Intel® L440GX+ Server Board
Server Integration Guide
For Windows 2000 Server

Revision 1.0
Feb, 2000

Revision History

Revision	Revision History	Date
.5	Draft	2/1/2000
1.0	Release	2/18/2000

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Conventions and Terminology

This document uses the following terms and abbreviations:

Term	Definition
440GX+	Intel 82440GX basic AGP set joined with an Intel 21150BC PCI bridge.
Byte	An 8-bit quantity.
DP	Dual processors
ECC	Error Checking and Correction. On L440GX+, error correction is provided for single-bit memory errors, and error detection for multiple-bit errors.
EDO	Extended Data Out memory device
GB	Gigabyte = 1024 MB
Kb	Kilobit = 1024 bits
KB	Kilobyte = 1024 bytes
LVD	Low Voltage Differential
Mb	Megabit = 1024 Kb
MB	Megabyte = 1024 KB
MB/s	Megabytes per second.
Mbps	Megabits per second.
NIC	Network Interface Controller. On L440GX+, the Intel 82559 device performs this function.
OS	Operating System. Synonymous with "NOS" which is "Network Operating System"
PCI	Peripheral Component Interconnect. I/O bus for the L440GX+ server board.
POST	Power On Self Test
RAID	Redundant Array of Independent Disks
RAM	Random Access Memory
SCSI	Small Computer Systems Interface
SDRAM	Synchronous Dynamic RAM device
Ultra2 SCSI	Small Computer Systems Interface providing throughput of up to 80MB/sec with up to 8 SCSI devices/channel.
Wide Ultra2 SCSI	Small Computer Systems Interface providing throughput of up to 80MB/sec with up to 16 SCSI devices/channel.
UP	Uni-Processor (single processor)
Windows* 2000	Microsoft Windows 2000 family of operating systems (does not imply one version over another).
Windows 2000 Professional	Microsoft Windows 2000 Professional operating system
Windows 2000 Server	Microsoft Windows 2000 Server operating system
Windows 2000 Advanced Server	Microsoft Windows 2000 Advanced Server operating system

Integration Planning:

Server Use:

Knowing how the server will be utilized is a key piece of information when making initial operating system, application software, hardware, and configuration decisions. For optimal performance, the hardware and operating system needs to be selected and tuned to the needs of the application software. This recipe assumes that the server will be used in a "multi-purpose" environment where no single task will dominate the server resources.

Operating System (OS) Selection and Options:

Windows* 2000 is currently available in three different versions:

Windows 2000 version	Number of processors supported	Network Management Features
Professional	2	No
Server	4	Yes: DNS, DHCP, WINS, SNMP
Advanced Server	8	Yes: DNS, DHCP, WINS, SNMP

Windows 2000 Professional is a replacement for Windows NT 4.0 Workstation. It supports dual processors (DP), but does not include the network management features such as DHCP Server or WINs Server. Both Windows 2000 Server and Windows 2000 Advanced Server support the network management features of Windows NT 4.0. This recipe is compatible with all three versions of Windows 2000. For additional information on Windows 2000 specifications, features, and integration, please visit these links:
Microsoft's Windows 2000 Homepage: http://www.microsoft.com/windows2000/default.asp
Microsoft's Deployment Planning Guide:
http://www.microsoft.com/windows2000/library/resources/reskit/dpg/default.asp
Windows 2000 Magazine: http://www.win2000mag.com

Hardware Selection:

Intel has tested and validated many types, makes and models of hardware for use with the L440GX+. For a complete list, please review the online hardware compatibility documentation:
http://support.intel.com/support/motherboards/server/l440gx/compat.htm

Processor(s):

The L440GX+ will operate in either a uni-processor (UP) or a dual-processor (DP) configuration. If you choose a DP configuration, be sure both processors are equal in terms of speed and cache size. **Note: the L440GX+ server board does NOT support all Intel® Pentium® II and Intel® Pentium® lll processors.** For a complete list of supported processors, please reference http://www.intel.com/support/motherboards/server/l440gx/procsupp.htm

Random Access Memory (RAM):

The total amount and quality of server memory has a larger impact on the overall performance of the operating system than any other sub-system. Microsoft's **minimum** RAM requirement for Windows 2000 Professional is 64MB and the Windows® 2000 Server products require at least 128MB. More memory will increase system performance under multi-tasking loads.

