8
NETWORK SERVERS AND SERVICES FUNDAMENTALS

PROJECTS

Project 8.1	Understanding Key Concepts
Overview	Part of understanding your options for network configuration is to understand the capabilities of various network operating systems (NOS), which include the services they support and how they can be used together in a heterogeneous server environment. Several available NOS options support the same features, functionality, and the same basic network services. When deploying servers in your network, you need to consider interoperability requirements as well as how server placement impacts accessibility and network traffic levels. During this project, you match various server-related terms to the definitions and descriptions of how they are used.
Outcomes	After completing this project, you will know how to: ▲ identify key terms and concepts related to NOS types and versions ▲ identify key terms related to basic network services
What you'll need	To complete this project, you will need: ▲ the following worksheet
Completion time	20 minutes
Precautions	None

The worksheet includes a list of server-related networking terms 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.

___	Shell	A. Highly secure industry-standard authentication method. Kerberos was developed for UNIX and is supported on most current NOSs as an authentication method.
___	Mac OS X	B. Directory container objects that can contain other objects. These objects are at the mid-levels in a directory structure and are used to contain and organize other objects.
___	Linux	C. UNIX/Linux command-line interface.
___	Kerberos	D. Specialized applications that run on web servers and provide services to clients over the Internet.
___	Leaf objects	E. Shorthand method for describing an object's context or name, but written without labels.

___ Intermediate objects

___ eDirectory

___ Active Directory

___ POSIX

___ Server applications

___ Web services

___ Typefull context

___ Bindery

___ GSNW

F. Microsoft Windows hierarchical directory-based networking, based on X.500 standards.

G. Directory object's location, including an object's organization and its OU structure, but not including the object's name.

H. Current version of Novell's X.500-based hierarchical network directory service.

I. Authentication method used by NetWare servers prior to NetWare 4.

J. Operating system designed to look and act exactly like UNIX, but distributed through open source licensing.

K. Windows server application that enables a Windows server to act as a gateway giving Windows clients that do not run a NetWare client access to NetWare resources. Supports versions only prior to NetWare 5 and IPX/SPX (NWLink) communications.

L. UNIX application development standard.

M. Directory objects directly representing directory network entity, such as users and computers.

N. Specialized applications that run on server NOS and provide resources or special services to network clients.

O. Macintosh operating system version built on a UNIX kernel.

P. Macintosh operating system version that introduced support for Microsoft's Internet Explorer and for Java Virtual Machine.

Project 8.2	Comparing Network Operating Systems
Overview	The most commonly used NOS types and versions are Microsoft's Windows Server, UNIX, Linux, and Apple's Macintosh. In many ways, these different NOS are very similar, but they also have striking differences. Being able to recognize both the similarities and the differences and then use that information as part of your basis when selecting an NOS is important. During this project, you will review various NOS types along with their characteristics and features.
Outcomes	After completing this project, you will know how to: ▲ compare NOS characteristics ▲ compare NOS features
What you'll need	To complete this project, you will need: ▲ the following worksheet
Completion time	20 minutes
Precautions	None

■ Part A: NOS Characteristics

Part A includes Table 8-1 with NOS types and a list of statements that describe one or more of them. Check the boxes for the letters that best describe each access protocol. Each statement applies to at least one NOS. Some statements may apply to multiple NOS types.

A. Defaults to TCP/IP as a network protocol
B. Supports bindery as a downlevel authentication method
C. Supports NTLM as a downlevel authentication method
D. Provides a user interface for running standard applications
E. Deployed as a dedicated server
F. Based on or emulates a UNIX kernel
G. Uses a directory system to locate network objects and resources
H. Can be downloaded, deployed, and used at no charge

Table 8-1: NOS Types

NOS	A	B	C	D	E	F	G	H
Novell Netware/Open Enterprise								
Windows Server 2008								
UNIX								
Linux								
Mac OS X								

■ Part B: NOS Features

Part B includes Table 8-2 with NOS types and a list of features. Check the boxes for the letters that best describe each NOS. Each statement applies to exactly one NOS.

A. Uses Samba to support Windows clients
B. Uses the Open Directory system
C. Includes NWLink protocol support
D. Provides a management interface only
E. Uses X Windows as GUI user interface
F. Saves documents in PDF as native file format
G. Runs on SUSe Linux
H. Native requests for services use SMB protocol requests
I. Native support for printers and printer management uses LPD/LPR protocols
J. Includes Keychain for password storage

Table 8-2: NOS Features

NOS	A	B	C	D	E	F	G	H	I	J
Novell Open Enterprise										
Windows Server 2008										
UNIX/Linux										
Mac OS X										

Project 8.3	Understanding Basic Services
Overview	All of the NOS in common use support a variety of basic services. That means that many of your network's requirements can be met without having to purchase additional server applications. In some cases, you can even configure a server to support multiple services, cutting down on your hardware requirements. One common example is having a server act as both a file and print server. The specific services supported depend on the NOS. All of those services in common use support file and print services and can be configured to support some kind of user authentication. Seeing Web server support included is common as well. Some, like most Linux distributions, include more specialized service, such as database services, while others require you to purchase separate server applications for that purpose. Some services are provided as a feature of the TCP/IP protocol. These include DNS and DHCP services. In this project, you will review some key points about basic services and look at some options for setting up servers to support various basic services.
Outcomes	After completing this project, you will know how to: ▲ identify how basic server types are used ▲ explain options for configuring Windows Server 2008 roles ▲ explain how to configure a Windows 7 Professional or Windows 7 Enterprise peer print server
What you'll need	To complete this project, you will need: ▲ a computer running Windows Server 2008 ▲ a computer running Windows 7 Professional or Windows 7 Enterprise ▲ the following worksheet
Completion time	45 minutes
Precautions	The instructions in this project assume you are working on a two-node network with one computer running Windows 7 Professional or Windows 7 Enterprise and one computer running Windows Server 2008. If these computers are part of a larger classroom network, your instructor will provide you with alternate instructions for configuring network and domain parameters. If working on an existing network, you must review the project steps with your network administrator. Your network administrator may need to make changes or additions to the instructions.

■ Part A: Basic Services

In this part of the project, you are asked a series of questions about services that you will commonly find on most LANs.

1. What is the general guideline for physical placement of file and print servers in a routed network?

_____

_____

2. Why?

_____

_____

3. The Kerberos protocol is most commonly associated with servers acting in what role?

_____

4. Why do some NOS include other protocols that are used in the same role (include at least one example)?

_____

_____

_____

_____

5. In a TCP/IP network, when would you need to deploy DNS servers?

_____

_____

_____

_____

6. When would you need to deploy DHCP servers?

_____

_____

7. When would you need to deploy servers configured as routers?

_____

_____

_____

8. What kind of server would you most commonly find deployed outside of your internal network, separated from the network by a firewall?

_____

9. Why?

_____

_____

10. When would you include a NAT server on your network?

_____

_____

_____

■ Part B: View Available Service Configurations

In this part of the project, you will view some of the service configurations and roles supported by Windows Server 2008. Currently, your Windows Server 2008 computer is configured as an Active Directory domain controller, but the operating system is designed to support a wide range of optional services as server roles. You should be logged on as an Administrator at the start of the part of the project.

1. If **Manage Your Server** is not already open on your desktop, open the **Start** menu, point to **Administrative Tools**, and select **Server Manager**.
2. Expand the **Roles** by clicking on the + in the left-hand window and scroll down to the Roles section in the **Details** window (right-hand screen) as indicated in Figure 8-1.

