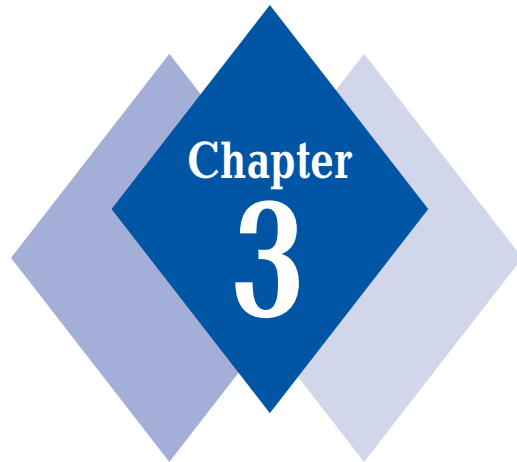


# Hardware and Software Compatibility



## **In This Chapter**

*Choosing not to install Windows 7 over an older operating system*

*Recognizing when you may have to install Windows 7 over an older OS*

*Using the Windows 7 Upgrade Advisor to catch problems in advance*

*Taking action if the Windows 7 Upgrade Advisor indicates that an updated driver "isn't available"*

*Understanding Windows 7 compatibility issues*

*Using devices and printers*

*Achieving better backward compatibility with XP Mode and Windows Virtual PC*



One of the biggest issues you'll face when moving to a new version of Windows—any version, not just Windows 7—is compatibility. Whenever Microsoft changes the underpinnings of Windows, both hardware and software compatibility are going to suffer. That said, Microsoft claims that Windows 7 offers far better backward compatibility than did previous Windows versions, mostly because it is architecturally a minor upgrade when compared to Windows Vista and thus shares the same software and hardware compatibility prowess as its predecessor. However, all it takes is the loss of a single necessary hardware device or software application to turn any Windows upgrade into a disaster. In this chapter, we examine some of the compatibility issues you can run into when making the move to Windows 7, and how you can troubleshoot them.

## Hidden Perils of the Windows 7 Upgrade

With all the new features and functionality provided by Windows 7, you might be tempted to buy a retail version of the operating system and install it over your existing copy of Windows Vista or, in the case of Windows XP, perform a migration-type upgrade. While we do cover upgrade scenarios fully in Chapter 2, we don't generally recommend upgrading an older PC to Microsoft's latest OS, for the following reasons (all of which are especially true for XP users):

- ◆ Your old PC may not be up to the challenge of running Windows 7. You may need substantial investments in additional RAM, a more capable video card, a larger hard drive, or all of the above to get adequate performance from Windows 7.
- ◆ Some of your hardware, such as printers and networking adapters, may not work at all after you install Windows 7—unless you update the drivers they need to versions that are Windows 7-compatible.
- ◆ Even if you find that one or more of your drivers need to be updated, the vendor of your hardware may not make a Windows 7-compatible version available for months, years, or ever. (It's happened before with previous versions of Windows.)
- ◆ Some of the software that's installed and running just fine in Windows XP may not work properly once you've performed the upgrade. (There are workarounds for this, however, as described later in this chapter.)
- ◆ Finally, some software or hardware may never work in Windows 7. Companies do go out of business, after all. Others simply stop supporting older models to entice you to upgrade to a new machine.

### Secret

#### Avoid Installing Windows 7 over Windows Vista

We recommend that you get Windows 7 preinstalled with your next new PC. This is the best way to acquire Windows 7. Another reasonable option, assuming you know what you're doing and have recent hardware, is to purchase a retail version of Windows 7 and then perform a *clean install* of the OS on your existing PC. We *don't* recommend that you install Windows 7 over Windows Vista.

Here's why. Installing Windows 7 on top of Windows Vista may cause incompatibility problems that you might not be able to fix easily. When you buy a new PC with Windows 7 preinstalled, it's almost certain that the components in the PC will have been selected for their compatibility and will have the latest driver software. PC makers also support their products with Web sites that provide the latest known drivers. These sites aren't usually as up-to-date as they should be, but they will at least work.

In general, you shouldn't consider installing Windows 7 on a PC that previously ran Windows XP or Vista unless the following conditions are true:

- You need a feature of Windows 7 that you can't add to XP. (Much less likely with Vista.)
- You need an application that requires Windows 7.
- You can't afford even the least expensive new PC that comes with Windows 7 preinstalled.

Even if one of the preceding conditions is true, you may be better off backing up all of your old data to a CD/DVD or removable hard disk, formatting the old PC's hard drive, and doing a clean install of Windows 7. This avoids the possibility that some components of the old OS will hang around to cause conflicts. If you've never backed up and formatted a hard drive, however, don't try to learn how on any PC that's important to you.

If you do decide to install Windows 7 on an older PC, at least run Microsoft's Windows 7 Upgrade Advisor, described in this chapter, to determine which drivers you may need to update first; and regardless of how you need to install Windows 7, check out Chapter 2 first, which provides a thorough overview of the various ways in which you can get this system installed.

## The Windows 7 Upgrade Advisor

To help you determine whether your current PC has the performance characteristics and hardware and software compatibility needed to avoid issues before upgrading or migrating to Windows 7, Microsoft provides a handy tool called the Windows 7 Upgrade Advisor.

The Upgrade Advisor performs an analysis of your PC and is partly designed as a marketing tool, as it will recommend which version of Windows 7 is right for your system. (Curiously, it almost always recommends one of the more expensive, premium versions.) The Upgrade Advisor also provides real-world benefit outside of Microsoft's needs: it will tell you which hardware devices and software applications need updates before they can work with Windows 7; and because the back end of the Upgrade Advisor application runs on Microsoft's servers, it always provides up-to-date information.

**tip**

The Windows 7 Upgrade Advisor can be downloaded from the Microsoft Web site. See [www.microsoft.com/windows/windows-7/upgrade-advisor.aspx](http://www.microsoft.com/windows/windows-7/upgrade-advisor.aspx).

**Secret**

While the Windows 7 Upgrade Advisor is primarily designed to help users of previous Windows versions discover whether their PC can be upgraded successfully to Windows 7, it also has a secret second use: it can be run on Windows 7 and used to determine whether your PC is able to run a more capable (and more expensive) version of Windows 7.

## Using the Upgrade Advisor

The Windows 7 Upgrade Advisor is a simple wizard-like application, as shown in Figure 3-1.



**Figure 3-1:** The Windows 7 Upgrade Advisor can be used to determine whether your PC has what it takes to compute in the 21st century.