The quality of the memory modules is at least (if not more) important than the total amount of memory installed in the system. Be sure to consult Intel's Tested Memory List (http://support.intel.com/support/motherboards/server/l440gx/lgx_mem.htm) before purchasing RAM for your system. For maximum system integrity, only use memory modules which are listed on the Tested Memory List for the L440GX+.

Hard Drives:
The L440GX+ supports two on-board IDE channels, one Wide Ultra2 SCSI channel (for a high-performance RAID array) and one Ultra Wide SCSI channel. Drive capacity and speed will vary according to your performance requirements. SCSI drives intended for use in a RAID array should all be of the same manufacturer make and model. Windows* 2000 requires at least 2GB of hard drive space (the operating system itself only uses ~720MB, but swap files and application storage space must also be taken into account. If Windows 2000 doesn't detect a hard drive with a capacity of at least 2GB, the installation will abort).

Pre-Integration: Gather Everything You Need

Assumptions

This installation procedure assumes the reader is installing Windows 2000 on a system built with an Intel L440GX+ dual processor ready server board with the following options:

- 1 or 2 approved Intel® Pentium® II or Intel® Pentium® III processors.
- At least 128 MB of approved RAM memory.
- One new or unformatted hard drive used for installation of the OS and the only drive in the system.
- Incorporation of additional drives for mirroring or other RAID options will be performed following the OS installation.
- The drive is either an EIDE hard drive set as primary master or a SCSI hard drive set as ID 0(drive termination must be properly set).
- The drive for installing the O/S is at least 4GB in size. *[A single 2GB drive is the minimum requirement.]*
- The onboard Adaptec* AIC 7896 SCSI controller is used for controlling the SCSI devices.
- The networking protocol for this installation is TCP/IP bound to the same network interface card.
- The network adapter used will be the onboard Intel® 82559 Ethernet* adapter. *The Intel® 82559 on-board NIC is functionally equivalent to the Intel® EtherExpress™ PRO/100+ network interface controller. Refer to Microsoft documentation for details on network protocols and other information if necessary.*
- The L440GX+ can boot from the 3.5" floppy drive.
- Windows 2000 Server will be installed from the CD-ROM drive with the boot/setup floppy disks.
- The Windows 2000 software is a US/English version.

Note: No tape drive is initially 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 (un-interruptible power supply) will be initially integrated. As with tape drives it is also strongly recommended that a UPS be used with any server that contains critical customer data.

Checklists:

1. Determine what protocol(s) this server will be running. If using TCP/IP record information below.
   - IP Address: _____
   - Subnet Mask: _____
   - Default Gateway: _____
   - Server Name: _____
   - Domain or Workgroup Name: _____

2. Power up the L440GX+ and note at the initial POST screen what level of BIOS is installed: _____.
   Compare the installed BIOS revision against the latest version posted on http://support.intel.com/support/motherboards/server/l440gx/software.htm. Update to the latest BIOS, firmware, and FRU/SDR versions if your L440GX+ does not have the latest versions installed already.

3. Enter BIOS Set Up (Press F2 during boot):

- **Advanced Menu** and confirm/set **Multi-Processing Specification** to **1.4**.
- **Boot Menu** and confirm/set the **Boot Device Order** (from the top down) to **Removable Media, Atapi CD-ROM, Hard Drive.**

4. Make the Windows* 2000 Installation Floppy Disks:
   4.1. You need four formatted 3.5" floppy disks and the Windows 2000 CD. On a computer running a 32-bit version of the Windows operating system:
   4.2. Insert the Windows 2000 Server CD into the CD-ROM drive.
   4.3. When prompted, **Would you like to upgrade to Windows 2000**, click **No**.
   4.4. On the Windows 2000 Server CD splash screen, click **Browse This CD**.
   4.5. When a list of folders appears, double-click the **BOOTDISK** folder.
   4.6. Double-click **MAKEBT32**.
   4.7. At the prompt, **Please specify the floppy drive to copy the images to**, type: **A**.
   4.8. Insert the first disk, and press **Enter**.
   4.9. Follow the instructions to create the remaining three disks.
   4.10. Close the **BOOTDISK** folder and close the Windows® 2000 CD splash screen.

Your Resource CD

An Intel L440GX+ Server Board CD was shipped with your system. This CD contains valuable information and driver files for installing Windows NT 4.0, Novell Netware, and Unix, but is not required for installing Windows 2000 Server. (The Windows 2000 Server CD contains all of the drivers required for a successful installation on the L440GX+.)