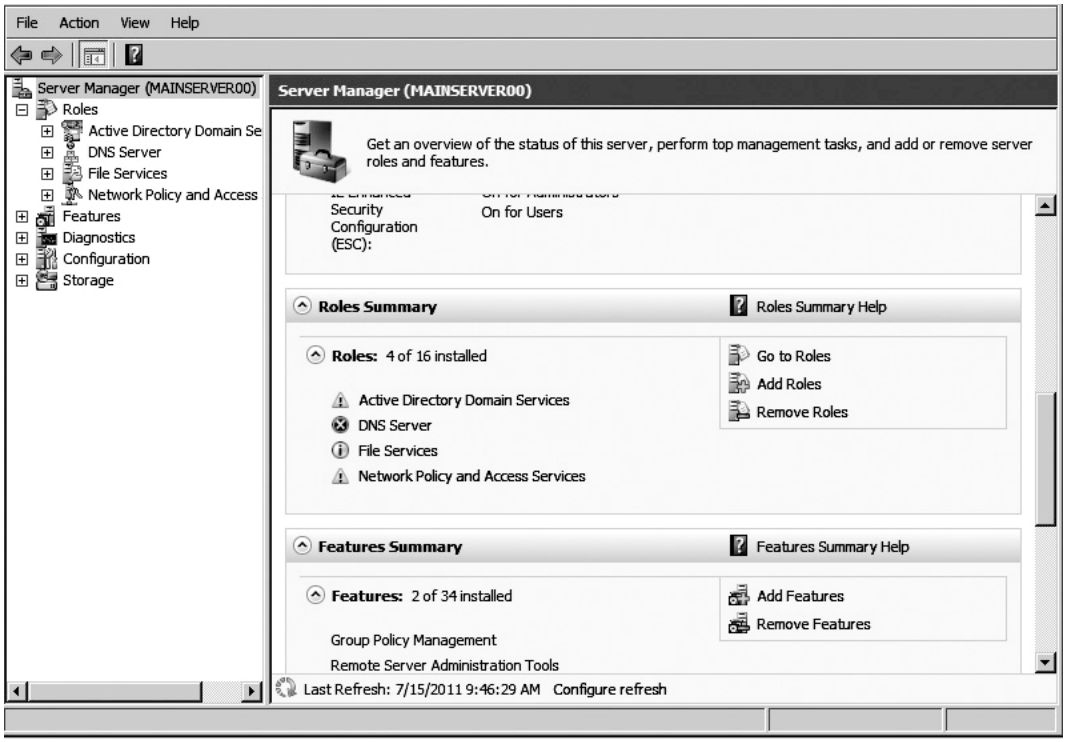

Figure 8-1: Manage your server

3. What roles is your server currently configured to support?

   _____

   _____

5. Click **Go to Roles**. Doing so displays detailed information about each of the current roles.
6. Close the configuration log.
7. What should you use to configure a role that isn't listed?

   _____

   Note: In the next several steps, you will remove the remote access server role. If the computer is not configured as a remote access server, skip Steps 8 through 11 and continue with Step 12.

8. Click **Remove Roles** and click *Next.*

   Note: This is the same effect as disabling the RRAS server in the **Routing and Remote Access** console.

9. Uncheck **Network Policy and Access Service** role, as shown in Figure 8-2, and click *Next.*

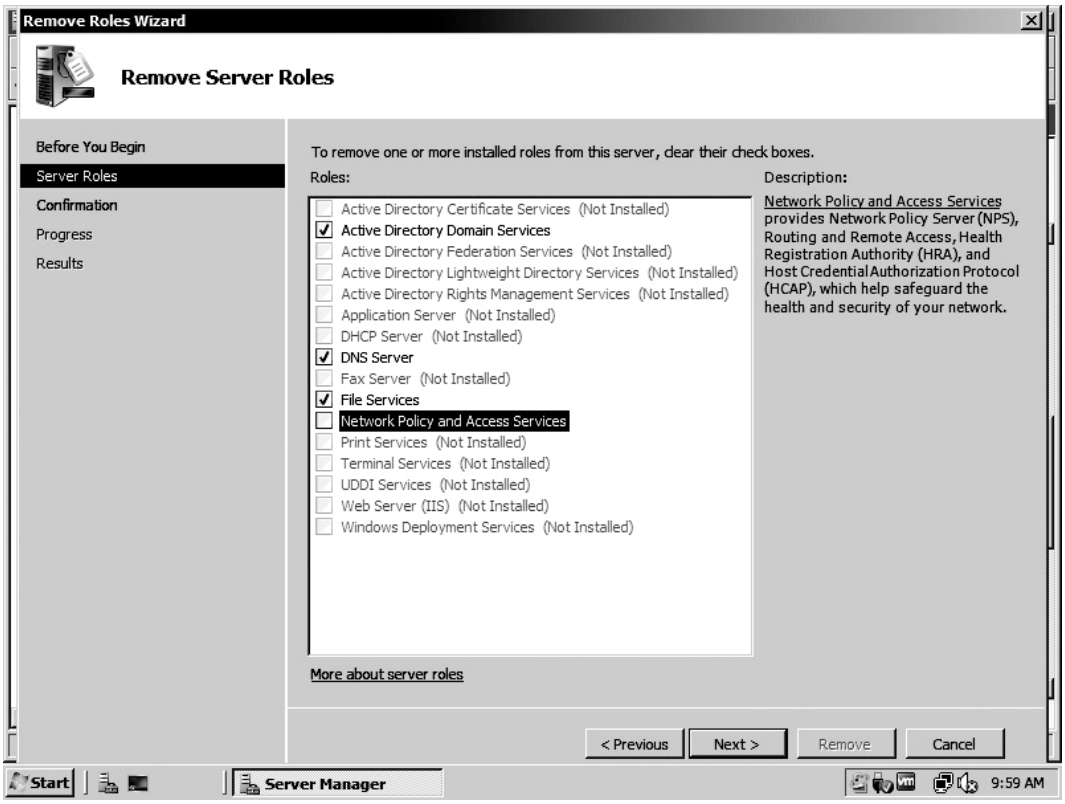

Figure 8-2: Removing remote access server support

10. When prompted to Remove the Service, click *Remove* as shown in Figure 8-3.

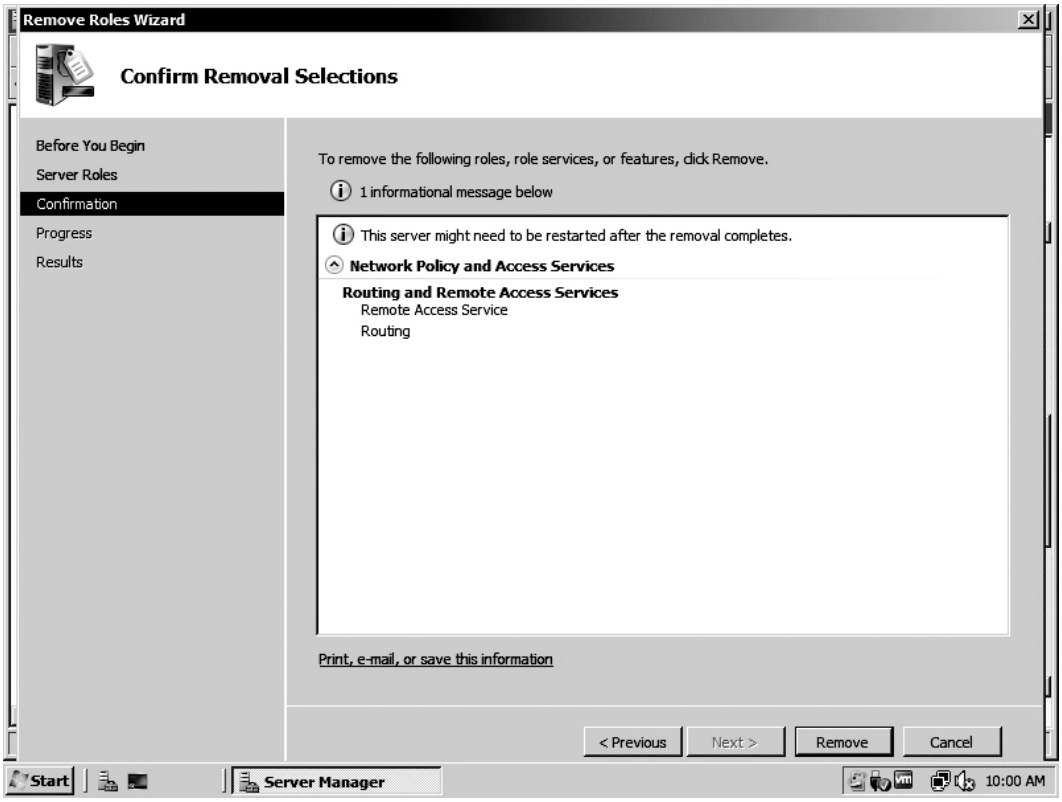

Figure 8-3: Confirm Removal Selections

11. Click *Restart you server* when prompted. Your will receive a confirmation after the server restarts, click *Close.*
12. Open the **Start** menu, select **Control Panel**, and then select **Programs**.
13. Click **Turn Windows Features on or off**. This is a second way of configuring services and roles.
14. Click **Add Role** and scroll through the list and view the other services available.

