

Module 5: Implementing Printing

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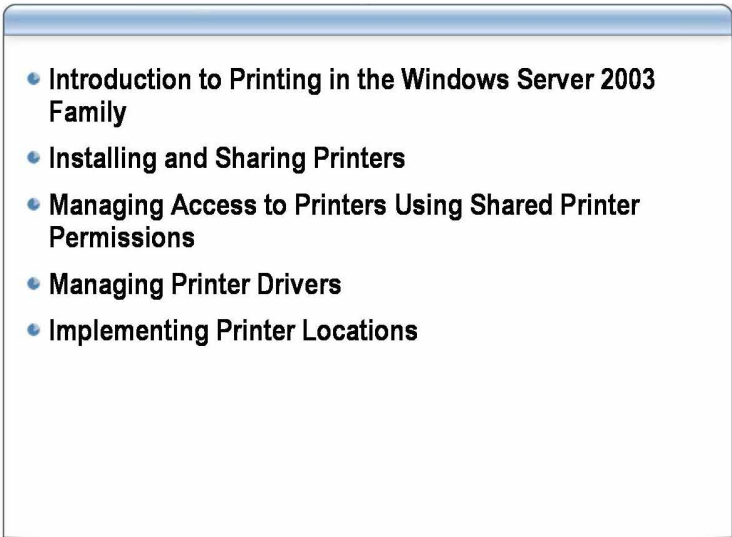
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Overview

- 
- Introduction to Printing in the Windows Server 2003 Family
 - Installing and Sharing Printers
 - Managing Access to Printers Using Shared Printer Permissions
 - Managing Printer Drivers
 - Implementing Printer Locations

Introduction

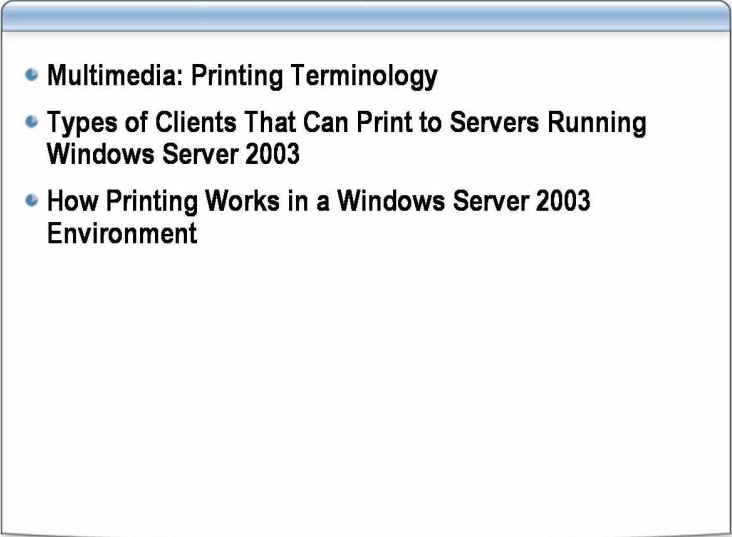
Printers are common resources that are shared by multiple users on a network. As a systems administrator, you should set up a network-wide printing strategy that meets the needs of users. To set up an efficient network of printers, you must know how to install and share network printers and how to manage printer drivers and printer locations. The Microsoft® Windows® Server 2003 family helps you to perform these tasks efficiently through an easy-to-use interface.

Objectives

After completing this module, you will be able to:

- Explain the printing process in the Windows Server 2003 family.
- Install and share printers.
- Manage access to printers by using shared printer permissions.
- Manage printer drivers.
- Implement printer locations.

Lesson: Introduction to Printing in the Windows Server 2003 Family

- 
- **Multimedia: Printing Terminology**
 - **Types of Clients That Can Print to Servers Running Windows Server 2003**
 - **How Printing Works in a Windows Server 2003 Environment**

Introduction

The Windows Server 2003 family makes it easy for an administrator to set up network printing and configure the print resources from a central location. You can also configure client computers running Microsoft Windows 95, Microsoft Windows 98, or Microsoft Windows NT® to print from the network print devices.

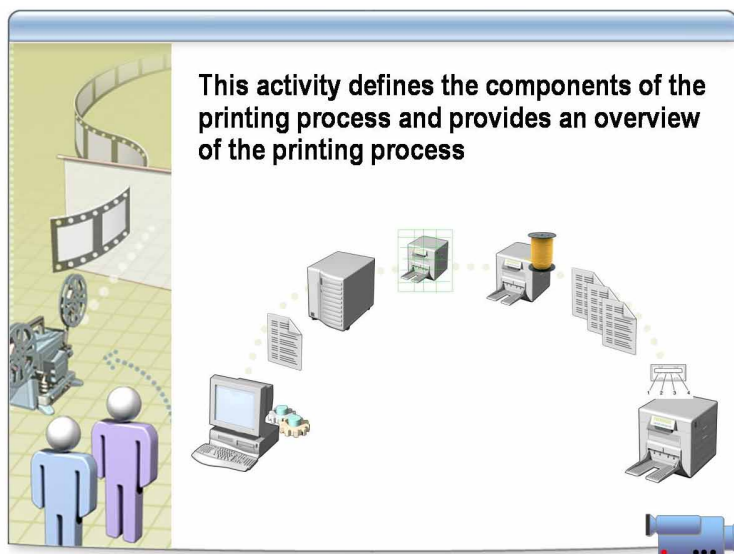
Before you set up printing in Windows Server 2003, you should be aware of the terms used and how printing works in a Windows Server 2003 environment.

Lesson objectives

After completing this lesson, you will be able to:

- Explain printing terminology.
- Describe the client computers that can print to servers running Windows Server 2003.
- Explain how printing works in a Windows Server 2003 environment.

Multimedia: Printing Terminology



File location

To start the *Printing Terminology* activity, open the Web page on the Student Materials compact disc, click **Multimedia**, and then click the title of the activity.

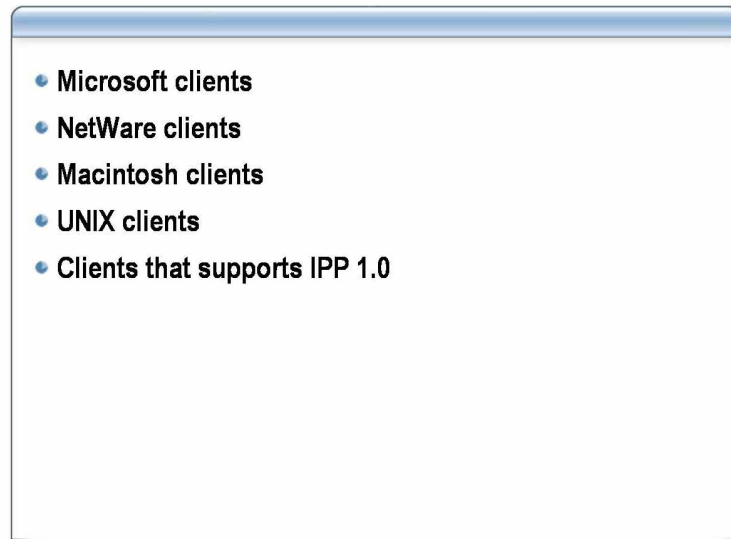
Component definitions

In the first part of the activity, you drag labels to components of the printing process. When you drop a label on the correct component, the definition of that component is displayed. You can also click **Show me** to have all definitions displayed.

Printing process

After all component definitions are displayed, click **Play** to view an animation of the basic printing process.

Types of Clients That Can Print to Servers Running Windows Server 2003



Introduction

Client computers can access a printer immediately after a systems administrator adds the printer to a print server running Windows Server 2003.

Client computers that can print to Windows Server 2003

A print server running Windows Server 2003 supports the following clients:

- Microsoft clients

All 16-bit clients running Windows and clients running Microsoft MS-DOS® require 16-bit printer drivers on each client. Necessary drivers are downloaded to 32- and 64-bit Windows clients.

- NetWare clients

NetWare clients require that Microsoft File and Print Services for NetWare is installed on the print server running Windows Server 2003. They also require that transport compatible with Internetwork Packet Exchange/Sequenced Packed Exchange (IPX/SPX) is installed on the print server and on each client.

- Macintosh clients

Macintosh clients require that Microsoft Print Services for Macintosh is installed on the print server running Windows Server 2003. They also require that the Appletalk networking protocol transport is installed on the print server and on each client.

- UNIX clients

UNIX clients require that Microsoft Print Services for UNIX is installed on the print server running Windows Server 2003. UNIX clients that support the Line Printer Remote (LPR) specification connect to a print server by using the Line Printer Daemon (LPD) service.

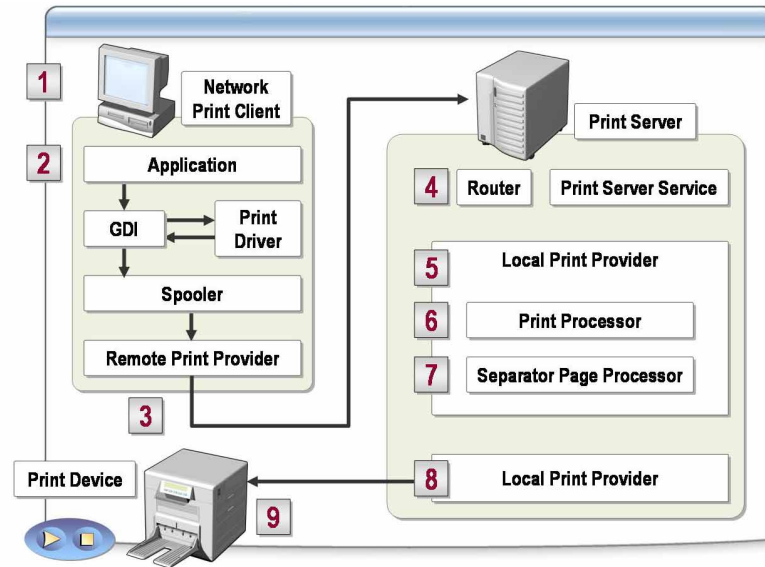
- Client that support Internet Printing Protocol (IPP) 1.0

Any client that supports IPP 1.0 can print to a print server running Windows Server 2003 by using Hypertext Transfer Protocol (HTTP). The clients that support IPP are clients running Windows 95, Windows 98, or Windows Server 2003. You must first install Microsoft Internet Information Services (IIS) or Microsoft Peer Web Services (PWS) on the computer running Windows Server 2003.

