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Troubleshoot and Optimize Windows® 8

Mike Halsey *Microsoft MVP for Windows*

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Troubleshoot and Optimize Windows 8® Inside Out

Mike Halsey

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Introduction

When you buy a new television set or games console, you just expect to be able to plug it in and for it to work without incident, every day of every year, until it dies. This has never been the way with computers because of the flexibility we demand of them. Each one needs to be customizable in an almost limitless number of ways, with dizzying combinations of hardware, software, and options.

With each and every one of those changes adding or modifying files within the core operating system, it's inevitable that you'll eventually encounter a problem. When this happens, the sheer number of combinations of software, hardware, updates, settings, customization options, and plug-ins can make diagnosing and repairing the problem extremely complex. How do you repair a problem in an operating system that's made up of thousands of files and that has an extremely complex structure and format?

That's where this book comes in. Think of it as an introduction, a complete guide, and a master class all in the one volume, not just to the structure of the operating system and its related files, but also to what commonly goes wrong, why this happens, and how you can set about the sometimes complex process of troubleshooting a problem to begin with.

Beginning with the assumption that preventing problems from occurring is the best starting point, *Troubleshoot and Optimize Windows 8 Inside Out* guides you through the technical maze of Microsoft's latest operating system, all the while explaining the how's and why's of troubleshooting in ways that are relevant and make sense.

Who This Book Is For

This book offers a comprehensive look at how to troubleshoot problems and optimize Windows 8. It serves as an excellent reference for users who need to understand how to accomplish what they need to do. In addition, this book goes a step or two farther, providing useful information to advanced users and IT professionals who need to understand the bigger picture.

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Assumptions About You

You have already have been repairing or supporting computers and users in some fashion, be this privately (within your friends and family circle), for a business or organization (either formally or informally), or within an enterprise environment. You are also keen to expand your skills and knowledge and broaden and deepen your technical understanding of Windows 8 and how it works and interacts with hardware, software, and the Internet.

This book touches on some IT professional subjects that are covered in more detail elsewhere and for which there are sometimes Microsoft certification qualifications, but you will not need prior knowledge or understanding of these subjects. I focus on techniques and topics that are likely to appeal to readers who have already mastered the many basics of the Windows operating system.

How This Book Is Organized

This book gives you a comprehensive look at the features within the Windows 8 operating system that you will need to prevent, mitigate, diagnose, and repair problems and errors. This book is structured with a logical approach to troubleshooting.

Part 1, "Preventing Problems," examines the ways in which Windows 8 computers can be installed and configured so as to prevent problems from occurring or to minimize the impact of those problems.

Part 2, "Applying Easy Technical Fixes," details the many ways in which problems and errors can be repaired quickly and simply, sometimes by remotely giving instruction to the user.

Part 3, "Using Advanced Technical Fixes," details the process of how you set about diagnosing and troubleshooting complex problems., what to look for in the operating system, and what tools and utilities exist to help with this.

Part 4, "Disaster Recovery," assumes that a significant problem has already occurred that needs to be fixed quickly but cannot be easily addressed from within the operating system itself.

Part 5, "Using Advanced Utilities," examines the advanced administration and configuration tools for Windows 8 in depth, looking at how they can be used for advanced troubleshooting and optimization, and how you can use them to configure Windows 8 to further prevent and mitigate problems.

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Features and Conventions Used In This Book

This book uses special text and design conventions to make it easier for you to find the information you need.

Text Conventions

Convention	Meaning
Abbreviated commands for navigating the ribbon	For your convenience, this book uses abbreviated commands. For example, "Click Home, Insert, Insert Cells" means that you should click the Home tab on the ribbon, then click the Insert button, and then finally click the Insert Cells command.
Boldface type	**Boldface** indicates text that you type.
Initial Capital Letters	The first letters of the names of tabs, dialog boxes, dialog box elements, and commands are capitalized. Example: the Save As dialog box.
Italicized type	*Italicized* type indicates new terms.
Plus sign (+) in text	Keyboard shortcuts are indicated by a plus sign (+) separating key names. For example, Ctrl+Alt+Delete means that you press the Ctrl, Alt, and Delete keys at the same time.

Design Conventions

INSIDE OUT

This statement illustrates an example of an "Inside Out" heading

These are the book's signature tips. Here, you get the straight scoop on what's going on with the software—inside information about why a feature works the way it does. You'll also find handy workarounds to deal with software problems.

CAUTION!

Cautions identify potential problems that you should look out for when you're completing a task or that you must address before you can complete a task.

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> **Note**
> **Notes offer additional information related to the task being discussed.**

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Acknowledgments

It is sometimes very difficult to write books, even when you know the subject matter backward, forward, and every direction in between. Writing a troubleshooting and optimizing book presents further problems when you want to make sure you have all the bases covered. I would like then to dedicate this edition to all the people who have swelled my mailbag in recent years with an enormously wide assortment of Windows-related issues and other computer problems, errors, and crashes. You're all in here, somewhere. :)

Keep 'em coming!

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PART 1

Preventing Problems

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CHAPTER 1

Finding Your Way Around Windows 8

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When Microsoft introduced the new Start screen in Windows 8, the change was always going to be extremely significant for IT professionals, enthusiasts, and people who work with the administrative and management tools in Windows.

The changes aren't limited to the new Start screen. When you visit the desktop, you will notice that the Start menu is gone completely, and seemingly nothing has been introduced to replace it.

I want to start this book, therefore, with an introduction to where you can find all the tools and utilities that you've been accustomed to using for years and that you'll commonly need when you're troubleshooting and optimizing Windows, your software, and your hardware.

Finding the Desktop

When you start Windows 8 and you're presented with the new Start screen, one of the Tiles you will see is the desktop. In some ways, the desktop in Windows 8 has been downgraded to an app itself, but only in the respect that it's not loaded until you actually need it. If you don't need to use the desktop at all in a computing session, then you'll notice Windows 8 is slightly quicker without the memory and processor overheads of having the desktop loaded and running (see Figure 1-1).

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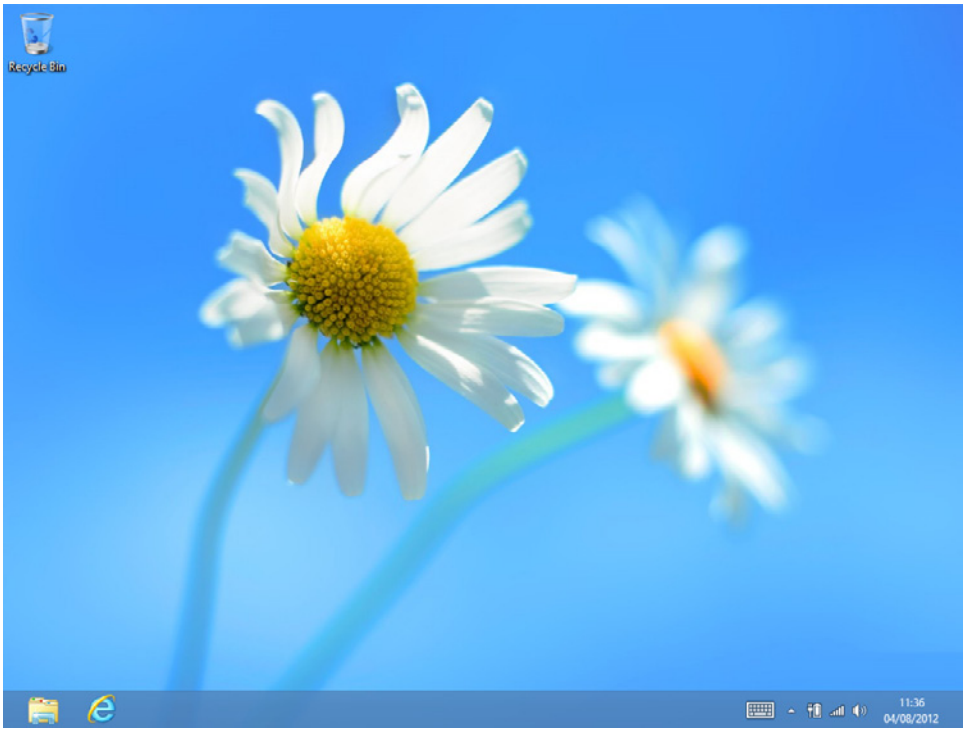

Figure 1-1 The desktop in Windows 8

So, what's new or changed on the desktop? Well, for starters, there's no Start menu, though some third-party utilities are available to either switch it back on or replace it with something else entirely.

Using the New Charms

The ever-present Start button in the lower-left corner that has been a part of so many versions of Windows has been replaced by the new Windows 8 charms. You can access the charms, which appear from the right side of your screen, from both the Start screen and on the desktop. To reveal the charms, use one of the following three methods:

- On touch devices, from the right edge of the screen, swipe inward with your finger.
- Move your mouse to the "hot corners" in the upper- or lower-right corner of your screen.
- Press the Windows logo key+C on your keyboard.

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Using the Taskbar

The rest of the taskbar in Windows 8 hasn't changed at all from Windows 7. If you have already been using Windows 7, you should be instantly familiar with it.

You can "pin" program icons to the taskbar, but not apps. To pin program icons, right-click an icon on the Start screen, and then from the option menu that appears at the bottom of your screen, select Pin To Taskbar.

INSIDE OUT

Accessing desktop program properties

If you need to access the Properties for a desktop program—a task you would previously have done in the Start menu by right-clicking the program's icon—you can still do this from the All Apps view in the Start screen. With a program's icon visible, right-click it, and you will be able to open its file location. Here, you can right-click on the program icon to access its properties.

Jumplists still exist and work in the same way as in Windows 7. I always thought that Jumplists were one of best features of Windows 7. You access them by clicking and swiping up from a taskbar icon with your mouse or by right-clicking the icon.

In Jumplists, you can access commonly used features within a program or run a second instance of that program. Many jumplists also contain lists of recently accessed files, and you can pin files to Jumplists so that they will always appear.

Additionally, you can pin websites to the taskbar by dragging their icon from the Internet Explorer address bar onto the taskbar, and many websites have some features and functions programmed in so that their Taskbar Jumplist will contain specific parts of the website or functions directly from the Windows desktop.

INSIDE OUT

Be careful which icon you place first on the taskbar

With the Start menu gone, there's still a reflex urge to move your mouse to the lower-left corner of the screen to open it. My best advice is to ensure that the first icon on the taskbar is something that opens quickly, such as File Explorer, because you'll be opening it quite a bit at first.

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Accessing the Action Center and Notification Area

At the far right of the taskbar, you will see the white flag icon for the Action Center (see Figure 1-2), which is the central location for all Windows 8 messages and notifications regarding troubleshooting, security, maintenance, and backup.

Figure 1-2 The Action Center and other icons on the taskbar

I will refer to the Action Center many times throughout this book, but you'll know if there is a message waiting for you because the flag icon will display a small red and white notification cross; a subtle but eye-catching change.

To the left of the Action Center is a small up arrow. Click this up arrow to open the notifications area "bucket," which is perhaps better known as the *system tray*. Any running software that has its own tray icon can be found here.

If you have a touch-screen, then Windows 8 will add the on-screen keyboard icon to the system tray, as well.

Finding the Full Control Panel

When it comes to administration, probably the first thing you'll look for in Windows 8 is the Control Panel. There are many aspects of your computer's administration that you can only configure in the desktop Control Panel, but Windows 8 now offers an alternative way by which you can quickly configure common system settings. To take advantage of this, click the Settings charm. This displays just a few settings. If what you need to access is not there, click the Change PC Settings link to open the new PC Settings panel.

Here again, though, the options are still very limited, so where is the full Control Panel, and how do you access it?

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To access the full Control Panel, open the charms *from the desktop*. Next, click the Settings charm. Links appear at the upper-right corner of the screen (see Figure 1-3) for Control Panel, Personalization, PC Info (which is the System screen in the Control Panel), and Help.

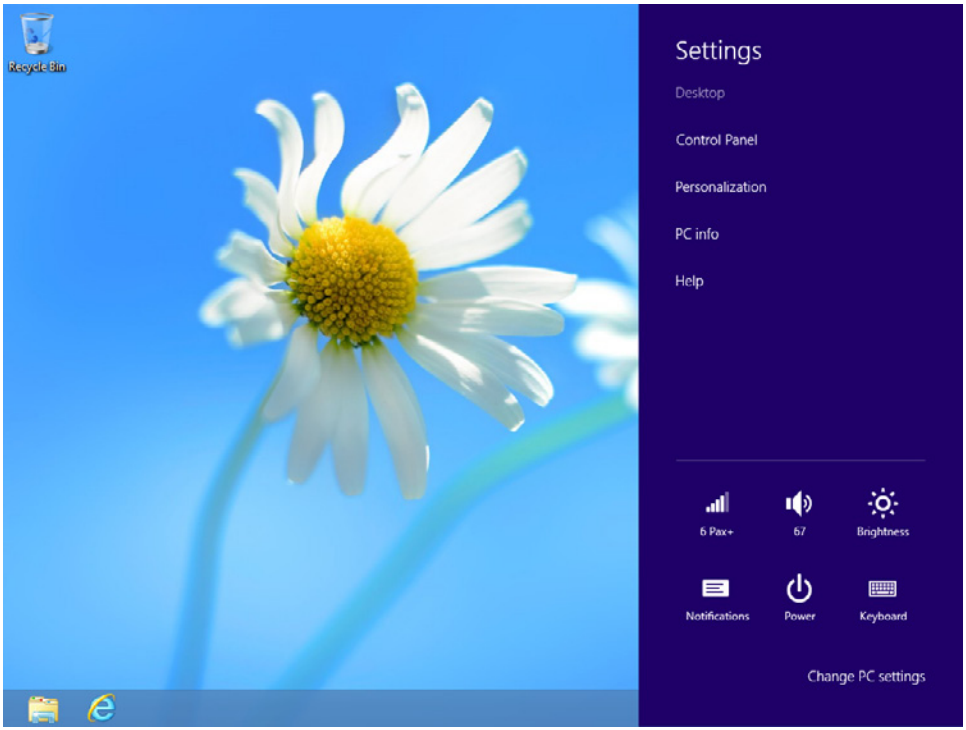

Figure 1-3 Opening Settings from the desktop reveals a Control Panel link

By default, the Control Panel opens with the Categories view, but in the upper right of the window, you can change the View By option to show Large or Small icons, which displays all of the Control Panel items, as shown in Figure 1-4.

