

Virtualization and Windows 7

INFORMATION IN THIS CHAPTER

- Windows XP Mode
- Many Forms of Virtualization
- Summary

Windows Virtual PC is an optional component of Windows 7 Professional, Enterprise, and Ultimate editions. Windows Virtual PC allows Windows 7 to run other operating systems as virtual machines. This means the Windows 7 system will be the host where Windows Virtual PC is installed and then guest operating systems may be installed. This feature allows end users and administrators to install legacy applications that may not be compatible with Windows 7 on another operating system and have them appear to be running seamlessly with Windows 7.

WINDOWS XP MODE

Windows 7 Professional, Enterprise, and Ultimate support additional features that both administrators and end users can take great advantage of. One of these features is Windows XP Mode. Windows XP Mode is a virtualization technology that gives end users and administrators the ability to use the new features of Windows 7 while allowing the use of critical and essential applications that may not function correctly on Windows Vista or Windows 7. Windows XP Mode functions with Windows Virtual PC, which is available for Windows 7 Professional, Enterprise, and Ultimate. Windows Virtual PC is an evolution of Virtual PC 2007, a stand-alone product for previous versions of Windows.

Windows XP Mode is a separate download from the Microsoft Web site. You will also require Windows Virtual PC, which is also free as a download from Microsoft.

WARNING


Be careful when changing BIOS settings. The BIOS interface is designed for advanced users; it is possible to make changes that could prevent your computer from starting correctly.

With some limitations, Windows XP Mode is a full version of Windows XP Service Pack 3. Installing a program in Windows XP Mode makes the program available in both Windows XP Mode and Windows 7. This technology allows users and businesses to run legacy applications during the transition to Windows 7. It does not support 3D graphics or applications that require specialized hardware like TV tuners or similar devices.

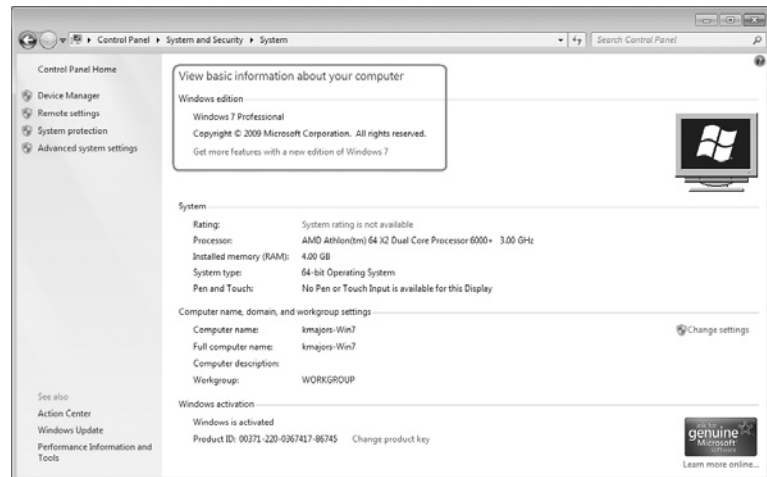
The following are some specific requirements to run Windows XP Mode:

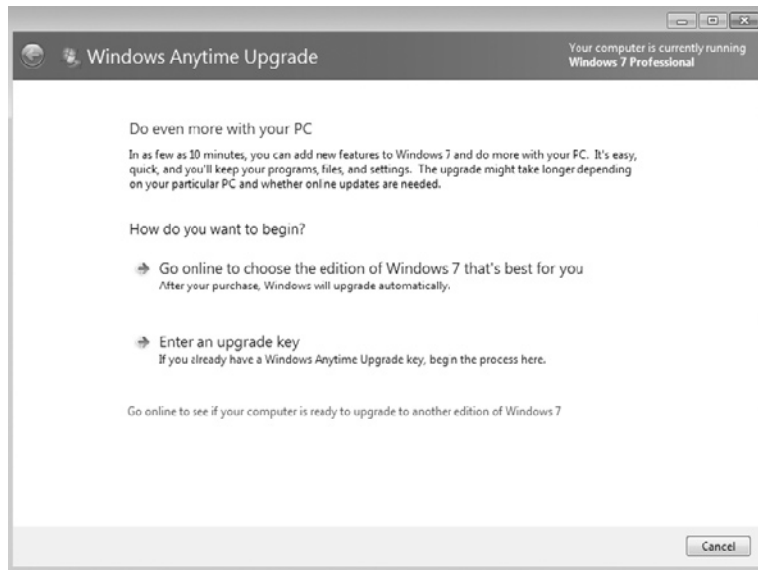
- Windows operating systems such as Windows 7 Professional, Enterprise, or Ultimate editions.
- A computer that is capable of hardware virtualization. This means your computer has a central processing unit (CPU) with either Intel-VT or AMD-V virtualization features. If it is a fairly new computer, you will probably have this feature in it.
- Virtualization features turned on in your computer's basic input/output system (BIOS). These are not always turned on by default so you may need to enter the setup mode of your computer to enable these features.

Verifying Your Windows 7 Version

The first part of loading Windows XP Mode is to make sure that you are running the correct version of Windows 7. You must be running the Professional, Enterprise, or Ultimate version of Windows 7. To verify that you are running the correct version, click the **Start button**  | **Control Panel** | **System and Security** | **System**. Confirm the version as shown in Figure 9.1.

■ FIGURE 9.1 Windows 7 Version





■ FIGURE 9.2 Anytime Upgrade

If you need to upgrade your Windows 7 version, you can click the **Get more features with a new edition of Windows 7** hyperlink. This will open a window to ask what you want to do next. This window is shown in Figure 9.2.

Once you select the desired version of Windows 7, you will be prompted for a method of payment. This is the part that is not free, and you will have to pay for the upgrade if you wish to continue with Windows XP Mode. You will receive a license key when the transaction is complete.

Once your new upgrade key is received, you can return to the screen shown in Figure 9.2, and this time select **Enter an upgrade key**.

Enter your upgrade key in the dialog box, as shown in Figure 9.3, and click **Next** to activate the Windows 7 upgrade. Click **Finish** when you have finished the activation.

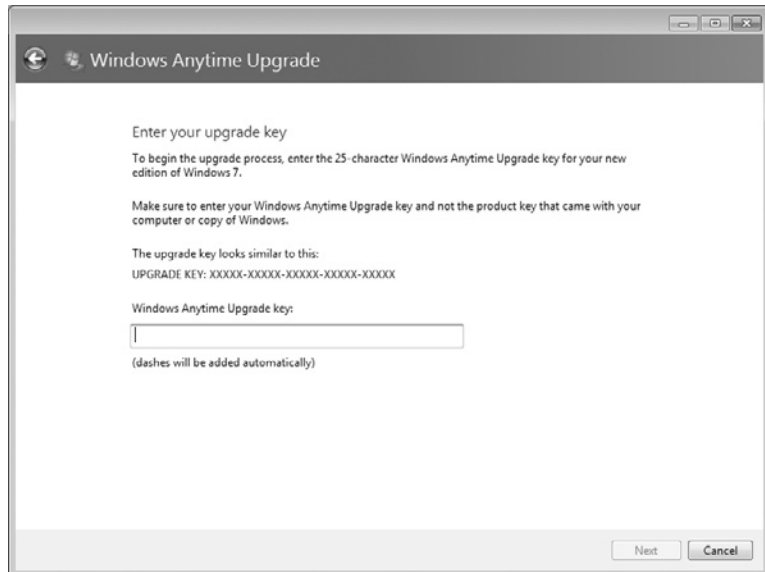
Confirm Hardware Virtualization

You must have a computer with a CPU that has hardware virtualization capabilities to use Windows XP Mode. This should not be too difficult of a requirement to meet. Most modern processors will have this feature. If you are running a processor from Intel, you will need the Intel-VT feature. AMD processors must have the AMD-V hardware features. Microsoft has created a **Hardware-Assisted Virtualization Detection Tool** for your convenience. This tool can be downloaded at www.microsoft.com/downloads/details.

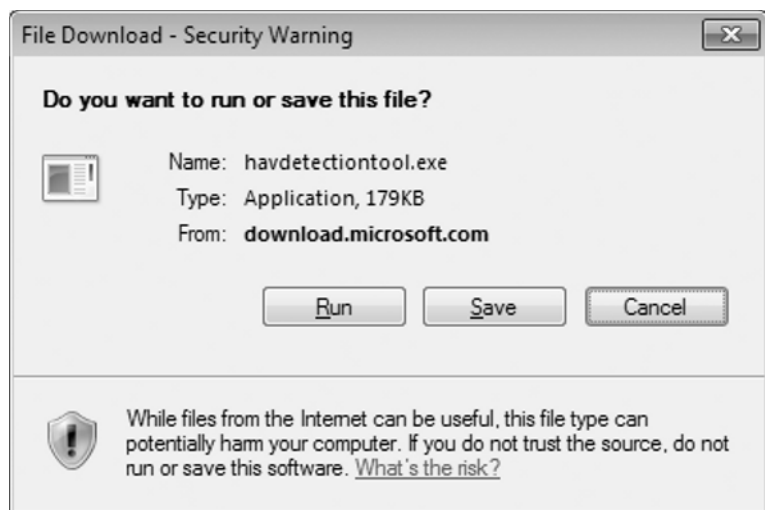
aspx?FamilyID=0ee2a17f-8538-4619-8d1c-05d27e11adb2&displaylang=en or you can search for **havdetectiontool.exe** at the Microsoft Downloads Web site.

When you select the **Download** button, you will be asked to save or run in a window like Figure 9.4. Select **Run**.

■ FIGURE 9.3 Anytime Upgrade Key



■ FIGURE 9.4 Security Warning



Another security warning may appear as shown in Figure 9.5. Select **Run** to continue.

When the license agreement appears, read the license agreement and then click the **I accept the license terms** box as shown in Figure 9.6. Click **Next** to continue.

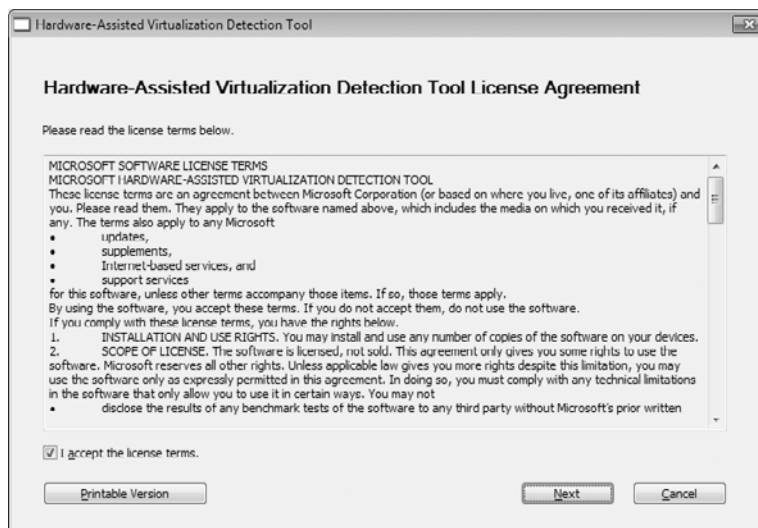
You will receive an informational window similar to Figure 9.7 that will tell you if your computer meets the virtualization requirements.

