EXAM OBJECTIVES

Exam 70-215

- Install, configure, monitor, and troubleshoot Terminal Services.
  - Remotely administer servers by using Terminal Services.
  - Configure Terminal Services for application sharing.
  - Configure applications for use with Terminal Services.

CHAPTER

20 Managing Terminal Services

In this chapter, you'll learn about Terminal Services in Windows 2000. Terminal Services allows network clients to connect to a Terminal server and begin a session with that server, where they can use applications that might not normally function on their desktops. You can also use Terminal Services to remotely administer a Terminal server on your network from your own desktop computer. I'll explore the various features of Terminal Services in this chapter, including Terminal Services modes, installing and configuring Terminal Services, installing and configuring applications for use with Terminal Services, configuring clients, establishing and managing sessions, licensing, and troubleshooting.

Chapter Pre-Test

1. Which Terminal Services mode allows you to remotely manage the Terminal server?
2. What tool do you use to install Terminal Services?
3. How does Terminal Services run 16-bit applications?
4. After installing Terminal Services in application server mode, what must you do to previously installed applications so they can function with Terminal Services?
5. What are application compatibility scripts?
6. What two methods can be used to install Terminal Services Client software?
7. What tool can you use to end a client's Terminal Services session?
8. What command-line utility can be used to remotely control a Terminal Services session?
9. What licensing requirements are necessary for remote administration mode?
10. How much time do you have before licensing is required in application server mode?

What Is Terminal Services?

Terminal Services is a Windows 2000 Server component that provides terminal emulation to network clients. This means that network clients can access a Terminal server, begin a session with it, and run applications from the Terminal server as though the applications were installed locally on the user's computer. The term *Terminal server* is commonly used to refer to the Windows 2000 Server computer on which Terminal Services is installed.

TIP

A Terminal server is also called a *Terminal Services server*. In Microsoft documentation, these two terms are used interchangeably.

When a user logs onto a Terminal server, the user sees the Terminal server's desktop interface, but keyboard strokes and mouse clicks made on the user's end are returned to the Terminal server for processing. In essence, the user's computer becomes a "dumb terminal." All processing is performed on the server's end, and the Terminal server can host many Terminal Services sessions at one time.

So, why would you want to use Terminal Services on your network? First, if you use Terminal Services for application sharing, you can allow users to access applications that might not run on their current system. This feature allows you to have a powerful server computer that can host various applications without having to provide user desktop systems with the power to support those applications.

For example, let's say you want to provide Microsoft Office to a number of clients that have older computers, older operating systems, and a definite lack of RAM and processing power. With Terminal Services, those users can connect to the Terminal server and use those applications just as though they were installed locally. To the users, it appears as though their systems are running the applications, when in reality, the applications are being run on the server's end. This feature allows you to implement new applications without having to upgrade current PC hardware and software at the same time. In conjunction with Group Policy, Terminal Services can provide an end-user a highly effective desktop configuration and application bank without having to perform any of the configuration or processing locally.

Aside from providing end-user applications, you can also use Terminal Services to remotely administer the Terminal servers on your network. This feature allows you, as the administrator, to remain at your desk while

connecting to various Windows 2000 Server computers (assuming they run Terminal Services) throughout your network. You can configure and administer those servers without ever having to leave your desk.

Terminal Services operates in one of two modes: application server mode or remote administration mode. In *application server mode*, your Terminal server can provide applications to systems that cannot run Windows or do not have the power to run a particular application. In addition, in application server mode you can remotely administer the Terminal server. In *remote administration mode* you can remotely manage and configure the Terminal server, but you can't run applications.

EXAM TIP

You can't run Terminal Services in application server mode and remote administration mode at the same time. The selections are mutually exclusive. Keep this in mind when you take the Server exam.

Installing and Configuring Terminal Services

Terminal Services is not installed by default during the installation of Windows 2000 Server. You can either install Terminal Services during a custom installation of Windows 2000 Server, or you can install Terminal Services after Windows 2000 Server is installed by using the Add/Remove Programs application in Control Panel.

When you install Terminal Services, you need to configure the mode the Terminal server will function in, either remote administration mode or application server mode:

- **Choose remote administration mode** if you're only concerned with remote administration of this Terminal server.
- **Choose application server mode** to configure this Terminal server for application sharing. An added benefit of using application server mode is that you get the capability of remote administration of the Terminal server, as well. Because of the large amount of resources used by Terminal Services, Microsoft recommends that you install Terminal Services on a member server or stand-alone server, rather than a domain controller, when using Terminal Services for application sharing.

Installing and configuring Terminal Services is fairly straightforward, as the following steps explain.

STEP BY STEP

INSTALLING AND CONFIGURING TERMINAL SERVICES

1. Select Start ➪ Settings ➪ Control Panel.
2. In the Control Panel dialog box, double-click Add/Remove Programs.
3. In the Add/Remove Programs dialog box, click Add/Remove Windows Components.
4. In the Windows Components Wizard dialog box, scroll down until Terminal Services is displayed. Select the check box next to Terminal Services. Click Next.
5. The Terminal Services Setup screen appears as shown in Figure 20-1. Notice the two modes you can select between.

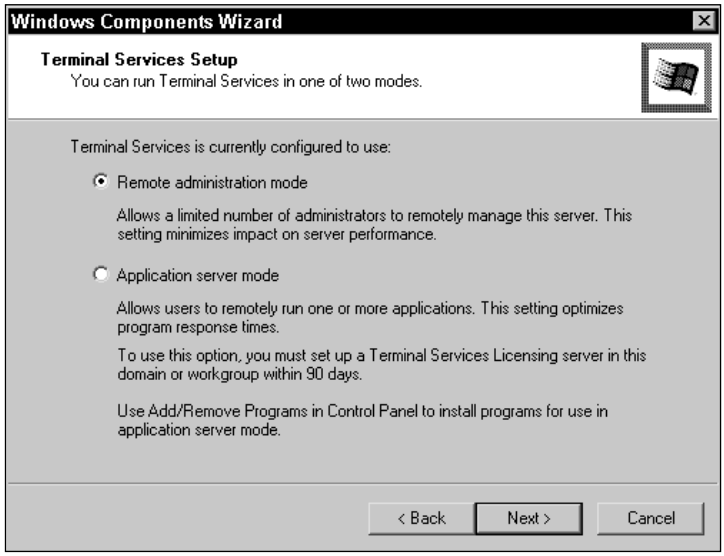

FIGURE 20-1 Selecting the Terminal Services mode

Select the “Remote administration mode” option if you only want to use Terminal Services to remotely administer this server.

Select the “Application server mode” option if you want to configure this server for application sharing. If this mode is selected, you will get the capability of remote administration of the Terminal server, as well.

Click Next.

6. On the next Terminal Services Setup screen select the appropriate permissions setting from the two options provided.

STEP BY STEP *Continued*

- **Permissions compatible with Windows 2000 Users:** This is the most secure selection for Terminal Services. However, many legacy applications won't run when this option is selected.
- **Permissions compatible with Terminal Server 4.0 Users:** This is the least secure selection for Terminal Services. However, most legacy applications will run when this option is selected. This is the default selection.

Click Next.

7. The next Terminal Services Setup screen displays a list of currently installed applications that may not work correctly after Terminal Services is installed. These applications might have to be removed and reinstalled. Click Next.
8. Windows 2000 installs Terminal Services. If you have not previously placed your Windows 2000 compact disc into your CD-ROM drive, insert it and click OK when prompted. If the Microsoft Windows 2000 CD dialog box appears, close it. In the Completing the Windows Components Wizard screen, click Finish.
9. In the System Settings Change dialog box, click Yes to restart your computer and complete the installation of Terminal Services.

Installing Applications for Use with Terminal Services

Once you have installed Terminal Services in application server mode, Terminal Services is configured for application sharing. The next step is to install the desired applications you want Terminal Services clients to be able to use.

In a perfect world, any application you might want to use would work perfectly with Terminal Services. Unfortunately, this is not the case. Some applications simply do not work well in a multisession environment. Some applications use too much memory or CPU cycles, and some simply do not work well with multiple users. So, you may have decisions to make and you may need to perform some testing to ensure that the applications you want to use will work well with Terminal Services.

When you are deciding which applications to use, you should take a look at how each application will run on the Terminal server. Applications that work well with Terminal Services do not use excessive system memory or

CPU cycles. This point alone should make you stop and take a look at both your applications and your Terminal server. The Terminal server needs a large hard drive, a fast CPU (probably 600 MHz or higher), and plenty of RAM (probably 512MB or more). In addition, the applications you use need to identify users by a username, not a computer name.

