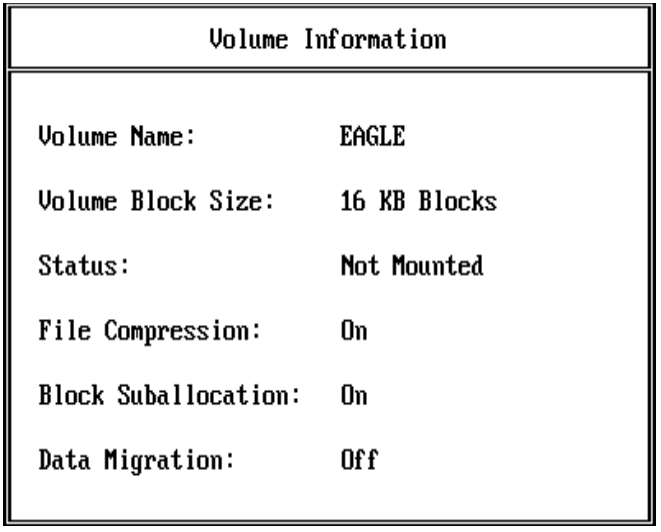
Procedure

Procedure

1. **In the “Manage NetWare Volumes” screen, choose the volume whose name you want to change and press** <Enter>**.**

   The “Volume Information” screen appears:

Figure 3-16
The “Volume Information” Screen



2. **Choose the “Name” field in the “Volume Information” screen and press** <Enter>**.**

3. **Type in a new volume name and press** <Enter>**.**

   Press <F1> for naming rules.

4. **Either modify other volume parameters or press <Esc> to return to the list of volumes.**

   Unlike some parameter settings, which can be modified later, the following parameter settings can be modified *only* before volumes are saved and mounted:

   - Enable / Disable File Compression (see "Enable / Disable File Compression (Optional)" on page 68)
   - Enable / Disable Block Suballocation (see "Enable / Disable Block Suballocation (Optional)" on page 69)

5. **Modify other volume parameters, or press <Esc> and continue with "Save and Mount Volumes" on page 72.**

Modify Volume Block Size (Optional)

If you do not want to modify the volume block size, you can go to any of the other optional procedures in this section, or you can continue the installation by going to "Save and Mount Volumes" on page 72.

Install sets the following defaults for block size. These block sizes minimize RAM and disk space requirements for the volume sizes indicated.

Volume size	Block size
0 to 31 MB	4 KB or 8 KB
32 to 149 MB	16 KB
150 to 499 MB	32 KB
500+ MB	64 KB

Hint

We recommend accepting these defaults, but there might be advantages to adjusting block sizes.

Small block sizes require more server memory to track the File Allocation Table (FAT) and Directory Entry Table (DET). Also, larger block sizes are best for large database records. Larger block sizes are preferred if block suballocation is enabled (see"Enable/Disable Block Suballocation (Optional)" on page 69).

Since you cannot change the block size once a volume is saved to disk, if you plan to eventually expand volumes, choose the block size according to the final predicted volume size.

Procedure

Procedure

1. **In the "Manage NetWare Volumes" screen, choose the volume whose block size you want to change, and press** <Enter>**.**

   The "Volume Information" screen shown in Figure 3-17 appears:

Figure 3-17
The "Volume Information" Screen

```
                    Volume Information

Volume Name:              EAGLE

Volume Block Size:        16 KB Blocks

Status:                   Not Mounted

File Compression:         On

Block Suballocation:      On

Data Migration:           Off
```

2. **Use the arrow keys to highlight the "Volume Block Size" field and press** <Enter>**.**

3. **Choose a new block size and press** <Enter>**.**

   Large block sizes (32 KB or 64 KB) can cause some DOS utilities to calculate the amount of free hard disk space incorrectly.

4. **Modify other volume parameters, or press** <Esc> **and continue with "Save and Mount Volumes" on page 72.**

Enable/Disable File Compression (Optional)

Warning

Once file compression for a volume is enabled and volume information is saved to disk, you can't change the compression status of the volume. You must delete the volume and re-create it to change the file compression status.

If you do not want to enable or disable file compression, you can go to any of the other optional procedures in this section, or you can continue the installation by going to "Save and Mount Volumes" on page 72.

If file compression is enabled, files in a volume that are not accessed for a specified amount of time are converted to a compressed state, thus saving disk space. A compressed file becomes uncompressed when it is accessed.

The default setting for file compression is "On."

File compression is enabled at the volume level. To set individual files in that volume either with or without compression, you must use the FLAG utility or the NetWare Administrator utility (after installation).

Hint

To maximize disk space, you should enable both file compression and block suballocation (see "Enable/Disable Block Suballocation (Optional)" on page 69).

For more information, see "File Compression" in *Concepts,* or "Using File Compression" in Chapter 7 of *Supervising the Network.*

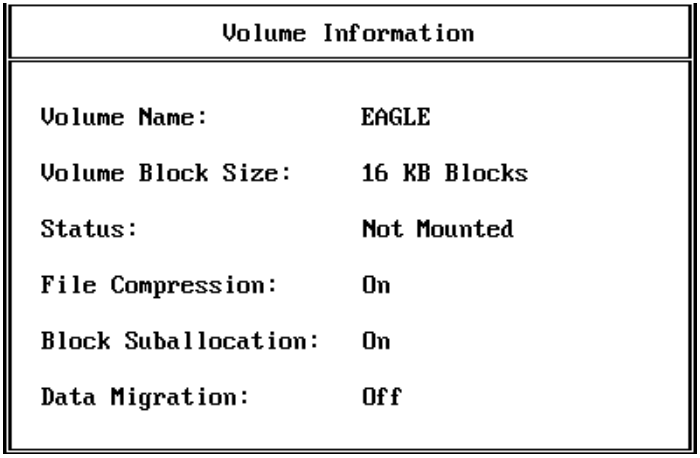
Procedure

Procedure

1. **At the "Manage NetWare Volumes" screen, choose the volume you want to change the file compression status for and press** <Enter>**.**

   The "Volume Information" screen shown in Figure 3-18 appears:

Figure 3-18
The "Volume Information" Screen



2. **Use the arrow keys to highlight the "File Compression" field and press** <Enter>**.**

   The "Select a Volume Compression Setting" screen appears.

3. **Toggle between "On" and "Off" by pressing** <Enter>**.**

4. **Modify other volume parameters, or press** <Esc> **and continue with "Save and Mount Volumes" on page 72.**

Enable/Disable Block Suballocation (Optional)

If you do not want to enable or disable block suballocation, you can go to any of the other optional procedures in this section, or you can continue the installation by going to "Save and Mount Volumes" on page 72.

Block suballocation allows the last part of several files to share one disk block, saving disk space.

Block suballocation divides any partially used disk block into 512-byte suballocation blocks. These suballocation blocks are used to share the remainder of the block with "leftover" fragments of other files.

For example, if block suballocation is not enabled, storing a 5KB file takes two 4KB blocks (on a volume with a 4KB block size); consequently, 3 KB of disk space is wasted.

With block suballocation enabled, the same 5KB file takes up only 5 KB of disk space: one 4KB block and two 512-byte suballocation blocks of another 4KB block. Subsequent files in need of suballocation blocks take them from this block as well, until the 4KB block is used up.

The default setting for block suballocation is "On."

Hint

To maximize disk space, you should enable *both* file compression and block suballocation.

If you are considering using High Capacity Storage System (HCSS) now or in the future, we recommend turning block suballocation and file compression off.

For more information, see "Block suballocation" in *Concepts*.

Procedure

Procedure

1. **In the "Manage NetWare Volumes" screen, choose the volume you want to change the block suballocation status for and press** <Enter>**.**

   The "Volume Information" screen shown in Figure 3-19 appears:

Figure 3-19
The "Volume Information" Screen

```
                    Volume Information

Volume Name:              EAGLE
Volume Block Size:        16 KB Blocks
Status:                   Not Mounted
File Compression:         On
Block Suballocation:      On
Data Migration:           Off
```

2. **Use the arrow keys to highlight the "Block Suballocation" field and press** <Enter>**.**

   The "Select a Volume Compression Setting" screen appears.

3. **Toggle between "On" and "Off" by pressing** <Enter>**.**

4. **Modify other volume parameters, or press** <Esc> **and go to "Save and Mount Volumes" on page 72.**

Disable/Enable Data Migration (Optional)

If you do not want to enable or disable data migration, you can go to any of the other optional procedures in this section, or you can continue the installation by going to "Save and Mount Volumes" on page 72.

Enabling data migration lets you migrate (move) data to an external storage device (disk, tape, optical disk), while the NetWare operating system still perceives the data as residing on the volume.

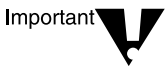
This frees up valuable hard disk space for frequently used files while still allowing access, though somewhat slower, to infrequently used files.

For example, a law firm might store case reports on a 500MB volume. They don't want to archive these files, because they might need any of them at any time. Any single case, however, has only a small chance of being used.

Enabling data migration allows this firm to call up to 256 GB of case data from their 500MB hard disk when using Novell's High Capacity Storage System (HCSS). All cases are migrated and take only a few extra seconds to call up.

The default setting for data migration is "Off."

If you are planning to use an external storage system, this parameter must be set to "On."



If you are planning on moving files to an optical storage system (such as HCSS), set file compression and block suballocation to "Off" to allow HCSS to optimize disk storage.

For more information, see "Data migration" or "High Capacity Storage System" in *Concepts* and Chapter 6, "Migrating Data Using the High Capacity Storage System," in *Supervising the Network*.

Procedure

Procedure 2 3

1. **In the “Manage NetWare Volumes” screen, choose the volume you want to change the data migration status for and press** <Enter>.

   The “Volume Information” screen shown in Figure 3-20 appears:

Figure 3-20
The “Volume Information” Screen

```
Volume Information

Volume Name:           EAGLE
Volume Block Size:     16 KB Blocks
Status:                Not Mounted
File Compression:      On
Block Suballocation:   On
Data Migration:        Off
```

2. **Use the arrow keys to highlight the “Data Migration” field and press** <Enter>**.**

   The “Select a Volume Compression Setting” screen appears.

3. **Toggle between “On” and “Off” by pressing** <Enter>**.**

4. **Modify other volume parameters, or continue with “Save and Mount Volumes” below.**

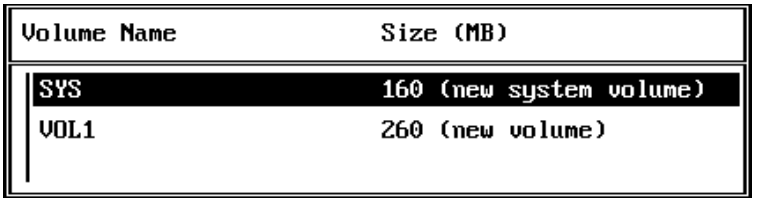
Save and Mount Volumes

Prior to saving and mounting volumes, you should have made any desired modifications to the NetWare volumes settings.

Once a volume is saved and mounted, you cannot make modifications to the volume settings, listed under “Manage NetWare Volumes” on page 61, without deleting the volumes and re-creating them.

The “Manage NetWare Volumes” screen shown in Figure 3-21 should be present on your screen:

Figure 3-21
Manage NetWare Volumes Screen



Procedure

Procedure

1. **While in the list of volumes, press <F10> to save all volume information.**

   A confirmation screen appears.

2. **Choose “Yes” to save the volume changes.**

   After you have saved volume information to disk, Install mounts all volumes to make them accessible to network users.

Install NetWare/IP (Conditional)

If you chose to install and configure the TCP/IP transport protocol during the procedure in “Load the LAN Drivers” on page 48, Install now asks whether you want to install the NetWare/IP™ software.

Installing NetWare/IP requires you to complete the following steps:

Procedure

Procedure

1. **When prompted, choose “Yes” to install the NetWare/IP software.**

   Before responding to this prompt, carefully consider the information in “When to Install NetWare/IP” below.

2. **Configure the server as a DNS client as described in “Configuring a DNS Client” on page 76.**

3. **Configure the NetWare/IP server as described in “Configuring a NetWare/IP Server” on page 76.**

4. **Start the NetWare/IP server as described in "Starting the NetWare/IP Service" on page 77.**

5. **Press** <Esc> **as needed to exit the NetWare/IP Configuration utility and return to the Install utility.**

When to Install NetWare/IP

Generally, you should install NetWare/IP if the server will service IP-based network clients or if the server will function as a gateway between an IPX network and a TCP/IP network.

Before you decide to install NetWare/IP during a NetWare 4 installation, however, consider the following:

- The NetWare/IP software must be installed and configured in a specific manner. Prior to installing a NetWare/IP network, you should be familiar with the information presented in the *NetWare/IP Administrator's Guide*.

- The NetWare/IP service relies on two other services: the Domain Name System (DNS), which is optional, and the Domain SAP/RIP Service (DSS). DSS must be running on the network before the NetWare/IP service can initialize. DNS is not required, but it can be running.

- If you plan to install NetWare/IP in a TCP/IP-only environment, you must install NetWare 4 and NetWare/IP at the same time. NetWare/IP provides the TCP/IP transport that the NetWare server needs to communicate with the existing network. During installation, a NetWare 4 server needs to communicate with the network to configure itself as part of the Directory tree.

- If you are installing the first server in a TCP/IP-only network or if DNS (optional) and DSS are not already running on the network, you need to complete the tasks described in "Installing the First Server in a TCP/IP-only Network" below.

If you are installing the first NetWare 4 server in a TCP/IP-only network or if DNS and DSS are not already running on the network, use the following procedure to set up a NetWare DNS or DSS server:

Procedure

1. **Install NetWare 4 as described in this chapter.**

   When prompted to configure transport protocols, choose to use and configure the TCP/IP transport. When prompted to install NetWare/IP, do not configure or start the NetWare/IP service.

   Because you do not start the NetWare/IP service, you cannot connect to an existing network, so you can't place an object that represents the server in an existing Directory tree.

2. **After successfully installing NetWare 4, install the NetWare/IP software as described in "Installing NetWare/IP on a NetWare 4 Server" in the *NetWare/IP Administrator's Guide*, but do not configure or start the NetWare/IP service.**

   The software necessary to configure and initialize a DNS name server or DSS server is installed along with the NetWare/IP software.

3. **At the new server, use UNICON to configure and launch the NetWare DNS and DSS server software.**

   For information on configuring a NetWare DNS server, see Chapter 7, "Setting Up DNS Support" in the *NetWare/IP Administrator's Guide*. For information on configuring a DSS server, see Chapter 8, "Configuring the Domain SAP/RIP Service" in the *NetWare/IP Administrator's Guide*.

4. **At the new server, use NWIPCFG or UNICON to configure and launch the NetWare/IP server.**

   For information on configuring the NetWare/IP server, see Chapter 9, "Configuring NetWare/IP Servers" in the *NetWare/IP Administrator's Guide*.

Configuring a DNS Client

To configure the server as a DNS client or resolver, complete the following steps:

Procedure

1. **From the NetWare/IP Administration menu, choose the *Configure DNS Client* option.**

   If the computer on which you are installing NetWare was an IP-based workstation, Install detects the previous DNS client configuration. Unless you want to change this configuration, you can simply confirm the current configuration.

2. **Enter the name of the DNS domain to which this server belongs.**

3. **Enter the IP address(es) of the DNS name server(s) this server should contact to resolve DNS queries.**

4. **To exit the DNS Client Access form, press** <Esc>**.**

Configuring a NetWare/IP Server

To configure the NetWare/IP server, complete the following steps:

Procedure

1. **From the NetWare/IP Administration menu, choose the *Configure NetWare/IP Server* option.**

   If the computer on which you are installing NetWare was a NetWare/IP client, Install detects the NetWare/IP domain to which the client belonged. If the server is to use the same domain and you don't want this server to act as a forwarding gateway, you can simply confirm the current configuration.

2. **Enter the name of the NetWare/IP domain to which this server belongs.**

3. **To configure the NetWare/IP server as a forwarding gateway, move the cursor to the *Forward IPX Information to DSS* field, press** <Enter>**, and choose "Yes."**

4. **To exit the NetWare/IP Server Configuration form, press** <Esc> **and choose "Yes."**

Starting the NetWare/IP Service

To start the NetWare/IP service, complete the following steps:

Procedure

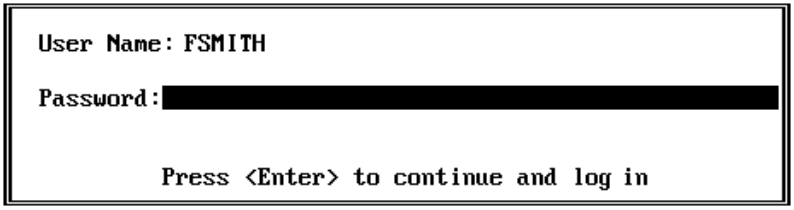
Procedure

1. **From the NetWare/IP Administration menu, choose the *Start NetWare/IP Server* option.**
2. **Press** <Esc> **to continue.**
3. **If you are installing from a remote network installation, continue with "Establish Server-to-Server Session (Conditional)" below.**

Establish Server-to-Server Session (Conditional)

If you are installing from a remote network installation area, the following screen appears:

Figure 3-22
Enter your Password to Reconnect to the Source Server



Procedure

Procedure

1. **Reenter your password to reconnect to the source server, and press** <Enter>

   When installing from a remote network installation area, a client connection to the source server is disrupted once the LAN driver is loaded.

   The path to the source server is recalled from memory, but the password must be reentered.

2. **Press** <Enter> **again.**

3. **Continue with “Copy NetWare Files” below.**

Copy NetWare Files

This part of the installation automatically copies selected NetWare 4.2 system files and utilities to volume SYS:

After copying the NetWare files, the screen shown in Figure 3-23 appears prompting you to verify or change the source path.

Figure 3-23
Verify the Path Before Copying

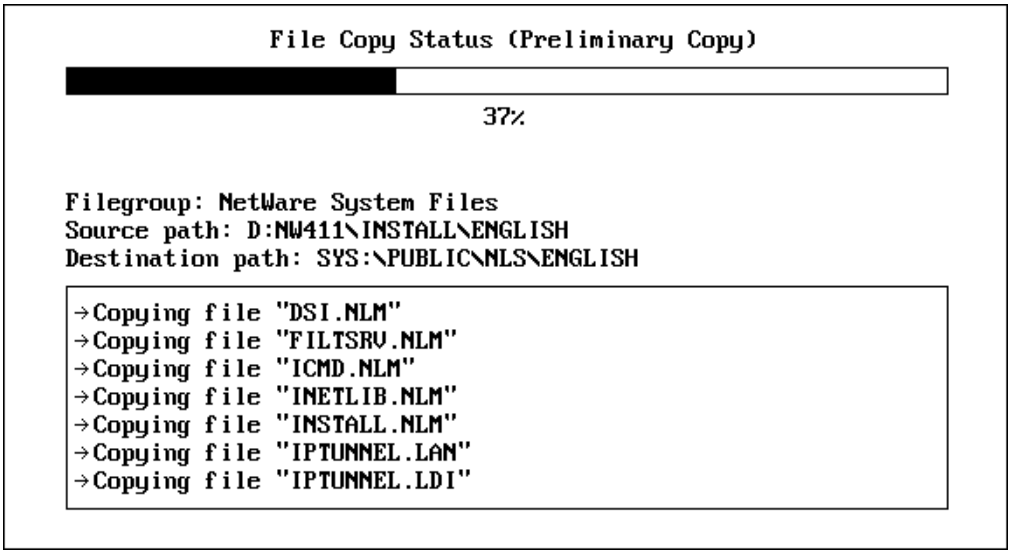
```
Note: NetWare files will be installed from path:

    NW411\INSTALL\ENGLISH\

You may change this path now if necessary. On CD-ROM, this should be path
<drive_or_vol>:PRODUCTS\NW411\INSTALL\IBM\<DOS_or_OS2>\XXX\<language>.

    Press <F3> to specify a different path;
    Press <Enter> to continue.
```

Procedure

1. **Verify or change the source path and press** <Enter>**.**

   At this time, NetWare copies only the SYSTEM and LOGIN files necessary to continue the installation as shown in Figure 3-24. Later, after Novell Directory Services has been installed, the remaining files are also copied.

Figure 3-24
The Files Needed to Continue Are Copied



2. **Continue with "Installing Novell Directory Services" below.**

Installing Novell Directory Services

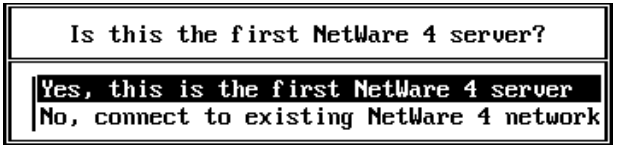
Once the preliminary files have been copied to the server, the network is scanned for Directory trees. Unless you are installing the first NetWare 4 server in the network, you will most likely want to install the server into an existing Directory tree.

Important

If you are using Install to restore your server after a planned backup or for disaster recovery, there are prompts you can follow throughout the process of installing Novell Directory Services. For more information about the circumstances and requirements for backing up and restoring your server, whether the restoration is planned or unplanned, please see "Restore NDS from Backup (Optional)" on page 96.

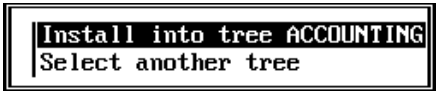
Based on your network configuration, one of the following screens appears:

Figure 3-25
When No Directory Tree Is Located



If no NetWare 4 server (and accompanying Directory tree) can be located on the network, the menu above appears.

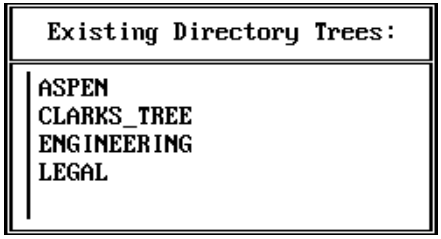
If you want to	Then
Install the first NetWare Server	Go to “Install the First NetWare 4 Server” on page 82.
Connect to an existing NetWare 4 network	Go to “The Server Cannot Locate a Previously Installed Directory Tree” on page 83.
Use Install to restore Directory Services	Press <F3> here and go to “Restore NDS from Backup (Optional)” on page 96.



If a single Directory tree is located, the Directory tree name is displayed as in the menu above.

If you want to	Then
Install into the displayed directory tree	Go to “Install into the Single Existing Directory Tree” on page 84.
Select another tree	Go to “The Server Cannot Locate a Previously Installed Directory Tree” on page 83.

If you want to	Then
Create a new directory tree	Choose “Select another tree” and press <Enter>. Press <Ins>, and then at the confirmation prompt, press <Enter>. Follow the procedures under “Install the First NetWare 4 Server” on page 82.
Use Install to restore Directory Services	Press <F3> here and go to “Restore NDS from Backup (Optional)” on page 96.



If multiple Directory trees are located, they are displayed as in the menu above.

If you want to	Then
Install into one of the existing Directory trees	Continue with “Install into an Existing Directory Tree” on page 85.
Use Install to restore Directory Services	Press <F3> here and go to “Restore NDS from Backup (Optional)” on page 96.

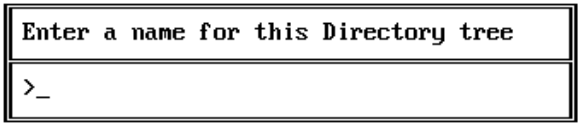
Procedure

Procedure

1. **From the "Is this the First NetWare 4 Server?" menu choose "Yes, This Is the First NetWare 4 Server" and press** <Enter>**.**

   The following screen appears, ready for you to name your new Directory tree.

Figure 3-26
Enter a Name for the Directory Tree



   For help on rules for naming a Directory tree, press <F1>.

2. **Specify the Directory tree name and press** <Enter>**.**

   Each Directory tree (hierarchy of the Novell Directory database) must have a name that's unique across the internetwork. (Most organizations will have only one Directory tree.)

   The tree name

   - Enables client workstations to access data on multiple servers in a Directory tree without logging in to each server.
   - Enables client workstations to log in to different Directory trees by specifying the tree name.

Important

Each Directory tree has its own database of objects that is not visible from another tree. Be aware of this limitation before creating multiple Directory trees.

Once a Directory tree name has been entered, a list of time zones appears. (This list does not contain all existing time zones.)

3. **Continue with "Set Up Time Synchronization" on page 86.**

The Server Cannot Locate a Previously Installed Directory Tree

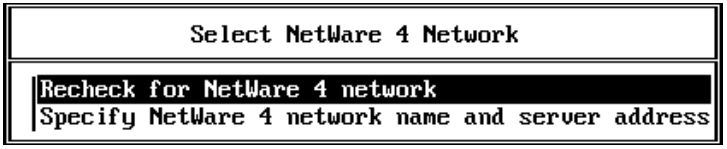
Procedure

Procedure

1. **From the "Is This the First NetWare 4 Server?" menu, choose "No, Connect to Existing NetWare 4 Network" and press** <Enter>**.**

   The following menu appears:

Figure 3-27
Choose NetWare 4 Network Menu



   You can find out the network name by loading MONITOR.NLM on an existing server on the network. The network name is the same as the Directory tree name.

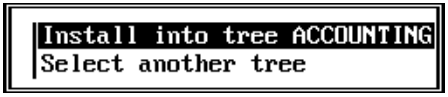
2. **Choose one of the menu options.**

If	Then
You have verified that an existing NetWare 4 server is up and physically connected to this server, and that both servers are bound to IPX with the proper LAN driver, frame type, and IPX external network number	Choose "Recheck for NetWare 4 Network" and press <Enter>. If a single Directory tree is located, go to "Install into the Single Existing Directory Tree" on page 84. If multiple Directory trees are located, go to "Install into an Existing Directory Tree" on page 85.

If	Then
Your network has SAP filtering and you know the IPX internal network number of an existing NetWare 4 server	Choose “Specify NetWare 4 network name and server address” and press <Enter>. Enter the name of the Directory tree and press <Enter>. Enter the IPX internal network number of an existing NetWare 4 server in the Directory tree and press <Enter>. If a single Directory tree is located, go to “Install into the Single Existing Directory Tree” on page 84. If multiple Directory trees are located, go to “Install into an Existing Directory Tree” on page 85.

Install into the Single Existing Directory Tree

Install the new NetWare 4.2 server into the single Directory tree displayed in the menu below by completing the following procedure:



Procedure

Procedure 23

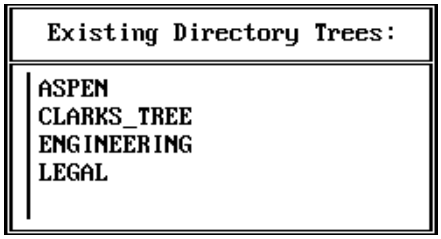
1. **Choose “Install into Tree** *tree_name*” **and press** <Enter>**.**

   A list of time zones appears.

2. **Continue with “Set Up Time Synchronization” on page 86.**

Install into an Existing Directory Tree

Install the new NetWare 4.2 server into one of the Directory trees displayed in the menu below by completing the following procedure:



Procedure

Procedure

1. Choose the Directory tree you want this server to be part of.

A list appears of all Directory trees that are visible from this server. Most organizations will have only one Directory tree. The tree name is established during the installation of the first NetWare 4.2 server in a tree.