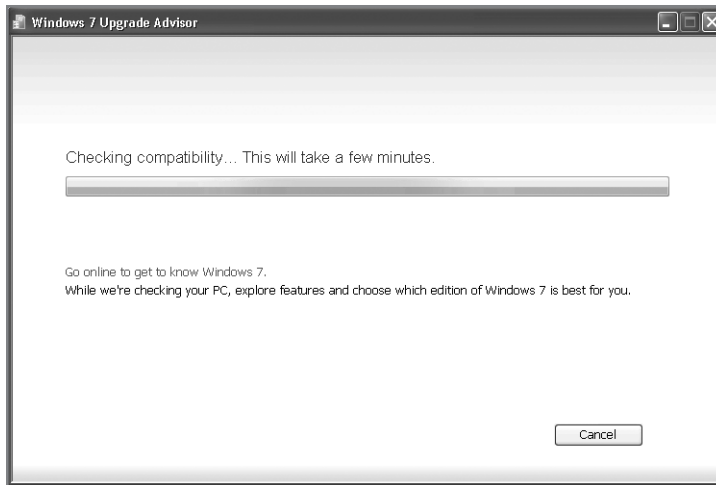
The Upgrade Advisor is designed to test two different kinds of hardware compatibility:

- ◆ Whether your hardware is fast enough and modern enough to run Windows 7 satisfactorily
- ◆ Whether your device drivers are compatible with Windows 7

The Upgrade Advisor's initial screen suggests that you should plug in any devices you may want to use with Windows 7. It's easy to forget some, but this is absolutely the right time to have them checked out, so here's a short list to jog your memory about the various devices you want to ensure are plugged into your PC and powered on before you start the Upgrade Advisor's system scan:

- ◆ Printers and scanners (make sure they're powered on not just plugged in)
- ◆ External hard disk drives, backup devices, and USB drives of all kinds
- ◆ An extra USB hub that you seldom use—plug it in anyway to check it
- ◆ Spare USB keyboards and mice that you may have forgotten
- ◆ An iPod, Zune, or other MP3 player, even if you seldom synchronize it to your PC
- ◆ Headphones and other audio devices (they may require audio drivers that won't be tested unless the devices are jacked in to an audio port).

When you've checked for all of the preceding and you are satisfied that you've plugged in and turned on everything you might want to test, click the Start check button in the Upgrade Advisor to continue. Depending on the speed of your system, the scan (see Figure 3-2) can take anywhere from a minute or two to several minutes.

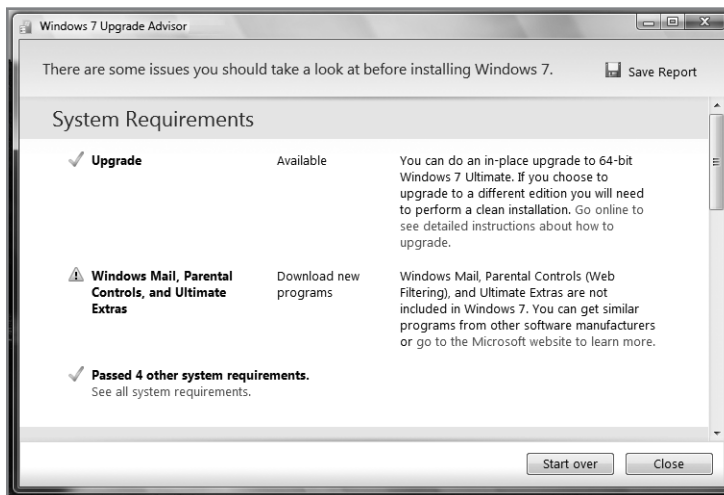


**Figure 3-2:** Hold your breath, as the moment of truth awaits.

## Picking through the Results

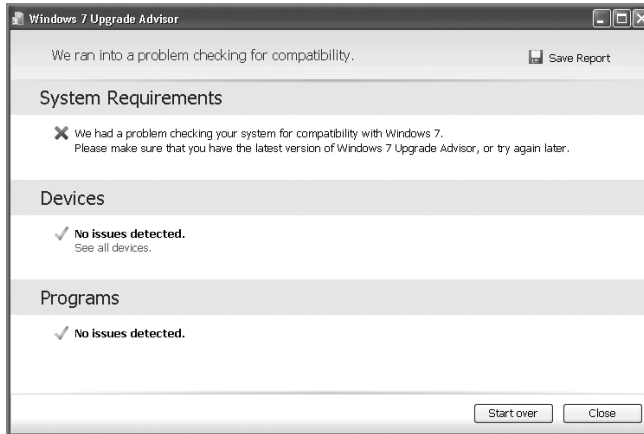
The Upgrade Advisor tests three areas: the PC's hardware, to determine whether it meets the minimum Windows 7 requirements; the various hardware devices attached to the system, to ensure that they all have compatible drivers; and the software applications.

When the test is complete, you will see a display like the one shown in Figure 3-3. Almost invariably, the Upgrade Advisor will tell you that your system has received mostly passing grades.



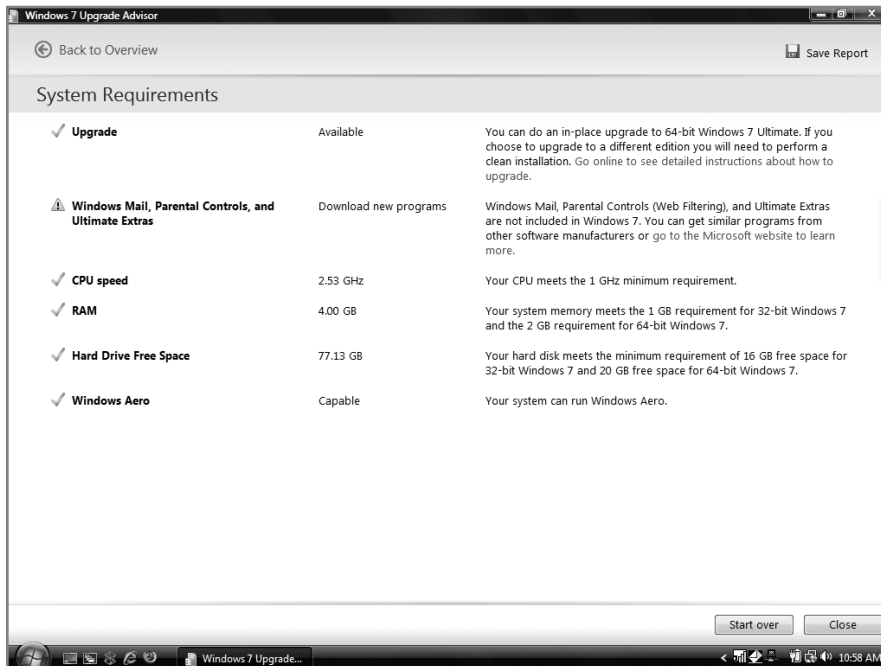
**Figure 3-3:** How did you do? On most PCs built since 2006, the Upgrade Advisor will report that the system can easily handle the core Windows 7 experiences. If a PC fails the System Requirements test, don't even consider installing Windows 7 on the machine without some serious hardware upgrades.

Look below this message, however, and you may see some issues. As shown in Figure 3-4, many older XP-based PCs will have a number of problems to investigate. In some cases, the Upgrade Advisor will explain what's wrong and provide links for more information.



**Figure 3-4:** Many XP-era PCs will have a bit of upgrading ahead before they can be moved to Windows 7.

As shown in Figure 3-5, the Upgrade Advisor can provide information about how your system conforms to Windows 7's requirements.



**Figure 3-5:** The Upgrade Advisor will compare your PC to what it knows to be correctly working hardware and software.

If you decide at this point to install Windows 7 on your own PC, and that PC later proves to perform too slowly for you, you can always upgrade your RAM, video board, and disk drive—possibly even swap out your motherboard for a new model—to improve the situation after the fact. However, you should have a reasonable concept of acceptable minimum performance before performing the upgrade. We discuss our minimum hardware recommendations for Windows 7 in Chapter 2.

## Drivers That Lack a Windows 7–Compatible Version

If the Upgrade Advisor reports that a particular driver you need may not exist, the first place to start your search is the site of the hardware vendor. New drivers are released every day, so the one you need may have just come out and it's likely that the hardware maker will make it available long before it shows up on Windows Update.

Smaller companies and those that no longer support a particular model of hardware may never spend the time to develop a Windows 7–ready driver. In that case, you may have no choice but to purchase newer hardware that does have a driver you can use in Windows 7.