15. Select **Print Services/Role Services** and click *LPD Printer* while leaving the default ***Print Server***, as shown in Figure 8.4.

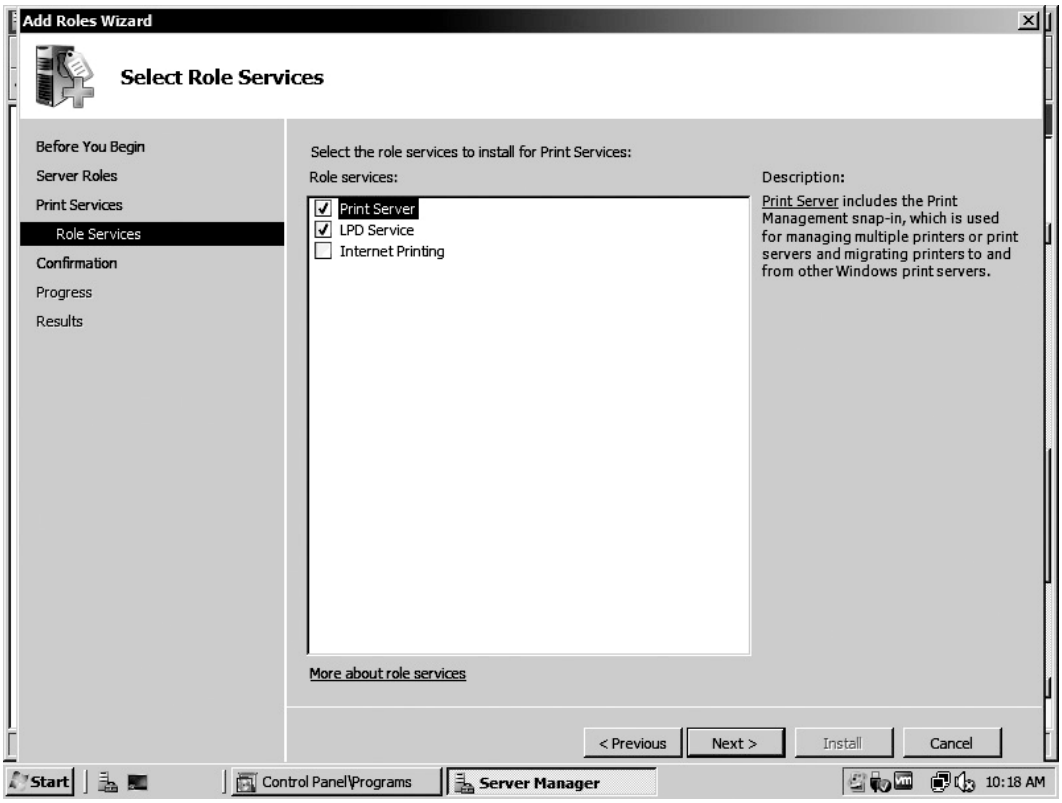

Figure 8-4: Print services selected

17. Click *Next* and *Install*.
18. Click *Close* when **The Installation Succeeded** window appears.
20. Exit the remaining windows and return to the server desktop.
21. What is the potential security concern when configuring multiple service support?

_____

_____

22. What is the potential performance concern?

_____

_____

_____

23. The **Services** utility gives you a way to temporarily stop a service. This might be necessary, for example, when troubleshooting a performance problem. Open the **Start** menu, point to **Administrative Tools,** and select **Services.**

24. Scroll down and then locate and select **TCP/IP Print Server**, as shown in Figure 8-5. You enabled this server when you installed UNIX printer support.

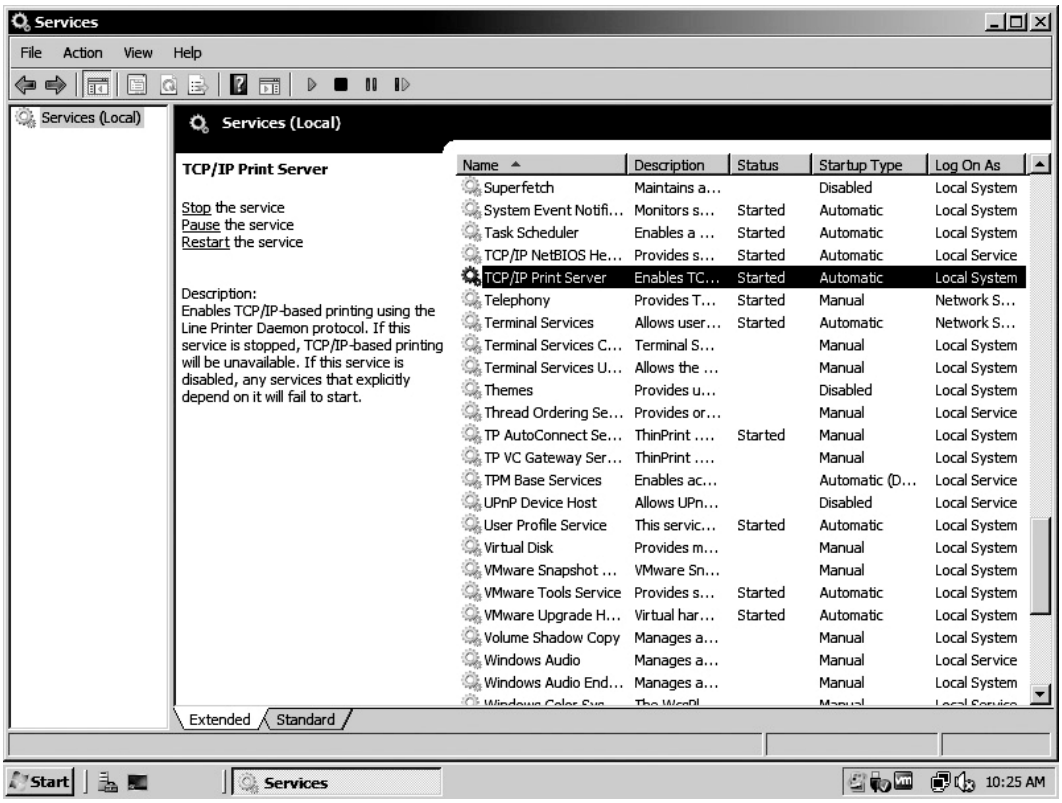

Figure 8-5: TCP/IP Print Server

25. Double-click **TCP/IP Print Server** to open its **Properties** dialog box and click *Stop.* Doing so will stop the service until manually restarted or until the computer is restarted.
26. Click *OK* and then exit **Services**.

■ Part C: Configure a Peer Server

You will complete this part of the project on the computer running Windows 7 Professional or Windows 7 Enterprise. **Peer servers,** which are computers that act as both network clients and servers, are common on Windows, UNIX, Linux, and Macintosh networks. You will also sometimes see Windows servers used as peer servers on a Novell network. During this part of the project, you will configure the computer running Windows 7 Professional or Windows 7 Enterprise as a peer print server, a commonly used configuration.