Additional reading

For more information about IPP, see article 323428 “How To: Configure Internet Printing in Windows Server 2003” in the Microsoft Knowledge Base at <http://support.microsoft.com/?kbid=323428>.

How Printing Works in a Windows Server 2003 Environment



Introduction

When you add a printer that is connected to a network through a network adapter, you can implement printing in the following ways:

- Add a printer directly to each user's computer without using a print server computer.
- Add the printer once to a print server computer and then connect each user to the printer through the print server computer.

Printing without using a print server

Suppose that a small workgroup has only a few computers and a printer that is connected directly to the network. Each user on the network adds the printer to their Printers and Faxes folder without sharing the printer and sets their own driver setting.

This configuration has the following disadvantages:

- The users do not know the actual state of the printer.
- Each computer has its own print queue that displays only those print jobs sent from that computer.
- You cannot determine where your print job is in relation to all the print jobs from other computers.
- Error messages, such as paper jams or empty paper trays, appear only on the print queue for the current print job.
- All the processes on a document submitted for printing are done on that one computer.

Printing with a print server

A computer running Windows Server 2003 functions as a print server. The computer adds the printer and shares it with the other users. A computer running Microsoft Windows XP Professional can also function as a print server. However, it cannot support Macintosh or NetWare services, and it is limited to only 10 connections in the same local area network (LAN).

Printing with a print server has the following advantages:

- The print server manages the printer driver settings.
- A single print queue appears on every computer connected to the printer, enabling each user to see where their print job is in relation to others waiting to print.
- Because error messages appear on all computers, everyone knows the actual state of the printer.
- Some processing is passed from the client computer to the print server.
- You can have a single log for administrators wanting to audit the printer events.

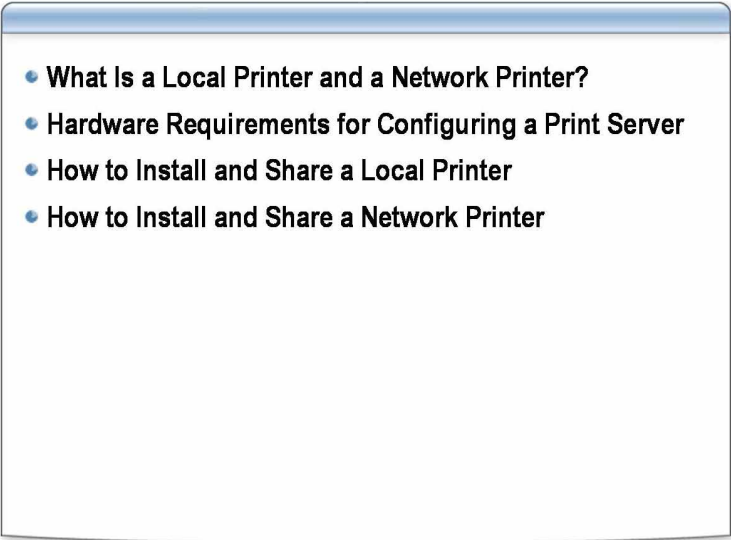
Note Typically, print servers are implemented on servers that also perform other functions.

Additional reading

For more information about the printing process, see:

- “Printing overview” at http://www.microsoft.com/technet/treeview/default.asp?url=/technet/prodtechnol/windowsserver2003/proddocs/entserver/sag_PRINTconcepts_01.asp?frame=true.
- “Printing and print servers” at http://www.microsoft.com/technet/treeview/default.asp?url=/technet/prodtechnol/windowsserver2003/proddocs/entserver/sag_PRINTconcepts_ps_queue_spooler.asp?frame=true.

Lesson: Installing and Sharing Printers

- 
- What Is a Local Printer and a Network Printer?
 - Hardware Requirements for Configuring a Print Server
 - How to Install and Share a Local Printer
 - How to Install and Share a Network Printer

Introduction

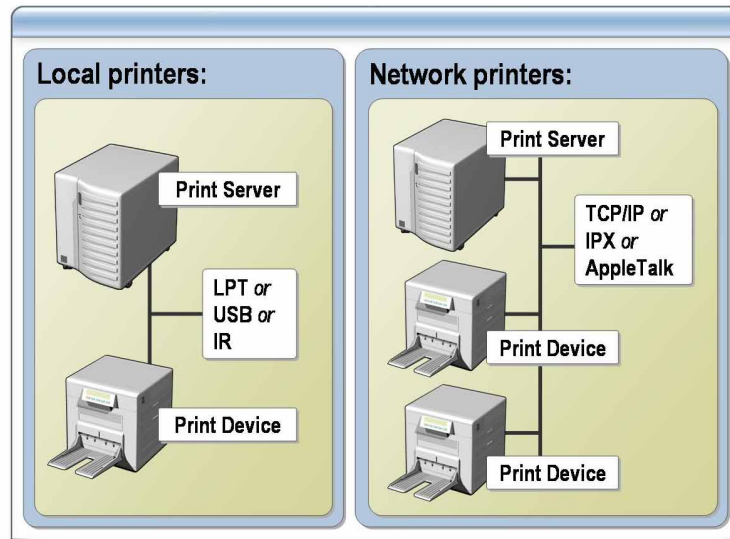
Users in a home environment mostly print to a local printer attached to their client computer. In a businesses environment, client computers print to a centralized print server that redistributes the print jobs to a print device. By using a print server, the network administrators can centrally manage all printers and print devices.

Lesson objectives

After completing this lesson, you will be able to:

- Explain the differences between printing to a local printer and printing to a network printer.
- Explain the requirements for configuring a print server.
- Install and share local printers.
- Install and share network printers.

What Is a Local Printer and a Network Printer?



Introduction

As a systems administrator, you will be asked to create two types of printers: a local printer and a network printer. You must create both types of printers before sharing them for others to use.

Definition

Local printers are created to print to a locally attached print device by using parallel (LPT), Universal Serial Bus (USB), or infrared (IR). Local printers also print to a network print device that uses Internet Protocol (IP) or IPX. They also support Plug and Play.

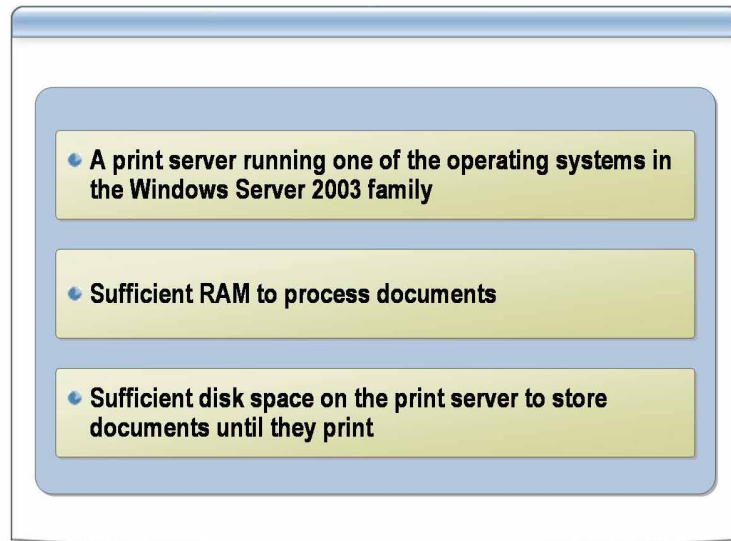
Network printers print to a network printer by using IP, IPX or Appletalk. Network printers also print to a printer that redirects the print job to a print device.

Advantages and disadvantages

The following table lists the advantages and disadvantages of printing to a local printer or a network printer.

	Local printer	Network printer
Advantages	<ul style="list-style-type: none"> The print device is in close proximity to the user's computer Plug and Play can detect local printers and automatically install drivers 	<ul style="list-style-type: none"> Many users can access print devices
Disadvantages	<ul style="list-style-type: none"> A print device is needed for every computer Drivers must be manually installed to every local printer A local printer takes more processor clock cycles to print 	<ul style="list-style-type: none"> Security is limited on the physical security of the print device Network printers support distributing updated printer drivers to multiple clients The local computer takes more processor clock cycles to print

Hardware Requirements for Configuring a Print Server



Introduction

There are certain hardware requirements for setting up an efficient printing environment. Whether you are using a local printer or a network printer, if the minimum hardware requirements are not met, network printing may be highly inefficient.

Hardware requirements

Setting up printing on a Windows Server 2003 network requires the following:

- At least one computer to function as the print server that is running one of the operating systems in the Windows Server 2003 family

If the print server is expected to manage many print jobs, it is recommended that you dedicate a server for printing. The print server can run any operating system in the Windows Server 2003 family. Use one of these products when you need to support a large number of connections in addition to Macintosh, UNIX, and NetWare clients.

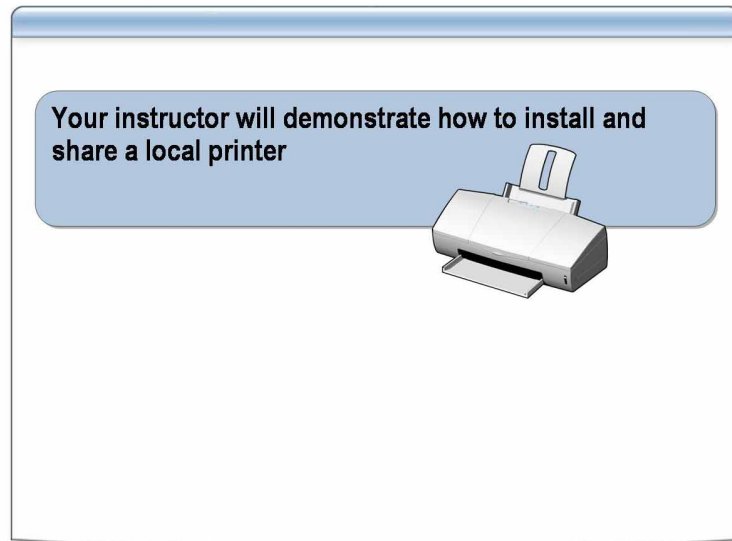
- Sufficient RAM to process documents

If a print server manages many printers or many large documents, the server may require additional RAM beyond what Windows Server 2003 requires for other tasks. If a print server does not have sufficient RAM for its workload, printing performance may decline.

- Sufficient disk space on the print server to store documents

You must have enough disk space to ensure that Windows Server 2003 can store documents that are sent to the print server until the print server sends the documents to the print device. This is critical when documents are large or when documents accumulate. For example, if 10 users each send one large document to print at the same time, the print server must have enough disk space to hold all of the documents until the print server sends them to the print device.