Important

Make sure you choose the correct Directory tree name. If your organization has more than one tree, attaching to the wrong tree or creating a new Directory tree will prevent this server from sharing data within the desired Directory database.

Choosing an existing tree makes this new server part of that tree's Novell Directory database.

If	Then
(Conditional) The Directory tree you want this server to be a part of is not displayed, and you have verified that an existing NetWare 4 server in that tree is up and physically connected to this server, and that both servers are bound to IPX with the proper LAN driver, frame type, and IPX external network number	Press <F4> to rebuild the list

If	Then
(Conditional) Your network has SAP filtering and you know the IPX internal network number of an existing NetWare 4 server	Press <F3> and enter the name of the Directory tree and press <Enter> Then enter the IPX internal network number of an existing NetWare 4 server in the Directory tree and press <Enter>.
You need to create a new Directory tree on the network	Press <Ins>. At the confirmation prompt, press <Enter>. Continue with "Install the First NetWare 4 Server" on page 82.

2. Continue with "Set Up Time Synchronization" below.

Set Up Time Synchronization

Time synchronization is important to NDS, because it

- Monitors and adjusts a NetWare server's internal time to ensure consistency of reported time across the network.
- Indicates when a server's time is synchronized with the rest of the network.
- Provides time stamps to establish the order of events in the Directory.

Setting up time synchronization incorrectly can cause network synchronization problems within the Directory database.

For more information on time synchronization, see "Planning the Time Synchronization Strategy" in *Guide to NetWare 4 Networks*, "Maintaining NetWare 4 Networks" in *Supervising the Network*, and "Time Synchronization" in *Concepts*.

To enable time synchronization, you need to specify

- What time zone the server will be in.
- What type of time server category this server falls into.

- Whether the server is in a zone that observes daylight saving time.

Procedure

Procedure

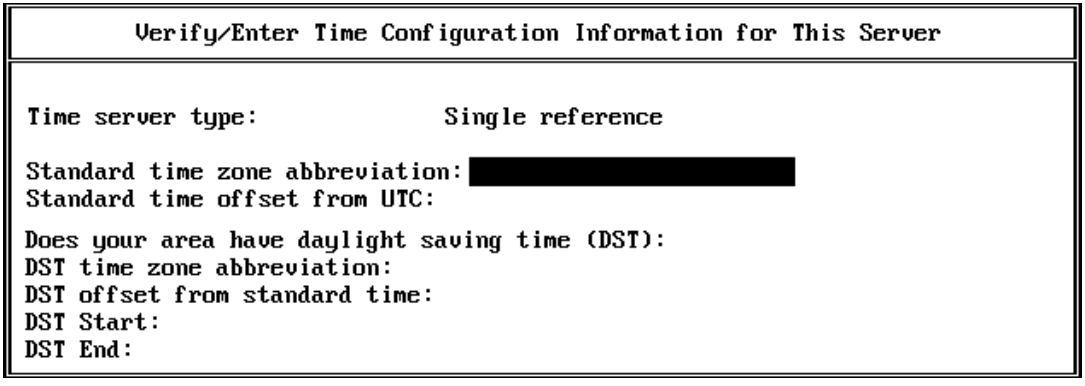
1. Choose the time zone this server is installed in.

If the time zone	Then
Is listed	Move the cursor to the appropriate time zone and press <Enter>. Verify that the information presented is correct. If it is, continue with Step 11 on page 90. If it isn't correct, follow Step 2 through Step 11.
Is not listed	Press <Ins> and continue with Step 2.

2. At the "Time Configuration Parameters" screen, verify or specify time synchronization parameters.

The following screen appears with the cursor in the "Standard Time Zone Abbreviation" field:

Figure 3-28
Time Configuration Screen



3. **(Conditional) If you want to choose a different time server type, highlight the "Time Server Type" field and press** <Enter>**.**

   There are four time server types:

   - Single Reference
   - Reference
   - Primary
   - Secondary

   The default sets the first NetWare 4.2 server in a Directory tree as a Single Reference server. All other servers default as Secondary servers.

Do not change the time server defaults without a clear understanding of time server types. Press <F1> for help, or refer to "Planning the Time Synchronization Strategy" in *Guide to NetWare 4 Networks* for a description of these time server types.

4. **In the "Standard Time Zone Abbreviation" field, enter the three-letter abbreviation for your standard time zone and press** <Enter>**.**

   Not all time zones have agreed-upon abbreviations. Time zone information is subject to local custom and national rules. Find out what the commonly used abbreviation for your standard time zone is, or enter your own abbreviation.

   The time information you specify is saved in this server's AUTOEXEC.NCF file. You can change it later by editing this file (see "Modify the AUTOEXEC.NCF File" on page 101).

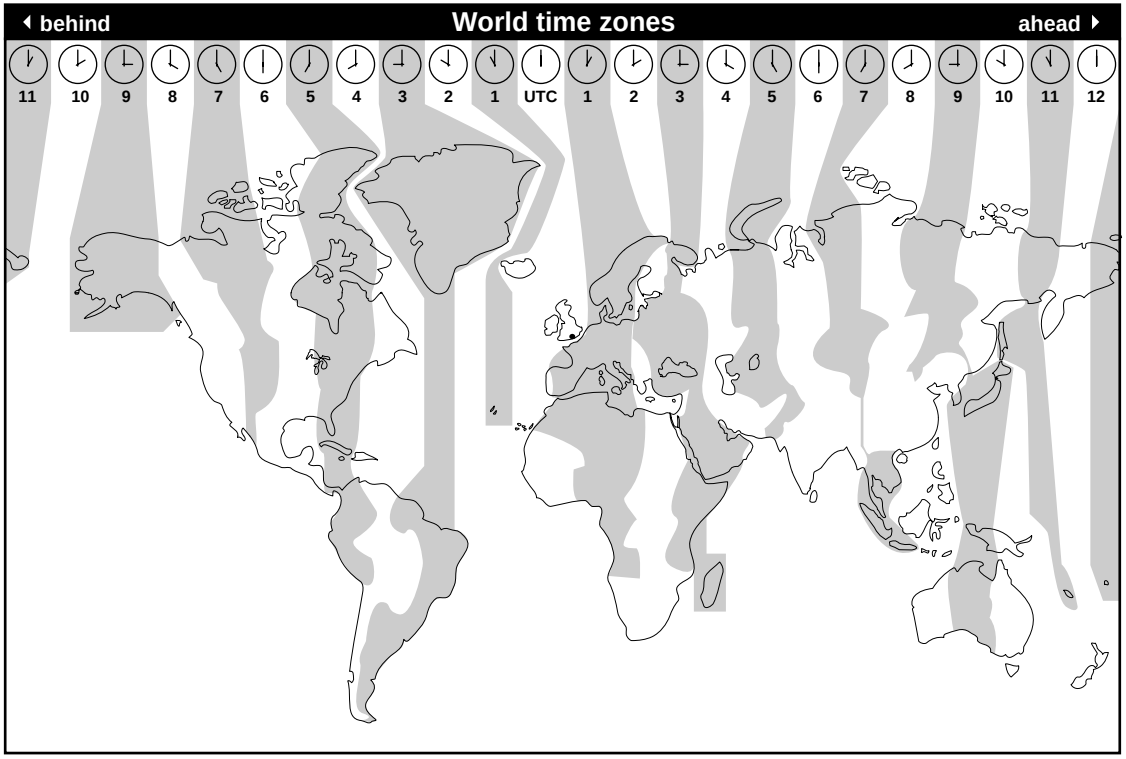
5. **In the "Standard Time Offset from UTC" field, enter the offset (in hours) from UTC (Coordinated Universal Time, sometimes known as Greenwich Mean Time) and press** <Enter>**.**

   If your time zone is east of UTC, use "AHEAD" with the number, since your time is ahead of UTC. For example, in Germany, you would type "1" and then press <Enter> to toggle to "AHEAD."

   If your time zone is west of UTC, toggle to "BEHIND," because your time is behind UTC.

Use the following illustration to find your time zone's offset from UTC.

Figure 3-29
World Time Zones and Their Offsets from UTC



6. **In the "Does Your Area Have Daylight Saving Time (DST)" field, press** <Enter> **and use the arrow keys to toggle between "Yes" and "No."**

Table 3-1
Daylight Saving Time Options

If	Then choose	And then
Your time zone switches to daylight saving time (and back to standard time) during each year	Yes	Continue with Step 7.

Table 3-1
Daylight Saving Time Options

If	Then choose	And then
Your time zone never switches to daylight saving time	No	Go to Step 11.

7. In the "DST Time Zone Abbreviation" field, enter the three-letter abbreviation your time zone uses during daylight saving time and press <Enter>**.**

Important

If you do not specify the abbreviation for daylight saving time, the server won't automatically adjust for the seasonal change. Internal algorithms assume that if no DST abbreviation is specified, local custom is to not observe DST.

Not all time zones have agreed-upon abbreviations. Time zone information is subject to local custom and national rules. Find out what the commonly used abbreviation for your daylight saving time zone is, or enter your own abbreviation.

8. In the "DST Offset from Standard Time" field, enter the difference between standard time and daylight saving time and press <Enter>**.**

Enter the offset in hours:minutes:seconds. The default is 1:00:00 (one hour) *ahead*, meaning that your daylight saving time is one hour ahead of your standard time.

If daylight saving time in your area varies from your standard time by more or less than the default (one hour), enter a different time offset.

9. In the "DST Start" field, specify the starting day for daylight saving time and press <Enter>**.**

Follow the screen prompts to decide which format to use.

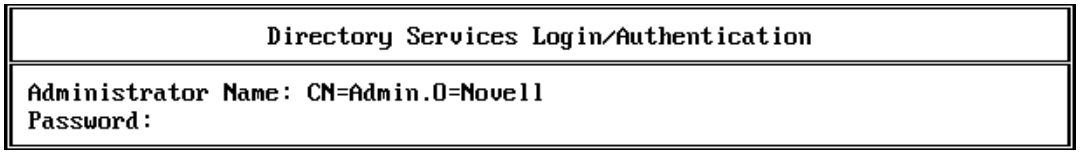
10. In the "DST End" field, specify the day daylight saving time ends and press <Enter>**.**

Follow the screen prompts to decide which format to use.

11. Save the time configuration information by pressing <F10> **and then** <Enter>**.**

If	Then
You are installing a first NetWare server	Continue with “Specify the Server’s (Name) Context” on page 91.
You are installing into an existing Directory tree	The screen below appears. Continue with Step 12, before going to “Specify the Server’s (Name) Context” below.

Figure 3-30
Directory Services Login/Authentication



12. **(Conditional) If you are installing into an existing Directory tree, type the administrator name (if necessary) and press** <Enter>**, and then type the administrator password and press** <Enter>**.**

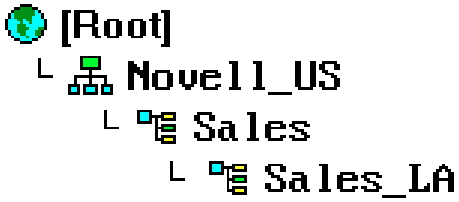
Specify the Server’s (Name) Context

The server context, or name context, specifies where the server is located in the hierarchical Directory tree. The context is composed of

- A company or organization name (example: O=Novell).
- Optional names of organizational units and subunits, such as divisions or departments (example: OU=Sales).
- An optional country code (example: C=US).

For recommendations on how to lay out your Directory tree, see “Designing the Directory Tree Structure” in *Guide to NetWare 4 Networks*.

For example, if your NetWare server were located in the “Sales_LA” group of the Sales department of a company called “Novell_US,” the server’s context would look like this:



OU=Sales_LA.OU=Sales.O=Novell_US

The object "[Root]" is automatically created during NDS installation.

For more information on context and naming conventions, see "Designing the Directory Tree Structure" in *Guide to NetWare 4 Networks* and "Context" in *Concepts*.

Depending on whether you are creating a new tree or installing into an existing tree, one of the following screens prompts you to specify the server's NDS context:

Figure 3-31
Server Context Screen for a New Tree

```
Company or Organization:
Level 1 (Sub)Organizational Unit (optional)
Level 2 (Sub)Organizational Unit (optional)
Level 3 (Sub)Organizational Unit (optional)

Server Context:

Administrator Name:
Password:
```

Figure 3-32
Server Context Screen for an Existing Tree

```
Company or Organization: NOVELL
Level 1 (Sub)Organizational Unit (optional)
Level 2 (Sub)Organizational Unit (optional)
Level 3 (Sub)Organizational Unit (optional)

Server Context: NOVELL
```

Procedure

Procedure

1. **In the "Company or Organization" field, accept the current name or type your company or organization name and press** <Enter>**.**

   Only valid characters (letters A through Z or a through z, numbers 0 through 9, hyphen, underscore) can be used.

2. **(Optional) In the "Level 1 (Sub)Organizational Unit" field, type in an Organizational Unit name (such as a division or a department) and press** <Enter>**.**

   Use this name to further specify your Directory tree. This could be a division name, a locality name, a department name, or anything that reflects your organization's structure.

   Notice that the information in the "Server Context" field is updated every time you enter a new name.

3. **(Optional) In the "Level 2 (Sub)Organizational Unit" field, type in an additional Organizational Unit name and press** <Enter>**.**

4. **(Optional) In the "Level 3 (Sub)Organizational Unit" field, type in an additional Organizational Unit name and press** <Enter>**.**

   You can manually enter more than three levels of Organizational Units (up to 25) into the "Server Context" field. Make sure you enter a period (.) as a delimiter between each new name entry. For example, if you wanted to create a fourth Organizational Unit level in Figure 3-37 on page 104, you would type OU=*organizational unit name* (followed by a period) on the left end of the context.

5. **(Optional) Return to the "Server Context" field and type a country code or additional Organizational Units and press** <Enter>**.**

   Enter the country code after the company name, separated by a period. For example, if your country is France, add ".C=FR" to the end of the server context.

   Although a country code is not required, it can be useful in a multinational organization.

For a list of country codes, see Appendix C, "Country Codes," on page 221.

Important

Adding a country name to the context might create some problems with default naming in some NetWare 4.2 utilities because the utilities assume the highest level to be O=*organization*.

That means that if you use Country in the Directory tree, you always have to include name typing (CN=.OU=.O=) whenever you log in or refer to an object name in the tree, regardless of what context you or the other object are in.

For example, if you included the country code for the United States (US), the object name for Dave Smith might be

CN=DSMITH.OU=ACCOUNTING.O=NOVELL.C=US

For more information, see "Designing the Directory Tree Structure" in *Guide to NetWare 4 Networks* and "CX" in *Utilities Reference*.

6. (Conditional) If this the first NetWare server in the tree, record the administrator's name on the NetWare 4.2 Server Worksheet (see Figure 3-39 on page 109).

The default common name (CN) for the administrator of the first NetWare 4.2 server in a Directory tree is ADMIN. Install creates this User object ADMIN directly under the Organization (O=) level.

The administrator can

- Manage this Server object.
- Manage User objects in this container.
- Manage the Directory tree (only applies to ADMIN created on the first NetWare 4.2 server).

You can change the name of user ADMIN using the NETADMIN (or NetWare Administrator) utility after the server is installed and you have set up a workstation.

7. (Conditional) If this is the first NetWare server in the tree, type the administrator's password and press <Enter>**.**

7a. At the prompt, retype the password and press <Enter>**.**

7b. (Optional) Record the password on the NetWare 4.2 Server Worksheet (see Figure 3-39 on page 109).

This password is also the password for the bindery user SUPERVISOR. If you change the administrator password later, the SUPERVISOR password will not change until you change it using the either the NETADMIN or NWADMIN utility.

8. **To save Directory information, press** <F10>**.**

If	Then
You are installing the first NetWare server in the Directory tree	A message appears indicating that Novell Directory Services is being installed.
You are installing into an existing Directory tree	A confirmation menu appears. Press <Enter> to choose "Yes."

9. **Continue with "Review the Created Directory Tree (Optional)" below and "Review the Trustee Assignments Created (Optional)" on page 97. Then continue with "Install the License Server" on page 98.**

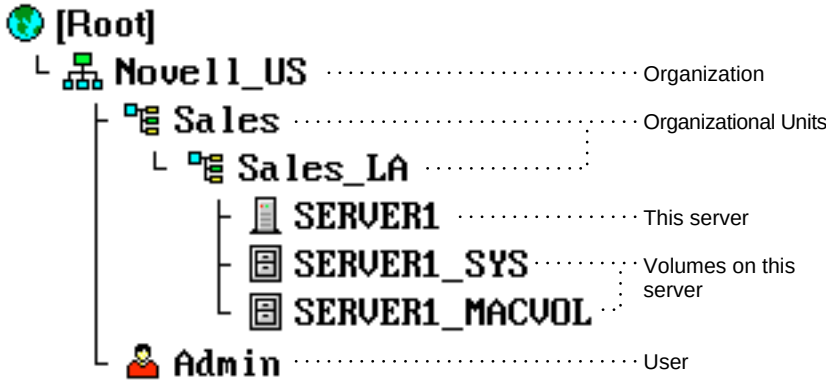
Review the Created Directory Tree (Optional)

The following objects were created in the Directory tree:

- Server object.
- Volume objects *(servername*_SYS and other volumes you specified).
- User object ADMIN (the administrator who has Supervisor object rights to this context). Install places this object directly under the Organization level.
- User object ADMIN is created only once, and only on the first server in the Directory tree.
- User object Supervisor (for bindery services purposes only). This object can be recognized only from pre-NetWare 4.2 utilities. User object Supervisor takes on User object ADMIN's password.

These objects are placed in the same context you defined for your server. The following illustration shows what your Directory tree might look like after you installed your first NetWare 4.2 server.

Figure 3-33
Example of a Directory Tree



Restore NDS from Backup (Optional)

Install for NetWare 4.2 allows you to restore Directory Services whether you planned for a hardware upgrade and backed up your directory services or your server experienced a failure.

If you planned to upgrade your hardware and backed up your server with the intention of restoring it, a BACKUP.NDS file exists from which the server directory services can be restored. In order to complete the restoration, find where this file is stored.

If this is a restoration of a server in an unplanned circumstance, find the location of the SERVDATA.NDS file that was created during your normal backup process. When you press <F3> or <F5>, a screen appears indicating a path from which Novell Directory Services server configuration information is restored.

To restore NDS from backup, complete the following steps:

1. Accept the path or specify a new one.

2. Follow the on-screen instructions.

Review the Trustee Assignments Created (Optional)

- User object ADMIN has the Supervisor object right on the [Root] object. By inheritance, ADMIN also has the Supervisor right on all Volume objects in the Directory.
- [Public] has the Browse right on the [Root] object.

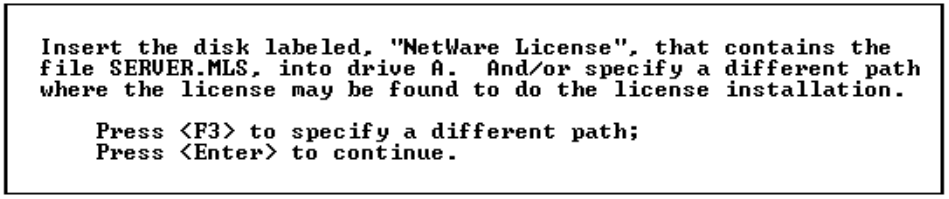
  [Public] is equal to the group EVERYONE in the NetWare 3™ environment.
- Any container object has Read and File Scan rights to the PUBLIC directories of all system volumes in that container.
- The [Root] object (or security equivalent) of a tree has the Browse right on all User objects in that tree. This can be blocked by an Inherited Rights Filter or removed from a container's trustee list (ACL).
- The [Root] object has the Read right to the member property of any Group object.
- The [Root] object has the Read right to the following properties of any Volume object: host server name (the server that the physical volume resides on) and host resource (the physical volume).
- All User objects have the Read right to their own properties and to the properties of any profile they belong to. User objects also have Read and Write rights to their user login scripts.

For more information on rights and trustee assignments, see "Rights" and "Trustee" in *Concepts* and Chapter 2, "Managing Directories, Files, and Applications," and Chapter 3, "Creating Login Scripts," in *Supervising the Network*.

Install the License Server

After Directory Services has been installed, the screen below appears, prompting you to insert the license diskette and install the NetWare 4.2 license server:

Figure 3-34
Insert the *License* Diskette when Prompted



Procedure

Procedure

1. **Insert your *License* diskette into drive A:.**

   During the server upgrade, you must insert the *NetWare 4.2 License* diskette labeled "Server + 5 Connections." Additive licenses can be installed using INSTALL.NLM only after completing the server installation.

   A message appears that the server license was successfully installed. As you continue the installation, a prompt to log in as a network administrator or the equivalent appears.

2. **Remove the *License* diskette and store it in a safe place.**

Important

   Be sure to keep your *License* diskette as a backup. You might need it in the future if your installed license should get corrupted.

3. **Continue with "Modify the STARTUP.NCF File" below.**

Modify the STARTUP.NCF File

The STARTUP.NCF file resides on the boot disk partition, together with SERVER.EXE. It executes immediately after SERVER.EXE.

The STARTUP.NCF file contains the commands to load the disk drivers you specified under “Load Disk Drivers.” You can add other commands to this file or delete existing ones. However, since deleting commands could cause problems, make sure you know what you are deleting.

A sample STARTUP.NCF file is shown in Figure 3-35 below.

Figure 3-35
Sample STARTUP.NCF File

File: STARTUP.NCF

```
Load IDE INT=E PORT=1F0
Load Mac
Load AHA1740 SLOT=3
Load ASPICD
Set Reserved Buffers Below 16 MEG=200
```

Volume SYS: is automatically mounted when its corresponding disk driver is loaded during the STARTUP.NCF file’s execution.

The following table shows some of the commands you can add to the STARTUP.NCF file.

Table 3-2
Syntax Examples for Assorted Commands

If you want to	Add these or other commands
Load name spaces for Macintosh, OS/2*, UNIX*, or FTAM	LOAD MAC.NAM LOAD OS2.NAM LOAD NFS.NAM LOAD FTAM.NAM These commands must precede the command to mount the volume that stores the files using the name space.

Table 3-2
Syntax Examples for Assorted Commands

If you want to	Add these or other commands
Set server parameters	You can add the following six SET commands to the STARTUP.NCF file only. You can add other SET commands to either the STARTUP.NCF or the AUTOEXEC.NCF file. SET Maximum Physical Receive Packet Size SET Auto Register Memory Above 16 Megabytes SET Reserved Buffers Below 16 Meg SET Maximum Subdirectory Tree Depth SET Auto TTS Backout Flag SET Minimum Packet Receive Buffer (For more information on these and other SET commands, see “SET” in *Utilities Reference* or type **SET** at the server console.)
Pause after each command	PAUSE

Procedure

1. **Type one command on each line.**

   Table 3-2 on page 99 gives some syntax examples for assorted commands.

2. **To delete or modify commands, simply backspace to erase the command.**

3. **When you’re finished modifying the file, press** <F10>**.**

4. **When asked whether you want to save the file, choose “Yes.”**

For more information on	See
Editing the STARTUP.NCF file through INSTALL.NLM	“Creating or Editing a Server Batch (.NCF) File” in Chapter 7 of *Supervising the Network*.
Editing the STARTUP.NCF file using SERVMAN	“SERVMAN” in *Utilities Reference*.

If you make changes to this file, they take effect only when you reboot the server after the installation is finished.

5. **Continue with "Modify the AUTOEXEC.NCF File" below.**

Once STARTUP.NCF loads disk drivers and any name spaces you add to it, control is passed to the AUTOEXEC.NCF file to complete the boot process.

You can also add commands to the STARTUP.NCF file by loading INSTALL.NLM, or by using the SERVMAN server utility. For further information, see *Utilities Reference*.

Modify the AUTOEXEC.NCF File

The AUTOEXEC.NCF file is located in the SYS:SYSTEM directory. It runs after the server has mounted the system volume (volume SYS:). It provides the NetWare server with commands to complete the boot process after SERVER.EXE and STARTUP.NCF are executed.

A sample AUTOEXEC.NCF file is shown in Figure 3-36 below.

Figure 3-36
Sample AUTOEXEC.NCF File

```
                    New File: AUTOEXEC.NCF

set Time Zone = MST7MDT
set Daylight Savings Time Offset = 1:00:00
set Start Of Daylight Savings Time = (APRIL SUNDAY FIRST  2:00:00 AM)
set End Of Daylight Savings Time = (OCTOBER SUNDAY LAST  2:00:00 AM)
set Default Time Server Type = SINGLE
file server name SERVER1
ipx internal net 1D0C38A
LOAD NE2000 INT=3 PORT=300 FRAME=Ethernet_802.3  NAME=NE2000_1_E83
BIND IPX NE2000_1_E83 NET=1D0C301
```

The AUTOEXEC.NCF file displays commands you specified earlier in the program. These include:

- Time zone SET commands (time server type, time zones, daylight saving time status and offset).
- Bindery context (for bindery services, set automatically at this server's context).

  Users logging in, attaching, or mapping to a NetWare 4.2 server from a client running NETX rather than VLM™ programs need to use the bindery context set in the server's AUTOEXEC.NCF file.
- Server name.
- IPX internal network number.
- All LOAD and BIND commands for LAN drivers, protocols, and frame types.

Following are some of the commands you can add to the AUTOEXEC.NCF file:

If you want to	Add these or other commands
Load other modules (NLM™ programs) when the server boots	LOAD MONITOR LOAD *NLMname*
Mount volumes	MOUNT *volumename* MOUNT ALL Volume SYS: is automatically mounted when its corresponding disk driver is loaded during the STARTUP.NCF file's execution.
Set server parameters, including time synchronization parameters	For a complete list of all available SET commands, see "SET" in *Utilities Reference*.
Execute any other valid console commands during the boot process	SECURE CONSOLE
Pause after a command	PAUSE

If you make changes to the AUTOEXEC.NCF file, they take effect only when you reboot the server after the installation is finished.