## Understanding Windows 7 Compatibility Issues

Any discussion of PC compatibility, of course, encompasses two very different but related topics: hardware and software. In order for a given hardware device—a printer, graphics card, or whatever—to work correctly with Windows 7, it needs a working driver. In many cases, drivers designed for older versions of Windows will actually work just fine in Windows 7. However, depending on the class (or type) of device, many hardware devices need a new Windows 7–specific driver to function properly on Microsoft's latest operating system.

Software offers similar challenges. While Windows 7 is largely compatible with the 32-bit software applications that Windows users have enjoyed for over a decade, some applications—and indeed, entire application classes, such as security software—simply won't work properly in Windows 7. Some applications can be made to work using Windows 7's built-in compatibility modes, as discussed below. Some can't. Those that can't—like legacy 16-bit software or custom software typically found in small businesses—might be able to find solace in the new XP Mode feature in Windows 7. We examine XP Mode at the end of this chapter.

A final compatibility issue that shouldn't be overlooked is one raised by the ongoing migration to 64-bit (x64) computing. Virtually every single PC sold today does, in fact, include a 64-bit x64-compatible microprocessor, which means it is capable of running 64-bit versions of Windows 7. However, until Windows 7, virtually all copies of Windows sold were the more mainstream 32-bit versions of the system. We'll explain why this is so and how the situation is now changing in favor of 64-bit with Windows 7.

### Secret

From a functional standpoint, x64 and 32-bit versions of Windows 7 are almost identical. The biggest difference is RAM support: while 32-bit versions of Windows “support” up to 4GB of RAM, the truth is, they can't access much more than 3.1GB or 3.2GB of RAM because of the underlying architecture of Windows. 64-bit versions of Windows 7, meanwhile, can access up to a whopping 192GB of RAM, depending on which version you get.

## Hardware Compatibility

One of the best things about Windows historically is that you could go into any electronics retailer, buy any hardware device in the store, bring it home, and know it would work. Conversely, one of the worst things about any new version of Windows is that the previous statement no longer applies. Paul (who, let's face it, is old) often tells the story about the time he was wandering down the aisles of a Best Buy in Phoenix, Arizona, over a decade ago when Windows NT 4.0 first shipped, with a printed copy of the Windows NT Hardware Compatibility List (HCL) in his hand. He needed a network adapter but had to be sure he got one of the few models that worked in the then new NT 4.0 system.

Windows 7 users face a similar problem today, though there are some differences. First, there's no HCL available anymore, at least not a public one, so you're a bit more on your own when it comes to discovering what's going to work. Second, Windows 7 is already far more compatible with existing hardware than NT was back in the mid 1990s. Indeed, thanks to a 3-year head start with Windows Vista—with which Windows 7 shares the same compatibility infrastructure—Microsoft claims that Windows 7 is actually far more compatible with today's hardware than Windows XP was when it first shipped back in 2001. Based on our extensive testing and evidence provided by Microsoft, this is clearly the case. But then, that was true with Windows Vista as well, though overblown tales of that system's compatibility issues burned up the blogosphere during virtually its entire time in the market.

We've tested Windows 7 for over a year on a wide variety of systems, including several desktops (most of which use dual- and quad-core x64-compatible CPUs), Media Center PCs, notebook computers, Tablet PCs, TouchSmart PCs, netbooks, and even an aging Ultra-Mobile PC. Windows 7's out-of-the-box (OOTB) compatibility with the built-in devices on each system we've tested has been stellar, even during the beta, and it only got better over time. (In this case, OOTB refers to both the drivers that actually ship on the Windows 7 DVD as well as the drivers that are automatically installed via Automatic Updating the first time you boot into your new Windows 7 desktop.) On almost all of these systems, Windows 7 has found and installed drivers for every single device in or attached to the system. So much for all the compatibility nightmares.

Myths about how the Windows Aero user interface requirements would require mass hardware upgrades also dissipated during the Vista time frame. And sure enough, by the time we got to Windows 7, we stopped seeing anything other than the Windows Aero UI on every single modern (2006 or newer) PC we've tested. (With the following exception: when you install Windows 7 Home Basic or Starter, you don't gain access to Windows Aero—but this is due to limitations of the OS, not the hardware.)

As always, you could still run into hardware issues with older scanners, printers, and similar peripherals, especially if you're coming from Windows XP. Paul's network-attached Dell laser printer wasn't supported by Windows 7-specific drivers at launch (though it was in Windows Vista with Service Pack 1 and newer). But because it's really a Lexmark printer in disguise, he was able to get it up and running just fine using Lexmark drivers.

If you're coming from Windows Vista, or are using Windows Vista-era hardware, you're in much better shape. For the most part, everything should just work. TV-tuner hardware? Yep. Zune? Done. Apple's iPods? They all work (even on x64 systems). Windows Media-compatible devices? Of course; they all connect seamlessly and even work with Windows 7's Sync Center interface.



## Software Compatibility

We regularly use and otherwise test what we feel is a representative collection of mostly modern software. This includes standard software applications—productivity solutions and the like—as well as games.

We both run a standard set of applications across most of our desktop and mobile PCs. We've also tested numerous video games to see how they fare under Windows 7. (Hey, someone has to do it.) The results have been very positive: not only do most Windows XP-compatible applications and games work just fine under Windows 7, many pre-Windows 7 games also integrate automatically into Windows 7's new Games Explorer as well. Unless it's a very new game designed specifically for Windows 7, you won't get performance information as you do with built-in games, but the game's Entertainment Software Ratings Board (ESRB) rating is enough to enable parents to lock kids out of objectionable video games using Windows 7's parental-control features. It's a nice touch.

If you're coming from Windows Vista, the extra performance boost you get from simply migrating to Windows 7 is astonishing. No, Windows 7 doesn't offer the same raw performance as does Windows XP. But it's close. And it's much faster than Windows Vista. Much faster.

cross  
ref

See Chapter 16 for more information about gaming and Windows 7.

The biggest software-compatibility issues you're going to see in Windows 7 will involve very old applications that use 16-bit installers, and classes of applications—especially antivirus, antispymware, and other security solutions—that need to be rewritten to work within Windows 7's new security controls. Security vendors will fix their wares, no doubt about it. But what about 16-bit applications and other software that just won't run under Windows 7? Surprise. Microsoft has an answer. It's called XP Mode, and we examine this software later in the chapter.

### x64: Is It Time?

The one dark horse in the Windows 7 compatibility story is x64, the 64-bit hardware platform that we're all using today (though few people realize it). The x64 platform is a miracle of sorts, at least from a technology standpoint, because it provides the best of both worlds: compatibility with virtually all of the 32-bit software that's been created over the past 15 years combined with the increased capacity and resources that only true 64-bit platforms can provide.

When Windows Vista first debuted back in late 2006, x64 compatibility was a mixed bag. Hardware compatibility, surprisingly, was excellent, and virtually any hardware device that worked on 32-bit versions of Windows Vista also worked fine on 64-bit versions. Software was another story. Too often, a critical software application simply wouldn't install or work properly on 64-bit versions of Windows, making these versions a nonstarter for most.

Time, however, truly heals all wounds. A huge number of compatibility issues were fixed over Windows Vista's first year on the market, and x64 versions of Windows Vista are now largely compatible, both from a hardware and software perspective, with anything that works with 32-bit versions of the system.

With Windows 7, the situation is even better. With this system, x64 is now the mainstream hardware and software computing architecture for the first time, and you will most likely obtain an x64 version of Windows 7, no matter how you acquire it. In our view, x64 is the way to go. So if you have a choice, open yourself up to the massive RAM improvements that accompany x64 versions of Windows 7.