Hardware Integration:

Safety Warning: Whenever working in the system, ensure the power cords are fully disconnected. Power supplies that support Wake-On Lan* or the Emergency Management Port (EMP) provide a continuous 800 milliamps, +5v standby voltage to the system board.

- Install the L440GX+ Server board into the server chassis.
- Install the Intel® Pentium® II or Intel® Pentium® III Processor(s) and/or termination cards on the L440GX+ Server board. *[All processor slots must be populated with a processor or a termination card.]*
- Install the Memory DIMM(s) on the L440GX+ Server board.
- Install the Floppy disk drive into the chassis.
- Install a CD-ROM drive into one of the 5.25 drive bays. If this drive is an IDE drive, refer to the drive documentation for proper master-slave jumper configuration. If this drive is a SCSI drive, be aware that mixing various SCSI implementations on the same channel may affect data transfer performance. This drive is usually attached to channel B of the integrated Adaptec* SCSI controller. The device ID is usually set to 2. For proper configuration, refer to the documentation accompanying your SCSI devices.
- Connect the NIC to the network.
- Connect all peripheral cables (keyboard, mouse, monitor, UPS, power, etc).

[Detailed, step-by-step instructions for installing these items into an Intel Astor II server chassis are available on the optional SMaRT Tool CD. The SMaRT Tool CD does not ship with the L440GX+, but may be obtained free of charge by calling the Intel Literature Center. Please reference Appendix B to locate the Intel Literature Center nearest you.]

Installing Windows* 2000

These Windows 2000 installation steps assume that you are creating a new installation on an unformatted hard drive partition (not an upgrade of an existing Windows operating system). *[If you intend to upgrade an existing Windows operating system, the menus may vary from these instructions. Be sure to read the installation notes on the Windows 2000 CD-ROM (in the /SETUPTXT directory) before proceeding with an upgrade.]*

1. Place the Windows 2000 Boot floppy (1 of 4) into the floppy drive. Place the Windows 2000 CD-ROM into the CD-ROM drive and power-on the L440GX+.

2. The Windows 2000 Server installation begins.

3. Insert the remaining three Windows 2000 Server installation disks as prompted by Windows 2000 Setup.

4. At the **Welcome to Setup** screen, press **Enter**.

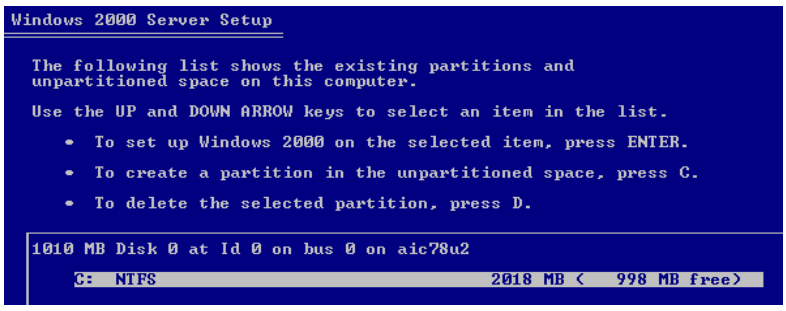
5. Review and if acceptable, agree to the license agreement by pressing **F8**.
   *[**Note**: If you had a previous version of Windows 2000 installed on this server, you might get a message asking if you want to repair the drive. Press **Esc** to continue and not repair the drive.]*

6. Windows 2000 will scan and display drive and partition information. If you don't need to preserve any of the current data on the drive, delete all partitions by highlighting each one and pressing the D key. When all disk space is labeled as **Unpartitioned space**, press **C** to create a partition in the unpartitioned space.

7. If your server has a single disk drive, delete the total **space default value** and type **2048** at the **Create partition of size (in MB)** prompt. Press **Enter**. (If your server has two disk drives, type the total size of the first drive at this prompt.)

8. After the **New (Unformatted)** partition is created, press **Enter**.

9. Select **Format the partition using the NTFS file system** (the default selection) and press **Enter**. Remove the floppy disk from the drive. *[NTFS supports large drives as well as resource and user-level security.]*



10. Windows 2000 Setup formats the partition and then copies the files from the Windows 2000 Server CD to the hard drive. When this process is finished, the computer will restart and the Windows 2000 Installation Program will continue.

11. The **Welcome to the Windows 2000 Setup** Wizard appears, click **Next**. Windows 2000 then detects and installs devices. This can take several minutes, and during the process your screen may flicker.