This project assumes that you do not have a printer configured on the computer. This project also assumes that you have the **Control Panel** configured in **Classic View**.

1. Open the **Start** menu and select the **Control Panel**.
2. Double-click **View Devices and Printers**, under the **Hardware and Sound** icon.
3. Click **Add a printer**, as indicated in Figure 8-6.

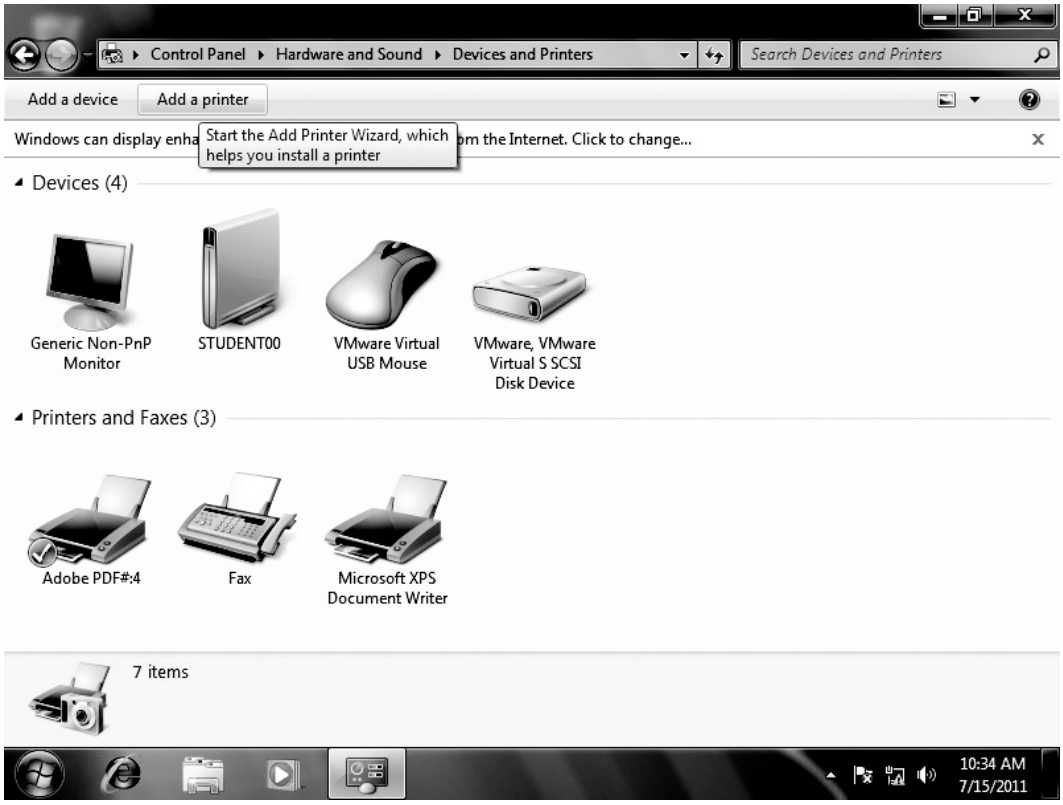

Figure 8-6: Printers and Faxes window

4. Click **Add a local printer**, as in Figure 8-7, and then click *Next*.

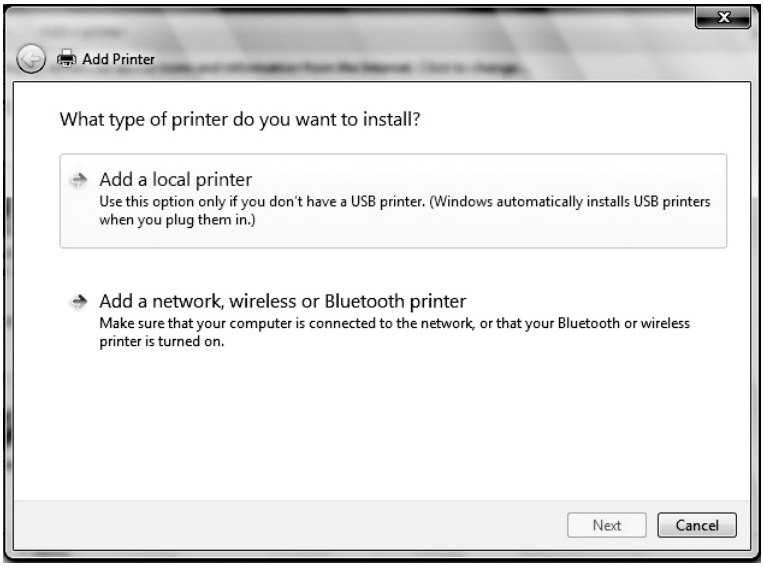

Figure 8-7: Manually selecting a printer

6. Leave the port at default **(LTP1)** and click *Next.*
7. Under **Manufacturer**, select **HP** and under **Printers**, select **LaserJet 4100 Series PCL6** (see Figure 8-8), and then click *Next.*

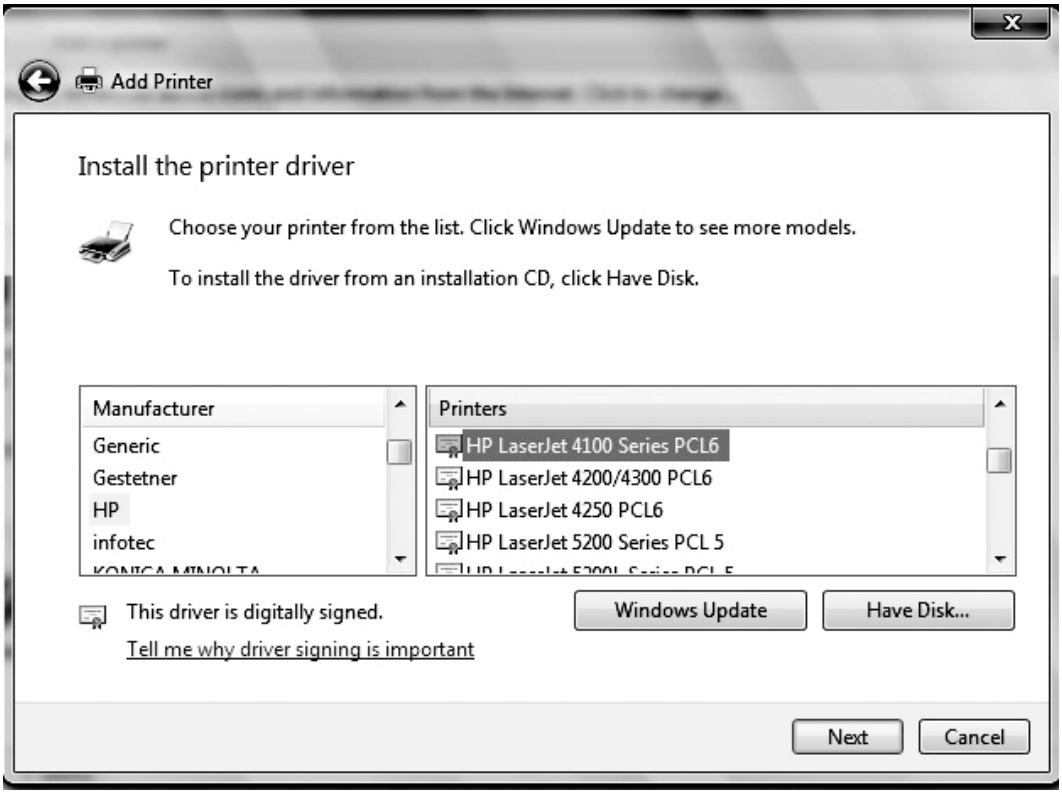

Figure 8-8: Selected printer

8. Change the printer name to **SharedHP** and click *Next.*
9. You make the computer a print server by sharing the printer. Select **Share name**, leave the name at default, and click *Next* (see Figure 8-9).
10. The **Location** and **Comment** are optional fields and are provided so you can enter information about the printer, such as its physical location in the office. Leave these fields blank and click *Next.*