You could receive one of three possible messages:

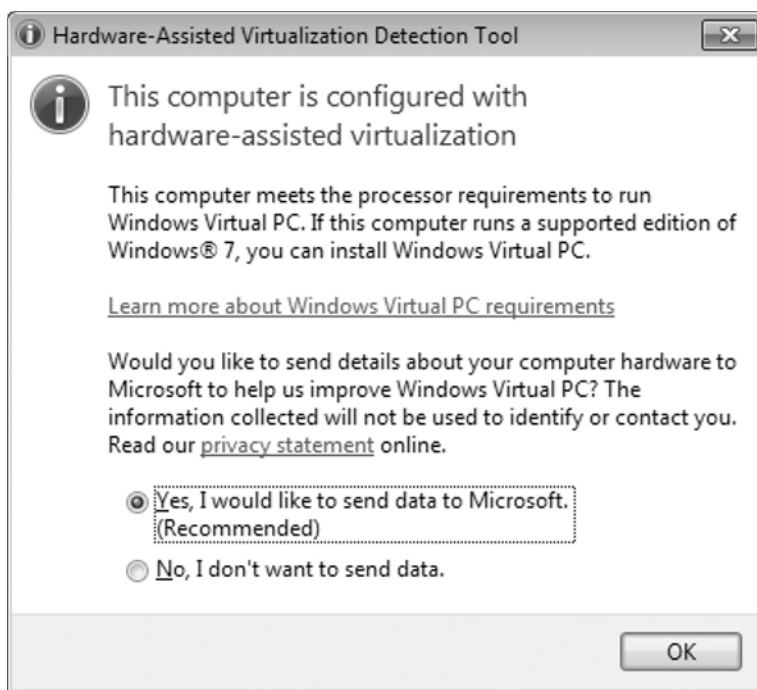
- *This computer is configured with hardware-assisted virtualization.* This is the message we are looking for. It tells us that we are ready to go!



■ FIGURE 9.5 Security Warning



■ FIGURE 9.6 License Agreement



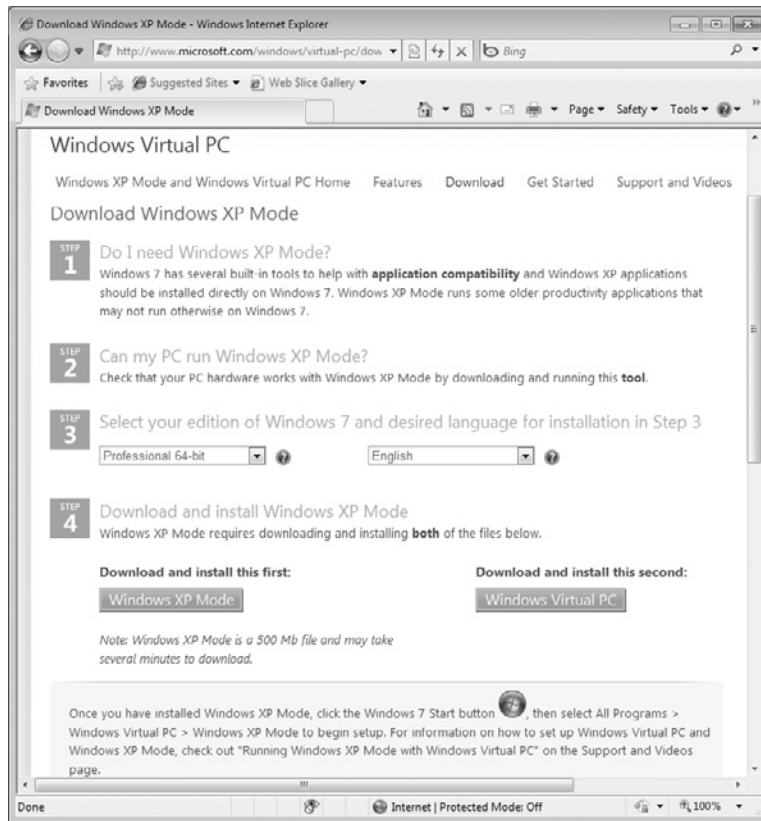
■ **FIGURE 9.7** Virtualization Detection Message

- *Hardware-assisted virtualization is not enabled on this computer.* This means your computer is capable of virtualization, but you will need to enable the hardware virtual assistance in the system BIOS. Please see the warning above before proceeding.
- *This computer does not have hardware-assisted virtualization.* This message means that you cannot run Windows XP Mode or Virtual PC. You cannot use these features on your current computer.

You can now select if you want to share this information with Microsoft or not. Select your choice and click **OK**.

Loading Windows XP Mode

We have now confirmed that we have a supported version of Windows 7 and our computer is capable of supporting virtualization. We are ready to download Windows XP Mode. Windows XP Mode is a complete Virtual Hard Disk with Windows XP Service Pack 3 loaded. This download may take a few minutes to several hours depending on your Internet connection, so plan your day accordingly.



■ **FIGURE 9.8** Windows XP Mode Download Web Site

Follow these instructions to install Windows XP Mode on your Windows 7 computer:

1. Make sure you are connected to the Internet and go to the Windows XP Mode download Web page at www.microsoft.com/windows/virtual-pc/download.aspx. You will see a qualification page similar to Figure 9.8.
2. We have already confirmed Step 1 and Step 2, so select the version of Windows 7 you have running on your computer. Please be careful of the 32-bit or the 64-bit selection. Select your preferred language in the second pull-down list.
3. Click the **Windows XP Mode** download button in step four of Figure 9.8. This is a 500MB file, so it might take a few minutes or longer depending on your Internet connection.

4. You will get a security warning like Figure 9.9.
 - a. Click **Save** to save the download for use on several similar Windows 7 desktops. You will be prompted for a location to save the file.
 - b. Click **Run** if this is the only desktop that will be running Windows XP Mode.
5. You may be asked for authorization again to start the installation of Windows XP Mode as shown in Figure 9.10. Click **Run** to continue.

■ FIGURE 9.9 Security Warning



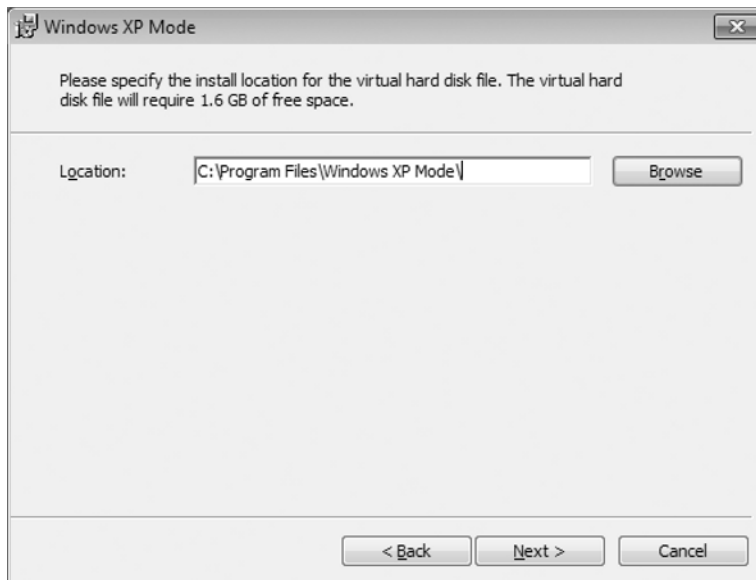
■ FIGURE 9.10 Security Warning



6. Windows XP Mode will start the install process as shown in Figure 9.11. Click **Next** to continue.
7. Select the location for the install of Windows XP Mode files. The location is shown in Figure 9.12. You can either accept the default or click the **Browse** button to select another location. These files are



■ FIGURE 9.11 Welcome Screen



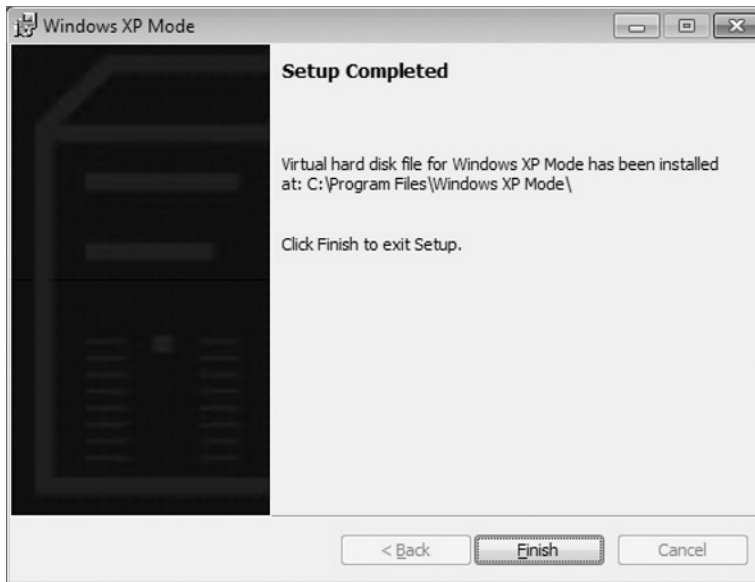
■ FIGURE 9.12 Installation Location

fairly large, so if you have a larger disk drive that has more space, is faster, or you just want to locate this in a different spot, you may want to select a different location other than the default. Click **Next** when ready to continue.

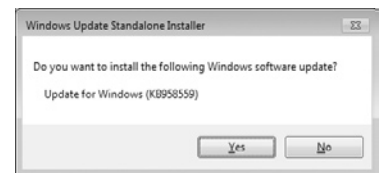
8. The files will begin to load. The installation progress will be similar to Figure 9.13. The progress line will cross a couple of times, so be patient.
9. Congratulations! You are finished. Click **Finish** as shown in Figure 9.14.
10. Next you need to install Virtual PC on your Windows 7 desktop. Start by going back to the Virtual PC Web site in step 1. Click the **Windows Virtual PC** button as shown in Figure 9.8.
11. Again you will be asked if you want to **Run** or **Save** the download as shown in Figure 9.9. If this is the only desktop you will be loading Virtual PC on select **Run**. If you have more than one desktop, select **Save** and pick a folder to store for file. This is only a 10MB file so it won't take quite as long to download.
12. When the file is finished downloading, you will be asked if it is **OK** to install the update as shown in Figure 9.15. Click **Yes** to continue.
13. The License screen appears. Read the license by scrolling to the bottom or select the printable version and print it out. Click the **I Accept** button as shown in Figure 9.16 when ready. If you do not want to accept the license, click the **I Decline** button. This will prevent you from installing the Windows Virtual PC software.