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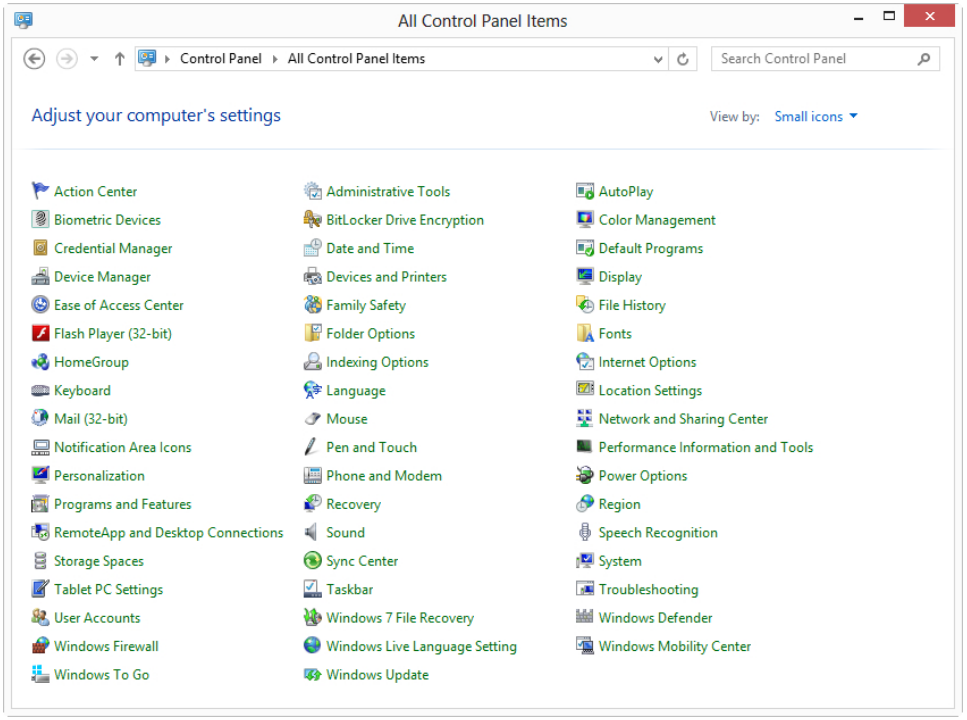

Figure 1-4 The full Control Panel in Windows 8

Finding the Computer Management and Administrative Tools

In Windows Vista and Windows 7, it's well known that if you wanted to open the Computer Management console—where you would work with tools such as the Disk Manager, Task Scheduler, and Event Viewer—you would right-click the Computer link in the Start menu, and then select Manage.

With the Start menu gone in Windows 8, you can no longer do this, and although the Control Panel offers a link to the Administrative tools, which contain a link to the Computer Management console (see Figure 1-5), Microsoft has included a much simpler way to access this and other features.

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You can access these, both from the desktop and the Start screen, by moving your mouse to the lower left of the screen and right-clicking. They are also available by pressing Windows logo key+X.

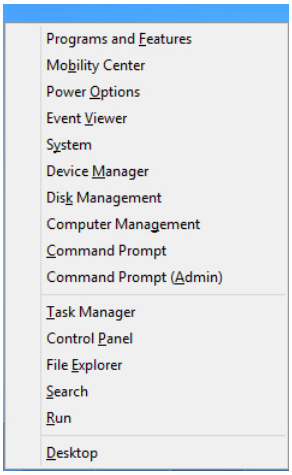

Figure 1-5 The new Administration menu

This menu contains links to the common Management tools in Windows in addition to some features that were in the Start menu that were always considered useful.

These include the Command Prompt (also with a separate Run As Administrator link because you cannot right-click in this menu), the Run dialog, and more.

The best news is that this menu is user-configurable, so you can add additional links to it.

In File Explorer you can navigate to C:\Users\Your Username\AppData\Local\Microsoft\Windows\WinX. Note that in the View tab on the ribbon in File Explorer, you will need to select the Show Hidden Items check box to display the AppData folder.

Here, you have folders called Group1, Group2, and so on, as illustrated in Figure 1-6. You can create new groups, which are shown in the menu separated by a horizontal line.

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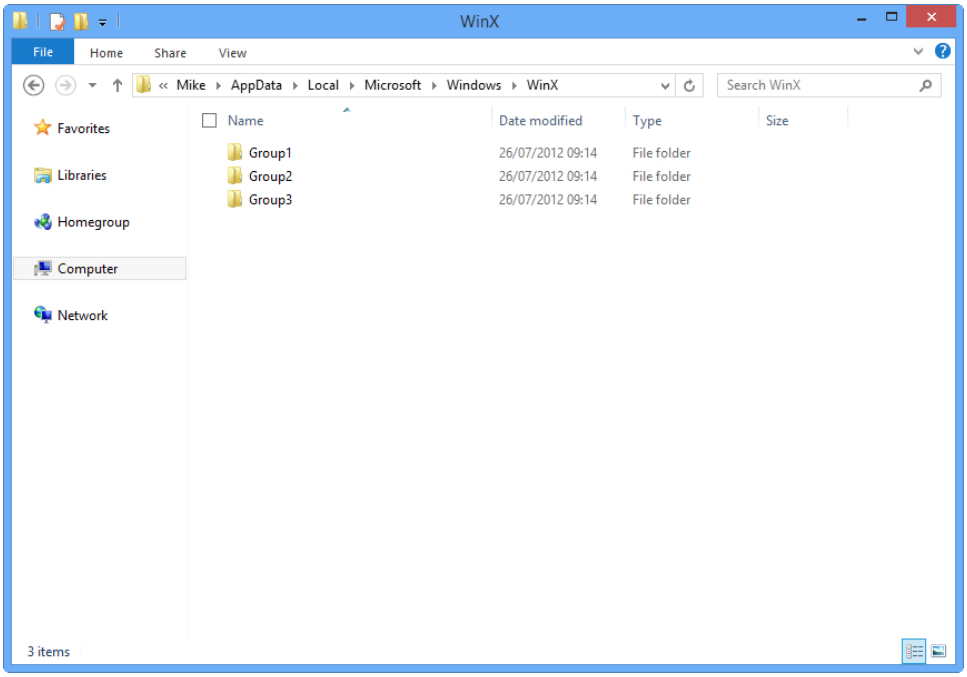

Figure 1-6 Modifying the Administrator menu options

Some software exists to allow you to customize this menu, but security that Microsoft has introduced prevents it from being changed manually by the user.

INSIDE OUT

Displaying the Administrative Tools on the Start screen

If you want, you can show all the Administrative tools in Windows 8 as tiles on the Start Screen. To do this, follow these instructions:

1. **On the Start screen, click the Settings charm.**
2. **At the upper right of the screen, click Tiles.**
3. **An option appears to turn the Administrative Tools links on and off, as shown in Figure 1-7.**

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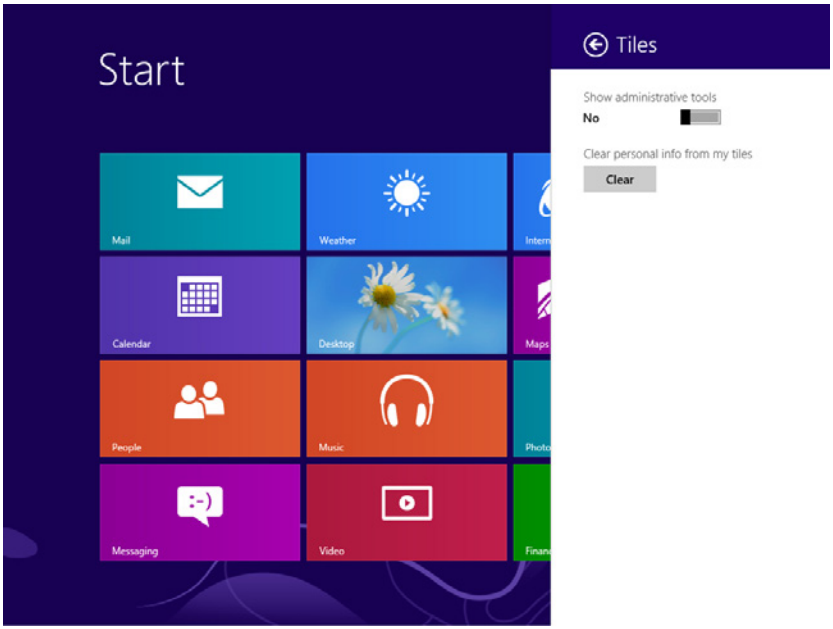

Figure 1-7 Displaying the Administrative tools on the Start screen

Searching in Windows 8

Another thing that has changed significantly in Windows 8 is search. With the Start menu gone, there's no longer a search box, but in many ways search has been made much easier to use than previously.

You can open search from the aforementioned Administration menu or by clicking the Search charm, but by far, the easiest way to use search in Windows 8 is to open the Start screen, which you can do at any time by pressing the Windows logo key on your keyboard, and then typing your search query.

Once you start typing while on the Start screen, search results will automatically begin to appear. They are separated into three categories, Apps, Settings, and Files, and you can see the categories in the upper right of the search results screen. When you are troubleshooting and optimizing Windows 8, you will most commonly want to click Settings in the top right of the search results screen, which will display all the Settings results.

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INSIDE OUT **Search in File Explorer**

It is worth noting that a search box in File Explorer still exists and operates in the same way as in Windows 7, prioritizing content from the current view. If you are in the Administrative tools view, for example, and execute a search, then the tools and utilities there will be prioritized in the search results.

Summary

It's easy to see that the introduction of the new Start screen has created a learning curve for existing Windows users, enthusiasts, and IT professionals. It's good to see, however, that Microsoft have taken into account the things that administrators will want to do with Windows and built in new tools to help. You'll discover that the addition of the customizable Administration menu is probably going to be the most useful difference.

These are the tools and panels you'll need to access most while working through this book, and it's important to know how to find what you want to avoid frustration and prevent a loss of productivity.

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CHAPTER 2

Repairing Windows 8 in 30 Minutes or Less

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One of the biggest problems with computers in general (and Microsoft Windows does not enjoy any immunity here) is that historically things always break at the least appropriate time and they always take far too long to repair.

When Microsoft moved Windows to a new operating system *kernel*—the core code of the operating system (OS)—with Windows Vista, it based it upon the stable and reliable one that it had been using for Windows Server since the days of NT. The unreliable, buggy, and crash-prone kernel from Windows 98, ME, and XP was jettisoned forever, and from that point forward, Windows became a much more stable and robust product.

With Windows 7, Microsoft released an incredibly crash-resistant and stable OS and pretty much banished the much maligned *Blue Screen of Death* (BSOD) shown in Figure 2-1 to the annals of history. Indeed, so rare is a BSOD today, in Windows 8, it's become the *Blue Unhappy Emoticon of Death*. I'm sure in the coming years this new screen will pick up many colorful names (well...the color blue, anyway).

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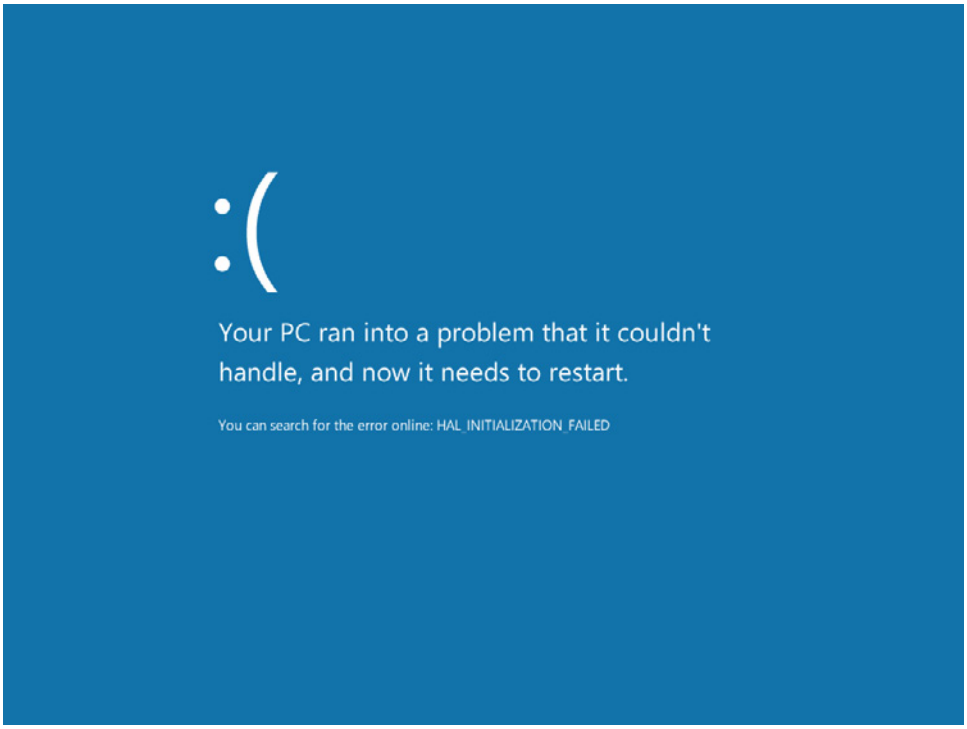

Figure 2-1 The Blue Unhappy Emoticon of Death

The simple fact remains, though, that Microsoft Windows is the most open and supported computing platform on the planet. People can count how many apps (applications) exist in the Android app store for Google's open tablet and smartphone OS, but nobody in the world is brave enough to count how many programs, apps, peripherals and pieces of internal (and external) hardware exist for Windows.