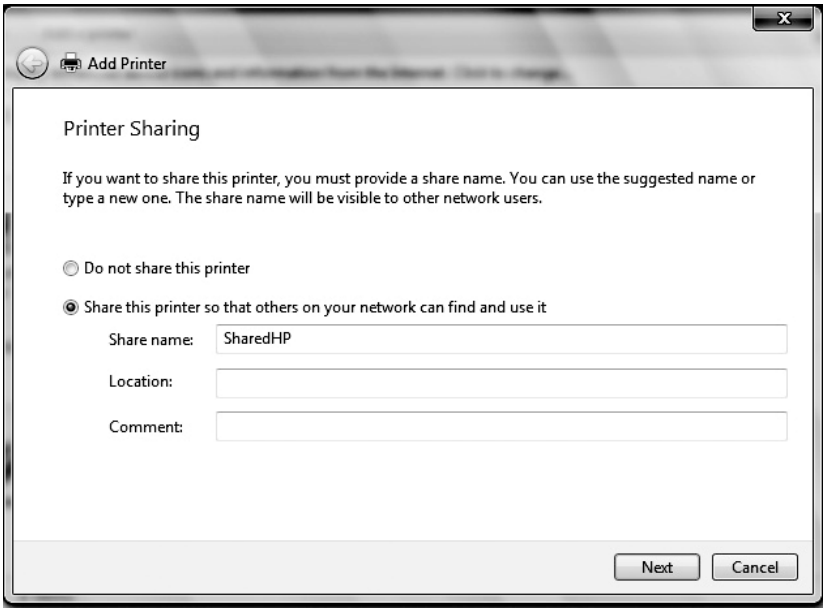

Figure 8-9: Printer configuration

11. Leave **Set as Default** and if prompted to print a text page, select **No** and then click *Next.*
12. Why shouldn't you print a test page to this printer?

    _____

    _____

13. Review the **Summary** information and click *Finish* to install the printer.
14. You should see the printer listed like the example shown in Figure 8-10 when installation is complete.

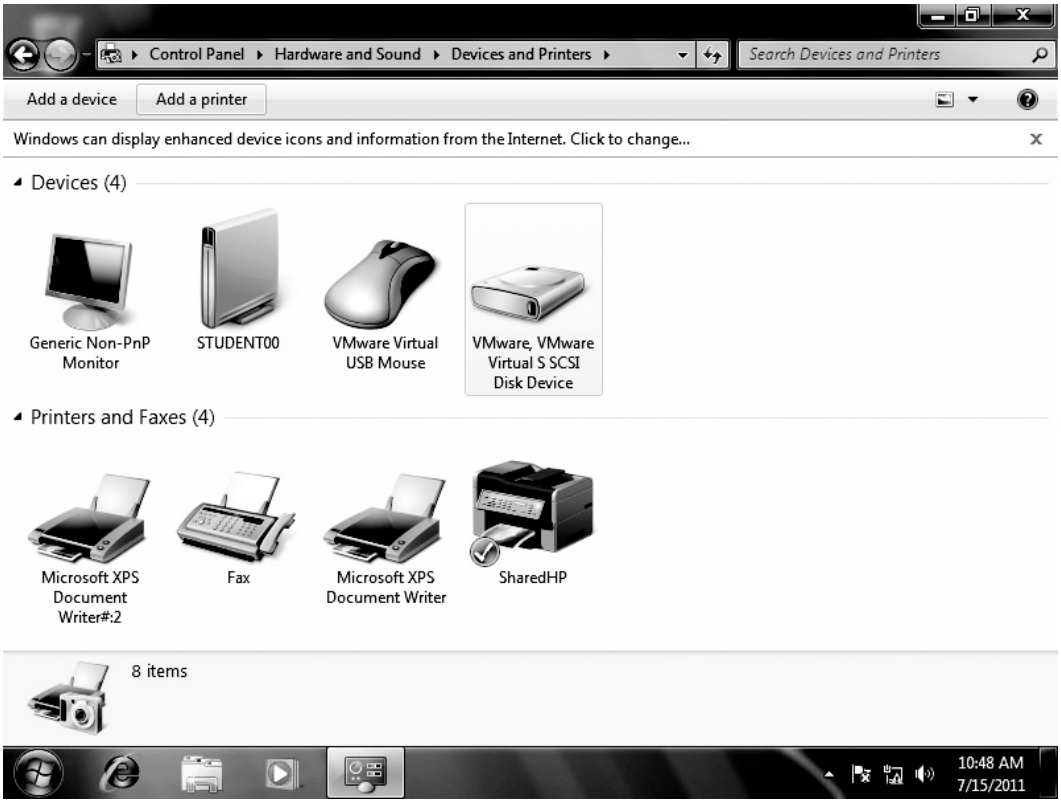

Figure 8-10: Installed printer

15. Right-click **SharedHP** and select **Properties**.
16. Select the **Sharing** tab, as shown in Figure 8-11.

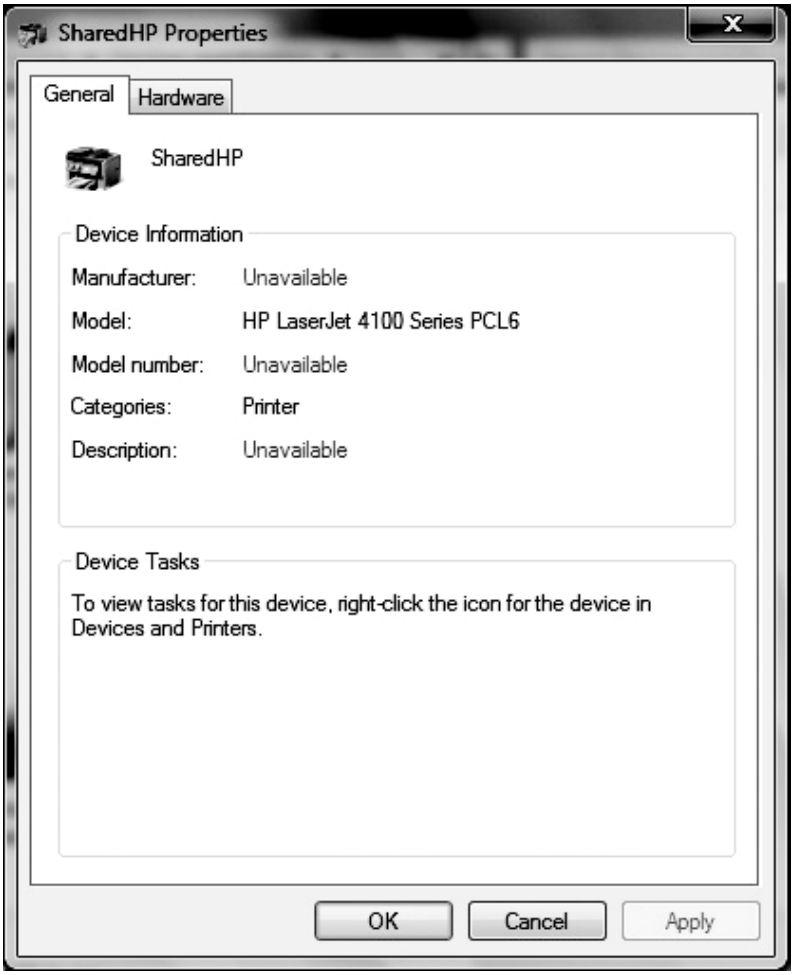

Figure 8-11: Printer sharing properties

17. Click *OK* to close the **Properties** dialog box and then close the **Devices and Printers** window.

■ Part D: Verify a Resource Listing

You will complete this part of the project on the computer running Windows Server 2008. You will verify that the printer is listed in and available through the Active Directory.