How to Install and Share a Local Printer



Introduction

To install and share a local printer, you use the Add Printer Wizard, located in the Printers and Faxes folder. You can also add and configure printer ports in the Add Printer Wizard. The Add Printer Wizard prompts you to install a printer driver if one is needed or to replace the existing driver.

The Add Printer Wizard also enables you to connect to a remote shared printer and install its software interface on your computer, assuming that you want local control and have the correct permissions. If you do this, the printing process bypasses the print server for the remote printer by processing print jobs locally and redirecting the output to a remote printer.

Install a printer attached to your computer with a parallel port (LPT):

Connect the printer to the appropriate port on your computer according to the printer manufacturer's documentation, and verify that it is ready to print.

1. Connect the printer to your computer.
2. In Control Panel, in the Printers and Faxes folder, double-click **Add Printer**.
3. In the Add Printer Wizard, on the **Welcome** page, click **Next**.
4. On the **Local or Network Printer** page, click **Local printer attached to this computer**.
5. Select the **Automatically detect and install my Plug and Play printer** check box, and then click **Next**.
6. Depending on the printer you are installing, a Found New Hardware message or the Found New Hardware Wizard appears to notify you that the printer has been detected and that installation has begun.
7. Follow the instructions on the screen to complete the printer installation.
8. The printer icon is added to your Printers and Faxes folder.

Installation without using Plug and Play

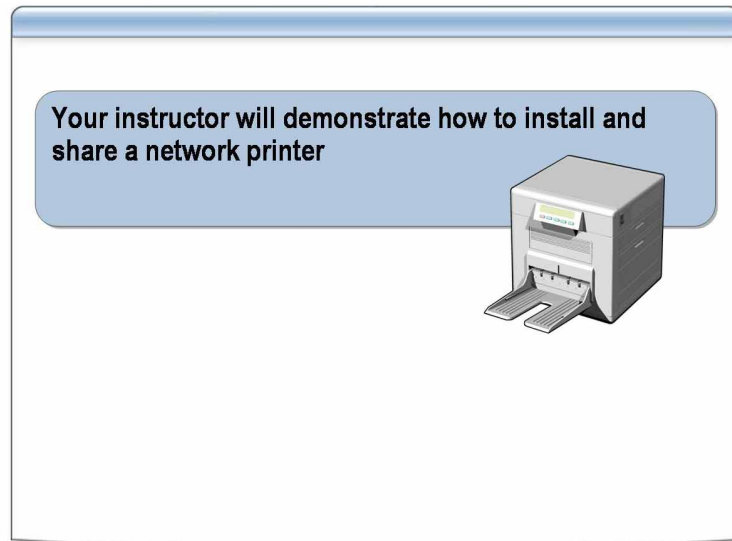
If you could not install your printer by using Plug and Play, or if the printer is attached to your computer with a serial (COM) port:

1. In Control Panel, in the Printers and Faxes folder, double-click **Add Printer**.
2. In the Add Printer Wizard, on the **Welcome** page, click **Next**.
3. On the **Local or Network Printer** page, click **Local printer attached to this computer**.
4. Clear the **Automatically detect and install my Plug and Play printer** check box to avoid waiting for the completion of another printer search, and then click **Next**.
5. Follow the instructions on the screen to finish installing the printer by selecting a printer port, selecting the manufacturer and model of your printer, and typing a name for your printer.

Sharing a local printer

In Windows Server 2003, the Add Printer Wizard shares the printer and publishes it in the Active Directory® directory service by default, unless you select the **Do not share this printer** check box on the **Printer Sharing** page of the Add Printer Wizard.

How to Install and Share a Network Printer



Introduction

In larger organizations, most print devices have a network interface. Using these print devices has several advantages. There is greater flexibility in where you locate your printers. In addition, network connections transfer data quicker than printer cable connections.

Procedure for installing a network printer

To install a network printer:

1. In the Printers and Faxes folder, double-click **Add Printer**.
2. In the Add Printer Wizard, on the **Welcome** page, click **Next**.
3. On the **Local or Network Printer** page, click **Local printer attached to this computer**.
4. Clear the **Automatically detect and install my Plug and Play printer** check box, and then click **Next**.
5. When the Add Printer Wizard prompts you to select the printer port, click **Create a new port**.
6. From the list, click the appropriate port type and follow the instructions.
By default, only **Local Port** and **Standard TCP/IP Port** appear in the list.

Procedure for sharing a network printer

To share a network printer:

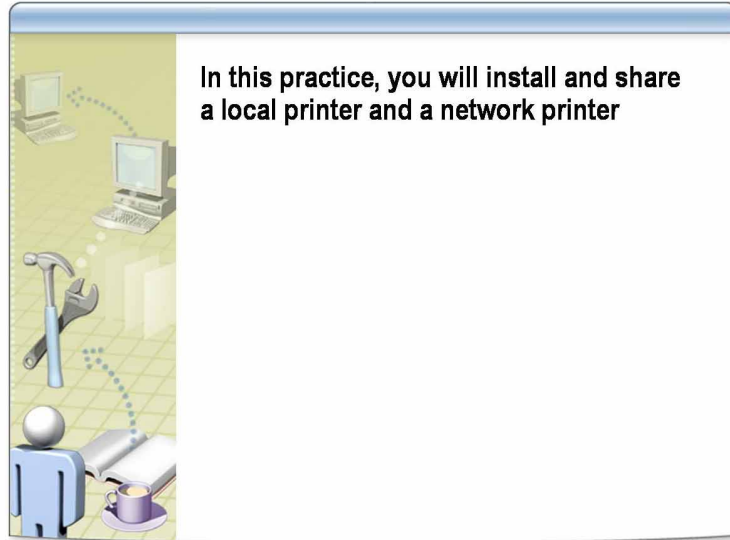
1. In the Printers and Faxes folder, right-click the printer you want to share, and then click **Sharing**.
2. On the **Sharing** tab, click **Share this printer**, and then type a name for the shared printer.

If you share the printer with users using different hardware or different operating systems, click **Additional Drivers**. Click the environment and operating system for the other computers, and then click **OK** to install the additional drivers.

If you are logged on to a Windows 2000 or Windows Server 2003 domain, you can make the printer available to other users on the domain by clicking **List in the Directory** to publish the printer in Active Directory.

3. Click **OK**, or if you have installed additional drivers, click **Close**.

Practice: Installing and Sharing Printers



Objective

In this practice, you will install and share a local printer and a network printer.

Instructions

Before you begin this practice:

- Log on to the domain as *ComputerNameAdmin*.

Note This practice focuses on the concepts in this lesson and as a result may not comply with Microsoft security recommendations. For example, this practice does not comply with the recommendation that users log on with domain user account and use the **Run as** command when performing administrative tasks. When using the Printers and Faxes interface, you cannot use the **Run as** command.

- Review the procedures in this lesson that describe how to perform this task.

Scenario

As a network administrator, you must configure your server running Windows Server 2003 Server as a print server for a print device attached locally and a print device attached to the network. The Sales department in your city organizational unit is located in Building 1 on the first floor and has a network print device that must be configured. The IT department has a print device attached to the local LPT1 port of your server.

Note Your student computer is not actually attached to a print server. This practice simulates the creation of a print server. A test page will not print, so you will receive a test page print error if you attempt to print a test page.

Practice**► Create a printer attached to an LPT1 port**

- Create an HP LaserJet 5si on an LPT1 port, name the printer *ComputerName* IT Datacenter Printer, and then share the printer with the same name.

► Create a printer based on a print device on a subnet

- Create a local LaserJet 5si printer on a Standard TCP/IP port. Find the name of your computer in the following table and use the port and shared printer name next to it.

The LaserJet 5si print device uses a Generic Network Card and a LaserJet 5si driver.

City	IP address	Shared printer name
Vancouver	192.168.11.50	Vancouver Sales Printer
Denver	192.168.21.50	Denver Sales Printer
Perth	192.168.31.50	Perth Sales Printer
Brisbane	192.168.41.50	Brisbane Sales Printer
Lisbon	192.168.51.50	Lisbon Sales Printer
Bonn	192.168.61.50	Bonn Sales Printer
Lima	192.168.71.50	Lima Sales Printer
Santiago	192.168.169.50	Santiago Sales Printer
Bangalore	192.168.179.50	Bangalore Sales Printer
Singapore	192.168.189.50	Singapore Sales Printer
Casablanca	192.168.199.50	Casablanca Sales Printer
Tunis	192.168.209.50	Tunis Sales Printer
Acapulco	192.168.219.50	Acapulco Sales Printer
Miami	192.168.229.50	Miami Sales Printer
Auckland	192.168.239.50	Auckland Sales Printer
Suva	192.168.9.50	Suva Sales Printer
Stockholm	192.168.19.50	Stockholm Sales Printer
Moscow	192.168.29.50	Moscow Sales Printer
Caracas	192.168.39.50	Caracas Sales Printer
Montevideo	192.168.49.50	Montevideo Sales Printer
Manila	192.168.59.50	Manila Sales Printer
Tokyo	192.168.69.50	Tokyo Sales Printer
Khartoum	192.168.79.50	Khartoum Sales Printer
Nairobi	192.168.89.50	Nairobi Sales Printer

Lesson: Managing Access to Printers Using Shared Printer Permissions

- What Are Shared Printer Permissions?
- Why Modify Shared Printer Permissions?
- How to Manage Access to Printers

Introduction

Most corporate printers do not enforce security on printers, because limiting who can print to a printer may be counterproductive in a work environment. However, strict security should be enabled for some printers, such as printers that print payroll checks or high-capacity printers that print bound booklets or photo-quality print jobs. You must configure printer security to enable the correct people to use the printers with the level of access they need to do their job.

Lesson objectives

After completing this lesson, you will be able to:

- Explain the different types of shared printer permissions.
- Explain why you modify shared printer permissions.
- Manage access to printers by setting and removing permissions for a printer.

What Are Shared Printer Permissions?

Permission	Allows the user to:
Print	Connect to a printer and send documents to the printer.
Manage Printers	Perform the tasks associated with the Print permission. The user also has complete administrative control of the printer. The user can pause and restart the printer, change spooler settings, share a printer, adjust printer permissions, and change printer properties.
Manage Documents	Pause, resume, restart, cancel, and rearrange the order of documents that all other users submit. The user cannot send documents to the printer or control the status of the printer.

Introduction

Windows provides the following levels of shared printer permissions:

- Print
- Manage Printers
- Manage Documents

When multiple permissions are granted to a group of users, the least restrictive permission applies. However, when a Deny permission is applied, it takes precedence over any permission.