It is this openness that is the biggest strength of Windows, and conversely, its biggest weakness. The problem Microsoft faces is keeping an OS that already contains billions of lines of computer code stable and reliable while maintaining compatibility with hardware and software that won't usually have gone through any kind of testing and certification process, and that can interact with other hardware and software in unpredictable ways.

So, when Windows does fail, the problem is how do you get it back up and running just as it was before (but without the bugs and problems, obviously), as quickly as possible?

This is the single question that enthusiasts and IT professionals alike have asked me the most since I wrote *Troubleshooting Windows 7 Inside Out* back in 2010. As a result, I decided that this would be the perfect place to start this new edition.

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What Can Often Go Wrong with Windows

As I just mentioned in the introduction, the most common problems that arise in Windows are caused by the software that you install and the hardware that you plug into your computer. If you ran Windows completely on its own, with no external hardware and no additional software, or perhaps only using official Microsoft software such as its Office suite, then you'd possibly never encounter a single problem (Windows Update issues notwithstanding).

It is the third-party ecosystem and especially Windows Update that causes the most problems in Windows, and even Windows 8 on ARM processors won't be completely immune to this. And this is despite most tablets not supporting external hardware and the OS only supporting new apps. ARM Processors are new to Windows computers. Until recently, they had been used primarily for smartphones and tablets running Apple's iOS and Google's Android OS. ARM processors are incompatible with the Intel chips found in desktop PCs, which is why a separate version of Windows 8 has been released for them.

The three main areas where you might experience problems are the following:

- Startup problems
- Security problems
- Configuration problems

I will discuss how you can quickly fix each of these in a short while.

What to Look for

The first question to ask yourself when you encounter a problem with Windows 8 is "What's changed?" Something unique and different will always have happened to cause the problem. If a computer was perfectly stable every day for the last three weeks doing the same job in the same way, it's not going to fail just for that. Something will *always* have changed and the first job is to determine and diagnose what this change is.

This leads to several questions:

- Have you just performed a Windows Update? (This should always be the first question.)
- Have you installed new hardware?
- Have you installed new software?
- Have you updated the driver for a hardware device?

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- Have you updated any of your software?
- Are you using two software applications at the same time in a way that you don't normally do?
- Are you trying to perform several complex jobs at the same time?
- Has there been an interruption to the power supply recently?
- Have you been eating or drinking at the computer?
- Has anybody else used your computer?

If we continue going down the list, we eventually get to "Did you remember to plug it in?", "Is there a power outage in your neighborhood?", and "Are you confusing your PC with the microwave after a particularly heavy night out?"

It is at this point that we reach the oldest question in technical support. And if I had a bet on how quickly this phrase would appear in this book, I'd probably have guessed correctly and won a dollar. Of course, that question is, "Have you tried turning it off and on again?"

You might be amazed at just how often this fixes problems, but let's have a look at why this is. The simple reason behind why a restart fixes many problems is that every single problem with a computer or with Windows 8 is caused by a human being. For something to go wrong, someone first has to be doing something on the computer. If you leave a computer on its own all the time, then, assuming that there's no poorly written software or hardware drivers running in the background, it is very unlikely something will go wrong.

When you restart a computer, whatever it is that you were doing before, you're now no longer doing. Any software that you were running will probably have been closed; any hardware you were using will probably now be inactive; and you are effectively starting with a clean slate.

Sometimes, however, something will happen that will leave an impact on the computer, your hardware drivers, software, or Windows 8 itself, and after you restart, something will go wrong and Windows will either misbehave when you try to use it or, in the worst case, it will fail to load at all. This is a very common complaint to IT departments, so it's a good place to start.

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Fixing Common Startup Problems

Since\ the introduction of Startup Repair in Windows Vista, the OS can sometimes do a reasonable job of fixing itself. If you can't start your copy of Windows 8, try restarting it a few times; Startup Repair should automatically run.

Startup Repair is a utility that sits on a hidden system partition that is created when Windows 8 is first installed. It will run a series of checks on the components that start the operating system and reset everything to its default configuration.

Startup Repair is by no means perfect, but if somebody calls you to say that her computer won't start, ask her how many times she has tried. Usually you need to attempt to start Windows three times before Startup Repair will run.

If this doesn't happen, you will need to enter the Startup Repair options manually. You access these from the boot menu. To start this, press F8 at startup, after the BIOS or UEFI screen.

INSIDE OUT

Windows Fast Start and the boot menu

Unless you already have a dual-boot system on your computer, it can be extremely difficult to get the boot menu in Windows 8 to appear at all. It is always wise to create a *recovery drive* or a *system repair disc*, and I will show you how to create these in Chapter 6, "Optimizing Backup and Restore."

There are two other ways to get to the Startup options in Windows 8, however, if there simply isn't enough time to press F8 or Shift F8 (which will access the traditional Windows boot menu). If you hold down the Shift key while clicking the Restart charm, Windows 8 will stop at the boot menu when it restarts. You can also go into PC Settings, and then in the General section, in the Advanced Startup section, click Restart Now. This, too, will boot Windows 8 to the Boot Options menu.

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When the boot menu opens, select the Troubleshoot option from the first screen, as shown in Figure 2-2.

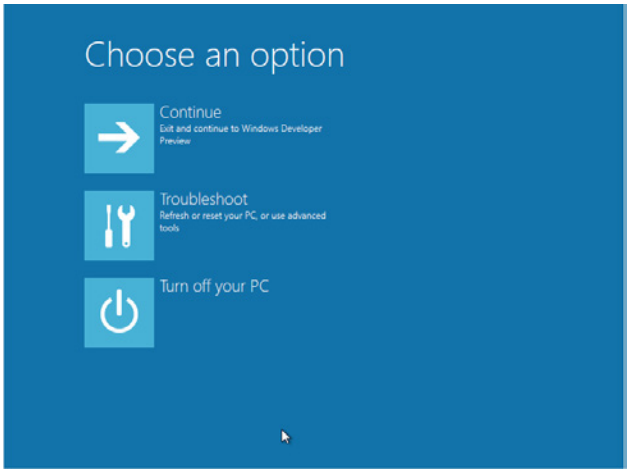

Figure 2-2 Selecting Troubleshoot from the boot menu

The Troubleshoot window opens and presents two very interesting new features in Windows 8, Refresh Your PC and Reset Your PC (see Figure 2-3). You should only use the latter option if you want to wipe all your user accounts, programs, apps, hardware drivers, and files off the computer. You might want to do this, for instance, if you're selling it or giving it to a friend.

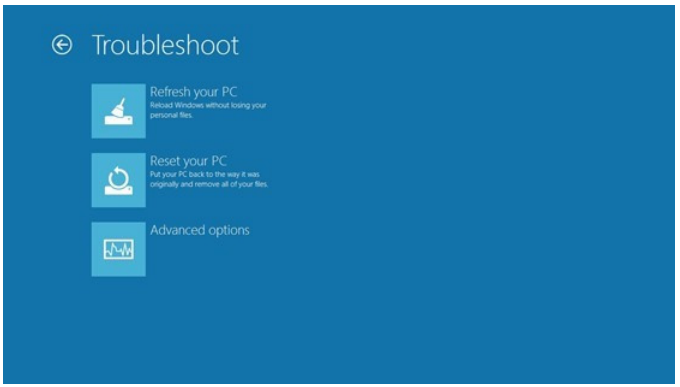

Figure 2-3 Refresh Your PC and Reset Your PC are the first options in the Troubleshoot menu

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The Refresh Your PC option is the new way to restore a system image of Windows, complete with all your current settings, files, and apps intact. This isn't to be confused with a System Image, which still exists as an option. I'll discuss both of these in full in Chapter 7, "Performing Maintenance on Windows 8."

The main difference between System Image and Refresh Your PC is that the image required to refresh a copy of Windows 8 already exists without any user involvement.

INSIDE OUT

The differences between Refresh Your PC and System Image, explained

When you create a system image of Windows 8, you are taking a snapshot of that installation, complete with programs, apps, settings and configuration options as it exists at that time. Restoring the system image will restore Windows 8 exactly as it was at that moment.

A refresh image is different in that it takes a snapshot of your installed programs, apps, and your user accounts, but *not* your program settings. This means that after restoring from a refresh image, you will need to change your custom options in your software, set up email accounts in Microsoft Outlook, and make other changes that Refresh Your PC doesn't save.

What it will do, as I said, is restore an image of the OS while keeping your current apps, settings, and files intact. What it *won't* do is restore any of your desktop software, which will be wiped.

INSIDE OUT

Creating a custom refresh image

You can create a custom refresh image with the following simple command at the Command Prompt, which you will need to be running as an Administrator.

recimg -CreateImage C:\<*Folder*>

Here, C:\<*Folder*> is the location on your hard disk where you want the image to be located.

If you create a custom refresh image, then that will be the snapshot that is restored, including all your installed desktop software.

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One of the best things about Refresh Your PC is that it's so easy, even an end user can do it. By this I mean that if you work at a support desk and someone calls to say he can get to the Start screen or desktop, but Windows 8 is malfunctioning, you can talk him through no more than six simple key presses that will kick the process off. This saves valuable time visiting the user to repair it yourself. Again, I'll describe how to do this later in this chapter.

Sometimes, though, you don't want to have to wait 20 minutes or more for an image to be restored, and just using System Restore will be enough, especially if the problem has occurred after a software or hardware install, a manual driver update, or a Windows Update.

After you click Refresh Your PC, choose the Advanced Options, which opens the menu shown in Figure 2-4. Here, you will see System Restore as well as the System Image Recovery option, by which you can restore from a System Recovery Disc, just as you can with Windows 7.

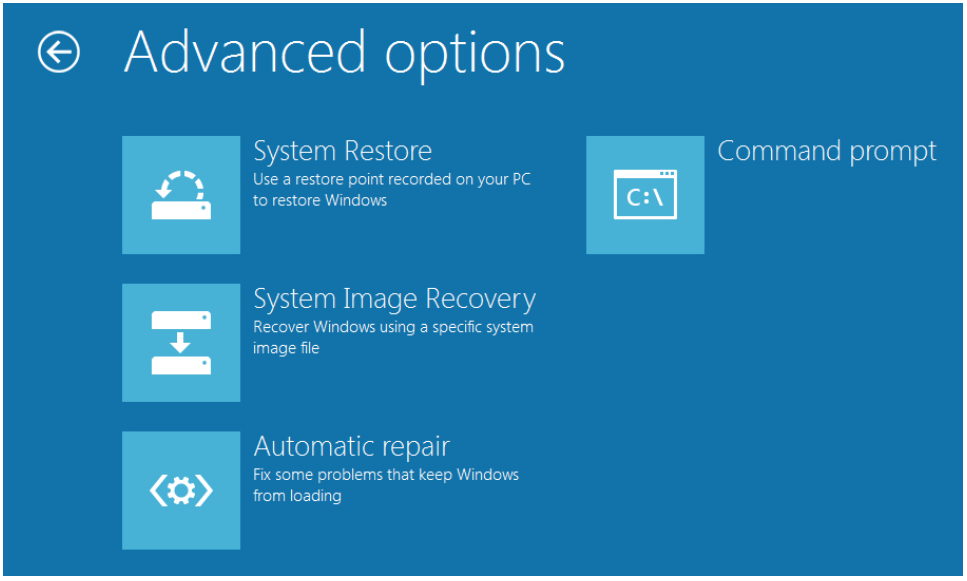

Figure 2-4 You can find System Restore in the Advanced Options menu

If the boot system itself is corrupt, however, you will need to manually rebuild it from the command prompt here. I show you how to do this in Chapter 20, "Using Advanced Repair Methods."

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Fixing Common Security Problems

Security problems can be caused by pretty much anything and can include all manner of issues, from Windows reporting that it isn't genuine (which is normally fixed by a simple reboot) to users being unable to access their files for some reason, or there is some type of encryption such as Microsoft BitLocker in place which has decided to lock you out of your files or even the whole computer

CAUTION

It is normally a good idea when travelling with a BitLocker-encrypted laptop or tablet that you also have with you, but kept separately from the device, a USB pen drive containing the encryption key(s).

Other security problems can be caused by a malware infection, which can be trickier to resolve.

Generally, security problems can usually be solved by refreshing the computer or running a System Restore. After all, if the configuration was worked well earlier, then restoring those settings should work again. And as previously mentioned, if it's a refresh that you're suggesting, you can sometimes talk the user through performing this on her own.