When you are choosing applications for use with Terminal Services, always try to use 32-bit applications. You may have 16-bit applications you used with previous versions of Windows, such as 3.11, that you want to make available to the clients of the Terminal server. Although Terminal Services can run 16-bit applications by translating them using Win16-on-Win32 (WOW), you can expect a serious performance hit on the server. Many 16-bit applications will increase the memory each user needs by 50 percent and processor by 40 percent. In short, if you use 16-bit applications, you will see performance problems, and not as many people will be able to use the Terminal server at the same time. For similar reasons, MS-DOS applications are not recommended for use with Terminal Services since they tend to consume more system resources than 32-bit applications.

You must install the applications that you want to use *after* you install Terminal Services in application server mode. If the applications you want to make available to clients are already installed on the Terminal server, you must uninstall them and reinstall them. In order to install applications for use with Terminal Services, you must use Add/Remove Programs in Control Panel to install the application. The reason for this is simple: most applications are installed for use by a single user — if multiple users are to use an application, it must be installed in a multiuser format.

Terminal Services provides two application installation modes: execute mode and install mode. In execute mode, the Terminal server runs an application or installs it for a single user. In install mode, the Terminal server installs the application for use in a multi-user environment. By using Add/Remove Programs in Control Panel, the server is automatically put in install mode. If you try to install the application by using the application's installation/setup program, the setup will fail on a Terminal server and you will receive a failure notice.

The following steps explain how to use Add/Remove Programs in Control Panel to install applications for use with Terminal Services.

STEP BY STEP

INSTALLING AN APPLICATION ON A TERMINAL SERVER

1. Select Start ➪ Settings ➪ Control Panel.
2. In Control Panel, double-click Add/Remove Programs.
3. In the Add/Remove Programs dialog box, click Add New Programs.
4. Click the CD or Floppy command button.
5. Insert the application's first installation floppy disk or CD-ROM. In the Install Program From Floppy Disk or CD-ROM dialog box, click Next.
6. The wizard searches for the installation floppy or CD-ROM. In the Run Installation Program dialog box, click Next.
7. Depending on the application, other windows may appear that ask you to enter additional information, such as name, CD code, and so on. Follow the instructions that appear on-screen to complete the installation of the application.

Once you have installed all of the applications you want to use on your Terminal server, your next task is to try to tweak these applications so that they work as well as possible with Terminal Services. Windows 2000 Server includes a collection of application compatibility scripts to optimize many common applications for use with Terminal Services. The scripts are stored in the *SystemRoot*`\Application Compatibility Scripts\Install` folder on a Windows 2000 Server computer that has Terminal Services installed on it, as shown in Figure 20-2.

As Figure 20-2 shows, common scripts include Microsoft Office, Microsoft Word, Microsoft Excel, Netscape Communicator, and so on. The content of each script varies depending on the application. The scripts are designed to perform tasks such as editing the registry as needed, turning off CPU-intensive features, and adding multiuser support. To use the scripts, install your application first, locate its script in the `Install` folder, then double-click the script's icon to run the script. You need to run the script before any users try to access the application on the Terminal server. When the script completes its processing, log off and log back on before accessing the application.

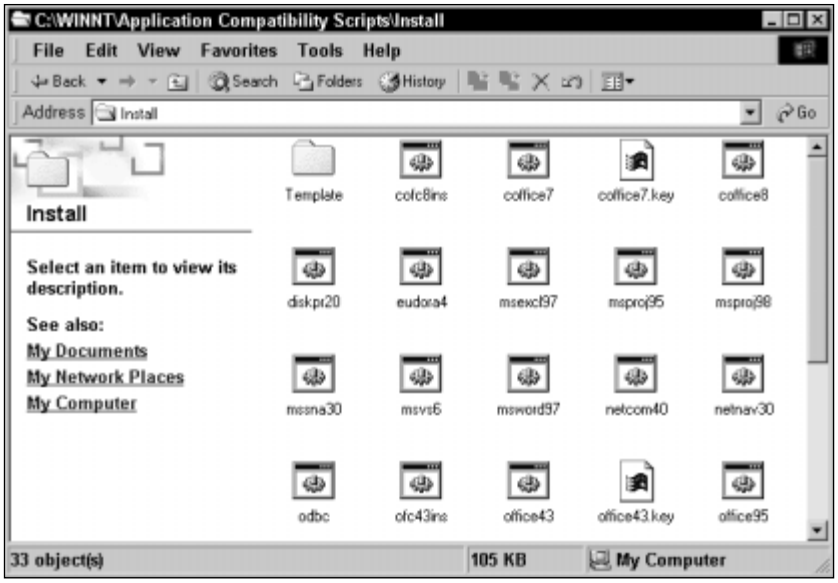

FIGURE 20-2 Application Compatibility Scripts

Aside from running available scripts, there are a few other things you can do to enhance the performance of your applications with Terminal Services. First, a serious performance problem can be intensive video usage. Some applications have very active video usage, and these features can push the Terminal server's CPU to the max. If possible, reconfigure the application to use less intensive video settings.

Next, look for features that always run in the background. For example, Microsoft Word has a spelling checker that constantly runs in the background. As you type, the spelling checker examines your words and underlines any words it believes you have misspelled. Although a helpful feature, this does cause Word to consume more system resources. Once you have identified features, like the spelling checker, that run in the background of the application, turn those features off.

Another option is to identify features in an installed application that are helpful in a limited way, but that users can live without. For example, the Office Assistant in Microsoft Office — you know, the little cartoon paperclip — can be helpful, but users can access the Help files without it. These little features can consume resources and degrade performance. Look for ways to turn them off.

A final issue you should think about is application programs that start other programs. For example, Microsoft Office programs often have a toolbar that allows the users to launch other Microsoft applications from that application. While good on a desktop PC, you should try to remove these toolbars and features so that users can only open one application at a time. This conserves system resources, especially memory.

In some cases, the registry can be used to tweak applications so they use less system resources. This technique is not recommended. If at all possible, you should use the application's graphical user interface to configure the application to work well with Terminal Services.

CAUTION

Editing the registry is a serious operation. Changes made to the registry become effective immediately, and incorrect changes to the registry can cause systemwide problems, or even cause Windows 2000 to fail to boot.

Configuring Terminal Services Clients

One of the primary purposes of Terminal Services is to enable network clients to connect to the Terminal server and run applications. Without clients, Terminal Services doesn't have much purpose in life. The software that is installed on a client computer that enables it to communicate with a Terminal server is called Terminal Services Client.

The Terminal Services Client is called a "thin client" because it delivers a 32-bit Windows 2000 environment to a client computer that might not have this functionality on its own. Additionally, Terminal Services Client allows desktop PCs to run applications for which they may not have the processing or memory power to handle on their own.

When a Terminal Services client connects to the Terminal server, a terminal window appears on the client's computer, but all processing is performed on the server. Due to this design, Terminal Services can support legacy operating systems and hardware. Terminal Services Client software can be run on Windows-based terminal devices, Intel computers running Windows 95, 98, Millennium, NT 3.51 or 4.0, and 2000. Computers running Windows for Workgroups 3.11 are also supported as Terminal Services clients.

Installing Terminal Services Client Software

The network client computers that need to connect to the Terminal server normally do not have the necessary software installed by default. Client computers use special Terminal Services Client software and a protocol called Remote Desktop Protocol (RDP) to connect to the Terminal server. RDP is installed and configured on the client during the installation of Terminal Services Client software, so that the client can communicate with the Terminal server.

When you install Terminal Services, the Terminal Services Client is copied to the server. Terminal Services provides a nifty client creator, called Terminal Services Client Creator, which enables you to create floppy disks so that you can install the Terminal Services Client software on your client computers. The trick, of course, is actually getting that software to your clients.

You can use the floppy disk that is created with the Terminal Services Client Creator, physically visit each computer, and install the software. If you have a lot of client computers and you don't want to spend all day walking around with a floppy disk, you can share the Terminal server's folder that contains the Terminal Services Client software and perform over-the-network installations of that software on the client computers.

The Terminal Services Client software is located in the *`SystemRoot`*`\system32\clients\tsclient\net` folder on the Windows 2000 Server computer on which Terminal Services is installed. Two folders reside within this folder: `Win16` and `Win32`. Windows for Workgroups clients need to have the Win16 software installed, and x86-based Windows 9*x* and Windows NT clients need to have the Win32 software installed. Open the desired folder, then double-click the Setup icon. You can use either the floppy method or the over-the-network method for installation — whichever works best for you.

The following section gives you a step-by-step look at creating the client setup disks.

STEP BY STEP

CREATING CLIENT INSTALLATION/SETUP DISKS

1. Select Start ➪ Programs ➪ Administrative Tools ➪ Terminal Services Client Creator.

STEP BY STEP *Continued*

2. The Create Installation Disk(s) dialog box appears, as shown in Figure 20-3. Notice the two Network client options available in this dialog box. Also notice that Terminal Services Client Creator tells you how many disks you will need for the selected client software option.

