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NETWORKING FUNDAMENTALS

PROJECTS

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| Project 1.2 | Identifying Basic Components |
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Project 1.1 Understanding Key Concepts	
Overview	Understanding the basic networking standards, including the OSI, DoD, and Internet networking models, is important. These models provide common terms for describing network operations and ways of describing and comparing network components. This project reviews common networking terms and terms relating to networking standards.
Outcomes	After completing this project, you will know how to: <ul style="list-style-type: none">▲ identify key terms and concepts related to networking basics▲ identify key terms and concepts related to network components and network types
What you'll need	To complete this project, you will need: <ul style="list-style-type: none">▲ the following worksheet
Completion time	20 minutes
Precautions	None

The worksheet includes a list of terms related to networking standards and components, with models given on the left and descriptions on the right. Match each term with the description that it most closely matches. You will *not* use all descriptions. Each description can be used only once.

___ Router	A. Process of having two computers recognize each other and open a communication channel
___ Hub	B. Block of data formatted for transmission over a network
___ Cable plant	C. Transmission media and network devices making up the physical structure of a network
___ Peer-to-peer	D. Specialized computer providing resources to a network
___ Wide area network	E. Connection device used to connect network cables at a central connection point
___ Client/server	F. Device that enables a computer to physically connect to a network
___ Connection	G. Network communication device used to connect two or more networks (subnetworks or network segments)
___ Infrastructure	H. Low-level protocol that is currently the protocol most commonly used

___	Network adapter	I. Rules and standards defining network communications
___	Node	J. Networking model based on all network entities being tracked and managed through a directory that provides centralized management and control
___	Packet	K. Networking model with no centralized security or management control
___	Protocol	L. Any uniquely identified network device
___	Ethernet	M. Traditionally defined by LANs connected through the switched telephone network over a large geographic area
___	Server	N. Path over which network devices communicate in a wired network infrastructure
		O. Means by which computers identify each other on a network
		P. Networking model that has centralized security control as a defining feature

Project 1.2 Identifying Basic Components	
Overview	An important part of understanding network fundamentals is the ability to recognize common network components. Many connectivity components are common to the majority of PC networks.
Outcomes	After completing this project, you will know how to: <ul style="list-style-type: none"> ▲ recognize common network components ▲ recognize wired and wireless networks
What you'll need	To complete this project, you will need: <ul style="list-style-type: none"> ▲ the following worksheet
Completion time	15 minutes
Precautions	None

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Match the letters to the networking terms listed under Figure 1-1. All terms will be used and each term will be used only once.

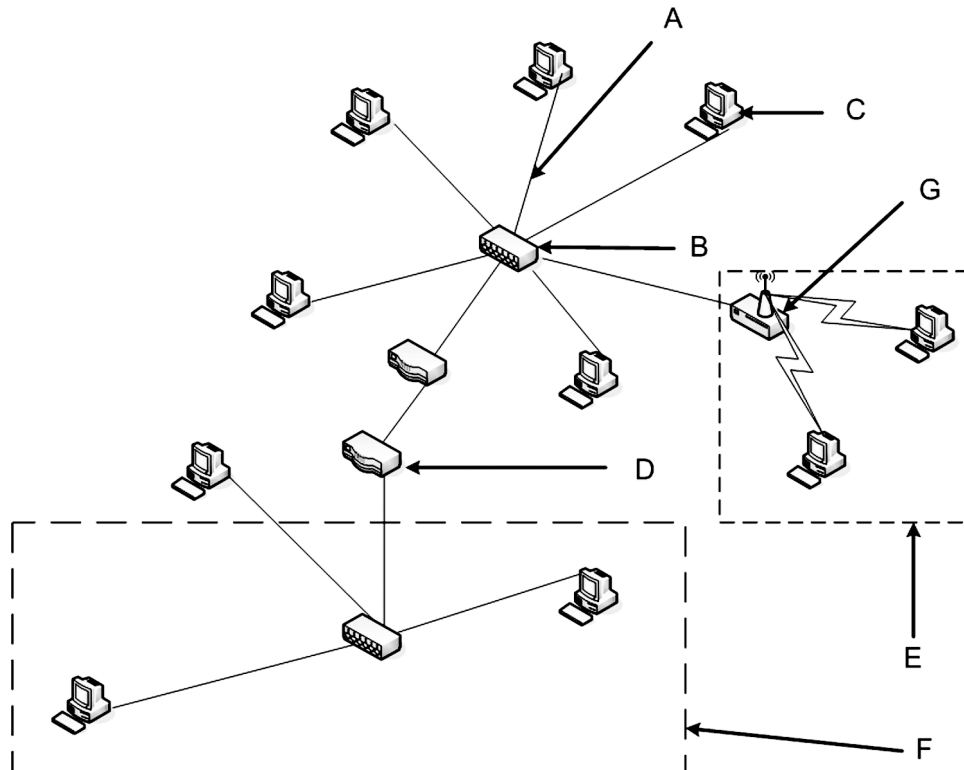


Figure 1-1: Sample network

Terms

- A. _____
- B. _____
- C. _____
- D. _____
- E. _____
- F. _____
- G. _____

- Wired network
- Wireless network
- Hub
- Client computer
- Router
- Cable plant
- Wireless access point