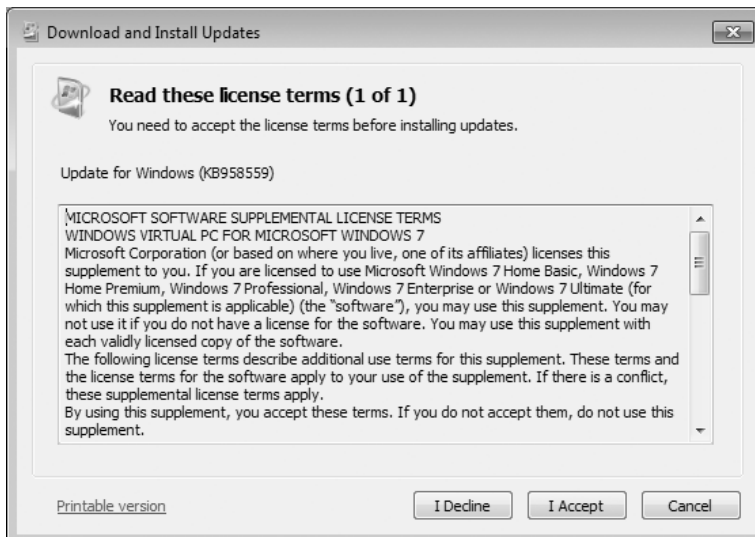
■ FIGURE 9.13 Installation Progress



■ FIGURE 9.14 Installation Complete



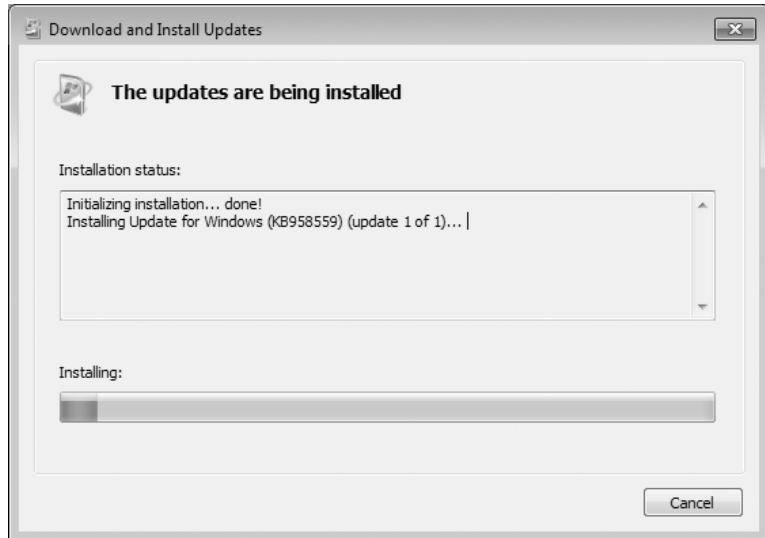
■ FIGURE 9.15 Stand-Alone Installer



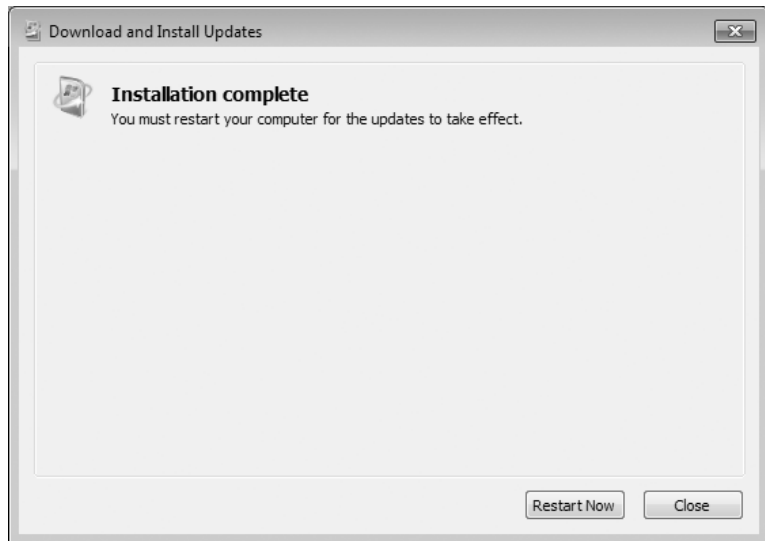
■ FIGURE 9.16 License Screen

14. The installation will begin. You can track the progress by watching the progress bar as shown in Figure 9.17.
15. Congratulations! You have successfully completed the install of Virtual PC as shown in Figure 9.18. You will now have to reboot your desktop. You can click the **Restart Now** button to reboot the computer. You can click **Cancel** to reboot later.

■ FIGURE 9.17 Installation Progress

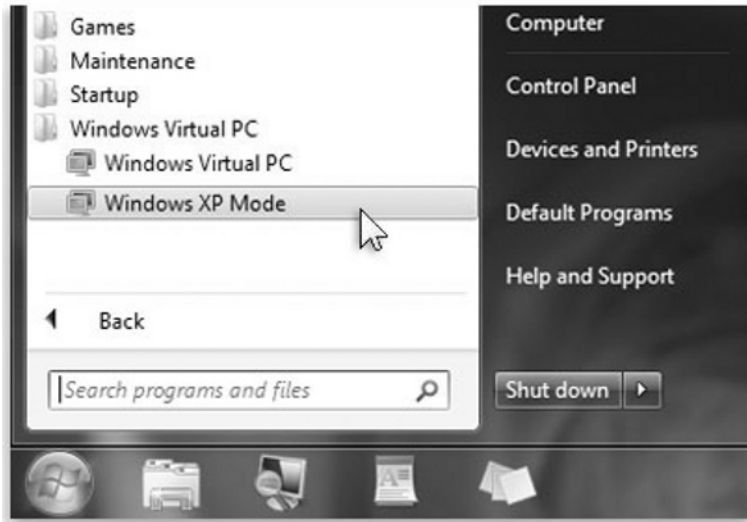


■ FIGURE 9.18 Installation Complete




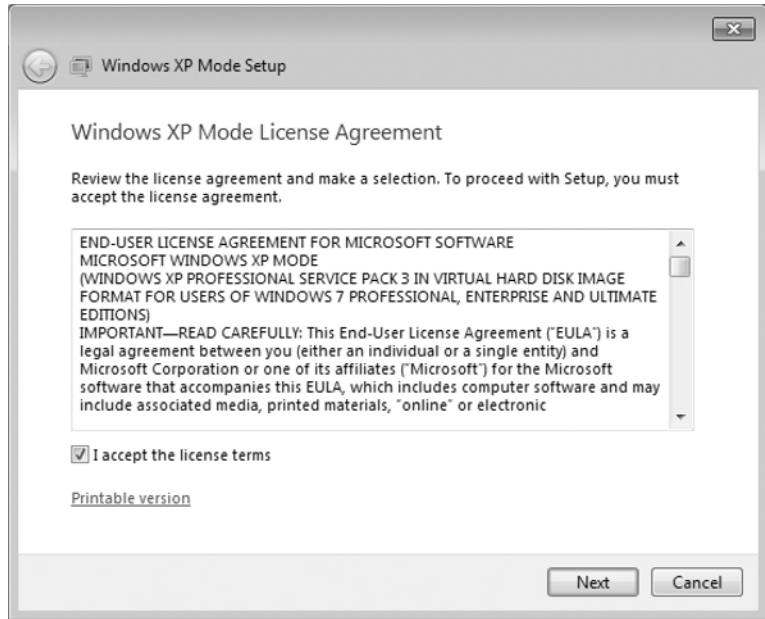
Setup of Windows XP Mode

We now have Windows XP Mode installed, but we still need to set it up. Remember this is a separate implementation of a full operating system. You must go through the first time use setup of Windows XP just like it is installed on a stand-alone computer. The big difference is that, this time, it will be available to both Windows XP and Windows 7. The following steps will get you through it easily.