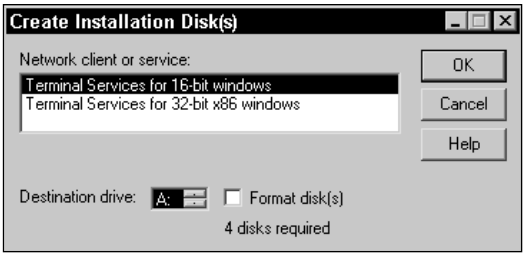

FIGURE 20-3 Creating Terminal Services client installation disks

3. Highlight the appropriate option. Then select the destination floppy drive from the "Destination drive" spin box. Optionally, you can select the Format Disk(s) check box to allow the Client Creator to format your floppy disks before the Terminal Services Client software is copied to them. When you have completed the appropriate selections in this dialog box, click OK.
4. A dialog box appears telling you to insert the first disk into your disk drive. Insert the disk, then click OK. Follow any additional instructions that appear to insert and remove disks as needed.

Once you have created the Terminal Services client installation/setup disks (or shared the folder containing the Terminal Services Client software), you're ready to install the client software on a client computer. The following steps explain how to install Terminal Services Client software on a 32-bit Windows client computer.

STEP BY STEP

INSTALLING TERMINAL SERVICES CLIENT SOFTWARE

1. On the client computer, start Windows Explorer, or Windows NT Explorer, as appropriate.

STEP BY STEP *Continued*

2. In the left pane, highlight the drive that contains the Terminal Services Client setup files—this is either the network drive that is connected to the shared folder that contains the Terminal Services Client software, or the floppy drive that contains the Terminal Services Client installation/setup floppy disk. In the right pane, double-click `Setup.exe`.
3. In the Terminal Services Client Setup welcome dialog box, click Continue.
4. Enter your name and organization in the dialog box provided. Click OK.
5. A confirmation dialog box appears. Click OK.
6. The License Agreement dialog box appears. Read the agreement and click I Agree.
7. In the Terminal Services Client Setup dialog box, click the large installer button.
8. The Terminal Services Client - Choose Program Group dialog box appears. Either accept the default Program Group selection or choose a new one. Click Continue.
9. Terminal Services Client software files are copied. Insert additional disks if prompted. When a dialog box notifies you that Terminal Services Client Setup was completed successfully, click OK. You don't need to reboot your computer.
10. Close Windows Explorer (or Windows NT Explorer).

Establishing a Terminal Services Session

Once the Terminal Service Client software is installed on the client computer, users can connect to the Terminal server and begin using applications. Clients connect to the Terminal server by using Terminal Services Client.

In addition to running applications, once a Terminal Services session is established on a client computer, the user of that computer can remotely administer the Terminal server by using the server's administration tools, including Active Directory Users and Computers, Computer Management, and so on.

The following steps explain how to establish a session with the server.

STEP BY STEP

ESTABLISHING A TERMINAL SERVICES SESSION

1. On the client computer, select Start ➪ Programs ➪ Terminal Services Client ➪ Terminal Services Client. The Terminal Services Client dialog box is displayed as shown in Figure 20-4. Notice that a list of available Terminal servers is displayed in this dialog box.

STEP BY STEP *Continued*

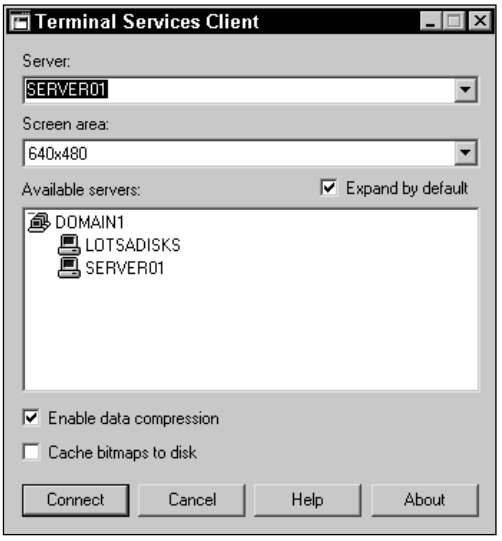

FIGURE 20-4 Starting the Terminal Services Client

2. Select the name of the Terminal server to which you want to connect from the list of available servers. If the server you want to access is not listed, type in the server's name or IP address in the Server text box.

   Select the desired screen area from the "Screen area" drop-down list box. You can select any screen size up to the current resolution setting on the client computer.

   Select the appropriate check boxes:

   - **Enable data compression:** This check box is selected by default, and should be selected to reduce network traffic to and from the Terminal server.
   - **Cache bitmaps to disk:** Select this check box if you want the local computer to cache bitmaps to disk to save network traffic. This option is especially useful when connecting to a Terminal server over a Dial-up Networking connection. This option is not selected by default.

   Click Connect.

3. The Log On to Windows dialog box appears. Enter a user name and password and click OK.
4. You are now connected to the server that is running Terminal Services. The desktop of the Terminal server is displayed in the Terminal Services Client dialog box. You can now run applications and remotely administer the Terminal server as if you were logged on interactively to the Terminal server.

As the previous section shows, connecting to the Terminal server is rather easy. If you want to view the Terminal Services session in a full-screen mode instead of in a window, press Ctrl+Alt+Break. To change from full-screen mode back to window mode, press Ctrl+Alt+Break again.

You can further configure your Terminal Services connections by using the Terminal Services Client Connection Manager. The Client Connection Manager allows you to create shortcuts for your Terminal Services connections. These shortcuts are used to automate the process of connecting to a Terminal server and logging on by using a set of predefined connection properties. The following steps explain how to use the Terminal Services Client Connection Manager to create shortcuts for your Terminal Services connections.

STEP BY STEP

CREATING A SHORTCUT FOR A TERMINAL SERVICES CONNECTION

1. On the client computer select Start ➪ Programs ➪ Terminal Service Client ➪ Client Connection Manager.
2. In the Client Connection Manager dialog box, select File ➪ New Connection.
3. The Client Connection Manager Wizard starts. Click Next.
4. In the Create A Connection screen, enter a short descriptive name for the connection in the "Connection name" text box, then enter the server's name or IP address in the "Server name or IP address" text box. You can also browse for a Terminal server. Click Next.
5. The Automatic Logon screen appears, as shown in Figure 20-5. If you want to automatically log on to the Terminal server when you connect, select the check box next to "Log on automatically with this information;" then enter an appropriate user name, password, and domain. Click Next.
6. The Screen Options screen appears. Select the desired screen resolution option. If you want the connection to be displayed in full screen, select the check box next to "Full screen." Click Next.
7. The Connection Properties screen appears. Select the appropriate check box(es): "Enable data compression," "Cache bitmaps," or both. Click Next.
8. The Starting a Program screen appears. By default, Terminal Services opens at the Windows desktop. However, you can change the default by having Terminal Services automatically start an application for you and display that application. To enable this option, select the check box next to "Start the following program," then enter the program path and filename in the text box. Click Next.

STEP BY STEP *Continued*

FIGURE 20-5 Automatic logon option

9. The Icon and Program Group screen is displayed. In this dialog box you can accept the default icon and program group for this connection, or you can specify different ones. Configure the options on this screen as desired and click Next.
10. In the Completing the Client Connection Manager Wizard screen, click Finish. The shortcut to the connection now appears in the Client Connection Manager dialog box, as shown in Figure 20-6.

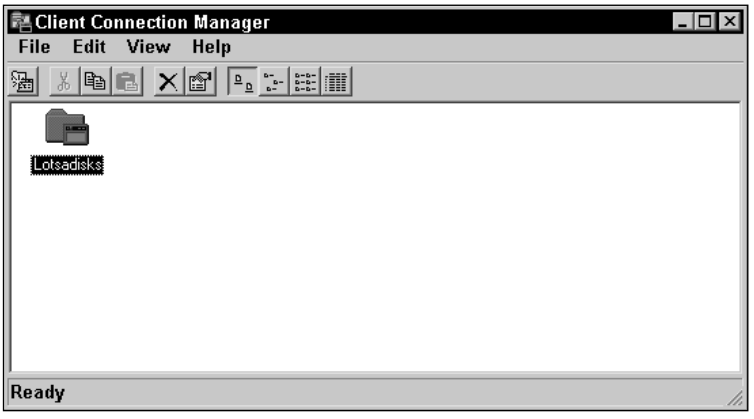

FIGURE 20-6 Client Connection Manager

You can use this same wizard to create shortcuts for multiple connections, with each shortcut having a different set of predefined Terminal Services connection properties. Once created, these shortcuts appear in the Client Connection Manager dialog box, which you can access by selecting Start➪ Programs➪ Terminal Services Client➪ Client Connection Manager.