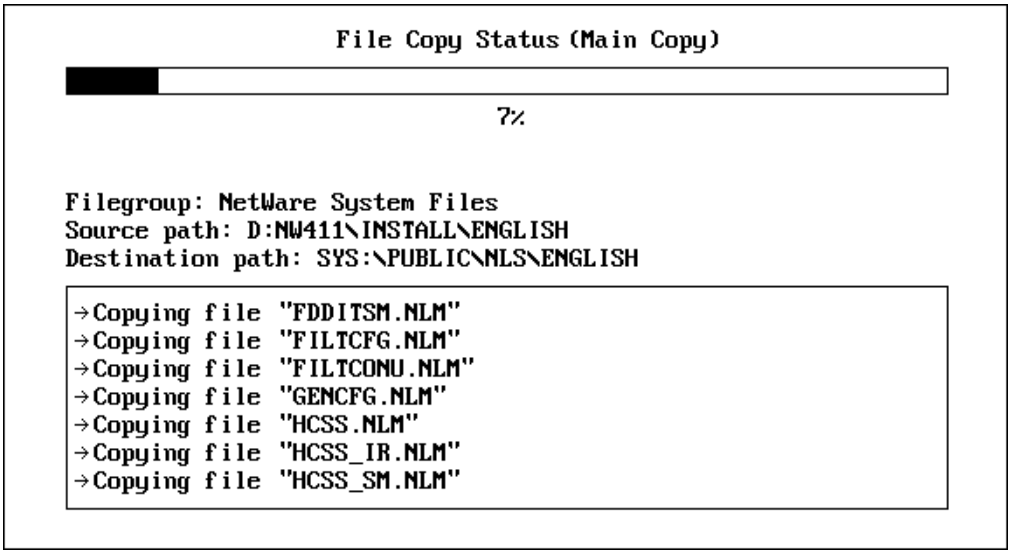
You can also add commands to the AUTOEXEC.NCF by loading INSTALL.NLM at the server (see "Creating or Editing a Server Batch (.NCF) File" in Chapter 7 of *Supervising the Network*), or the SERVMAN server utility (see "SERVMAN" in *Utilities Reference*).

Procedure

1. **Press the Up-arrow or Down-arrow keys to edit specific commands in the AUTOEXEC.NCF file.**
2. **Verify the syntax for the command in *Utilities Reference*.**
3. **To add commands, type one command on each line.**
4. **To delete or modify commands, simply backspace or press delete to erase the command.**
5. **When you're finished modifying the file, press** <F10>**.**
6. **When asked whether you want to save this file, choose "Yes."**

   The remaining NetWare files are copied to the server as shown in Figure 3-37. This could take a few minutes.

Figure 3-37
The Remaining NetWare Files Are Copied to the Server



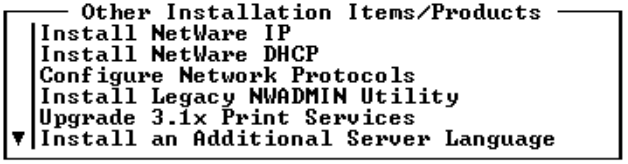
After these files are copied, the server installation is essentially complete.

If you want, you can install additional items or products (see "Perform Other Installation Options (Optional)" below).

Perform Other Installation Options (Optional)

The following screen appears listing other installation options:

Figure 3-38
Other Installation Options



All of the options listed above can be performed at any time from the server by loading INSTALL.NLM at the server console.

If	Then
You want to perform any of the listed installation actions at this time	Follow the procedures under the heading in this section that corresponds to the option you choose.
You want to install an optional product not listed	Choose “Install a Product Not Listed” from the “Other Installation Options” menu. Then follow the server prompts.
You do not want to perform any of the listed installation actions at this time	Choose “Continue Installation” from the “Other Installation Actions” menu and press <Enter>. After being prompted that the installation is complete, press <Enter> to get to the server console. Go to “Where to Go from Here” on page 108.

Upgrade 3.1*x* Print Services

This option allows system administrators upgrading their printer-supported NetWare 3.1*x* server to NetWare 4.2, to upgrade print configuration files.

Install NetWare/IP

This option allows you to install NetWare/IP. When you choose this option, a screen appears indicating the default path from which the files are copied or the option to choose a different path. The files are then copied.

Install NetWare DHCP

This option allows you to install NetWare DHCP (Dynamic Host Configuration Protocol). DHCP is a method of assigning IP addresses to hosts when the TCP/IP network clients contact the network rather than when the TCP/IP clients are configured.

When you choose this option, a screen appears indicating the default path from which the files are copied or the option to choose a different path. The files are then copied.

Configure Network Protocols

Choosing this option loads the INETCFG.NLM, which allows you to configure the protocols you selected under “Load the LAN Drivers” on page 48 as routing protocols.

This means that the server will not only function as a NetWare 4.2 server, but will also route IPX, TCP/IP, and AppleTalk packets to other network segments.

Procedure

1. **From the “Other Installation Actions” menu, choose “Choose an Item or Product Listed Above” and press** <Enter>**.**

2. **Choose “Configure Network Protocols” and press** <Enter>**.**

   A screen appears informing you that LAN driver, protocol or remote access commands in AUTOEXEC.NCF should be transferred to the configuration files maintained by INETCFG.NLM. After transfer, the information in these files is configurable from the INETCFG.NLM menu system. If you want to configure network protocols, you should respond “Yes.”

3. **Continue performing any additional installation options under the headings in this section, or go to “Exit the Install Utility” on page 108.**

Install an Additional Server Language

This option allows you to install message and help files for a selected language. You can later change the server language to display the installed language files through the “Change Server Language” option. When you choose this option, a screen appears indicating the default path from which files are copied or the option to choose a different path. The files are then copied.

Change Server Language

This option allows you to change the server language to a language selected earlier through the “Install an Additional Server Language” option.

Procedure

1. **From the “Other Installation Actions” menu, choose “Choose an Item or Product Listed Above” and press** <Enter>**.**

2. **Choose “Change Server Language” and press** <Enter>**.**

   A screen appears indicating the default path from which files are copied or the option to choose a different path

3. **Accept the path by pressing** <Enter>**, or press** <F3> **and indicate a new path.**

   A screen appears listing a number of languages you can choose from.

4. **Choose the desired server language.**

   This must be a language that you installed earlier through the “Install an Additional Server Language” option (see “Install an Additional Server Language” on page 106).

   The files are copied to the server. To have the server invoke the new language, bring down the server and then bring it back up.

5. **Continue performing any additional installation options under the headings in this section, or continue with “Exit the Install Utility” on page 108.**

Exit the Install Utility

The installation of the NetWare 4.2 server is now complete.

Procedure

1. **To exit the Install utility and go to the server console, press** <Enter>**.**

2. **Continue with “Where to Go from Here” below.**

Where to Go from Here

If you want to	Go to
Install additional NetWare 4.2 servers	“Install the Server Software” on page 40.
Install NetWare SFT III	Chapter 4, “Install NetWare 4.2 SFT III,” on page 111.

Figure 3-39

NetWare 4.2 Server Worksheet

Server name: _____ **IPX internal network number:** _____

Server make/model: _____ **Tree name:** _____

Time server type: _____ Time zone: _____ Offset from UTC ____ ahead

Daylight time zone: _____ ____ behind

Memory (RAM): Base: _____ Extended: _____ Total: _____

Server boot method: Hard disk ☐ Floppy diskette ☐ 3.5" ☐ 5.25"

Network boards (Fill in columns that apply to each network board.)

Name	LAN driver	I/O port	Memory address	Interrupt (IRQ)	DMA channel	Node address	Slot number	IPX external network #

Other boards (Internal or external disk controllers, serial controllers, SCSI controllers, video adapters, etc.)

Name	Driver (if applicable)	I/O port	Memory address	Interrupt (IRQ)	DMA channel	SCSI address	Other info

Disks

Drive Make/Model	Size	Mirrored with #	Volume segments
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			

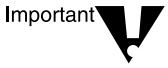
Volumes

Volume name	File compression ON	File compression OFF	Block suballocation ON	Block suballocation OFF	Data migration ON	Data migration OFF	Name space

chapter 4

Install NetWare 4.2 SFT III

This chapter describes how to install the NetWare 4.2 SFT III™ operating system on two network servers: a NetWare® 4.2 server (Server 1), and a computer that doesn't have NetWare installed on it (Server 2).



You must have NetWare 4.2 installed on one server or NetWare SFT III 3.11 installed on two servers before you can install NetWare 4.2 SFT III.

To upgrade from NetWare SFT III 3.11 to NetWare 4.2 SFT III, see "Upgrade from SFT III 3.11 and 4.1" on page 127.

If you have	Do the following
NetWare 2.*x*, 3.*x*, or 4.*x* installed on one server	Upgrade to NetWare 4.2
NetWare 4.2 installed on one server	Begin with "Prerequisite Tasks" on page 114.
NetWare SFT III 3.11 installed on two servers	Follow steps in "Edit SFT III 3.11 .NCF Files (Optional)" on page 128.

Necessary Resources

- ❑ The NetWare 4.2SFT III Installation quick path card to get an overview of the process.
- ❑ Two similar (preferably identical) 386, 486, or Pentium* computers (certified by Novell®) to be used as NetWare servers. Both computers must have similar (preferably identical)
  - CPU speed, memory, and storage capacity
  - Brand and version of DOS (3.1 or later)
  - Monitors (both monochrome or both color) and monitor boards (both VGA or both EGA, for example)
- ❑ A minimum of 20 MB of RAM in each NetWare server. (Some configurations may require more RAM.)
- ❑ CPU hardware running at a minimum of 25 MHz in each NetWare server.
- ❑ A CD-ROM drive and drivers installed as a DOS device on Server 1.
- ❑ A diskette drive on each server. (NetWare 4.2 *Main Server License* diskette is 3.5 inches)
- ❑ The NetWare 4.2 *Operating System* CD-ROM.
- ❑ The *NetWare 4.2 SFT III License* diskette.
- ❑ (Optional) Working copies of third-party disk drivers, LAN drivers, MSL™ drivers, or NLM™ programs.
- ❑ A Mirrored Server Link (MSL) connecting the two servers.

  The following table lists the third-party MSL boards certified at the time of publication. Additional boards may have been certified since. For full details on MSL board compatibility with NetWare 4.2 SFT III, call one of the following numbers

  Faxback 1-801-861-2776
  1-800-414-LABS (5227)
  Hotline: 1-801-861-5544

Table 4-1

Company/Board Name	Bus type	Driver name
Digital Equipment Corporation 1-800-DIGITAL or 1-603-884-6660		
DEC* DEFEA Series Adapter for MSL	EISA	DECMSL4X.MSL
Eagle Technology 1-800-733-2453 or 1-408-441-7453		
NMSL	EISA	NMSL.MSL
NE2000™ (limited)	ISA	HNE2000.MSL
NE/2-32™ (limited)	MCA	HNE232.MAL
Microdyne* 1-800-255-3967 or 1-703-329-3700		
NMSL	EISA	NMSL.MSL
Plaintree Systems 1-800-370-2724 or 1-617-239-8077		
WaveBus MSL (latest)	EISA, MCA	WBMSL.MSL
Thomas Conrad* Corporation 1-800-332-8683 or 1-512-836-1935		
Thomas Conrad MSL (latest)	EISA, MCA, ISA	TCMSL.MSL
TCNS* MSL (latest)	EISA, MCA, ISA	TCMSL.MSL
TCNS MSL Adapters (latest)	EISA, MCA, ISA	TCMSL.MSL
SysKonnect 1-408-725-4650		
SK-Net Series MSL	EISA	SKFEMSL.MSL
	MCA	SKFMMSL.MSL
	ISA	SKFMSL.MSL
Vinca* 1-801-223-3100		
V32 MSL	EISA, MCA, ISA	V32MSL.MSL

Prerequisite Tasks

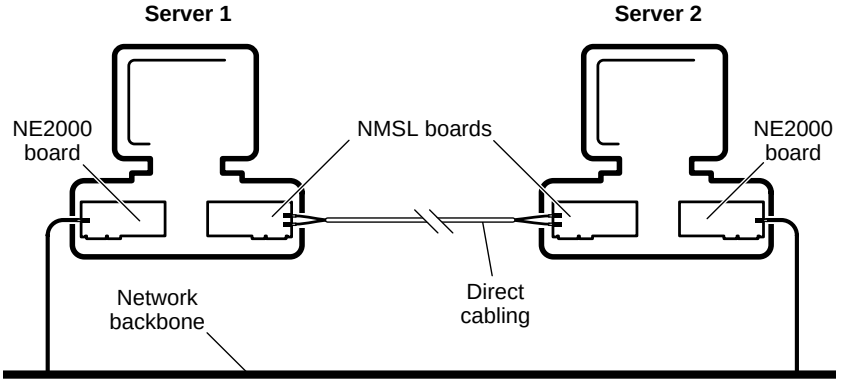
Checklist

- ❑ Install NetWare 4.2 on Server 1. (See Chapter 3, “Custom Installation,” on page 39.)
- ❑ Create a DOS partition on Server 2 that is preferably the same size as the DOS partition on Server 1 (at least 40 MB).

  If you wish to accommodate core dumps to your hard drive, make the DOS partitions 40 MB plus the number of megabytes (MB) of RAM per server. For example, if each server has 20 MB of RAM, the DOS partition would be at least 60 MB (40 MB + 20 MB).
- ❑ Format three high-density diskettes and label them “Disk 1,” “Disk 2,” and “Disk 3.”
- ❑ Install MSL (Mirrored Server Link™) boards in Server 1 and Server 2. Cable the MSL boards in each server directly to each other (as shown in Figure 4-1). See the MSL board manufacturer’s documentation for installation details.

  Note the MSL board’s address and the interrupt number for use later during installation.

Figure 4-1
MSL Installation



For best performance, assign the MSL board a higher priority interrupt than the network boards in the server.

- ❑ (Optional) Install and cable an alternate MSL board in each server for hardware redundancy in case of primary MSL board failure.

Install SFT III Servers

The installation of NetWare 4.2 SFT III includes these procedures:

- Naming and numbering the server engines
- Copying NetWare 4.2 SFT III files
- Choosing MSL (Mirrored Server Link) drivers
- Installing NetWare 4.2 SFT III on Server 2
- Creating and mirroring the NetWare partitions

Name and Number the Server Engines

Procedure

1. **Insert the NetWare 4.2 *Operating System* CD-ROM into the CD-ROM drive on Server 1.**
2. **Turn on the CD-ROM drive.**
3. **Boot DOS on Server 1.**
4. **Change to the root directory of the CD-ROM drive.**

   For example, type

   `D:` <Enter>
   `CD\` <Enter>

5. **Type**

   `INSTALL` <Enter>

6. **Select the language in which you want to install the software.**
7. **Select "NetWare Server Installation."**
8. **Select "NetWare 4.2 SFT III."**

A menu displaying NetWare 4.2 SFT III installation options appears.

9. Select "Convert NetWare 4.2 to SFT III."

10. In the space provided, type the MSEngine name and press <Enter>**.**

By default, the name you assigned to Server 1 when you installed NetWare 4.2 appears in the box. You may use this name for the MSEngine, or type in a different name.

The MSEngine name should be a unique name that is 2 to 47 characters long, with no periods or spaces. Valid characters are A-Z, 0-9, hyphen, and underscore.

SFT III requires three unique server names: one for the mirrored operating system functions (MSEngine), and one for each server's input and output functions (IOEngine).

The system creates two IOEngine names by appending the characters "_IO1" and "_IO2" to the MSEngine name.

For more information see "MSEngine" and "IOEngine" in *Concepts*.

11. Specify IPX™ internal network numbers for each engine by doing one of the following:

11a. Select "Continue with Installation" to accept the randomly-generated numbers.

11b. Select "Modify Network Numbers" to assign your own IPX internal network numbers.

Each internal network number should be a unique, hexadecimal number that is one to eight digits long. You can't assign an IPX internal network number of "0" or "FFFFFFFF."

Each IOEngine must have its own unique IPX internal network number, and the MSEngine number must be different from both IOEngine numbers.

Copy NetWare 4.2 SFT III Files

Procedure

1. **On Server 1, accept the default DOS boot directory or specify a new one.**

   The installation utility copies MSERVER.EXE and other SFT III-specific files to the boot directory.

   If you specify a directory other than the one in which the STARTUP.NCF file for NetWare 4.2 is located, you will be asked to provide the location of STARTUP.NCF.

2. **Choose whether or not to modify the IOSTART.NCF file.**

   The SET Reserved Buffers Below 16 Meg=200 command has been added to the IOSTART.NCF file. This command is necessary for some drivers. If you are certain the driver you are using doesn't need it, you can delete this command from the IOSTART.NCF file.

   The documentation that came with the driver should tell you if the driver requires this command. If the driver requires it, and it isn't present, the server won't work.

   Some drivers also require that memory above 16 MB be disabled while the driver loads. In that case, you will need to add the SET Auto Register Memory Above 16 Megabytes=Off command to the IOSTART.NCF file.

3. **Specify the location of your AUTOEXEC.BAT file.**

   If SERVER.EXE is in Server 1's AUTOEXEC.BAT file, the installation utility changes SERVER.EXE to MSERVER.EXE.

4. **Specify the diskette drive letter for Server 1.**

5. **Insert *Disk 1* (a blank, formatted, high-density diskette) into the diskette drive on Server 1 and press** <Enter>**.**

   The installation utility copies SFT III-specific files, MSL drivers, and batch files to Disk 1.

If the diskette isn't blank, answer "Yes" to the prompt, "This diskette is not empty. Delete data and proceed?" If you wish to retain the data currently on the diskette, replace it with a blank diskette.

6. **Insert the other two diskettes as prompted.**

   The installation utility copies MSERVER.EXE and installation batch files to *Disk 2* and *Disk 3*.

Choose Mirrored Server Link (MSL) Drivers

Procedure

1. **Specify the MSL driver for the MSL board installed in Server 1.**

2. **(Conditional) If the MSL board uses an MSL driver not listed on the screen, press** <Ins>**.**

   2a. **Specify the drive for the MSL driver diskette.**

   2b. **Select the MSL driver.**

   2c. **Specify the memory address and interrupt number for the MSL board.**

3. **(Conditional) If you installed an alternate MSL board in Server 1, specify an additional MSL driver.**

The INSTALL program loads the IOEngine on Server 1. After the MSL driver loads, installation on Server 1 is complete.

Install SFT III on Server 2

Procedure

1. **Leave Server 1 running and take the three DOS diskettes, the driver diskette(s), and the *NetWare 4.2 SFT III License* diskette to Server 2.**

2. **Boot DOS on Server 2.**

3. **Insert *Disk 1* into the diskette drive on Server 2.**

4. **Change to the diskette drive on Server 2 and type**

   `INSTALL` <Enter>

   The installation utility copies MSERVER.EXE, SFT III-specific files, MSL drivers, and batch files to Server 2's boot directory, which is the same as on Server 1.

5. **When prompted, insert *Disk 2* and *Disk 3* into the diskette drive on Server 2 and press** <Enter>**.**

6. **After the files have been copied, remove *Disk 3* from the diskette drive.**

7. **Specify the MSL driver for the MSL board installed in Server 2.**

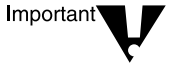
8. **(Conditional) If the MSL board uses an MSL driver not listed on the screen, press** <Ins>**.**

   8a. **Specify the path to the MSL driver diskette.**

   8b. **Select the MSL driver.**

   8c. **Specify the memory address and interrupt for the MSL board.**

9. **(Conditional) If you installed an alternate MSL board in Server 2, specify an additional MSL driver.**



Load the MSL drivers on Server 2 in the same order they were loaded on Server 1.

The installation utility loads the IOEngine on Server 2, synchronizes the memory, and executes the ACTIVATE SERVER command. ACTIVATE SERVER loads the MSEngine. The two server consoles display the same installation screen.

10. **Choose the server drivers for the hardware installed in Server 2.**

    If Server 2's LAN and Disk hardware are the same as the hardware in Server 1, select "Make Drivers on the New Machine the Same as the Original."

11. **From the "Driver Actions" menu, select "Continue Installation."**

    The disk and LAN drivers for Server 1 load, and the IPX external network numbers bound to the network boards in Server 1 are displayed.

    Note the board names if you have multiple network boards of the same type in the server.

12. **Continue by pressing** <Enter>**.**

    The disk and LAN drivers for Server 2 load, and you are prompted to accept or change the protocols bound to the network boards in Server 2.

    Note the board names if you have multiple network boards of the same type in the server.

13. **Continue by pressing** <Enter>**.**

Create and Mirror the NetWare Disk Partitions

Procedure

1. **Choose a partitioning method.**

   "Automatically" creates a NetWare disk partition in the available free space on Server 2, then mirrors the NetWare disk partition from Server 1 to Server 2. This method assumes that the disk storage is identical on both machines.

   "Manually" allows you to specify the NetWare partition size and Hot Fix™ Redirection Area on Server 2. Then, you must set up disk mirroring between the two servers' disk partitions.

   1a. If you chose "Automatically," go to Step 15.

   1b. If you chose "Manually," continue with Step 2.

2. **Select "Create, Delete, and Modify Disk Partitions."**

3. **From the "Available Disk Drives" menu, select the disk drive for Server 2 (***MSEnginename*_**IO2).**

4. **Select "Create NetWare Disk Partition" and press** <Enter>**.**

5. **Specify the NetWare partition size on the disk drive for Server 2 (*MSEnginename*_IO2) so that it matches the size of the NetWare partition for Server 1(*MSEnginename*_IO1).**

If you don't make the NetWare partitions the same size on both servers, they will not mirror.

   5a. **From the "Disk Partition Information" screen, highlight the number next to "MB" on the "Partition Size" line.**

   5b. **Type the size of the NetWare partition in megabytes (MB) and press** <Enter>**.**

   5c. **Continue by pressing** <F10>**.**

6. **When prompted to "Create NetWare Partition," choose "Yes."**

7. **Return to "Disk Partition and Mirroring Options" by pressing** <Esc> **twice.**

8. **Set up disk mirroring between the two servers by selecting "Mirror/Unmirror Disk Partition Sets."**

Mirror each disk to a disk on the other server. This preserves your data if one server goes down.

9. **Select the disk partition for Server 1 (*MSEnginename*_IO1) and press** <Enter>**.**

10. **Add the disk partition for Server 2 (*MSEnginename*_IO2) to the mirrored set by pressing** <Ins>**.**

11. **Select the disk partition for Server 2 (*MSEnginename*_IO2) and press** <Enter>**.**

12. **Continue by pressing** <F10>**.**

    The "Disk Partition Mirroring Status" list appears.

    An "In Sync" status on one partition alone does not mean the disk data is mirrored. After disk mirroring is complete, *both* partitions will be "In Sync."

13. **Return to "Disk Partition and Mirroring Options" by pressing** <Esc>**.**

    The percentage of mirroring completed appears. You can continue the installation process while the disks are mirroring.

14. **Select "Continue with Installation" and press** <Enter>**.**

    The installation utility mounts volume SYS:.

15. **When prompted, insert the *NetWare 4.2 SFT III License* diskette into the drive on Server 2 and press** <Enter>**.**

    Installation on both NetWare 4.2 SFT III servers is now complete.

    Although the installation process is finished, disk mirroring continues in background mode. The mirror status is displayed on the screen.

Do not bring down the server or turn on Server Test Mode until the disks are fully mirrored. Otherwise, data may be lost.

16. **Exit the installation utility or edit the server configuration files as explained below.**

Edit Server Configuration Files (Optional)

When you turn on or restart the servers, NetWare 4.2 SFT III reads from server configuration files with the .NCF filename extension that were automatically created by the installation utility.

After you set up disk mirroring, you can edit the .NCF files to customize your NetWare 4.2 SFT III system with additional LOAD commands or SET parameters. You can cut from one file and paste to another.

To cut text, press <Tab> to move to the window from which you want to copy. Use the arrow keys to place the cursor at the beginning of the text you wish to copy. Press <F5> and then use the arrow keys to place the cursor at the end of the text you wish to copy. The selected text will be highlighted. Press <Delete> to cut. Press <F6> to copy.

To paste text, press <Tab> to move to the window into which you want to copy. Use the arrow keys to place the cursor at the point you want to paste and then press <Ins>.

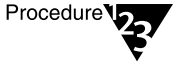
Table 4-2 lists the SFT III server configuration files, locations, and contents.

Table 4-2
SFT III Configuration Files in Order of Execution

File	Location	Contents
IOSTART.NCF (Two files—one for each server)	DOS partition	IOEngine name and IPX internal network number; loading instructions for disk drivers and MSL drivers; IOEngine SET parameters; loading instructions for NLMs that do not require an active MSEngine or a mounted volume SYS:.
MSSTART.NCF (Two identical files)	DOS partition of each machine in the startup directory with MSERVER.EXE	Commands that are executed by the MSEngine after the server is mirrored but before the system volume is mounted. Some SET parameters can be set only in MSSTART.NCF.
MSAUTO.NCF	SYS:SYSTEM	Commands that are executed by the MSEngine after the server is mirrored and the system volume mounted; initialization commands for Time Services; Directory Services, and most other Mirrored-Server NLM programs; name and IPX internal network number; loading instructions for MSEngine NLM programs.
IOAUTO.NCF (Two files—one for each server)	DOS partition or Volume SYS:	Commands for loading network drivers and binding network protocols; loading instructions for NLM programs that require an active MSEngine and a mounted volume SYS: (such as printing and backup NLM programs).

Changes to commands in the .NCF files do not take effect until you reboot the server.

Procedure



From the MSEngine prompt on either SFT III server, type

`INSTALL` <Enter>

17. **Select "NCF Files" and edit the IOSTART.NCF files for each NetWare server.**

    Select the IOSTART.NCF option for Server 1.

    Example of IOSTART.NCF for primary IOEngine:

```
ioengine name SFT3_IO1
ioengine ipx internal net 7654321
load isadisk port=1f0 int=e
load nmsl
```

The LOAD command for the MSL driver should be the last line of the IOSTART.NCF file. The disk and MSL drivers should be in the same directory as MSERVER.EXE.

18. **Save the file by pressing** <F10> **or** <Esc> **and then** <Enter>**.**

19. **Select the IOSTART.NCF option for Server 2.**

    Example of IOSTART.NCF for secondary IOEngine:

```
ioengine name SFT3_IO2
ioengine ipx internal net 6543210
load isadisk port=1f0 int=e
load nmsl
```

The LOAD command for the MSL driver should be the last line of the IOSTART.NCF file.

20. **Save the file by pressing** <Esc> **and then** <Enter>**.**

Edit IOAUTO.NCF Files

Procedure

1. **From "NCF Files," select the IOAUTO.NCF option for Server 1.**

   Example of IOAUTO.NCF file:

   ```
   LOAD NE2000 INT=3 PORT=300 FRAME=ETHERNET_802.2
     NAME=NE2000_2_E82
   BIND IPX NE2000_2_E82 NET=1012672
   ```

2. **Edit the file to load additional modules in Server 1's IOEngine.**

3. **Save the file by pressing** <Esc> **and then** <Enter>**.**

4. **Select the IOAUTO.NCF option for Server 2.**

5. **Edit the file to load modules in Server 2's IOEngine.**

6. **Save the file by pressing** <Esc> **and then** <Enter>**.**

Edit MSAUTO.NCF Files

Procedure

1. **From "NCF Files," select the MSAUTO.NCF option.**

2. **Edit the file to change the MSEngine name or IPX internal network number.**

   Changes to the MSEngine name or IPX internal network number do not take effect until after you bring down both servers and reboot them.

3. **Save the file by pressing** <Esc> **and then** <Enter>**.**

Procedure

1. **From “NCF Files,” select the MSSTART.NCF option.**

2. **Type instructions in the MSSTART.NCF file to customize the SET parameters for your MSEngine.**

   MSEngine parameters that can be set only in the MSSTART.NCF file include Minimum Packet Receive Buffers, Cache Buffer Size, Maximum Subdirectory Tree Depth, Auto TSS Blackout Flag, and Concurrent Remirror Requests. See SFT III Parameters under “SET” in *Utilities Reference*.