## Dealing with Software Incompatibility

Regardless of Windows 7's compatibility successes, compatibility issues can still bite you when you least expect it. Fear not: there are ways to get around most software incompatibility issues. You just have to know where to look.

### Compatibility Mode

If you do run into an application that won't work properly in Windows 7, first try to run it within a special emulation mode called *compatibility mode*. This enables you to trick the application into thinking it is running on an older version of Windows. There are two ways to trigger this functionality: automatically via a wizard, or manually via the Explorer shell. There's also a third related function, the Program Compatibility Assistant, which appears automatically when Windows 7 detects you're having a problem installing or using an application.

Let's take a look at all three.

### Using the Program Compatibility Wizard

The Program Compatibility Wizard is a simple application that detects issues on your PC and can automatically fix them for you. Or, if the wizard doesn't detect an issue, you can simply point it at the misbehaving application and have it do its thing, using recommended settings or a manual troubleshooting process.

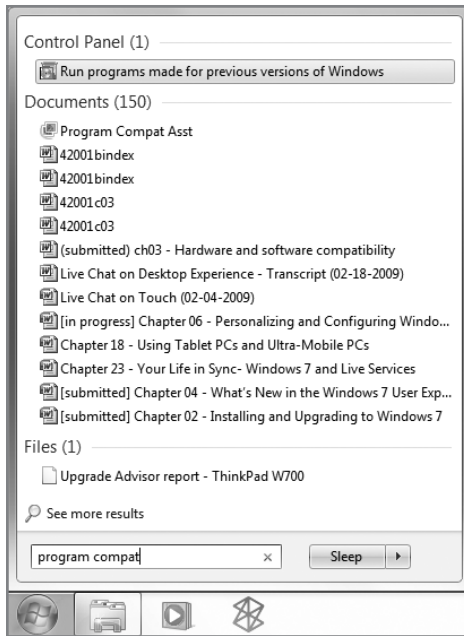
You'd think that using a wizard would be easier than manually configuring compatibility mode; and that would be true if you could just find the thing; unfortunately, the Program Compatibility Wizard isn't available from the Windows 7 user interface. Instead, you have to trigger it using this secret.

Open the Start menu and type **program compatibility** in Start Menu Search. One result will come up: *Run programs made for previous versions of Windows* (see Figure 3-6). You click that to start the Program Compatibility Wizard.

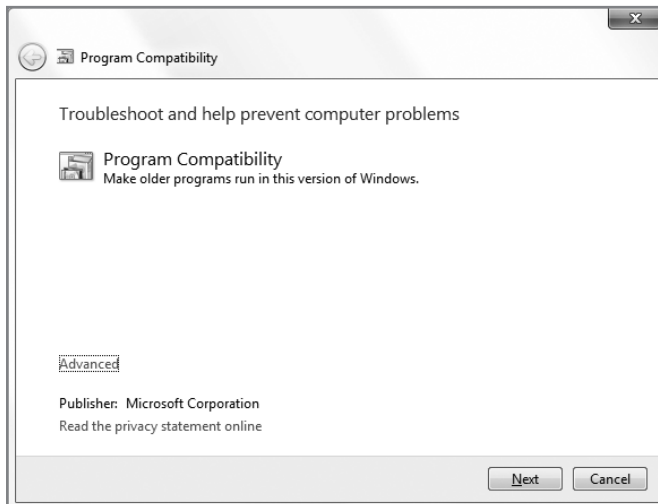
Yes, really.

The admittedly bare-bones-looking Program Compatibility Wizard (see Figure 3-7) steps you through the process of identifying the application to run in compatibility mode and which settings you'd like to configure.

When you click Next, the Program Compatibility Wizard will attempt to find any badly behaving applications. If it can't find any, you can choose the application from a list of applications or click Not Listed and manually show the wizard where to find the application in question.

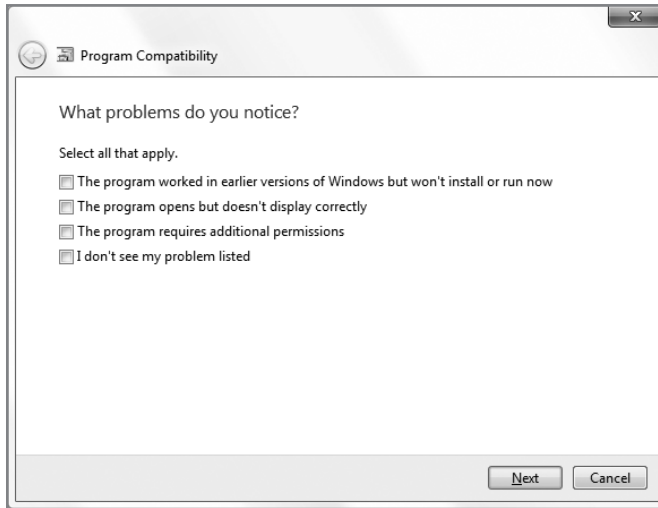


**Figure 3-6:** It's well hidden, but the Program Compatibility Wizard might be just what you need to get that stubborn legacy application to run correctly in Windows 7.



**Figure 3-7:** It ain't pretty, but the Program Compatibility Wizard usually gets the job done.

Once you've identified the program you'd like to fix, you can try the recommended settings, which is always a good idea. If this fixes things, you can simply go about your business. If it doesn't, the wizard will walk you through the process, asking a series of questions, as shown in Figure 3-8.



**Figure 3-8:** Still not working? Tell the wizard your troubles.

For example, if you know an application worked on a previous version of Windows, and it's not working now in Windows 7, you can pick from an extensive list of Windows versions to emulate, including Windows Vista, Windows Vista with Service Pack 1 (SP1), Windows Vista with Service Pack 2 (SP2), Windows Server 2003 with SP1, Windows XP with SP2, Windows XP with SP3, Windows 2000, Windows NT. 4.0 with SP5, Windows 98/Windows ME, or Windows 95.

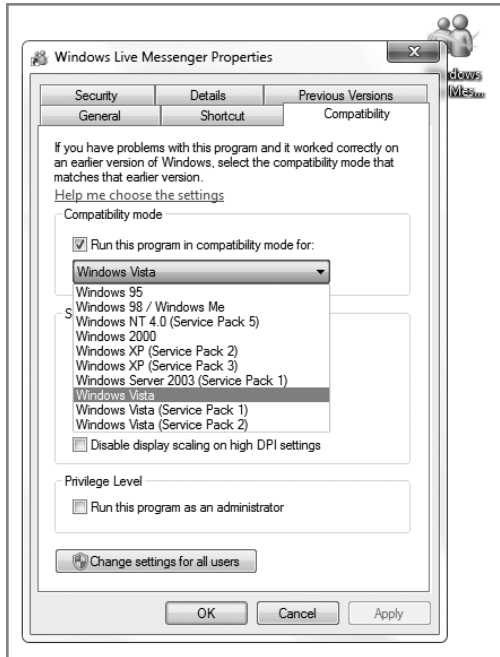
Once you've answered a few questions, the wizard will apply the appropriate settings to the application and prompt you to test-run the application to see how things work out. You can then either accept the configuration, go back and make changes, or just quit the wizard.

### Enabling Compatibility Mode Manually

You don't actually have to hunt around for the Program Compatibility Wizard if you want to run an application in compatibility mode. Instead, find the executable (or, better yet, a shortcut to the executable, such as the ones you'll find in the Start menu), right-click, and choose Properties. Then, navigate to the Compatibility tab, shown in Figure 3-9.

