



**N440BX Purpose Built File/Print  
Server Integration Guide  
For Novell® NetWare 4.11**



*Revision 1.5  
May, 1998*

# Revision History

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Revision	Revision History	Date
1.0	Initial Release	4/98
1.5	Legal disclaimer clarifications	5/98

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## **Integrating a N440BX as a High-Performance File/Print Server**

### ***Assumptions***

This installation procedure assumes the reader is installing Novell NetWare 4.11 on a system built with an Intel N440BX Dual Processor Ready server baseboard and a Columbus-II chassis. In addition, it is assumed four new or unformatted hard drives are being used: 1 EIDE hard drive for installation of the O/S, and 3 identical SCSI hard drives for setting up a RAID 5 disk array. The first hard drive for installing the O/S should be at least 1GB and the other three can be almost any capacity as long as they are identical. Also, it is assumed that the onboard Symbios 53C876 SCSI controller is used for controlling the SCSI devices. The networking protocol assumed for this installation is IPX/SPX and the network adapter used is assumed to be the onboard Intel 82558 Ethernet\* adapter. The Intel 82558 on-board NIC is functionally equivalent to the Intel EtherExpress™ PRO/100+ network interface controller. Refer to NetWare documentation for details on network protocols and other information if necessary.

Note: No tape drive was integrated into the server system. Intel strongly recommends integrating a backup device and running routine backups on any server that is put into production use by customers. In addition, no UPS (uninterruptible power supply) was integrated. As with tape drives it is also strongly recommended that a UPS be used with any server that contains critical customer data.

### ***Hardware Integration Overview***

- ❖ Prepare the Columbus-II Chassis Sub-Assembly Kit for baseboard installation according to instructions included with the chassis.
- ❖ Install the N440BX Server board into the Columbus-II Chassis
- ❖ Install the Pentium II Processor(s) and/or termination cards on the N440BX Server board.
- ❖ Install the Memory DIMM(s) on the N440BX Server board.
- ❖ Install the Floppy disk drive into the Columbus-II Chassis
- ❖ Install an IDE ATAPI CD-ROM drive into the bottom 5.25 external drive bay.
- ❖ Install the IDE and SCSI Hard Disk Drives into the Internal drive bay and install the internal drive bay into the Columbus-II Chassis.

## **Installing Novell NetWare 4.11**

**NOTE:** If you plan to install your server from CD-ROM or from floppy diskettes, you will need a minimum of 8 MB of RAM. If you plan to install your server from a remote network installation area, you will need a minimum of 10 MB of RAM. The additional 2 MB of RAM is needed when installing from a remote network installation on area, because the new server will need to load the CLIB and STREAMS NLM programs.

The minimum amount of storage space required is 90 MB: 15 MB for a DOS partition plus 75 MB for a NetWare disk partition containing volume SYS:. However, if all file NetWare file groups are copied to the server, you will need a minimum of 100 MB for volume SYS: We therefore recommend a larger volume SYS:. 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 12 MB of RAM, you might want to increase the DOS partition from 15 MB to 27 MB (15 MB + 12 MB = 27 MB). If you plan to install the DynaText\* viewer and the NetWare 4.1 documentation on the server, add another 60 MB of disk space.

### Pre-Installation Steps

- A) Label a blank high density (HD) formatted 3.5" floppy disk "Registration Disk" and have it available for use during the install routine.
- B) Determine what protocol(s) this server will be running. Assuming TCP/IP record information below.



IP Address \_\_\_\_\_  
Subnet Mask \_\_\_\_\_  
Default Gateway \_\_\_\_\_  
Server Name \_\_\_\_\_

See Appendix C & D for additional worksheets

- C) Power up your system and note at the initial screen what level of BIOS is installed. The latest BIOS can be found at "<http://support.intel.com/support/motherboards/server/>". Enter BIOS Set Up (Press F2 during boot), Advanced Menu and confirm/set **Multi-Processing Specification to 1.4**

Note: The N440BX Server Board Resource CD also contains the System Setup Utility and the product manual. This CD can also be launched from within Win95 or NT to run the graphical user interface (GUI). In addition to all the functionality listed above, the GUI provides more product and support information along with links to various Intel web sites.

### Installation Media

	 CD-ROM	 Remote network installation area
<b>Speed of Installation</b>	Slower than from a network.	Faster than from a CD.
<b>Hardware Configuration Requirements</b>	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 Net Ware 4.11 files, or the Net Ware 4.11 CD-ROM mounted as a Net Ware volume.
<b>Ease of Installation</b>	Requires setup of CD-ROM drive and drivers.	Simple. Must install as a Net Ware client first.

### Installation Steps from CD-ROM

1. Reboot the system with the DOS bootable disk.
2. Type **FDISK** at the command prompt and hit [Enter].
3. *(This will show you the current partition information on your hard drive.)* Note down the number of partitions on your hard drive. If FDISK shows an extended partition, keep in mind that there are logical partitions within that extended partition. Press [Esc] to get back to the Main Menu.
4. *(This will allow you to delete your partitions. WARNING: This procedure is not reversible.)* If you had any extended partitions, delete the embedded logical partitions by selecting [3]. Then delete the extended partition that contained the logical partitions.
5. *(This will allow you to delete your primary partition.)* Finally, if you had any Non-DOS partitions on your hard drive, delete them now by selecting [4].
6. Now that all existing partitions have been deleted, select [1] to create the primary DOS partition from which to install NetWare. When prompted "Use maximum partition size?" answer [No]. Enter in the partition size you wish to make. Leave all other free space on the hard drive UN-partitioned. This remaining space will be used by NetWare system volumes. Select [2] from the main menu, and then select the primary partition to be active. Quit FDISK.
7. To format the hard drive Restart the system with the DOS disk. Type **FORMAT C: /S** at the command prompt and press [Enter]. This will format the hard drive and transfer the system files from floppy to the hard drive.