To use a shortcut to establish a Terminal Services session, in Client Connection Manager, right-click the shortcut you want to use and click Connect.You can also right-click the shortcut and select Properties from the menu that appears to modify the properties used to establish that particular Terminal Services connection. The Properties dialog box provides you with the same options you configured when you originally created the shortcut to the connection.

TIP

If at any time you need to change the options you selected for a shortcut to a Terminal Services connection, simply access the Properties dialog box for the shortcut and make the desired changes. You don't need to create a new shortcut to the connection.

Once a Terminal Services session is established, the user of the client computer can perform tasks and use applications as desired. One issue I should point out, that could cause some help desk calls, concerns keyboard shortcuts. The typical keyboard shortcuts, such as Alt + Esc to switch between applications, don't work while in a Terminal Services session. These keyboard shortcuts are intercepted by the local buffer for use on the local computer, so they're not sent to the Terminal server. You can obtain a list of shortcut keys that can be used during a Terminal Services session in Terminal Services Client Help. To access this feature, start a Terminal Services session from a client computer, right-click the title bar of the Terminal Services Client dialog box, then select Help➪ Terminal Services Client Help from the menu that appears.

Managing Terminal Services Sessions

Once you have a Terminal server up and running, your applications configured, and your client computers able to connect to the Terminal server, that's about all there is to it. But what happens if a client has a problem or you need to manage a client's session? Terminal Services provides you with

a couple of ways to manage Terminal Services sessions — you can either use command-line utilities, or you can use the Terminal Services Manager. These tools allow you to help clients, to see what a client is doing, and to perform other Terminal Services management tasks.

There are quite a few Terminal Services command-line utilities you can use to monitor and control Terminal Services sessions. Table 20-1 lists most common command-line utilities for managing Terminal Services sessions. You can use this table as handy reference as well as to review for the Windows 2000 Server exam. These commands should be run at a command prompt from within a Terminal Services session. You must be logged on as an Administrator to use many of these commands.

TABLE 20-1 Terminal Services Command-Line Utilities

Command	Explanation
`change logon`	Used to disable and enable logons to the Terminal server
`change port`	Used to modify COM port mappings for MS-DOS programs
`change user`	Used to change the current user's `.ini` file mapping
`cprofile`	Used to remove file associations from a user's profile
`dbgtrace`	Used to enable and disable debug tracing
`flattemp`	Used to enable and disable flat temporary directories
`logoff`	Used to end a client's session
`msg`	Used to send messages to Terminal Services clients
`query process`	Used to display information about processes
`query session`	Used to display information about Terminal Services sessions
`query termserver`	Used to display a list of Terminal servers on the network
`query user`	Used to display information about currently logged on users
`register`	Used to register programs
`reset session`	Used to reset/delete Terminal Services sessions
`shadow`	Used to remotely control or monitor Terminal Services sessions
`tscon`	Used to start a Terminal Services session
`tsdiscon`	Used to end a Terminal Services session

Command	Explanation
`tskill`	Used to terminate a process on the Terminal server
`tsprof` profile path	Used to copy user information and to change a user's
`tsshutdn`	Used to shut down a Terminal server

Aside from using the command-line utilities, you can also use the GUI Terminal Services Manager to manage Terminal Services sessions. You can access Terminal Services Manager (which is physically located on the Terminal server) from either a client after a Terminal Services session has been established, or on the Terminal server itself. To access Terminal Services Manager, select Start ➪ Programs ➪ Administrative Tools ➪ Terminal Services Manager. The Terminal Services Manager dialog box is shown in Figure 20-7.

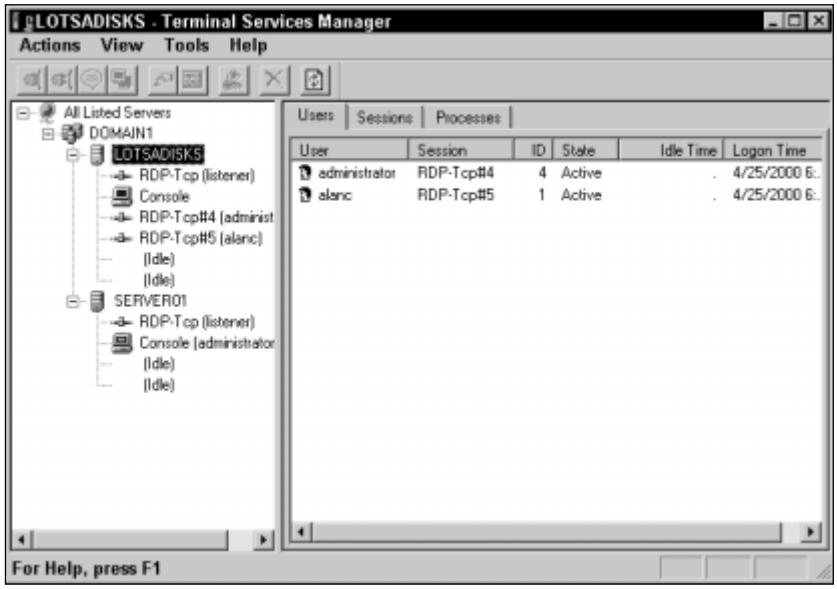

FIGURE 20-7 Terminal Services Manager

You can perform a number of actions by using Terminal Services Manager, such as connecting to a Terminal Services session, disconnecting from a session, logging off a user from a session, sending a message to a user, and so on. Two of the most important tasks you can perform by using Terminal Services Manager are monitoring and managing Terminal Services usage, and using remote control.

TIP

Some Terminal Services Manager actions, such as Remote Control and Connect, work only when Terminal Services Manager is run from a Terminal Services client session. When the Terminal Services Manager is run on the Terminal server console, these features are disabled.

Monitoring Terminal Services Usage

Terminal Services Manager allows you to monitor and manage Terminal Services usage. As Figure 20-7 shows, the left pane of the console displays the domains in your network and the Terminal servers that are available in those domains. Using the left pane, you can switch between Terminal servers and manage each of them as necessary. The right pane displays the contents of what is selected in the left pane. For example, if you select a Terminal server in the left pane, the users connected to that Terminal server are listed in the right pane. When examining users, the right pane gives you information such as the user, the session type and ID, the amount of idle time, and the logon time. This is all well and good, but what can you actually do in this console? The following sections point out some of the most important tasks you can perform and provide you with step-by-step instructions for completing those tasks.

When you select the desired Terminal server in the left pane of the Terminal Services Manager console, three tabs appear in the right pane: Users, Sessions, and Processes. These tabs are illustrated in Figure 20-7. You can expand the Terminal server in the left pane and select the sessions individually, but simply selecting the Terminal server in the left pane and then using the right pane is the easiest approach. The Users tab lists the users that are currently connected to the Terminal server and those users that have recently disconnected from the Terminal server. When you highlight a user in the right pane, there are several actions you can perform in Terminal Services Manager that affect that user:

- **Disconnect:** This action disconnects the user from the Terminal server. Any unsaved data the user is working on is lost. The user does not have the option to save data before being disconnected.
- **Send Message:** This option allows you to send a message to the user.

- **Reset:** This action resets the Terminal Services clients session and closes any applications the user has open. Unsaved data is lost.
- **Status:** This status option displays input/output statistics for the user's session. Figure 20-8 shows a Status dialog box. Notice the various session statistics displayed in this dialog box.

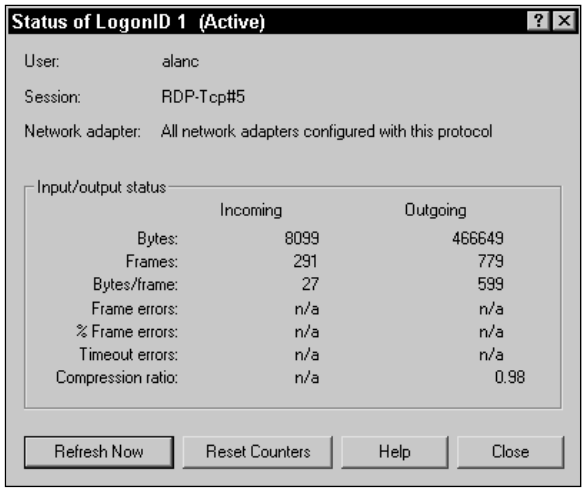

FIGURE 20-8 Session Statistics

- **Log Off:** This action logs the user off the Terminal server.

Many of these Terminal Services Manager actions are available on toolbar buttons as well. In the next section, I'll show you how to perform actions in Terminal Services Manager that affect users.

STEP BY STEP

MANAGING USERS

1. Select Start ➪ Programs ➪ Administrative Tools ➪ Terminal Services Manager.
2. In the left pane, expand the domain that contains the Terminal server you want to manage. Then highlight the desired Terminal server.
3. In the right pane, highlight the user you want to manage.
4. Select the Actions menu, and then select the action you wish to perform, such as Disconnect, Send Message, Reset, Status, or Log Off.