As you can see, this tab provides all of the options found in the wizard, but in a handier, more easily contained location. Just pick the options you'd like, click Apply, and test the application. Once it's working correctly, you can click OK and never bother with this interface again.

Compatibility mode is a great (if hidden) feature, but it's no panacea. Some applications will simply never run on Windows 7, no matter what you do.



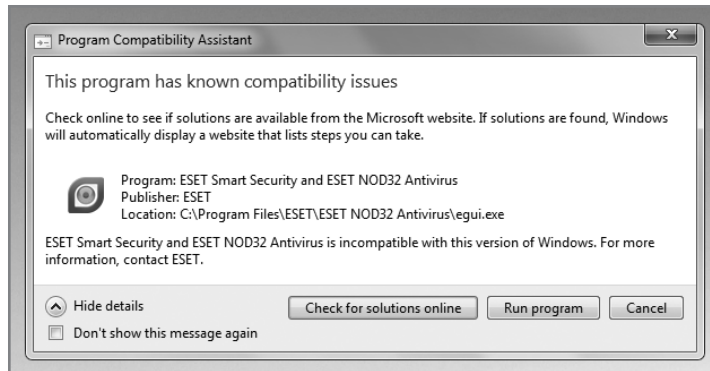
**Figure 3-9:** Any application can be run in compatibility mode.

## Secret

Compatibility mode should not be used to enable older security applications such as antivirus software. These types of applications should be run only on the operating systems for which they were designed.

## Understanding the Program Compatibility Assistant

When Windows 7 detects that you're installing an application with a known compatibility problem or suspects that a just-completed application installation has not concluded successfully, it will offer to fix the problem. This functionality, called the Program Compatibility Assistant, occurs automatically, as shown in Figure 3-10. You're free to decline the offer if you believe the application ran correctly. There is no way to trigger it manually, as you can with program-compatibility mode. Like any good neighbor, it will simply appear when needed.



**Figure 3-10:** The Program Compatibility Assistant will pop up whenever it thinks you need help.

## Windows Virtual PC and XP Mode

When all else fails, a new Windows 7 feature can come to the rescue. Actually, there are two features involved:

- ♦ **Windows Virtual PC** is a software solution that provides a virtual machine environment in which *guest* operating systems, with their own applications and services, can run separately and independently from the *host* environment, or physical PC.
- ♦ **XP Mode** provides a virtual version of Windows XP in which you can configure virtualized, XP-based applications to run side by side with native Windows 7 applications. This effect is shown in Figure 3-11.



**Figure 3-11:** It's crazy but it's true: Windows XP and Windows 7 applications can now run side by side.

**Secret**

Windows Virtual PC is free for all Windows 7 users, but Windows XP Mode is a perk of the Professional, Enterprise, and Ultimate versions of the operating system. You can download both from [www.microsoft.com/windows/virtual-pc/download.aspx](http://www.microsoft.com/windows/virtual-pc/download.aspx).

The next sections take a look at both of these new Windows 7 components.

**tip**

Windows Virtual PC is the latest version of Microsoft's venerable Virtual PC product line. Previously, this environment was made available as a standalone application to users of various Windows versions. With Windows Virtual PC, however, this product is now a Windows 7 feature. And though it doesn't ship on the disc with Windows 7, it can only be installed on Windows 7.

## Understanding Windows Virtual PC

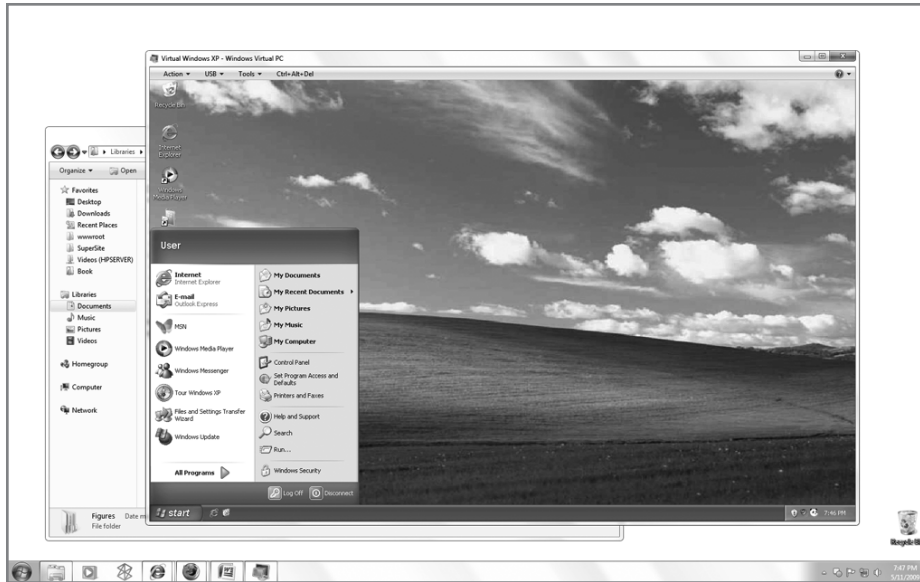
To the operating system and applications running in a virtual environment like Windows Virtual PC, the virtual machine appears to be a real PC, with its own hardware resources and attributes. These virtualized systems have no knowledge or understanding of the host machine at all.

Though virtual machines cannot rival the performance of real PCs for interactive use—they're useless for graphically challenging activities such as modern, action-oriented games, for example—they are perfect for many uses. In fact, virtual machines are often used to test software in different environments, or test Web sites and Web applications with different browser versions.

**Secret**

Looking for a way to play old DOS-based games under Windows 7? Forget Windows Virtual PC. Instead, check out DOSBox. It's awesome, and if you're looking for a Duke Nukem fix this is the place to be (see [www.dosbox.com](http://www.dosbox.com)).

In Windows 7, the Windows Virtual PC virtualized environment—shown in Figure 3-12—plays a special role. Because new versions of Windows are often incompatible with legacy applications, a virtual machine environment running an older version of Windows and those incompatible legacy applications can be quite valuable. Best of all, in such cases, users are often less apt to notice any performance issue because older operating systems tend to require fewer resources anyway.



**Figure 3-12:** Here, you can see Windows XP running inside Windows Virtual PC on top of Windows 7.

That said, for the best results, anyone utilizing Virtual PC to run an older operating system such as Windows XP along with whatever set of Windows 7–incompatible applications is well served to pack the host PC with as much RAM as physically possible. For typical PCs today, that means loading up with 4GB. Remember: you’re running two operating systems and any number of applications simultaneously. That old Pentium 3 with 256MB of RAM just isn’t going to cut it.

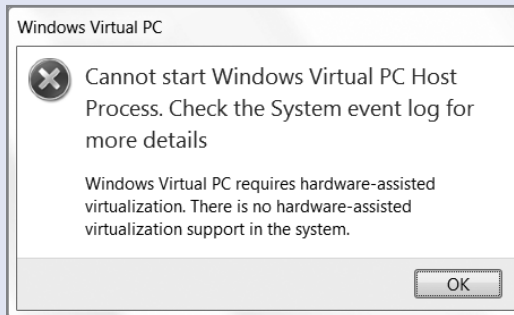
## Secret

Windows Virtual PC is available in separate 32-bit and 64-bit versions. Make sure you download the correct version for your PC.

## Secret

Windows Virtual PC has specific hardware requirements, and thanks to the vagaries of microprocessor marketing, your PC may not be up to snuff. The only important consideration, indeed, is the microprocessor: in order to run Windows Virtual PC (and, thus, XP Mode as well), you need a microprocessor that supports hardware-assisted virtualization. And you must be able to enable this functionality in the PC’s BIOS. If you don’t have such support, you’ll see the error message shown in Figure 3-13 when you try to install Windows Virtual PC.