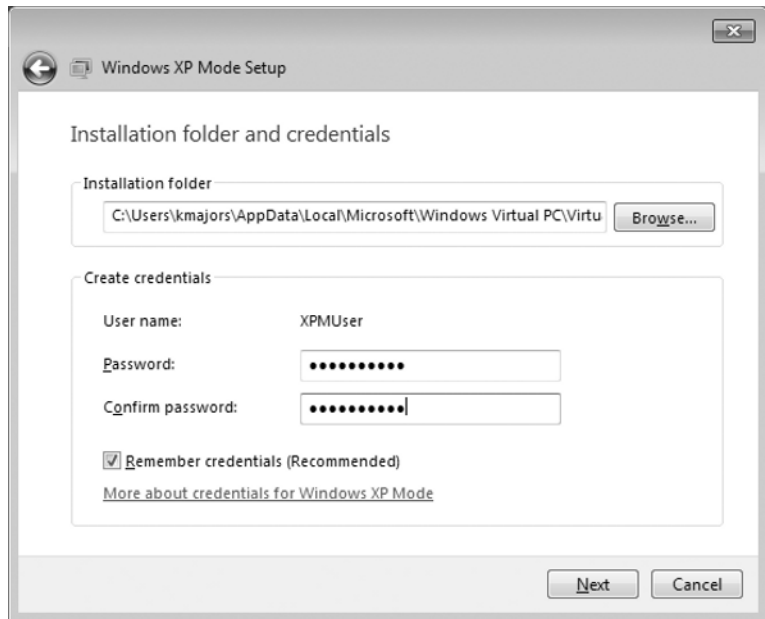


■ FIGURE 9.19 Start Menu Selection

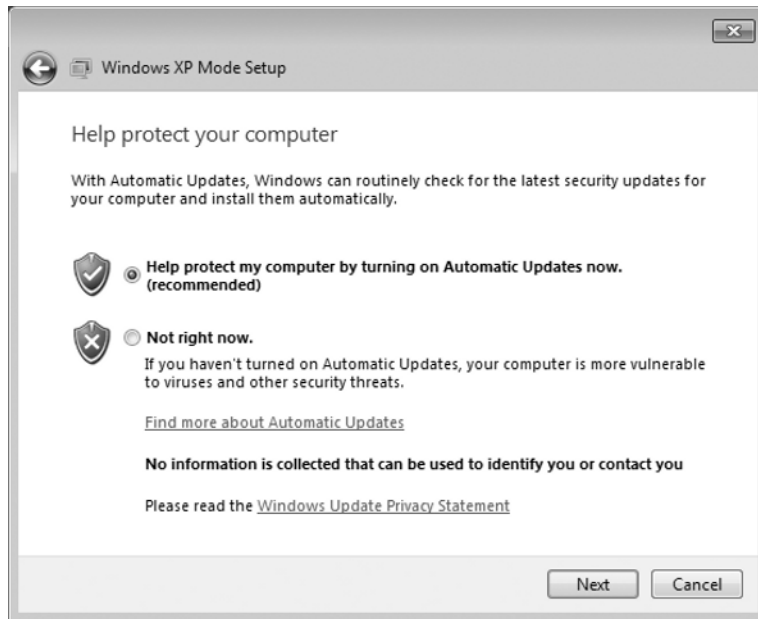
1. When your computer has restarted, click the Windows 7 **Start** button , then select **All Programs | Windows Virtual PC | Windows XP Mode** to begin setup as shown in Figure 9.19.
2. You will be presented with a licensing screen. Please read the licensing terms and click **I accept the license terms** when ready, and then click **Next** as shown in Figure 9.20. You can click the **Printable version** link if you want to print the agreement.
3. Next, you must verify the installation folder and set up a password for the XPMUSER account. This is a required account that is automatically created. It is the default account used to run Windows XP Mode and any virtual applications installed in the virtual instance of Windows XP with SP3. You would normally need to enter this password when starting the Windows XP Mode. If you do not want to enter the password each time you start Windows XP Mode, you can store the credentials by checking the **Remember credentials** check box. Figure 9.21 shows the Installation folder and credentials screen.
4. Verify the installation folder listed at the top of this screen. It should be the same folder you selected when you installed Windows XP Mode in the previous section. If not, click the **Browse** button and find the installation files. Enter an appropriate password for your password rules. Reenter the password again. Click **Next** when ready to continue. Any authorized user accessing an application running in Windows XP Mode will use these credentials.



■ FIGURE 9.20 Windows XP Mode License Screen



■ FIGURE 9.21 Installation Folder and Credentials



■ FIGURE 9.22 Automatic Updates

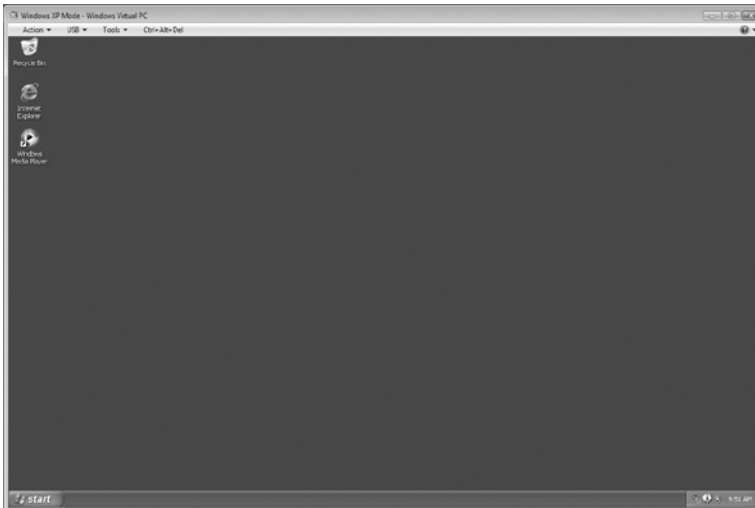
5. You need to set up Automatic Updates next. As shown in Figure 9.22, you can select an option to automatically download and apply the updates or to turn this service off. For this service to function properly, both the host Windows 7 computer and the Windows XP Mode virtual desktop must be able to connect to the Internet. It is recommended that Automatic Updates be enabled. Click **Next** to continue.
6. Setup will now configure drive sharing. Drive sharing will allow files to be shared between both the Windows 7 operating system and the Windows XP Mode. Applications can pass data between the two operating systems with copy and paste seamlessly. Click **Start Setup** as shown in Figure 9.23.
7. The setup process will start. Figure 9.24 shows you the progress screen. This may take a few minutes, so be patient.
8. Once the installation is complete, you will be automatically logged on to the new virtual machine. The hardware will be identified as Windows XP Mode starts up. Figure 9.25 shows the virtual desktop for Windows XP Mode.
9. Next, you will need to apply any additional updates for Windows XP. You should see the **Automatic Updates** icon in the lower right corner. This is shown in Figure 9.26. Double-click this icon to start the update process.



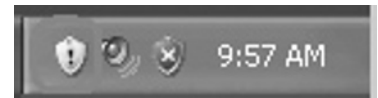
■ FIGURE 9.23 Setup Drive Sharing



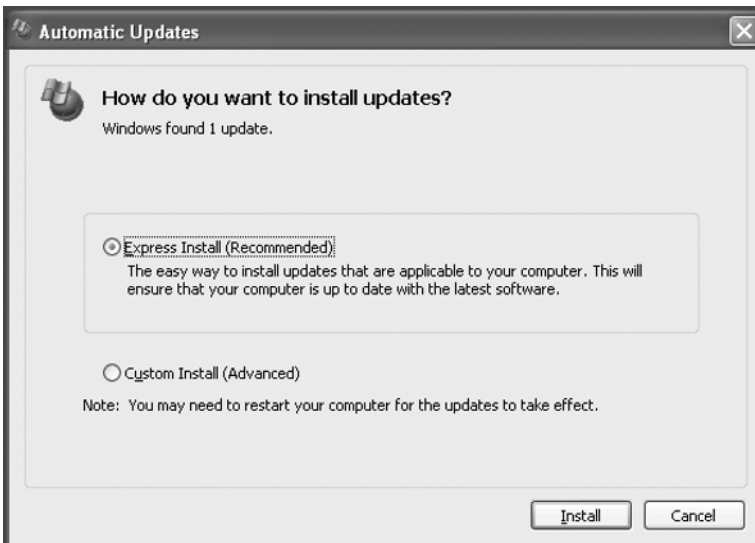
■ FIGURE 9.24 Installation Progress Screen



■ FIGURE 9.25 Windows XP Mode Desktop

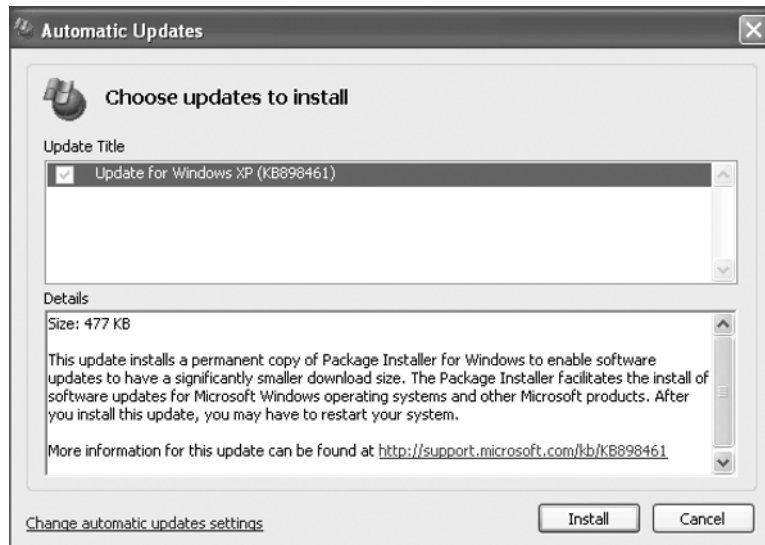


■ FIGURE 9.26 Automatic Update Icon



■ FIGURE 9.27 Automatic Updates

10. You should see the familiar Automatic Updates screen as shown in Figure 9.27. You have two choices:
- a. **Express Install** – This option will install all the recommended and critical updates.
 - b. **Custom Install** – This option will list all the available updates and allow you to select the ones you want to install.



■ FIGURE 9.28 Custom Install

Since this is a virtual machine and we are only using it to run applications that will not run in Windows 7, the **Express Install** is the recommended choice. We are only interested in the recommended and critical patches in mostly all instances. If you require any additional updates for your specific application, then choosing the **Custom Install** will allow you to be selective. Figure 9.28 shows this option. Click **Install** for either option to install the updates.

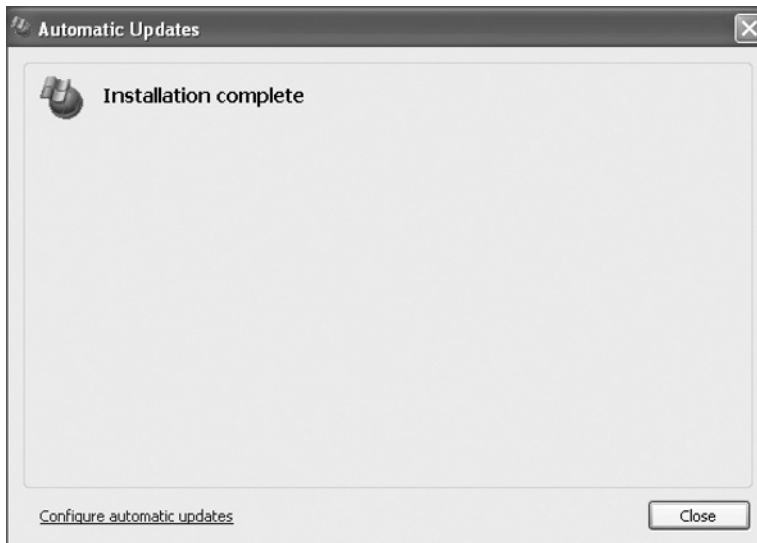
11. Congratulations! All the recommended updates have been applied. Figure 9.29 will be displayed when all the updates have completed. Click **Close**.

Install an Application in Windows XP Mode

Now that we have Windows XP Mode installed and setup, we need to load an application. These applications will run in a separate memory space and will be isolated from Windows 7 applications. Although mostly all applications can be configured to work with Windows 7, there are a few that either will not work or work better if they are running on Windows XP. A good example may be that a custom application was built on Microsoft Access XP. This application is the remaining application that has not been migrated to Microsoft Access 2007/2010. You must load Access XP into Windows XP Mode. The following steps will show you the process of loading an application into Windows XP Mode.

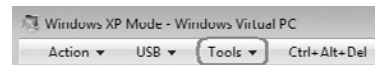
WARNING

Windows XP Mode does not include any antivirus protection. You need to load an antivirus program even if you already have one loaded on the host Windows 7 computer.