12. In the **Regional Settings** dialog box, make changes required for your locale (typically, none are required for the United States), and click **Next**.

13. In the **Personalize Your Software** dialog, fill in the **Name** and **Organization** boxes. Click **Next**.

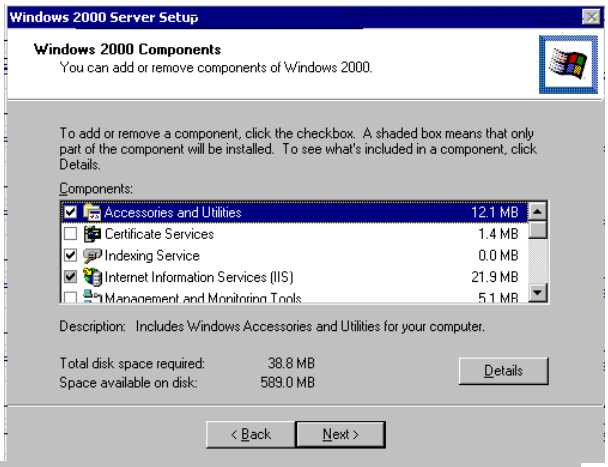
14. Type the **Product Key** (found on the back of your Windows* 2000 CD case) in the text boxes provided. Click **Next**.

15. In the **Licensing Modes** dialog box, select the appropriate licensing mode for your organization and click **Next**. *[If you're not sure, just use the default selection.]*

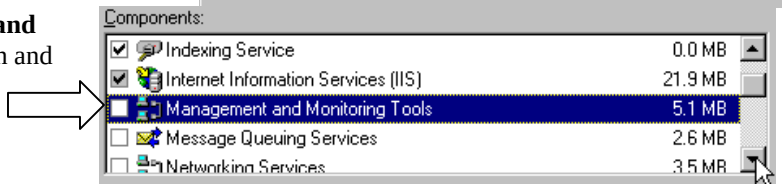
16. In the **Computer Name and Administrator Password** dialog box, type the new computer name in the computer name box and enter a password for the Administrator account. Click **Next**.

17. The **Windows* 2000 Components** dialog box comes up next. *[Windows 2000 Pro will have fewer options than the screenshots shown here because Windows 2000 Pro doesn't include the advanced management tools of the Windows 2000 Server products. Simply accepting the defaults will provide a general-purpose set of features.]*

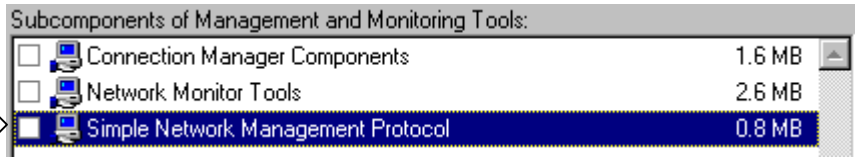
    For servers utilizing the Windows 2000 Server and Advanced Server software, this section shows you how to select SNMP, DHCP, DNS, and WINS services.



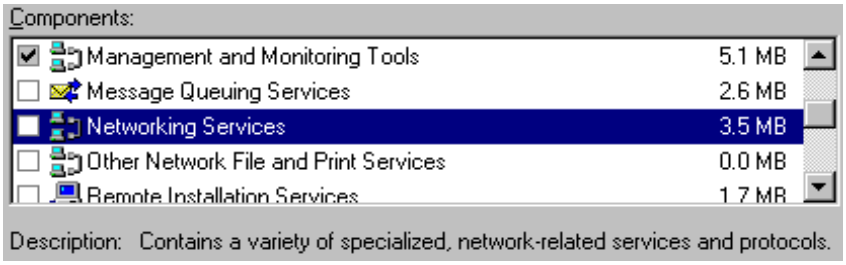
    Select the **Management and Monitoring Tools** option and click on **Details.**