Project 1.3 Understanding Network Types	
Overview	<p>You can identify and categorize networks in various ways. You can identify a network, for example, by type, architecture, and topology. Network type refers to whether the network is configured as a local, metropolitan, or wide area network. Architecture refers to the logical network design and networking model that defines features such as whether the network is based on centralized or decentralized security. Topology refers to the physical structure of the network and how network devices are connected.</p> <p>Identifying can get complicated because these categories can be mixed and matched in a number of ways. Just because you know the network type, you don't necessarily know everything about its architecture and/or its topology. Although identifying and categorizing are each important, for now we focus on one way of identifying networks—by network type. You need to be able to compare and contrast local area networks (LANs), metropolitan area networks (MANs), and wide area networks (WANs) to determine the best solution to an organization's needs.</p>
Outcomes	<p>After completing this project, you will know how to:</p> <ul style="list-style-type: none"> ▲ compare and contrast network types ▲ choose a network type based on organizational requirements
What you'll need	<p>To complete this project, you will need:</p> <ul style="list-style-type: none"> ▲ the following worksheet
Completion time	60 minutes
Precautions	None

Read each of the networking scenarios and answer the questions that follow each scenario. You will be required to identify the appropriate network type and answer questions about how networking requirements might be met.

■ Part A: Networking Scenario #1

All of your company's offices are located in Boston and the surrounding suburbs. You need to prepare a networking solution that enables employees in all six offices to communicate both internally in that office and, to a lesser extent, between the other offices. The farthest distance between any two offices is 50 miles. Most user resource requirements are met by servers located in the same office as the users who need to access them. The main communication requirements between offices relate to e-mail and periodic file transfers. You have been promised a budget sufficient to meet the requirements, but you have also been told to keep costs to a minimum.

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1. What network type should you use to configure the complete network?

2. What network type should you use to configure each office?

3. How many internetwork connections would you typically configure at each office?

4. What are potential concerns related to the connections between the offices?

■ Part B: Networking Scenario #2

Your company occupies the top three floors of a building. Other companies have offices on the floors below you. You want to design the network that is as easy to manage as possible. You want to minimize the potential impact of problems on any one floor to the other two floors. You are implementing this network as a wired network.

1. What network type should you use to configure the complete network?

2. What network type should you use to configure each floor?

3. In general terms, describe how you would connect the floors.

4. What type of network device should you use to connect the computers on each floor?

5. What one component's failure would prevent the floors from communicating with each other? How would this component failure impact communications between all of the computers on a single floor?

6. What role might the Internet have in this configuration?

■ Part C: Networking Scenario #3

You work for a nonprofit organization with an office in each state in the continental United States. Each office provides various support services to family farms located in the state for which it is responsible. You have nearly constant interoffice communication requirements. All networking expenses must be justified to the organization's management board, and you are expected to find ways to keep these expenses to a minimum.

1. What network type should you use to configure the complete network?

2. What network type should you use at each office?

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3. You need to keep the equipment, service, and support costs needed to connect the offices to a minimum. Describe, in general terms, what you should use as your communication backbone between the offices. Justify your answer.

4. Other than keeping cost to a minimum, what is the primary concern for interoffice connections?

Project 1.4 Preparing for Network Installation	
Overview	<p>Like so many other things in life, one of the fastest ways to learn the ins and outs of networking is to dive in and do it yourself. With modern technologies, all you need for a basic network is two or more computers with network adapters and appropriate operating systems and a communication path. If you're setting up a wireless network (and don't need to connect to a wired network), that's all you need. For a wired network, you also need:</p> <ul style="list-style-type: none">• a network cable for each computer• a hub, switch, or other connection device <p>We're going to set up a wired network, so your first step is to make sure that you've made the necessary hardware connections. This project assumes that you are setting up a small, private, two-node network. If you are setting up a larger classroom network, your instructor may provide you with additional information and requirements.</p>
Outcomes	<p>After completing this project, you will know how to:</p> <ul style="list-style-type: none">▲ identify minimum wired network hardware requirements▲ install a network adapter▲ connect a wired network
What you'll need	<p>To complete this project, you will need:</p> <ul style="list-style-type: none">▲ the connection instructions below▲ two computers with Ethernet network adapters▲ two network cables▲ a hub or switch

Completion time	10 minutes
Precautions	<p>If connecting to a classroom network, your instructor may provide alternate steps. If so, use those steps instead of the ones provided here.</p> <p>If connecting to an existing network, you <i>must</i> review what you are doing with the network administrator before making any connection to the network.</p> <p>Do not power on the computers after making the physical network connections.</p>

Below are the steps to connect a simple Ethernet wired network. Make sure that you have the required equipment available before you start. If connecting to an existing network, provide your network administrator with a copy of these instructions so that he or she can change them as necessary to meet network requirements.