3. **Save the file by pressing** <Esc> **and then** <Enter>**.**

View SFT III Console Displays

SFT III servers have three console displays: the primary IOEngine, the secondary IOEngine, and the MSEngine.

Press <Alt> to see the console title bar. The right side of the title bar indicates the primary or secondary console.

Press <Alt>+<Esc> or <Ctrl>+<Esc> to view the server console displays in SFT III.

- To select the primary IOEngine, the secondary IOEngine, the MSEngine, or other console displays (such as the installation screen), press <Alt>+<Esc>.

- To display a menu of console options, press <Ctrl>+<Esc>. Type the number of the console you wish to display.

Implement Dual Processing (Optional)

To implement dual processing with NetWare 4.2 SFT III, you must have a server with two CPUs installed and a dual-processing driver (available from your server hardware manufacturer).

A second processor may be installed in one or both SFT III servers.

Follow the procedure below to assign one CPU to the IOEngine and one CPU to the MSEngine.

Procedure

1. **From the IOEngine console of the server with two CPUs installed, load the dual processing driver.**

   See the server hardware manufacturer's installation instructions for loading the dual processing driver. For example, type

   `LOAD 2NDPROC` <Enter>

2. **To implement dual processing at startup, put the load command in the IOSTART.NCF file of the server with two CPUs.**

Upgrade from SFT III 3.11 and 4.1

Necessary Resources

- ❑ The NetWare 4.2 SFT III Installation quick path card to get an overview of the process
- ❑ NetWare SFT III 3.11 or 4.1 installed on two servers
- ❑ A CD-ROM drive on one server
- ❑ A diskette drive on each server
- ❑ The NetWare 4.2 *Operating System* CD-ROM and the NetWare 4.2 *Main Server License* diskette
- ❑ The *NetWare 4.2 SFT III License* diskette

❑ Three formatted, high-density diskettes labeled “Disk 1,” “Disk 2,” and “Disk 3”

Prerequisite Tasks

❑ Back up your NetWare SFT III 3.11 or 4.1 servers, including files in the DOS partitions of both servers.

❑ Note the directory in which MSERVER.EXE currently resides if you plan to install version 4.2 in the same directory as the previous NetWare version.

❑ Make sure that all users are logged out.

❑ Bring down the MSEngine and both IOEngines.

Edit SFT III 3.11 .NCF Files (Optional)

Before upgrading your NetWare SFT III servers to NetWare 4.2 SFT III, edit both servers’ .NCF files if

- The .NCF files contain LOAD commands for third-party drivers or modules that aren’t compatible with NetWare 4.2. To determine which drivers and modules are compatible with NetWare 4.2, call one of the following numbers:

  Faxback 1-801-861-2776
  1800-414-LABS (5227)
  Hotline: 1-801-861-5544

  Update the LOAD commands with the NetWare 4.2 driver or module names and the appropriate path names (if not on volume SYS:).

- Your servers use the Ethernet 802.3 frame type, but the frame type is not specified in the .NCF files.

  Specify the 802.3 frame type in the LOAD command in the IOAUTO.NCF files. For example, type

  ```
  LOAD NE2000 FRAME=ETHERNET_802.3 INT=3 PORT=300
  ```

- The .NCF files contain old SET parameter names. Use the table below to update SET parameter names from previous versions to NetWare 4.2 SFT III SET parameter names.

Old SET parameter names	SFT III 4.2 SET parameter names
Mirrored Server Comm ACK Wait Time Out	MSL Error Wait Time
Secondary Take Over Delay Amount	Secondary Take Over Wait Time
Comm Deadlock Detect Wait Time	MSL Deadlock Wait Time
Check Server to Server Comm	Extra MSL Checking
Primary Server Comm Deadlock Recovery Option	Primary Server MSL Deadlock Recovery Option
Secondary Server Comm Deadlock Recovery Option	Secondary Server MSL Deadlock Recovery Option
MSEngine Outputs Different	MSEngine Outputs Different Recovery Option
Primary Server Comm Consistency Recovery Option	Primary Server MSL Consistency Error Recovery Option
Secondary Server Comm Consistency Recovery Option	Secondary Server MSL Consistency Error Recovery Option
Primary Server Comm Driver Stuck Recovery Option	Primary Server MSL Send Blocked Recovery Option
Secondary Server Comm Driver Stuck Recovery Option	Secondary Server MSL Send Blocked Recovery Option
Primary Server Comm Hardware Failure Recovery Option	Primary Server MSL Hardware Failure Recovery Option
Secondary Server Comm Hardware Failure Recovery Option	Secondary Server MSL Hardware Failure Recovery Option
Notify Users Of Mirrored Server Synchronization	Notify All Users Of Mirrored Server Synchronization

Old SET parameter names	SFT III 4.2 SET parameter names
Notify Users Of Mirrored Server Failures	Server Failure Notification Name

Upgrade Server 1

Procedure

1. **Install the DOS CD-ROM drivers on the server with the CD-ROM drive.**
2. **Insert the NetWare 4.2 *Operating System* CD-ROM into the CD-ROM drive on Server 1.**
3. **Turn on the CD-ROM drive.**
4. **Boot DOS on Server 1.**
5. **Change to the root directory of the CD-ROM drive.**

   For example, type

   `D:` <Enter>
   `CD\` <Enter>
6. **Type**

   `INSTALL` <Enter>
7. **Select the language in which you want to install the software.**
8. **Select "NetWare Server Installation."**
9. **Select "NetWare 4.2 SFT III."**

   A menu displaying SFT III installation options appears.
10. **Select "Upgrade Current SFT III to SFT III 4.2" and press** <Enter>**.**
11. **Specify the path for the destination directory.**

The destination directory can be the directory where the 3.11 version of MSERVER.EXE currently resides or it can be a new directory.

If you install to the directory where the 3.11 version resides, you should first backup that directory. The installation utility will overwrite existing files when it copies the 4.2 MSERVER.EXE and other SFT III-specific files to the destination directory.

12. **(Conditional) Check the list of third-party drivers that were not updated in the DOS boot directory. These drivers may be compatible with NetWare 4.2, but if they are not you will need NetWare 4.2-compatible replacements on diskette.**

13. **Specify the locale configuration and file format.**

    See "Specify Language and Filename Format Information" on page 44.

14. **Create diskettes for Server 2.**

    Insert *Disk 1*, *Disk 2*, and *Disk 3* as prompted.

15. **Remove *Disk 3* when the files have been copied.**

16. **Take the three diskettes to Server 2.**

Upgrade Server 2

Procedure

1. **Boot DOS on Server 2.**

   If you are using third-party drivers on Server 2, you will have to copy the drivers to the DOS boot directory and SYS:SYSTEM manually. They will not be copied during the automated installation procedure.

2. **Insert *Disk 1* in the diskette drive of Server 2.**

3. **Change to the diskette drive and type**

   `INSTALL` <Enter>

4. **Insert *Disk 2* and *Disk 3* when prompted.**

5. **Specify the path to the 3.11 IOSTART.NCF and MSSTART.NCF files from SFT III 3.11.**

6. **Remove *Disk 3* when the files have been copied and you are prompted for the NetWare 4.2 *Main Server License* diskette.**

7. **Insert the NetWare 4.2 *Main Server License* diskette when prompted.**

8. **Insert the *SFT III License* diskette when prompted.**

9. **Choose a Directory tree or create a new Directory tree.**

10. **Specify the time zone and time configuration.**

11. **Specify the server context.**

12. **Specify the password for ADMIN.**

13. **Save the Novell Directory Services® information.**

    NetWare files copy to the SYSTEM and PUBLIC directories.

14. **(Conditional) If the IOSTART.NCF files contain load commands for network drivers, move those load commands from the IOSTART.NCF files to the IOAUTO.NCF files.**

    The upgrade to NetWare 4.2 SFT III is complete.

chapter 5

Upgrade Using INSTALL.NLM

You can use INSTALL.NLM, along with the NetWare® 4.2 *Operating System* CD-ROM, to upgrade your existing NetWare 3.1*x* or 4.*x* server to the NetWare 4.2 operating system.

This option allows you to update your server with new operating system and boot files, and, if upgrading from a 3.*x* server, to transform your bindery information into a Novell Directory Services® (NDS™) structure.

How It Works

Using the "Upgrade NetWare 3.1*x* or 4.*x*" option of INSTALL.NLM, the server is upgraded to NetWare 4.2 through the following:

- Device drivers and LAN drivers for the new NetWare 4.2 operating system are loaded.
- (Conditional) Novell Directory Services (NDS) is installed or upgraded (see "Prepare the NDS Tree for Upgrade" on page 134).
- The AUTOEXEC.NCF file is modified.
- The NetWare 4.2 files are copied to the server.
- Printing is upgraded using PUPGRADE.NLM.

Prepare the Server for Upgrade

Necessary Resources

- ❑ NetWare 3.1*x* or 4.*x* server. This is the server you upgrade.
- ❑ NetWare 4.2 *Operating System* CD-ROM.
- ❑ CD-ROM drive installed on the server being upgraded, the *Operating System* CD-ROM mounted as a NetWare volume, or the CD-ROM files copied to another server.
- ❑ Minimum 20 MB of RAM on the server.

To determine how much RAM your server should have, refer to Appendix A, “Calculate RAM Requirements,” on page 211.

- ❑ Minimum 175 MB Volume SYS: on the server.
- ❑ Minimum 40 MB DOS partition on the server.

Prepare the NDS Tree for Upgrade

If you have ever had a NetWare 4.0 or 4.01 server in the tree, you must complete the following procedure.

1. **Copy DSREPAIR.NLM from PRODUCTS\SPACK6A\SYS\SYSTEM on your NetWare 4.2 *Operating System* CD to one of your servers holding a copy of the [Root] partition.**
2. **At the server console, load DSREPAIR.NLM and select Unattended Full Repair.**

   This fixes a time-stamp problem that existed only in NetWare 4.0 and 4.01.

If you have NetWare 4.1*x* servers that will not be upgraded to NetWare 4.2, complete the folowing procedure.

1. **For all NetWare 4.10 servers, contact Novell’s Support Connection on the Web, and copy the recommended DS.NLM file to the SYS:SYSTEM directory on each NetWare 4.10 server.**

2. **For all NetWare 4.11 servers, choose one of the following options to upgrade the DS NLM on each server to version 6.00:**

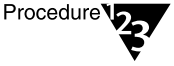
   - Install Support Pack 6 from PRODUCTS\SPACK6A on the NetWare 4.2 *Operating System* CD to all NetWare 4.11 servers.
   - Run NDSMGR32.EXE to update DS.NLM on all the servers in the NDS tree to version 6.00.
   - Copy DS.NLM from PRODUCTS\NW411_\411\SYSPRE on the NetWare 4.2 *Operating System* CD to the SYS:SYSTEM directory on each NetWare 4.11 server.

3. **At each server's console, type the following (including the period):**

   SET DSTRACE = *. <Enter>

   This restarts the new version of NDS without interrupting current connections.

Complete the following procedure.



1. **(Optional) Use the NetWare 3.1*x* SALVAGE utility to restore deleted files.**

   To salvage already-deleted files, restore them before upgrading.

2. **Make at least two backups of your NetWare 3.*x* or NetWare 4.*x* system. Do not attempt an upgrade without a backup.**

3. **Notify users to log out of the NetWare 3.*x* or NetWare 4.*x* server.**

   Broadcast a message from the console that users must log out before the server upgrade. Users must stay logged out until the upgrade is complete.

4. **If you are using third-party NLM programs, disk drivers (*.DSK), or LAN drivers (*.LAN), check with your Novell Authorized Reseller℠ representative for compatibility issues before upgrading your network.**

You can also access a list of certified LAN drivers and device drivers at the following locations:

http://developer.novell.com/infosys/10042.htm
http://developer.novell.com/devres/sas/driver/ddrivers.htm

5. **If you are upgrading a NetWare 3.1*x* server into an existing Directory tree, gather the following information:**

   - Tree name
   - Which context to place this server into
   - Administrator's name (user ADMIN or another user with Supervisor object rights to this context)
   - Administrator's password (for authentication to the Directory)

6. **If you are upgrading several servers into the same Novell Directory Services context, do this before upgrading:**

   6a. Consolidate names of users who exist under different names on different servers.

   For example, user Mark Peters might be MARK on server ONE and MPETERS on server TWO. If you upgraded both servers into the same context, two User objects would be created for the same user, Mark Peters.

   6b. Change names of users with the same names on different servers that are upgraded into the same context.

   For example, there might be a user MARK on server ONE and a different user MARK on server TWO. Even though they are two different users, you could accidentally merge them into one Directory object called MARK. (You can rename conflicting bindery object names during the upgrade process.)

   For example, a merge of user MARK on server ONE and MARK on server TWO gives server ONE's MARK access to both servers' files.

Copy the New Boot Files

Procedure

1. **From the server's volume SYS:, copy the LAN drivers (.LAN files) used by your server and your server's AUTOEXEC.NCF file to a floppy diskette.**

   Take this precautionary measure to ensure you have a backup of these files.

2. **Bring down the server.**

   At the system console (:), type

   DOWN <Enter>

3. **Exit to DOS by typing**

   EXIT <Enter>

4. **Change to the server boot directory and, on the floppy diskette you used in Step 1, copy the following files:**

   *.BAT (batch files)
   *.NAM (name spaces)
   The device drivers (such as IDE.DSK) used by your server
   INSTALL.NLM
   SERVER.EXE
   STARTUP.NCF
   VREPAIR.NLM

5. **(Optional) If you are upgrading a NetWare 3.1*x* server, use the DOS RENDIR command to rename your SERVER.31*x* directory to NWSERVER.**

   This allows you to copy the NetWare 4.2 server boot files to the existing boot directory and thus save disk space on your DOS partition.

6. **Change to the drive letter corresponding to your CD-ROM drive, or to the mapped drive where the NetWare 4.2 *Operating System* files are located and type**

   `INSTALL` <Enter>

   If you are using a multiple language NetWare 4.2 *Operating System* CD-ROM, the following menu appears.

Figure 5-1
Choose the Desired Server Language

7. **(Conditional) If you are installing from a multiple language CD-ROM, choose the language in which you want the server upgraded and press** <Enter>**.**

   The "Terms and Conditions" document appears.

8. **Read the "Terms and Conditions" document. When finished, press any key to continue.**

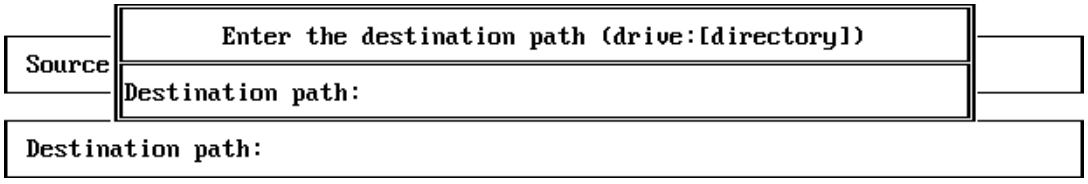
   The following menu appears:

9. **Choose "NetWare 4.2" and press** <Enter>**.**

10. **Choose "Upgrade NetWare 3.1*x* or 4.*x*" and press** <Enter>**.**

The following screen appears:

Figure 5-2
The Source and Destination Paths



11. **Specify the destination path where you want the boot files copied and press** <Enter>**.**

    For example:

    C:\NWSERVER

12. **(Conditional) If you typed a new destination directory (that does not exist), choose "Yes" and press** <Enter> **to create the new directory.**

13. **(Conditional) If you did not rename your boot directory in Step 5, press** <Enter> **to continue.**

    You are prompted to enter the path to your existing SERVER.EXE file.

14. **(Conditional) If you did not rename your boot directory in Step 5, type the path to your existing SERVER.EXE file and press** <Enter>**.**

    For example:

    C:\NWSERVER

Note

Recall that the SERVER.31*x* directory was changed to NWSERVER in Step 5.

The boot files are copied to the new destination directory.

Once the files have been copied, a screen might display drivers that were found in the existing startup directory, but were not updated.

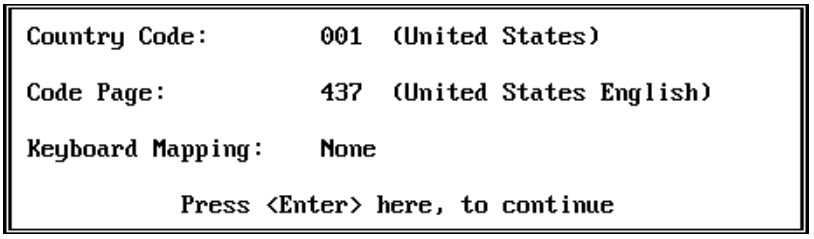
15. **Press** <Enter> **to continue.**

16. **Continue with "Specify Language."**

Specify Language

Once all boot files are copied, the "Language Configuration" screen appears.

Figure 5-3
Language Configuration Screen



Note

For information on any of the settings in this screen, press <F1> or refer to your DOS manual.

Procedure

Procedure

1. **Specify the country code, code page, and keyboard mapping.**

   Use the Up- and Down-arrow keys to maneuver through the screen.

   1a. **(Conditional) If the country code setting is *not* correct, press** <Enter> **to view options and choose an applicable country code.**

   The "Code Page" field is highlighted.

   1b. **(Conditional) If the code page setting is *not* correct, press** <Enter> **and choose an applicable code page.**

   The "Keyboard Mapping" field is highlighted.

   1c. **(Conditional) If you do *not* have a standard U.S. English keyboard, press** <Enter> **and choose an applicable keyboard type.**

2. **Press** <Enter> to save and continue**.**

   SERVER.EXE is then loaded.

3. **Continue with "Load the Device Drivers."**

Load the Device Drivers

Loading Device Drivers Automatically

INSTALL.NLM's driver autodetection functionality detects your server's hardware and might load the appropriate device drivers automatically without any user input.

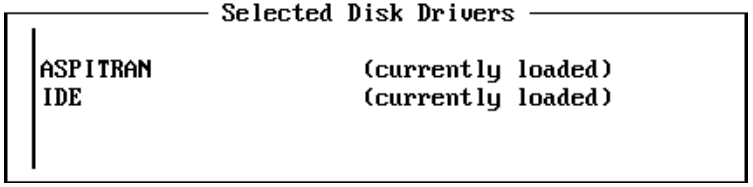
Whether the correct device drivers can load depends on your server bus (supported buses include EISA, PCI, PNPISA, MCA, SCSI, and IDE), and if the driver's product ID is present in the DDI file.

If the device drivers are loaded automatically, the screen in Figure 5-4 does not appear.

If	Go to
INSTALL.NLM loads the device drivers automatically	Step 3 on page 144.
INSTALL.NLM does not load the device drivers automatically	"Loading Device Drivers Manually."

If the device drivers are not autodetected and loaded automatically, a screen similar to the one below appears, displaying the device drivers currently loaded on your server.

Figure 5-4
Loaded Device Drivers Are Displayed



With NetWare 4.2, you can use disk drivers (.DSK files) or replace those with the NetWare Peripheral Architecture™ (NWPA) counterparts.

NPA separates driver support into two components: a Host Adapter Module (.HAM file) and a Custom Device Module (.CDM file). The HAM is the component used to drive the host bus adapter hardware. The CDM is the component used to drive hardware devices attached to a host adapter bus.

There are certain scalability advantages to upgrading to HAMs and CDMs. For more information, see Appendix D, “Understanding Driver Architecture,” on page 223.

Procedure

Procedure 2 3

1. Load your device drivers.

If you want to	Then
Continue to load disk drivers (.DSK files) rather than .HAM and .CDM files	Choose “Continue Installation.” Continue with Step 3 on page 144.
Load the new .HAM and .CDM files	Choose “Deselect a selected drive.” Choose “Select an additional driver.” Then choose the appropriate .HAM file (the corresponding .CDM loads automatically). Continue with Step 2.

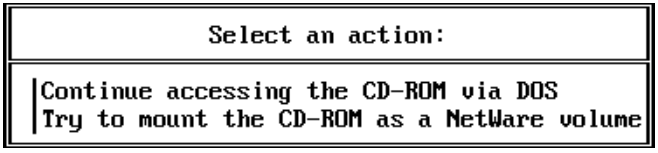
2. Verify that the displayed parameter settings are correct.

If you want to	Then
Accept the default values	Choose “Save Parameters and Continue.”
Change the defaults because they do not match the installed hardware	Choose “Select/Modify Driver Parameters and Continue.”

A prompt appears asking if you want to load any additional drivers.

If you want to	Then
Load additional device drivers	Choose “Yes” and press <Enter>. Then repeat Step 1 and Step 2.
Proceed without loading additional device drivers	Continue with Step 3.

The following screen might appear.



3. **(Conditional) If the menu shown above appears, choose one of the menu options.**

   If a device driver in your STARTUP.NCF file conflicts with the DOS CD-ROM driver, your keyboard could lock up during the upgrade.

   To avoid this, you can attempt to mount the CD-ROM as a NetWare volume. In doing so, you might be prompted to install new device drivers.

   A message appears informing you that your server's AUTOEXEC.NCF file will be scanned for LAN drivers without specified frame types. Any drivers with unspecified frame types will default to the 802.2 frame type.

   If your server was using the 802.3 frame type (for example, NetWare 3.11), change the load command in the AUTOEXEC.NCF file after the upgrade.

4. **Press** <Enter> **to continue.**

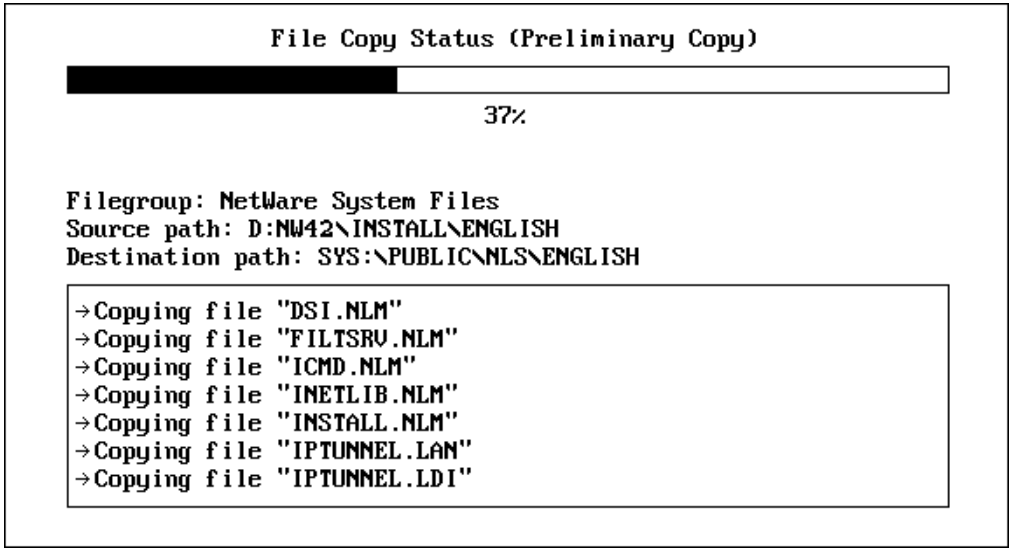
   Driver and name space files are upgraded, available LAN drivers are scanned, and a portion of the NetWare 4.2 files are copied.

   A message appears informing you that certain LAN drivers were replaced with their current updates. A list appears of those drivers that were not replaced.

5. **Press** <Enter> **to continue.**

   At this time, NetWare copies only the SYSTEM and LOGIN files necessary to continue the upgrade. The remaining files are copied later in the upgrade.

Figure 5-5
The Files Needed to Continue Are Copied



You are prompted to insert the *License* diskette.

6. **Insert the *License* diskette and press** <Enter>**.**

   During the server upgrade, you must insert the *NetWare 4.2 Upgrade License* diskette labeled "Server + 5 Connections." Additive licenses can be installed using INSTALL.NLM only after upgrading the server.

7. **When prompted that the license installed successfully, press** <Enter>**.**

   A screen informs you that a temporary AUTOEXEC.NCF file will be executed.

   The temporary AUTOEXEC.NCF file is created from your existing AUTOEXEC.NCF file. Lines that could possibly cause a server abend (such as LOAD .NLM lines) are disabled with a REM command.

8. **View the temporary AUTOEXEC.NCF file.**

If	Then
Statements in your original AUTOEXEC.NCF file are required for your server to communicate on the network	Press <F3>. Remove any necessary REM commands. Press <F10> to continue.
You want to continue and execute the temporary AUTOEXEC.NCF file	Press <Enter> to continue.

9. Continue with "Load the LAN Drivers."

Load the LAN Drivers

Loading LAN Drivers Automatically

INSTALL.NLM's driver autodetection functionality detects your server's hardware and might load the appropriate LAN drivers automatically without any user input.

Whether the correct LAN drivers can load depends on your server bus (supported buses include EISA, PCI, PNPISA, MCA, SCSI, and IDE), and if the driver's product ID is present in the DDI file.

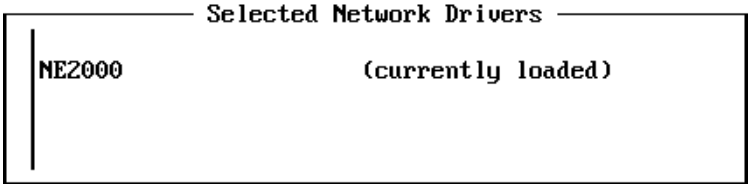
If the LAN drivers are loaded automatically, the screen in Figure 5-6 does not appear.

If	Go to
INSTALL.NLM loads the LAN drivers automatically	Step 2 on page 148.
INSTALL.NLM does not load the LAN drivers automatically	"Loading the LAN Drivers Manually."

Loading the LAN Drivers Manually

If the LAN drivers are not autodetected and loaded automatically, a screen similar to the one below appears, displaying the LAN drivers currently loaded on your server.

Figure 5-6
Loaded LAN Drivers Are Displayed



Procedure

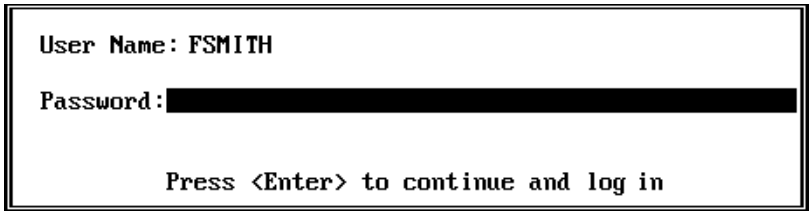
Procedure

1. Determine if you need to make any changes to the displayed LAN drivers.

If	Then
You need to load an additional driver	Choose “Load an additional driver” from the “Additional Driver Actions” menu. Choose the appropriate LAN driver. View the listed driver parameters and make any necessary changes. Choose “Save parameters and load driver” and press <Enter>.
You need to unload a selected driver	Choose “Unload a selected driver” from the “Additional Driver Actions” menu. Highlight the driver you want to unload and press <Enter> to unload it.
You want only the displayed drivers loaded	Press <Enter> to continue.

If you are installing from a remote network installation area, the following screen appears.