**Figure 3-13:** Windows Virtual PC has very specific hardware requirements and won't work on all PCs.

This technology goes by different names depending on which microprocessor vendor you're talking about. With Intel, it's called Virtualization Technology (Intel VT). And with AMD it's simply called AMD Virtualization (AMD-V). The vast majority of modern (for example, 64-bit and multicore) AMD processors include AMD-V, so you're generally in good shape if you're running a PC with an AMD processor. But in the Intel world, you have some work ahead of you.

Let's get the simple part out of the way first. If your PC utilizes an Intel i7 or i7 Extreme processor, you're all set. All of these products include the necessary hardware support. For the remainder of Intel's modern CPU lineup, however, you can refer to Tables 3-1 and 3-2.

**Table 3-1: Intel Desktop Microprocessor Support for Hardware-Assisted Virtualization**

<i>Intel Microprocessor</i>	<i>Supports Hardware-Assisted Virtualization</i>
Core 2 Duo E4300, 4400, 4500, 4600, and 4700	No
Core 2 Duo E6300, 6320, 6400, 6420, 6540, and 6550	Yes
Core 2 Duo E6600, 6700, 6750, and 6850	Yes
Core 2 Duo E7200, 7300, 7400, and 7500	No
Core 2 Duo E8190	No
Core 2 Quad Q6600 and 6700	Yes
Core 2 Quad Q8200, 8200S, 8300, 8400, and 8400S	No

*continues*

**Table 3-1: Intel Desktop Microprocessor Support for Hardware-Assisted Virtualization** *(continued)*

<i>Intel Microprocessor</i>	<i>Supports Hardware-Assisted Virtualization</i>
Core 2 Quad Q9300, 9400, and 9400S	Yes
Core 2 Quad Q9450, 9550, 9550S, and 9650	Yes
Pentium D Pentium EE 805, 820, 830, and 840	No
Pentium D Pentium EE 915, 925, 935, and 945	No
Pentium D Pentium EE 920, 930, 940, 950, and 960	Yes
Pentium D Pentium EE 955 and 965	Yes
Pentium for Desktop E2140, 2160, 2180, 2200, and 2220	No
Pentium for Desktop E5200, 5300, and 5400	No

**Table 3-2: Intel Mobile Microprocessor Support for Hardware-Assisted Virtualization**

<i>Intel Microprocessor</i>	<i>Supports Hardware-Assisted Virtualization</i>
Core 2 Duo Mobile L7200, 7300, 7400, and 7500	Yes
Core 2 Duo Mobile P7350, and 7450	No
Core 2 Duo Mobile P7370	Yes
Core 2 Duo Mobile P8400, 8600, 8700, 9500, and 9600	Yes
Core 2 Duo Mobile SL9300, 9400, and 9600	Yes
Core 2 Duo Mobile SP9300, 9400, and 9600	Yes
Core 2 Duo Mobile SU9300, 9400, and 9600	Yes
Core 2 Duo Mobile T5200, 5250, 5270, 5300, 5450, and 5470	No
Core 2 Duo Mobile T5500, and 5600	Yes
Core 2 Duo Mobile T5550, 5670, 5750, 5800, 5850, 5870, and 5900	No
Core 2 Duo Mobile T6400, and 6570	No

<i>Intel Microprocessor</i>	<i>Supports Hardware-Assisted Virtualization</i>
Core 2 Duo Mobile T7100, 7200, 7250, 7300, and 7400	Yes
Core 2 Duo Mobile T7500, 7600, 7700, and 7800	Yes
Core 2 Duo Mobile T8100, and 8300	Yes
Core 2 Duo Mobile T9300, 9400, 9500, 9550, 9600, and 9800	Yes
Core 2 Duo Mobile U7500 and U7600	Yes
Core 2 Extreme Mobile QX9300	Yes
Core 2 Extreme Mobile X7800 and 7900	Yes
Core 2 Extreme Mobile X9000 and 9100	Yes
Core 2 Quad Mobile Q9000	Yes
Core 2 Quad Mobile Q9100	No
Core 2 Solo SU3300 and 3500	Yes
Core 2 Solo U2100 and 2200	Yes
Core Duo L2300, 2400, and 2500	Yes
Core Duo T2050 and 2250	No
Core Duo T2300, 2400, 2500, 2600, and 2700	Yes
Core Duo T2300E, 2350, and 2450	No
Core Duo U2400 and 2500	Yes
Core Solo T1300 and 1400	Yes
Core Solo T1350	No
Core Solo U1300, 1400, and 1500	Yes

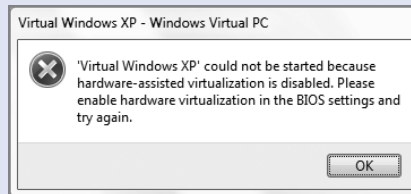
If the PC you're using does not include a microprocessor that supports hardware-assisted virtualization, you have two options: you can use a different PC, of course. Or you could use a competing virtualization solution that doesn't include such a limitation. (Note, however, that no competing virtualization products include a free copy of Windows XP.) We favor VMWare Workstation ([www.vmware.com/products/ws](http://www.vmware.com/products/ws)) but if you would like a free solution, check out VirtualBox ([www.virtualbox.org](http://www.virtualbox.org)) instead.

**Secret**

The previous tables were current when this book was written, but of course AMD, Intel, and other microprocessor makers are always updating their product lines. So be sure to check this book's Web site, [www.winsupersite.com/book](http://www.winsupersite.com/book), for the latest processor compatibility tables.

**Secret**

If your PC's processor has hardware-assisted virtualization support but you failed to enable it in the BIOS, you will see the dialog shown in Figure 3-14 when you attempt to install XP Mode or another OS in a virtual machine. That means you have to reboot, enable the feature in the BIOS, boot into Windows again, and then rerun Windows XP Mode Setup. So get this set up first.

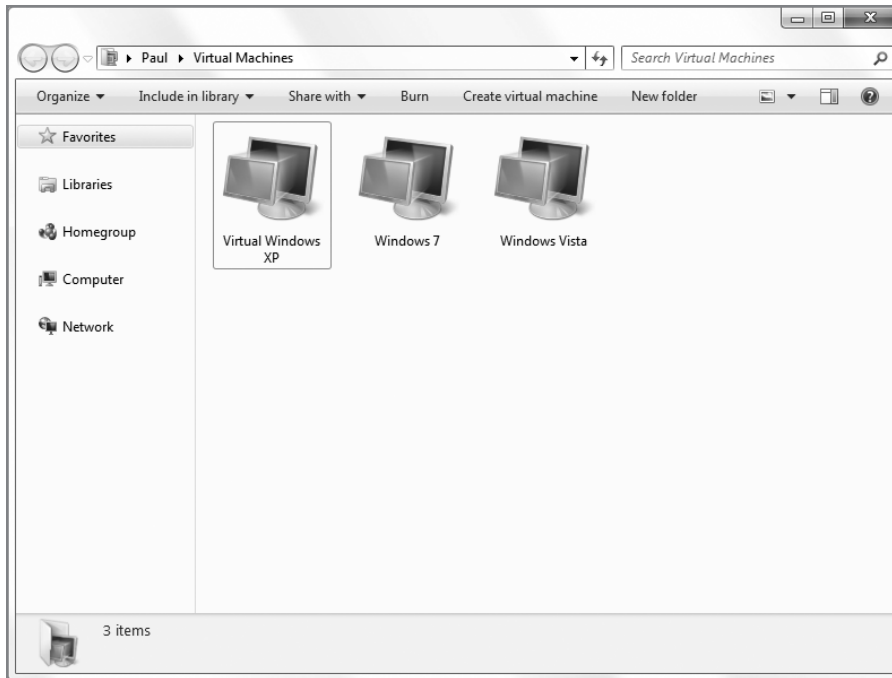


**Figure 3-14:** Enable hardware-assisted virtualization before running XP Mode Setup or configuring any other virtual machines.