Fixing Common Configuration Problems

Nine times out of ten, configuration problems are caused by the installation of new software or updates to existing software, a new hardware device, updates to existing drivers, or by a Windows Update.

If you have a configuration problem on the computer, then you (or any other person using the computer) have just done something that perhaps you shouldn't have. This can include, for example, updating the computer in a managed environment where the IT department has already determined that Windows Update KB966706 causes a conflict with the bespoke software that's needed to run weekly reports.

If you have a configuration problem, then usually this can be solved by undoing what it is that's just been done: uninstalling software, rolling back a hardware driver (see Chapter 11, "Dealing with Windows 8 Annoyances," for instructions on how to do this), or performing a System Restore again to rectify a Windows Update.

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These actions will usually require being at the computer that's faulty and will also require the user who encountered the problem to be honest about what he was doing right before it occurred.

Other configuration problems can manifest themselves as USB devices that no longer work. The best way to fix this is to unplug the device and then plug it into a *different* USB port. This will force Windows to reload the drivers for that device.

INSIDE OUT **My Wi-Fi dongle doesn't work**

It's not unheard of that after moving a computer or doing work on it, perhaps even just cleaning it or around it, a USB Wi-Fi dongle fails to work. Plugging it in to a different USB port usually fixes this problem because these devices can be fussy about what ports they choose to work in.

Refreshing Windows 8

I've talked a bit in this chapter about a new feature called Refresh that can effectively reinstall Windows 8 while keeping all your apps, settings, files intact. Even if you have a custom image set, Refresh will keep your desktop software, as well. But how do you use it and why do I say an IT department can talk a user though it? Let's have a look at this now, step by step.

1. Open the Start screen by using one of three methods: swipe in from the right edge of the screen with your finger, move your mouse to the lower right of the screen, or press Windows logo key+C on your keyboard.

2. With the Start screen open (see Figure 2-5), click the Settings charm.

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Figure 2-5 The Start screen with the Charms displayed on the right edge of the screen

3. In the panel that appears, click Change PC Settings at the lower right, as shown in Figure 2-6.

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Figure 2-6 The Settings panel on the Start screen

The new PC Settings screen appears,

4. On the left side of the screen shown in Figure 2-7, click General.

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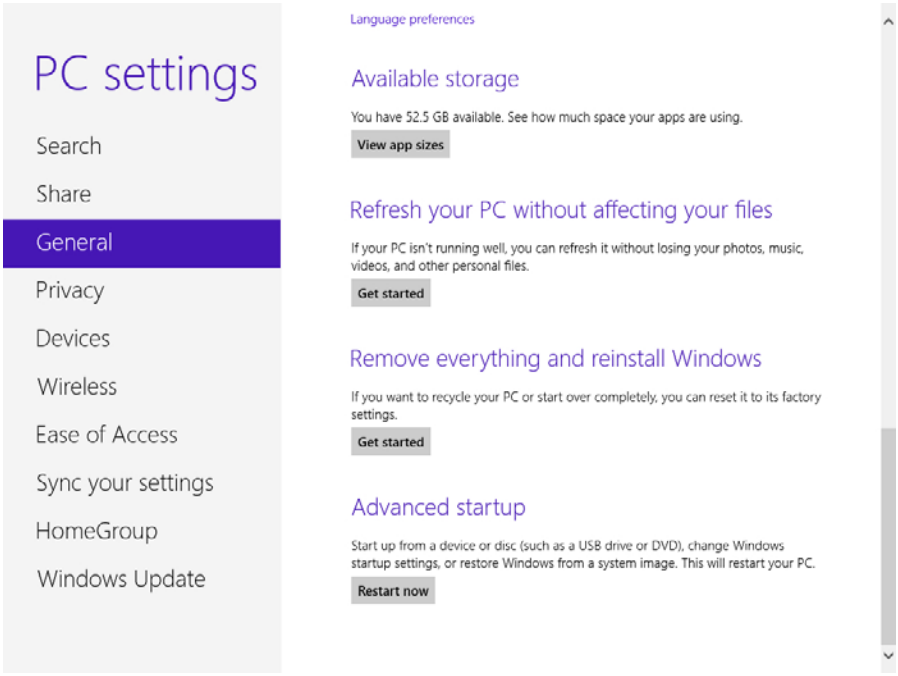

Figure 2-7 The PC Settings window

5. In the right side panel, in the Refresh Your PC Without Affecting Your Files section, click Get Started.

The dialog box shown in Figure 2-8 appears, explaining what Refresh Your PC is and what it does.

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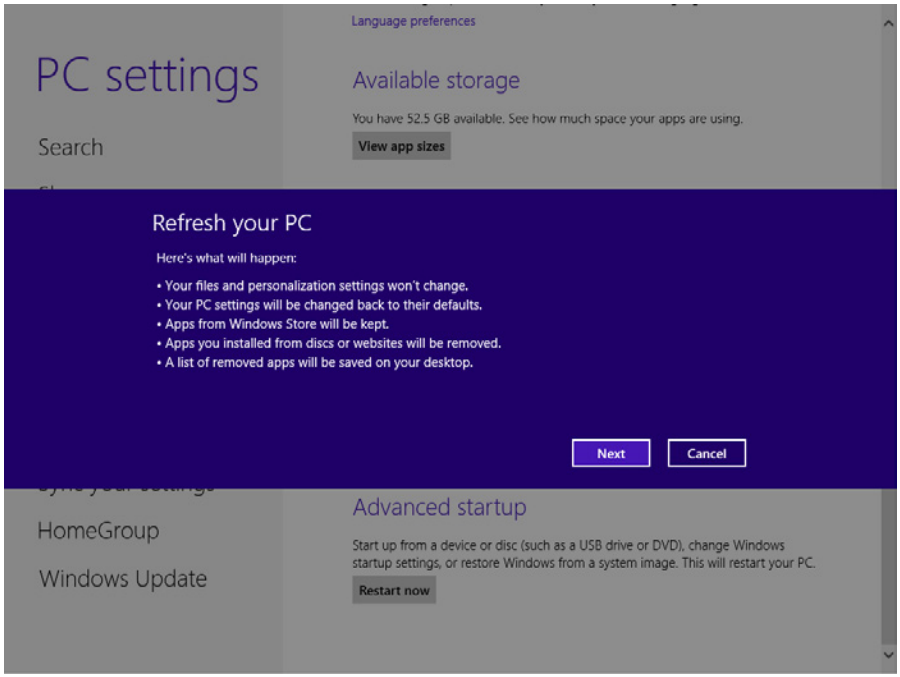

Figure 2-8 The Refresh Your PC option

6. Click Next to refresh the PC.

Summary

There is always truth in the old system administrator's adage that the best and quickest way to repair any problem with Windows is to re-image the computer. This can take time, though, and will certainly require the support technician to be present.

The new tools in Windows 8 and the addition of Startup Repair, which you might not have seen before if you are upgrading from Windows XP, are extremely useful, extremely simple and easy to use, and usually extremely quick, as well.

Armed with this knowledge you not only can repair problems more quickly and simply than ever before, but it's a simple matter to train users, friends, and family to perform these actions themselves, without even needing to contact you.

And what enthusiast, IT professional, or system administrator doesn't want that?

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CHAPTER 3

Preventing Problems Before They Occur

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How Big Should Partitions Be? 32
What to Do When Windows 8 Is Installed 33
Useful Windows 8 Settings to Change 35
Managing Startup Programs 37
Moving Your Files Away From Windows. 39
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PREVENTING PROBLEMS BEFORE THEY OCCUR is always a good idea and can be very simple to achieve; the problem is knowing where to start. You would think that Windows 8 would be set up by default to be incredibly easy to fix when something goes wrong, if it would ever happen. However, I have found it very ironic that for the past decade as Windows has become more reliable, stable, and robust that the number of troubleshooting, repair, and diagnostic tools has increased with each edition.

Windows 8 is no exception with tools such as System Restore, image backup (not just one but two types including Refresh Your PC), a reset option, file versioning, automated troubleshooters, the Action Center, and more. However, as I detailed in the last chapter, the problem is that there are so many hardware and software packages available for the platform that it's impossible to predict how each will interact with each other and with Windows.

The aim of a good preventative strategy, therefore, isn't about making sure all the tools exist to help you recover from an emergency; it's about making sure that problems simply don't exist in the first instance.

Take an IT Help Desk, for example. These departments are expensive to operate because of the staffing costs. Companies obviously want to keep costs down in departments that don't directly contribute revenue. So, when small problems occur, such as a keyboard breaking or a printer driver failing to work, each callout requires personal attention from a trained professional, and each one costs time and money, not just for the IT department but also in terms of lost productivity for the person with the problem.

If you can spend a little additional time settings things up in a bulletproof manner to begin with, then this can save a lot of time diagnosing and fixing a problem later on.

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INSIDE OUT

Why spend time configuring and backing up Windows?

Windows 8 constantly makes small changes and adjustments to its files and settings as you work. The more you do, the more changes Windows makes. After a period of time, these changes can cause software or Windows components to misbehave or malfunction, and they can become extremely difficult to undo. If you back up your copy of Windows 8 after the changes are entrenched, you preserve potential problems.

The benefit of taking time to back up a clean, unused Windows 8 installation is that when something goes wrong, your backup will be an exact copy of a fully working setup, including all of your software and settings. There will be no need to reinstall everything one piece at a time. Plus, you only need to make the initial backup once.

If you have a desktop PC and access to two or more hard disks, it's even better if you can split your Windows installation, files, and backups across them. This means that if you have a real catastrophe, such as the physical disk containing your Windows installation fails, you don't lose your backup copy of Windows, too. You can also use two hard disks to keep identical copies of your files and data; again, just in case a physical disk fails.

Laptops and most PC systems include only one physical disk, however, so you typically won't have the option of splitting your data across different physical drives. But if the idea of splitting things up interests you, you might want to purchase a separate USB external hard disk.

INSIDE OUT

Of hard disks, partitions, and deviled eggs

Think of a hard disk as one big plate for all the food at a party buffet. No matter how careful you are in laying out the food, it will always end up mixed together; and if somebody spills the garlic mayonnaise, it'll go over everything.

What you really need are different plates to separate the food (see Figure 3-1). If you use one long plate that's split into several compartments, you can put a different treat in each space, safe in the knowledge that these compartments will help keep the garlic mayonnaise off the chocolate profiteroles.

It's a similar story with computer hard disks. You can split your hard disk into partitions; for example, one for Windows 8, a second for your files and data, and a third for backups, including a backup of your Windows 8 installation. Splitting them between partitions keeps them apart for safety.

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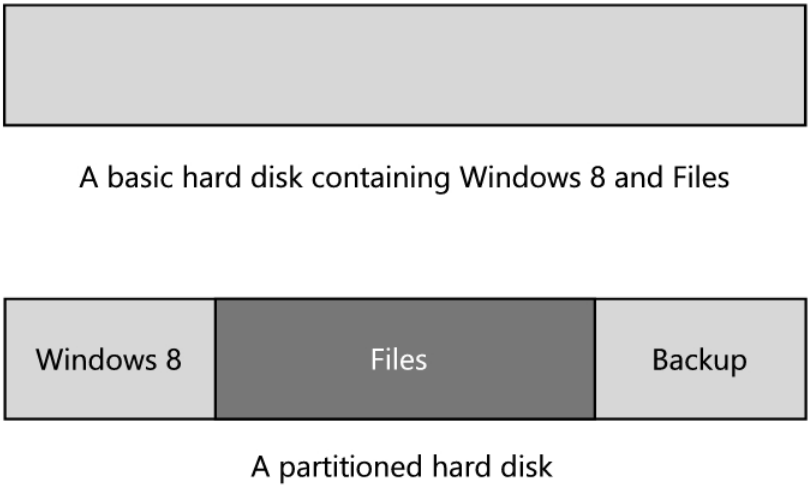

Figure 3-1 Partitioned and nonpartitioned disks

Upgrading or Performing a Clean Install

Whenever a new version of Windows is released, the biggest question that confronts you is whether you should format the hard disk and start with a clean installation or upgrade the existing copy of Windows in which you already have all your software, drivers, and files working.

I've been troubleshooting and repairing Windows installations for many years now, and I've seen so many more problems caused by upgrading from one version of Windows to another that I would always recommend performing a format and a clean install.

How to Clean Install Windows 8 to Prevent Problems

Indeed, with Windows these days, I'd even go so far as to suggest that you delete the partition that Windows resides on and the 100-MB System Reserved partition that goes with Windows 7 and Vista, because the boot system has changed again slightly, and I've seen backup and restore problems caused by the System Reserved partition.

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INSIDE OUT

Wiping and recreating the Windows 8 System Reserved partitions on installation

When you install Windows 8 and choose a custom installation, you will be asked on which what physical hard disk you want to install the OS (see Figure 3-2). If you are wiping out a previous Windows installation, I recommend using the Drive Options link to delete both the Windows partition *and* the 100-MB System Reserved partition if you have one.