Figure 5-7
Enter Your Password to Reconnect to the Source Server



2. **(Conditional) Reenter your password to reconnect to the source server, and press** <Enter>**.**

   If you are installing from a remote network installation area, a client connection to the source server is disrupted once the LAN driver is loaded.

   The path to the source server is held in the client's memory, but you must reenter the password.

3. **Press** <Enter> **again.**

   If you are upgrading a NetWare 4 server, you are prompted to enter the Administrator password.

4. **(Conditional) Enter the Administrator password and press** <Enter>**.**

If you are upgrading a	Go to
NetWare 3.1*x* server	"Install Novell Directory Services (Conditional)."
NetWare 4.*x* server	"Modify the AUTOEXEC.NCF File" on page 169.

Install Novell Directory Services (Conditional)

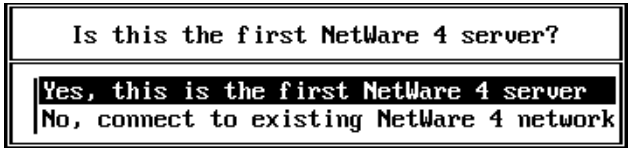
Novell Directory Services (NDS) is a relational database that is distributed across your entire NetWare 4 network. NDS provides global access to all network resources to which you have been given rights, regardless of where they are physically located.

Users log in to a multiserver network and view the entire network as a single information system called a Directory tree. The Directory tree's single view is the basis for increased productivity and reduced administrative costs.

The network is scanned for Directory trees. Unless you are upgrading the first NetWare 3.1*x* server in the network, you will most likely want to place the server into an existing Directory tree.

Based on your network configuration, one of the following screens appears.

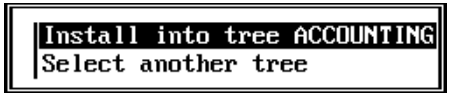
Figure 5-8
When No Directory Tree Is Located



If no NetWare 4 server (and associated Directory tree) can be located on the network, the menu shown above appears.

If	Go to
The menu in Figure 5-8 appears	"A Nonlocatable Directory Tree, or the First 3.1x Server Upgrade" on page 151.

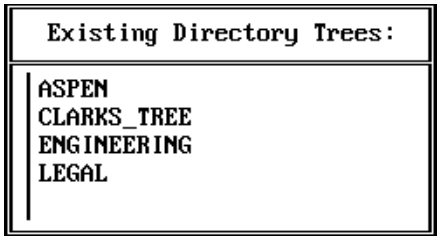
Figure 5-9
When a Single Directory Tree Is Located



If a single Directory tree is located, the Directory tree name is displayed as in the menu above.

If	Go to
The menu in Figure 5-9 appears	“A Single Directory Tree Is Found” on page 160.

Figure 5-10
When Multiple Directory Trees Are Located

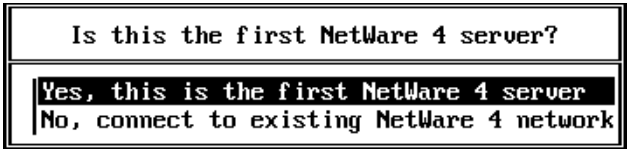


If multiple Directory trees are located, a menu similar to the one shown above appears.

If	Go to
The menu in Figure 5-10 appears	“Multiple Directory Trees Are Found” on page 163.

The menu below appears if there is no previously installed NetWare 4 server, or if the server you are upgrading cannot see the previously installed NetWare 4 server(s).

Figure 5-11
When No Directory Tree Is Located



If the Server Cannot Locate a Previously Installed Directory Tree

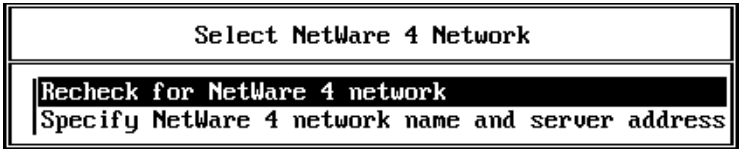
Procedure

Procedure

1. **From the "Is this the first NetWare 4 server?" menu, choose "No, connect to existing NetWare 4 network" and press** <Enter>**.**

   The following menu appears:

Figure 5-12
Select NetWare 4 Network Menu



You can find out the network name by loading MONITOR.NLM on an existing server on the network. The network name is the same as the Directory tree name.

2. Choose one of the menu options.

If	Then
You have verified that an existing NetWare 4 server is up and physically connected to this server, and that both servers are bound to IPX™ with the proper LAN driver, frame type, and IPX external network number	Choose “Recheck for NetWare 4 Network” and press <Enter>. If a single Directory tree is located, go to “A Single Directory Tree Is Found” on page 160. If multiple Directory trees are located, go to “Multiple Directory Trees Are Found” on page 163.
Your network has SAP filtering and you know the IPX internal network number of an existing NetWare 4 server	Choose “Specify Address of NetWare 4 Server” and press <Enter>. Enter the name of the Directory tree and press <Enter>. Enter the IPX internal network number of an existing NetWare 4 server in the Directory tree and press <Enter>. If a single Directory tree is located, go to “A Single Directory Tree Is Found” on page 160. If multiple Directory trees are located, go to “Multiple Directory Trees Are Found” on page 163.

If This Is the First NetWare 3.1*x* Server Upgrade

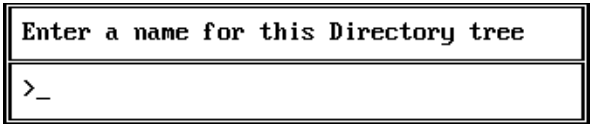
Procedure

Procedure 2 of 3

1. Choose “Yes, this is the first NetWare 4 server” and press <Enter>**.**

The following screen appears, ready for you to name your new Directory tree.

Figure 5-13
Enter a Name for the Directory Tree



2. Specify the Directory tree name and press <Enter>**.**

Each Directory tree (hierarchy of the Novell Directory database) must have a name that's unique across the internetwork. (Most organizations have only one Directory tree.) For more information on Directory trees, see *Guide to NetWare 4 Networks*.

Each Directory tree has its own database of objects that is not visible from another tree. Be aware of this limitation before creating multiple Directory trees.

Once a Directory tree name has been entered, a list of time zones appears. (This list does not contain all existing time zones.)

3. Set up time synchronization.

For more information on time synchronization, see Chapter 5, "Planning the Time Synchronization Strategy" in *Guide to NetWare 4 Networks*, and "Time synchronization" in *Concepts*.

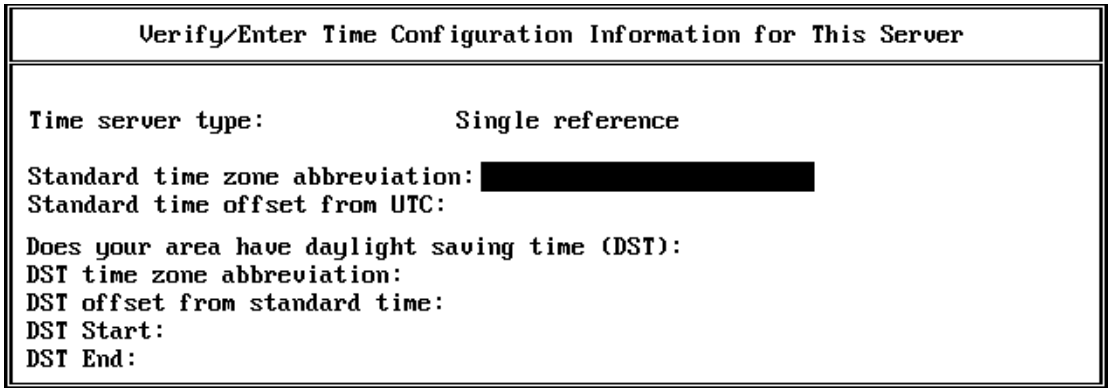
3a. Choose the time zone where this server exists.

If the time zone	Then
Is listed	Move the cursor to the appropriate time zone and press <Enter>. Verify that the information presented is correct. If it is, press <F10> and skip to Step 4. If it isn't, follow Step 3b through Step 3k to enter correct information.
Is not listed	Press <Ins> and continue with Step 3b.

3b. At the "Time Configuration Parameters" screen, verify or specify time synchronization parameters.

The following screen appears. The cursor appears in the "Standard Time Zone Abbreviation" field.

Figure 5-14
Time Configuration Screen



3c. (Conditional) If you want to choose a different time server type, highlight the "Time Server Type" field and press <Enter>**.**

There are four time server types:

- Single Reference
- Reference
- Primary
- Secondary

The default sets the first server in the Directory tree as a Single Reference server. All other servers default as Secondary servers.

Important

Do not change the time server defaults without a clear understanding of time server types. Press <F1> for help, or refer to Chapter 5, "Planning the Time Synchronization Strategy" in *Guide to NetWare 4 Networks*, for a description of these time server types.

3d. In the "Standard Time Zone Abbreviation" field, enter the three-letter abbreviation for your standard time zone and press <Enter>**.**

Not all time zones have agreed-upon abbreviations. Time zone information is subject to local custom and national rules. Find out what the commonly used abbreviation for your standard time zone is, or enter your own abbreviation.

The time information you specify is saved in this server's AUTOEXEC.NCF file. You can change it later by editing this file (see "Modify the AUTOEXEC.NCF File" on page 169.)

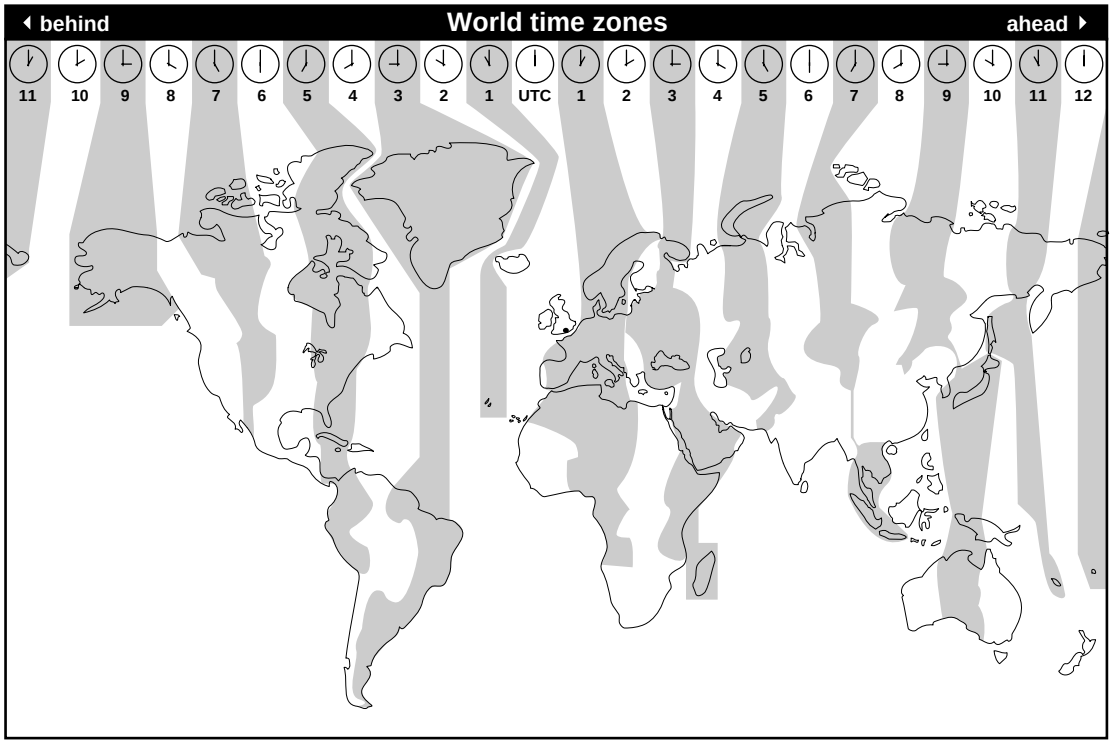
3e. In the "Standard Time Offset from UTC" field, enter the offset (in hours) from UTC (Coordinated Universal Time, sometimes known as Greenwich Mean Time) and press <Enter>**.**

If your time zone is east of UTC, use "AHEAD" with the number, since your time is ahead of UTC. For example, in Germany you would type "1" and then press <Enter> to toggle to "AHEAD."

If your time zone is west of UTC, toggle to "BEHIND" because your time zone is behind UTC.

Use the following illustration to find your time zone's offset from UTC.

Figure 5-15
World Time Zones and Their Offsets from UTC



3f. In the "Does Your Area Have Daylight Saving Time (DST)" field, press <Enter> **and use the arrow keys to toggle between "Yes" and "No."**

If	Then choose	And then
Your time zone switches to daylight saving time (and back to standard time) during each year	Yes	Continue with Step 3g.
Your time zone never switches to daylight saving time	No	Continue with Step 3k.

3g. In the "DST Time Zone Abbreviation" field, enter the three-letter abbreviation your time zone uses during daylight saving time and press <Enter>**.**

Important

If you do not specify the abbreviation for daylight saving time, the server won't automatically adjust for the seasonal change. Internal algorithms assume that if no DST abbreviation is specified, local custom is to not observe DST.

3h. In the "DST Offset from Standard Time" field, enter the difference between standard time and daylight saving time and press <Enter>**.**

Enter the offset in hours:minutes:seconds. The default is 1:00:00 (one hour) *ahead*, meaning that your daylight saving time is one hour ahead of your standard time.

If daylight saving time in your area varies from your standard time by more or less than the default (one hour), enter a different time offset.

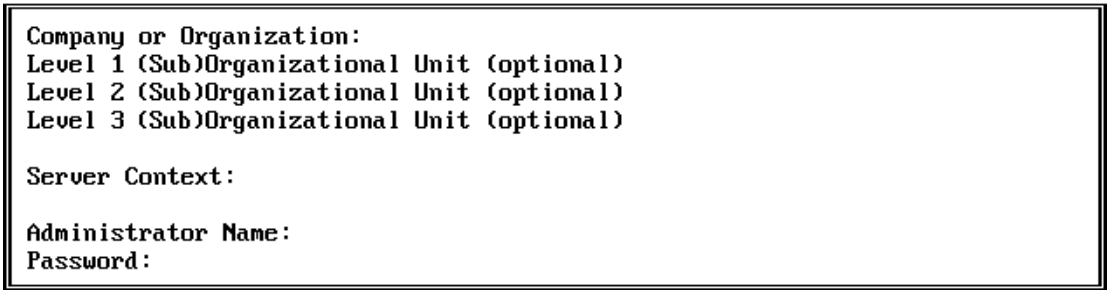
3i. In the "DST Start" field, specify the starting day for daylight saving time and press <Enter>**.**

3j. In the "DST End" field, specify the day daylight saving time ends and press <Enter>**.**

3k. Save the time configuration information by pressing <F10> **and then** <Enter>**.**

The following screen appears, prompting you to specify the server's NDS context.

Figure 5-16
Server Context Screen



4. Specify the server's context.

The server context, or name context, specifies where the server is located in the hierarchical Directory tree. The context is composed of

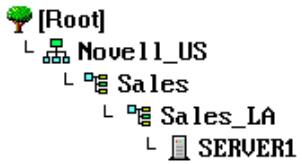
- A company or organization name (example: O=Novell).
- Optional names of organizational units and subunits, such as divisions or departments (example: OU=Sales).
- An optional country code (example: C=US).

Note

For recommendations on how to lay out your Directory tree, see Chapter 3, "Designing the Directory Tree Structure" in *Guide to NetWare 4 Networks*.

For example, if your NetWare server were located in the "Sales_LA" group of the Sales department of a company called "Novell_US," the server's context would look like this:

Figure 5-17
Example of a Context



OU=Sales_LA OU=Sales O=Novell_US

Note

The object "[Root]" is automatically created during NDS installation.

For more information on context and naming conventions, see *Guide to NetWare 4 Networks*.

4a. In the "Company or Organization" field, type your company or organization name and press <Enter>.

Only valid characters (letters a through z, numbers 0 through 9, hyphen, underscore) can be used.

4b. (Optional) In the "Level 1 (Sub)Organizational Unit" field, type in an Organizational Unit name (such as a division or a department) and press <Enter>**.**

4c. (Optional) in the "Level 2 (Sub)Organizational Unit" field, type in an additional Organizational Unit name and press <Enter>**.**

4d. (Optional) In the "Level 3 (Sub)Organizational Unit" field, type in an additional Organizational Unit name and press <Enter>**.**

You can manually enter more than three levels of Organizational Units (up to 25) into the "Server Context" field. Make sure you enter a period (.) as a delimiter between each new entry.

Entries in the "Server Context" field must be in a typeless naming format. For example, the context in Figure 5-17 would be .SALES_LA.SALES.NOVELL_US

4e. (Optional) Return to the "Server Context" field and type a country code or additional Organizational Units and press <Enter>**.**

Enter the country code after the company name, separated by a period. For example, if your country is France, add ".C=FR" to the end of the server context.

Although a country code is not required, it can be useful in a multinational organization.

For a list of country codes, see Appendix C, "Country Codes," on page 221.

Adding a country code to the context might create some problems with default naming in some NetWare 4.2 utilities, because the utilities assume the highest level to be O=*organization*.

That means that if you use Country in the Directory tree, you always have to include name typing (CN=.OU=.O) whenever you log in or refer to an object name in the tree, regardless of what context you or the other object are in.

For example, if you included the country code for the United States (US), the object name for Dave Smith might be

CN=DSSMITH.OU=ACCOUNTING.O=NOVELL.C=US

For more information, see Chapter 3, "Designing the Directory Tree Structure" in *Guide to NetWare 4 Networks*.

If you want to establish more than three Organizational Unit levels, you can do so while in the "Server Context" field. For example, if you wanted to create a fourth Organizational Unit level in Figure 5-17 on page 158, you would type OU=*organizational unit name* on the left end of the context.

5. **Note the administrator's name.**

   The default common name (CN) for the administrator of the first NetWare 4.2 server in a Directory tree is ADMIN. User ADMIN is created directly under the Organization (O=) level.

6. **Type the administrator's password and press** <Enter>**.**

7. **At the prompt, retype the password and press** <Enter>**.**

Important

This password is also the password for the bindery user SUPERVISOR. If you change the administrator password later (using the NetWare Administrator or NETADMIN utilities), the SUPERVISOR password does *not* change until you change it using the SYSCON utility.

8. **Press** <F10> **to save the Directory information.**

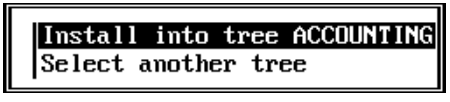
   A message appears indicating that Novell Directory Services is being installed.

9. **Continue with "Modify the AUTOEXEC.NCF File" on page 169.**

A Single Directory Tree Is Found

If, after scanning the network, a single Directory tree is found, the tree name is displayed along with the following menu:

Figure 5-18
When a Single Directory Tree Is Found



Procedure

Procedure

1. Choose an option from the menu.

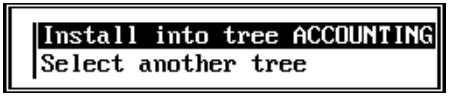
If	Then
You want to install into the displayed Directory tree	Go to “Install into the Displayed Directory Tree” on page 161.
You want to install into a Directory tree that is not displayed	Go to “If the Server Cannot Locate a Previously Installed Directory Tree” on page 151.
You want to create a new Directory tree	Choose “Select Another Tree” and press <Enter>. Press <Ins>. At the confirmation prompt, press <Enter>. Follow the procedures under “If This Is the First NetWare 3.1x Server Upgrade” on page 152.

2. Continue by following the on-screen prompts.

Install into the Displayed Directory Tree

Install the new NetWare 4.2 server into the Directory tree displayed in the menu below by completing the following procedure:

Figure 5-19
When a Single Directory Tree Is Found



Important

Depending on its structure, the displayed Directory tree can be either a “simple” tree (a single-level tree installed using the “Simple Installation” option) or a “custom” tree (a multilevel tree installed using the “Custom Installation” option).

Procedure

Procedure

1. **Choose “Install into Tree** *tree name*”** **and press** <Enter>**.**

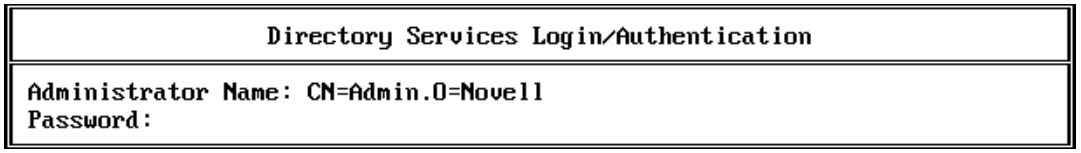
   A list of time zones appears.

2. **Set up time synchronization by completing Step 3 on page 153.**

   After setting up time synchronization, one of the following screens appears:

Figure 5-20
When a Simple Directory Tree Is Found

Figure 5-21
When a Custom Directory Tree Is Found



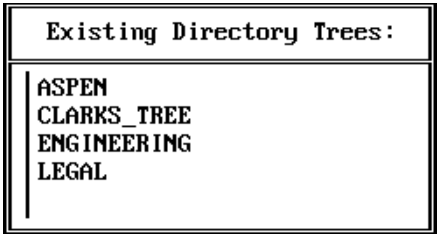
If	Then
The screen in Figure 5-20 appears	Type the administrator password and press <Enter>. Continue with “Modify the AUTOEXEC.NCF File” on page 169.
The screen in Figure 5-21 appears	If necessary, type the administrator name and press <Enter>. Type the administrator password and press <Enter>. Complete Step 4 on page 157 to set up the server’s context. Then continue with “Modify the AUTOEXEC.NCF File” on page 169.

If	Then
The screen in Figure 5-20 appears and you want to customize (add additional levels to) the Directory tree	Press <F4>. If necessary, type the administrator name and press <Enter>. Type the administrator password and press <Enter>. Complete Step 4 on page 157 to set up the server's context. Then continue with "Modify the AUTOEXEC.NCF File" on page 169.

Multiple Directory Trees Are Found

If multiple Directory trees are found, the "Existing Directory Trees" menu appears:

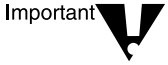
Figure 5-22
When Multiple Directory Trees Are Found



Procedure

1. Choose the Directory tree you want this server to be part of.

A list appears of all Directory trees that are visible from this server.



Make sure you choose the correct Directory tree name. If your organization has more than one tree, attaching to the wrong tree or creating a new Directory tree prevents this server from sharing data within the desired Directory database.

Choosing an existing tree makes this server part of that tree's Novell Directory database.

1a. (Conditional) If the Directory tree you want this server to be part of is not displayed, verify that an existing NetWare 4 server in that tree is up and physically connected to this server, and that both servers are bound to IPX with the proper LAN driver, frame type, and IPX external network number. Then press <F4> **to rebuild the list.**

1b. (Conditional) If your network has SAP filtering and you know the IPX internal network number of an existing NetWare 4 server, press <F3> **and enter the name of the Directory tree and press** <Enter>**. Then, enter the IPX internal network number of an existing NetWare 4 server in the Directory tree and press** <Enter>**.**

1c. (Conditional) If you need to create a new Directory tree on the network, press <Ins>**. At the confirmation prompt, press** <Enter>**. Follow the procedures under "If This Is the First NetWare 3.1x Server Upgrade" on page 152.**

2. Specify time synchronization parameters.

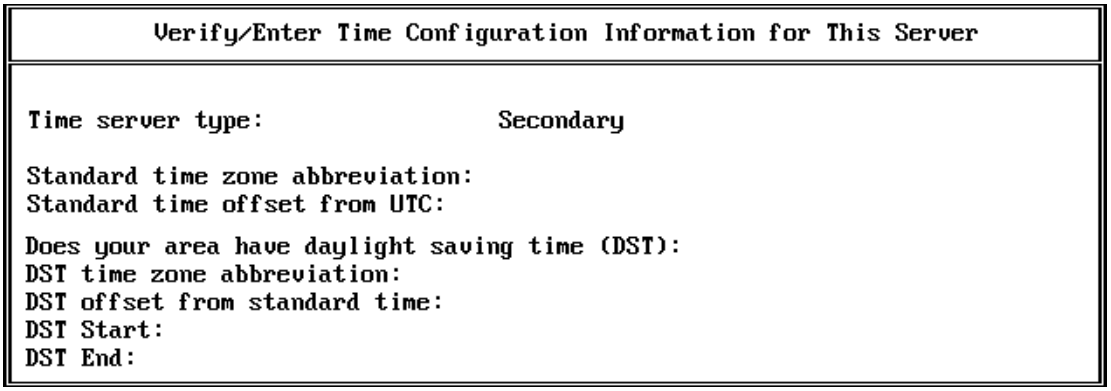
2a. Choose the time zone you want to upgrade this server in.

If	Then
Your time zone is listed	Move the cursor to your time zone and press <Enter>. Verify that the information presented is correct. If it is, press <F10> and continue with Step 3. If it isn't, enter the correct information by proceeding with Step 3b under "If This Is the First NetWare 3.1x Server Upgrade" on page 152.

If	Then
Your time zone is not listed	Press <Ins> and proceed with Step 3b under “If This Is the First NetWare 3.1x Server Upgrade” on page 152.

The time configuration defaults for all servers except the first NetWare 4 server appear.

Figure 5-23
Time Configuration Screen



2b. (Conditional) If you chose a simple Directory tree, the following screen appears.

Figure 5-24
If You Chose a Simple Directory Tree

Note

A “simple” Directory tree is a single-level tree that was installed using the “Simple Installation” option.

If	Then
You want to place this server into the simple Directory tree	Type the administrator password and press <Enter>. Continue with “Modify the AUTOEXEC.NCF File” on page 169.

If	Then
You want to customize the simple Directory tree (create multiple levels)	Press <F4>. If necessary, type the administrator name and password and press <Enter>. Type the administrator password and press <Enter>. Complete Step 4 on page 157. Continue with "Modify the AUTOEXEC.NCF File" on page 169.

2c. In the "Verify/Enter Time Configuration Information for this Server" screen, verify or specify time synchronization parameters.

Refer to Chapter 5, "Planning the Time Synchronization Strategy" in *Guide to NetWare 4 Networks* for information on how to plan for time synchronization.

Then see "A Nonlocatable Directory Tree, or the First 3.1x Server Upgrade" on page 151 for instructions on how to configure time parameters.

2d. Press <F10> **to save and continue.**

A prompt appears asking for the administrator login name and password.

3. (Conditional) If the administrator's name is not displayed, type the complete name for the administrator and press <Enter>**.**

For example, type

```
CN=ADMIN.O=NOVELL
```

Or, if you specified a country, type

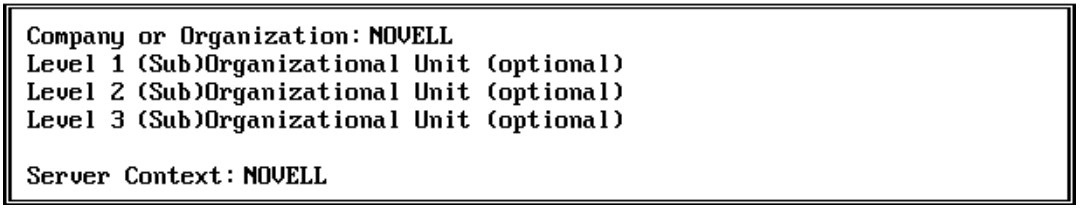
```
CN=ADMIN.O=NOVELL.C=US
```

When the first NetWare 4 server is installed, the administrator's default name is ADMIN, but this name could have been changed after the first NetWare 4 server was installed.