8. After that copy all the necessary files from the floppy diskette to the hard drive (i.e. CD-ROM drivers). Now remove the DOS Disk and restart the system from the hard drive. This drive should appear as Drive C:. Run the Setup Utility for the IDE CD Rom drive. This drive should appear as Drive D:. The system is now prepared for Novell® NetWare Server 4.11.
9. Insert the NetWare 4.1 Operating System CD-ROM into the CD-ROM drive.
10. Change to the drive letter corresponding to the CD-ROM.
11. Type INSTALL <Enter>
12. Choose the language in which you want the server installed and press <Enter>.
13. The "Select the Type of Installation Desired" menu appears.
14. Choose "NetWare Server Installation" and press <Enter>.
15. A menu appears displaying additional installation options.
16. Select "Simple Installation of NetWare 4.1" and press <Enter>.
17. A screen appears requesting a server name.
18. Type the server name in the field provided and press <Enter>.
19. For help on rules for naming servers, press <F1>.
20. The server boot files are copied to the server.
21. Select a Locale configuration for the server (keyboard). **Note: Ignore the next two steps if you don't have multiple processors. These steps are bypassed during the installation if the process does not detect a second processor.**
22. After the automated steps, select whether you want to install a SMP version.
23. If you choose yes the next screen will ask for the appropriate PSM(Platform Support Module) driver. Select **MPS14.PSM - Platform Support Module for Intel MPS Compliant Systems** and press [Enter].
24. After this the NetWare installation scans for the hard disk controllers and network adapters. It will then try to automatically supply a driver for the found hardware. If it cannot find a driver, it will ask you to either choose one from a list, or to provide one from the manufacturer.

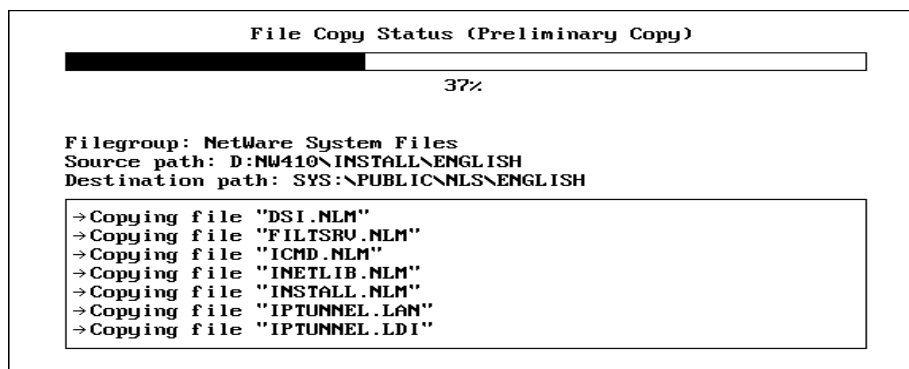


25. Press [F3] to continue without selecting.
26. Again press [F3] to continue without selecting.
27. Again press [F3] to continue without selecting.
28. Again press [F3] to continue without selecting. This will automatically install **IDEATA** in **DISK & CD-ROM Drivers**.
29. Then **Select additional or modify selected Disk/LAN drivers**.
30. Press [Enter] in DISK & CD-ROM Drivers.
31. At the next screen, **Select an additional driver**.
32. Press <**Ins**> to Install an unlisted driver
33. Press [F3] to define a path.

*Note: Many driver diskettes have both 3.12 and 4.11 drivers. The 3.12 drivers will be listed first if the path does not specify the 4.11 directory.*

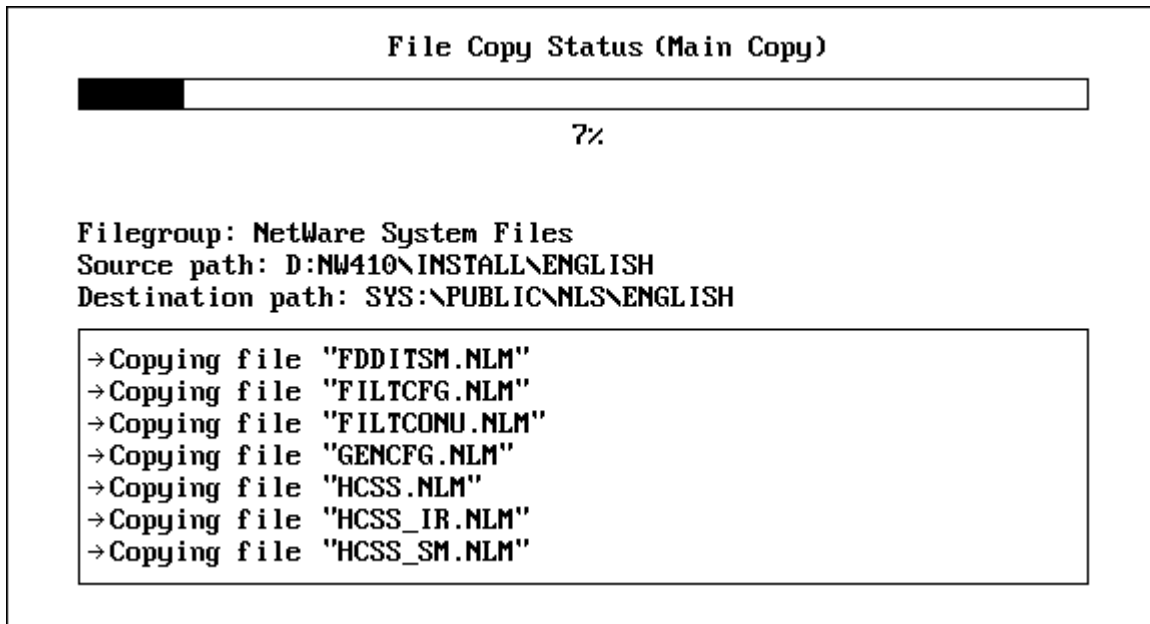
34. Enter the Netware SCSI Drivers diskette, and type in **A:\NETWARE\NWPA**
35. Select the **SYM8XXNW.HAM Symbios Logic Netware HAM Driver (SYM8XXNW-2.03.00)**
36. Enter **NO** to Save Existing file C:\NWSERVER\SYM8XXNW.HAM
37. Enter **NO** to Save Existing file C:\NWSERVER\SYM8XXNW.DDI
38. Enter **NO** to Save Existing file C:\NWSERVER\NWPALOAD.NLM
39. Set the SLOT number of the card
40. Set the parameters as you require, **Save Parameters and Continue**
41. Enter **No** to 'Do You Want to Select an Additional Disk Driver?'
42. Select **Continue Installation**
43. Then go down to **Network (LAN) Drivers** & press [Enter].
44. At the next screen, **Select an additional driver**.