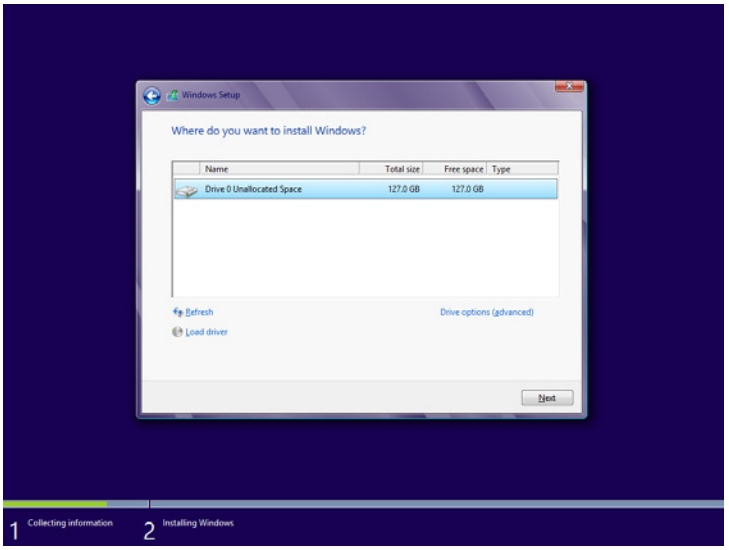

Figure 3-2 Choosing the installation disk in Windows 8

You can now create a new Windows partition on this disk, and the Windows 8 installer will create a new System Reserved partition.

The reason for doing this is that subtle changes are made to the Windows boot system with each incarnation of the operating system (OS). With Windows 8 comes better support for UEFI-enabled motherboards, which is a new alternative to the aging BIOS firmware system, and a new Secure Boot system along with System Reserved partitions that contain all the boot information of up to 300 MB. Occasionally, a 100-MB System Reserved partition isn't big enough for Windows to store its system image backup and restore data.

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NOTE

If you have multiple hard disks installed in the computer, it is always wise to open the case and physically unplug all but the primary hard disk. This ensures that the System Reserved partition and Windows 8 are always on the same drive. If they end up on separate drives, you can never remove the drive containing the system partition without preventing Windows 8 from starting.

Upgrading to Windows 8 from XP, Vista, or Windows 7

If you do upgrade from an earlier version of Windows, what can you take with you? For the upgrade to Windows 8, Microsoft has changed again what can and cannot be transferred, so you might find that if you are upgrading from Vista, for example, that it's simply not worth doing. Table 3-1 presents a synopsis of what can upgrade.

Table 3-1 **Items That You Can Upgrade to Windows 8**

	When upgrading from...		
You Can Transfer	**Windows 7**	**Windows Vista**	**Windows XP**
Applications	Yes	No	No
Windows settings	Yes	Yes	No
User accounts and files	Yes	Yes	Yes

NOTE

There are so many differences between the *32-bit (x86)* and *64-bit (x64)* versions of Windows that I would not recommend upgrading. And be aware that Windows will not allow you to move from an x64 OS to an x86 OS.

When you upgrade, you need to know that not everything will work afterward and some things might even conflict. The Windows 8 Upgrade Advisor will run automatically and inform you of any potential problems and incompatibilities with your software and hardware. If you have Microsoft Security Essentials installed, you will need to uninstall it before upgrading because antivirus is built in to Windows 8 and Security Essentials won't work. There might also be hardware drivers that are incompatible, although generally the driver model for Windows Vista, Windows 7, and Windows 8 are the same.

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CAUTION

Whenever you perform a clean install or especially an upgrade of Windows, you *must* first ensure that you have a complete and up-to-date backup of all your files, data, and documents.

How Big Should Partitions Be?

The size of your hard disk and how you intend to use your computer will determine how big you should make your partitions. I would always suggest that you have a minimum three partition structure: one for Windows 8, one for files, and one for a backup copy of Windows.

Your backup partition should be the same size as your Windows 8 partition if you only want to keep a backup copy of Windows 8 on it. It will need to be bigger if you also want to keep files and software installers there, too.

NOTE

If you want to keep a custom system image *and* a custom refresh image (which I recommend), your backup partition will need to be double the size of your Windows 8 installation.

You can use Table 3-2 as a guide for how large your Windows 8 partition should be. Please note these figures are suggestions only. If you use development software (web, programming, or design), you might find you will need more space for your programs.

Table 3-2 **Recommended Windows 8 Partition Sizes for Various Use Scenarios**

PC Usage	Windows 8 Partition Size
Light business	30 GB; Enter **30720** in the partition size box
Light home	30 GB to 50 GB; Enter **30720** or **51200** in the partition size box
Power user	50 GB to 200 GB; Enter **51200** or **204800** in the partition size box
Developer	100 GB; Enter **102400** in the partition size box
Video/photo editor	100 GB to 200 GB; Enter **102400** to **204800** in the partition size box
Gamer	100 GB to 300 GB; Enter **102400** to **307200** in the partition size box

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So what do you do about creating partitions for your files and Windows image backup? The best practice advice is this: if you have more than one physical hard disk in your computer, always put the image backup on the secondary drive and probably the files there, as well. This ensures that if the hard disk containing Windows fails, you don't lose your files or backup, and if the disk containing the files and backup fails, you still have a working copy of Windows.

However, if you are on a single-disk system—which is much more likely, especially given that most new Windows 8 computers these days are either all-in-one affairs, laptops, or tablets—your backup partition should be the same size (perhaps slightly less as you need some extra overhead room for temporary files, downloads, and the like on your main Windows partition) than the Windows 8 partition, and your files partition should occupy all the space you have left.

This is generally fine on a desktop or all-in-one computer which will come with a hard disk of 1 TB or more, but what if you are installing Windows 8 on an Ultrabook or a tablet that only comes with a 128-GB solid-state drive (SSD)? In this circumstance, I would suggest skipping the backup partition and instead creating a backup image on a DVD, or better still, an external USB hard disk.

INSIDE OUT

Blowing away the OEM restore partition

Computer manufacturers, known as Original Equipment Manufacturers (OEMs), will almost always put a hidden restore partition on your computer. This might currently contain a copy of Windows 7 or even Windows Vista. If you need to reclaim valuable hard disk space and don't mind deleting the original Windows image that shipped with your computer, you can delete this partition by using the Windows installer.

What to Do When Windows 8 Is Installed

After Windows 8 is installed, you need to complete the following important tasks before you get to the job of installing all your software and using the OS in earnest:

- Windows 8 is the first version of Windows that comes standard with antivirus protection. If you prefer using different antivirus software instead of Microsoft Security Essentials (known in Windows 8 as Windows Defender), then you should install this first.

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- Install only software you will definitely use regularly. Skip loading software you will use only rarely or might not use at all; when you are ready to use it, you might find that it's been upgraded anyway.
- Try to avoid installing shareware or trial version software. Although many amateur software authors do write some excellent applications, it rarely goes through the same quality control procedures as commercial packages. Shareware and similar software can cause problems on a PC.
- Update all the installed software to get any upgrades. This is especially important for Adobe Acrobat Reader because PDF files are often used to hide viruses.
- Activate your software and enter the required product keys to keep the software from becoming unusable if you need to restore it from a backup.

For a new installation of Windows 8, I recommend the following series of steps:

1. Run Windows Update to make sure you have the latest updates to the operating system. Do this several times; restart the PC after each update to ensure that your computer is current. You can access Windows Update by searching for it on the Start screen or from PC Settings.
2. Ensure that Windows 8 is activated. If you don't activate Windows 8, it might become inoperable if you at some point restore from a backup. To activate Windows 8 from Control Panel, click System And Security, and then click System. The option to activate Windows 8 is at the bottom of the window.
3. Modify Windows 8 settings to your preferences (regional settings, for example). Read the following section for details about how to do this.

CAUTION

It's important that you don't do too much regular work while getting Windows 8 ready to create a system image backup. Avoiding regular work helps to ensure that nothing can go wrong during this important period.

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Useful Windows 8 Settings to Change

By default, Windows 8 is set up to be efficient and you don't need to tweak many settings. There are still, however, some that I would recommend you make that can enhance performance (the computer's performance, that is, not the type you get told about in spam emails!) and make the operating system run more smoothly in general.

You access these settings in the desktop Control Panel, as shown in Figure 3-3. To access this, on the Start screen, type the word **control** to search for it.

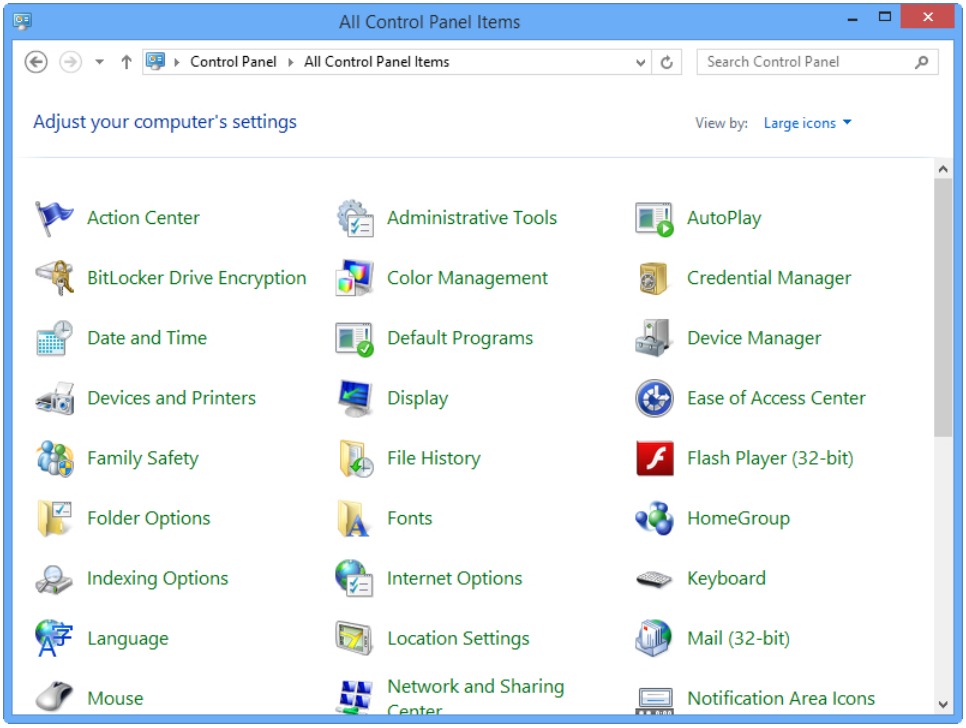

Figure 3-3 The desktop Control Panel in Windows 8

Windows 8 uses a space on your hard disk drive called virtual memory to help better manage the computer's physical memory and to load programs quickly. By default, Windows manages the size of the virtual memory file (also known as the paging file), but this means that it can grow and shrink and cause problems that ultimately slow down access to the files and data on the hard disk.

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To change the virtual memory size, follow these steps:

1. In the Control Panel, click System And Security and then click System.

   A new list of options appears.

2. In the blue panel on the left side of the window, click Advanced System Settings.

3. In the System Properties dialog box, click the Advanced tab.

4. In the Performance section, click Settings, as shown in Figure 3-4.

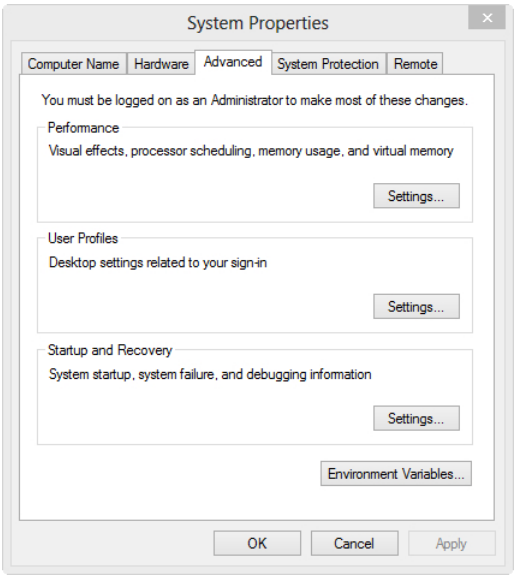

Figure 3-4 The Advanced tab in the System Properties dialog box in Control Panel

5. In the dialog box that appears, click the Advanced tab, and then click the Change button.

   The Virtual Memory dialog box opens, in which you can change the virtual memory settings, as shown in Figure 3-5.

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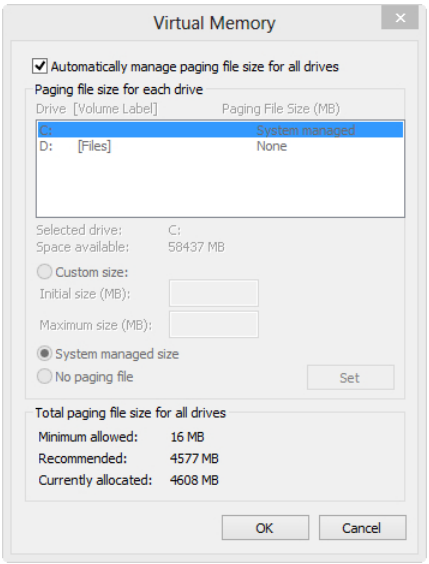

Figure 3-5 Setting the virtual memory page file size

Clearing the Automatically Manage Paging File Size For All Drives option and selecting the Custom Size option instructs Windows to keep this paging file the same size all the time. This can help keep access to your files fast.

The recommended amount of disk space is displayed toward the bottom of the Virtual Memory dialog box (4577 MB in the example in Figure 3-5). Enter the recommended paging file size for your computer in both the Initial Size (MB) text box and Maximum Size (MB) text box, click Set, and then click OK to close the dialog box.

In Control Panel, you can also change regional and language settings and get access to the Device Manager to check that the drivers for all of your hardware are installed.

Managing Startup Programs

When you wanted to manage your Startup programs in previous versions of Windows you would launch MSConfig and go to the Startup tab. MSConfig is still in Windows 8, but it no longer manages programs that run at startup. For that, there's the new Task Manager.