■ Part A: Install the Network Adapter

Complete the following steps only if a computer does not have a built-in network adapter or if the network adapter is not already installed. Each computer must have a network adapter to complete the projects in this manual. Use caution during component installation. Electronic components are easily damaged, so be careful to avoid electrostatic discharge (shock) while installing the adapter.

1. Power off and unplug the computer.
2. Remove the computer cover.
3. Locate an open PCI expansion slot.
4. Remove the slot cover and insert the network adapter, checking that it is fully seated.
5. Replace the anchor screw to hold the network adapter in place.
6. Replace the computer cover.

■ Part B: Build the Network

1. Place the hub (or switch) within easy distance of both computers.
2. Connect one end of a network cable to the first open port on the hub. A sample hub with attached cables is shown in Figure 1-2.

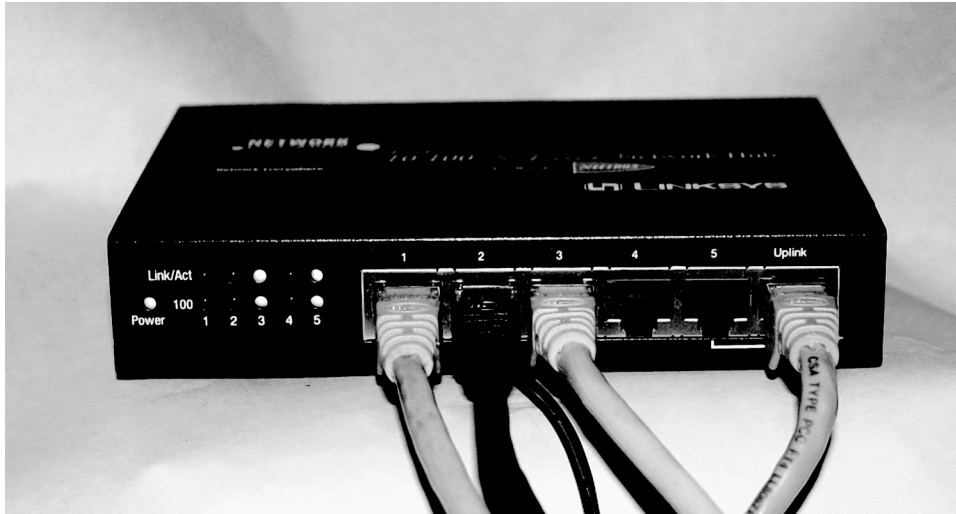


Figure 1-2: Hub with attached cables

3. Attach the other end of the network cable to the network adapter port on the first computer, as shown in Figure 1-3.



Figure 1-3: Connected network cable

4. Repeat steps 3 and 4 for the second computer.
5. Plug in the hub to the AC power.

Project 1.5 Installing Windows Server 2008	
Overview	<p>Microsoft Windows Server 2008 is a version of Microsoft's server operating system. It can be used in a server-only role or as a peer server as both a client and a server. In this case, we are using a 180-day trial version of Windows Server 2008.</p> <p>You will be prompted for network configuration information during Windows Server 2008 installation. You can set configuration parameters at that time, but you also have the option of going back and changing your network configuration as needed.</p>
Outcomes	<p>After completing this project, you will know how to:</p> <ul style="list-style-type: none"> ▲ install Windows Server 2008 ▲ configure networking parameters ▲ verify successful installation
What you'll need	<p>To complete this project, you will need:</p> <ul style="list-style-type: none"> ▲ Project 1.4 completed ▲ Windows Server 2008 installation CD or the trial version software downloaded from: www.microsoft.com/windowsserver2008/en/us/trial-software.aspx for a 64 bit R2 SP1 version or www.microsoft.com/download/en/details.aspx?id=5023 for the 32 bit version.
Completion time	60 minutes (approximate, depending on computer configuration and speed)
Precautions	<p>The instructions in this project assume you will be setting up a two-node network with one computer running both Windows 7 Professional or Enterprise and Windows Server 2008. If you are deploying the Windows Server 2008 computer as part of a larger classroom network, your instructor will provide you with alternate instructions for configuring network parameters. Note that the host computer should have sufficient hard disk capacity (approximately 20GB) and sufficient RAM (a minimum of 4GB) to complete these exercises using virtual machines.</p> <p>If you are adding the Windows Server 2008 computer to an existing network, you should also review the project steps with your network administrator. Your network administrator may need to make changes or additions to the installation instructions.</p>

■ Part A: Prepare for Installation

This project provides the instructions for installing Windows Server 2008 from an installation CD or downloaded trial version software and configuring networking parameters. Required parameters include the computer name and TCP/IP address parameters. Your instructor may provide alternate values for some configuration parameters. If so, record those below:

Computer name: _____
IP address: _____
Subnet mask: _____

This project assumes that you will be configuring the computer with a single disk partition. If your computer needs to be configured differently, your instructor will provide you with alternate partitioning instructions, which will replace Steps 4 through 7 below.