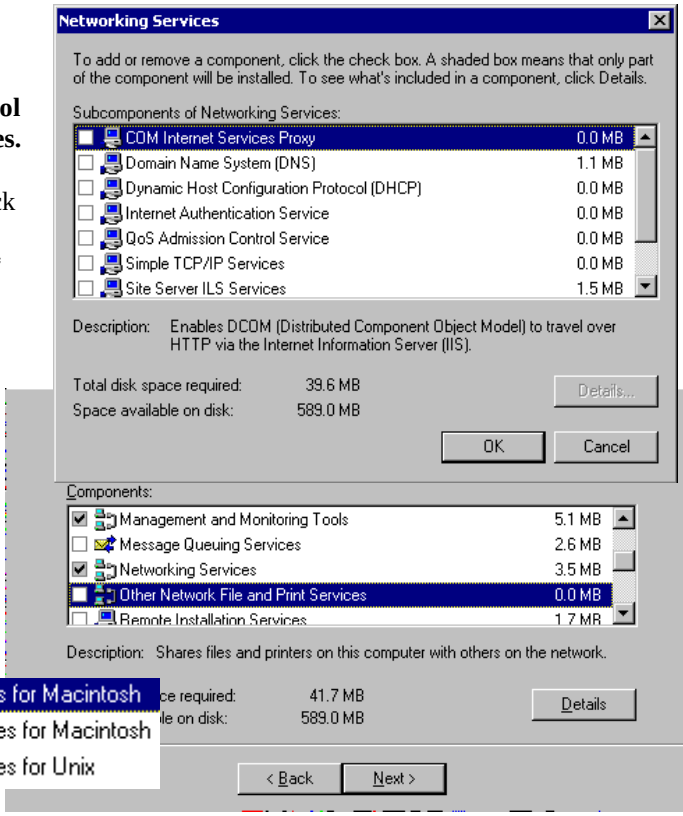
    Select the **Simple Network Management Protocol** and click **OK** to close and **Next** to continue.



18. In the Windows 2000 Components dialog box, select the **Networking Services** option and click on Details.

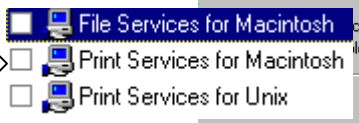


On the Networking Services screen, select **Domain Name System (DNS), Dynamic Host Configuration Protocol (DHCP), and Simple TCP/IP Services.** Scroll down and select **Windows Internet Name Service (WINS).** Click **OK** to continue. *[DNS, DHCP, and WINS are not included with Windows* 2000 Professional.]*



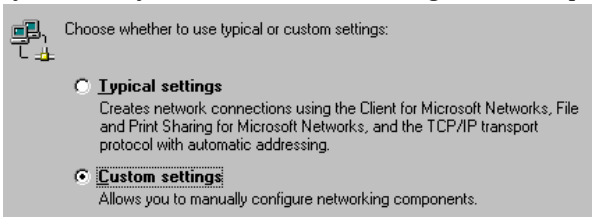
19. Back at the Components Window, select **Other Network File and Print Services.**

Select the appropriate services if you have Macintosh or UNIX clients on your network. Click **OK** to close and **Next** to continue.

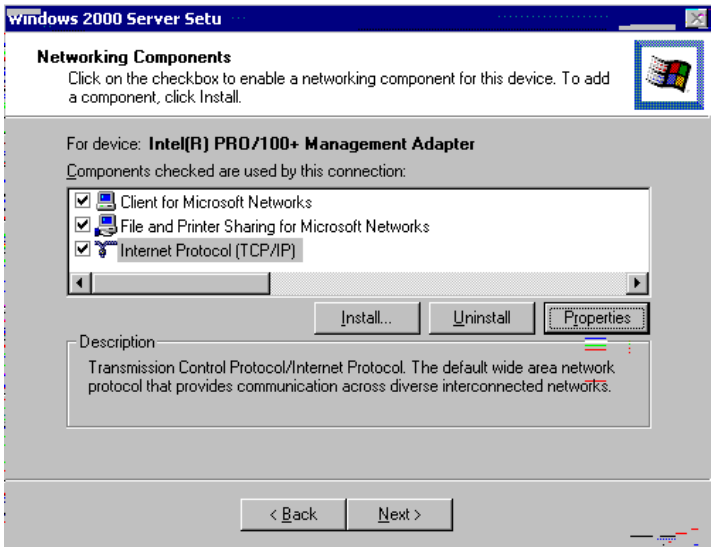


20. The Windows 2000 installation will now prompt you to verify the **Date and Time** settings, then the optional components you just selected will be installed.