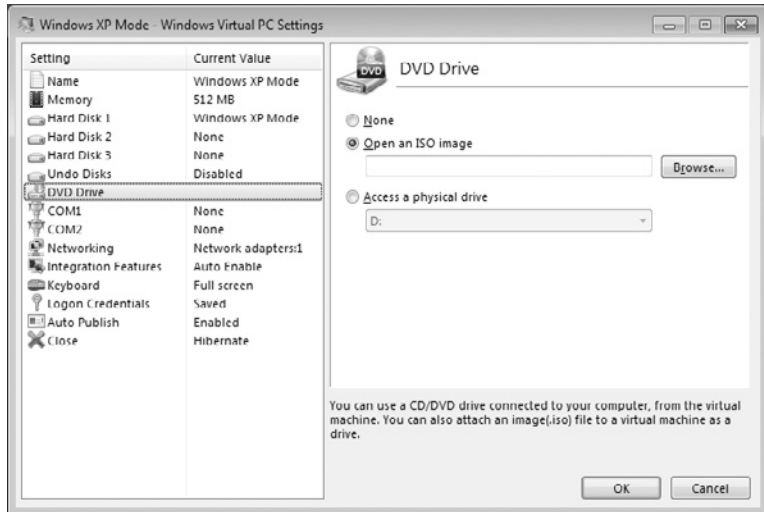
■ **FIGURE 9.29** Installation Complete

1. To start Windows XP Mode, click the **Windows 7 Start button**, then select **All Programs | Windows Virtual PC | Windows XP Mode** as shown in Figure 9.19.
2. Insert the software CD into the CD- or DVD-ROM or mount an International Organization for Standardization (ISO) file to Windows XP Mode. To mount an ISO file click **Tool | Settings...** from the top menu in the Windows XP Mode window as shown in Figure 9.30.
 - a. Select the DVD drive from the list of devices as shown in Figure 9.31.
 - b. If you have more than one physical DVD drive, you can select the one you want to use by clicking the **Access a physical drive** radio button and selecting the desired DVD drive letter from the pull-down box. If you have an ISO image you want to use, just click the **Open an ISO image** radio button. Click the **Browse** button. Select the ISO image you want to mount as shown in Figure 9.32 and click **Open** to continue.
 - c. Regardless of your installation media choice, once you have made your selection, click **OK** to continue.
3. Select the setup program and start the application install. Figure 9.33 shows an application ready to install.
4. Follow the installation instructions for your application.
5. Once the application is completed, you can run the application in Windows XP Mode by clicking **Start | All Programs** and selecting

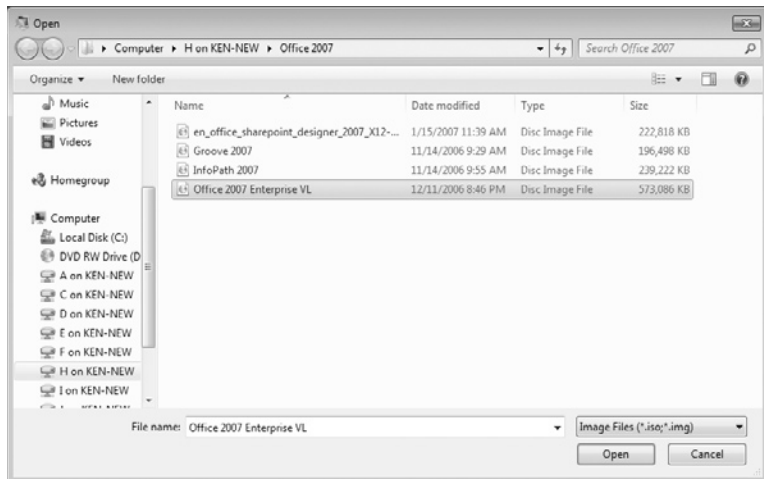


■ **FIGURE 9.30** Windows XP Mode Menu Bar

■ FIGURE 9.31 Virtual Device Settings

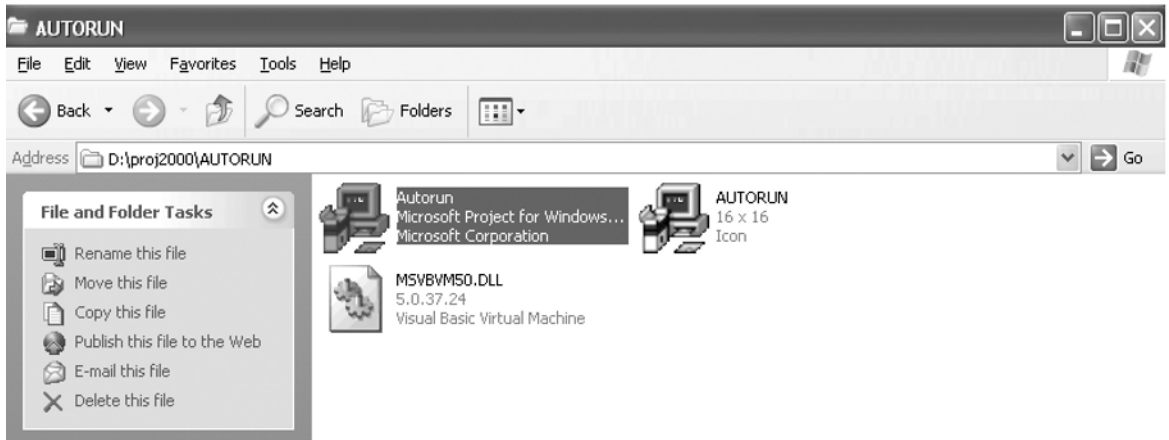


■ FIGURE 9.32 Selecting an ISO Image File



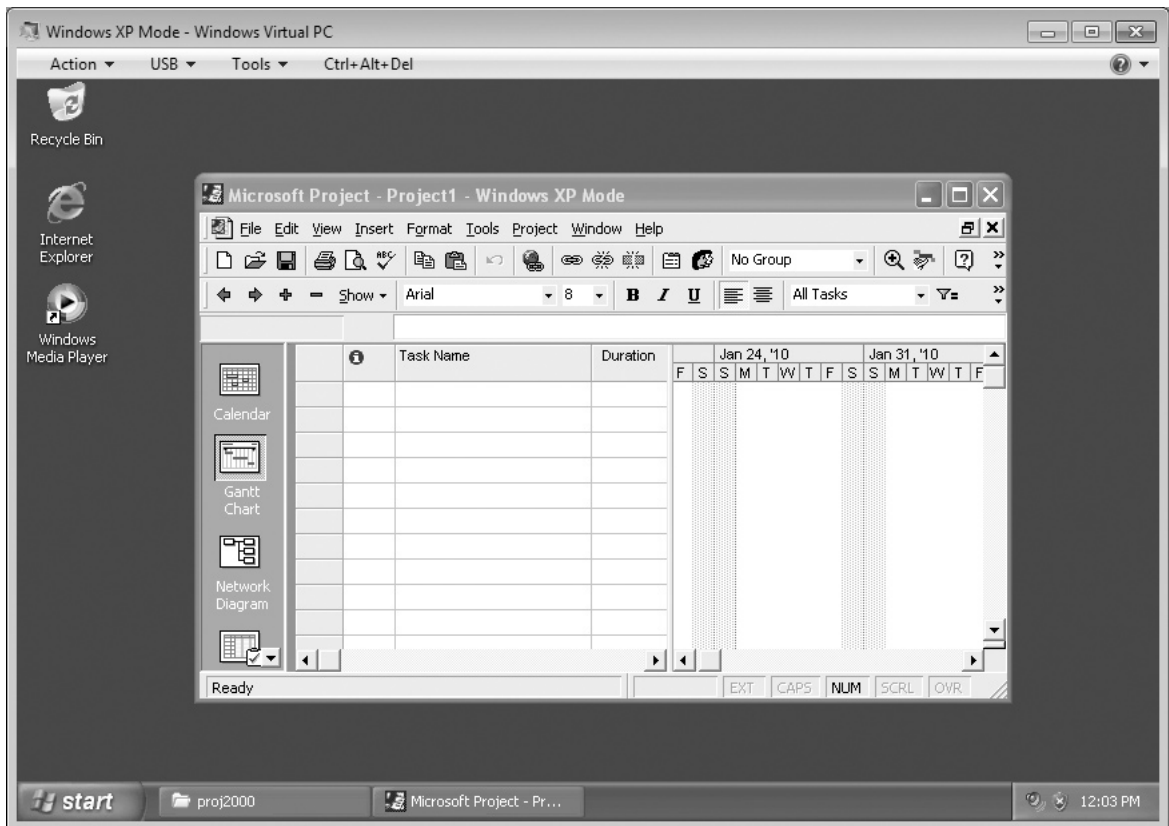
your application. The application should start up as it normally would in a Windows XP desktop. Figure 9.34 shows Microsoft Project 2000 running in the Windows XP Mode desktop.

6. Congratulations! You have loaded an application into a virtual machine. What does this mean to you and how does it help your situation? Go ahead and close the application and log off Windows XP Mode and close the window. You will receive a message that *The Windows XP Mode is hibernating.*



■ FIGURE 9.33 Application Installation

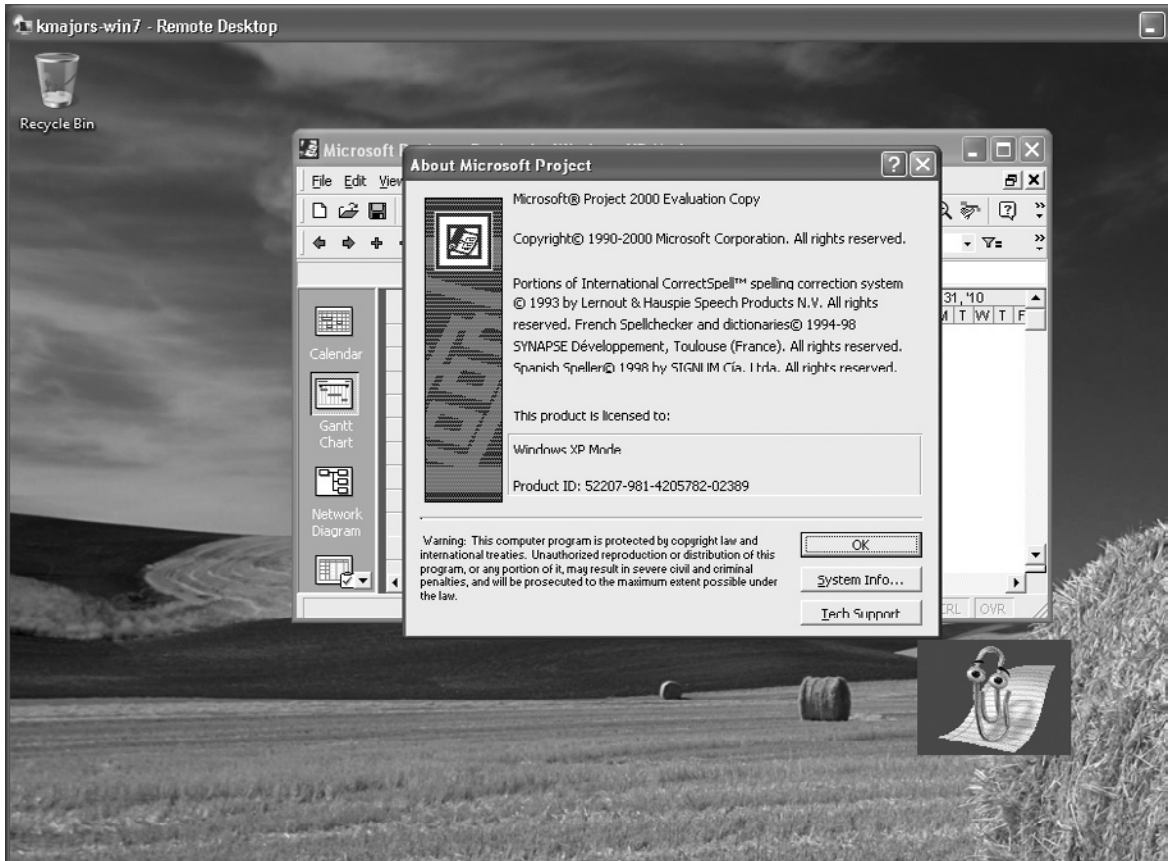
■ FIGURE 9.34 Application Running in Windows XP Mode