1. Open your VMWare Player as in Figure 1-4.



Figure 1-4: VMWare Player

2. Choose **Create a New Virtual Machine** and then choose either **Installer disc** if you have access to a Windows Server 2008 Install DVD or **Installer Disc Image file (iso)** if you downloaded the Demo Windows Server 2008 file referred to earlier, as in Figure 1-5.



Figure 1-5: New Virtual Machine Wizard welcome screen

3. Choose Windows Server 2008 Standard as the version to install.
 Use **Student01** for your personalized Windows full name or the instructor assigned name and number.
 Use **P@SSw0rd** (θ = zero) for your password, and if you have access to a Windows Product Key, enter it here as Figure 1-6 shows.



Figure 1-6: New Virtual Machine Wizard easy install information

Note: If you do not have access to a key, you can still install Windows Server 2008, but you'll be unable to activate it later. Make sure that you enter the product key to activate Windows within the 30-day grace period. After the grace period of 30 days ends, your system will not boot and you may have to reinstall the copy again.

4. Leave the default name as Server2008 and choose a location to store your virtual machine. In this case, it's being saved to a removable hard drive in a file called My Virtual Machines\Server2008, as in Figure 1-7.



Figure 1-7: New Virtual Machine Wizard: Name the Virtual Machine

5. Accept the default size for the virtual hard drive and storage (refer to Figure 1-8).



Figure 1-8: New Virtual Machine Wizard: Specify disk capacity

6. In some cases, for a complete installation, you need to “customize hardware” from the next window. Click on the **Customize Hardware** Button as Figure 1-9 shows.



Figure 1-9: New Virtual Machine Wizard: Ready to create virtual machine

7. Choose the **New CD/DVD**, and click the **Advance** button (refer to Figure 1-10).



Figure 1-10: Advanced: Virtual device node

8. Choose the **Legacy Emulation** radial and click **OK**.
9. Highlight the **Network Adapter** and click on the **Host-only** radial, as shown in Figure 1-11.

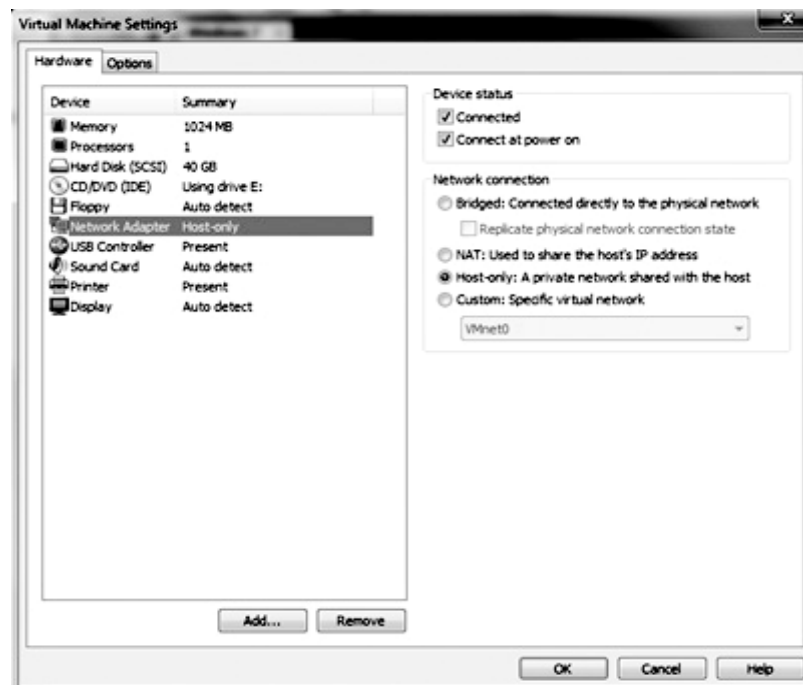


Figure 1-11 : Virtual machine settings: Network adapter

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10. Click *OK* to finish.
11. You will first see a window with the peripheral on your computer, and then likely a warning about downloading VMWare Tools. Download and install these tools if asked.
12. When the VMware Tools have downloaded, you will see the **Product Key Activation Screen**. Do not enter a key and uncheck the **Automatically activate Windows when I am online** radial (refer to Figure 1-12).