21. In the **Networking Settings** dialog, select **Custom Settings** and then click **Next.**

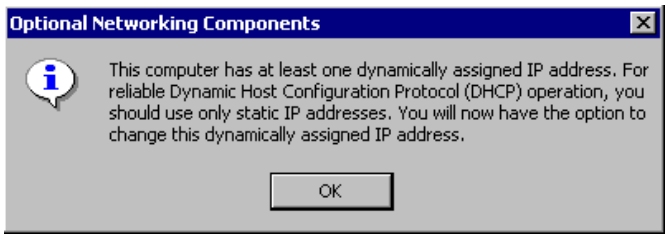


22. Click on **Internet Protocol (TCP/IP)** and then click **Properties.** By default, TCIP/IP is setup to use DHCP which is not recommended for servers. Enter the specific TCP/IP information on this screen (at the very least, enter the IP address and subnet mask; enter the gateway IP address if this server will be accessing the internet). Click **OK** and then **Next**.

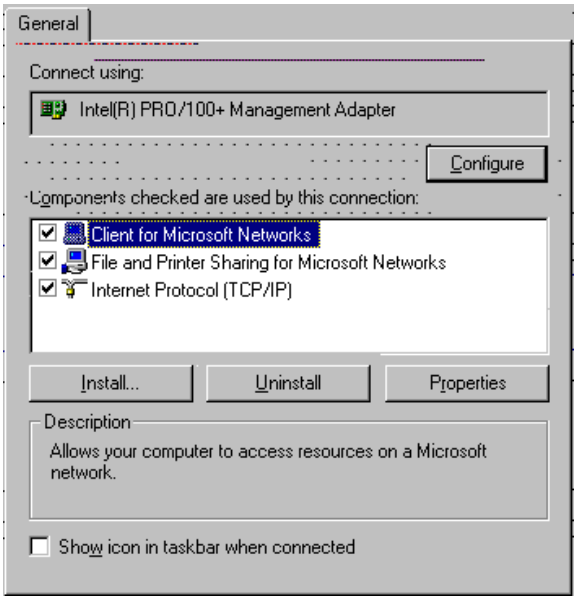


23. In the **Workgroups or Computer Domain** dialog box, **No** is selected by default. Enter the Workgroup or Domain name if you have that information. If not, you can change this later with the *Configure Your Server Wizard*. Click **Next**.

24. The installation will continue to install the Networking Components and you may see various notification and configuration screens depending upon the options you selected. If you chose not to set a static IP address, the WINS installation will give you a second chance to enter one.



25. The Local Network Settings dialog box will appear and give you a change Install additional components and/or configure the components already selected. *[If you will only have Windows clients on the network, the default TCP/IP protocol should be all you need. Add NWLink IPX/SPX if you have Netware clients as well.]*



26. Windows* 2000 Server Installation continues and configures the necessary components. This takes a few minutes.

27. When you reach the **Completing the Windows 2000 Setup** Wizard, remove the CD-ROM from the drive and click **Finish**.

28. The server restarts and the operating system loads from the hard drive.

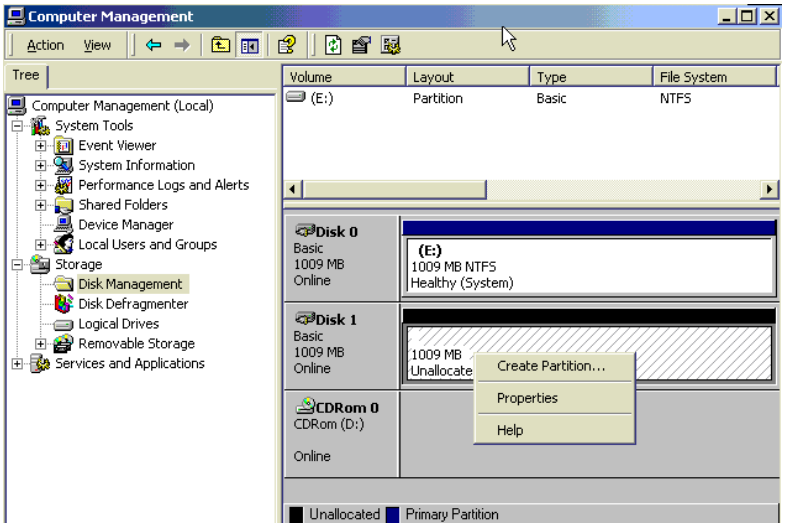
Server Configuration Wizard *[Windows 2000 Server and Windows 2000 Advanced Server only]*

When the server restarts, press **Ctrl-Alt-Del** and log onto the server as **Administrator** (with the password you specified during installation). After the logon is completed successfully, Windows 2000 Server automatically launches the **Windows 2000 Configure Your Server** wizard:

*[If the wizard does not launch or does not appear as shown in this example, right-click on the **My Computer** icon on the desktop and select **Manage** from the drop-down list.]*

From the **Configure Your Server** wizard, select **File Server** and then click **Open Computer Management**. This will launch the **Computer Management** snap-in.