Managing Sessions

The Sessions tab in the right pane of the Terminal Services Manager console presents much of the same types of information displayed on the User tab, but interprets that information in terms of the session in progress. Figure 20-9 shows the Sessions tab.

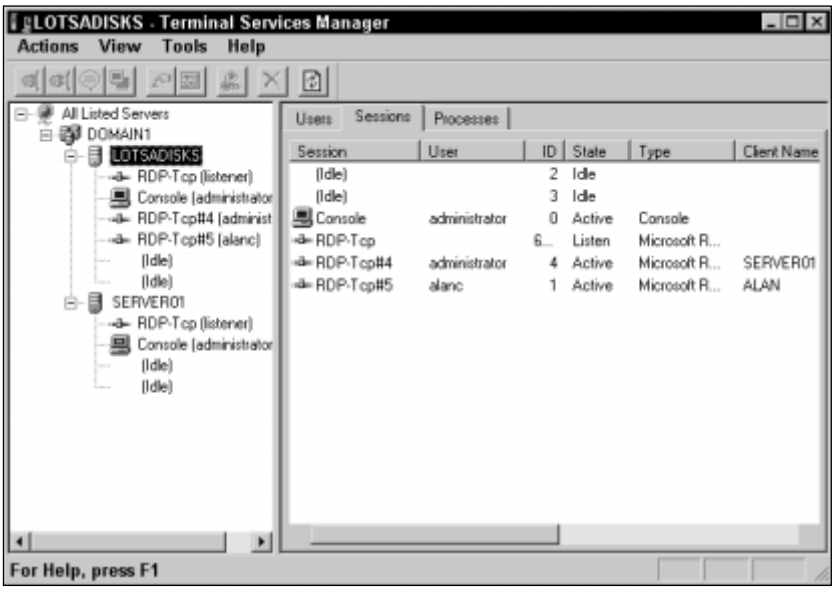

FIGURE 20-9 The Sessions tab

The Sessions tab lists the sessions in progress, both by console and by RDP-Tcp connection number. The Console session refers to the user that is logged on interactively to the Terminal server. For each session the user name is listed, as well as the state, type, client name, idle time, logon time, and so forth. If you highlight a session, then click the Actions menu, you can choose to disconnect the session, send a message, reset the session, or view the session's status. The basic difference between the Sessions tab and the Users tab is the perspective or point of view — on the Sessions tab you can view your Terminal Services usage by sessions, and on the Users tab you can view Terminal Services usage by users.

Managing Processes

The Processes tab in the right pane of the Terminal Services Manager console enables you to view the system processes in use by the connected users. The Processes tab is shown in Figure 20-10.

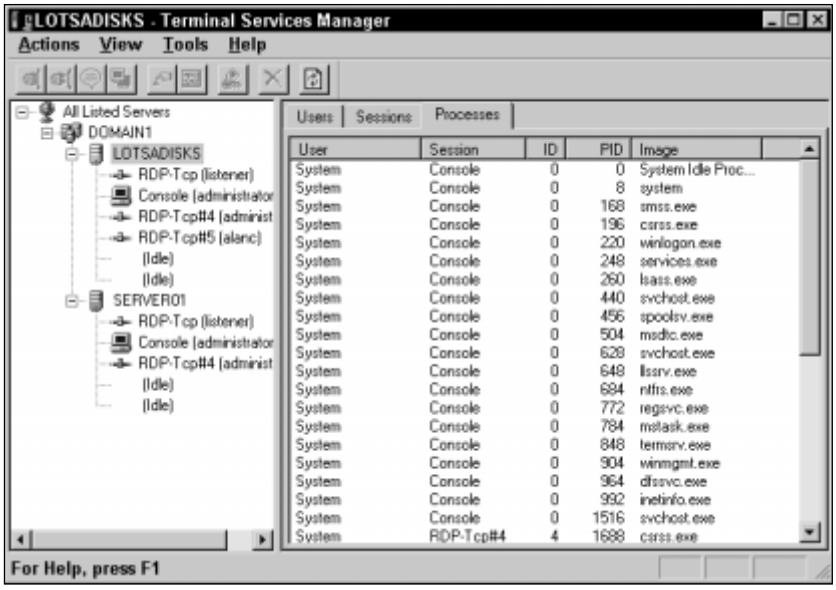

FIGURE 20-10 The Processes tab

The Processes tab lists the user, session, session ID, PID, and image being used by each process. The PID, or process ID, gives you an ID number for each image. An image is an executable file that is being run. By examining the Processes tab, you can determine which user is using which resource. If the user should not be using the resource, or has been using the resource for too long, you can end the process.

CAUTION

You should be aware, however, that ending a process in Terminal Services Manager does *not* give the user any warning, and all of the user's unsaved data will be lost.

STEP BY STEP

ENDING A PROCESS

1. Select Start ➪ Programs ➪ Administrative Tools ➪ Terminal Services Manager.
2. In the left pane, expand the domain that contains the Terminal server you want to manage. Then highlight the desired Terminal server.
3. In the right pane, click the Processes tab.

STEP BY STEP *Continued*

4. On the Processes tab, locate the user and the process you want to terminate. Highlight the user's name, then select Actions ➪ End Process.
5. A Terminal Services Manager warning message appears. Click OK.

TIP

You cannot end all processes for a user at one time. You must individually select each process the user is running, then end them one at a time.

Using Remote Control

Remote control is a helpful feature of Terminal Services that enables you to remotely control another user's session. With remote control, you can take over that user's session, just as if you were logged on as the user. For example, let's say that users are learning how to run a new application you have implemented. When a particular user is having a problem with the application, you don't have to shut down the application or physically walk to the user's desk. You can use remote control to find out what the user is doing wrong and fix the problem — right from your own workstation.

EXAM TIP

Make sure you're ultra-clear on this point — you can only use remote control from a Terminal Services client session. Remote control is disabled when you run the Terminal Services Manager on the Terminal server console.

The Terminal Services remote control feature is tied to the users account's remote control settings in Active Directory, and these settings determine what you can do with remote control, or if remote control is even enabled. Before trying to use remote control, you'll need to check out the Properties of the user's account in Active Directory Users and Computers. Each user account has a Remote control tab, as shown in Figure 20-11. Notice the various configurable options on the Remote control tab. The settings shown in Figure 20-11 are the default selections for all newly created user accounts.

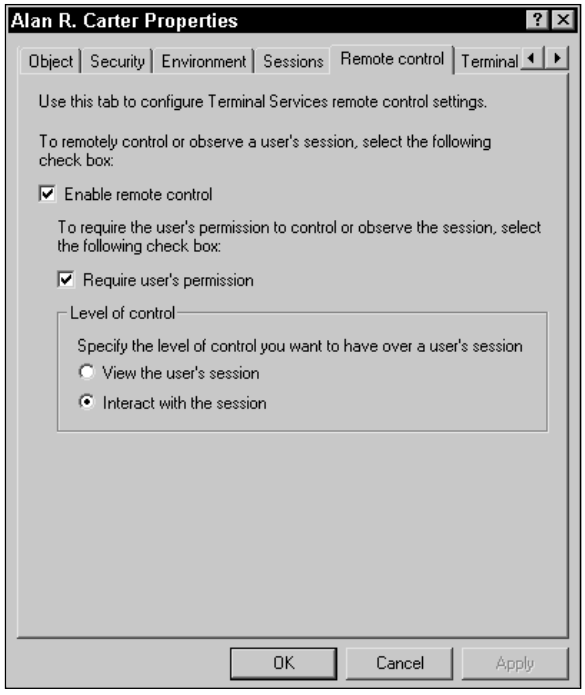

FIGURE 20-11 The Remote control tab

Before you can use Terminal Services remote control for a specific user account, you'll need to enable remote control, configure whether the user's permission is required for you to remotely control his or her session, and configure your level of control over the user's session. You can choose to simply view the user's session, or to interact with it. The interaction option allows you to essentially take over the user's session. For example, if a user is having problems saving a document in Microsoft Word, you could take over the session and save the document for the user. If you select the check box next to "Require user's permission," when you attempt to remotely control the user's session, the user is sent a message asking the user to either accept or deny your request for remote control.

The following step-by-step instructions show you how to configure a user's account for remote control.

STEP BY STEP

CONFIGURING A USER'S ACCOUNT FOR REMOTE CONTROL

1. Select Start ➪ Programs ➪ Administrative Tools ➪ Active Directory Users and Computers.
2. In the left pane, double-click the `Users` folder or the OU in which the user account resides.
3. In the right pane, highlight the desired user account and select Action ➪ Properties.
4. In the user's Properties dialog box, click the Remote control tab.
5. Select the check box next to "Enable remote control" (and optionally, the "Require user's permission" check box). Select either the "View the user's session" option or the "Interact with the session" option. Click OK.
6. Close Active Directory Users and Computers.