45. Press <Ins> to Install an unlisted driver
46. Insert the LAN driver disk, and press F3 to specify the path as **A:\NWSERVER**
47. From the list select **E100B.LAN : Intel EtherExpress Pro PCI Adapter**.
48. "Save Existing file C:\NWSERVER\E100b.LAN ?", Enter **No**
49. "Save Existing file C:\NWSERVER\E100b.LDI ?", Enter **No**
50. When asked to input the correct settings, enter **10001** for the "Slot Number".
51. Select **Save Parameters and Continue**
52. Enter **No** to 'Do you want to Select an Additional Network Driver ?'
53. Select **Continue Installation**
54. If the NetWare was not able to automatically detect any hardware, you can install the drivers for it manually. If you have no further hardware to add, select **Continue Installation** and press [Enter].
55. Ignore the message about the CD Rom not being mounted, this will be corrected later.
56. NetWare will now copy files to the hard drive.



57. Choose **Yes, this is the first Netware 4 server** at the Install NDS screen
58. After successfully finished copying, select the appropriate Time Zone that server will reside in and press [Enter].

59. At the next screen, enter the name of your organization and press [Enter].
60. At the next screen, set the Administrator's password and Continue the Installation.
61. At the next screen, NetWare will present you with your setup information that you may need to record for future reference. Then press [Enter].
62. At the next screen, NetWare will ask for your license disk. Insert the disk and press [Enter]. *(If you do not have a disk, press F9 to continue. This will default NetWare into 2 user mode.)*
63. Once NetWare Directory Services has been installed, NetWare begins copying the remaining NetWare files to volume SYS:. This could take a few minutes.



64. After it has finished, NetWare will present you with a menu of operations you may perform based on choices you may have made during the installation.

These choices are:

Create Registration diskette

Make diskettes

### **Create a Registration Diskette**

Having a Registration diskette is useful in case you experience system problems in the future and must call Novell Technical SupportSM.

Install can read information such as OS version, addresses, number of licensed connections, SFT level, amount of RAM installed, network board configuration, and disk drive configuration, and it can copy this information to the Registration diskette.

Novell support technicians can access the above information, which greatly speeds up their ability to help you.

## Procedure

1.From the "Other Installation Actions" menu, select "Choose an Item or Product Listed" and press <Enter>.

2.Choose "Create a Registration Diskette" and press <Enter>.

The screen that appears lists three prerequisites:

\* The NetWare 4.11 Registration diskette

\* The name and address of your Novell Authorized ResellerCLM

\* Your company's reseller contact (the person in your company in responsible for purchases).

3.Press <F10> to continue.

4.In the "Reseller Information" form that appears, fill in the name and address of the Novell Authorized Reseller you purchased NetWare 4.11 from.

4a.Press <Enter> after each entry.

4b.Press <F10> to continue.

5.In the "Customer Information" form, fill in the reseller contact's name and the name of your company (or organization).

5a.Press <Enter> after each entry.

5b.Press <F10> to continue.

6.Insert the Registration diskette into drive A: and press <Enter>.

Install now copies the registration information to this diskette.

7.(Optional) Copy configuration information to the Registration diskette.

7a.Press <F2> to view configuration information.

7b.Press <Esc> to exit the screen.

7c.When asked "Copy This Information to the Diskette?" choose "Yes" or "No."

7d.Insert the Registration diskette into the mailer labeled "Product Registration" and send it to Novell.

### ***Make Diskettes***

This option allows you to make diskettes necessary to upgrade an existing NetWare 2.x, 3.x, or 4.x server to NetWare 4.11.

This option also allows you to make client diskettes. If you don't want to make client diskettes at this time, you can make them later from the server by loading INSTALL.NLM or from a workstation by running MAKEDISK.BAT as explained in the "Install NetWare Client" section

65. You are now finished installing Novell® NetWare Server 4.11. Press [Enter] to exit the installation program and you will be returned to the NetWare console.