7. Click the **Windows 7 Start button | All Programs | Windows Virtual PC | Windows XP Mode Applications** as shown in Figure 9.35. Notice your application is listed.
8. Double-click this application. You will receive a message that Windows XP Mode is being enabled and your application starts up as shown in Figure 9.36.
9. As you use your application, you will discover that it performs as it normally would if it was installed locally on the Windows 7 desktop directly. Figure 9.36 also shows that this is Microsoft Project 2000 running in Windows XP Mode.
10. Congratulations! You have successfully installed and configured Windows XP Mode and loaded and run an application from both the Windows XP Mode desktop and the Windows 7 Start menu.



■ FIGURE 9.35 Windows XP Mode Applications



■ **FIGURE 9.36** Application Running in Windows XP Mode

MANY FORMS OF VIRTUALIZATION

Windows 7 can support many different methods of virtualization and leverage them in combinations to meet the deployment needs for yourself or your business. We will next look at some of these methods to give you an idea of what can be accomplished.

Using Windows 7 in combination with Windows Server 2008 and Hyper-V and the System Center Suite can provide your enterprise with a very flexible and robust environment to provide your users with the desktop they require. This can start with the very desktop itself to access to applications or a completely hosted desktop. The key to this is a new licensing model that Microsoft has developed. The Virtual Enterprise Centralized Desktop (VECD) license is the Windows 7 license that allows virtualization of Windows desktops.

VECD Licensing Is a Challenge

The VECD license is the Windows 7 license that allows virtualization. Traditionally, a user only accessed one desktop at a time on a single specific device. When a new desktop device was installed, it typically required a new Windows license. If it relocated an existing license, the previous desktop was taken out of service. With virtualization, this is not the typical use case anymore.

The VECD allows a business to run a copy of Windows 7 in a data center that may provision multiple desktops across several servers in production and for disaster recovery.

A VECD license allows the following:

- *The ability to run a copy of Windows in a data center* – This is required for dynamic provisioning and creating deployment images of Windows 7 for use by your users.
- *Rights to move virtual machines between servers for increased reliability* – With load balancing and disaster recovery, even a virtual desktop may run on several servers in a data center or even multiple data centers. Each instance of Windows 7 would normally need to be licensed, but with the VECD, only the active instance would need to be licensed.
- *Unlimited backup of virtual machines* – This is especially important for distributed disaster-recovery sites. Many companies will back up desktops to multiple disaster-recovery sites for rapid recovery if any one location becomes unavailable. This is different from the normal backup to tape or even a removable disk for desktops. It is not uncommon for servers to maintain a continuous data-protection model, but more frequently desktops now fit the category of a critical system.
- *Ability to access up to four running VM instances per device* – Traditionally, all users needed their own license for a desktop. The VECD will allow the same desktop device to access up to four running virtual machines. We have already loaded Windows XP Mode on our Windows 7 desktop. That is a running virtual machine. You are good for three more. This is possible because we also loaded Virtual PC. You could create a complete data center on just your desktop. You may need to license the other three operating systems but not the connections.
- *Rights to access corporate desktops from home for a user that has already been licensed at work* – If a user normally accesses a virtual machine running Windows 7 at work, they are allowed to access the same virtual desktop from home without requiring an additional license.

- *Availability to volume licensing keys, such as Key Management Service (KMS) and Multiple Activation Keys (MAK)* – This feature allows the enterprise to use the KMS system in Windows Server 2008 to activate and authorize Windows 7 desktops locally without the need to connect to the Internet or contact Microsoft individually.

The key to the VECD license is the desktops *must* be covered under Microsoft's Software Assurance (SA). This is a requirement to even purchase the VECD license. This can save a great deal on the cost of the upgrade and support of the Windows 7 environment. For example,

- Your company has 100 laptops and desktops.
- Your company has 100 thin clients.
- If the laptops do not have SA, you would need 200 VECD licenses (100 thin clients and 100 laptops).
- If the laptops have SA, you would need 100 VECD licenses (100 laptops). You would need to maintain the SA on each of the laptops.

The details and specifics of your exact solution is beyond the scope of this book. You are encouraged to download the latest version of the Virtual Desktop Infrastructure (VDI) licensing brochure at www.microsoft.com/windows/enterprise/solutions/virtualization/licensing.aspx or contact your Microsoft Licensing Specialist.

As you can see from our simple example, you could save a significant amount on your licensing costs if you decide to leverage virtualization in your business. Although it is a bit tricky at first look, it is worth spending a few minutes discussing the benefits and requirements with your licensing provider.

VDI or Centralized Virtual Desktops

VDI is an alternative desktop deployment model for Windows 7. Instead of running a local copy on each user's desktop, a common image is created and stored on one or more servers in the data center. This image is deployed to a server running a hypervisor.

There are several benefits to implementing a VDI infrastructure:

- A common supported desktop environment can be rapidly deployed across your by creating a single Windows 7 desktop image and using that image to deploy virtual machines on your server hypervisor. A single server can support many virtual desktops. Each of these desktops reacts as a stand-alone Windows 7 desktop. Unlike using Remote Desktop Services (RDS), the users connecting to a virtual

WHAT IS A HYPERVISOR?

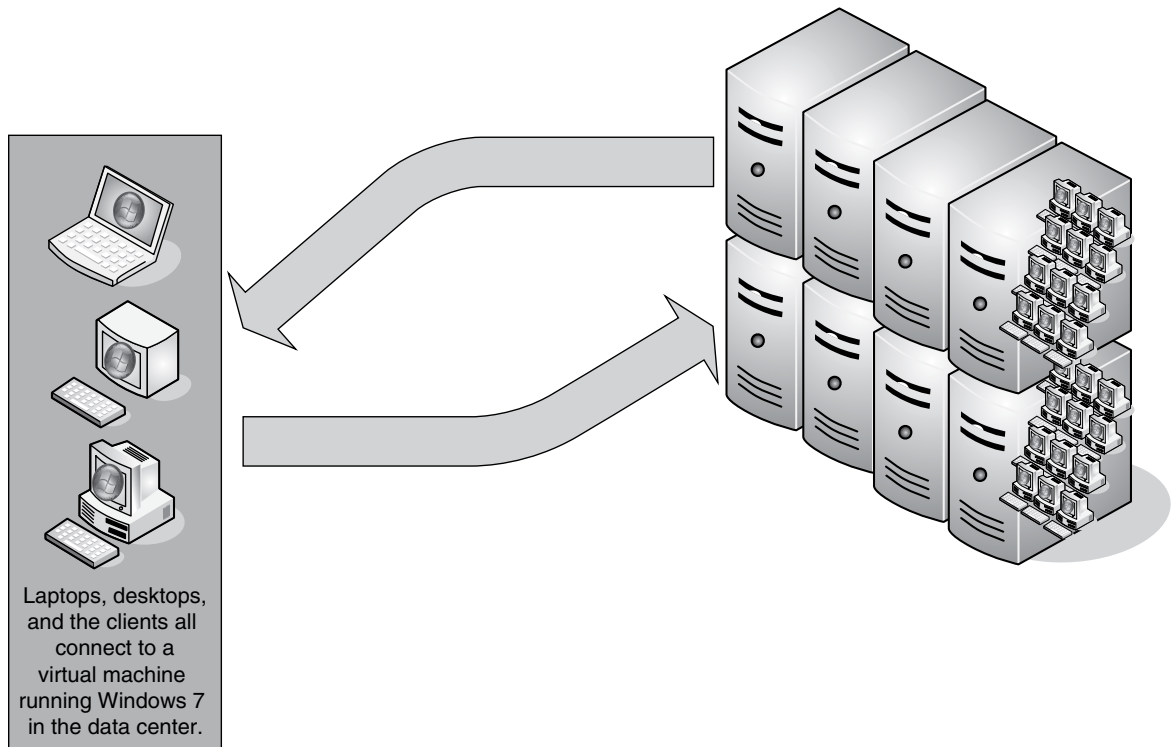
A *hypervisor* is a layer of software that allows for the running of several operating systems simultaneously on a common computer while maintaining isolation between the different operating systems. Windows Server 2008 has a hypervisor known as *Hyper-V*. There are also several other hypervisors such as VMware vSphere and Citrix XenServer.

desktop can have full access to all features of that virtual machine without impacting the other virtual desktops or the host server. Your users could still use the Remote Desktop Client to connect to their virtual desktop.

- Updates and changes to Windows 7 can be done in a centralized fashion by updating the Windows 7 desktop image and then redeploying the updated image to all your users. When they log on the next time, they will have the updated image and all the rest of their settings will be maintained.
- If a problem with an update requires a rollback to a previous version of the desktop image, it can be quickly done. Saving a copy of the previous image before performing the update allows for a roll back by redeploying the previous image and having users to log off and then log back on to receive the previous image.

Figure 9.37 shows a sample VDI design.