4. **Type the administrator's password and press** <Enter>**.**

5. **In the screen shown below, choose an existing NetWare 4 context or specify a new one.**

Figure 5-25
Specify the Server Context



If you want to	Then
Place this server into a previously defined context	Press <Enter> at each organizational level to view existing container objects and choose the object you need.
Define a new context for this server	Enter one or more new Organizations (O=) and/or Organizational Units (OU=). See below for examples.

You can either place this server into a previously defined context or you can specify a new context. By defining a context that doesn't exist yet, you create the context—that is, you create a new branch in the Directory tree.

Assume the context of the only existing NetWare 4 server is

OU=NEW_PRODUCTS.OU=MARKETING.O=NOVELL

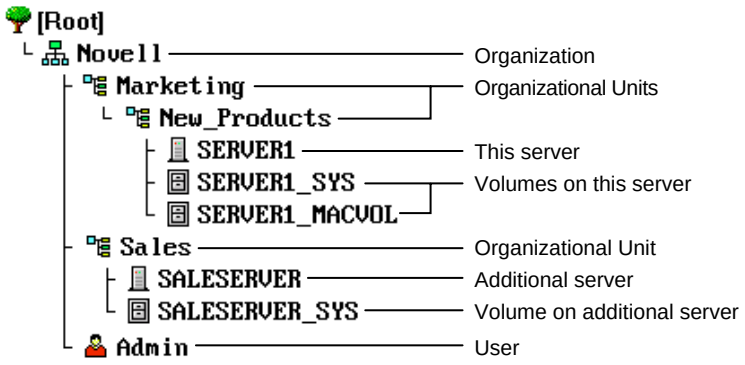
If you specify the new server's context as

OU=SALES.O=NOVELL

the Directory tree will have a new "branch" (Sales). After server upgrade, you can view your Directory tree using the NETADMIN or NetWare Administrator utility.

The following illustration shows an expanded tree:

Figure 5-26
Expanded Directory Tree Example



Important

By default, INSTALL.NLM adds a replica of the partition that contains the server's context only if the number of existing replicas is less 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.

In the example above, the master replica of the partition "OU=SALES" resides on server SALESSERVER. Its read-write replica resides on server SERVER1. You can modify partitions with PARTMGR NetWare Administrator, after server and workstation installations are complete.

For more information on Directory partitions, see Chapter 4, "Determining a Partition and Replication Strategy" in *Guide to NetWare 4 Networks*.

6. **To save Directory information, press** <F10>**.**

   A confirmation menu appears.

7. **Press** <Enter> **to choose "Yes."**

8. **Continue with "Modify the AUTOEXEC.NCF File."**

Modify the AUTOEXEC.NCF File

INSTALL.NLM scans the server's AUTOEXEC.NCF file to verify that Ethernet 802.2 frame support is loaded for Ethernet LAN drivers.

NetWare versions earlier than NetWare 3.12 used the Ethernet 802.3 frame type. Your upgraded server by default loads the 802.2 frame type. The new frame type, along with the new NDS information, is displayed in a new AUTOEXEC.NCF file.

Procedure

Procedure

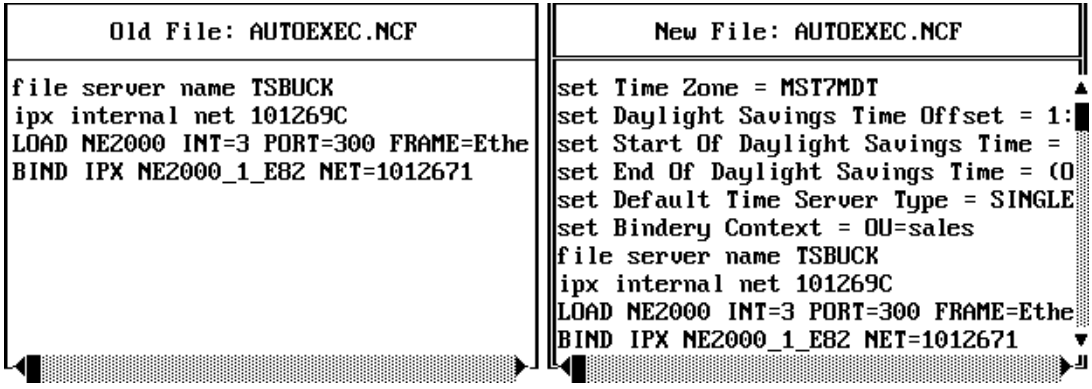
1. **Read the prompt explaining the changes in the AUTOEXEC.NCF file and press** <Enter>**.**

   A new prompt appears, listing other changes that might be added to the AUTOEXEC.NCF file.

2. **Read the prompt and press** <Enter>**.**

   A screen similar to the one below appears.

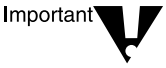
Figure 5-27
The Old and New AUTOEXEC.NCF Files Are Displayed



The old AUTOEXEC.NCF file is displayed on the left, the new one is displayed on the right.

Use the scroll bars to view the portions of the lines that are out of view.

3. **Make any desired modifications to the new AUTOEXEC.NCF file using the keys indicated on the screen.**



If you are upgrading a NetWare 3.11 server, or if your server's old AUTOEXEC.NCF file had a command to load the 802.3 frame type, a LOAD command for both the Ethernet 802.2 and 802.3 frame types are placed in the new AUTOEXEC.NCF file. To reduce network traffic, load only one frame type, preferably the 802.2.

4. **Press** <F10> **to continue.**

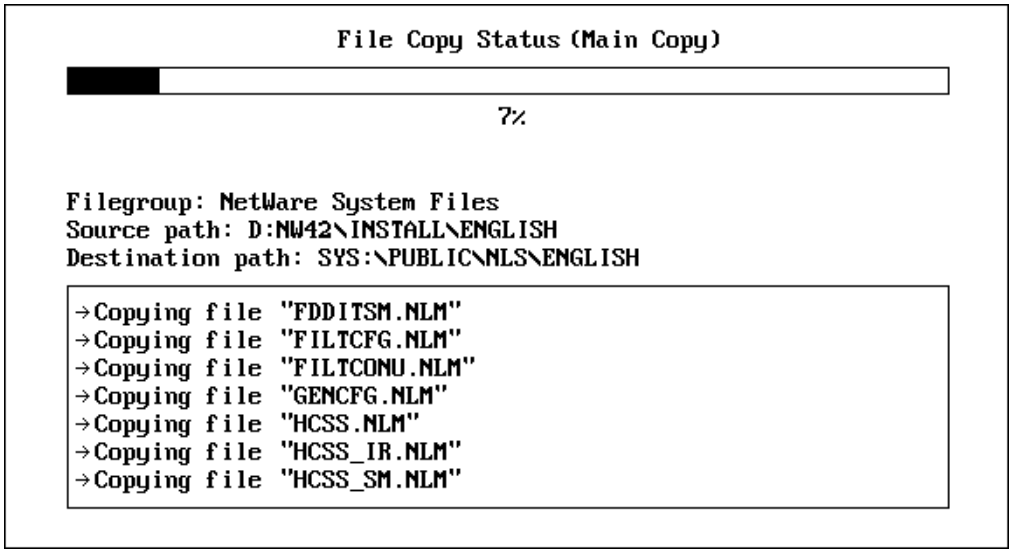
A prompt appears asking if you want to save the new AUTOEXEC.NCF file.

5. **Choose "Yes" and press** <Enter> **to save the new AUTOEXEC.NCF file.**

The remaining NetWare files are copied to the server. This could take several minutes.

After these files are copied, the server upgrade is essentially complete. If you want, you can install additional items or products. For a discussion of each item or product, see "Perform Other Installation Options (Optional)" on page 104 in Chapter 3, "Custom Installation."

Figure 5-28
The Remaining NetWare Files Are Copied to the Server



Once the remaining NetWare files have been copied, the upgrade is complete. A menu of optional installable products and items is displayed.

6. **(Conditional) If you want to perform any of the installation options, continue with “Perform Other Installation Options (Optional)” on page 104 in Chapter 3, “Custom Installation.”**

What to Do after the Upgrade

Once your servers are upgraded, you should take the time to perform any applicable network upgrade tasks. These include

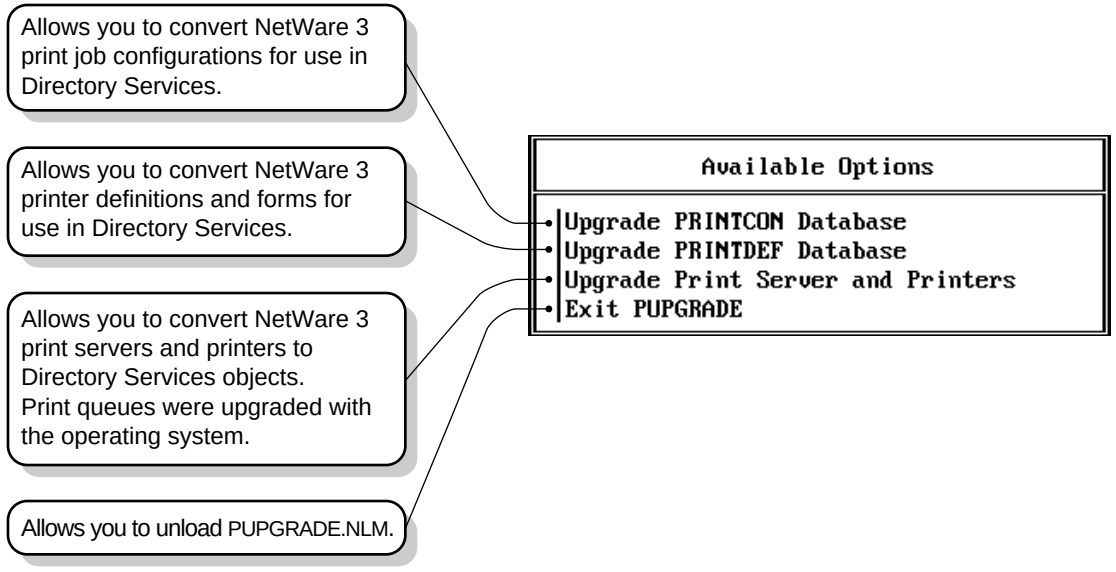
- Upgrading your printing configuration
- Modifying login scripts
- Copying NetWare 4.2 utilities to other servers (conditional)
- Other administrative tasks

Upgrading Your Printing Configuration

Upgrade your NetWare 3 print servers and queues to NetWare 4 NDS objects, as well as PRINTCON and PRINTDEF databases to the NetWare 4 format using the PUPGRADE.NLM.

The following figure shows the tasks you can perform with PUPGRADE.NLM.

Figure 5-29
PUPGRADE Tasks



Upgrading NetWare 3 Printing Objects with PUPGRADE.NLM

Use the following procedures to upgrade bindery print servers, printers, print job configurations, or print device definitions.

Procedure

1. **At the system console, type**

   `LOAD PUPGRADE` <Enter>

PUPGRADE.NLM can also be launched by loading INSTALL.NLM, selecting “Product Options,” and then selecting “Upgrade 3.1*x* Print Services.”

2. **Type in your username at the prompt.**

   You must be user ADMIN or equivalent. For example, you might type

   `.ADMIN.NOVELL`

   You are also prompted for a password.

3. **Enter your password and press** <Enter>**.**

   The “Available Options” menu appears.

4. **Select the option you want.**

   Each option is discussed in the following paragraphs.

Upgrading the PRINTCON Database

When you select “Upgrade PRINTCON Database,” a log appears that shows the elements of the database as they are upgraded. No action is required.

When the upgrade process is complete, the log is stored in ASCII format as file SYS:SYSTEM/PRINTCON.UPG. Here you can read the upgrade information and review any errors that might have occurred.

Upgrading the PRINTDEF Database

When you select "Upgrade PRINTDEF Database," an "Enter Context" window appears with the container object listed (example: "O=Novell"). Select the context shown or type the context you want to use. Then press <Enter>.

A log appears that shows the forms, device definitions, functions, and modes that are being upgraded. No action is required.

When the upgrade process is complete, the log is stored in ASCII format as file SYS:SYSTEM / PRINTDEF.UPG. Here you can read the upgrade information and review any errors that might have occurred.

Upgrading a Print Server and Associated Printers

When you select "Upgrade Print Server and Printers," a list of the existing NetWare 3 print servers appears. Select the server you want to upgrade.

A log appears that shows the print server being upgraded, printers that are being upgraded, notification objects, print queues, and so forth. No action is required.

Only print servers that existed before the NetWare server was upgraded appear on this list. After you have upgraded your NetWare 3 server, you cannot add any bindery objects that PUPGRADE recognizes. If you add a bindery print server after the NetWare server is upgraded, the print server has no Directory Services object ID assigned to it. PUPGRADE finds only the old bindery ID, not the Directory Services object ID it is looking for.

Also, because user ADMIN does not exist in NetWare 3, user ADMIN is not included in the list of authorized users for upgraded print queues. In addition, user ADMIN is not included as an authorized operator for upgraded print queues and print servers. You must manually add user ADMIN to these lists before it is authorized.

User SUPERVISOR is not carried over to the NetWare 4 environment.

When the upgrade process is complete, the log is stored in ASCII format as file SYS:SYSTEM / <*printserver*>.UPG. Here you can read the upgrade information and review any errors that might have occurred. Each print server has its own upgrade log file.

Modifying Login Scripts

You must make any necessary modifications to the container login script (which replaces the NetWare 3 system login script) and user login scripts.

If you changed the server name, update references to the server in the container and user login scripts.

Although user login scripts are upgraded, they are not modified and server names are not changed to match your new environment. Use the NetWare Administrator utility to modify the login scripts.

If you have set up your login scripts so that users have drive mappings to directories in which they have no rights, these users receive the following message when they log in:

```
Attempt to map drive to invalid path in MAP command.
```

Complete one of the following:

- Delete the drive mapping from the login script.
- Delete the drive mapping from the system login script and insert the drive mapping in the user's login script only when the user has been granted rights to the directory.
- Create a group, grant the group the trustee assignment, assign the appropriate users to the group, and then use an IF…THEN command in the system login script before the drive mapping (IF member of "*groupname*," THEN map *drive*:=*volume:directory*).

Certain login script commands have to be modified or deleted after the upgrade:

- MEMBER_OF_*group*

  Groups have been replaced by Group objects and Profile objects. This variable becomes a Group object in NetWare 4. For more information, see Chapter 3, "Creating Login Scripts" in *Supervising the Network*.

- MAP command

  When you map a drive to a directory that's located on a NetWare 4 NDS volume, modify the volume name to correspond to the new Directory name.

  However, when you map a drive to a server that is running a previous version of NetWare, the MAP command functions as it did originally and must include the servername.

- ATTACH command

  Users can still attach to pre-4.2 servers, but the ATTACH command is not valid for NetWare 4.2 servers.

The majority of login commands work the same under NetWare 4.2 as they did under previous NetWare versions. In MAP commands, if the server is not specified (MAP F:=SYS:directory), the Message Server attribute of the User is used.

Copying NetWare 4.2 Utilities to Other Servers (Conditional)

If you are going to maintain a mixed NetWare 3 and NetWare 4 environment, copy some NetWare 4.2 utilities to the PUBLIC directories of the 3.*x* servers.

You can copy these utilities easily using the NetSync utility. NetSync also unifies the individual 3.*x* server binderies. If you do not want the binderies unified, copy the files manually.

If you decide to copy the files manually, do not copy the listed print files. The print files are needed only for binderies unified through NetSync.

For a list of the files, refer to the INSTALL.DAT file located in the SYSTEM\NETSYNC subdirectory.

Other Administrative Tasks

You should review the post-upgrade suggestions below.

- Check applications to see if they run properly.

  Some DOS applications don't work when installed on volumes that have more than 32 MB of disk space. Some of these applications can be made to work by doing the following:

  - Restrict the application's directory on the destination server with DSPACE.
  - Make the directory path a fake root using the MAP command.

- Check directory security.
- Set new directory and file attributes using FLAG or FILER.
- If you have workstations that boot from diskettes, create new boot diskettes for each workstation.
- If the server was renamed, change the server's name in the users' AUTOEXEC.BAT files to the new NetWare 4.2 server name.
- Check user restrictions and accounting charge rates to make sure your system is configured the way you want it.
- (Optional) To store Macintosh* files and folders on a NetWare 4.2 server, install NetWare for Macintosh on the NetWare 4.2 server.

  This product provides support for Macintosh workstations that connect to the NetWare 4.2 server.

- Assign Directory object and property rights to Directory objects that were upgraded from bindery objects.

  See Chapter 1, "Managing Novell Directory Services Objects," in *Supervising the Network* for details.

- To set up the maximum amount of disk space a user can use, use the NETADMIN or NetWare Administrator utility in NetWare 4.2 after you have finished the upgrade to NetWare 4.2.
- Allow users to log in to the NetWare 4.2 server.

Users can log in if

- Volume SYS: is mounted
- The user exists in the bindery
- The LAN driver is loaded and bound to a protocol
- Logins are enabled

To ensure that logins are enabled, type

ENABLE LOGIN <Enter>

chapter 6

Moving Bindery Objects and Files to NDS

This chapter explains how to use the Novell® Upgrade Wizard to copy your NetWare® 3.1*x* or NetWare 3.2 server bindery and file system "across-the-wire" (via the network) and place them in a desired location in an existing NDS™ tree.

Upgrading across-the-wire (frequently referred to as a "migration") using the Novell Upgrade Wizard includes

- Copying the NetWare 3.1*x* or NetWare 3.2 server bindery and upgrading the individual bindery objects to NDS objects in the NDS tree.
- Moving the contents of individual volumes on the NetWare 3.1*x* or NetWare 3.2 server to existing volumes in the NDS tree.

The process involves the following steps:

1. Installing the utility
2. Preparing for the migration
3. Launching the utility
4. Preparing a project
5. Moving objects in the Project Window
6. Verifying that objects and files can be upgraded as specified
7. Migrating across-the-wire

Installing the Novell Upgrade Wizard

The Novell Upgrade Wizard is *not* installed during the installation of NetWare 4.2. You must therefore install it on the workstation you plan to use during the migration.

1. **At the workstation where you will be running the Novell Upgrade Wizard, insert the NetWare 4.2 Operating System CD-ROM into the CD-ROM drive.**

2. **Locate the self-extracting executable at the following path:**

   \products\upgrdwzd\upgrdwzd.exe

3. **Execute the self-extracting file by typing `upgrdwzd` and then following the prompts.**

Preparing for the Migration

You must complete several tasks before you can use the Novell Upgrade Wizard. Each is discussed below.

- ❑ Perform a system backup.

- ❑ Always back up the NDS database and the volumes to which the NetWare 3.1*x* or NetWare 3.2 file system will be migrated. This measure protects against possible file loss or corruption during the migration.

- ❑ Verify workstation system requirements.

  You can run the Novell Upgrade Wizard from either a Windows* 95 or Windows NT* workstation.

  For Windows 95, upgrade to Novell Client™ for Windows 95 version 3.0 or higher.

You can find the client version by choosing Start > Settings > Control Panel and then double-clicking Network, choosing Novell NetWare Client, then clicking the Properties button. The Novell Client page appears with the client version at the bottom. If this procedure did not access the client version number for you, your client must be upgraded.

You can get a free client upgrade at http://www.novell.com/download

For Windows NT, upgrade your client to Novell Client for Windows NT version 4.5 or higher.

You can find the client version on the title bar of the Login dialog.

You can get a free client upgrade at http://www.novell.com/download

❑ Verify that you have sufficient rights.

You must have Supervisor or equivalent rights to both the NetWare 3.1*x* or 3.2 and NetWare 4.2 servers. If you are not authenticating to the NDS tree as user Admin, you must have Console Operator rights granted to you.

❑ Disable SAP filtering (conditional).

You should ensure that SAP filtering is disabled on each server involved in the migration. If SAP filtering cannot be disabled, you should ensure that the default server (preferred server) for the client is on the same LAN segment as the other servers you are migrating to and from.

❑ Update NLM™ programs on the NetWare 3.1*x* server.

For the Novell Upgrade Wizard to work properly, some NLM programs may need to be updated with more recent versions. Working versions of these NLM programs are found in the products\nw3x subdirectory in the location where you installed the Novell Upgrade Wizard. For example, if you installed using the default path, the NLM programs are in c:\program files\novell\upgrade\products\nw3x

❑ Unload NLM programs on the NetWare 3.1*x* or NetWare 3.2 server.

Unload the following NLM programs in the order indicated:

- Tsa311.nlm or tsa312.nlm
- Smdr.nlm
- Smdr31x.nlm
- Spxs.nlm
- Tli.nlm
- After311.nlm
- Clib.nlm
- A3112.nlm
- Streams.nlm

Important

Some NLM programs require you to unload additional interdependent NLM programs. If doing so becomes too cumbersome or impossible, you can reboot your server. When the server is rebooted, the previously copied NLM programs are loaded.

If the server's autoexec.ncf file includes a LOAD command for tsa311.nlm or tsa312.nlm, the NLM loads automatically and you do not need to load it manually as documented below.

❑ Update NLMs on the NetWare 4.2 server

You must update the map3xids.nlm and copy the new miglib.nlm on the NetWare 4.2 server you are migrating to. Both NLMs can be found in the products\nw4x subdirectory in the location where you installed the Novell Upgrade Wizard. For example, if you installed using the default path, the NLM is at:

c:\program files\novell\upgrade\products\nw4x

❑ Load the new tsa311.nlm or tsa312.nlm (conditional).

The tsa311.nlm or tsa312.nlm must be loaded on the NetWare 3.1*x* or NetWare 3.2 server prior to the migration. If you did not reboot after updating the NLM programs, load tsa311.nlm or tsa312.nlm manually. Doing so loads all of the updated NLM programs that you copied earlier.

- ❑ Load and add name spaces (conditional).

  If any volumes you are going to migrate contain files with non-DOS, Windows 95, Windows NT, or OS/2* naming conventions, you must load the appropriate name spaces on the destination volumes on the NetWare 4.2 server and then add the name spaces to the volume prior to the migration.

  The NFS* name space is loaded through nfs.nam.

  The Macintosh* name space is loaded through mac.nam.

- ❑ Determine what objects to migrate.

  The Novell Upgrade Wizard allows you to migrate the entire NetWare 3.1*x* or 3.2 bindery and/or the contents of the individual NetWare 3.1*x* or 3.2 volumes.

  In most cases, you will want to migrate both the bindery and the contents of the server volumes. However, there may be occasions where you want to only migrate the bindery (for example, to quickly add users in an NDS tree) or the contents of an individual volume.

- ❑ Have the users log out of the NetWare 3.1*x* or NetWare 3.2 server.

  Any files that are open on the NetWare 3.1*x* or NetWare 3.2 server during the migration will not be migrated.

Launching the Novell Upgrade Wizard

Procedure

1. **Click the Windows 95 or Windows NT Start menu.**

2. **Select Programs > Novell > Novell Upgrade Wizard.**

   Once the utility is launched, the Startup dialog box appears, ready for you to create a new project.

Creating a Project

A project is a model that you use to place NetWare 3.1*x* or NetWare 3.2 objects in the NDS tree. You must create and complete a project before you can migrate the bindery and file system.

Procedure

1. **In the Startup dialog box, select the Create New Upgrade Project option and click OK.**

   A wizard is launched. The first page of the wizard asks you to indicate the name and location of the new project.

2. **Type a project name and use the Browse button to indicate the location where you want the project saved. Then click Next.**

   A new page appears, asking you to indicate the NetWare 3.1*x* or NetWare 3.2 server you're migrating (the source) and the NDS tree you're migrating to (the destination).

3. **Use the two drop-down list boxes to indicate the source server and destination tree.**

   3a. **If the desired source server and/or destination tree are not displayed, use the server button or tree button to log in to a server or NDS tree.**

   3b. **Once you have indicated the source server and NDS tree, click Next.**

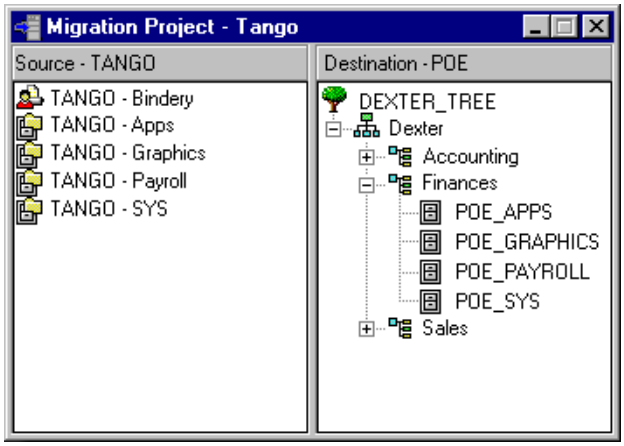
   A new wizard page appears, displaying information about the utility's database.

4. **Click Create to create the upgrade project.**

Moving Objects in the Project Window

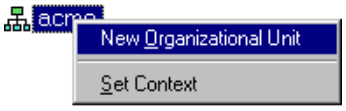
The indicated source server and destination tree are displayed in the Project Window, where bindery objects and volume data from the source server can be dragged and dropped to desired locations in the NDS tree. A sample project window is shown below.

Figure 6-1
Sample Project Window



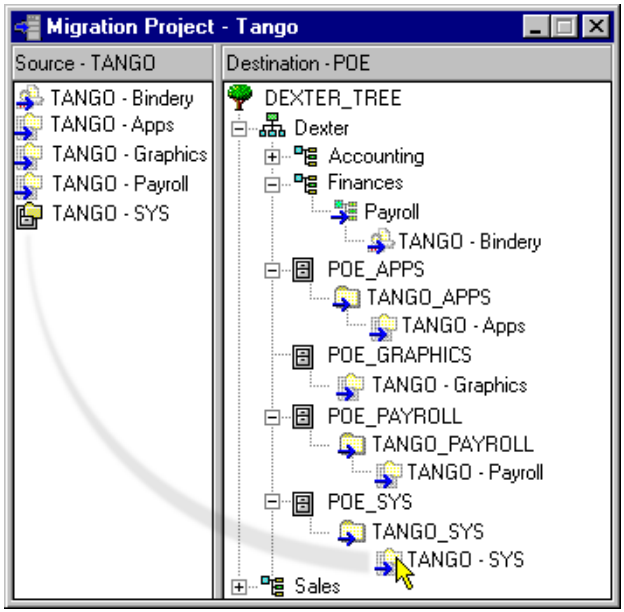
Creating Subordinate Objects (Conditional)

Before dragging and dropping the bindery or volume data, first determine where in the destination tree you want each to be copied. If the desired container (for the bindery) or folder (for the volume data) does not already exist in the NDS tree, right-click the "parent" (container for the bindery, folder or volume for the volume data) and create and name the new container or folder.