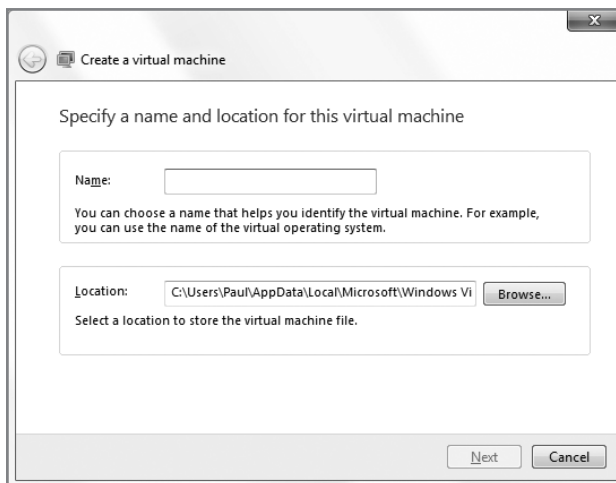
You manage Windows Virtual PC from a very simple Virtual Machines explorer, rather than from the console application window that accompanied previous versions. Shown in Figure 3-15, this window provides a toolbar button from which you can create a new virtual machine.

The Create a virtual machine wizard (see Figure 3-16) can create new virtual environments using an existing virtual disk, or, more likely, by creating a new one from scratch. In the latter case, you install a new operating system just as you would normally, using the original setup CD or DVD, or an ISO image, which can be "mounted" so that it works like a physical disk from within the virtual environment.

After determining the name of the virtual machine, how much RAM it will use, and the location of the virtual hard disk, it's time to install an operating system. You're welcome to install virtually any modern, 32-bit version of Windows, but Windows Virtual PC natively supports Windows 7, Windows Vista with SP1 or higher and Windows XP with SP3 in a special way: in these environments, you can install integration components that take guest-to-host integration to the next level.



**Figure 3-15:** Console be gone: Windows Virtual PC is managed from a simple explorer.



**Figure 3-16:** Virtual PC's Create a virtual machine wizard helps you determine the makeup of the virtualized environment.

**Secret**

Though Windows Virtual PC is available in a 64-bit version, the product supports only 32-bit guest operating systems.

Noticeably absent from this list, incidentally, is any form of Linux. You can, in fact, try to install various Linux distributions in Windows Virtual PC, but this install type has some limitations, chief among them a lack of integration with the host environment that supported guest operating systems receive. That said, many modern Linux distributions don't work correctly in Windows Virtual PC unless you are capable of some serious tinkering. In this case, Google is your friend.

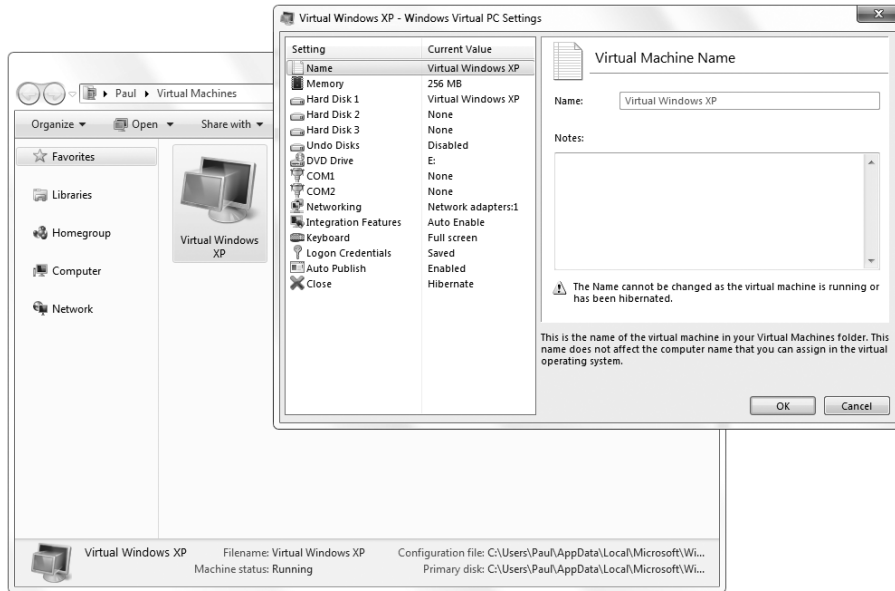
**Secret**

While Windows Virtual PC supports both Windows Vista and Windows 7, the emulated graphics subsystem utilized by this environment is not powerful enough to render the operating systems' Windows Aero user interface. Therefore, if you choose to run Windows Vista or 7 in a virtual machine, you have to make do with the Windows Basic user experience.

To manage any virtual machine environment you've created, just select it in the Virtual Machines explorer and click the Settings button that appears. The resulting Settings window (see Figure 3-17) lets you configure individual VM settings, including the RAM, virtual hard disk(s), and other devices associated with the VM.

In use, virtual machines are like slower versions of "real" PC installs. You can continue running guest operating systems in a Windows Virtual PC window side by side with the host Windows 7 system, or you can run the guest OS full-screen, making it appear as if your modern Windows 7-based PC has gone back in time. Windows Virtual PC supports a variety of niceties for moving information back and forth between the host and guest operating systems, including cut-and-paste integration and the notion of a shared folder that exists in both systems so you can move files back and forth.

But what really makes Windows Virtual PC special is that those integration components allow compatible operating systems to publish their applications into the host PC environment. That way, you don't have to launch and manage a second PC desktop. Instead, you can simply use the application(s) that caused you to install Windows Virtual PC in the first place.



**Figure 3-17:** Individual virtual machines are managed with a single window too.

### Taking It to the Next Level: Windows XP Mode

For users of Windows 7 Professional, Enterprise, and Ultimate, Microsoft provides a freely downloadable, prepackaged, and fully licensed copy of Windows XP with SP3 as a perk. Called Windows XP Mode, this feature allows you to run XP applications side by side with Windows 7 applications using Windows Virtual PC. Yeah, it really is that cool.

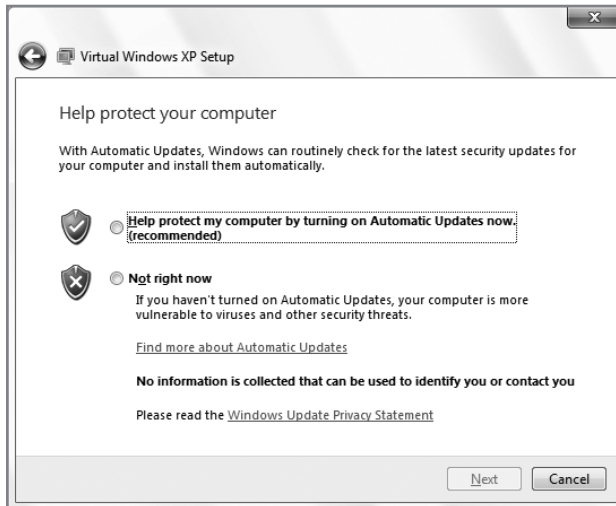
When you download and install Windows XP Mode and run it for the first time, you are prompted to provide a non-optional password for the default user account in Windows XP, which is imaginatively titled *User* (see Figure 3-18).