1. Open the **Start/Control Panel** menu and select **Printer** under **Hardware and Sound**.
2. Double-click **Add printer** to open the **Add Printer Wizard**.
3. Click *Next.*
4. Select **A network printer**, or **a printer attached to another computer** and then click *Next.*
5. In the Add Printer Window, select **The Printer I want isn't Listed** and click *Next.*

6. Choose *Browse* in the **Select a shared Printer by Name** window, and browse to Student00/SharedHP, then click *Next* as in Figure 8-12.

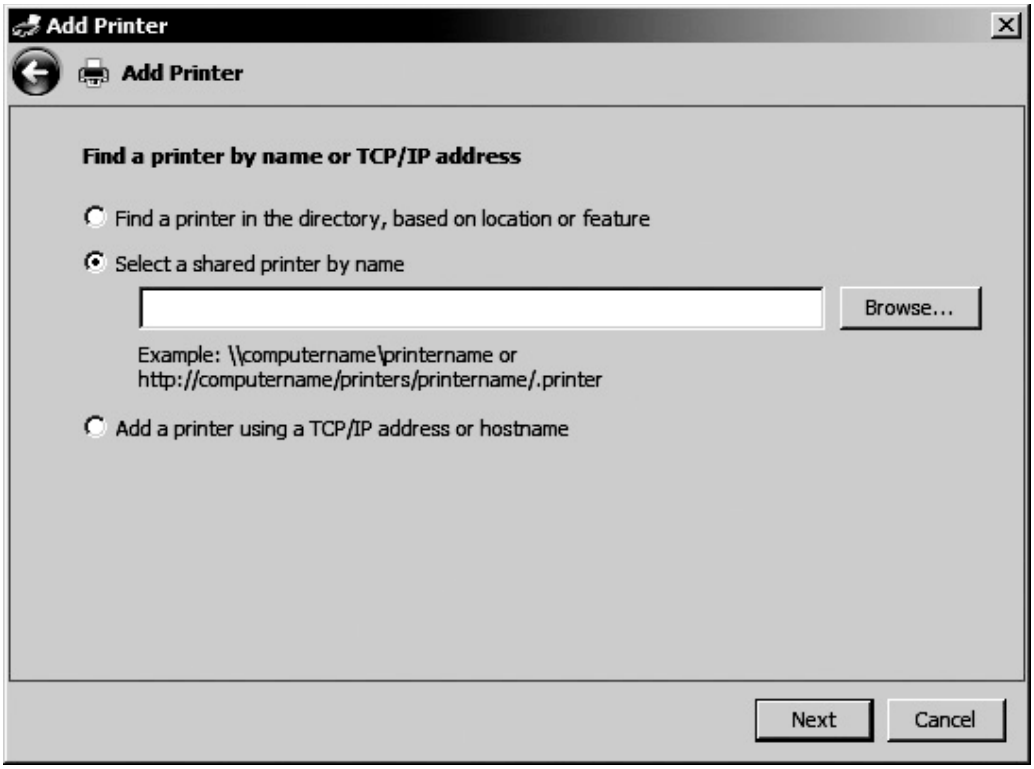

Figure 8-12: Available shared printer

7. Select **SharedHP** and click *Next.*
8. Leave as the Default Printer and Click *Next.*
9. Click *Finish.*
10. The printer is now listed in **Printers**, as shown in Figure 8-13.

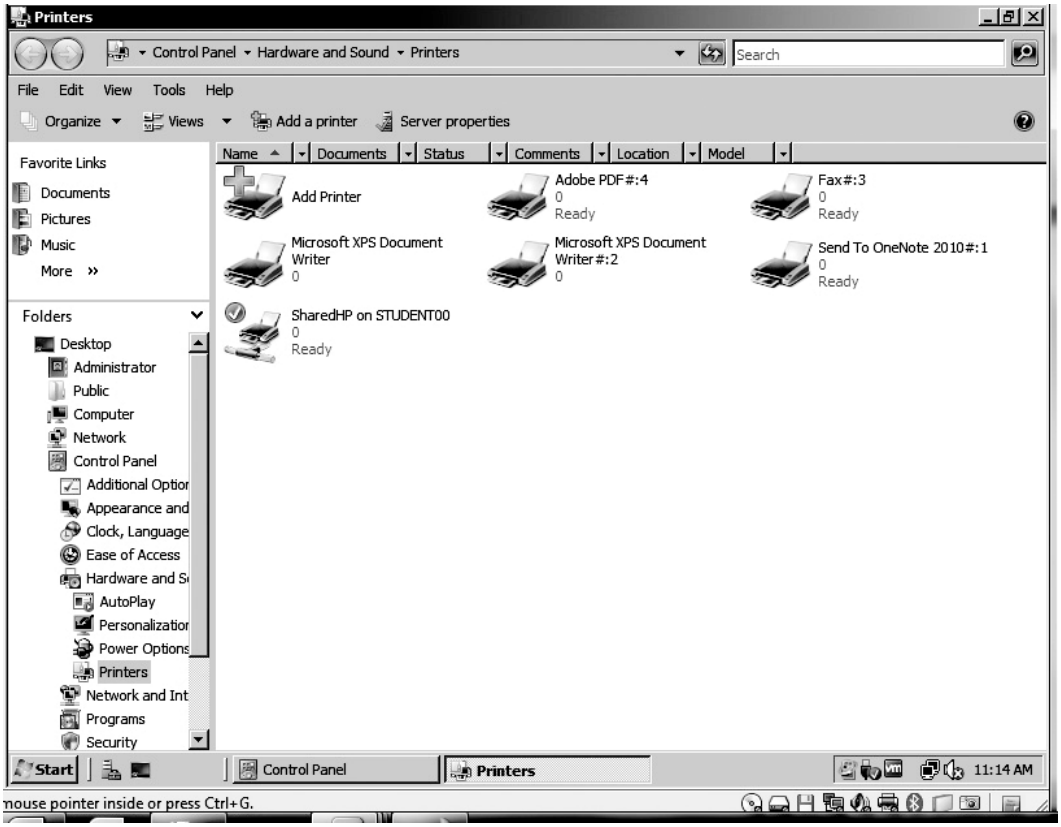

Figure 8-13: Installed shared printer

11. Close the **Printers** window.

Project 8.4	Determining Server Placement
Overview	Windows 7 Professional and Windows 7 Enterprise can be configured to support both incoming and outgoing dial-up connections. You will want to be cautious when configuring an incoming dial-up connection because it is an entry point to your computer from anywhere with a phone line. This is particularly true if your computer is connected to a network. In this project, you will identify where to place various servers to meet network design requirements.
Outcomes	After completing this project, you will know how to: ▲ identify the impact of server placement in various scenarios ▲ find ways to avoid or minimize network problems
What you'll need	To complete this project, you will need: ▲ the following worksheet
Completion time	30 minutes
Precautions	None

■ Part A: LAN Configuration

The questions in Part A refer to the configuration shown in Figure 8-14. The network is a routed TCP/IP LAN. Some of the current network servers are shown. The servers are as follows:

- Serv1—Domain controller
- Serv2—Domain controller and DNS
- Serv3—Domain controller
- Gen1—File and print server
- Gen2—File and print server

Figure 8-14 shows the logical network organization. Physically, all servers are kept in the same secure room. The network supports approximately 90 hosts, including servers.