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This not only makes sense but it also makes it much simpler for users to manage what runs when their computers start; after all, it's been years now since programs could almost always be found in the Startup folder in the Start menu.

You'll want to run the Task Manager in More Details mode. To do so, click the More Details button on the lower-left corner of the Task Manager window.

Click the Startup tab to display a list of software that runs when the computer starts, as illustrated in Figure 3-6.

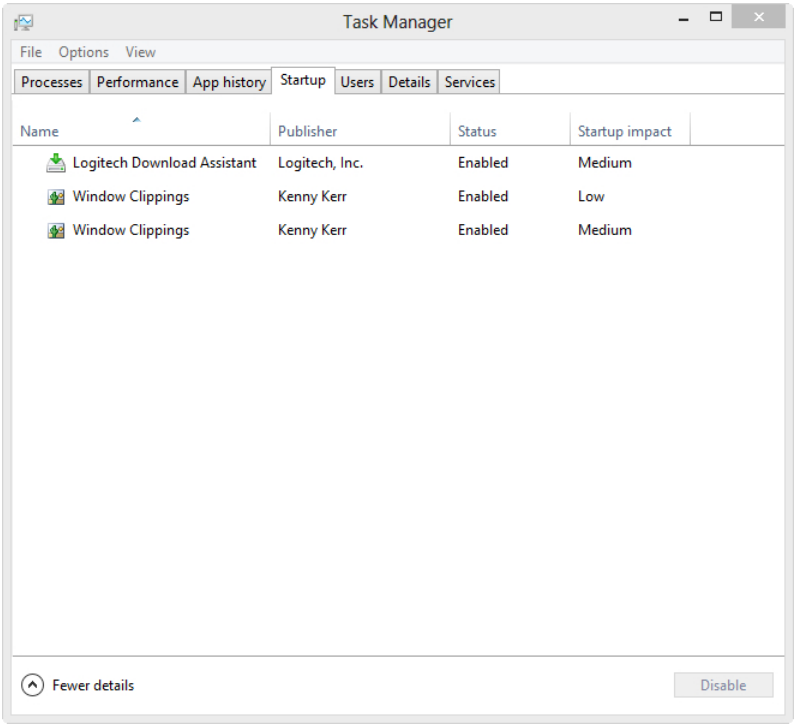

Figure 3-6 The improved Task Manager in Windows 8 now manages Startup software

If you want to disable a program, highlight it, and then in the lower-right corner of the window, click the Disable button. It really couldn't be any simpler.

One thing that's very worthy of note on this tab is the new Startup Impact column. This helps you to make much more informed decisions about what needs to be disabled and what can be left enabled because it gives you a reasonable indication of how long it takes each program to load when Windows first starts.

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Moving Your Files Away from Windows

One of the biggest problems with Windows traditionally—well, so far as I am concerned anyway—is that it's always kept your important files and documents on the same physical partition as your copy of Windows. This can cause all manner of problems if Windows fails (I'll show you how to recover files from a failed Windows installation in Chapters 28 through 31, in Part IV of this book).

Despite Windows 8 being more stable and reliable than any previous versions of Windows, the thought of keeping my files on the same partition still fills me with dread, and I never recommend that anybody ever do this. This is why earlier in this chapter I recommended creating a separate partition for your files when you install Windows 8.

INSIDE OUT

Why move your files away from Windows 8?

Although Windows 8 is a very stable operating system, your PC is still not a consumer electronic device. Windows could become corrupt with little or no notice. If you must reinstall Windows at some point, you could lose all of your files and data if they are stored on the same drive or partition where you originally put the operating system. That's why it is important to separate your data from Windows on your PC.

Now there are several ways to move your files and data away from Windows 8, including the official way, which involves changing all the default store folders for libraries, one at a time. This is a very long and, dare I say, arduous way to do the job when there's actually a much simpler and quicker way to perform the same task, which I describe in the following:

1. Open File Explorer.
2. At the left side of the Address Bar, click the first arrow, just next to the folder icon, as depicted in Figure 3-7.

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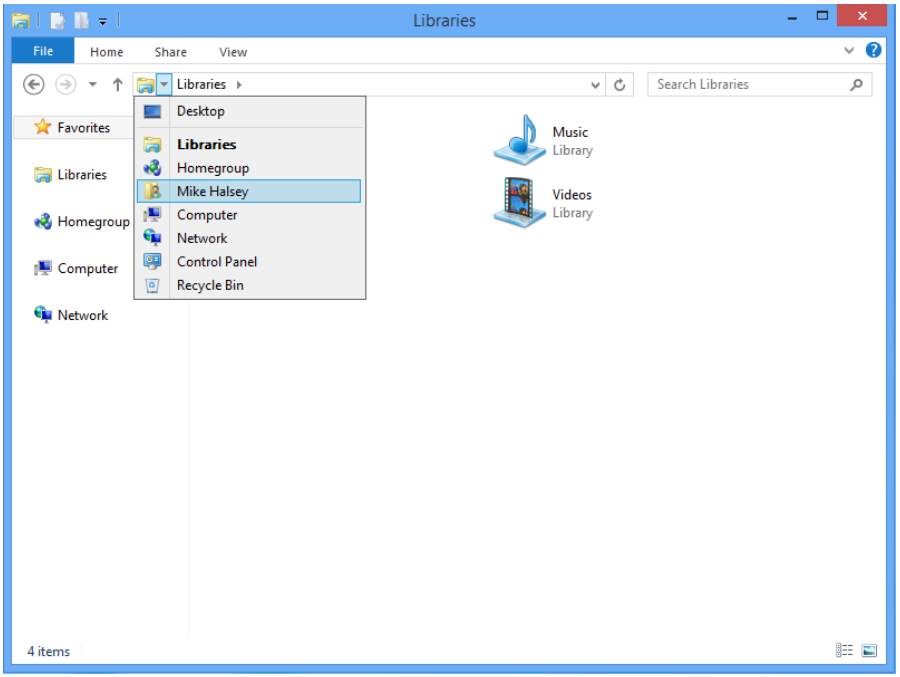

Figure 3-7 Using the Address bar in File Explorer

3. On the drop-down menu that appears, click your user name.
4. Select your user folders. I would always recommend Downloads, Favorites, My Documents, My Music, My Pictures, and My Videos.
5. On the ribbon, click Cut.
6. Go to the hard disk or partition on which you want the user folders stored.
7. On the ribbon, click Paste.

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CAUTION!

Be sure to select Cut and *not* Copy in step 3, which will not move the files; it will simply duplicate them.

Backing Up Windows 8

When Windows Vista introduced a full image backup system, IT professionals became very excited (well, I did anyway). When this was expanded to include every edition of Windows 7 (not just Professional and above), people became even more excited (even if was just me again).

With Windows 8, there are not one but two ways to create an image backup. I spoke about how to create a custom refresh image in Chapter 1, "Finding Your Way Around Windows 8," but I would also recommend creating a full image backup, as well.

The reason for this is that if Windows spectacularly fails and you can't load the refresh option from the boot loader, you will need a full image containing both Windows 8 *and* the boot loader that you can reinstall from a USB pen drive or from a DVD startup repair disc.

This option has been moved (slightly) in Windows 8, and there is no longer a Backup & Restore option in the Control Panel. It is now called Windows 7 File Recovery, but you can still find it in the Control Panel.

1. In the Control Panel, change the View By setting to Large Icons or Small Icons to show all the Control Panel items.
2. Open the Windows 7 File Recovery window (see Figure 3-8).
3. In the panel on the left, in File Recovery, click Create A System Image.

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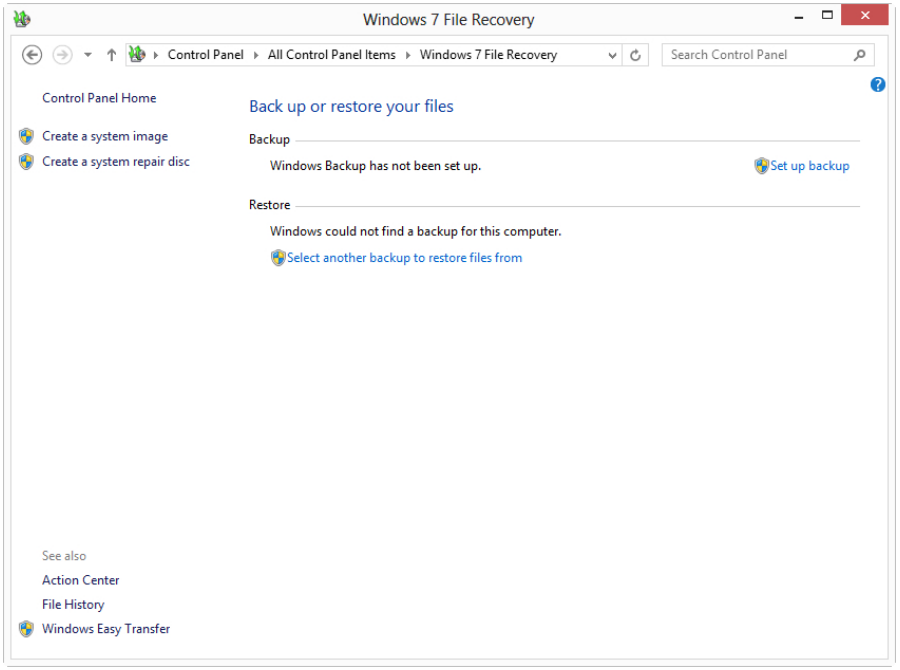

Figure 3-8 Using Windows 7 File Recovery

4. In the dialog box that appears, select the location where you want to store your Windows image backup, as shown in Figure 3-9, and then click Next.

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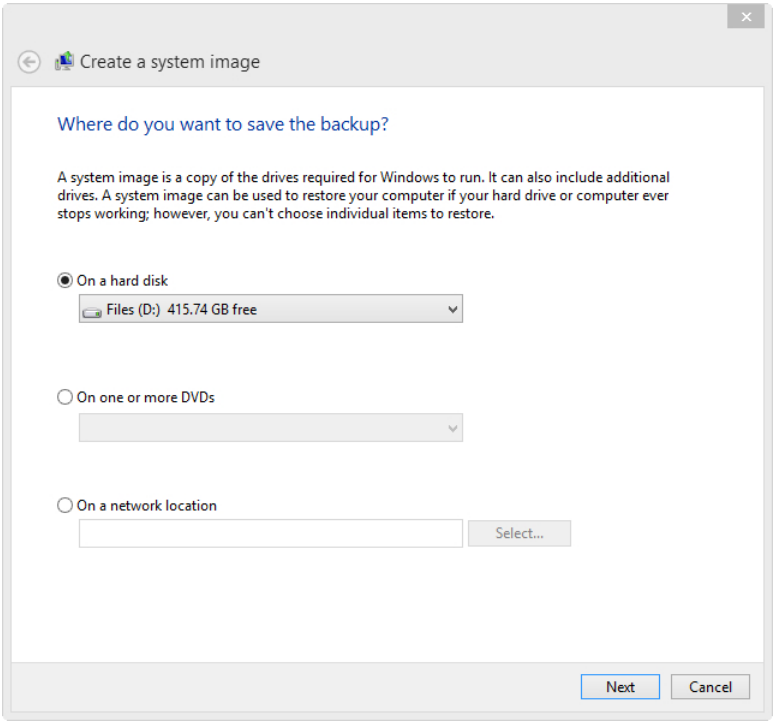

Figure 3-9 Creating a system image backup

Windows 8 will automatically select your Windows and System Reserved partitions for backup.

5. Click Next to start the backup process.

INSIDE OUT

Network backup precautions

Don't back up your operating system to a network location if your computer connects to the network only via Wi-Fi, because you will be unable to see the backup if you need to restore it. Only do a network backup if you connect via a physical network cable. This is because you restore the image from the boot system of the installation DVD, and Wi-Fi networks cannot be seen by Windows in this mode.

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Windows 8 is now backed up, although it is also advisable to create a refresh image, as well. This can usually be stored on your Files partition if no space exists on your Backup partition for it.

If Windows 8 then fails, you can restore this quickly and simply, which I show you how to do this in Chapter 14, "Easy Ways to Repair Windows 8."

Summary

Although Windows 8 is very well configured and very robust on a clean install, there are still many things that have not changed since the days of Windows 98. The auto-sizing of the virtual memory Page File, for example, still means that you have a file that will expand and contract all the time. On a mechanical hard disk this can cause problems with file fragmentation, slowing down file access times, and on a solid-state disk it simply wastes usable space.

Ensuring that you have suitable image backups is essential, too. Even though it might seem overkill to create a system restore image *and* a custom refresh image, the latter means that you don't have to configure all the changes you have made to your computer since you first made it, and the former means you're covered for almost any disaster than can befall your computer.

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CHAPTER 4

Using the Basic Windows Utilities

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Windows Update 52
Windows Firewall 55
Windows Defender 57
Legacy Program Compatibility 59

Troubleshooting in Windows 7 was fairly straightforward. All important messages in the operating system were channeled through the new Action Center, and from there, you could find most of what you needed. With the new user interface (UI) taking center stage in Windows 8, though, most of the tools and utilities you need to diagnose and repair Windows 8 problems are hidden away, and in the case of Windows 8 on ARM processors, some are missing completely.

This doesn't make Troubleshooting any harder for those who are familiar with the desktop, but casual computer users will certainly find things more confusing and complicated.