Creating a New Partition

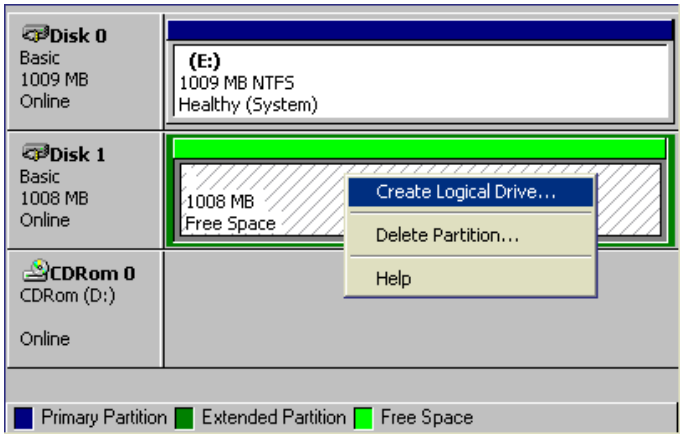


1. Click the + next to **Storage** if the folder is not already expanded. Click the **Disk Management** folder.

2. To create a new partition, right-click **unallocated disk space** and click **Create partition**. The **Welcome to the Create Partition** wizard appears. Click **Next**.

3. Select **Extended Partition**, and click **Next**.

4. Accept the specified partition size by clicking **Next**, and then click **Finish**.



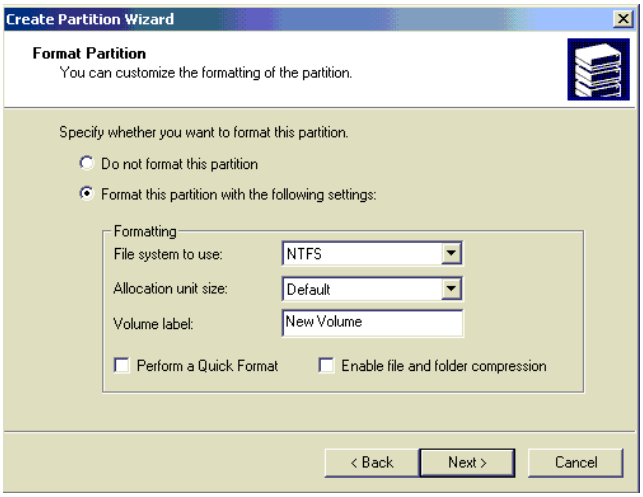
5. Right-click **Free space** and then click **Create logical drive**.

6. The **Welcome to the Create Partition** wizard appears. Click **Next**.

7. Select **Logical drive**, and click **Next**.

8. Accept the specified partition size by clicking **Next**.

9. Accept the default drive letter by clicking **Next**.



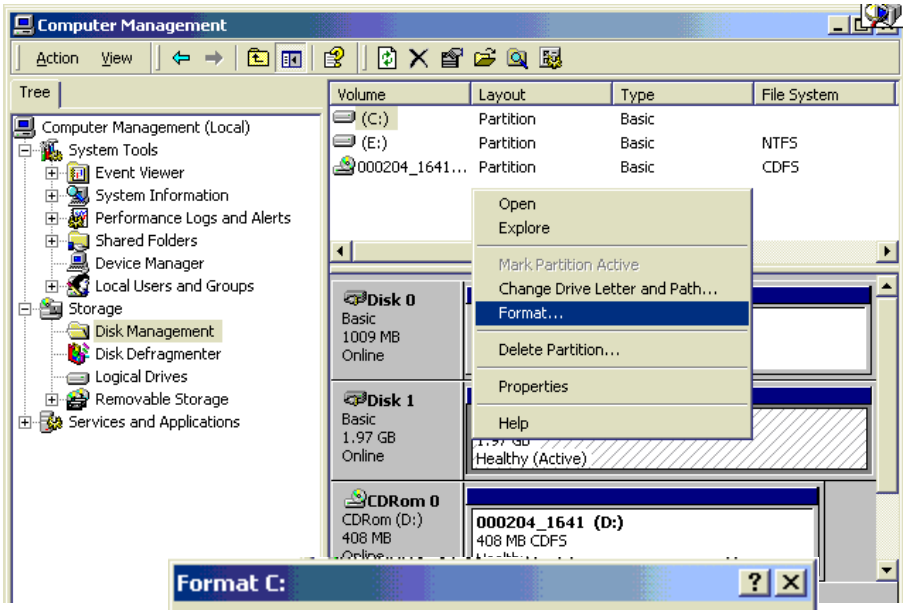
10. On the Format Partition page, accept the defaults for File system to use (NTFS format and the entire size of the partition), Allocation unit size, and Volume label. Click **Next** and then click **Finish**. The drive or partition will be formatted. This may take some time depending on the size of the disk and the speed of the computer