Tasks that can be performed at each permission level

The following is a brief explanation of the types of tasks a user can perform at each permission level:

- Print

The user can connect to a printer and send documents to the printer. By default, the Print permission is granted to all members of the Everyone group.

- Manage Printers

The user can perform the tasks associated with the Print permission and has complete administrative control of the printer. The user can pause and restart the printer, change spooler settings, share a printer, adjust printer permissions, and change printer properties. By default, the Manage Printers permission is granted to members of the Administrators and Power Users groups.

By default, members of the Administrators and Power Users groups have full access, which means that the users are granted the Print, Manage Documents, and Manage Printers permissions.

■ Manage Documents

The user can pause, resume, restart, cancel, and rearrange the order of documents submitted by all other users. The user cannot, however, send documents to the printer or control the status of the printer. By default, the Manage Documents permission is granted to members of the Creator Owner group.

When a user is granted the Manage Documents permission, the user cannot access existing documents currently waiting to be printed. They can only access documents sent to the printer after they are granted the permission.

Printer permissions assigned to default groups

Windows assigns printer permissions to six groups of users. These groups include Administrators, Creator Owner, Everyone, Power Users, Print Operators, and Server Operators. By default, each group is granted a combination of the Print, Manage Documents, and Manage Printers permissions, as shown in the following table.

Group	Print	Manage Documents	Manage Printers
Administrators	X	X	X
Creator Owner		X	
Everyone	X		
Power Users	X	X	X
Print Operators	X	X	X
Server Operators	X	X	X

Caution Add a minimum number of trusted users to the Administrators, Power Users, Print Operators, and Server Operators groups.

Why Modify Shared Printer Permissions?

- **Limit access to a printer for selected users**
 - Example: Give all nonadministrative users in a department a low-level permission and give all managers a higher-level permission. This enables both users and managers to print documents, but managers can change the print status of any document sent to the printer.
- **Deny access to a printer for selected users**
 - Example: Give selected members of a group the ability to print documents, and deny other group members access to the printer to force them to use another printer.

Introduction

When a shared printer is installed on a network, default printer permissions are assigned that enable all users to print. You can also enable selected groups to manage documents sent to the printer and enable selected groups to manage the printer. You can explicitly deny access to the printer through user or group membership.

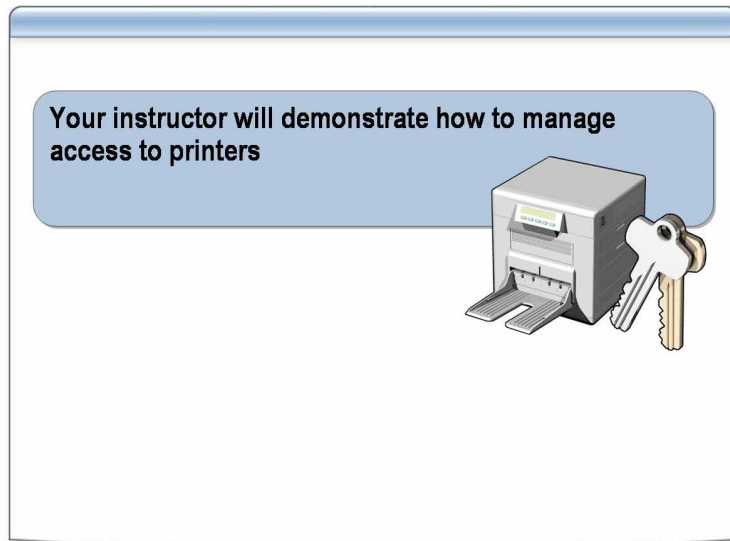
Limit access to a printer for selected users

You might want to limit access for some users by granting specific printer permissions. For example, you can grant the Print permission to all nonadministrative users in a department and grant the Print and Manage Documents permissions to all managers. As a result, all users and managers can print documents, but managers can also change the print status of any document sent to the printer.

Deny access to a printer for selected users

In some cases, you may need to give access to a printer to a group of users. However, there may be a few users in the group whom you do not want to access the printer. In this case, you can grant permissions to the group and deny permission to specific users in the group. For example, you can give selected members of a group the ability to print documents and deny other group members access to the printer to force them to use another printer.

How to Manage Access to Printers



Introduction

You must change shared printer permissions as your networking environment changes.

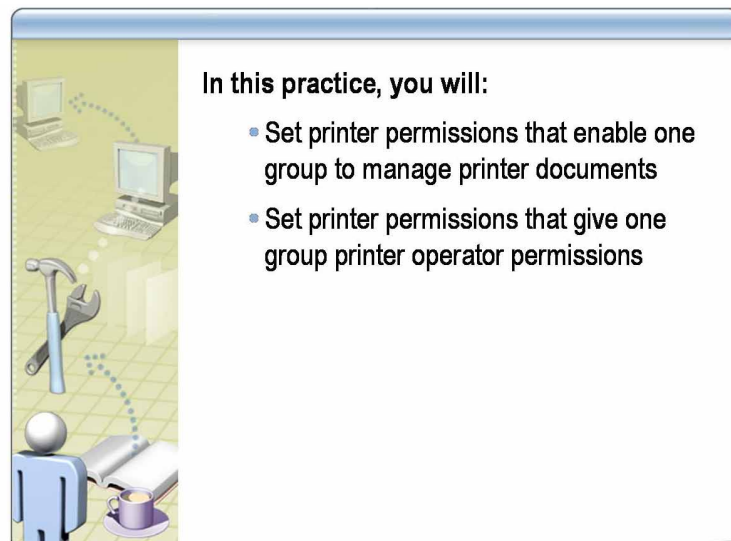
Procedure

To manage access to printers by allowing or denying permissions for a printer:

1. In the Printers and Faxes folder, right-click the printer for which you want to set permissions, and then click **Properties**.
2. In the **Properties** dialog box, on the **Security** tab, do one of the following:
 - To change or remove permissions of an existing user or group, under **Group or User names**, click the name of the user or group.
 - To grant permissions to a new user or group, click **Add**. In the **Select Users, Computers, or Groups** dialog box, type the name of the user or group you want to grant permissions to, and then click **OK**.
3. Under **Permissions for Administrators**, select the **Allow** or **Deny** check box for each permission you want to allow or deny.

Note To view or change the underlying permissions that make up the Print, Manage Printers, and Manage Documents permissions, click **Advanced**.

Practice: Managing Access to Printers Using Shared Printer Permissions



Objective

In this practice, you will:

- Set printer permissions that enable one group to manage printer documents.
- Set printer permissions that give one group printer operator permissions.

Instructions

Before you begin this practice:

- Log on to the domain by using the *ComputerName*Admin account.

Note This practice focuses on the concepts in this lesson and as a result may not comply with Microsoft security recommendations. For example, this practice does not comply with the recommendation that users log on with domain user account and use the **Run as** command when performing administrative tasks. When using the Printers and Faxes interface, you cannot use the **Run as** command.

- Ensure that you have a printer called *ComputerName* Sales Printer.
- Review the procedures in this lesson that describe how to perform this task.

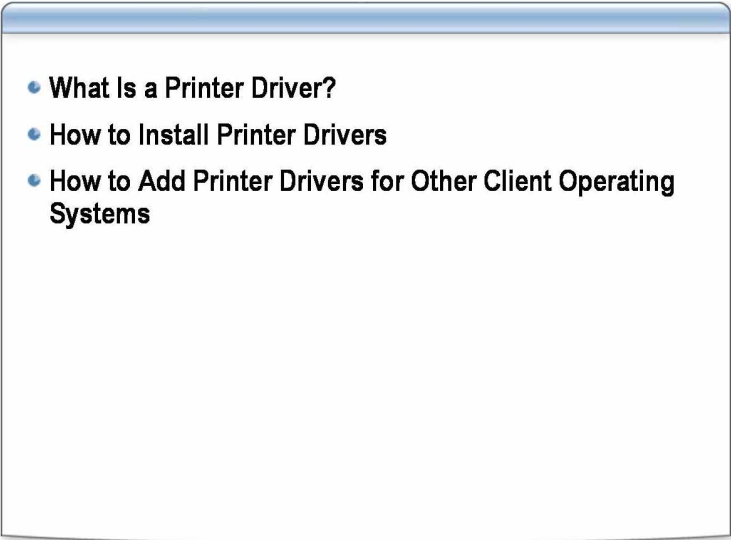
Scenario

A systems engineer asks you to modify printer permissions for the printer used by the Sales department. You must configure printer permissions so that only users in the Sales department can print to the printer and that IT personnel can manage the printer.

Practice**► Modify printer permissions**

- Configure permissions for *ComputerName* Sales Printer as follows:
 - Grant Print permission to the group DL NWTraders Sales Personnel Print.
 - Grant Manage Printers permissions to the group DL NWTraders IT Personnel Print.
 - Remove the Everyone group.

Lesson: Managing Printer Drivers

- 
- **What Is a Printer Driver?**
 - **How to Install Printer Drivers**
 - **How to Add Printer Drivers for Other Client Operating Systems**

Introduction

This lesson introduces you to the skills and knowledge that you need to manage printer drivers.

Lesson objectives

After completing this lesson, you will be able to:

- Explain what a printer driver is.
- Install new or updated printer drivers.
- Add printer drivers for other client operating systems.

What Is a Printer Driver?

<ul style="list-style-type: none"> • Software that computer programs use to communicate with printers and plotters • Translates the information you send from the computer into commands that the printer understands • Consists of the following types of files: 	
Configuration or printer interface file	<ul style="list-style-type: none"> • Displays the Properties and Preferences dialog boxes when you configure a printer • Has a .dll extension
Data file	<ul style="list-style-type: none"> • Provides information about the capabilities of a specific printer • Can have a .dll, .pcd, .gpd, or .ppd extension
Printer graphics driver file	<ul style="list-style-type: none"> • Translates DDI commands into commands that a printer can understand • Has a .dll extension

Definition

A printer driver is software used by computer programs to communicate with printers and plotters.

What is the purpose of printer drivers?

Printer drivers translate the information you send from the computer into commands that the printer understands. Usually, printer drivers are not compatible across platforms, so various drivers must be installed on the print server to support different hardware and operating systems. For example, if your computer is running Windows XP and you share a printer with users with computers running Microsoft Windows 3.1, you might need to install multiple printer drivers.