### **Obtaining and installing the latest NetWare support packs:**

The latest service packs and client software for Novell products can be obtained at:  
<http://support.novell.com/misc/patlst.htm>

### ***Installing the Support Pack***

1. To explode the file, type (filename) <Enter>. Explode the file on the server's volume SYS:, on another server volume, or on a local client that is using RCONSOLE to run the installation.

NOTE: This file contains directory paths that could exceed the DOS limits. The file must be extracted in a root level directory on your local drive or on a NetWare volume that accepts longer paths.

2. At the server console prompt, type LOAD INSTALL <Enter>.

3. Select "Product Options".
4. Select "Install a Product Not Listed".
5. Depending on where the intraNetWare Support Pack files are located, complete one of the following steps:
  - A. From the local volume SYS:, press <F3> and specify the path, including the volume name (e.g., SYS:\(directory name).
  - B. From a different server on the network, press <F3> and specify the full path including the server name (e.g., Server\_Name\VOL1:\(directory name). This step prompts for a login name and password for the other server.
  - C. From a local drive on a client using RCONSOLE, press <F4>.
6. Press <Enter>.
7. Press <F10> to accept the marked options and continue.
8. Press <Enter> to end.
9. After the files finish copying, review the .NCF files for accuracy, then bring down the server and restart it to complete the installation of the intraNetWare Support Pack.
10. In order to activate the purge fixes (PRGFREFX.NLM), the "PURGE /ALL" DOS command must be run at the root of all the server volumes. In addition, VREPAIR.NLM should be run until there are no errors.

NOTE: Newer files already existing on the server will NOT be overwritten. The files are first version checked, if they are the same then date checked.

## **Install NetWare Clients**

### ***Install a DOS and Windows Client (VLM)***

DOS and Windows clients share the same installation program. To provide for this, the installation program runs within the DOS environment.

Review the following checklist to make sure you are prepared to install the NetWare Client software for a DOS or Windows Client using the NetWare VLM.EXE.

Prerequisites:

An IBM\* PC (or compatible) with an XT, AT, 386, 486, Pentium\*, or higher (SX or DX) processor.

A hard drive or a floppy drive and diskette with the following amount of available disk space:

DOS only: 1.2 MB

DOS and Windows: 4 MB

A network board installed in your client computer.

Network boards are supplied with default settings for the interrupt, base I/O port address, and base memory address. You should already know the hardware board settings for your particular network board before running the installation program. For more information on installing the network board, see the manufacturer's documentation.

Most network boards use interrupt 3 or 5 if these are not used by COM2 or LPT2.

The base I/O port addresses often available for the network board are 300h and 340h.

**IMPORTANT:** If you specify an interrupt for the network board that is already being used by another device, you can still install the network board, but the network software will not run successfully.

The base memory address often available for the network board is D800 (sometimes written as D8000). Some network boards do not use RAM; if your network board is one of these, you do not need to specify a value for this setting. If you use a memory manager (for example, EMM386 or QEMM\*), you might need to exclude the base memory address controlled by the memory manager, if the memory manager cannot automatically detect that it is used by the network board. Network cabling. Each type of network board requires unique cabling. See the manufacturer's documentation packaged with your network board for requirements. Token ring network boards require a cable connection to the MAU before installing the operating system. Otherwise, the NTR2000 driver will not load.

(Optional) A computer cabled to the network and running Windows 3.1.

If you are using Windows, close Windows before loading the installation program. The client installation program will modify some Windows files that are used when in Windows. Do not install from an Windows DOS Box.

At least one NetWare 4.11 server installed.

Five formatted diskettes with the following names and labels. You create these diskettes by following the procedure in "Create Client Diskettes from a Workstation."

Diskette name	Volume label
NetWare Client for DOS and Windows Disk 1	WSDOS_1
NetWare Client for DOS and Windows Disk 2	WSDOS_2
NetWare Client for DOS and Windows Disk 3	WSDOS_3
NetWare Client for DOS and Windows Disk 4	WSDOS_4
NetWare Client for DOS and Windows ODI drivers	WSDOS_5

## Procedure

1. Insert the NetWare Client for DOS and Windows Installation Diskette 1 into your floppy disk drive.
2. Type the driver letter and load Install by typing A:\Install
3. Follow the installation instructions on your screen.

Default settings for the NetWare Client software should be sufficient for an initial connection. You can do a standard installation with the default settings and configure other options later.

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

4. Exit Install by pressing the key.
5. Reboot your computer.

### ***Install a DOS Client (Client 32)***

1. Insert the NetWare Client 32 for DOS/Windows 3.1x Disk 1 - DOS into your floppy disk drive.
2. Type the driver letter and load Install by typing A:\Install

Before Install begins copying files, you can press to return to the previous menu or to cancel the installation.

3. Follow the installation instructions on your screen.

Default settings for the NetWare Client software should be sufficient for an initial connection. You can do a standard installation with the default settings and configure other options later.

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

4. Exit Install and return to DOS by pressing the key, or press to reboot.

In order for your modifications or new installation to take effect, you need to reboot your computer.



### ***Install a Windows 3.1x Client (Client 32)***

1. Insert the NetWare Client 32 for DOS/Windows 3.1x Disk 1 - WIN into your floppy disk drive.
2. Close all other programs running on the computer, and from the Windows Program Manager, choose File|Run.
3. Type the drive letter and path to SETUP.EXE for Client 32 on the command line, and choose.
4. Choose in the Welcome dialogue box and choose to accept the Software License Agreement.
5. In the Target Directory box, type the path to the directory where the computer runs Windows. If the computer runs Windows from the network, quit Setup and run INSTALL.EXE from DOS.
6. Choose a 16-bit or 32-bit LAN driver for your network board. Make sure the board setting specifies the correct ODI LAN driver for your network board, then choose .