Figure 1-12: Install Windows: Product key entry

13. Ignore the warning about activating your Windows, click *No*, and you'll then see the **Windows** install screen. **Note:** This step could take some time, so be patient.
14. When complete, your virtual machine will restart, as in Figure 1-13.

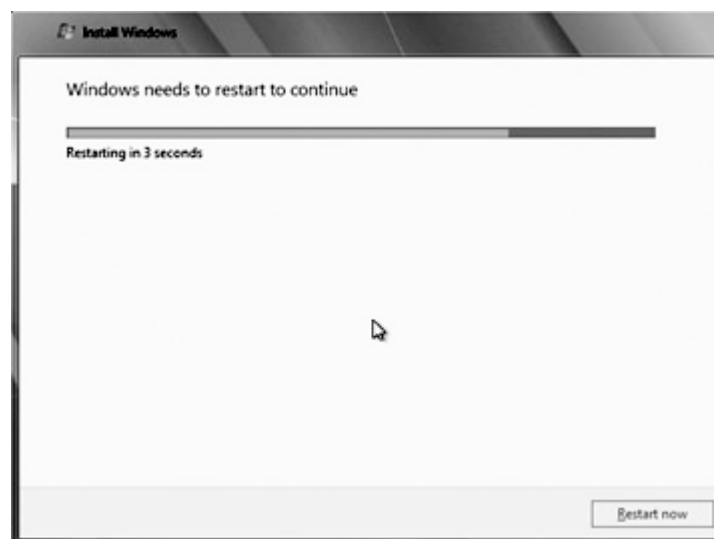


Figure 1-13: Install Windows: Restart

15. Complete the installation. **Note:** This step may take some time. Refer to Figures 1-14 and 1-15.

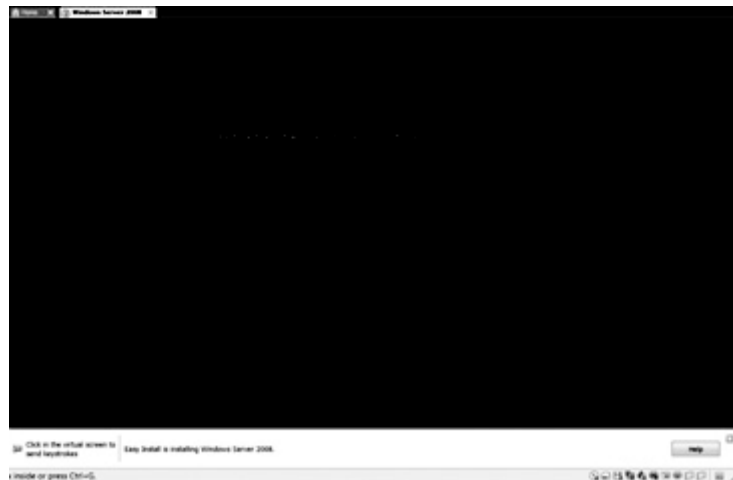


Figure 1-14: Complete the installation

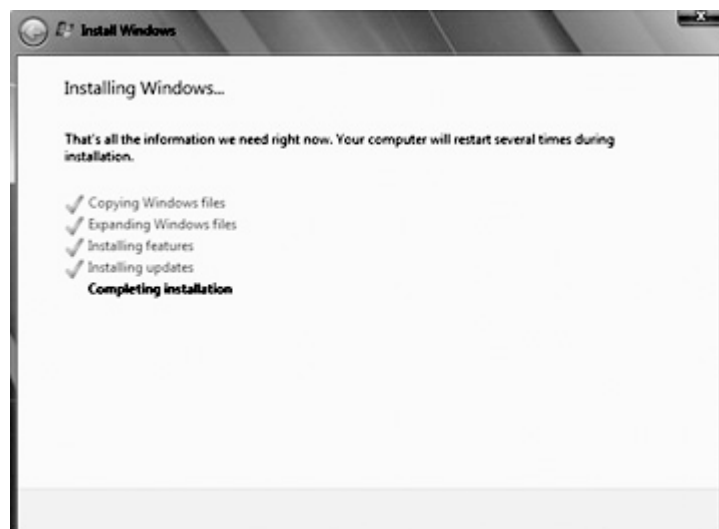


Figure 1-15: Install Windows: Completing the installation

16. Remember to have your mouse cursor within the virtual machine; to do so, click anywhere inside it. To get it out of the virtual machine, hold *Ctrl + Alt*.

Congratulations! You have successfully created a Virtual Windows 2008 Server Appliance!

Note: The first time you log on, Windows will continue to configure the server. To log on to a virtual machine, push *Ctrl + Alt + Insert* to get to the log on screen, which is shown in Figure 1-16.