Printer driver files

Printer drivers consist of the following three types of files:

- Configuration or printer interface file
 - This file displays the **Properties** and **Preferences** dialog boxes when you configure a printer.
 - This file has a .dll extension.
- Data file
 - This file provides information about the capabilities of a specific printer, including its resolution capability, whether it can print on both sides of the page, and what size paper it can accept.
 - This file can have a .dll, .pcd, .gpd, or .ppd extension.
- Printer graphics driver file
 - This file translates device driver interface (DDI) commands into commands that a printer can understand. Each driver translates a different printer language. For example, the file Pscript.dll translates the PostScript printer language.
 - This file has a .dll extension.

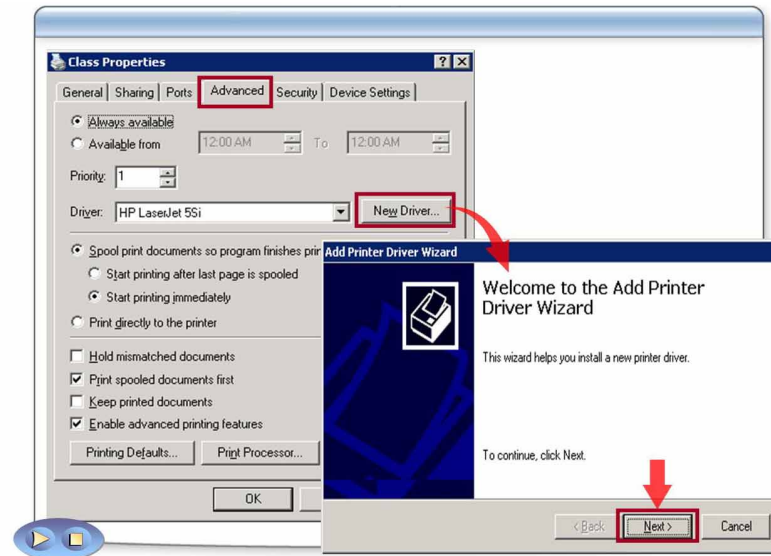
Example of how printer driver files works

Printer driver files, which are usually accompanied by a Help file, work together to make printing possible. For example, when you install a new printer, the configuration file reads the data file and displays the available printer options. When you print, the printer graphics driver file queries the configuration file about your selections so that it can create the proper printer commands.

Signed print drivers

It is strongly recommended that you use only device drivers with the **Designed for Microsoft Windows XP** or **Designed for Microsoft Windows 2003 Server** logos. Installing device drivers that Microsoft has not digitally signed might disable the system, allow viruses on to your computer, or otherwise impair the correct operation of your computer either immediately or in the future.

How to Install Printer Drivers



Introduction

If you are managing a print server, you occasionally receive updated printer drivers from print device manufacturers. These updated drivers often have hot fixes, but they should be thoroughly tested before you install them on your print server.

Procedure for installing new or updated printer drivers

To install new or updated printer drivers:

1. In the Printers and Faxes folder, right-click the printer for which you want to change drivers, and then click **Properties**.
2. In the **Properties** dialog box, on the **Advanced** tab, click **New Driver**.
3. In the Add Printer Driver Wizard, on the **Welcome** page, click **Next**.
4. Do one of the following:
 - Select the appropriate printer manufacturer and printer model if the new or updated driver is in the list.
 - Click **Have Disk** if the printer driver is not included in the list or if you have received a new or updated driver on CD or diskette from the printer manufacturer. Type the path where the driver is located, and then click **OK**.
5. Click **Next**, and then follow the instructions on the screen to finish installing the printer driver.

Note To install new or updated printer drivers, you must be logged on to your computer as a member of the Administrators group. When using Windows 2000 Professional, you may be able to install new or updated printer drivers when you are logged on as a member of the Power Users group, depending on the components required by the printer driver.

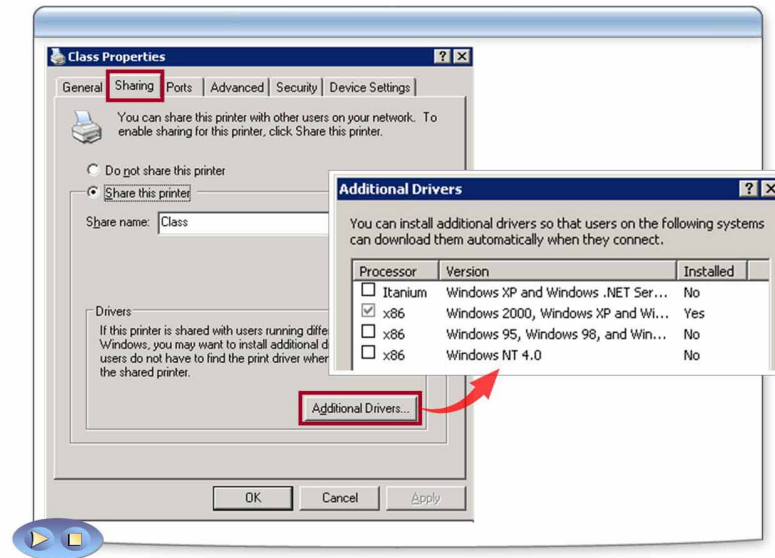
If the printer driver you want to use already exists on the print server, you can install it by selecting it in the **Driver** list.

**Procedure for removing
printer drivers**

To remove printer drivers:

1. In the Printers and Faxes folder, on the **File** menu, click **Server Properties**.
2. In the **Print Server Properties** dialog box, on the **Drivers** tab, under **Installed printer drivers**, select the driver you want to remove, click **Remove**.
3. In the message box, click **Yes**.

How to Add Printer Drivers for Other Client Operating Systems



Introduction

If you share a printer with users running Windows 95, Windows 98, or Windows NT 4.0, you can install additional printer drivers on your computer so that those users can connect to your printer without being prompted to install the drivers missing from their systems. The drivers are located on the Windows Server 2003 Support CD. Printer drivers for Microsoft Windows NT version 3.1 and Microsoft Windows NT version 3.5 are not included but might be available from the print device manufacturer.

Procedure

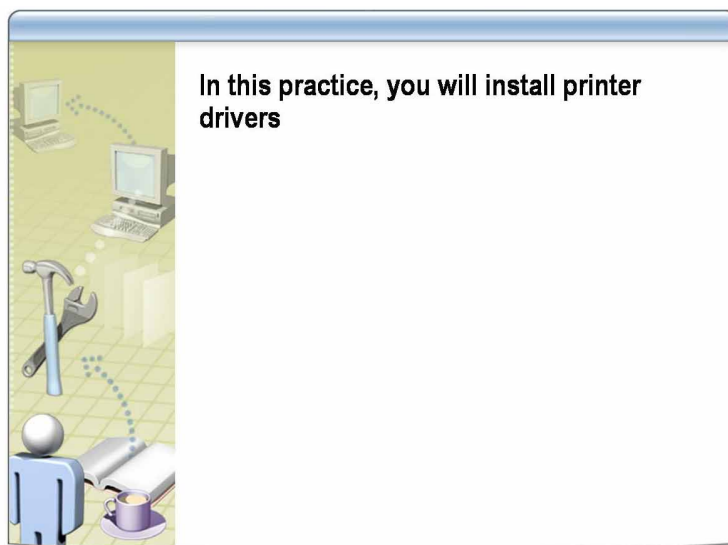
To add printer drivers for other versions of Windows:

1. In the Printers and Faxes folder, right-click the printer for which you want to install additional drivers, and then click **Properties**.
2. In the **Properties** dialog box, on the **Sharing** tab, click **Additional Drivers**.
3. In the **Additional Drivers** dialog box, select the check boxes for the additional environments and operating systems, and then click **OK**.

Additional reading

For more information about downloading print drivers to clients, see "Managing printer drivers" at http://www.microsoft.com/technet/treeview/default.asp?url=/technet/prodtechnol/windowsserver2003/proddocs/entserver/sag_printconcepts_20.asp?frame=true.

Practice: Managing Printer Drivers



Objective In this practice, you will install printer drivers.

Instructions Before you begin this practice:

- Log on to the domain by using the *ComputerNameAdmin* account.
- Ensure that you have a printer called *ComputerName Sales Printer*.
- Review the procedures in this lesson that describe how to perform this task.

Note This practice focuses on the concepts in this lesson and as a result may not comply with Microsoft security recommendations. For example, this practice does not comply with the recommendation that users log on with domain user account and use the **Run as** command when performing administrative tasks. When using the Printers and Faxes interface, you cannot use the **Run as** command.

Scenario You have discovered that the Sales department for your city organizational unit uses clients running Windows 98 and Windows NT 4.0. The Sales manager informs you that the Sales staff keeps asking for printer drivers when they connect to printers on your print server. You must add Windows 98 and Windows NT 4.0 drivers to the *ComputerName Sales Printer* so that clients can automatically install the appropriate drivers.

Practice

► **Install printer drivers for other client operating systems**

- Install printer drivers for *ComputerName Sales Printer* for the following operating systems:
 - Windows 98
 - Windows NT 4.0

Lesson: Implementing Printer Locations

- What Are Printer Locations?
- Requirements for Implementing Printer Locations
- Naming Conventions for Printer Locations
- How Printer Locations Are Configured
- How to Set the Location of Printers
- How to Locate Printers

Introduction

This lesson introduces you to skills and knowledge that you need to implement printer locations.

Lesson objectives

After completing this lesson, you will be able to:

- Explain the purpose of printer locations.
- Explain the requirements for implementing printer locations.
- Explain the naming conventions for printer locations.
- Explain the tasks involved in configuring printer locations.
- Set the location of the printers.
- Locate printers.

What Are Printer Locations?

- Printer locations enable users to search and connect to print devices that they are in close physical proximity to
- In Active Directory, an IP subnet is represented by a subnet object, which contains a Location attribute that is used during a search for printers
- Active Directory uses the value of the Location attribute as the text string to display printer location

Definition

Printer locations enable users to search and connect to print devices that they are in close physical proximity to.

Why implement printer locations?

Implementing printer locations:

- Enables you to install printers easily in a prepopulated query.
- Enables users to use a hierarchy to find printers in other locations by clicking **Browse**.

Active Directory and printer locations

When you implement printer locations, a search for published printers in Active Directory returns a list of printers that are located in the same physical location (for example, in the same building or on the same floor) as the client computer the user is using to perform the search.

This printer location tracking capability is based on the assumption that print devices that are physically located near a user reside on the same Internet IP subnet as the user's client computer. Subnets are subdivisions of an IP network. Each subnet possesses its own unique network address.