To select additional boards, choose the drop-down box. If your network board is not listed, you can load the driver from a network or local drive by choosing .

7. Choose to allow Setup to change the AUTOEXEC.BAT and CONFIG.SYS files.
8. Choose any additional software you want to install, and choose . Then supply information for the additional software you are installing.
9. When Setup completes, reboot the computer or return to Windows.
10. Client 32 cannot load until the computer restarts.

### ***Install a Windows 95 Client (Client 32)***

1. Insert the NetWare Client 32 for Windows 95 Disk 1 - Setup into your floppy disk drive or insert the Client 32 or NetWare 4.11 CD-ROM into your CD-ROM drive.
2. Choose on the Windows 95 taskbar.
3. Type the path for the Client 32 installation program (SETUP.EXE).
4. For example, to install from drive A:, type the following: A:\SETUP.EXE
5. Or for example, to install from the Client 32 CD-ROM in drive D:, type the following:

6. D:\PRODUCTS\WIN95\IBM\ENGLISH\SETUP.EXE
7. Follow the installation instructions on your screen.

In order to run Client 32, you need to reboot your computer.

## **Designing the Directory Tree Structure**

### ***Introduction:***

The NetWare® Directory Services™ (NDSTM) technology allows you to develop a common, distributed Directory database of logical and physical resources regardless of where the resources are physically located---forming a single information system.

Applications that have traditionally maintained Directory databases such as e-mail, human resources, and network management applications can now share a common source of Directory information that is available from any server in the network. This greatly enhances access to and management of resource information for the entire network.

All NetWare 4™ servers on the network access the Directory database for information about network resources and access to those resources. Because of this, network information is not server specific. Each network resource is represented by a unique entry in the database and is accessed by its name, not by its association to a particular server.

All network clients access information and resources through a single connection to the network.

### ***NDS the Database:***

NDS is an object-oriented implementation of a Directory that allows you to build sophisticated naming schemes and logical representations of network resources. The objects used in NDS are referred to as Directory objects.

Directory objects are structures that store information; they are not the actual entity represented by the object. For example, a Printer object stores information about a specific printer and helps manage how the printer is used, but it is not the actual printer itself.

The specific information that is stored for each object then becomes the directory information that can be used by applications and resources across the entire network. The Directory information is stored in the Directory database.

Directory objects consist of categories of information, known as properties or attributes. These properties act as data fields within an object for defining specific information about the object.

Some properties contain vital network information, such as printer names, network addresses, and configuration information. Other properties contain non-vital information, such as a user's job title, telephone number, and street address. The specific property information is referred to as an object's property value.

Some property values are required. An object cannot be created without these values, and these values cannot be deleted. For example, a User object requires both the name of the object and a value for the user's last name.

Many properties are multivalued. This means that more than one value can be set for a given property of an object. For example, values for multiple phone numbers can be set in the Telephone Property of a User object.

### ***Object Classes***

The Directory database contains three types or classes of objects:

- \* [Root] object (Directory tree name)
- \* Container objects
- \* Leaf objects

These objects represent both actual and logical resources in the network, such as users, printers, groups, and print queues.

### ***Directory Tree Design***

The size of your network isn't as important as the environment your network exists in---the network's hardware, communication links, LAN/WAN topology, and your organization's structure.

The complexity of your network's physical and organizational infrastructure determines the amount of designing necessary to efficiently implement the NDS technology---the more complex your environment, the more designing you need to do.

For example, a small network with multiple WAN links might have many more design concerns than a large network with no WAN links. This is because of unique physical attributes associated with different WAN architecture types.

Generally, four types of network environments affect the design of a Directory tree:

*Single server network* Typically maintains only LAN connections. The entire network is housed in one building or office and all connections lead to a single server.

*Single location network* Typically maintains only LAN connections. The entire network is housed in one building or office.

*Single campus network* Typically maintains only LAN or high speed WAN connections. The entire network is located at one site, in one or more buildings.

*Multiple campus network* Typically maintains connections between campus sites. It relies on data transmission across LAN and WAN links, with issues concerning speed and volume.

### ***Planning the Directory Tree Structure***

NetWare Directory Services supports many different Directory tree structures. This flexibility ensures that your tree design is the most efficient for your particular network environment. To ensure that you build the most efficient structure, you should maintain four goals:

- \* Provide intuitive and efficient access to network resources.
- \* Provide secure access to shared resources that is easily maintained and monitored.
- \* Develop a clear and concise blueprint for completing the implementation process.
- \* Develop a flexible layout of the tree structure to ensure that future changes can be easily incorporated.

The basic design principles provided in this section should assist you in accomplishing these goals.

You should build your tree structure by actually drawing each layer of the Directory tree as you read the following discussions. You can use modeling or drawing software, or create diagrams of the structure on paper.

The most helpful documents for this procedure are organization and resource charts, location maps, and WAN topology charts.

## *Completing General Tasks*

To implement NDS on your network, you need to first complete the following general tasks:

1. Install the first server and set up the Directory tree.

When you install NetWare 4, the INSTALL utility automatically installs NetWare Directory Services and prompts you to name the [Root] with the tree name. Then you can create and name an Organization object and up to three Organizational Unit objects.

You must then set the server context within the Directory tree. If you want to participate in the information superhighway, add a country code when setting the server context and a Country object will be created directly below the tree name or [Root] object.

The network hardware supports both file services and NetWare Directory Services. If you add large numbers of leaf objects, such as users or print queues, to a single container, you might need to increase the amount of memory on that NetWare server to improve performance.