I want to split this chapter into two sections, therefore, looking first at what you can do in the new UI from the Windows 8 Start screen and then delving into the basic utilities that are available for users who are comfortable with the desktop.

Windows 8 Utilities

The whole point of the new UI, apart from creating a tablet-friendly interface for Windows, is to reduce and simplify. Thus, the PC Settings (Control Panel) includes only the options that most people need, most of the time. There's nothing in here that anybody could really call an advanced setting.

That having been said, there are still a couple of items here that are useful for maintaining and troubleshooting a healthy computer.

Refresh

This book wouldn't be complete without mentioning the Refresh option. The Refresh option is located in the General section under PC Settings, as illustrated in Figure 4-1.

It's very appropriate to discuss Refresh here because it can be used by an end user to restore Windows 8 to a working copy while keeping files, apps, software (if a custom image has been set), and Windows settings intact.

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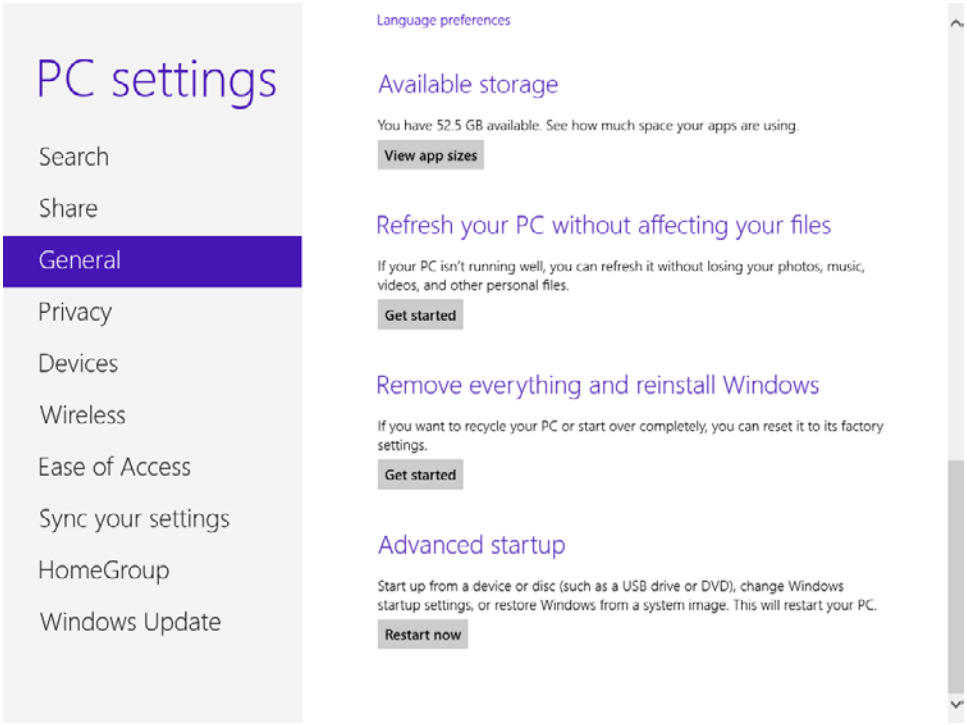

Figure 4-1 You can find the Refresh option in the General section in PC settings

CAUTION!

If you are talking a user through the process of refreshing Windows, be careful to explain to her the difference between Refresh and Reset.

INSIDE OUT

Why Refresh isn't suitable for workplace desktop users

As I mentioned in Chapter 2, "Repairing Windows 8 in 30 Minutes or Less," Refresh doesn't take a complete, as-of-that-moment, snapshot of your working Windows installation. Although it saves all of your installed desktop software and installed Windows 8 apps, it doesn't save any of the settings for your desktop software.

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The upshot of this is that after performing a Refresh you will have to set up your desktop software again, including entering email account information in Outlook or any other email client.

This makes Refresh an unsuitable option for any user who uses the desktop exclusively in the workplace; unless the user engages apps exclusively or most of the time, a system image backup is a better option.

Windows Update

Windows Update section in PC Settings, which is enabled by default in Windows 8, is a very simple affair (see Figure 4-2). There's just one button—Check For Updates—and that's it.

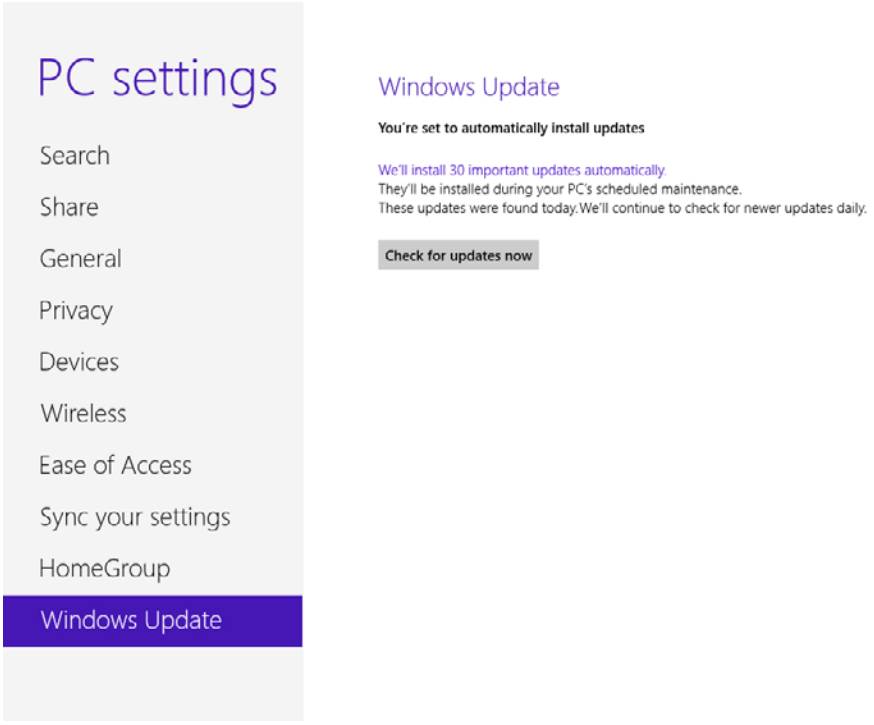

Figure 4-2 The simple-to-use Windows Update in PC Settings

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This isn't all good news, however, because this means that there will be optional or extra useful updates that users might never see, or pretty essential upgrades for components or software such as Internet Explorer or Windows Live Essentials that users might not see for months until they become mandatory.

However, as a basic way for users to be able to manage Windows Update, I very much doubt that Microsoft could have done a better job of it.

Desktop Utilities

On the Windows 8 desktop, there are many more choices with respect to utilities than were available in Windows 7. These choices are described in the following subsections.

The Action Center

The Action Center is the central location for all important Windows messages. It was developed through feedback from Windows XP users who felt that their software and Windows itself was pestering them too often with pop-up information balloons.

You access the Action Center by clicking the white flag logo (the irony of which has never been lost on me) on the far right of the Windows 8 Taskbar (see Figure 4-3). If there are any messages pending, a pop-up window will appear first, which includes an Open Action Center link.

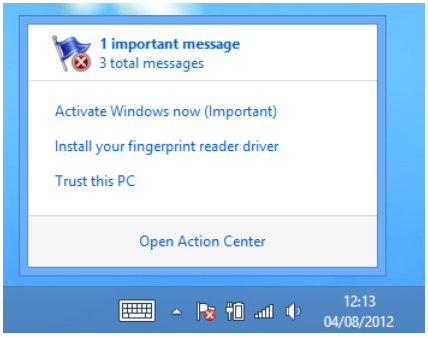

Figure 4-3 The Action Center Notifications pop-up window on the Windows 8 Desktop

So, rather than pop-up annoying messages on screen, if there are messages waiting for you in the Action Center, the white flag will appear with a red circle and a white cross. It is a small but eye-catching alert.

It is easy to control what messages and alerts for which the Action Center will prompts you; for example, you can turn off all backup messages if you use third-party backup software.

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Some third-party software, especially antivirus packages, will automatically plug themselves into the Action Center, and you can monitor them from there.

All messages in the Action Center display a colored band to their left (see Figure 4-4) that denotes the message's priority; green indicates that all is well, yellow messages signify that information is available, and red ones designate that something needs your attention.

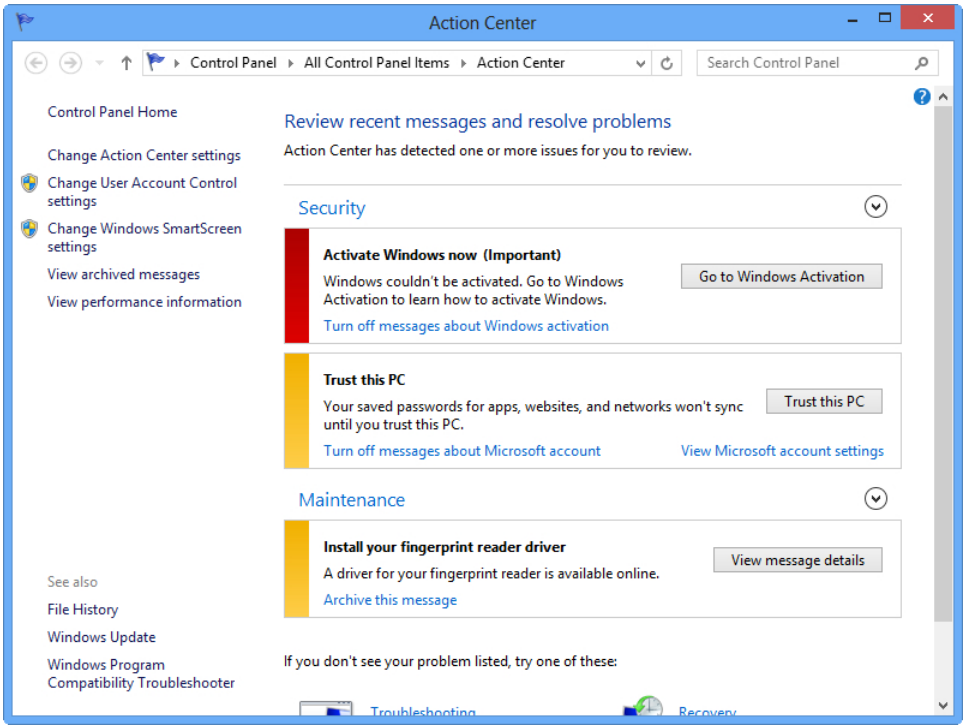

Figure 4-4 The Action Center in Windows 8

When something fails with Windows 8, such as when a program or a driver crashes, the operating system stores information about these errors in a log and displays the log in Action Center. If there are any error logs in Action Center, you will see a Check For Solutions option under Maintenance. Click this option to search for a matching error log, hopefully, there's a solution in Microsoft's database. You can also use the Maintenance section to change the Settings And Troubleshooting Settings. It's possible that in a corporate environment the IT department will turn off these settings, perhaps to conserve Internet bandwidth or because of its own update management policy.

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Windows 8 Automatic Maintenance

One new feature in the Action Center is the Automatic Maintenance tool (see Figure 4-5), which pools checking for and installation of software updates, security scans, and system diagnostics into one action that is performed on a daily schedule.

You can even configure Automatic Maintenance to temporarily wake a computer from sleep to perform the tasks (only if it's plugged into an electric supply).

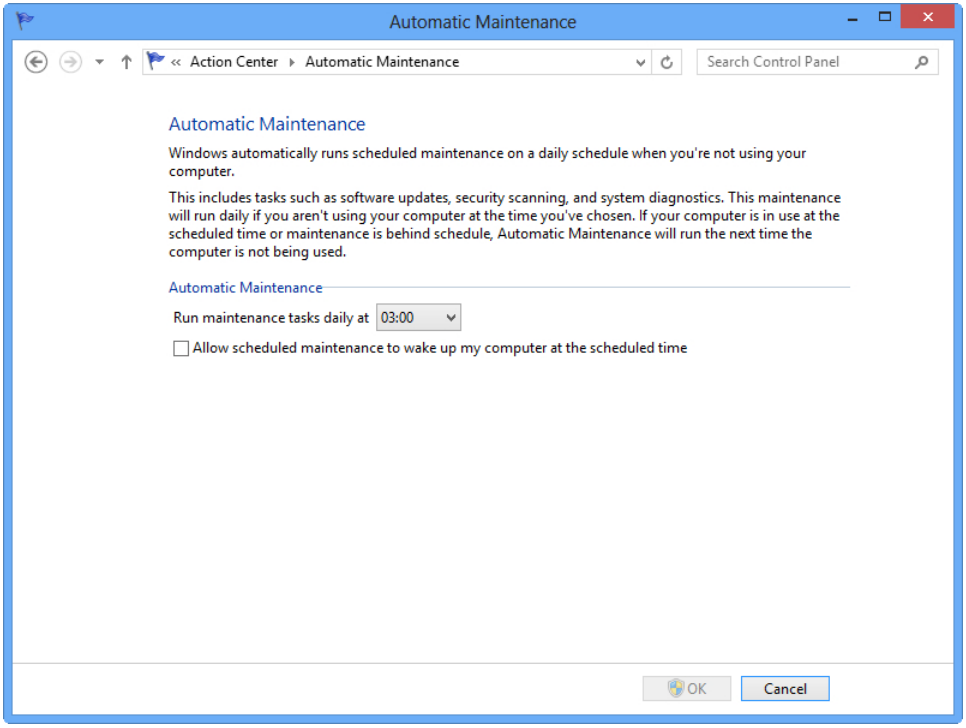

Figure 4-5 Configuring Automatic Maintenance in Windows 8

As a way of helping keep Windows 8 happy and healthy, this is an excellent idea, and performing all the tasks simultaneously also helps reduce battery drain when you are using a laptop or tablet computer.