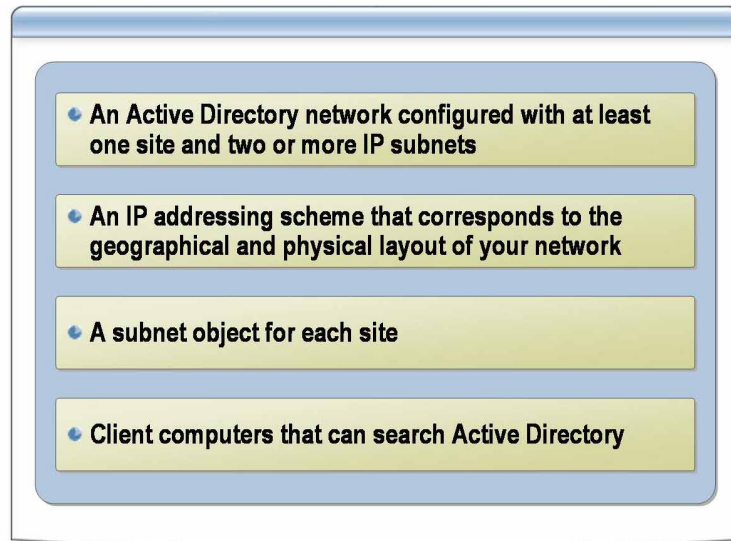
In Active Directory, an IP subnet is represented by a subnet object, which contains a Location attribute that is used during a search for printers.

Active Directory uses the value of the Location attribute as the text string to display printer location. Therefore, when a user searches for a printer and a printer location is implemented, Active Directory:

- Finds the subnet object that corresponds to the subnet on which the user's computer is located.
- Uses the value in the Location attribute of the subnet object as the text string for a search for all published printers that have the same Location attribute value.
- Returns to the user a list of printers whose Location attribute value matches the one that is defined for the subnet object. The user can then connect to the nearest printer.

Additionally, users can also search for printers in any location. This is useful if they need to find and connect to a printer in a physical location different from the one in which they normally work.

Requirements for Implementing Printer Locations



Requirements

Before you can implement printer locations, your Windows Server 2003 network must have the following:

- An Active Directory network configured with at least one site and two or more IP subnets

Networks with one subnet do not need printer location tracking. Because IP subnets are used to identify the physical location of a printer, a network with only one subnet will generally have all printers in close proximity to users.

- An IP addressing scheme that corresponds to the geographical and physical layout of your network

Computers and printers that reside on the same IP subnet must also reside in approximately the same physical location. If this is not the case with your network, you cannot implement printer locations.

- A subnet object for each site

The subnet object, which represents an IP subnet in Active Directory, contains a Location attribute that is used during a search for printers. The value of this Location attribute is used during a search in Active Directory to locate printers that reside near the physical location of the user's client computer.

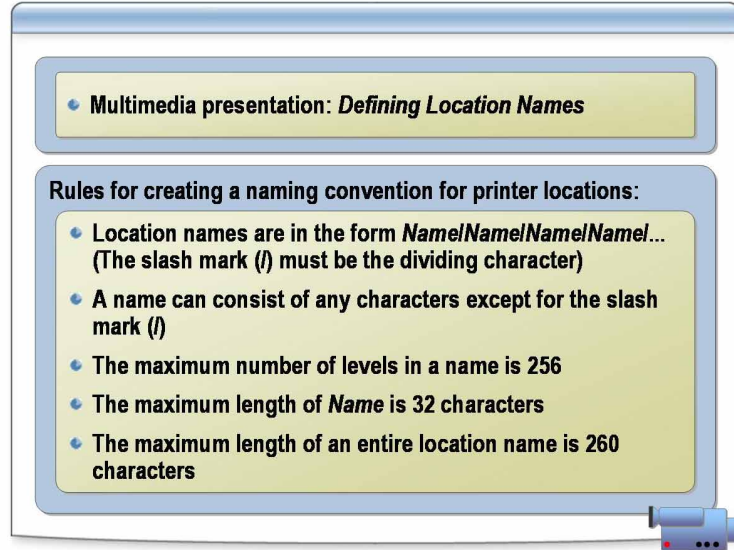
- Client computers that can search Active Directory

Users with client computers running Windows 2000 Professional, or previous versions of Windows on which Active Directory client software is installed, can use printer locations when searching for printers.

When printer location is disabled

You can add information to the **Location** box on the **General** tab of the printer's **Properties** dialog box even if printer location is disabled. However, this may make printers difficult for users to locate. When users search for printers on the tenth floor and printer location is disabled, they need to know exactly what to type in the **Find Printers** dialog box. When printer location is enabled, the **Location** box in the **Find Printers** dialog box is filled in automatically.

Naming Conventions for Printer Locations



Introduction

The key to implementing printer locations is developing a naming convention for printer locations that corresponds to the physical layout of your network. Printer location names must correspond to an IP subnet. You use a naming convention to determine the values of the Location attributes for both the subnet object and the printer object.

Multimedia: Defining Location Names

The *Defining Location Names* presentation explains the relationship between the Location attributes of subnets and printers. To start the presentation, open the Web page on the Student Materials compact disc, click **Multimedia**, and then click **Defining Location Names**. Do not open the presentation unless the instructor tells you to.

Rules for creating a naming convention for printer locations

To enable printer locations, create a naming convention for printer locations by using the following rules:

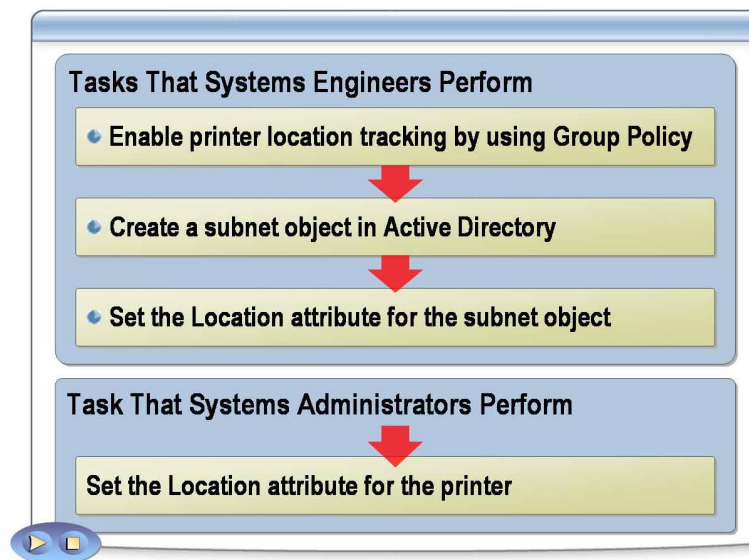
- Location names are in the form *Name/Name/Name/Name/...* (The slash mark (/) must be the dividing character).
- A name can consist of any characters except for the slash mark (/).
- The maximum number of levels in a name is 256.
- The maximum length of *Name* is 32 characters.
- The maximum length of an entire location name is 260 characters.

Because location names are used by end users, they should be simple and easy to recognize. Avoid using special names that only facilities management knows. To make the name easier to read, avoid using special characters in a name, and keep names to a maximum of 32 characters so that the whole name string is visible in the user interface.

Example

Note that the tree varies in depth depending on the complexity of the organization and the amount of detail available in the IP network. The naming convention for this example includes more levels than for a smaller organization located in a single city or a single building. The full name for Floor1 of Building1 in London is London/Building1/Floor1, and the full name for RemoteOffice1 in Vancouver is Vancouver/RemoteOffice1.

How Printer Locations Are Configured



Introduction

To initially set up printer locations, you must have read/write access to Active Directory Sites and Subnet Objects so that you can create subnet objects, give the subnet object a location, and associate the subnet object with a site. When assigning locations to a printer, you must match the location for the printer with the location for the subnet object.

Tasks that systems engineers perform

After a systems engineer ensures that the network meets the requirements for implementing printer locations and a naming convention is created, the systems engineer performs the following tasks to configure printer locations:

1. Enable printer location tracking by using Group Policy. Printer location tracking prepopulates the Location search field when a user searches for a printer in Active Directory. The value used to prepopulate the search field is the same value that is specified in the Location attribute of the subnet object that corresponds to the IP subnet in which the user's computer is located.
2. Create a subnet object in Active Directory. If a subnet object does not already exist, use Active Directory Sites and Services to create a subnet object.
3. Set the Location attribute of the subnet object. Use the naming convention that you developed for printer location names as the value of this attribute.

Note To set the Location attribute for the subnet object, in Active Directory Sites and Services, right-click the subnet object, and then click **Properties**. On the **Location** tab, type the location name that corresponds to the subnet object, and then click **OK**.

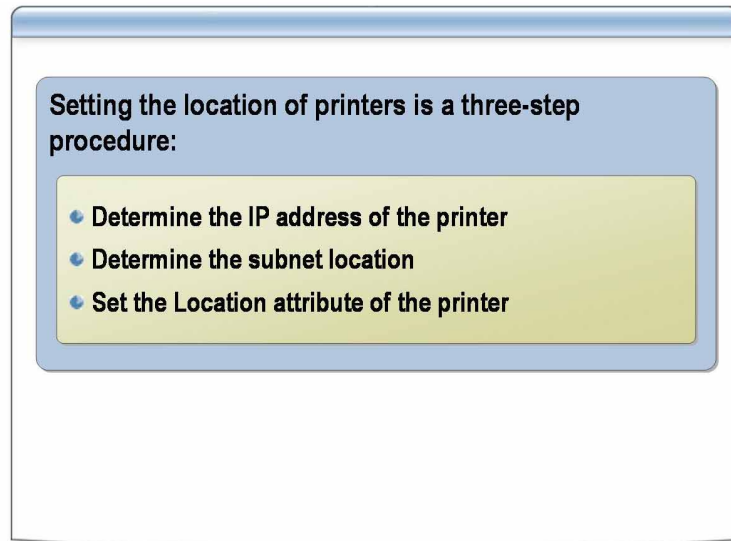
Tasks that systems administrators perform

The following task is the only task that a systems administrator performs to configure printer locations:

- Set the Location attribute of printers. For each printer, add the Location attribute of the IP subnet in which the printer resides to the printer's properties. Use the same printer location name that you used for the location of the subnet object.

When installing a new printer, you can specify the Location attribute by using the Add Printer Wizard.