Figure 1-16: Ctrl + Alt + Delete message

■ Part B: Configuring Windows 2008 Server

1. Log on as **Administrator**, as shown in Figure 1-17.

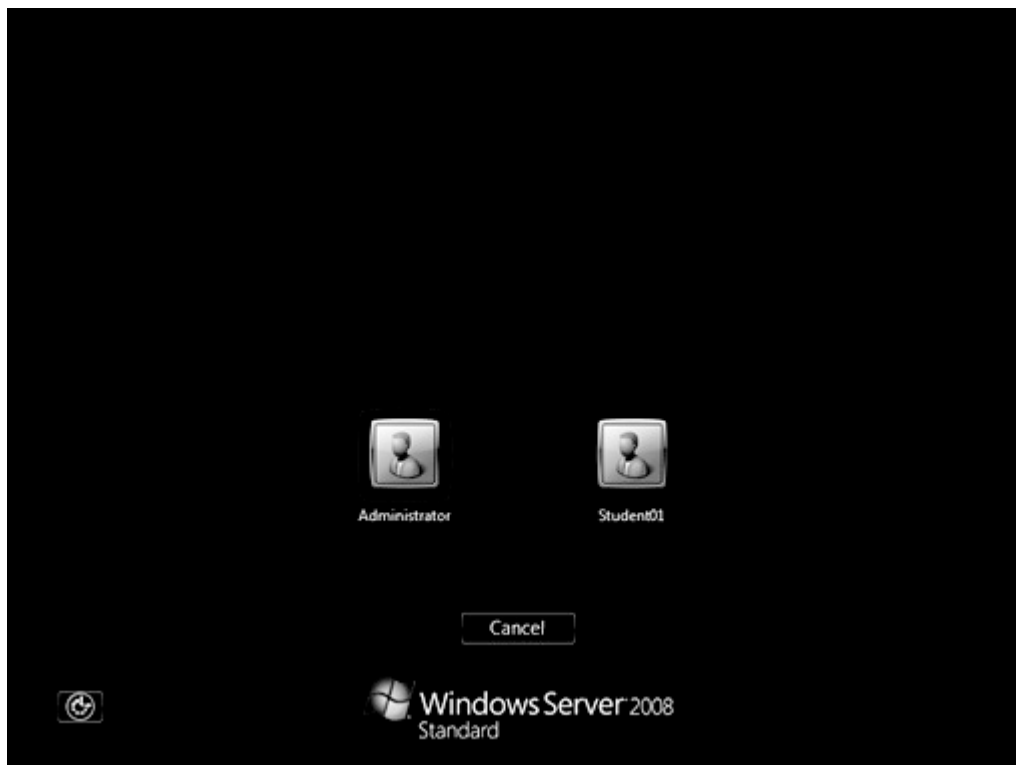


Figure 1-17: Log on screen: Select Administrator

2. Change your password. **Note:** The first time you log on to Windows Server 2008, it will ask you to change your password. Use **P@SSw0rd** again.
You will receive a message that your password has been reset, and your virtual machine will begin configuring the desktop.

3. The VMware Tools may install. If so, the virtual machine will reboot, and you will be ready. Log in and continue your lab projects configuring and using Windows 2008 Server (refer to Figure 1-18).

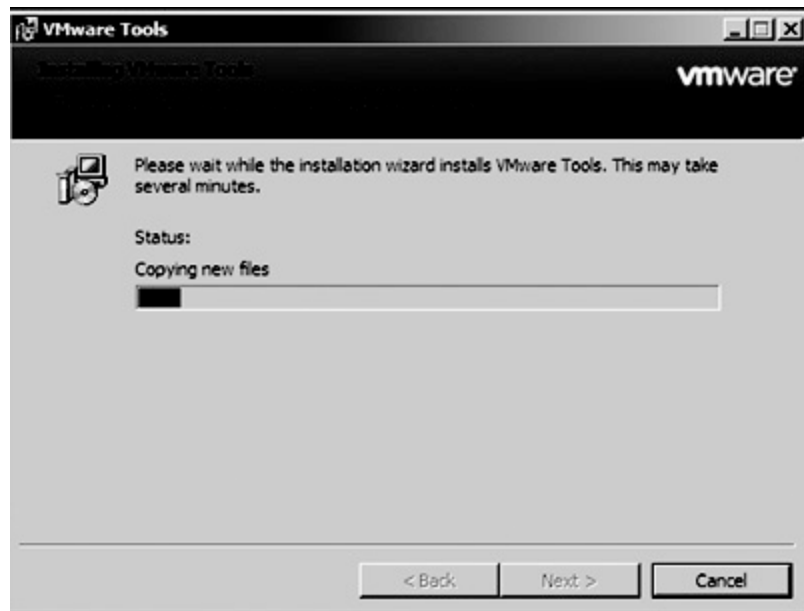


Figure 1-18: VMware Tools: Installing VMware Tools

4. After the machine has rebooted, log on as administrator and begin configuring your Server per the following information (also refer to Figure 1-19):
Computer name: **MainServer00**
Password: **P@SSw0rd**
Confirm password: **P@SSw0rd**
Set date and time according to your local time zone.
IP address: **192.168.1.11**
Subnet mask: **255.255.255.0**
Workgroup or computer domain: **BUSICORPWG**