2. Use NetWare Administrator or NETADMIN and PCONSOLE to complete the setup.

NetWare Administrator is a Windows-based utility, and NETADMIN and PCONSOLE are DOS-based utilities. To run these utilities, you must first install and set up a DOS or Windows\* client workstation.

Then, you can set up the remaining Directory tree structure, create objects for all network resources you want available in the Directory database, and create Profile objects for maintenance purposes.

Leaf objects. Place leaf objects in containers that provide the best access for the resources, groups, and users that use them.

For example, a NetWare Server object that stores a replica of each partition on the network can be placed in an Organization object for more efficient network management. Other servers and print queues can be placed in Organizational Units with the users or groups that use them.

Profile objects. Create Profile objects that provide organization or department login scripts in the appropriate container objects for groups of users who need similar work environments but who are not located in the same container object.

Implementing objects this way allows for easy, centralized control at the top of the tree and local control of the lower levels. At each container level, a User object with supervisory rights has authority over the objects within that container object.

3. Add new servers to appropriate contexts.

To add a new server, first create the container object you want to install a new server into by using NetWare Administrator or NETADMIN.

4. Set the appropriate container and property rights.

Security features can be set up in NetWare Administrator or NETADMIN.

5. Configure time synchronization by specifying time synchronization parameters for each NetWare server.

The number and location of container objects, partitions, and replicas determine the type of time servers you should create for your network.

### ***Directory Tree Structure***

The Directory tree begins with a general Organization object with multiple Organizational Unit objects below. Organizational Units are based on functional groups, projects, and departments and also on site locations such as cities or countries.

Multiple-campus networks typically require both system-wide administrative groups with central management at the organizational and departmental levels and site-based administrative groups that manage local resources and objects.

Multiple-campus networks typically have a number of high-level divisions within the organization that form the top level of Organizational Units. Most of these divisions are divided into sub-departments which form a second level of Organizational Units. A third level of Organizational Units might consist of locations or functional groups.

## **Setting Up NetWare Print Services**

### ***Using Print Services Quick Setup in NetWare Administrator***

Use the Print Services Quick Setup option to define your initial Print Server, Printer, and Print Queue objects and assign a print queue to a printer.

## Procedure

1. Install your printer.
2. Log in to the NetWare server as user ADMIN or equivalent.
3. Run Windows\*, and then run NetWare Administrator.
4. From the "Tools" menu, choose "Print Services Quick Setup."
5. In "Print Server Name," type a name for this Print Server object (or browse to an existing print server).
6. In "Printer Name," type a name for this Printer object.
7. In "Printer Type," type or select a printer type.

When you choose a printer type, a dialog box specific to your printer type displays.

8. Complete the dialog box for your printer type.

- \* AIO
- \* AppleTalk
- \* Parallel
- \* Serial
- \* UNIX

9. In "Print Queue Name," type a name for this Print Queue object.
10. In "Print Queue Volume," type a name for this print queue volume (or browse to choose a volume).
11. Choose "Create."

This completes the first part of setting up NetWare Print Services. But the Printer object you created is not yet associated with any physical printer.

### ***Using Quick Setup in PCONSOLE***

Use the Quick Setup option to define your initial print server object, printer object, and print queue object and to assign a print queue to a printer.

The following quick setup procedure will assume two laser printers, called PR\_Far and PR\_Near. They will be serviced by a print server called PS\_1 through two queues called

Q\_Far and Q\_Near, both located on a single NetWare server which will be called NWFS\_1.

Printer PR\_Far will be connected to the parallel port LPT1 on the NetWare server, and printer PR\_Near will be connected to parallel port LPT1 on a client workstation.

#### Procedure

1. Connect your printers to the parallel (LPT) port of the workstation.
2. Log in to the NetWare server as user ADMIN or equivalent.

For example:

```
LOGIN NWFS_1/.ADMIN.NOVELL
```

3. Type PCONSOLE at the command line.

This is normally found in volume SYS:PUBLIC.

The "Available Options" menu appears.

4. If the current context is the desired one, skip to Step 5. If not,
  - 4a. Select the "Change Context" option.
  - 4b. Enter the desired context or press <Insert> to browse.

Being in the correct context is critical to the success of your setup; therefore, you must change to the context in which the print related objects are to reside.

5. Use Quick Setup to define PS\_1, PR\_Far, and Q\_Far.

- 5a. Select the "Quick Setup" option.
- 5b. At the "Print server:" prompt, select the print server name.

Press <Enter> to bring up a list of current print servers. If no print servers are in that context, PCONSOLE will select a name based on your current context.

- 5c. Press <Insert>; then enter the name "PS\_1".
- 5d. Select "New printer:" and enter "PR\_FAR".
- 5e. Select "New print queue:" and enter "Q\_FAR".



5f.Press <F10> to save the changes.

NOTE: If you accept the default names for the printing objects, you need only to press <F10>. To select a different volume, press <Insert> to browse for a volume to hold the print queue. Change the names and printer configuration as you wish.

6.Use Quick Setup to add PR\_Near and Q\_Near.

6a.Select the "Quick Setup" option.

6b.Select print server PS\_1.

6c.Select "New printer:" and enter "PR\_NEAR".

6d.Select "New print queue:" and enter "Q\_NEAR".

6e.Select the "Location" field; then select "Manual Load."

6f.Press <Esc>; then select "Yes" to save the changes.

7.Press <F10> to save the changes.