Once your user accounts are configured for remote control, you can then access the desired sessions and view or interact with the session. Using remote control is straightforward, but there is one thing you should know before you use it. When you connect to a user's session by using remote control, you will be presented with a Remote Control hot key dialog box. This dialog box prompts you to select a desired hot key combination which you can use to end your remote control session. Once you select a hot key combination, you should be sure to memorize it because you'll need it to end your remote control session.

CAUTION

You can use the `shadow` command-line utility to establish a remote control session, but you will not be presented with the Remote Control hot key dialog box. The default Remote Control hot key combination (Ctrl + * on the numeric keypad) will be used, so be certain you know this hot key combination before using the `shadow` command.

STEP BY STEP

ESTABLISHING A REMOTE CONTROL SESSION

1. From a Terminal Services client, log on to the Terminal server as Administrator (or by using a user account that has administrative privileges).

STEP BY STEP *Continued*

2. In the Terminal Services Client window, select Start ➪ Programs ➪ Administrative Tools ➪ Terminal Services Manager.
3. In the left pane, expand the domain that contains the Terminal server you want to manage. Then highlight the desired Terminal server.
4. In the right pane, highlight the desired user account, then select Actions ➪ Remote Control.
5. In the Remote Control dialog box, either accept the default hot key combination, or select a desired hot key combination and click OK.
6. Terminal Services connects you to the user's session. The remote user may need to agree to your remote control request before the remote control session can be established.
7. To end the remote control session, use the hot key combination you selected in Step 5.

Terminal Services Licensing Requirements

Ah, licensing. You can't get away from it, and Terminal Services is no exception. In order to use Terminal Services for application sharing, you must meet certain licensing requirements. You can deploy Terminal Services in application server mode and permit client computers to connect to the Terminal server for 90 days without any licenses. After that time, licensing must be configured or clients will not be able to connect to the Terminal server.

If you choose to run your Terminal server in remote administration mode, which allows Administrators to connect to the Terminal server and remotely administer it, then you do not need any licensing. A license for two concurrent connections is built in.

EXAM TIP

Keep the licensing requirements in mind for the Server exam—using Terminal Services in remote administration mode requires no license; however, running Terminal Services in application server mode requires licenses, but you have 90 days to implement the necessary licensing.

In order to configure and manage Terminal Services licensing, you must install an application to assist you. The following two sections show you how to install Terminal Services Licensing and how to manage licenses with it.

Installing Terminal Services Licensing

Terminal Services Licensing is an application that is installed separately from Terminal Services. Before installing Terminal Services Licensing, you'll need to decide if the Terminal server on which you are installing the licensing software will handle licensing for a single domain/workgroup, or whether it will manage the licenses for an entire Enterprise. There is not one correct answer here. It mainly comes down to administration, and how you manage licenses on your network, either on an enterprise or a domain level.

You install Terminal Services Licensing in the same manner as all other server components in Windows 2000 — by using Add/Remove Programs in Control Panel. The following steps show you how to install Terminal Services Licensing.

STEP BY STEP

INSTALLING TERMINAL SERVICES LICENSING

1. Select Start ➪ Settings ➪ Control Panel.
2. In the Control Panel dialog box, double-click Add/Remove Programs.
3. In the Add/Remove Programs dialog box, click Add/Remove Windows Components.
4. In the Windows Components Wizard dialog box, scroll down the list of components and select the check box next to Terminal Services Licensing. Click Next.
5. In the Terminal Services Setup screen, click Next.
6. The Terminal Services Licensing Setup screen appears, as shown in Figure 20-12. Notice the two license server options in this dialog box: "Your entire enterprise," and "Your domain or workgroup."

   Select the appropriate licensing option, and click Next.
7. Windows 2000 configures components. When prompted, insert your Windows 2000 Server compact disc and click OK. If the Microsoft Windows 2000 CD dialog box appears, close it. Terminal Services Licensing is installed.
8. In the Completing the Windows Components Wizard screen, click Finish.

STEP BY STEP *Continued*

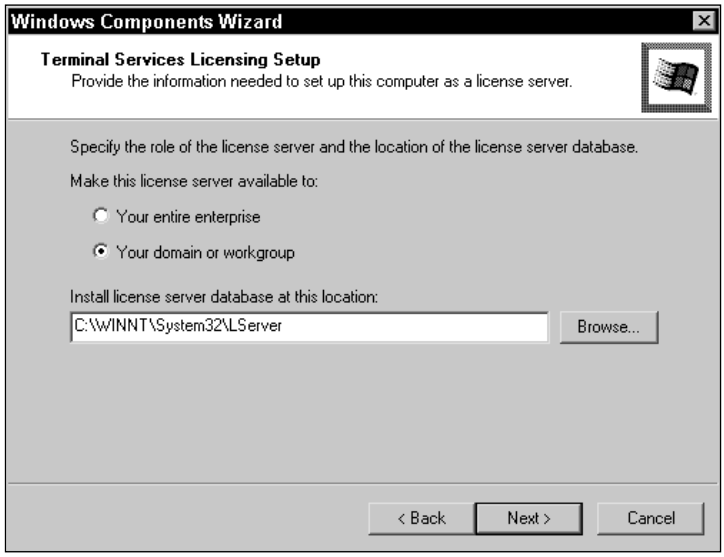

FIGURE 20-12 Configuring Terminal Services Licensing

9. Close the Add/Remove Programs dialog box.
10. Close Control Panel.

Managing Licenses

Installing the Terminal Services Licensing application is simple. Unfortunately, understanding Terminal Services licensing is a bit more complex. Terminal Services licensing is on per seat basis, not on a per user basis. In other words, computers — not users — are licensed to access the Terminal server.

Let's start with the Windows 2000 Server computer on which Terminal Services is installed — that's your Terminal server. For that computer, you'll need a Windows 2000 Server license. This license is included when you buy Windows 2000 Server.

Next, you'll need a Windows 2000 Server Client Access License for each and every computer or Windows-based Terminal that will connect to the Terminal server, because they're connecting to a Windows 2000 Server computer.

In addition to these licenses, you'll need *one* of the following Terminal Services–specific client access licenses for each client computer or terminal that will connect to the Terminal server:

- **Windows 2000 Professional License:** This license, which is included when you purchase Windows 2000 Professional, permits you to not only install and run Windows 2000 Professional, but also gives you the right to access Terminal Services on a Windows 2000 Server computer.
- **Windows 2000 Terminal Services Client Access License (TSCAL):** This license provides a client computer or terminal the right to access Terminal Services on a Windows 2000 Server computer.

If all this wasn't bad enough, there are even more licenses that you should consider purchasing.

Instead of the Terminal Services–specific client access licenses described in the previous section, you can purchase the Windows 2000 Terminal Services Internet Connector License. This license allows a maximum of 200 concurrent users to connect anonymously to a Terminal server over the Internet. This license is suitable for companies that want to demonstrate Windows-based software over the Internet without having to rewrite this software as Web-based applications. This type of license isn't suitable for most companies, however, because none of the users who access the Terminal server with this license can be employees of the company.

Finally, if your company wants to enable users who work at home to connect to the Terminal server, an additional license — the Work at Home Terminal Services Client Access License — is required.

As you have probably gathered by now, Terminal Services licensing can get tricky and is easily confusing. The Terminal Services Licensing tool is designed to make this process somewhat easier, but you'll have to be the judge of whether that is true or not. Before taking a look at the Terminal Services Licensing application, let's consider how licensing works.

Unfortunately, you can't simply enter how many licenses you have purchased in Terminal Services Licensing. Instead, the licensing process goes through the Microsoft Clearinghouse, which is a database that Microsoft maintains to activate license servers and install client license packs. It's a new approach for Microsoft, and one you can expect to see more of if it works well.

The process goes like this. The Administrator logs on to the computer that is running Terminal Services Licensing — this is the computer that will become the license server. Then, the Administrator starts Terminal Services Licensing and uses this program to contact the Microsoft Clearinghouse, typically over the Internet. Microsoft Clearinghouse activates the license server, and provides the server with a digital certificate to validate it. Once this is established, the licensing server can then make transactions with the Microsoft Clearinghouse for additional client licenses. In addition to using the Internet, the Microsoft Clearinghouse can be contacted by fax and telephone, although the Internet is the preferred and fastest approach.

The following steps explain how to start Terminal Services Licensing and how to activate the license server.

STEP BY STEP

ACTIVATING THE LICENSE SERVER

1. Select Start ➪ Programs ➪ Administrative Tools ➪ Terminal Services Licensing.
2. The Terminal Services Licensing dialog box appears, as shown in Figure 20-13. Notice that the Terminal server displayed is not activated.