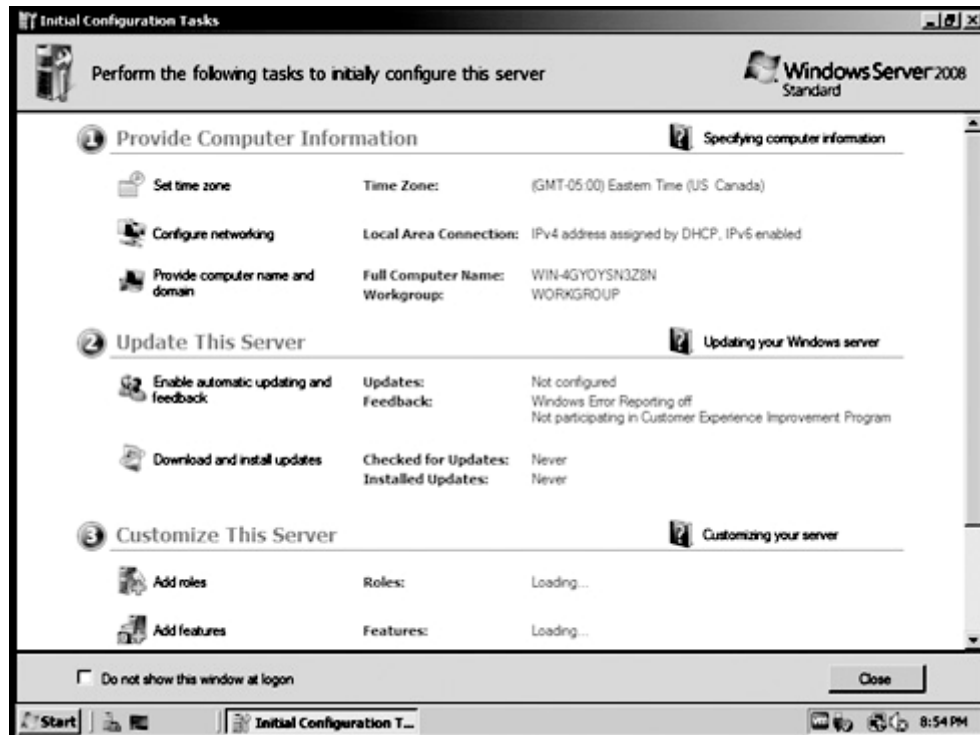


Figure 1-19: Initial configuration tasks

5. Choose **Configure Networking** and right-click on the **Local Area Network** Icon to choose properties from the drop down menu, as shown in Figure 1-20.