**Figure 3-18:** You must create a password, but the Remember credentials option is even more important.

The more important option is Remember credentials (recommended). We, too, recommend that you select this option, as the point of XP Mode is that you can seamlessly run XP applications side-by-side with Windows 7 apps. If you do not allow the system to remember your logon credentials (for example, your user name and password), you will be prompted to provide them every time you run an XP application.

You're also prompted to configure Automatic Updates, as shown in Figure 3-19. Again, you should do so, as you want the underlying XP system to take care of itself. After initial configuration, you should be able to forget it even exists for the most part.



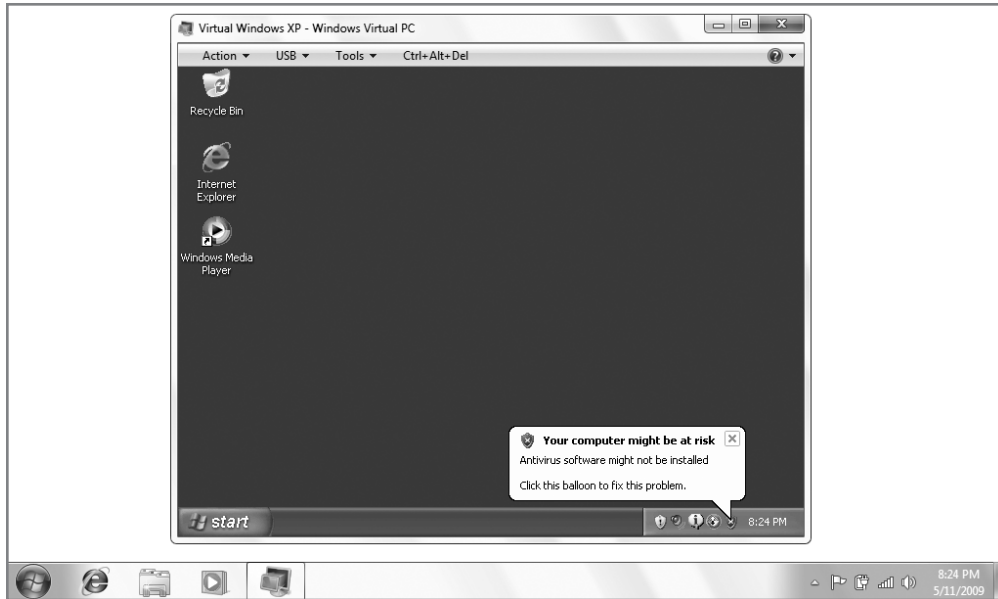
**Figure 3-19:** Make sure you enable Automatic Updates.

After this, you will have to wait quite a while as Windows Virtual PC steps through the process of starting the virtual machine, setting up Windows XP Mode for first use, starting the OS, and enabling integration features. What's happening behind the scenes is that Windows Virtual PC is actually moving through the post-Setup steps, creating the user and configuring the Automatic Updates setting you previously defined. When it's ready, the familiar Windows XP Desktop will appear in a window on top of your Windows 7 Desktop, as shown in Figure 3-20.

Of course, running a virtual environment inside of a host OS like Windows 7 isn't the end goal here. The reason you're running Windows XP virtually in the first place is that you want access to that system's larger (and older) software library. From here on out, any application you install under Windows XP will actually appear in the Windows 7 Start menu, as shown in Figure 3-21.

In this way, XP Mode is *publishing* installed applications to Windows 7. And when you run these apps from the Windows 7 Start menu, naturally, they run side-by-side with native Windows 7 applications, share the same clipboard and file system with the host environment, and so on. And really, that's the point: XP Mode isn't about running Windows XP. It's about getting incompatible applications to work properly again.





**Figure 3-20:** Ah, the good ol' days.



**Figure 3-21:** When you install applications in the virtual Windows XP environment, they also appear in the Windows 7 Start menu, so you can run them from there.

**Secret**

It's not obvious, but this ability to run virtual applications inside of Windows 7 is not limited to Windows XP Mode. Nor is it limited to virtualized instances of Windows XP. You can do the same thing with virtualized Windows Vista and Windows 7 applications, too.

**Secret**

Publishing applications is nice, but what about XP's built-in apps, like Internet Explorer 6? You can manually publish built-in Windows XP apps using the following workaround: launch Windows XP Mode, right-click the XP Start menu, and choose Open All Users. In the Explorer window that appears, navigate into the Programs folder. Now, drag a shortcut for the application you'd like to run into the Programs folder. Close it, close XP Mode, and check the Windows 7 Start menu: success!

## Looking to the Future

As it stands today, Windows Virtual PC is an interesting and, in many cases, desirable solution, especially with Windows XP Mode. But the underlying technology is still based on the legacy Virtual PC code and not on newer, hypervisor-based virtualization solutions like Hyper-V, part of the Windows Server 2008 product line. This technology runs closer to the metal than Windows Virtual PC, so it offers much better performance and is more secure and easily maintainable. Despite utilizing a different architecture, however, Hyper-V is compatible with the same VHDs used by Windows Virtual PC, ensuring that customers who adopted Microsoft's virtualization products early in the game could move their virtualized environments forward.

Microsoft also offers more managed application virtualization products, which today are, of course, geared toward larger companies. Microsoft purchased a company called SoftGrid and relaunched its application virtualization solution as Microsoft Application Virtualization, or App-V. This software enables Microsoft customers to stream applications to the desktop in special virtualized packages. Instead of delivering an entire virtualized environment to end users, companies can deliver individual applications in a package, along with any required dependent files. These packages break the application/operating system lock and allow for some interesting scenarios, including the ability to run multiple versions of the same application on a single OS.

Then, in 2007, Microsoft purchased another innovative company in the virtualization space, Kidaro. This acquisition gave Microsoft the final piece of the puzzle: the ability to combine the power of Virtual PC with the application independence of SoftGrid. The resulting product, Microsoft Enterprise Desktop Virtualization (MED-V), is basically a server-based version of XP Mode.

Looking ahead, it seems like future versions of Windows will include a virtualization solution based on Hyper-V and some combination of the SoftGrid and Kidaro technologies. This would expand on the work done in Windows 7 but provide additional performance and manageability benefits. Then, in these future Windows versions, Microsoft will be able to move in completely new technical directions, secure in the knowledge that its virtualization platform will enable users to install virtually (sorry) any application that works on older versions of Windows. The key is packaging them into mini-virtualized environments that include only those parts of Windows XP, Windows 98, or whatever they need in order to run.

Windows Virtual PC and Windows XP Mode are just one step down this road. They are an important step, of course.

## Summary

Windows 7 constitutes, in many ways, a break with the past, but that doesn't necessarily mean you have to make a break with your existing hardware or software just yet. Using Microsoft's Windows 7 Upgrade Advisor, you can determine whether your current PC is powerful enough to run Windows 7 and, if so, which of your existing hardware devices and software applications will work properly after the upgrade. After installing Windows 7, however, you're not on your own. Features such as the Program Compatibility Wizard and the Program Compatibility Assistant can force older Windows applications to run fine in Windows 7. If that doesn't work, there are always virtualization solutions, including Microsoft's free Windows Virtual PC and the seamless Windows XP Mode environment. Chances are good there's a way to make your existing devices and applications work with Windows 7. You just need to know where to turn.