How to Set the Location of Printers



Introduction

Before setting the Location attribute of a printer, you must determine the following two things:

- The IP address of the printer to determine the Location attribute of the subnet object

After you determine the proper location name, you can then add the name to the Location attribute of the printer. If you are configuring a new printer, the systems engineer gives you a printout from the print device that tells you the IP address and the appropriate driver to use. If you are adding the location name to an existing printer, you can determine the IP address of the print device by looking at the TCP/IP port that the printer is printing to.

- Subnet location

Procedure for determining the IP address of an existing printer

To determine the IP address of an existing printer:

1. In the Printers and Faxes folder, right-click the printer whose Location attribute you want to set, and then click **Properties**.
2. In the **Properties** dialog box, on the **Ports** tab, click the TCP/IP port used for the printer, and then click **Configure Port**.
3. In the **Configure Standard TCP/IP Port Monitor** dialog box, write down the IP address found in the Printer Name or IP Address, and then click **OK**.
4. In the **Properties** dialog box, click **Close**.

Procedure for determining the subnet location

To determine the subnet location:

1. In Active Directory Sites and Services, in the console tree, expand **Sites**, and then expand **Subnets**.
2. Right-click the network that matches the IP address of the print device, and then click **Properties**.
3. Look on the **Location** tab, and then write down the Location attribute of the subnet object.
4. Click **OK**.

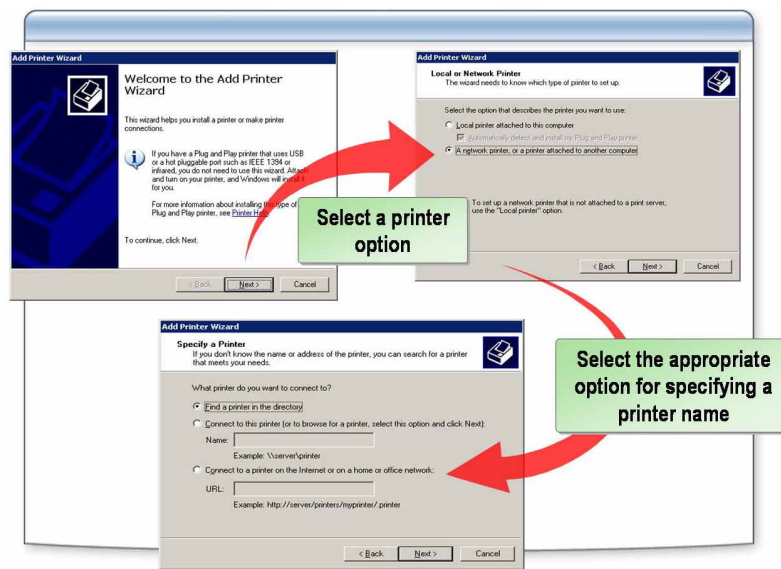
Procedure for setting the Location attribute of the printer

To set the Location attribute of the printer:

1. In the Printers and Faxes folder, right-click the printer whose Location attribute you want to set, and then click **Properties**.
2. In the **Properties** dialog box, on the **General** tab, in the **Location** box, type the printer location, or click **Browse** to find it.

It is recommended that you are more precise when you describe the printer location than the subnet location. For example, for the subnet location US/NYC, you might enter the printer location as US/NYC/Floor42/Room4207.

How to Locate Printers



Introduction

Location tracking is used whenever a user queries Active Directory. To start the query, a user clicks **Start**, clicks **Search**, and then clicks **Find Printers**. Users can also click **Find a printer in the directory** in the Add Printer Wizard to launch the **Find Printers** dialog box.

If location tracking is enabled, the system first determines where the client computer is physically located in the organization. While this is in progress, the **Location** box of the **Find Printers** dialog box displays **Checking**. After the location is determined, it is entered into **Location** box. If the location cannot be determined, the **Location** box is left blank.

When the user clicks **Find Now**, Active Directory lists all printers matching the user's query that are located in the location of the user. Users can change the value in the **Location** box by clicking **Browse**.

For example, suppose an organization is located in a building with several floors, and each floor is configured as a subnet. If a user located on the first floor fails to locate a color printer on Floor 1, then the user can change the location to **Organization 1/Floor 2** or even to **Organization 1** to increase the scope of the search.

Note The **Location** box is not automatically available for users running Windows 95, Windows 98, or Windows NT 4.0 without a directory service client.

Procedure

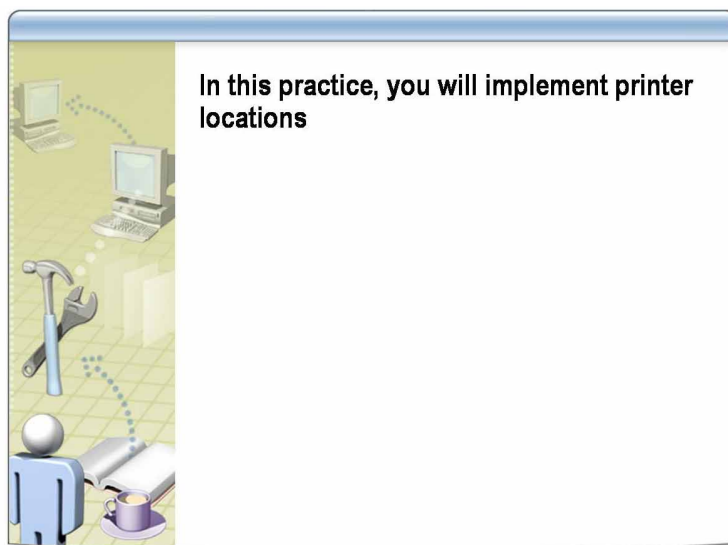
To locate a printer:

1. In the Printers and Faxes folder, double-click **Add Printer**.
2. In the Add Printer Wizard, on the **Welcome** page, click **Next**.
3. On the **Local or Network Printer** page, click **A network printer, or a printer attached to another computer**, and then click **Next**.
4. On the **Specify a Printer** page, connect to the desired printer by using one of the following three methods:
 - Search for it in Active Directory by doing the following:

Note If the user is not logged on to a domain running Active Directory, this method is not available.

- i. Click **Find a printer in the directory**, and then click **Next**.
If needed, change the default printer location listed in the **Location** box by clicking **Browse** and then choosing the appropriate location.
 - ii. In the **Find Printers** dialog box, click **Find Now**.
 - iii. In the list that appears, click the printer you want to connect to, and then click **OK**.
 - Type the printer name or browse for it by doing the following:
 - i. Click **Connect to this printer**.
 - ii. In the **Name** box, type the printer name by using the `\\PrintServerName\SharedPrinterName` format, and then click **Next**.
- or -
Browse for it on the network by clicking **Next**. On the **Browse for Printer** page, in the **Shared printers** box, locate the printer, and then click **Next**.
 - Connecting to a printer on the Internet or intranet by doing the following:
 - i. Click **Connect to a printer on the Internet or on a home or office network**.
 - ii. In the **URL** box, type the URL to the printer by using the `http://PrintServerName/Printers` format, and then click **Next**.
5. Follow the instructions on the screen to finish connecting to the printer.
The icon for the printer appears in your Printers and Faxes folder.

Practice: Implementing Printer Locations



Objective

In this practice, you will implement printer locations.

Instructions

Before you begin this practice:

- Log on to the domain by using the *ComputerNameAdmin* account.
- Ensure that you have a printer called *ComputerName Sales Printer*.
- Ensure that you have a printer called *ComputerName IT Datacenter Printer*.
- Review the procedures in this lesson that describe how to perform this task.

Note This practice focuses on the concepts in this lesson and as a result may not comply with Microsoft security recommendations. For example, this practice does not comply with the recommendation that users log on with domain user account and use the **Run as** command when performing administrative tasks. When using the Printers and Faxes interface, you cannot use the **Run as** command.

Scenario

You have learned that the Northwind Traders systems administrators have finished testing printer location tracking. They want you to set the value of the Location attributes for the printers in your city.

Practice**► Determine the Location attribute of your printers**

1. In the Printer Subnet table below, write down the printer share name and the subnet number for each printer in your city. (Example: Bonn Sales Printer, 192.168.61.0/24)

Printer Share Name	Subnet

2. Open Active Directory Sites and Services.
3. In the console tree, expand **Sites**, and then click **Subnets**.
4. Take the subnet number from step 1. Write down the Location attribute for each subnet in your city by using the Location attribute of the subnet object for each printer in your city.

Printer Share Name	Subnet	Location

5. Close Active Directory Sites and Services.

► Set the location of the printers on your student computer

- Set the Location attribute of the Sales and IT Datacenter Printer on your student computer found in step 4.

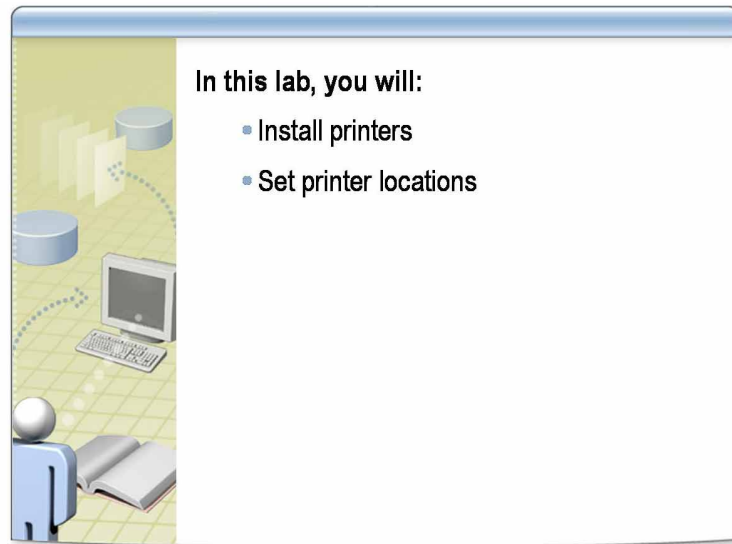
Printer Subnet Table

City	Printer Share Name	Subnet
Acapulco	Acapulco Sales Printer	192.168.131.0/24
Acapulco	Acapulco IT Datacenter Printer	192.168.129.0/24
Auckland	Auckland Sales Printer	192.168.151.0/24
Auckland	Auckland IT Datacenter Printer	192.168.149.0/24
Bangalore	Bangalore Sales Printer	192.168.91.0/24
Bangalore	Bangalore IT Datacenter Printer	192.168.89.0/24
Bonn	Bonn Sales Printer	192.168.61.0/24
Bonn	Bonn IT Datacenter Printer	192.168.59.0/24
Brisbane	Brisbane Sales Printer	192.168.41.0/24
Brisbane	Brisbane IT Datacenter Printer	192.168.39.0/24
Caracas	Caracas Sales Printer	192.168.191.0/24
Caracas	Caracas IT Datacenter Printer	192.168.189.0/24
Casablanca	Casablanca Sales Printer	192.168.111.0/24
Casablanca	Casablanca IT Datacenter Printer	192.168.109.0/24
Denver	Denver Sales Printer	192.168.21.0/24
Denver	Denver IT Datacenter Printer	192.168.19.0/24
Khartoum	Khartoum Sales Printer	192.168.231.0/24