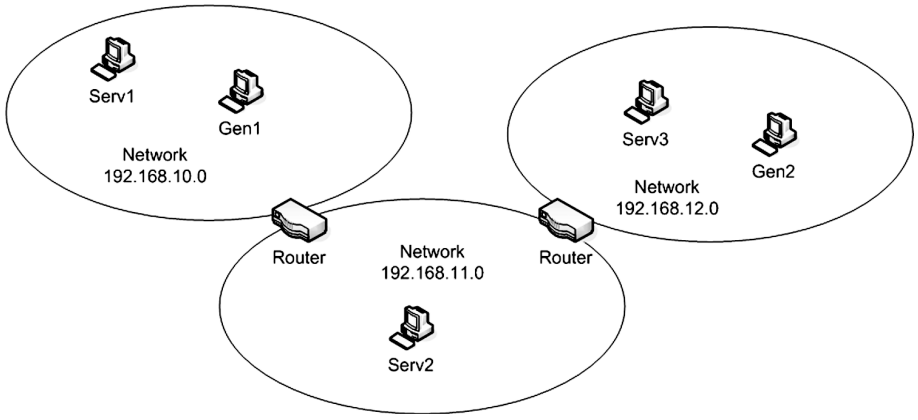

Figure 8-14: Routed LAN

1. The network was configured as a routed LAN without completely considering network requirements. You are considering combining the subnetworks. What is the main network characteristic that you must consider before doing this and why?

   _____

   _____

2. Other than removing the routers and physically connecting the central connection devices, what would the change require?

   _____

   _____

3. What is the most likely impact on the network if Serv3 fails?

_____

_____

_____

_____

4. What is the most likely impact on the network if Serv2 fails?

_____

_____

_____

5. How can you minimize the potential problems?

_____

_____

6. If you were deploying a single DHCP server for the network, where would you place it to minimize overall network traffic and why?

_____

_____

_____

_____

7. What if you were deploying two DHCP servers?

_____

_____

_____

_____

■ Part B: Demand-dial Configuration

The questions in Part B refer to the configuration shown in Figure 8-15. The network is a routed TCP/IP LAN. It is also configured as a Windows Active Directory network. Some of the current network servers are shown. The servers shown are as follows:

- Serv1—Demand-dial router
- Serv2—Demand-dial router
- Serv3—Demand-dial router

Currently, connections between each subnet are made over the public-switched telephone network (PSTN) using dial-up modems. Each server is configured with one modem. Access permissions are configured so that access to print and file servers is limited to hosts on the same subnet.

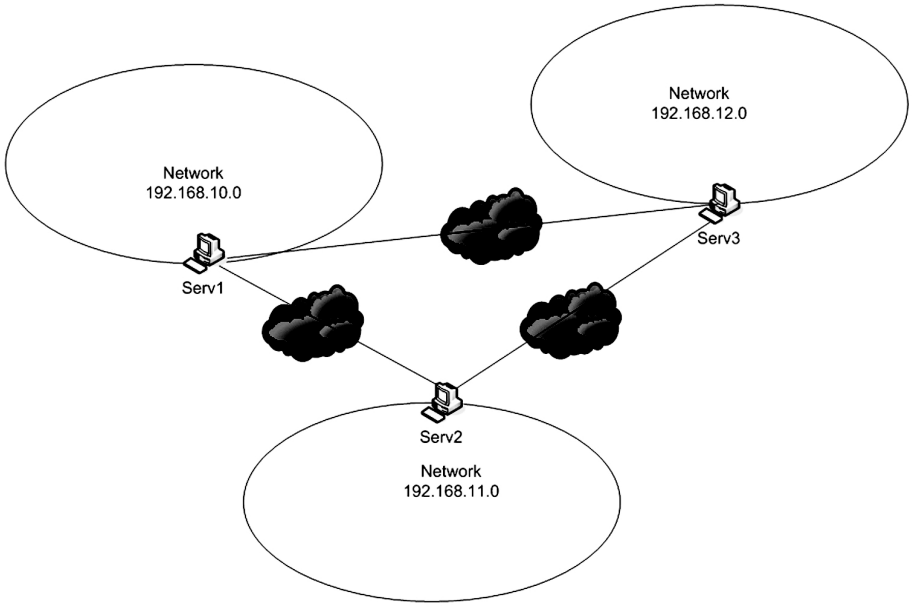

Figure 8-15: Demand-dial network

1. What are the biggest concerns in relation to communication between subnets?

   _____

   _____

   _____

2. Domain controllers will also be configured as DNS servers. You are planning to deploy a domain controller in each subnet. Justify this decision.

   _____

   _____

   _____

3. What traffic will be required between the subnets?

   _____

   _____

   _____

4. Each subnet's NetBIOS name resolution requirements are for the local subnet only. What do you need to do to support name resolution while keeping traffic and administrative requirements to a minimum?

_____

_____

_____

■ Part C: Heterogeneous Network

The questions in Part C refer to the configuration shown in Figure 8-16. The network is a routed TCP/IP LAN. Some of the current network servers and clients are shown. The computers shown are as follows:

- Linux1—Linux file server also used as a user workstation.
- Mac1—Mac OS X computer used primarily as a graphics and multimedia file server.
- Mac2—Mac OS X client used for commercial art and high-resolution graphics.
- Mac3—Mac OS X client used for commercial art, movies, and high-resolution graphics.
- Serv1—Windows Server 2008 file, print, and intranet web server.
- Serv2—Windows Server 2008 database server.
- Serv3—Windows 2000 Server print server with high-resolution graphics printer.

The majority of the client computers run Windows XP or Windows 2000 Professional. A few Linux workstations are also used as client computers. The only computers that need access to Mac1 are Mac2 and Mac3. Mac2 and Mac3 also need to access Serv1. The Macintosh computers print both draft and final copies of graphics files to the printer connected to Serv3. Client computers access Serv2 using various custom database applications. All clients need access to Serv2. Linux1 supports Windows and Linux clients only.

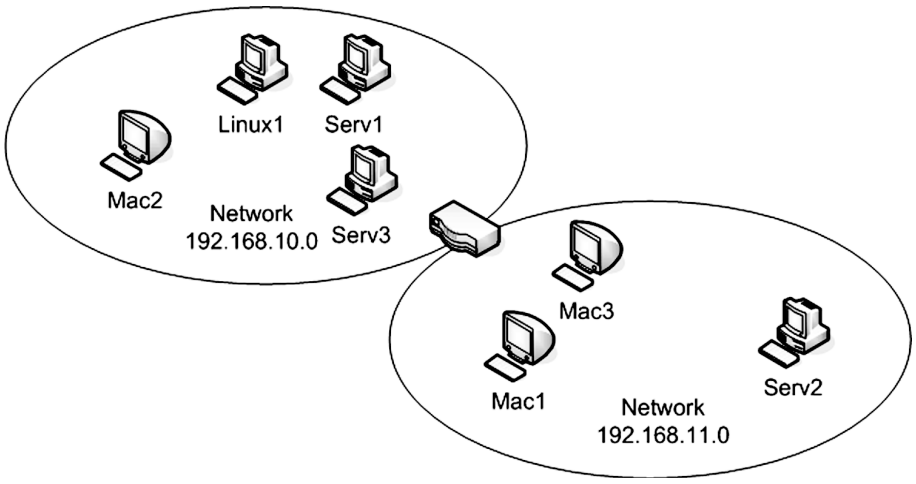

Figure 8-16: Heterogeneous network

1. In order to minimize administrative overhead, what should you use as the primary NOS for this network?

   _____

2. Why?

   _____

   _____

   _____

3. What would be necessary for Linux1 to provide the necessary client support?

   _____

4. Why?

   _____

5. What authentication protocol would be used, based on your proposed configuration? Explain your answer.

   _____

6. What other authentication protocols, if any, would be needed?

   _____

   _____

7. Of the computers shown in Figure 8-16, what changes could you make to computer placement to reduce the traffic through the router and why?