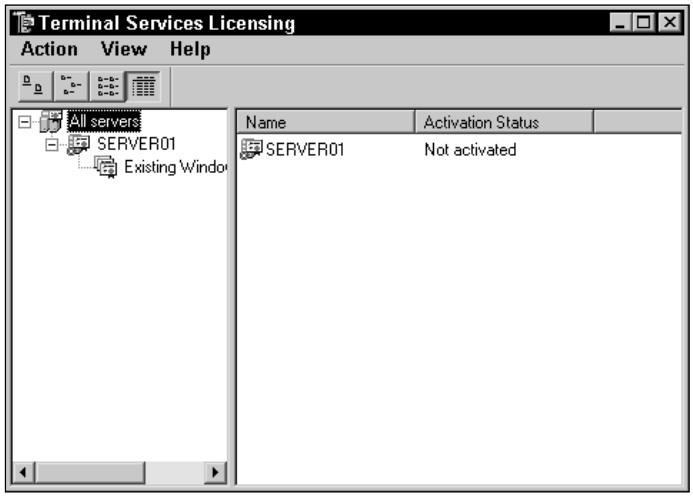

FIGURE 20-13 Terminal Services Licensing

In the right pane of the Terminal Services Licensing dialog box, highlight the server you want to activate, and select Action ➪ Activate Server.

3. The Licensing Wizard starts. Click Next.

STEP BY STEP *Continued*

4. In the "Connection method" screen, select the method you want to use to connect to the Microsoft Clearinghouse from the drop-down list box. Options you can select from include the Internet, World Wide Web, Fax, or Telephone.
5. The remaining steps very considerably depending on the connection method you chose in Step 4. Follow the instructions presented onscreen to complete the activation of your license server and to purchase client licenses.

Once you have activated the license server and purchased client licenses, your next task is to examine the licenses for the software you are making available to Terminal Service clients. In general, the software licensing that applies to the product in a single-session environment also applies in a Terminal Services environment. For example, Microsoft Office 97 requires a per-seat license. To meet the licensing requirements in a multi-user environment, each user that will use Microsoft Office in a Terminal Services session must have an Office license. Once you meet these requirements, you're ready to go.

Troubleshooting Terminal Services

For the most part, Terminal Services is easy to use once it is set up and configured. You are not likely to see a lot of problems, and most of the problems you will see are easily remedied. Here are a few of the most common Terminal Services problems and the troubleshooting actions you should take to resolve these problems:

- **A connection will not automatically log on to the Terminal server:** If a connection will not automatically log on, even though it is configured to do so, the problem is most likely with the encryption features of Windows 2000. The Windows NT version of Terminal Services Client does not recognize the user and password in the automatic logon part of the connection. You can fix this problem by right-clicking the connection in the Windows NT 4.0 version of Client Connection Manager, clicking the General tab, and selecting the Automatic logon box. Then, enter the user name and password.

- **An installed application program does not work:** If you are using Terminal Services in application server mode and an application does not work, then the application was probably installed prior to the installation of Terminal Services on this Windows 2000 Server computer. Uninstall the application and reinstall it using Add/Remove Programs in Control Panel.
- **A Windows for Workgroup client cannot log on, but receives an error message:** Windows for Workgroups, which is a 16-bit client, must be configured to save the domain password list by selecting the provided check box. Because of domain security, the domain controller will not be able to find the password if this check box is not selected.
- **A Terminal server in application server mode has stopped allowing clients to log on:** The most likely problem here is licensing. You have 90 free days before you must comply with Terminal Services licensing requirements. If licensing is not configured after 90 days, the Terminal server will not permit clients to access it.
- **When attempting to remotely control a Terminal Services client session, an error message is received:** There are three possible causes to this problem. First, in order to use remote control, you must be logged onto the Terminal server from a client session — when the Terminal Services Manager is run on the Terminal server console, remote control is disabled. Second, you must be logged on as Administrator or as a user with administrative privileges. Finally, the user's account must be configured to allow remote control.

KEY POINT SUMMARY

This chapter introduced several important Terminal Services topics:

- Terminal Services can be installed in either application server mode or remote administration mode.
- You can install Terminal Services and Terminal Services Licensing by using the Add/Remove Programs application in Control Panel.

- Applications used with Terminal Services can be optimized by using application compatibility scripts and by manually removing components that are CPU and memory intensive.
- Terminal Services Client software is available on the Terminal server after installation. Use the Terminal Services Client Creator tool to create client setup/installation floppy disks. You can also create a network share so that clients can install the Terminal Services Client software over the network.
- You can connect to a Terminal server by using the Terminal Services Client or by creating shortcuts to connections in Client Connection Manager.
- Terminal Services client sessions can be managed by using the Terminal Services Manager interface or via the command-line utilities.
- Remote control allows you to either view a client's session or interactively work with the session as though you are the user. Remote control is only available when Terminal Services Manager is run from a Terminal Services client session.
- When Terminal Services is deployed in remote administration mode, no additional licenses are required. Two concurrent connection licenses are provided with the Windows 2000 Server product.
- When Terminal Services is used in application server mode, you have 90 free days before licenses must be purchased and configured. The Terminal server must be licensed and client computers must be licensed to access the Terminal server.

STUDY GUIDE

This section contains several exercises that are designed to solidify your knowledge about Terminal Services, and to help you prepare for the Server exam:

- **Assessment Questions:** These questions test your knowledge of the Terminal Services topics covered in this chapter. You'll find the answers to these questions at the end of this chapter.
- **Scenarios:** The situation-based questions in scenarios challenge you to apply your understanding of the material to solve a hypothetical problem. In this chapter's scenarios, you are asked to analyze Terminal Services problems, and provide answers to the questions. You don't need to be at a computer to do scenarios. Answers to this chapter's scenarios are presented at the end of this chapter.
- **Lab Exercise:** These exercises are hands-on practice activities that you perform on a computer. The lab in this chapter gives you an opportunity to practice installing, configuring, and using Terminal Services.

Assessment Questions

1. An administrator wants to use both remote administration mode and application server mode on a Terminal server, but cannot seem to get the configuration to work. What is the problem?
   A. The server does not have the necessary system resources to provide both modes.
   B. The server is not in licensing compliance.
   C. Terminal Services does not support using both modes on the same server.
   D. The administrator does not have DNS configured correctly.
2. You want to remotely control a Terminal Services client session to assist a user. You are logged in as Administrator from a Terminal Services client, but you receive an error message when you try to use remote control. What is the most likely cause of the problem?

A. The user does not have administrative privileges.

B. The user's account is not configured to allow remote control.

C. The server is not configured for Application Server Mode.

D. There is a TCP/IP connectivity problem.

3. You install Microsoft Office on a Terminal server deployed in application server mode by using Add/Remove Programs in Control Panel. What should you do next before Terminal Services clients begin using this application?

A. Install the multisession feature.

B. Boot Terminal Services in Application Testing Mode.

C. Run the application compatibility script for that Office version.

D. Run `Tstest.exe`

4. When installing Terminal Services, you want to make certain that the most secure features are used. Which option should you select?

A. Permissions compatible with Windows 2000 users

B. Permissions compatible with Terminal Server 4.0 users

C. Permissions compatible with Windows NT users

D. Permissions compatible with Windows 98 users

5. You're having problems with a Terminal server in application server mode. The server will no longer allow clients to connect, even though it has been working fine during the past few months. What is the most likely cause of the problem?

A. The server is experiencing system resource problems.

B. The server's free licensing period has expired.

C. The server is not running TCP/IP.

D. There is a problem with RDP.

6. What is the default location of the Terminal Services application compatibility scripts?

A. *`SystemRoot`*`\Application Compatibility Scripts\Execute`

B. *`SystemRoot`*`\Application Compatibility Scripts\Clients`

C. *`SystemRoot`*`\Application Compatibility Scripts\Windows`

D. *SystemRoot*\Application Compatibility Scripts\Install

7. You would like to use the command line to end an application that a Terminal Services client is running. What command can you use?
   A. `Tscon`
   B. `Tsprof`
   C. `Tsend`
   D. `Tskill`
8. When using remote control, how do you end the remote control session without ending your Terminal Services session as well?
   A. Use the hot key combination you selected.
   B. Use the Shut Down command.
   C. Use the Kill Session command.
   D. Just close the Terminal Services window.

Scenarios

The following scenarios provide you with an opportunity to apply the knowledge you've gained in this chapter about Terminal Services. For each of the following situations, consider the given facts and answer the question or questions that follow.

1. After installing Terminal Services in application server mode, an administrator realizes that the applications he wants to make available do not work.
   a. What is the cause of this problem?
   b. How would you resolve the problem?
2. An administrator is logged onto the Terminal Services console. The administrator wants to remotely control a user's session, and he verifies that remote control is enabled on the user's account. However, the Remote Control option is not available in the Terminal Services Manager console.
   a. What is the cause of this problem?
   b. How would you resolve the problem?