### ***Additional Startup Tasks***

Before you can make printers available for network users to capture and print to, you need to complete Task 1 described below. Complete the additional tasks that are applicable to your hardware configuration.

Task 1: At the Netware server console, load PSERVER.NLM.

Type LOAD PSERVER, then follow the prompts to browse for the name of the print server you want.

You can also include the print server name in your load command. For example:

```
LOAD PSERVER .PS_1.NOVELL <Enter>
```

This command can be placed in your AUTOEXEC.NCF file.

Specify the context if it is different from your server's bindery context.

Where a printer is physically attached, an NPRINTER must be loaded. If the printer is physically attached to the server, the printer is defined as auto load and PSERVER.NLM will automatically load NPRINTER.NLM.

## **Managing NDS objects:**

### ***Setting up NetWare Administrator on a Windows 95 Workstation***

#### Prerequisites

- o A workstation cabled to the network and running Windows 95\* and Client 32TM
- o 1.2 MB of free disk space on the workstation
- o A drive mapping to SYS:PUBLIC on your preferred server
- o Authentication to a NetWare Directory tree

#### Procedure

- 1.From the Windows 95 desktop, right-click and choose "New."
- 2.Choose "Shortcut."
- 3.Choose "Browse."
- 4.From the Browser, locate the drive that points to SYS:PUBLIC and choose NWADMN95.EXE.
- 5.Choose "Open."
- 6.Choose "Finish."

NetWare Administrator is created as a shortcut icon on your desktop.

You can now use the NetWare Administrator graphical utility to manage your Directory tree.

### ***Creating Directories Using NetWare Administrator***

#### Procedure

- 1.Choose the "NetWare Administrator" icon from the Microsoft Windows (MS Windows) Program Manager or the OS/2 desktop.
- 2.Using the browser, select the directory to be the parent directory of the one you want to create.

To create a root directory, select the Volume object. For more about moving around in the browser and selecting objects, choose "Help" from the menu bar. For a list of directories and files on a volume, select "View/Set Context" and specify the volume name.

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

4. Enter the name for the new directory in the "Directory Name" box.

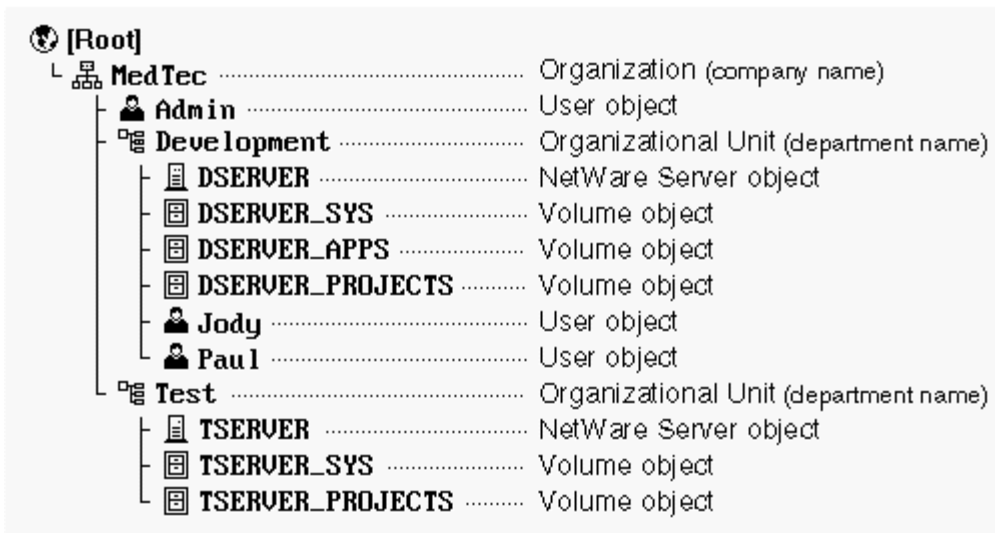
5. (Optional) Choose "Define Additional Properties" if you want to enter properties for the directory.

Choose this item if you want to assign properties to the new directory now. You can also add or modify properties after the directory is created. Properties include items such as trustees and access rights.

6. (Optional) Choose "Create Another Directory" to create another directory immediately after this one.

7. Choose "Create" to create a directory with the name you entered.

The new directory is created. You are returned to the browser.



See appendix E: for a sample directory structure.

## Appendix A: Detailed Equipment List

### **Hardware**

Chassis	Intel Columbus II
Baseboard	Intel N440BX Server Board
Processor	2 Intel Pentium® II microprocessors operating at 350 MHz
Memory	2 32MB Micron* PC/100 compliant DIMMS (Always check approved memory list before buying DIMMS for your N440BX Server Board) <a href="http://support.intel.com/support/motherboards/server/n440bx">http://support.intel.com/support/motherboards/server/n440bx</a>
SCSI Controller	Integrated Symbios 53C876 dual channel
NIC	Integrated Intel 82558 controller (EtherExpress™ PRO/100+)
Video	Integrated Cirrus Logic* GD 5480 PCI w/2MB of Video RAM
Hub	Intel InBusiness™ 8 Port Fast Ethernet
IDE Controller	Integrated dual channel IDE controller
Floppy Cont.	Integrated floppy controller
Floppy drive	TEAC FD235HF
CD-ROM	IDE ATAPI Sony* CDU311 connected as master on 2 <sup>nd</sup> IDE channel
Hard Drives	
IDE	1 Seagate* ST32132A – 2.1gig capacity
SCSI	3 Quantum* Atlas II Wide, XP32275W 2.2gig capacity Configured in a software RAID Level 5 disk array
Monitor	15" Mag Innovision Model NO:DX15FG
Mouse	Microsoft 2-button PS/2
Keyboard	Keytronic* 104 Key Model E03601QIPS2-C

### **Software**

OS	Novell® NetWare 4.11 (intraNetWare Support Pack v5.0)
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### **Misc**

BIOS: Production Release 4.0  
BMC Revision 05010039

## Appendix B. Calculate RAM Requirements

### Overview

NOTE: The following appendix is modified from a Novell® Application Notes article published in January 1995.