(continued)

City	Printer Share Name	Subnet
Khartoum	Khartoum IT Datacenter Printer	192.168.229.0/24
Lima	Lima Sales Printer	192.168.71.0/24
Lima	Lima IT Datacenter Printer	192.168.69.0/24
Lisbon	Lisbon Sales Printer	192.168.51.0/24
Lisbon	Lisbon IT Datacenter Printer	192.168.49.0/24
Manila	Manila Sales Printer	192.168.59.0/24
Manila	Manila IT Datacenter Printer	192.168.211.0/24
Miami	Miami Sales Printer	192.168.141.0/24
Miami	Miami IT Datacenter Printer	192.168.139.0/24
Montevideo	Montevideo Sales Printer	192.168.201.0/24
Montevideo	Montevideo IT Datacenter Printer	192.168.199.0/24
Moscow	Moscow Sales Printer	192.168.181.0/24
Moscow	Moscow IT Datacenter Printer	192.168.179.0/24
Nairobi	Nairobi Sales Printer	192.168.241.0/24
Nairobi	Nairobi IT Datacenter Printer	192.168.239.0/24
Perth	Perth Sales Printer	192.168.31.0/24
Perth	Perth IT Datacenter Printer	192.168.29.0/24
Santiago	Santiago Sales Printer	192.168.81.0/24
Santiago	Santiago IT Datacenter Printer	192.168.79.0/24
Singapore	Singapore Sales Printer	192.168.101.0/24
Singapore	Singapore IT Datacenter Printer	192.168.99.0/24
Stockholm	Stockholm Sales Printer	192.168.171.0/24
Stockholm	Stockholm IT Datacenter Printer	192.168.169.0/24
Suva	Suva Sales Printer	192.168.161.0/24
Suva	Suva IT Datacenter Printer	192.168.159.0/24
Tokyo	Tokyo Sales Printer	192.168.221.0/24
Tokyo	Tokyo IT Datacenter Printer	192.168.219.0/24
Tunis	Tunis Sales Printer	192.168.121.0/24
Tunis	Tunis IT Datacenter Printer	192.168.119.0/24
Vancouver	Vancouver Sales Printer	192.168.11.0/24
Vancouver	Vancouver IT Datacenter Printer	192.168.9.0/24

Lab A: Implementing Printing



Objectives

After completing this lab, you will be able to:

- Install printers.
- Set printer locations.

Instructions

Before you begin this lab, log on to the domain by using the *ComputerNameAdmin* account.

Note This practice focuses on the concepts in this lesson and as a result may not comply with Microsoft security recommendations. For example, this practice does not comply with the recommendation that users log on with domain user account and use the **Run as** command when performing administrative tasks. When using the Printers and Faxes interface, you cannot use the **Run as** command.

**Estimated time to
complete this lab:**
10 minutes

Exercise 1

Installing Printers

In this exercise, you will install printers.

Scenario

The home office in London needs the help of all systems administrators. Northwind Traders just upgraded all print devices in the offices in London and needs your help to configure them on a print server called Glasgow. To help you create these new printers, the systems engineers have provided a table that lists the printers each systems administrator must create and specific information about the printers.

All print devices are HP LaserJet 5si, and all printers are located on the remote computer named Glasgow. Printer permissions should be configured so that:

- DL NWTraders Legal Personnel Print has Print permission for the Legal printer.
- The group Authenticated Users has Print permissions for the Exec printer.
- DL NWTraders IT Print has Manage Printer permission for both printers.

Tasks	Specific Instructions
1. Connect to the print server named Glasgow.	<ul style="list-style-type: none">a. In the Run box, type \\glasgow and then click OK.b. From \\glasgow, double-click Printers and Faxes.
2. Create two printers on Glasgow.	<ul style="list-style-type: none">■ In the table at the end of the lab, find your student account, and then create two network printers on Glasgow with the print device port, location, and share name values in the table.
3. Configure printer permissions for the Legal printer.	<ul style="list-style-type: none">a. Grant Print permission to the group DL NWTraders Legal Personnel Print.b. Grant Manage Printers permission to the group DL NWTraders IT Personnel Print.c. Remove the Everyone group.
4. Configure printer permissions for the Exec printer.	<ul style="list-style-type: none">a. Grant Print permission to the group Authenticated Users.b. Grant Manage Printers permission to the group DL NWTraders IT Personnel Print.c. Remove the Everyone group.

Exercise 2

Searching for Network Printers with Locations

In this exercise, you will set printer locations.

Scenario

Your team has just installed many printers for the corporate office. You must confirm that the printers have been successfully configured for printer location tracking.

Tasks	Specific Instructions
1. Open Active Directory Users and Computers.	<ul style="list-style-type: none"> ▪ Open Active Directory Users and Computers.
2. Search for printers in the London location. (The results of your search may vary depending on the number of students in the classroom.)	<ul style="list-style-type: none"> a. From the root of nwtraders.msft, search for printers in the London/Build 2 location. b. How many printers are in the London/Build 2/FL 1/ location? <div style="border-bottom: 1px solid black; width: 100px; margin: 5px 0;"></div> Your answer may vary depending on the number of students in the classroom. c. From the root of nwtraders.msft, search for printers in the London location. d. How many printers are in the London location? <div style="border-bottom: 1px solid black; width: 100px; margin: 5px 0;"></div> Your answer may vary depending on the number of students in the classroom. e. From the root of nwtraders.msft, search for printers in the Entire Directory (Click Browse, and then click Entire Directory). f. How many printers are in the entire directory? <div style="border-bottom: 1px solid black; width: 100px; margin: 5px 0;"></div> Your answer may vary depending on the number of students in the classroom.
3. Close all windows and log off.	

Student Account Table

Student account	Print device port	Location	Printer name & Share name
AcapulcoAdmin	192.168.5.13	London/Build 3	Exec Printer 13
AcapulcoAdmin	192.168.3.13	London/Build 2/F1 1	Legal Printer 13
AucklandAdmin	192.168.5.15	London/Build 3	Exec Printer 15
AucklandAdmin	192.168.3.15	London/Build 2/F1 1	Legal Printer 15
BangaloreAdmin	192.168.5.9	London/Build 3	Exec Printer 09
BangaloreAdmin	192.168.3.9	London/Build 2/F1 1	Legal Printer 09
BonnAdmin	192.168.5.6	London/Build 3	Exec Printer 06
BonnAdmin	192.168.3.6	London/Build 2/F1 1	Legal Printer 06
BrisbaneAdmin	192.168.5.4	London/Build 3	Exec Printer 04
BrisbaneAdmin	192.168.3.4	London/Build 2/F1 1	Legal Printer 04
CaracasAdmin	192.168.5.19	London/Build 3	Exec Printer 19
CaracasAdmin	192.168.3.19	London/Build 2/F1 1	Legal Printer 19
CasablancaAdmin	192.168.5.11	London/Build 3	Exec Printer 11
CasablancaAdmin	192.168.3.11	London/Build 2/F1 1	Legal Printer 11
DenverAdmin	192.168.5.25	London/Build 3	Exec Printer 25
DenverAdmin	192.168.3.25	London/Build 2/F1 1	Legal Printer 25
KhartoumAdmin	192.168.5.23	London/Build 3	Exec Printer 23
KhartoumAdmin	192.168.3.23	London/Build 2/F1 1	Legal Printer 23
LimaAdmin	192.168.5.7	London/Build 3	Exec Printer 07
LimaAdmin	192.168.3.7	London/Build 2/F1 1	Legal Printer 07
LisbonAdmin	192.168.5.5	London/Build 3	Exec Printer 05
LisbonAdmin	192.168.3.5	London/Build 2/F1 1	Legal Printer 05
ManilaAdmin	192.168.5.21	London/Build 3	Exec Printer 21
ManilaAdmin	192.168.3.21	London/Build 2/F1 1	Legal Printer 21
MiamiAdmin	192.168.5.14	London/Build 3	Exec Printer 14
MiamiAdmin	192.168.3.14	London/Build 2/F1 1	Legal Printer 14
MontevideoAdmin	192.168.5.20	London/Build 3	Exec Printer 20
MontevideoAdmin	192.168.3.20	London/Build 2/F1 1	Legal Printer 20
MoscowAdmin	192.168.5.18	London/Build 3	Exec Printer 18
MoscowAdmin	192.168.3.18	London/Build 2/F1 1	Legal Printer 18
NairobiAdmin	192.168.5.24	London/Build 3	Exec Printer 24
NairobiAdmin	192.168.3.24	London/Build 2/F1 1	Legal Printer 24
PerthAdmin	192.168.5.03	London/Build 3	Exec Printer 03
PerthAdmin	192.168.3.3	London/Build 2/F1 1	Legal Printer 03
SantiagoAdmin	192.168.5.8	London/Build 3	Exec Printer 08
SantiagoAdmin	192.168.3.8	London/Build 2/F1 1	Legal Printer 08

(continued)

Student account	Print device port	Location	Printer name & Share name
SingaporeAdmin	192.168.5.10	London/Build 3	Exec Printer 10
SingaporeAdmin	192.168.3.10	London/Build 2/F1 1	Legal Printer 10
StockholmAdmin	192.168.5.17	London/Build 3	Exec Printer 17
StockholmAdmin	192.168.3.17	London/Build 2/F1 1	Legal Printer 17
SuvaAdmin	192.168.5.16	London/Build 3	Exec Printer 16
SuvaAdmin	192.168.3.16	London/Build 2/F1 1	Legal Printer 16
TokyoAdmin	192.168.5.22	London/Build 3	Exec Printer 22
TokyoAdmin	192.168.3.22	London/Build 2/F1 1	Legal Printer 22
TunisAdmin	192.168.5.12	London/Build 3	Exec Printer 12
TunisAdmin	192.168.3.12	London/Build 2/F1 1	Legal Printer 12
VancouverAdmin	192.168.5.2	London/Build 3	Exec Printer 02
VancouverAdmin	192.168.3.2	London/Build 2/F1 1	Legal Printer 02