■ FIGURE 9.37 Sample VDI Design



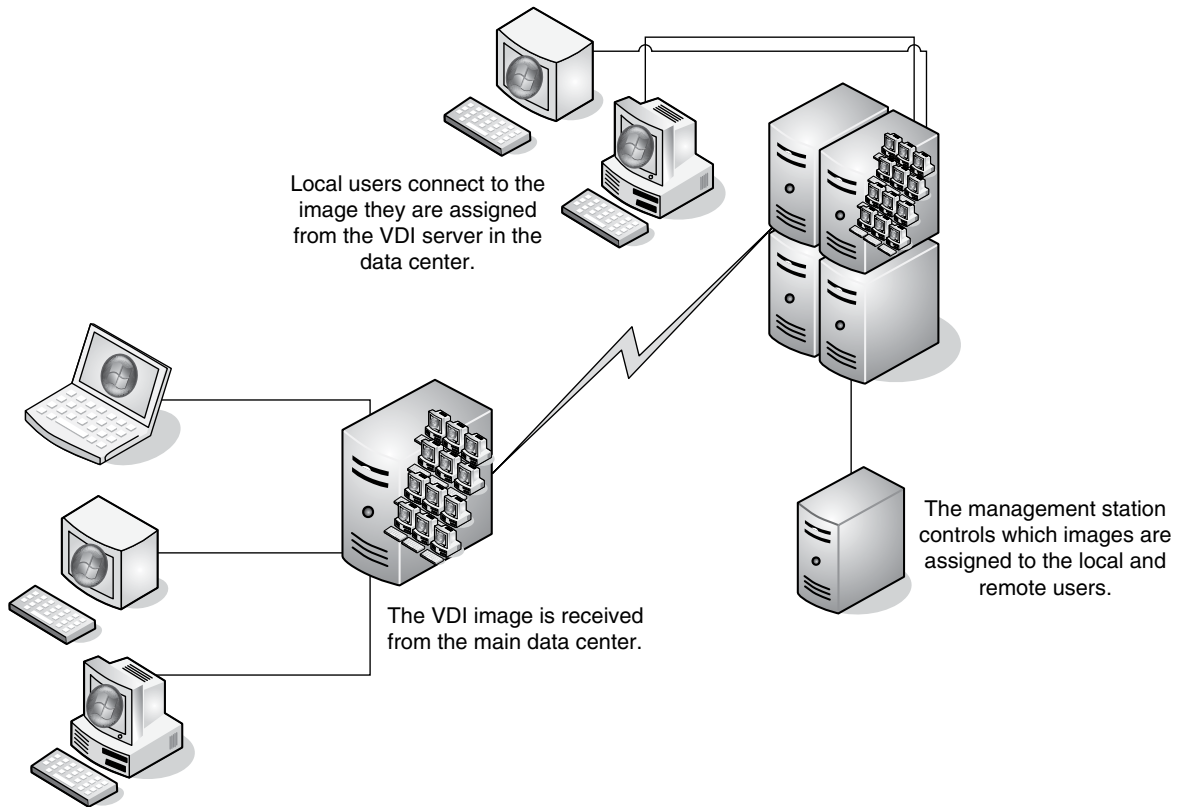
There are some barriers to implementing a VDI. The start-up costs can be high, and the return on investment is longer than it is on a server virtualization project. This is a business decision that should not be taken lightly but instead planned and budgeted before embarking on the project. Some specific areas that need to be considered are as follows:

- VDI may not reduce desktop costs because any saving is typically redirected into server, network, and storage infrastructure. Improvements in desktop management and user management are required to support large numbers of virtual desktops. Applying Group Policies through Active Directory to redirect user folders and implementing roaming profiles will increase the flexibility of a VDI design. VDI should be considered when desktop flexibility is more important than immediate cost savings.
- A user connected to a virtual desktop requires a constant connection to the network. Whether this is through a Local Area Network or across a Wide Area Network (WAN) or a remote connection, the user must be connected to the virtual desktop to be productive. If a user must be able to operate in a disconnected environment, VDI is not a suitable solution for them. If your users are not mobile or only work when they are connected to the network, then this could be a viable solution.
- Planning your VDI deployment is critical to the success of the project because it can be a complex and an investment in infrastructure. Defining which users will benefit the most and the needed virtualization components to deploy is crucial for success.

Distributed Virtual Desktops

A distributed desktop model allows for different desktop images to be deployed to a specific group of users based on their location or user group. This model can be useful if you have a number of different types of users in a single location or you have users in a variety of locations like a branch office. Each group has a different desktop requirement or is connected by a slow or intermittent link. The remote users may have a file server that stores their files and information. Figure 9.38 shows a distributed virtual desktop to a branch office.

Another distributed desktop design may include setting up a Pre-eXecution Environment. This method allows an administrator to deploy an image to a server and a desktop to download and boot that image at start up. Several desktop images can be developed and assigned to a desktop. When the desktop is started, the image is streamed to the device as it starts up. Changing a desktop image is as simple as reconfiguring the device's target image



■ **FIGURE 9.38** Distributed Desktops to a Branch Office

and restarting the desktop. This is a viable design if applications must be run from the local desktop. Some applications require a hardware dongle or a specific Media Access Control address for licensing. Applications that require special graphics or additional cards or adapters not supported in a virtual environment are also good candidates for this type of deployment.

The drawbacks and benefits are as follows:

- The individual images must be loaded with any applications or drivers required for the individual desktop computers. Unless all the desktops are identical, you may need to add the different drivers for each type of hardware the image is being prepared to run on.
- A different image can be configured to load on a desktop as a shift changes or new updates are configured. This is particularly useful because a new image is loaded each time the desktop is rebooted. Viruses and malware are limited in their effectiveness because the entire desktop image is reloaded each time the desktop is reloaded.

- This model is best used with a local server that holds the desktop images. Loading a desktop image over a WAN is a slow process that will discourage the remote users from rebooting their desktops. In this scenario, you should look at using either a local VDI or a distributed VDI solution.

Desktops can also be distributed using Microsoft System Center Configuration Manager (SCCM). This product is part of the System Center Suite and can be used to distribute both applications and desktops to user's desktops, both local and remote. This model will actually install the desktop operating system on the targeted desktop. This is a fairly complex product, and planning and testing of the solution is required for optimum success. You can also use this management solution in conjunction with another System Center Suite component, the Virtual Machine Manager 2008, to create, deploy, and manage desktops in a distributed environment.

Remember, when it comes to deploying a user's desktop, there are several options and one design rarely fits all situations. You can see for the different scenarios that a combination of all options can be leveraged to meet the specific needs of your situation.

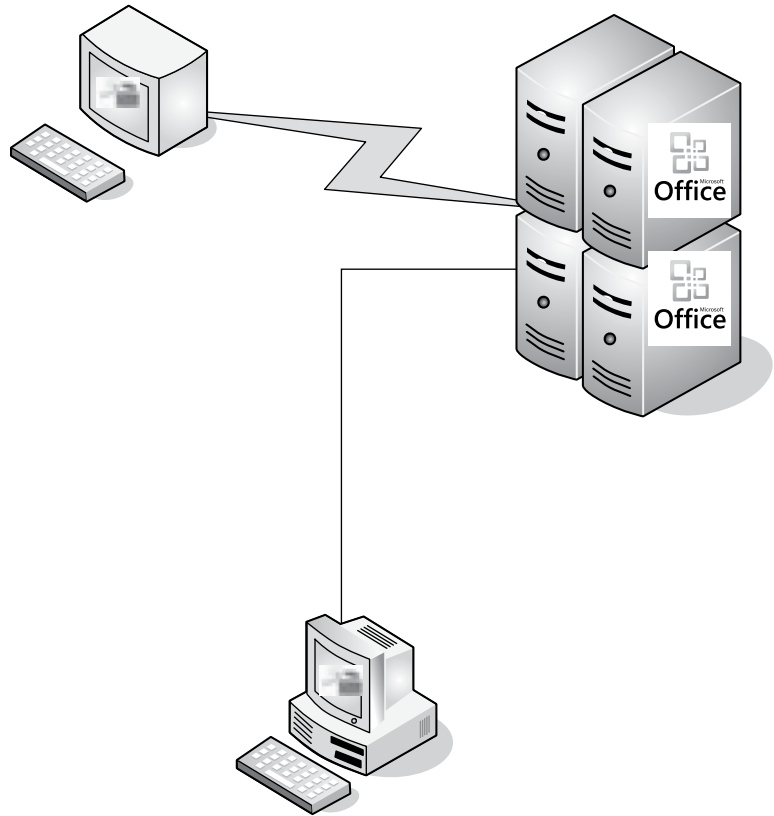
Application Virtualization

Application virtualization can mean many different things when talking about Windows 7 and Windows Server 2008. We have already used one type with Windows XP Mode when we loaded and ran an application that would not normally run on Windows 7. Although this is an easy answer to application virtualization, there are more advanced solutions.

Remote Desktop Services

RDS (formerly Terminal Services) is the most commonly used method of application virtualization. This method presents applications to connected users. The application actually runs in a session on the server in the data center while it appears to be running on the local desktop. This is a cost effective and reliable method of deploying applications to an enterprise. Figure 9.39 shows a simplified diagram of how RDS works.

Users, whether local or remote, all connect to the RDS server. The application is displayed to the end user while being executed on the RDS server. This gives equal performance to both local and remote users running the application. When the applications need to be upgraded or patched, they are patched only on the RDS servers. When the users next connect and run the application, they receive the updated version. The RDS server is capable



■ FIGURE 9.39 Remote Desktop Services

of supporting multiple users on a single server, and there are many new enhancements in RDS with Windows Server 7 that allow for a variety of connection methods. Web Services, Session Broker, and Network Load Balancing all work together to provide a seamless application virtualization environment for most users.

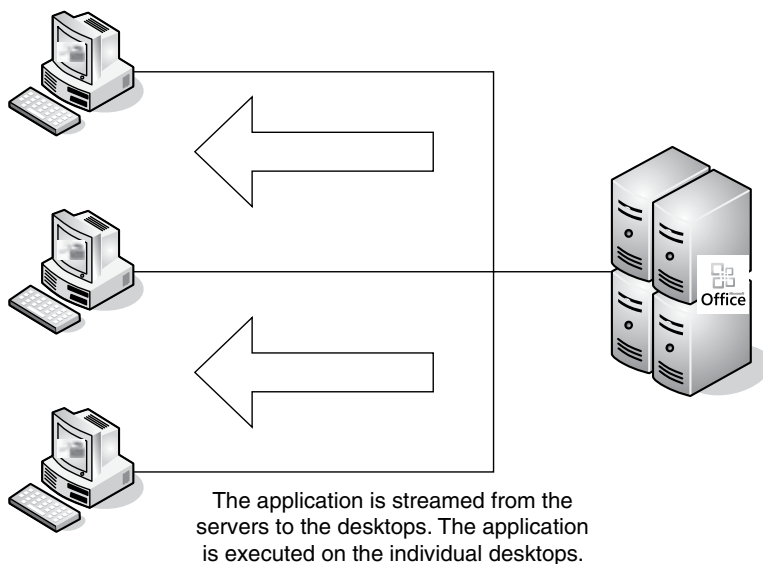
If your users do not want to connect to a server or a Web page to run their applications, there is a new feature in Windows Server 2008 RDS called *RemoteApp*. A published application can be converted to a RemoteApp and generate a Windows Installer File (MSI) that can be deployed through Active Directory, file download, e-mail, or your SCCM environment to all the targeted users. When installed on your Windows 7 desktop, double-clicking on it will launch the application just like it is installed on the end-user desktop. The connection to the RDS server is automatically established and the application is started. The RemoteApp can add items to the desktop Start menu or desktop icon just like a locally installed application.