Note: *You might get an error message saying **Volume is open or in use. Request cannot be completed**. This is a timing error because you just created the partition. If you receive this message, click **OK**, then right-click the partition again and click **Format**. Accept all defaults and click **OK**. You receive a warning that continuing the format will erase all data. Click **OK**.*

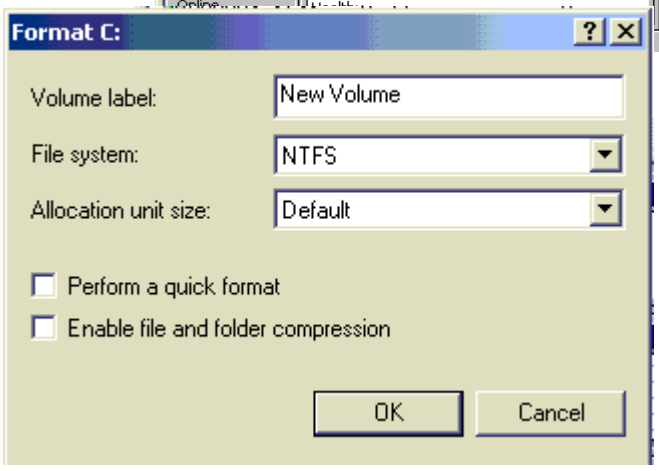
Formatting an Existing Partition

Warning: formatting destroys all existing data. Be sure you select the correct drive and partition.

1. From the **Computer Management** snap-in, right-click on the partition you select **Format**.



2. The **Format** window opens. Type in a volume label and select the **NTFS** file system for highest security. *[NTFS allows resource and user-level security to be enabled. FAT only supports share-level security and is NOT recommended for servers. In addition, FAT only supports partitions up to 4GB in size, whereas NTFS supports partitions up to 4Terabytes. For more information, see the Release Notes in the /SETUPTXT directory on your Windows* 2000 CD.]*



3. The logical drive letter will be retained and the drive is now ready for use.

Appendix A: Detailed Equipment List

Hardware

Baseboard	Intel® L440GX+ Server Board
Processor	2 Intel® Pentium® III microprocessors operating at 500 MHz
Memory	(Always check approved memory list before buying DIMMS for your L440GX+ Server Board) http://support.intel.com/support/motherboards/server/l440gx/compat.htm 2 Samsung* 128MB SDRAM M377S160DT3-C1L00
SCSI Controller	Integrated Adaptec* AIC 7896 dual channel
NIC	Integrated Intel® 82559 controller (EtherExpress™ PRO/100+)
Video	Integrated Cirrus Logic* GD5480
Hub	Intel® InBusiness™ 8 Port Fast Ethernet
Floppy Cont.	Integrated floppy controller
Floppy drive	TEAC* FD235HF
CD-ROM	IDE Toshiba* MX-6502B connected as master on 2nd IDE channel
Hard Drives	
SCSI	2 IBM* DMVS Ultrastar 9.1GB capacity (both connected to SCSI channel A)
Monitor	15” Mag* Innovision Model NO:DX15FG
Mouse	Microsoft* 2-button PS/2
Keyboard	Keytronic* 104 Key Model E03601QlPS2-C

Software

OS:	Windows* 2000 Server (5.00.2195)

Misc

BIOS:	Production Release v11.2
HSC:	Production Release v.12 (for the Intel Astor II chassis)
BMC:	Production Release v1.05

Appendix B: Intel Literature Center Locations

Americas:	1-800-548-4725
EMEA:	+44-1793-431-155
APAC:	+65-735-3811
Australia:	+61-2-9937-5800

Title: SMaRT Tool CD-ROM
Order no: 283802-004