Click and drag the bindery or Volume objects from the Source area to the desired location in the Destination area.

Figure 6-2
Sample Project Window with Dragged and Dropped Objects



Verifying that Objects and Files Can Be Migrated

Once the bindery and volumes have been moved to the Destination area, you should verify that the migration can proceed as indicated in the Project Window. The verification process checks for object conflicts, sufficient NDS and file system rights, disk space limitations, and a variety of other criteria that could impede the migration.

Procedure

1. **From the toolbar, click the Verification button, or select Project > Verify.**

   A new wizard is launched. The first wizard page gives an overview of how the verification works.

2. **Click Next.**

   A new page appears, allowing you to indicate whether you would like to migrate your print information, and if so, to which volume.

3. **Choose whether to migrate your print information.**

   3a. **If you do not want to migrate the print information, uncheck the check box at the top of the page.**

   The box is checked by default.

   3b. **If you want to migrate the print information, select the desired volume in the tree browser and click Next.**

   A new page appears, allowing you to apply an existing Template object to all users being migrated.

4. **Decide whether to apply a Template object.**

   4a. **If you do not want to apply a Template object, uncheck the check box at the top of the page.**

   4b. **If you want to apply a Template object locate and select the desired Template object and click Next.**

   A new page appears, giving you the option to create a Template object. You can then apply this template when you set up new users in the NDS tree.

5. **If you want to create a User template, check the box and enter a name for the template, then click Next.**

   A new page appears, allowing you to indicate how you want to address all occurrences of duplicate filenames between a volume on the source server and a volume or directory in the destination NDS tree.

6. **Choose one of the options on the page and click Next.**

   A new page appears, prompting you for the password to the source server and destination tree.

7. **Enter the passwords and click Next.**

   A new wizard page lets you indicate the type of verification that is to be performed. Check boxes let you indicate what categories are verified.

8. **Indicate what you want verified by placing check marks in the appropriate check boxes, then click Next.**

   After running the verification, a wizard page appears, showing any found naming conflicts between same-type objects.

9. **Correct naming conflicts between same type objects.**

   To correct the naming conflicts you can

   - Let the wizard rename the object automatically.
   - Choose not to migrate the object.
   - Merge the objects and maintain the bindery properties.
   - Merge the objects and maintain the NDS properties.

   If no naming conflicts are found, the list box in the wizard page is blank.

10. **Click a bindery object in the list box and select an appropriate option to resolve the conflict.**

    Repeat this step for each conflict listed and then click Next.

If you do not select a conflict resolution option, the object will, by default, be renamed.

A new wizard page appears, showing any found naming conflicts between different type objects, or items that cannot be merged. These include print forms, print devices, and print configurations.

11. Correct naming conflicts between different type objects.

To correct the naming conflicts you can

- Let the wizard rename the object automatically.
- Choose not to upgrade the object.

If no naming conflicts are found, the list box in the wizard page is blank.

12. Click a bindery object in the list box and select an appropriate option to resolve the conflict.

Repeat this step for each conflict listed, then click Next.

If you do not select a conflict resolution option, the object will, by default, be renamed.

A new wizard page appears, displaying any errors and warnings that were encountered during the verification process (with the exception of naming conflicts).

If no errors or warnings are detected in the verification, the list box is blank.

13. Resolve all errors before continuing. Click Next to continue.

A verification summary page appears with the results of the verification.

14. Read through the text and click Finish.

Migrating Across-the-Wire

With the Project Window and verification completed, and all conflicts, warnings, and errors addressed, you are ready to migrate the bindery and file system across-the-wire.

Procedure

1. **From the toolbar, click the Upgrade button, or select Project > Upgrade.**

   A new wizard is launched. The first wizard page gives an overview of how the upgrade works.

2. **Click Next.**

From this point, the upgrade repeats Steps 3 through 14 under “Verifying that Objects and Files Can Be Migrated” on page 187. One exception is that the Finish button in Step 14 is now a Proceed button.

Any conflicts that were shown previously (during the verification) but were not corrected are indicated by a check through the icon, indicating that the conflict has already been seen.

If you have corrected all of the errors, you can begin the migration by clicking the Proceed button.

The wizard first copies the contents of the bindery and then the file system, according to where you dragged objects in the Project Window.

A progress bar indicates the relative percentage of objects that have been upgraded and those yet to be upgraded.

You can stop the migration by clicking Stop. A dialog box appears, asking you to confirm your choice. If you still want to stop the migration, click Yes. The migration is terminated. All NetWare 3.1*x* or NetWare 3.2 server bindery and file contents copied to that point, however, remain in their destinations in the NDS tree until you delete them manually.

Post-Migration Procedures

Following the migration, you should perform any applicable post migration procedures. These include:

- Modifying login scripts
- Modifying your print configuration
- Checking migrated user information
- Checking migrated file information
- Checking third-party applications
- Moving individual objects to different locations in the NDS tree

For more information on post upgrade procedures or any of the information in this document, refer to the online help in the Novell Upgrade Wizard.

chapter 7

Installing Novell Clients

The Novell® Client™ software provides access to Novell networks from workstations that use a variety of operating systems. This chapter explains how to install the client software from CD-ROM on one workstation as well as one method of installing the client software across the network. Other methods are explained fully in the online documentation.

Preparing to Install the Client Software

Before installing the client software, make sure the client workstations have sufficient resources and the required software. The complete hardware and software setup for client workstations might require you to complete one or more of the following tasks:

- Check for a valid network connection
- Check client workstation requirements

Important

Novell Client for Windows* 95/98 and Novell Client for Windows NT* require long filename support. You must install and load the appropriate name spaces. See Novell Client for Windows NT > Setting Up > Preparing to Install > Preparing Servers in the online documentation available on the Documentation CD-ROM or on the Novell Client CD-ROM.

Checking for a Valid Network Connection

To check for a valid network connection from a Windows 95/98 or Windows NT workstation, complete the following steps.

Procedure

1. **Open Network Neighborhood.**

   If you have never installed a client or created a network connection, you might not have access to Network Neighborhood. Therefore, you must install the client software from CD-ROM. See “Installing Clients from CD-ROM” on page 196.

2. **Check that the networks you expect to see actually appear in the Network Neighborhood window.**

Preparing Client Workstations

Checking Client Workstation Requirements

There are certain client workstation requirements to be met before installing or upgrading Novell Client software:

- Workstation hardware and software

Platform	Hardware	Software
Windows 95/98	◆ 486 processor or better ◆ Minimum 28 MB free disk space ◆ Minimum 16 MB RAM	◆ Windows 95/98 ◆ Windows 95 or Windows 98 CD-ROM or the Windows .CAB files.
Windows NT	◆ Minimum hardware requirements of Windows NT 4.0	◆ Windows NT 4.0
DOS and Windows 3.1*x*	◆ 386 processor or better ◆ Minimum 15 MB free disk space ◆ Minimum 8 MB RAM ◆ A memory manager	One of the following operating systems: ◆ Novell DOS™ 7 ◆ MS-DOS* 5.*x* or 6.*x* ◆ PC-DOS 5.*x*, 6.*x*, or 7.0 ◆ Windows 3.1*x* or Windows for Workgroups 3.11

- The network board

  Novell Client for Windows NT and Novell Client for Windows 95/98 support Network Driver Interface Specification™ (NDIS™) drivers. For information about installing the network board, refer to the board manufacturer's instructions.

Open Data-Link Interface™ (ODI™) drivers are not installed on Windows 95/98 or Windows NT. If you are upgrading an older version of the client and you have ODI drivers currently installed, these drivers are still supported. If you are installing for the first time, NDIS drivers will be installed. If you do not already have the necessary NDIS driver, you might need to obtain it from the Windows 95 or Windows 98 CD-ROM or from the network board manufacturer.

Novell Client for DOS and Windows 3.1*x* supports ODI drivers. For information about installing the network board, refer to the board manufacturer's instructions.

Incompatibilities

Windows 95/98

The following network components are not compatible with Novell Client for Windows 95/98:

- Microsoft* Client for NetWare networks
- Microsoft file and printer sharing for NetWare networks
- Microsoft Service for Novell Directory Services™ (NDS™) software
- Novell NetWare workstation shell 3.*x* (NETX)
- Novell NetWare workstation shell 4.0 and later (VLM™) clients
- Novell Internetwork Packet Exchange™ (IPX™) ODI protocol (the 16-bit module for the NETX and VLM clients)

These network components conflict with Novell Client for Windows 95/98. If any of these network components is installed, the client installation program detects the conflict and removes the conflicting network components.

Windows NT

Read the Novell Client for Windows NT readme file, WINNT.TXT, for up-to-date information about software incompatibilities.

DOS and Windows 3.1*x*

There are no known incompatibilities.

Installing Clients from CD-ROM

If you plan to install the Novell Client software on a small number of workstations, or if the workstations are not yet connected to a network, installing from the Novell Client CD-ROM works best.

If you plan to install the Novell Client on several workstations on the network, consider using one of several network installation options. A network installation can upgrade existing client software or install new client software.

One network installation method is explained in this chapter (“Installing Clients from the Network” on page 198). Additional network installation options and specific information about each platform are available in the online documentation found on the Documentation CD-ROM or on the Novell Client CD-ROM.

Installing Clients from Windows

The Novell Client Setup utility helps you install Novell Client software on Windows-based workstations. This utility lets you select the client you want to install from a list of available clients. Administrative options are also available.

To install from a local CD-ROM drive, complete the following steps.

1. **Insert the Novell Client CD-ROM.**

   If the Novell Client Setup utility does not automatically launch, run WINSETUP.EXE from the root of the CD-ROM.

2. **Click a language for the installation.**

3. **Click a platform for the installation.**

4. **Click the software to install.**

   This starts the installation utility for that software.

5. **Follow the on-screen instructions.**

   For help during the installation, refer to the online help that accompanies the software.

Installing Clients from DOS

The DOS-based installation installs the necessary files for Novell Client for DOS and Windows 3.1*x* files and allows you to select from several optional utilities.

If you previously installed the client software in Windows and you are using multiple location profiles, you should update using the Windows installation. Location profiles maintain information about your working environment for each location you work in, or for each networking environment in a location.

The DOS installation does not support Novell Dial-up Services or Locations and it disables previously installed versions of the Locations Manager.

To install from a local CD-ROM drive, complete the following steps.

1. **Insert the Novell Client CD-ROM.**

2. **From a DOS prompt, switch to the drive where the CD-ROM is located.**

3. **Change to the PRODUCTS\DOSWIN32 directory, and then enter `install`.**

4. **Press** <Enter> **to accept the License Agreement.**

5. **Select the options you want to install on the workstation.**

6. **Press** <F10> **to continue.**

   To return to the previous screen or to cancel the installation, press <Esc> at any time before Install begins copying files.

7. **Configure the options you are installing.**

   Depending on the options you have chosen, various configuration screens appear. Use the arrow keys to move to a new field and press <Enter> to edit the field.

8. **Press** <F10> **to save your changes and continue.**

9. **Depending on the type of network board you have installed in the workstation, select the 16-bit or 32-bit LAN driver type.**

10. **Review the Installation Configuration Summary and make necessary changes by using the arrow keys to move to a new field and pressing** <Enter> **to edit the field.**

11. **Press** <F10> **to continue.**

    Install copies the appropriate files to your workstation and sets it up to run the Novell Client software.

12. **Exit Install by pressing** <Enter> **to return to DOS or** <Ctrl>+<Alt>+<Del> **to reboot the workstation.**

    The Novell Client for DOS and Windows 3.1*x* software does not load until the workstation restarts.

Installing Clients from the Network

If you plan to install the Novell Client software on multiple workstations, you can install from the network by copying files to the server and modifying the login script. One network installation method is explained here.

There are additional network installation options that might better suit your networking environment. You should evaluate these methods before deciding which is best for you. See “Other Network Installation Options” on page 208.

Even if your network has workstations on multiple platforms, you can install and upgrade the client software on all platforms when users log in. The process requires five tasks:

- Create a folder on the NetWare server.
- Copy Novell Client files and other required files to this folder. Workstations can then read the files during login.
- Grant rights to the new folder.
- Create or update the appropriate configuration file (INSTALL.CFG, SETUP.INI, NWSETUP.INI, or UNATTEND.TXT file) for each platform-specific client.
- Create or modify the appropriate login script.

Let users know in advance about the upgrade so they understand what is happening and why their working environment is changing.

Create a Folder

1. **Log in to a server as Admin or as a user with Admin equivalence.**

   You need rights to copy files to a network folder that all users can access. You also need rights to modify login scripts.

2. **Create a folder.**

   For example, create a client folder in the SYS:PUBLIC network folder.

   SYS:\PUBLIC\CLIENT

Copy Files

1. **From the Products directory on the Novell Client CD-ROM, copy the WINNT, WIN95, DOSWIN2, and ADM32 directories to the new folder.**

   If you are installing the client in only one language or your network does not have enough space to accommodate multiple language directories, you can delete the language directories you do not need from the NLS directory under each client directory. To ensure that you have all necessary files, copy the entire client directory and then delete only the extra language directories.

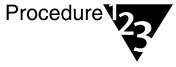
2. **(Conditional) If you are installing the Novell Client for Windows 95/98, copy the Windows 95 or Windows 98 .CAB files to the WIN95 directory.**

   The files are on the Microsoft Windows 95 or Windows 98 CD (and Upgrade CD) in the WIN95 or WIN98 folder.

3. **(Conditional) If you are installing the Novell Client for DOS and Windows 3.1*x* and you will be using the DOS installation utility (INSTALL.EXE), create a LOG directory in the new folder.**

   The login script executes commands that create a log file in the LOG directory. The log file indicates if the client update was successful.

Grant Rights



1. **Create a Group object called Client in the NDS tree.**

2. **Place into that group users whose workstations need to be installed or upgraded.**

3. **Make sure that the group has Read and File Scan rights to the new folder you created.**

   You can grant rights by using NetWare Administrator.

If you created the new folder in SYS:PUBLIC, the new folder should have Read and File Scan rights already associated with it, but you should make sure that these rights have not been changed.

Update Configuration Files

If you are using the default settings to install the clients, you do not have to create or modify the configuration files. You can bypass this process and proceed to “Create or Modify the Login Script” on page 204.

Each platform-specific installation utility reads a configuration file in order to get such information as where to copy drivers during installation and what is the most recent version number. This file must be placed in the same folder as the installation utility.

Platform	Configuration File
Windows 95/98	NWSETUP.INI and a Novell Client Install Manager-generated text file
Windows NT	Novell Client Install Manager-generated text file
Windows 3.1*x*	SETUP.INI
DOS	INSTALL.CFG

Updating Windows 95/98 and Windows NT Configuration Files

You can use Novell Client Install Manager, a GUI-based utility, to configure the client properties. This method eliminates your having to configure each workstation manually. Once you have created the configuration file with Install Manager, use the /U command line parameter in the login script to call the configuration file and set the properties.

To create a configuration file using Novell Client Install Manager, complete the following steps.

1. **Start the Novell Client Install Manager NCIMAN.EXE).**

   For Windows 95/98, the Install Manager is located in the SYS:PUBLIC\CLIENT\WIN95\IBM_*language*\ADMIN directory you copied to the server.

For Windows NT, the Install Manager is located on the in the Sys:Public\Client\WinNT\I386\Admin directory you copied to the server.

2. **Do one of the following:**

   - For Windows 95/98, click File > New File > Windows 95 to create a new file.
   - For Windows NT, click File > New File > Windows NT to create a new file.

3. **Modify the installation options as needed.**

   3a. In the Installation Options list box, double-click the configuration option you want to modify.

   3b. In the property pages, set the parameters and then click OK.

   The values you set appear in the right list box.

   3c. (Conditional) If you change properties for Novell Client for Windows NT or Windows 95/98 and intend to use the configuration file created with Novell Client Install Manager to upgrade existing client software, you must change the major or minor version parameter. If you are installing for the first time, proceed to Step 4.

   The client is updated only if the version numbers have changed. If the version numbers have not changed, even if parameters have been changed in the configuration file, the client and the new properties will not be changed.

   For Novell Client for Windows NT, change the version number with Novell Client Install manager by clicking Installation > Client and increasing the major or minor parameter by one or more.

   For Novell Client for Windows 95/98, you must change the version number in the NWSETUP.IN file. Open NWSETUP.INI and search for the ClientVersion section. The version number consists of four numbers, each separated by a decimal point (for example, 3.0.1.0). The third number is the major version number; the fourth number is the minor version number. Increase either number by one to install a new version.

You can set up one workstation the way you want all of the workstations set up, and then use Novell Client Install Manager to import the settings from that workstation's registry and save them to the configuration file you use during the installation. Once you set up the workstation, click File > Open Registry to import the settings into Novell Client Install Manager.

4. **Click File > Save.**

   You can save the file with any filename you want to use. For example, you could rename the file UNATT_95.TXT.

5. **Copy this file to one of the following directories:**

   - SYS:PUBLIC\CLIENT\WIN95\IBM_*language* directory (for Windows 95/98)
   - SYS:PUBLIC\CLIENT\WINNT\I386 directory (for Windows NT)

This file is then used in conjunction with the /U command line parameter in the login script to call the configuration file and set the properties during installation.

Updating DOS and Windows 3.1*x* Configuration Files

You can control the Windows-based install program (SETUP.EXE) by modifying the SETUP.INI file, and you can control the DOS-based install program (INSTALL.EXE) by modifying the INSTALL.CFG file. However, the defaults work fine for most installations.

Detailed instructions can be found in the online documentation under Novell Client for DOS and Windows 3.1x > Setting Up > Preparing to Install > Modifying the SETUP.INI File and under Novell Client for DOS and Windows 3.1*x* > Setting Up > Preparing to Install > Modifying the INSTALL.CFG File. Sample configuration files are also provided in the online documentation.

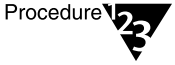
Create or Modify the Login Script

You need to modify login scripts for users whose workstations will be upgraded. You can do this with NetWare Administrator.

- To upgrade specific users' workstations, modify those users' login scripts.
- To upgrade workstations for users in a container, modify that container's login script.
- To upgrade workstations for users in a profile, modify that profile login script.
- To upgrade a workstation running bindery-based client software (such as Microsoft Client for NetWare Networks that ships with Windows 95 or Windows 98), edit the system login script (SYS:PUBLIC\NET$LOG.DAT).

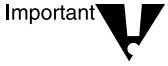
Creating or Modifying a Login Script with NetWare Administrator

To create or modify a login script with NetWare Administrator, complete the following steps.



1. **Start Netware Administrator.**
2. **Using the browser, select the object whose login script you want to create or modify.**
3. **Click Object > Details > Login Script.**
4. **Enter the login script commands and information into the login script text box.**

   For a sample of the login script commands you need to add to the scripts, see "Sample Login Script" on page 206. This sample login script is also available in a text file called INST_LOG.TXT at the root of the Novell Client CD-ROM .



Make sure you edit the sample login script to match the server names, directory paths, and specifications of your own network.

For additional information on all login script commands, see Login Script Commands or Using Login Script Commands in the online help or in the online documentation.

5. **To save the login script and close the Details dialog box, click OK.**

   If the login script you just created was a container or user login script, you're finished and the client software will be installed or updated the next time the users log in.

   If the login script you just created was for a Profile object, continue with Step 6.

6. **(Profile login scripts only) Using the browser, select the User object that needs to use the profile login script.**

7. **Click Object > Details > Login Script.**

8. **Enter the name of the Profile object in the Default Profile field located under the login script text box.**

9. **To save the Profile object name and close the Details dialog box, click OK.**

   Now you must add the User object as a trustee of the Profile Object.

10. **Using the browser, select the Profile object.**

11. **Click Object > Trustees of This Object > Add Trustee.**

12. **Enter the name of the User object that uses this Profile object.**

13. **Make sure the Browse object right and the Read property right are checked, and then click 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. Repeat Step 6 through Step 12 for all additional users who need to use this script.

If you are using this sample script to replace the Microsoft Client with the Novell Client for Windows 95/98, some user intervention is necessary. Due to Microsoft's limited scripting capabilities, users must close an open DOS box before the workstation is rebooted and the installation is completed.

If you are installing the Novell Client for Windows 95/98 on a new workstation or are upgrading an existing client, no user intervention is necessary.

This is not an issue for Windows NT.

In this sample, the information that is necessary to the script is represented in all capital letters. The information you should customize for your network is in lowercase letters.

Some lines in this sample have been artificially divided to accommodate the printed page. These artificial breaks should be removed when the script is placed in the user's login script. See the sample login script available in a text file called INST_LOG.TXT at the root of the Novell Client CD-ROM for a script that does not contain artificial line breaks.

Example 7-1

```
REM *****  Windows NT SECTION  *****
IF <os> = "Windows_NT" THEN BEGIN
   WRITE "Updating the Novell Client for Windows NT."
   #\\server1\sys\public\client\WINNT\i386\setupnw.exe /acu /u:unatt_nt.txt
   EXIT
END

REM *****  Windows 95 SECTION  *****
IF <winbootdir> <> "" THEN BEGIN
   WRITE "Updating the Novell Client for Windows 95."
    IF OS_VERSION="V7.00" THEN BEGIN
       #\\server1\sys\public\client\win95\ibm_enu\setup.exe /acu /
      u:\\server1\sys\public\client\win95\ibm_enu\unatt_95.txt
   ELSE
      @\\server1\sys\public\client\win95\ibm_enu\setup.exe /acu /
      u:\\server1\sys\public\client\win95\ibm_enu\unatt_95.txt
      EXIT
   END
   EXIT
EXIT

REM *****  DOS/WIN SECTION  *****
IF OS = "MSDOS" THEN BEGIN
    IF PLATFORM <> "WIN" THEN BEGIN
      WRITE " Updating the Novell Client for DOS and Windows 3.1x with the
      DOS install."
      MAP y:=\\server1\sys\public\client\
```

Example 7-1

```
       #y:ADM32\IBM_ENU\DOS_ACU\NWDETECT.EXE CLIENT32_VERSION 2.5.0
       IF ERROR_LEVEL = "1" THEN BEGIN
          #y:DOSWIN32\INSTALL.EXE
          IF ERROR_LEVEL = "0" THEN BEGIN
             #y:ADM32\IBM_ENU\DOS_ACU\NWSTAMP.EXE CLIENT32_VERSION 2.5.0
             #y:ADM32\IBM_ENU\DOS_ACU\NWLOG.EXE /F Z:\DOSLOG\DOSACU.LOG
             #y:ADM32\IBM_ENU\DOS_ACU\REBOOT.COM
          ELSE
             WRITE "Error running installation (%ERROR_LEVEL). Contact your
             network administrator"
             #y:ADM32\IBM_ENU\DOS_ACU\NWLOG.EXE /F Z:\DOSLOG\FAILED.LOG
          END
       ELSE
          WRITE "The Novell Client for DOS and Windows 3.1x was up-to-date."
       END
       EXIT
    ELSE
       WRITE " Updating the Novell Client for DOS and Windows 3.1x with the
       Windows install."
       MAP y:=\\server1\sys\public\client\
          @y:doswin32\nls\english\setup.exe /acu
       EXIT
    END
END
WRITE "OS %OS not supported by ACU"
WRITE ""
```

What Users See

If this is an new client software installation or if it is an upgrade from older client software, the software is installed or upgraded when users log in and then restart the workstation. Users might see system messages as their workstations are upgraded, depending on how you set up the installation.

If workstations already have current client software, the client login runs as usual.

Other Network Installation Options

There are additional network installation options that might better suit your networking environment. You should evaluate these methods before deciding which is best for you. The following information gives a brief overview of the other network installation methods and information on where to find complete documentation about them.

Installing with Z.E.N.works

Z.E.N.works™, or Zero Effort Networking, is an integrated set of products for managing workstations and user desktops while reducing the total cost of ownership.

Z.E.N.works includes Application Launcher, a component which lets you distribute applications such as the client software to workstations and manage those applications as objects in the NDS tree. Users do not need to worry about workstation configurations, drives, ports, command line parameters, application source directories, or whether they have the latest upgrade. You, as the administrator, manage such issues easily and centrally from NetWare Administrator.

In order to use Z.E.N.works, you must manage your network from a 32-bit workstation, such as Windows 95/98 or Windows NT. Not all of Z.E.N.works application and desktop management features are available on a Windows 3.1*x* workstation.

For more information, see Z.E.N.works Overview in the online documentation.

Additional Windows 95/98 Installation Options

You can use the following methods to install Novell Client for Windows 95/98 software:

- MSBATCH

  Use this option to install and configure Novell Client for Windows 95/98 without your having to be present. This process saves a great deal of time, especially if you need to install the software on multiple workstations. For more information, see Novell Client for Windows 95 > Setting Up > MSBATCH Install in the online documentation.

- Automatic Client Upgrade (ACU)

  Use this option to automatically upgrade multiple workstations from the Microsoft Client for NetWare Networks to Novell Client for Windows 95/98. For more information, see Novell Client for Windows 95 > Setting Up > ACU Install in the online documentation.

Additional Windows NT Installation Options

You can use any of the following methods to install Novell Client for Windows NT software:

- Unattended install

  Use this option to install and configure Novell Client for Windows NT without having to be present. This feature saves a great deal of time, especially if you need to install the software on multiple workstations.

  By preconfiguring installation options with Novell Client Install Manager, you can install both Windows NT and Novell Client for Windows NT, or Novell Client for Windows NT by itself, on one or more workstations over the network. For more information, see Novell Client for Windows NT > Setting Up > Installing Novell Client > Unattended Install of Novell Client in the online documentation.

- Automatic Client Upgrade (ACU)

  Use this option to automatically upgrade multiple workstations from the Microsoft Client for NetWare Networks to Novell Client for Windows NT. For more information, see Novell Client for Windows NT > Setting Up > Installing Novell Client > Automatic Client Upgrade in the online documentation.

- Windows NT Network control panel

  Use this option if you want to use the Network control panel to install Novell Client for Windows NT as you would other services. For more information, see Novell Client for Windows NT > Setting Up > Installing Novell Client > Installing from the Network Control Panel in the online documentation.

Additional DOS and Windows 3.1*x* Installation Options

There are two additional network installation methods for installing the Novell Client for DOS and Windows 3.1*x*:

- Automatic Client Upgrade (ACU)

  Use this option to set up and standardize the installation process. During installation, ACU automatically configures each workstation's client settings, thus virtually eliminating the need to configure individual workstations. For more information, see Novell Client for DOS and Windows 3.1*x* > Setting Up > Installing with ACU in the online documentation.

- User-Initiated Installation

  Use this option to set up an installation procedure with little or no user intervention. Once users are notified of the installation procedure, they can begin installing whenever it is convenient. For more information, see Novell Client for DOS and Windows 3.1*x* > Setting Up > Installing from the Network in the online documentation.

appendix **A**

Calculate RAM Requirements

If you need to calculate the memory requirements for a new server or double check the memory requirements for an existing server, here is a convenient worksheet with updated calculations for server configurations.