Using the advanced features of the Remote Desktop Client in Windows 7 allows for mapping of resources to the RDS server, so files and printers can be shared when a user connects. The advanced features also can authenticate a user before a user session is created to relieve the extra burden on the RDS server and allow for more connections and better performance. The drawback to this solution is the fact that a user must be able to connect to the RDS server in some fashion to be able to run an application.

App-V

App-V (formerly SoftGrid) is a method of application distribution that allows the application to be executed on the local desktop without actually installing the application on the individual desktop. Instead, it is streamed to the desktop as the different features of the application are required. This offers a method of running applications in a disconnected mode and allows applications to run in an isolated environment, so they don't conflict with each other. Figure 9.40 shows this basic design.

When an application is installed on the App-V server, it is sequenced, so the most common program modules are loaded first. The purpose of this sequencing is to allow the application to open faster and to allow the user to begin using the application even before all of it is loaded on the desktop. Because of the sequencing of the applications when the application is



■ **FIGURE 9.40** App-V Design

requested, the server sends the most common modules first or streams the application to the desktop. As more modules are requested by the desktop, they are streamed to that desktop. The application is actually processed on the desktop and not on the server.

The benefit of this design is that each application runs in a separate memory space. Applications that normally conflict with other applications can be configured to run on the same desktop without problems. These application streams can be directed to individual desktops, virtual desktops, or even RDS server sessions.

If a user needs to run an application in a disconnected mode, the application can be checked out for a specific amount of time. The entire application will be streamed to the desktop and will be available to the user even if the desktop become disconnected from the network. An example of this is laptop users. The user needs to download the application and then disconnect from the network to travel. When the application is started in a disconnected mode, it performs exactly the same as when connected to a network. Files and documents can be updated or created as needed. When the user reconnects to the network, the files are synchronized to the file servers and the application is either checked back in or the ticket can be renewed for the next trip. If the application has been updated since the initial check out, the new version is streamed to the laptop. Because this checkout process is similar to checking a book out of the library, there is a time limit on the application. This time limit is configured by the administrator. If the laptop is lost or stolen, the application will time out and become unusable. This helps protect you and your company from losing expensive software when the laptop is removed from the environment.

User Session Virtualization

User session virtualization is a newer version of desktop virtualization that works at the operating system level. While normal virtualization of the desktop allows an operating system to be run by virtualizing the hardware of the desktop, RDS and App-V allow for the virtualization of the applications. User session virtualization lies between the two.

A desktop has an operating system loaded on the base hardware. This can be either physical or virtual. The user session virtualization keeps track of all changes to the operating system that a user might make by encapsulating the configuration changes and associating them to the user account. This allows the specific changes to be applied to the underlying operating system without actually changing it. This allows several users to have completely different operating system configurations applied to a base operating system installation.

The most common example of user session virtualization is leveraging folder redirection and roaming profiles with Windows Server 2008. Applying these settings in Group Policies allows for a basic operating system to be loaded on several desktops, and a user can have the same experience and find all their files regardless of the specific desktop they choose to use. Although these settings are commonly used in an RDS environment, it can be just as easily implemented for your desktop environment. The big key to performance is to keep the user data close to the desktop the user will access. Because an RDS environment is centrally located in the data center, having the user-redirection folders and profiles in the data center improves overall performance. The same design could be true for a VDI deployment where all the virtual desktops are located in a data center. All the user-redirection folders and profiles should be located close to the virtual host servers.

If you are in a distributed desktop environment and there are local file servers available at each location, you can deploy virtualized user sessions in the form of redirected folders and roaming profiles.

Folder Redirection

Folder redirection is configured by applying a Group Policy. Windows Server 2008 has several settings that allow you to redirect user folders that would normally be contained in your profile to server-based folders. These settings are contained in the User Setting\Administrator Templates\System\Folder Redirection section of the Group Policy. You must be on the domain controller to enable these settings.

Common folders that can be redirected are as follows:

- My Documents
- Favorites
- Start Menu
- Desktop
- Application Data

These are the most common but there may be others you want to redirect. There are normally two settings, *Basic* and *Advanced*.

- Basic – This setting applies the folder redirection to all users to whom the Group Policy applies.
- Advanced – This setting applies to select users and can apply different settings to different user groups.

These folders are normally contained in your profile. They can become very large and take a long time to load when you log on. By redirecting them, you place a pointer in your profile that points to the folder where this

information is located. The pointer is not very large and does not change, so your profile remains smaller.

Roaming Profiles

To enable the roaming profiles, you use the Active Directory Users and Computer tool on your domain controller. By modifying your user account, you can point to the location of your profile on a file server. When you log on to a desktop computer, your profile settings will be downloaded to that desktop. When you log off, any changes will be copied back to the folder and your profile will be removed from the desktop.

There are two main types of roaming profile, *Terminal Services* and *Windows* profiles.

- Terminal Services – This profile is only applied to users running a Remote Desktop Session. It can be different from the Windows profile but is typically only set up for RDS users.
- Windows – This is the normal profile. It is set up in the Account Properties of each user account.

To set up a roaming profile you must create a shared folder on a centralized server and configure the path to the share in the user account properties. Using the format of `\\Servername\ProfileShareName\%Username%` will create a folder and insert the profile for each user configured to use a roaming profile. If for some reason the file share is not available, a default local profile will be created for the users when they log on. They will not have their settings or files.

Using roaming profiles across a slow link is not recommended because of the amount of time to load the file. You should always locate the file server close to the location the user will need it. That means if the roaming profile will be used in a desktop environment, the profile server should be close to the desktop. If this is a VDI, then the desktop is in the data center. If this is a Remote Desktop Service infrastructure, then the desktop is on the RDS server.

Microsoft Enterprise Desktop Virtualization

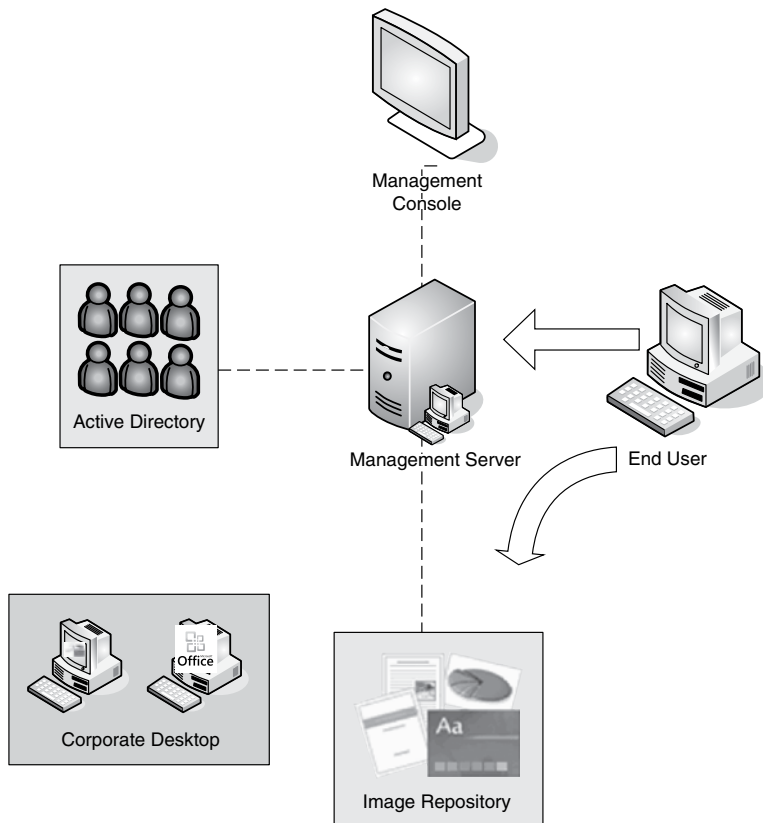
Microsoft Enterprise Desktop Virtualization (MED-V) is Microsoft's new core component of the Microsoft Desktop Optimization Pack (MDOP). Med-V enables the deployment and management of Microsoft Virtual PC images of Windows desktops to address enterprise upgrade and migration scenarios. MED-V helps an enterprise upgrade the version of Windows on the desktop even when some applications are not yet functional or supported on the new version of Windows. Windows XP Mode of Windows 7 is part of MED-V and leverages the Virtual PC on the Windows 7 desktop.

MED-V builds on top of Virtual PC to run two operating systems on one device, adding virtual image delivery, policy-based provisioning, and centralized management. MED-V works with other Windows operating systems like Vista to allow them the same benefits of Windows XP Mode on Windows 7.

Using the MDOP tools, an administrator can build and configure a desktop image with the unsupported application and deploy it to the enterprise desktops as a virtual image that will run as if it was installed on the desktop operating system.

MED-V allows deployment of legacy versions of a Windows operating system like Windows XP or Windows 2000 to any version of Windows desktop operating system. The management server allows for the creation and testing of multiple images. When the image is correct, it can be deployed to all users requiring the application.

Once installed, the application is available to users just like it was locally installed. Figure 9.41 shows the processes of MED-V in action.



■ FIGURE 9.41 MED-V in Action

The process works as follows:

1. The Corporate desktop images are prepared.
2. The image is stored in the Image Repository.
3. The Image Repository registers the image with the Management Server.
4. The Administrator uses the Management Console to assign the image to the appropriate Active Directory user group.
5. When the end user signs in, the image is deployed to his or her desktop and stored in the Virtual PC virtual machine folder.

In order to use MED-V, you must use and all managed desktops must be members of the Active Directory domain. Clients can be Windows 7, Vista, or Windows XP SP2. The guest operating system can be Windows XP SP2 or SP3 or Windows 2000 SP4.

The use of MED-V extends the benefits of Windows 7's Windows XP Mode to other desktops. This tool eliminates the barriers to adoption of a current desktop operating system because of application incompatibility.

■ SUMMARY

In this chapter, we learned how to deploy Windows 7's Windows XP Mode feature. To do this, we needed to:

- Verify our Windows 7 operating system was Professional, Enterprise, or Ultimate
- Verify our computer had virtualization hardware assist
- Verify that the computer BIOS was configured to enable the hardware assist features.
- Download and install Windows XP Mode
- Download and install Virtual PC

We configured Windows XP Mode by going through the wizard to assign a password and then performed a reboot of the system. Once we had the Windows XP Mode running, we installed a legacy application. We launched the application from Windows XP Mode and from the Start menu of Windows 7. This demonstrated the integration of the legacy application with the primary operating system.

We discussed several different types of virtualization and how to leverage them with Windows 7 and your enterprise.

- We discussed application virtualization with RDS, RemoteApp, and App-V.
- We discussed the VDI using Hyper-V and how we could leverage a virtual desktop to deploy a large number of corporate desktops quickly to both local and remote users.