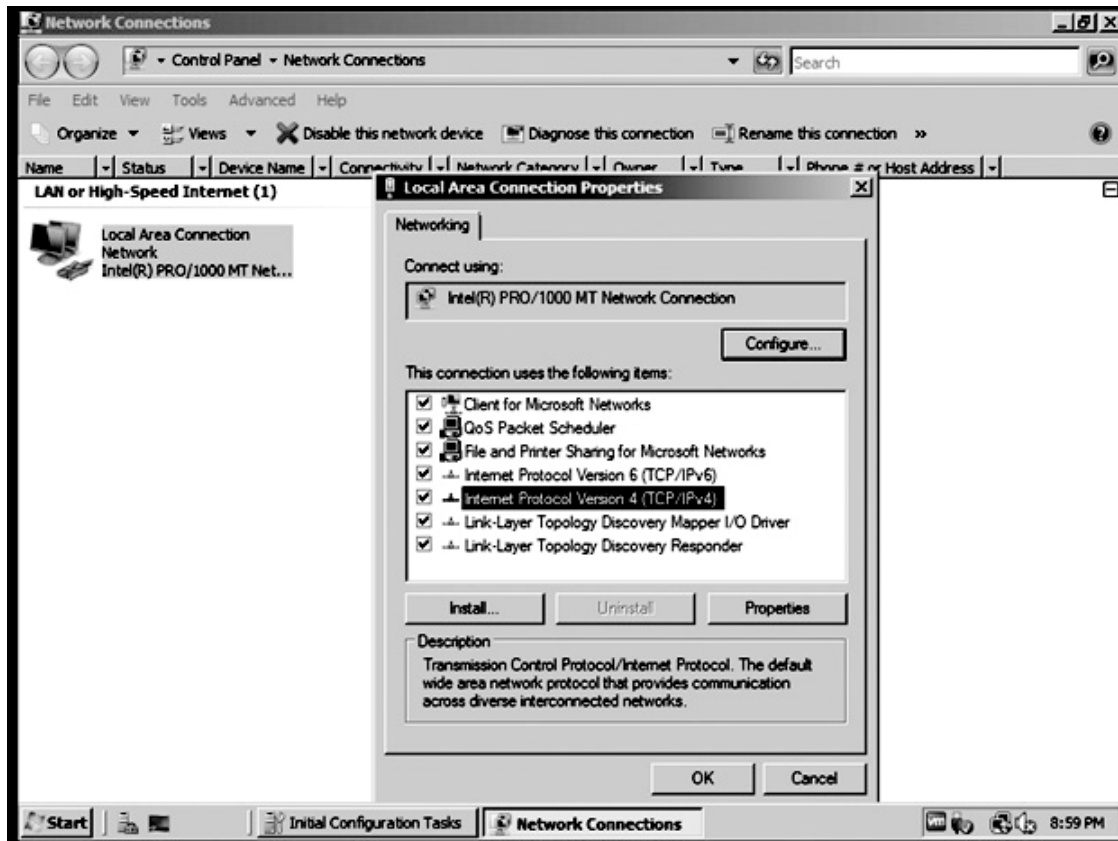


Figure 1-20: Network connections

6. Select **Internet Protocol Version 4** and **Properties** (refer to Figure 1-21).
Input the indicated IP address.

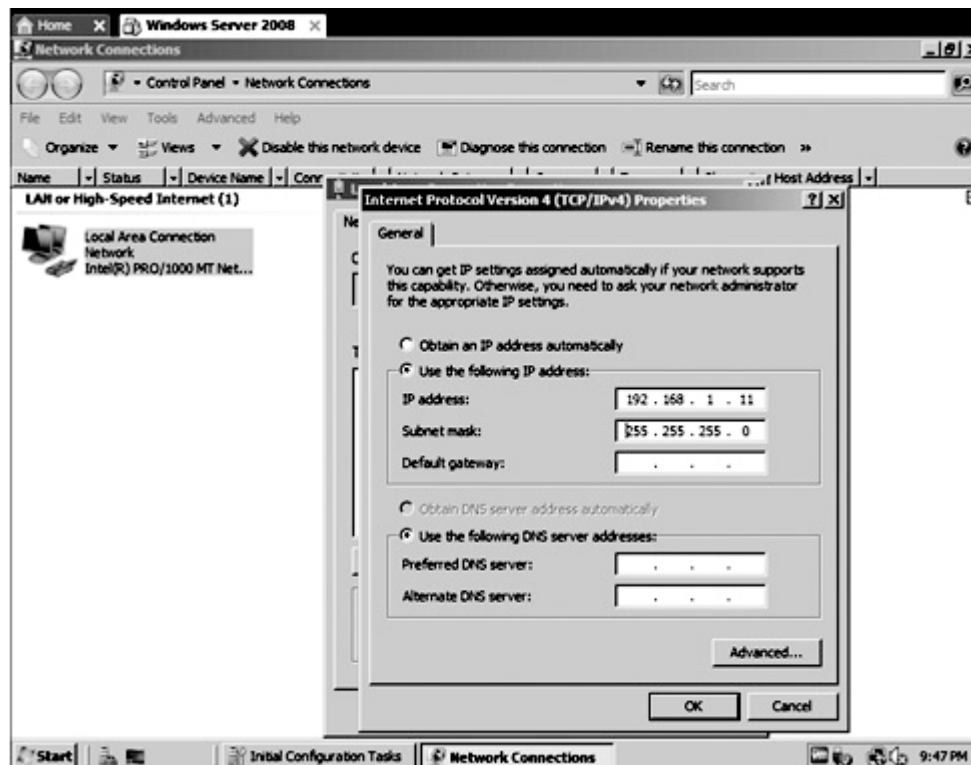


Figure 1-21: Network Connections: Internet Protocol Version 4 Properties

7. Click **OK**, exit the network connections window, and configure the computer name and time zones as indicated.
8. Reboot the virtual machine.

■ Part C: Verify Installation

1. Press **Ctrl + Alt + Del** to open the **Log on to Windows** dialog box.
2. When the log on screen displays, log on as **Administrator** using the password specified during installation.
3. If prompted to adjust screen resolution, follow the on-screen prompts to complete the process.
4. Open the **Start** menu, point to **All Programs** and then to **Accessories**, and then select **Command Prompt** to open a **Command Prompt** window.
5. Type **ipconfig** and press **Enter**.
6. Verify that the computer name and IP address reported are the same as the address specified during installation.
7. Type **exit** and press **Enter** to close the **Command Prompt** window.

8. Open the **Start** menu and select **Shut Down**. When prompted, type a reason for shutting down in the **Comment** prompt and click **OK**. Refer to Figure 1-22 for what this screen looks like.



Figure 1-22: Shut down Windows