Lab Exercise

Lab 20-1 Installing, Configuring, and Using Terminal Services

► Server

The purpose of this lab is to provide you with an opportunity to practice the Terminal Services tasks you've learned in this chapter.

There are four parts to this lab:

- Part 1: Installing and Configuring Terminal Services
- Part 2: Installing an Application for Use with Terminal Services
- Part 3: Installing Terminal Services Client Software
- Part 4: Establishing a Terminal Services Session and Remotely Administering the Terminal Server

Begin this lab by booting your computer to Windows 2000 Server and logging on as Administrator.

Part 1: Installing and Configuring Terminal Services

In this part, you install Terminal Services on your Windows 2000 Server computer and configure Terminal Services for application sharing.

1. Select Start ➪ Settings ➪ Control Panel.
2. In the Control Panel dialog box, double-click Add/Remove Programs.
3. In the Add/Remove Programs dialog box, click Add/Remove Windows Components.
4. In the Windows Components Wizard dialog box, scroll down until Terminal Services is displayed. Select the check box next to Terminal Services. Click Next.
5. The Terminal Services Setup screen appears. Select the "Application server mode" option. Click Next.
6. On the next Terminal Services Setup screen accept the default permissions selection and click Next.

7. The next Terminal Services Setup screen displays a list of applications that may not work correctly after Terminal Services is installed. These applications might have to be removed and reinstalled. Click Next.
8. Windows 2000 installs Terminal Services. If you have not previously placed your Windows 2000 compact disc into your CD-ROM drive, insert it and click OK when prompted. If the Microsoft Windows 2000 CD dialog box appears, close it. In the Completing the Windows Components Wizard screen, click Finish.
9. In the System Settings Change dialog box, click Yes to restart your computer and complete the installation of Terminal Services.

Part 2: Installing an Application for Use with Terminal Services

In this part, you install Adobe Acrobat Reader for use from Terminal Services client sessions.

1. After you have installed Terminal Services in application server mode, insert the compact disc that accompanies this book into your CD-ROM drive. If the Microsoft Windows 2000 CD dialog box appears, close it.
2. If the Control Panel dialog box is not displayed, select Start ➪ Settings ➪ Control Panel.
3. Double-click Add/Remove Programs.
4. In the Add/Remove Programs dialog box, click Add New Programs, then click the CD or Floppy command button.
5. In the Install Program From Floppy Disk or CD-ROM dialog box, click Next.
6. In the Run Installation Program dialog box, click Browse.
7. In the Browse dialog box, select your computer's CD-ROM drive from the "Look in" drop-down list box.
8. Double-click the `Adobe Acrobat` folder. Then select Programs from the "Files of type" drop-down list box at the bottom of the Browse dialog box.
9. Double-click `ar405eng.exe`, and follow the instructions presented on-screen to complete the installation of Adobe Acrobat Reader. When you're finished installing the application, close the Add/Remove Programs dialog box.

Part 3: Installing Terminal Services Client Software

In this part, you install Terminal Services Client software on your Windows 2000 Server computer.

1. If the Control Panel dialog box is not displayed, select Start ➪ Settings ➪ Control Panel.
2. In Control Panel, double-click Add/Remove Programs.
3. In the Add/Remove Programs dialog box, click Add New Programs, then click the CD or Floppy command button.
4. In the Install Program From Floppy Disk or CD-ROM dialog box, click Next.
5. In the Run Installation Program dialog box, click Browse.
6. In the Browse dialog box, select Local Disk (C:) from the "Look in" drop-down list box. Then double-click the `WINNT` folder, double-click the `system32` folder, double-click the `clients` folder, double-click the `tsclient` folder, double-click the `net` folder, double-click the `win32` folder, and finally, double-click setup.
7. In the Run Installation Program dialog box, click Next.
8. On the Terminal Services Client Setup welcome screen, click Continue.
9. Enter your name and organization in the dialog box provided and click OK.
10. A confirmation dialog box appears. Click OK.
11. The License Agreement dialog box appears. Read the agreement and click the I Agree button.
12. In the Terminal Services Client Setup dialog box, click the large installer button.
13. Click Yes to assign the same initial settings to all users of Terminal Services on this computer.
14. Terminal Services Client Setup completes. Click OK.
15. In the After Installation dialog box, click Next.
16. In the Finish Admin Install dialog box, click Finish.
17. Close the Add/Remove Programs dialog box.
18. Close Control Panel.

Part 4: Establishing a Terminal Services Session and Remotely Administering the Terminal Server

In this part, you establish a Terminal Services client session, and then use Terminal Services Manager to remotely manage the server from within the Terminal Services client session.

1. Select Start ➪ Programs ➪ Terminal Services Client ➪ Terminal Services Client.
2. In the Terminal Services Client dialog box, highlight SERVER01, then click Connect.
3. In the Log On to Windows dialog box, enter a user name of **Administrator** and a password of **password**. Click OK.
4. In the SERVER01 - Terminal Services Client dialog box, scroll down until the Start button for the Terminal Services Client dialog box appears. In the Terminal Services Client window taskbar (*not* in your regular Windows taskbar) Select Start ➪ Programs ➪ Administrative Tools ➪ Terminal Services Manager.
5. In the left pane of the SERVER01 - Terminal Services Manager dialog box, highlight SERVER01.
6. In the right pane, highlight Administrator. Select Actions ➪ Send Message.
7. The Send Message dialog box appears. In the Message text box, type **Alan says hello!** Click OK. Close the SERVER01 - Terminal Services Manager dialog box.
8. In the "Message from administrator" dialog box, notice the message you've received. Click OK.
9. Close the Terminal Services Manager dialog box.
10. In the Terminal Services Client dialog box, right-click My Computer, and select Manage from the menu that appears.
11. Computer Management starts. This is Computer Management for the Terminal server, *not* Computer Management for the local computer. At this point you could use Computer Management to remotely administer the Terminal server. Close Computer Management.
12. Close the Terminal Services Client dialog box.
13. In the "Disconnect Windows session" dialog box, click OK.

Answers to Chapter Questions

Chapter Pre-Test

1. The Terminal Services remote administration mode allows you to remotely manage a Windows 2000 Server computer if Terminal Services is installed on that computer.
2. To install Terminal Services, you use Add/Remove Programs in Control Panel. In the Add/Remove Programs dialog box, use the Add/Remove Windows Components feature.
3. Terminal Services uses Win16-on-Win32 (WOW) to translate the 16-bit code.
4. Existing applications must be uninstalled, then reinstalled by using Add/Remove Programs in Control Panel.
5. Application compatibility scripts are scripts used to optimize applications for use with Terminal Services.
6. Terminal Services Client software can be installed via a network share or by using a Terminal Services client setup/installation floppy disk set.
7. You can end a Terminal Services client session by using Terminal Services Manager or by using a command line-utility.
8. The command-line utility for remote control is `shadow.exe`.
9. No additional licensing is required for running Terminal Services in remote administration mode. Licenses for two concurrent connections are provided.
10. You have 90 days to use Terminal Services in application server mode before licensing is required.

Assessment Questions

1. **C.** You cannot use remote administration mode and application server mode on the same Terminal server at the same time.
2. **B.** While it is true that there could be a TCP/IP connectivity problem, the most likely cause of this problem is the user's account properties. You must enable remote control for the client by accessing the user account's Properties dialog box and selecting the "Enable remote control" check box on the Remote control tab.

3. **C.** After installing the application, run the application compatibility script for that application to optimize its performance with Terminal Services.
4. **A.** When installing Terminal Services, you can choose to use permissions compatible with Windows 2000 users only or to use permissions compatible with Terminal Server 4.0 users. The most secure option is Windows 2000 users, although some legacy application will not run under this setting.
5. **B.** When you install Terminal Services in application server mode, you have 90 days to purchase licenses before the Terminal server will stop allowing clients to connect.
6. **D.** The default location for Terminal Services application compatibility scripts is *`SystemRoot`*`\Application Compatibility Scripts\Install`
7. **D.** `Tskill` ends a process. Since you want to stop an application, this is the command you would use.
8. **A.** Using the hot key combination you selected ends the remote control session.

Scenarios

1. In Terminal Services application server mode, applications must be installed *after* Terminal Services is installed on the Windows 2000 Server computer. To solve this problem, uninstall the applications, then reinstall them by using Add/Remove Programs in Control Panel. You must use Add/Remove Programs in Control Panel and not the application's setup program.
2. In order to use remote control, you must be logged on to the Terminal server from a Terminal Services client session, and you must be logged on either as Administrator or as an a user with administrative privileges. You cannot remotely control a client when you are logged onto the Terminal server console. To solve the problem, log on to the Terminal server as Administrator by using a Terminal Services client session — then remote control will be available.