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.

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.

### 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, NetWare for Macintosh, 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."

#### Server Applications

Memory calculations for NetWare for Macintosh, NetWare for SAA, OracleWare, and other NetWare server applications can be found in their documentation and on the Network Support Encyclopedia (NSEpro) CD-ROM.

<b>STEP 1 Calculate the following variables.</b>									
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 $V1 \times 0.5$ , 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 $V2 \times V4$ )	_____ 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								
<b>STEP 2 Calculate your individual memory requirements.</b>									
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 $V1 \times 0.1$ )	_____ KB								
Line 3. If File Compression is enabled, enter 250, otherwise enter 0	_____ KB								
Line 4. Calculate the memory requirement for directory tables (multiply $V7 \times .006$ , or if suballocation is enabled multiply $V7 \times .011$ )	_____ KB								
Line 5. Calculate the memory required to cache the FAT (multiply Line V5 $\times .006$ )	_____ KB								
Line 6. Calculate the memory requirement for file cache using the following table. 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.	_____ KB								
<table border="0"> <tr> <td>Less than 100 clients</td> <td><math>V6 \times 400</math></td> </tr> <tr> <td>Between 100 and 250 clients</td> <td><math>40,000 + ((V6 - 100) \times 200)</math></td> </tr> <tr> <td>Between 250 and 500 clients</td> <td><math>70,000 + ((V6 - 250) \times 100)</math></td> </tr> <tr> <td>Between 500 and 1000 clients</td> <td><math>95,000 + ((V6 - 500) \times 50)</math></td> </tr> </table>	Less than 100 clients	$V6 \times 400$	Between 100 and 250 clients	$40,000 + ((V6 - 100) \times 200)$	Between 250 and 500 clients	$70,000 + ((V6 - 250) \times 100)$	Between 500 and 1000 clients	$95,000 + ((V6 - 500) \times 50)$	
Less than 100 clients	$V6 \times 400$								
Between 100 and 250 clients	$40,000 + ((V6 - 100) \times 200)$								
Between 250 and 500 clients	$70,000 + ((V6 - 250) \times 100)$								
Between 500 and 1000 clients	$95,000 + ((V6 - 500) \times 50)$								
Line 7. Enter the total memory (KB) required for support NLMs. 2,000KB is recommended for BTRIEVE(700), CLIB(500), INSTALL(600), and PSERVER(200)	_____ KB								
Line 8. Enter the total memory (KB) required for other services. Other services include NetWare for Macintosh, NetWare for SAA, OracleWare, NetWare Management System, and so on.	_____ KB								
<b>STEP 3 Calculate your total memory requirement.</b>									
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 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.	_____ MB								

## Appendix C: The Server Worksheet

Server information									
Server name: _____					IPX internal network number: _____				
Memory (RAM): Base: _____ Extended: _____ Total: _____									
Server boot method: Hard disk <input type="checkbox"/> Floppy diskette <input type="checkbox"/> 3.5" <input type="checkbox"/> 5.25"									
<b>Network boards</b> (Fill in columns that apply to each network board.)									
Name	LAN driver	IO port	Memory address	Interrupt (IRQ)	DMA channel	Node address	Slot number	IPX external network #	Frame type
<b>Other boards</b> (Internal or external disk controllers, serial controllers, SCSI controllers, video adapters, etc.)									
Name	Driver (if applicable)	IO port	Memory address	Interrupt (IRQ)	DMA channel	SCSI address	Other info		
<b>Disks</b>									
Drive Make/Model		Size	Mirrored with #	Volume segments					
1.									
2.									
3.									
4.									
5.									
6.									
7.									
8.									



## Appendix D: The Workstation Worksheet:

Workstation information									
<b>Boot method:</b> Hard disk <input type="checkbox"/> Floppy disk <input type="checkbox"/> Remote <input type="checkbox"/> Path: _____ Disk Size: _____									
<b>Memory (RAM):</b> Base: _____ Extended: _____ Total: _____									
Directory tree information									
<b>Directory context:</b> _____					<b>Tree name:</b> _____				
Operating System									
DOS <input type="checkbox"/> _____			Macintosh <input type="checkbox"/> _____			Microsoft <input type="checkbox"/> _____			
OS/2 <input type="checkbox"/> _____			UNIX NFS <input type="checkbox"/> _____			Windows			
Time Configuration									
<b>Time zone:</b> _____			Offset from UTC: _____			Sync with server: Yes <input type="checkbox"/> No <input type="checkbox"/>			
<b>Network boards</b> (Fill in columns that apply to each network board.)									
Name	LAN driver	IO port	Memory address	Interrupt (IRQ)	DMA channel	Node address	Slot number	IPX external network #	Frame type
<b>Other boards</b> (Internal or external disk controllers, serial controllers, SCSI controllers, video adapters, etc.)									
Name	Driver (if applicable)	IO port	Memory address	Interrupt (IRQ)	DMA channel	SCSI address	Other info		
<b>Disks</b>									
Drive Make/Model		Size	Volume name						
1.									
2.									
3.									

## Appendix E: Sample Network Directory Structure