   _____

   _____

   _____

8. How would this affect the placement of Serv2, if at all?

   _____

   _____

   _____

   _____

Project 8.5	Observing Network Traffic Flows
Overview	One of the determining factors in server placement is how servers impact traffic flows and bandwidth requirements. Different NOS products provide various tools for monitoring network traffic and collecting this information. Some third-party tools are also designed specifically for network monitoring. When you first deploy the network, collecting baseline performance information is generally suggested. Collecting this information at various times is best so you have an idea of peak, minimum, and average network traffic levels. You would then check network traffic periodically or any time a communication problem related to traffic levels is suspected. During this project, you will monitor the traffic generated by sample activities.
Outcomes	After completing this project, you will know how to: ▲ observe network traffic and performance using Windows Reliability and Performance Monitor
What you'll need	To complete this project, you will need: ▲ domain controller running Windows Server 2008 ▲ the following worksheet
Completion time	30 minutes
Precautions	The instructions in this project assume you are working on a two-node network with one computer running Windows 7 Professional or Enterprise and one computer running Windows Server 2008. If these computers are part of a larger classroom network, your instructor will provide you with alternate instructions for configuring network and domain parameters. If working on an existing network, you must review the project steps with your network administrator. Your network administrator may need to make changes or additions to the instructions. Watch the project instructions carefully. You may be using both computers throughout this project.

■ Part A: View Log on Traffic

Logging on can generate significant traffic on a network and place a noticeable load on the authenticating server, depending on the number of clients involved. During this part of the project, you see the load generated when one user logs on.

1. Shut down the computer running Windows 7 Professional or Windows 7 Enterprise.
2. To open **Windows Reliability and Performance Monitor**, on the computer running Windows Server 2008, open the **Start** menu and right-click on the Computer to select **Manage**, as shown in Figure 8-17.

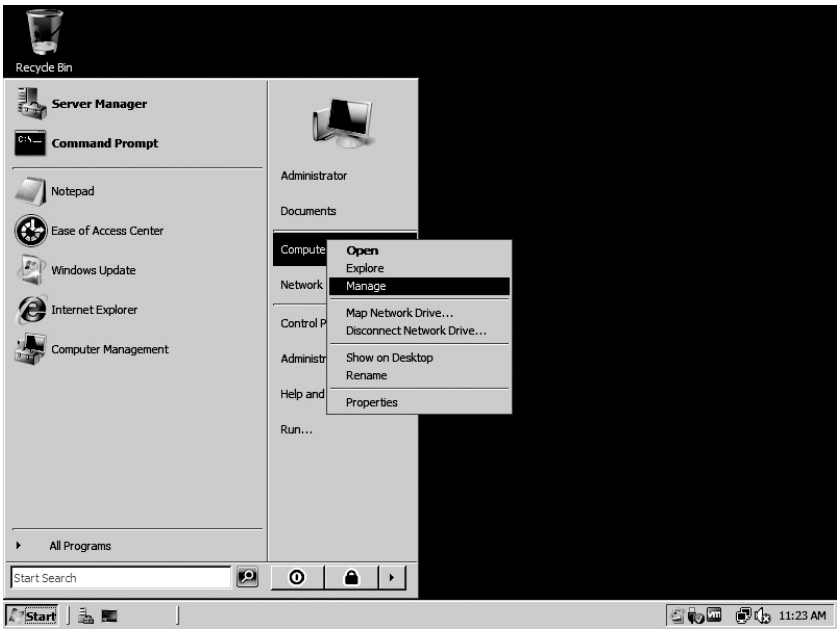

Figure 8-17: To Manage the Computer

3. In **Server Manager**, choose **Reliability and Performance Monitor** in the left-hand pane, as shown in Figure 8-18.

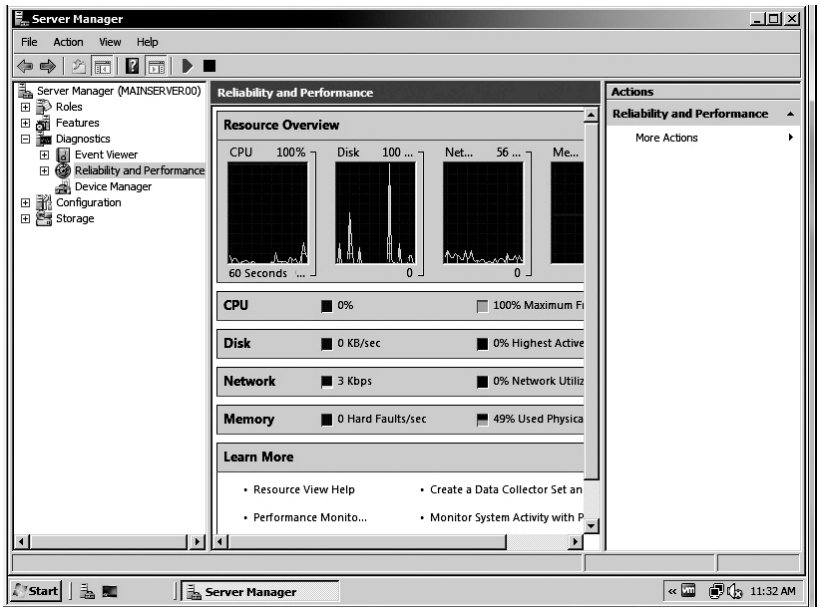

Figure 8-18: Reliability and Performance monitor

3. By default, **Reliability and Performance Monitor** is watching selected local resources only. Click the *More Actions* icon to add more screens to the **Customized View**.
   Note: You may find it easier to view monitored traffic if you remove the default counters. To do so, simply uncheck the counter from the customized view, as shown in Figure 8-19.

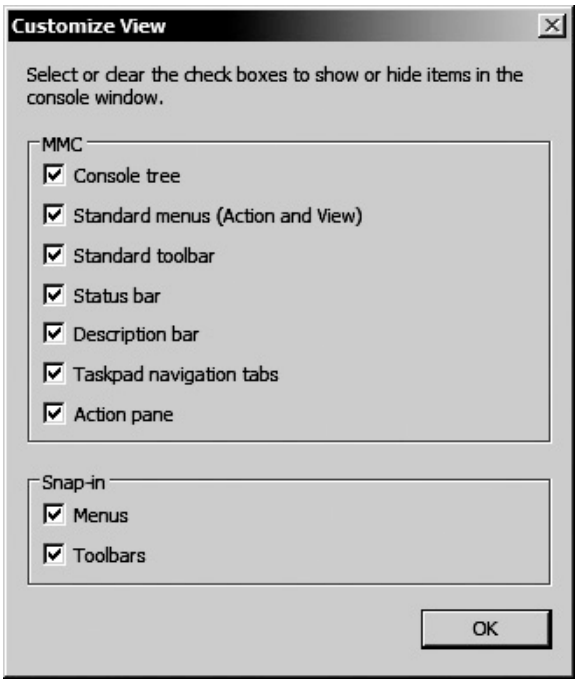

Figure 8-19: Adding and Deleting counters

4. Select **Network** to monitor current Network traffic, as shown in Figure 8-20.

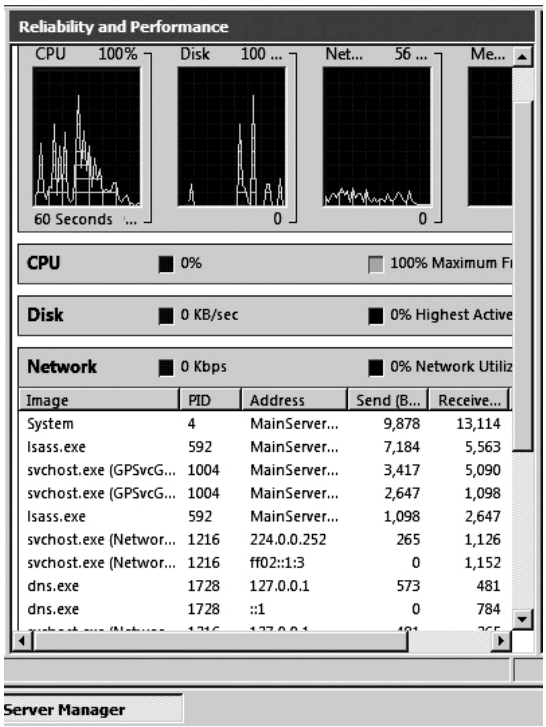

Figure 8-20: Monitoring Network activity

15. Exit the **Reliability and Performance Monitor**.