Memory Calculation

Because it is important that you have accurate server memory calculations, we've examined NetWare® server memory requirements and created the attached worksheet. This new worksheet

- Replaces the versions of the calculation found in earlier NetWare 3™ and NetWare 4™ documentation
- Satisfies the memory requirements for both NetWare 3 and 4 server configurations
- Simplifies the process by using a single unit of measure
- Adds precision to the disk-related calculations by breaking out the file cache requirements into a separate calculation

The old calculations, which tagged file cache requirements onto the disk calculation, produced incorrect results as server disk capacities soared above 2 GB.

In the new worksheet, we've corrected the disk-related calculation and now allow you to figure your file cache requirement based on your total number of clients. This is the correct way to figure file cache requirements.

Memory in NetWare 3 and 4

Only three differences between the NetWare 3 and 4 operating systems impact a server's memory requirement. We've built considerations for these differences into the worksheet so that memory requirements for both operating systems can be calculated on the same worksheet.

Core Operating System Requirements

The NetWare 4 operating system requires an additional 3 MB of memory. This memory supports the additional core services added to NetWare 4.

File Compression

File compression requires a static 250 KB of memory when activated.

Block Suballocation

Block suballocation requires five bytes of memory for every file managed by the server. This is an insignificant amount of memory for many systems.

The Worksheet

The attached worksheet requires you to know the following about your server:

- Total disk capacity

  This is the total number of megabytes attached to your server. Use 1024 MB for each gigabyte.

- Total *usable* disk capacity

  If your disk storage subsystem is duplexed or mirrored, this is half the total disk capacity above. Otherwise, the two numbers are equal.

- Total number of clients

  This is the total number of end-users or connections that simultaneously use the server.

- Volume block size

  This is the block size used during the installation of your NetWare volumes. The accuracy of this variable is important because volumes with 4 KB blocks require 16 times the amount of memory required by volumes with 64 KB blocks.

- Estimated total number of files

  This is your estimate of the total number of files that will reside on the server. An estimate will suffice because the directory tables require only 6 bytes per file. If you're using block suballocation, this requirement increases to 11 bytes per file.

Once you've got this information, use it to calculate the server variables on the worksheet. Then run through the worksheet's ten line calculation to arrive at your server's total memory requirement.

Additional Memory Considerations

If you're building a server with Name Spaces, CD-ROM, or other specialized server applications, the worksheet gives you a baseline memory requirement only. Look up the following resources and add the necessary memory at the bottom of the worksheet for an accurate total.

- Name Spaces

  See Appendix B, "Name Space Requirements," on page 215.

  Server Applications

  Memory calculations for NetWare for SAA*, OracleWare*, and other NetWare server applications can be found in their documentation and on the Novell® Support Connection™.

Figure A-1

NetWare 3 and 4 Server Memory Worksheet

STEP 1 Calculate the following variables.

V1. Enter the total number of megabytes of disk connected to the server
(For example: enter 1 for each MB, enter 1024 for each GB) _____ MB

V2. Calculate the number of megabytes of useable disk space connected to the server
(If you are mirroring or duplexing multiply V1 * 0.5, otherwise copy V1) _____ MB

V3. Enter the server's volume block size (4, 8, 16, 32, or 64) _____ MB

V4. Calculate the number of disk blocks per MB (divide 1024 / V3) _____ Blocks/MB

V5. Calculate the total number of disk blocks (Multiply V2 * V4) _____ Blocks

V6. Enter the maximum number of clients (end-users) attached to the server
(For example: enter 24 for 24 end-users) _____ Clients

V7. Enter the maximum number of files that will reside on the server _____ Files

STEP 2 Calculate your individual memory requirements.

Line 1. Enter the base memory requirement for the core OS
(enter 2048 for NetWare 3, or 5120 for NetWare 4) _____ KB

Line 2. Calculate the memory requirement for the Media Manager (multiply V1 * 0.1) _____ KB

Line 3. If File Compression is enabled, enter 250, otherwise enter 0 _____ KB

Line 4. Calculate the memory requirement for directory tables
(multiply V7 * .006, or if suballocation is enabled multiply V7 * .011) _____ KB

Line 5. Calculate the memory required to cache the FAT (multiply Line V5 * .008) _____ KB

Line 6. Calculate the memory requirement for file cache using the following table. _____ KB
This calculation uses a 0.4MB file cache per client memory requirement. The decrease as the user community size increases is based on assumptions regarding increased repetitive use of shared data (temporal and spacial locality) within cache.

Less than 100 clients V6 * 400
Between 100 and 250 clients 40,000 + ((V6 - 100) * 200)
Between 250 and 500 clients 70,000 + ((V6 - 250) * 100)
Between 500 and 1000 clients 95,000 + ((V6 - 500) * 50)

Line 7. Enter the total memory (KB) required for support NLMs. _____ KB
2,000KB is recommended for BTRIEVE(700), CLIB(500), INSTALL(600), and PSERVER(200)

Line 8. Enter the total memory (KB) required for other services. _____ KB
Other services include NetWare for Macintosh, NetWare for SAA, OracleWare, NetWare Management System, and so on.

STEP 3 Calculate your total memory requirement.

Line 9. Total Lines 1.. 8 for your total memory requirement (in KB) _____ KB

Line 10. Divide Line 9 by 1024 for a result in MB _____ MB
Using this result, round up to the server's nearest memory configuration. NetWare will enhance server performance by using all leftover memory for additional file cache.

appendix **B**

Name Space Requirements

In some cases additional name spaces require additional memory for directory cache and management. If you're installing additional name spaces on a NetWare® volume, you should follow the strategies in this appendix to size and tune your server's memory requirements. These sizing and tuning strategies resolve all of the additional memory requirements presented by name spaces.

The Directory Cache Connection

Each name space installed on a NetWare server's volumes requires support modules (NLM™ programs) and a modification to the server's directory entry tables (DET). The support modules require minimal memory for code. However, the modifications to each volume's DET require additional server memory for directory caching if the server's directory usage patterns are heavy and match several criteria.

With or without name spaces, all file and directory operations are handled through a single directory cache allocated and managed by NetWare. The purpose of the directory cache is to hold onto DET blocks recently read from the disk in anticipation of repeated use.

In NetWare 2, Novell cached the entire DET, but with the growth of disk capacities, fully cached directories became unrealistic for many servers. For example, a DOS file system containing 500,000 files requires 65 MB just to cache the DET. NetWare 3™ and NetWare 4™ use a most-recently-used (MRU) cache policy to manage their directory caches. The MRU policy keeps only the most recently used DET blocks in cache, tossing least-recently-used (LRU) blocks out when new DET blocks are requested. The MRU policy is an efficient means of using a much smaller cache to provide access to a very large data structure.

NetWare also uses an auto-adjusting mechanism to manage the size of the directory cache based on specific directory usage patterns.

DET Ratios

When a name space is installed on a volume, the volume's DET is extended to include an additional directory entry for each file. For instance, on a volume supporting DOS, NFS, and HPFS, NetWare manages three directory entries for each file, one entry for each installed name space, including DOS.

During file creation and other directory-related file operations, multiple name space directory entries for each file remain contiguous and are located in the same DET block on disk and in cache. This contiguous relationship overcomes the scenario in which the entries are non-contiguous, forcing multiple DET blocks to be read to have access to all DET references to the same file.

Under NetWare's native DOS support, each block read into cache contains 32 entries that provide information linked to 32 files. This means that you have access to the directory information for 32 files without having to read another DET block from the disk. This ratio of files represented per DET block is important because additional name spaces alter it significantly.

Cache Memory Requirements

You need additional memory when you begin to cache the DET after adding one or more name spaces to one or more volumes on the server. When Novell clients access a volume with additional name spaces, their access can be slowed because information stored in one directory cache buffer no longer represents 32 files. It represents 16, 10, or 8 files per DET block, depending on the number of name spaces configured on that volume.

For example, if you load a Macintosh* name space on top of the native DOS name space, DOS and Macintosh clients have to traverse ten directory blocks to perform the same work that before required only the traversal of five. The addition of the Macintosh name space doesn't change the directory entry block's ability to hold 32 entries, but now with two entries per file (one for each name space), the same directory entry block represents only 16 files. If you add another name space, the result is three entries per file, for a total of 10 files represented per DET block. Add an additional name space for four entries per file, and you have only eight files represented in each DET block.

The efficiency of your directory cache is decreased by a factor equal to the number of name spaces you have installed.

Sizing Server Memory

To calculate your baseline server memory requirement, use the worksheet in Appendix A, “Calculate RAM Requirements,” on page 211. In addition to this baseline memory requirement, additional name spaces require six bytes of memory for each directory entry.

Using the variables at the beginning of the worksheet, multiply V7 (the maximum number of files that will reside on the server) by .006, and then multiply the result by the number of additional name spaces installed on the server. If the additional name spaces are installed on specific volumes, this calculation need be performed only for the maximum number of files on the affected volumes.

Three Tuning Strategies

As with the tuning of any NetWare parameter, sizing the directory cache depends largely on the characteristics of the workload the server will be servicing—in this case, the directory access patterns exhibited by the server’s user community. The key is the frequency and breadth of directory searches, file opens, closes, and creations.

A low-use scenario could involve any number of users in which a small number of directories are shared or in which each users’ activity remains within a small region of the directory.

A high-use scenario could also involve any number of users, but user activity spans a very large number of directories and files.

Strategy 1: Handling Low Usage

At the low end, you won’t need to allocate any more cache than NetWare’s directory caching defaults permit. NetWare’s defaults allow NetWare to allocate 20 buffers immediately upon request, followed by a maximum allocation of up to 512 directory cache buffers (2 MB). This allocation is sufficient for the majority of NetWare servers.

Strategy 2: Handling Very High Usage

For the high end, you can adjust NetWare's auto-tuning facility, allowing it to allocate up to 8 MB of memory for directory cache immediately upon request, followed by a maximum allocation of up to 16 MB of total directory cache memory. These settings allow NetWare to cache up to 4,096 directory cache blocks. To do this, place the SET parameters listed below in your server's AUTOEXEC.NCF file.

```
SET maximum directory cache buffers = 4000
SET minimum directory cache buffers = 2000
```

Strategy 3: Tuning the Cache

If neither strategy 1 nor strategy 2 matches your circumstances, use this strategy to tune your directory cache.

First, allow your server to operate in its production environment for several weeks. This allows NetWare's auto-tuning facility to allocate the appropriate number of directory cache buffers.

Next, use MONITOR.NLM to inspect the number of allocated directory cache buffers. This number is found in the "Directory cache buffers" value in the "General Information" screen and is used in the table below. Multiply this value by the total number of name spaces (including native DOS support) to arrive at a new buffer allocation.

For	Do
Native DOS support	Nothing.
Native DOS support plus one additional name space	Multiply the directory cache buffer by 2.
Native DOS support plus two additional name spaces	Multiply the directory cache buffer by 3.
Native DOS support plus three additional name spaces	Multiply the directory cache buffer by 4.
Native DOS Support plus four additional name spaces	Multiply the directory cache buffer by 5.

Use the resulting buffer allocation to set the new minimum for the server, as shown in the SET parameters below. After setting the minimum, set the maximum to at least 100 buffers above the minimum, allowing the directory cache some room to grow under peak workloads.

```
SET minimum directory cache buffers = NewBuffer
  Allocation
SET maximum directory cache buffer =
  NewBufferAllocationCeiling
```

These new settings allow NetWare to freely allocate new directory cache buffers in a multi-name space environment, and increase the likelihood that (1) repeatedly used directory cache buffers remain in cache, and (2) those buffers remain in cache longer. The resulting directory cache is designed to support systems that house additional name spaces with the best possible read-path response times.

If, with these changes and a settling-in period, the server doesn't perform the anticipated allocation, then you know that your user community's directory access patterns don't require the additional cache. If, on the other hand, your server uses all the cache you made available, it's possible that your user community's directory access patterns are larger than you anticipated.

Based on your knowledge of the end-users' application and response time requirements, the server's allocation of directory cache might suggest the addition of more directory cache resources. The price, after all, is low: each additional 100 cache buffers add 3,200 directory entries to cache in exchange for 0.4 MB of server memory.

Just remember that any memory given to the directory cache is taken from the server's file cache. If you continue to take memory from file cache for directory cache, you might need to add memory to your server after sizing the directory cache appropriately.

appendix **C**

Country Codes

This appendix lists the CCITT country codes you can use in specifying the NetWare® 4.2 server's context.

The country object is optional in the Directory tree, and can be used if you have a multinational organization or if you want to match the ISO X.500 standard. You can, however, comply with X.500 without specifying a country code.

Important

The following list of country codes may be incomplete or inaccurate due to the constantly changing worldwide geopolitical situation.

Figure C-1
Country Codes

Country names and codes

AF	Afghanistan	**BV**	Bouvet Island	**CY**	Cyprus
AL	Albania	**BR**	Brazil	**CZ**	Czech Republic
DZ	Algeria	**IO**	British Indian Ocean Territory	**DK**	Denmark
AS	American Samoa	**VG**	British Virgin Islands	**DJ**	Djibouti
AD	Andorra	**BN**	Brunei Darussalam	**DM**	Dominica
AO	Angola	**BG**	Bulgaria	**DO**	Dominican Republic
AI	Anguilla	**BF**	Burkina Faso	**TP**	East Timor
AQ	Antartica	**BI**	Burundi	**EC**	Ecuador
AG	Antigua and Barbuda	**KH**	Cambodia	**EG**	Egypt
AR	Argentina	**CM**	Cameroon	**SV**	El Salvador
AW	Aruba	**CA**	Canada	**GQ**	Equatorial Guinea
AU	Australia	**CV**	Cape Verde	**ER**	Eritrea
AT	Austria	**KY**	Cayman Island	**EE**	Estonia
AZ	Azerbaijan	**CF**	Central African Republic	**ET**	Ethiopia
BS	Bahamas	**TD**	Chad	**FK**	Falkland Islands (Malvinas)
BH	Bahrain	**CL**	Chile	**FO**	Faroe Islands
BD	Bangladesh	**CN**	China	**FJ**	Fiji
BB	Barbados	**CX**	Christmas Island	**FI**	Finland
BY	Belarus	**CC**	Cocos (Keeling) Islands	**FR**	France
BE	Belgium	**CO**	Colombia	**FX**	France, Metropolitan
BZ	Belize	**KM**	Comoros	**GF**	French Guiana
BJ	Benin	**CG**	Congo	**PF**	French Polynesia
BM	Bermuda	**CK**	Cook Islands	**TF**	French Southern Territories
BT	Bhutan	**CR**	Costa Rica		
BO	Bolivia	**CI**	Cote d'Ivoire		
BA	Bosnia and Herzegovina	**HR**	Croatia (Hrvatska)		
BW	Botswana	**CU**	Cuba		

continued ▼

Country names and codes *continued*

GA	Gabon
GM	Gambia
GE	Georgia
DE	Germany
GH	Ghana
GI	Gibraltar
GR	Greece
GL	Greenland
GD	Grenada
GP	Guadeloupe
GU	Guam
GT	Guatemala
GN	Guinea
GW	Guinea-Bissau
GY	Guyana
HT	Haiti
HM	Heard and McDonald Islands
HN	Honduras
HK	Hong Kong
HU	Hungary
IS	Iceland
IN	India
ID	Indonesia
IR	Iran, Islamic Republic of
IQ	Iraq
IE	Ireland
IL	Israel
IT	Italy
JM	Jamaica
JP	Japan
JO	Jordon
KZ	Kazakhstan
KE	Kenya
KI	Kiribati
KP	Korea, Democratic People´s Republic of
KR	Korea, Republic of
KW	Kuwait
KG	Kyrgyzstan
LA	Laos, People´s Democratic Republic of
LV	Latvia
LB	Lebanon
LS	Lesotho
LR	Liberia
LY	Libyan Arab Jamahiriya
LI	Liechtenstein
LT	Lithuania
LU	Luxembourg
MA	Macau
MK	Macedonia, The former Yugoslav Republic of
MG	Madagascar
MW	Malawi
MY	Malaysia
MV	Maldives
ML	Mali
MT	Malta
MH	Marshall Islands
MQ	Martinique
MR	Mauritania
MU	Mauritius
YT	Mayotte
MX	Mexico
FM	Micronesia, Federated States of
MD	Moldova, Republic of
MC	Monaco
MN	Mongolia
MS	Montserrat
MO	Morocco
MZ	Mozambique
MM	Myanmar
NA	Namibia
NR	Nauru
NP	Nepal
NL	Netherlands
AN	Netherlands Antilles
NC	New Caledonia
NZ	New Zealand
NI	Nicaragua
NE	Niger
NG	Nigeria
NU	Niue
NF	Norfolk Island
MP	Northern Mariana Islands
NO	Norway
OM	Oman
PK	Pakistan
PW	Palau
PA	Panama
PG	Papua New Guinea
PY	Paraguay
PE	Peru
PH	Philippines
PN	Pitcairn
PL	Poland
PT	Portugal
PR	Puerto Rico
QA	Qatar
RE	Reunion
RO	Romania
RU	Russian Federation
RW	Rwanda
SH	St. Helena
KN	St. Kitts-Nevis
LC	St. Lucia
PM	St. Pierre and Miquelon
VC	St. Vincent and the Grenadines
WS	Samoa
SM	San Marino
ST	Sao Tome and Principe
SA	Saudi Arabia
SN	Senegal
SC	Seychelles
SL	Sierra Leone
SG	Singapore
SK	Slovakia
SI	Slovenia
SB	Solomon Islands
SO	Somalia
ZA	South Africa
GS	South Georgia and the South Snadwich Islands
ES	Spain
LK	Sri Lanka
SD	Sudan
SR	Suriname
SJ	Svalbard and Jan Mayen Islands
SZ	Swaziland
SE	Sweden
CH	Switzerland
SY	Syrian Arab Republic
TW	Taiwan
TJ	Tajikistan
TZ	Tanzania, United Republic of
TH	Thailand
TG	Togo
TK	Tokelau
TO	Tonga
TT	Trinidad and Tobago
TN	Tunisia
TR	Turkey
TM	Turkmenistan
TC	Turks and Caicos Islands
TV	Tuvalu
UG	Uganda
UA	Ukraine
AE	United Arab Emirates
GB	United Kingdom
US	United States
UM	United States Minor Outlying Islands
UY	Uruguay
UZ	Uzbekistan
VU	Vanuatu
VA	Vatican City State (Holy See)
VE	Venezuela
VN	Vietnam
VG	Virgin Islands (British)
VI	Virgin Islands (U.S.)
WK	Wake Islands
WF	Wallis and Futuna Islands
EH	Western Sahara
YE	Yemen
YU	Yugoslavia
ZR	Zaire
ZM	Zambia
ZW	Zimbabwe

appendix **D**

Understanding Driver Architecture

In earlier versions of NetWare 4™, a single disk driver (a .DSK file) served as the single interface between the NetWare operating system and all devices on the interface adapter. This is known as *monolithic architecture*.

NetWare® 4.11 introduced NetWare Peripheral Architecture™ (NWPA), which diverts the disk driver interface responsibilities to two new modules: a Host Adapter Module (HAM) and a Custom Device Module (CDM).

You can install your NetWare 4.2 server using either the traditional monolithic architecture (which uses the .DSK drivers) or the NWPA. For a quick overview of the advantages and disadvantages of using monolithic architecture and NWPA, see the table below.

Table D-1
Disk Driver Architecture Overview

Architecture Type	Advantages	Disadvantages
Monolithic (.DSK)	Has been around much longer. Individual drivers have been tested for compatibility by both Novell and third-party manufacturers.	Requires a compliant driver to run all hardware devices connected to the adapter. Will not be released after 1/97. Will not be supported after 1/98.
NetWare Peripheral Architecture (NWPA)	Each hardware device connected to the adapter uses an individual CDM, which makes it better designed for scalability. Will be the principle disk driver architecture in future releases of NetWare.	

For a detailed discussion of each architecture type, read the following sections and determine the driver architecture you want before loading your device or LAN drivers.

Monolithic Architecture

As stated earlier, monolithic architecture uses a single disk driver (a .DSK file) as the single interface between the NetWare operating system and all devices on the interface adapter.

You can use this architecture, if the disk driver supports all connected hardware devices.

Besides Novell® drivers, additional third-party drivers are also included with NetWare 4.2.

If you experience problems with third-party drivers, contact the manufacturer listed in the driver description that appears as you highlight the driver.

NetWare Peripheral Architecture (NWPA)

NWPA allows for broader driver support for host bus adapters and connected hardware devices.

The main advantage of using NWPA over monolithic architecture is that NWPA is better designed for scalability.

NWPA separates NetWare driver support into two components: a Host Adapter Module (HAM) and a Custom Device Module (CDM). The HAM is the component used to drive the host bus adapter hardware. The CDM is the component used to drive hardware devices attached to a host adapter bus.

When you want to connect a new hardware device to the host bus adapter, you need to load only the appropriate CDM for that hardware device (in addition to the HAMs and CDMs already loaded), not a compatible disk driver to run *all* hardware devices connected to the adapter.

HAMs and CDMs are loaded the same way you load other disk drivers. The difference is that you load a HAM for the adapter in your server, and a CDM for each device type attached to the adapter.

When the first HAM is loaded, the NWPA.NLM is loaded automatically. NWPA.NLM is an interface between the NWPA and the Media Manager. The Media Manager provides a storage management interface between applications and storage device drivers.

Once the HAM and NWPA.NLM are loaded, the server is scanned for new devices. Based on what new devices are found, the appropriate Novell CDMs are then loaded. Standard Novell CDMs are listed in Table D-2.

Table D-2
Novell NWPA Disk Drivers, HAMs, and CDMs

Computer architecture	Controller	HAM you must load	Novell CDM that is loaded
Industry Standard Architecture (ISA)	AT class IDE (ATA)	IDEATA.HAM	IDEHD.CDM (For a hard disk)
	Adaptec 154*X*	SCSI154*X*.HAM	SCSIHD.CDM (For a hard disk) SCSICD.CDM (For a CD-ROM drive) SCSIMO.CDM (For a magneto-optical drive) SCSI2TP.CDM (For a tape device)
Extended Industry Standard Architecture (EISA)	AT class IDE (ATA)	IDEATA.HAM	IDEHD.CDM (For a hard disk)
	Adaptec 154*X*	SCSI154*X*.HAM	SCSIHD.CDM (For a hard disk) SCSICD.CDM (For a CD-ROM drive) SCSIMO.CDM (For a magneto-optical drive) SCSI2TP.CDM (For a tape device)
	EISA vendor proprietary	See vendor	See vendor

If you are using a third-party CDM, rather than one of the Novell standard CDMs, it might be autodetected. If not, it must be loaded manually.

A description of NetWare 4.2 HAMs and CDMs appears on the screen as you highlight the driver.

For more information about the NWPA, refer to “NetWare Peripheral Architecture” in *Concepts*.

appendix **E**

Red Box CD-ROM Drivers

The following list defines the CD-ROM drivers and their load order needed to enable a CD-ROM device to mount a CD-ROM as a NetWare® volume.

The list may or may not be complete, as drivers may have been added to the Novell® Red Box™ (NetWare 4.2 product package) after the list was created.

An updated list can be obtained via Novell's faxback server by calling 1-800-NETWARE and requesting document #1344.

Please note that this list simply defines the load order of drivers included in the Red Box. The configurations listed may not work in every possible hardware configuration. Novell has made every effort to ensure the accuracy of the document and the information contained herein.

Table E-1
Red Box CD-ROM Drivers and Load Order

Manufacturer	Adapter	Driver load order
Adaptec*	AHA-1510A	AHA1510.DSK
		ASPITRAN.DSK
		ASPICD.DSK
		NWPA.NLM
		CDROM.NLM

Table E-1 *continued*

Red Box CD-ROM Drivers and Load Order

Manufacturer	Adapter	Driver load order
Adaptec	AHA-1522A	AHA1520.DSK
		ASPITRAN.DSK
		ASPICD.DSK
		NWPA.NLM
		CDROM.NLM
Adaptec	AHA-1542CF	AHA1540.DSK
	AHA-174*x*AS6*	ASPITRAN.DSK
	AHA-174*x*AS200*	ASPICD.DSK
	AHA-174*x*A*	NWPA.NLM
	*Standard Mode	CDROM.NLM
Adaptec	AHA-1640S6	AHA1640.DSK
		ASPITRAN.DSK
		ASPICD.DSK
		NWPA.NLM
		CDROM.NLM
Adaptec	AHA-1742AS6*	AHA1740.DSK
	AHA-174*x*AS6*	ASPITRAN.DSK
	AHA-174*x*AS200	ASPICD.DSK
	AHA-174*x*A*	NWPA.NLM
	*Enhanced Mode	CDROM.NLM

Table E-1 *continued*

Red Box CD-ROM Drivers and Load Order

Manufacturer	Adapter	Driver load order
Adaptec	AHA-2742A	AIC7770.DSK
	AHA-2742A-T	ASPITRAN.DSK
	AHA-2742T	ASPICD.DSK
		NWPA.NLM
		CDROM.NLM
Allways*	IN-2000	IN2000.DSK
		ADAASPI.DSK
		NWPA.NLM
		CDROM.NLM
Allways	AL-6000	AL6000.DSK
		ADAASPI.DSK
		NWPA.NLM
		CDROM.NLM
Allways	AL-7000	AL7000.DSK
		ADAASPI.DSK
		NWPA.NLM
		CDROM.NLM
Buslogic	BT-542/545	BT4X.DSK
	BT-640/646	NWPA.NLM
	BT-742/747	CDROM.NLM
	BT-445S	
	BT-946C	

Table E-1 *continued*

Red Box CD-ROM Drivers and Load Order

Manufacturer	Adapter	Driver load order
DPT	PM2012B	PM12NW40.DSK
	PM2022/9*X*	NWPA.NLM
	PM2122/9*X*	CDROM.NLM
DPT	PM2011B	PM11NW40.DSK
	PM2021/9*X*	NWPA.NLM
		CDROM.NLM
DTC	DTC 3290	DTC90AS4.DSK
		DTC90HD4.DSK
		ASPICD.DSK
		NWPA.NLM
		CDROM.NLM
DTC	DTC 3280	DTC80AS4.DSK
		DTC80HD4.DSK
		ASPICD.DSK
		NWPA.NLM
		CDROM.NLM
Future Domain	TMC-16*XX*	SIM18_4.DSK
	MCS-600/700	FUTXPT.DSK
	TMC3260	FUTD_4.DSK
		NWPA.NLM
		CDROM.NLM

Table E-1 *continued*

Red Box CD-ROM Drivers and Load Order

Manufacturer	Adapter	Driver load order
Future Domain	TMC-8*XX*	SIM950_4.DSK
		FUTXPT.DSK
		FUTD_4.DSK
		NWPA.NLM
		CDROM.NLM
Mylex	DAC960-3	DACNET4.DSK
	DAC960-5	ASPIDAC.DSK
		ASPICD.DSK
		NWPA.NLM
		CDROM.NLM

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December 1998

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Accuracy	❑	❑	❑	❑
Examples	❑	❑	❑	❑
Illustrations	❑	❑	❑	❑
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