Action Center Settings

To control what messages appear in the Action Center, in the colored panel on the left of the Action Center panel, click Change Action Center Settings. In the window that appears, indicate the items for which you want Windows to notify you when there are problems, as shown in Figure 4-6.

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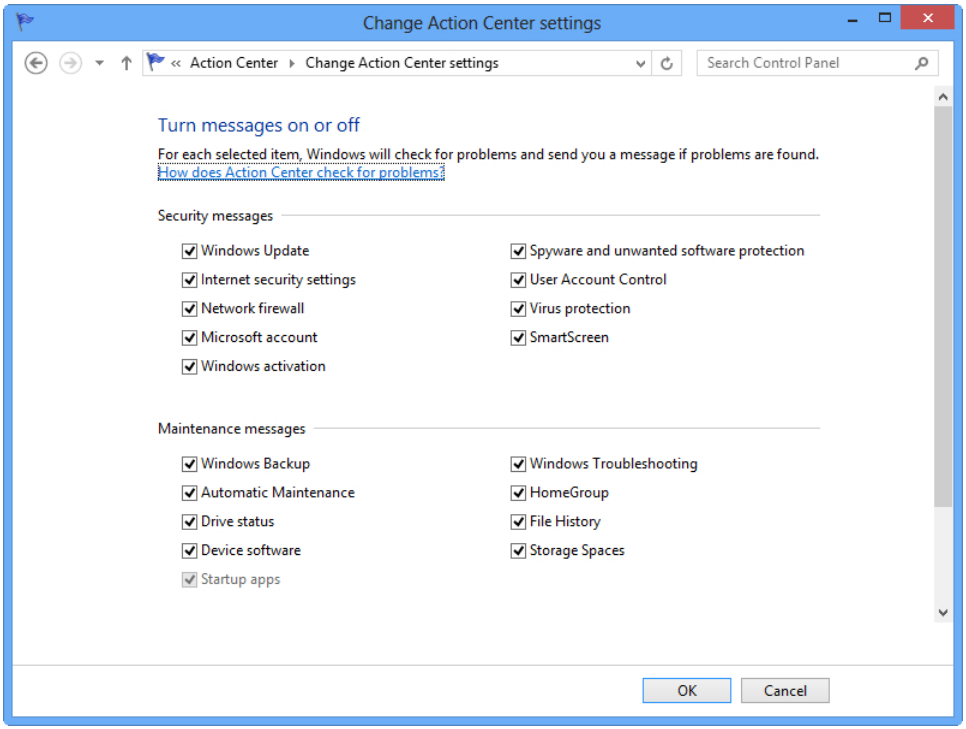

Figure 4-6 Changing the Action Center Settings

What Can You Do in the Action Center?

The Action Center should be your first resource when diagnosing problems within Windows 8. This is because it is not only the central place for diagnostic and maintenance messages from the operating system, it is also a centralized place from which you can control essential Windows 8 features such as the User Account Control security system and Network Access Protection.

You can also view archived Action Center messages from the main Action Center panel. Problems that have occurred with Windows 8 in the past can give you clues to a solution for a current problem.

In the Action Center, you can also view the operating system's reliability history. To do this, go to the Maintenance section (see Figure 4-7) and click View Reliability History. As I said earlier, Windows 8 tracks problems caused by software, drivers, and Windows components. It represents this information in a chart.

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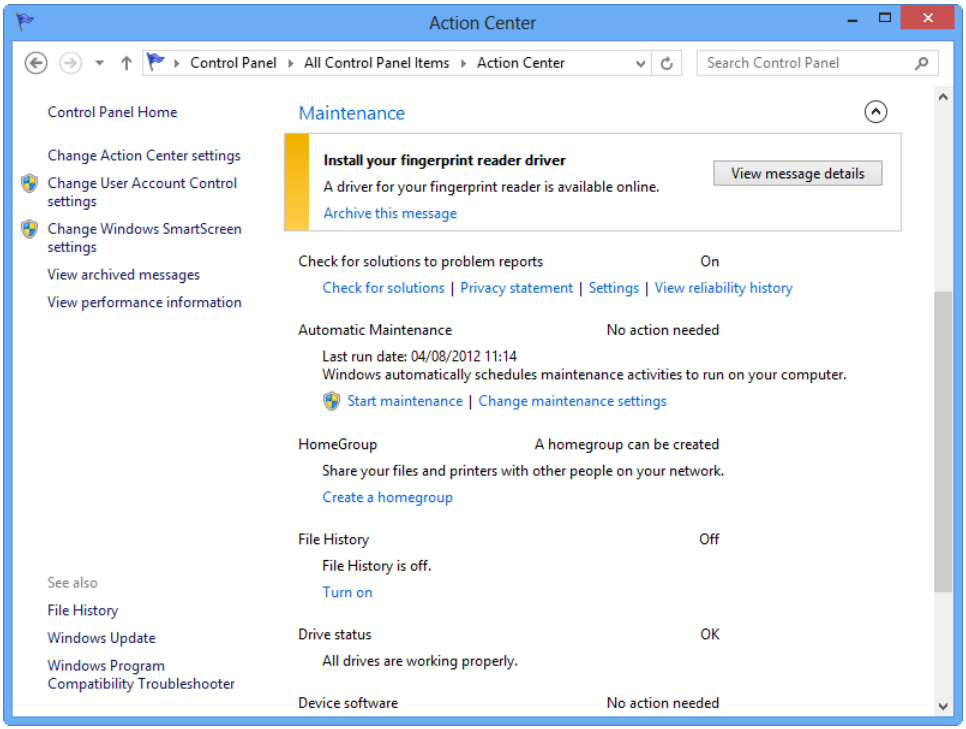

Figure 4-7 In the Maintenance Section, you can click a link to view the operating system's reliability history

Windows Update

By the time the first service pack launches for a Windows operating system, there can be 80 or more security and software updates included as a part of it. These updates address issues related to the following:

- Virus and malware attacks
- Hacking attacks
- Other security vulnerabilities
- Windows Product Key cracks
- Faults found in Windows
- Incompatibilities with third-party and other Microsoft software

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- Updates for programs and features in Windows 8
- Updated drivers for hardware
- Updates for other Microsoft software supported by Windows Update
- Legacy code updates

Most updates address security vulnerabilities and legacy code. Hundreds of millions of people worldwide use Windows, so it's a huge target for hackers and criminals, who regularly exploit software, such as Microsoft Internet Explorer. Legacy code updates—the other largest contributor to service packs—cover vulnerabilities that date back to previous versions of Windows and problems caused by maintaining compatibility with them.

For a stand-alone computer or for one on a small, unmanaged network, I recommend turning on automatic Windows updates, as shown in Figure 4-8. This can help prevent problems on your computer by automatically updating Windows components as updates become available.

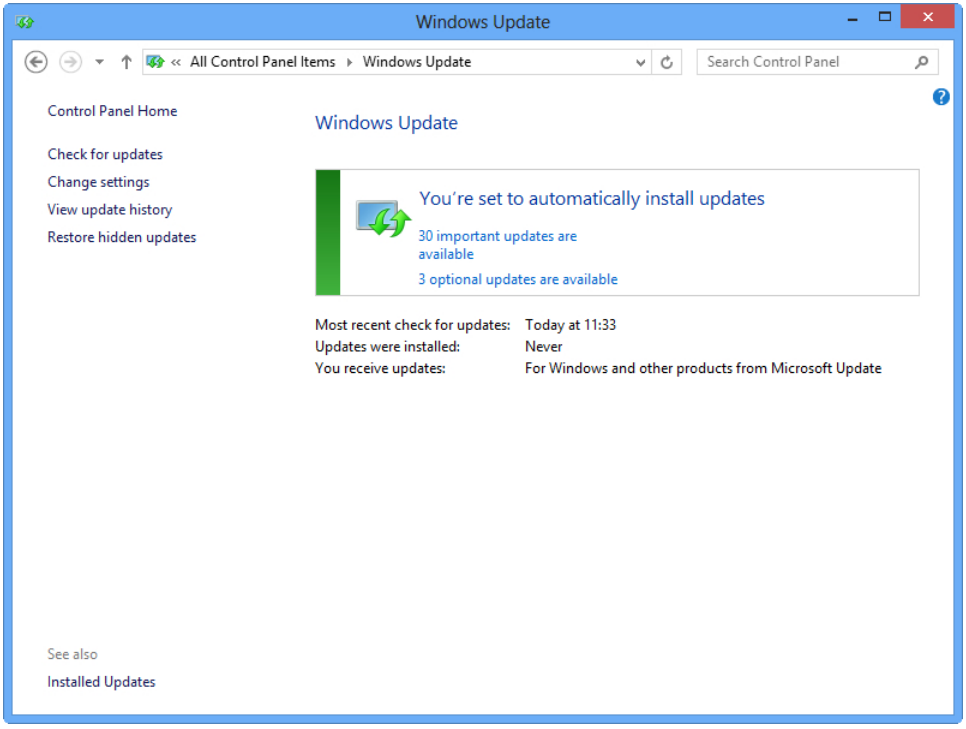

Figure 4-8 Windows Update as run from the Control Panel

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To access Windows Update, go to the Action Center, or in the Control Panel, look in the System And Security section.

Controlling Windows Update Through Group Policy

Windows Update sometimes causes problems, especially with older, legacy hardware or software for which an update introduces an incompatibility, preventing older software or hardware from working properly or making Windows 8 unstable when software runs.

In the corporate environment or on a small Windows Server network with multiple users, you can disable the Windows Update service and instead use Windows Server features to download and test all updates before they are rolled out across the network.

You can disable Windows Update in corporate environments by using a utility called Group Policy Editor. To access Group Policy Editor, open the Start screen and search for **GPEdit.msc** (not case-sensitive). The Local Group Policy Editor window appears, as depicted in Figure 4-9.

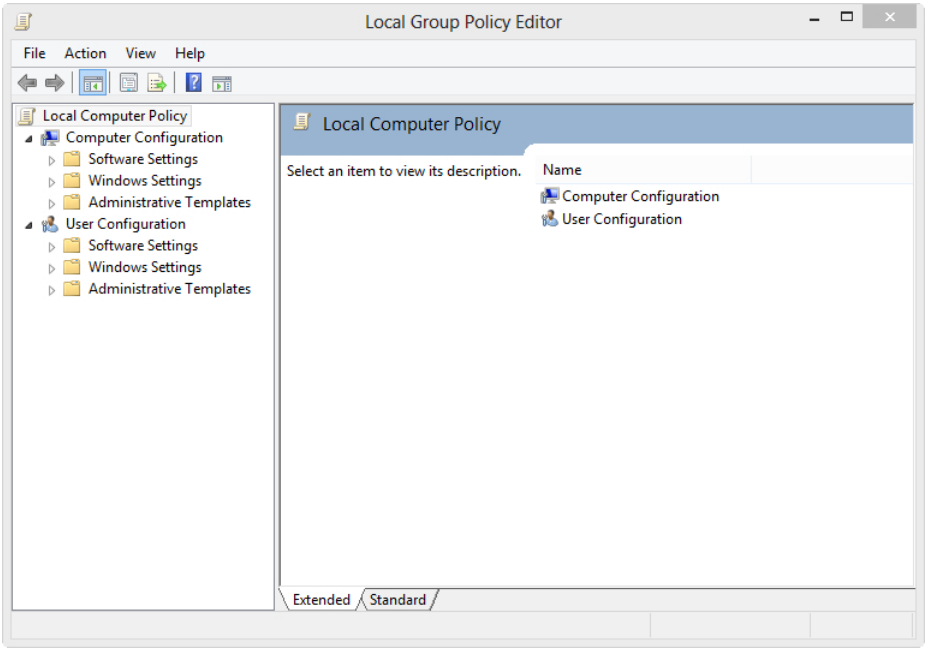

Figure 4-9 The Group Policy Editor in Windows 8

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INSIDE OUT

Group Policy Editor availability in Windows 8

As with previous versions of Windows, the Local Group Policy Editor is only available in Windows 8 Pro and Enterprise. It is also not available in the ARM version of the operating system.

Using the Group Policy Editor, you can independently control policies for the computer and for individual users. This is important because you want to grant systems administrators full control of the computer but limit access by other users.

To control Windows Update and set the policy for all users, in the Group Policy Editor, click Computer Configuration, click Administrative Templates, click Windows Components, and then click Windows Update. In this window, you can configure Windows Update to stop receiving automatic updates or to receive updates only from your company's server, among various other options that are available for controlling Windows Update.

Windows Firewall

Many people prefer to use a third-party firewall with Windows. Third-party firewalls can offer more features and more protection than the standard Windows firewall, but they can also be quite intrusive and complicated to use. For advanced computer users, or for people who are always careful about what they click and open when browsing the Internet, the standard firewall that comes with Windows 8 is perfectly adequate; in fact, some antivirus and security suites now don't even bother to include their own firewall, recognizing the effectiveness of the one that ships by default with Windows 7 and Windows 8.

Figure 4-10 shows that Windows Firewall is a two-way firewall that will block incoming and outgoing traffic, unlike the inbound-only block included in Windows XP. I recommend that you always have a firewall turned on, whether it's Windows Firewall or a third-party product. This is an essential security strategy that can prevent many types of problems and attacks on your computer.

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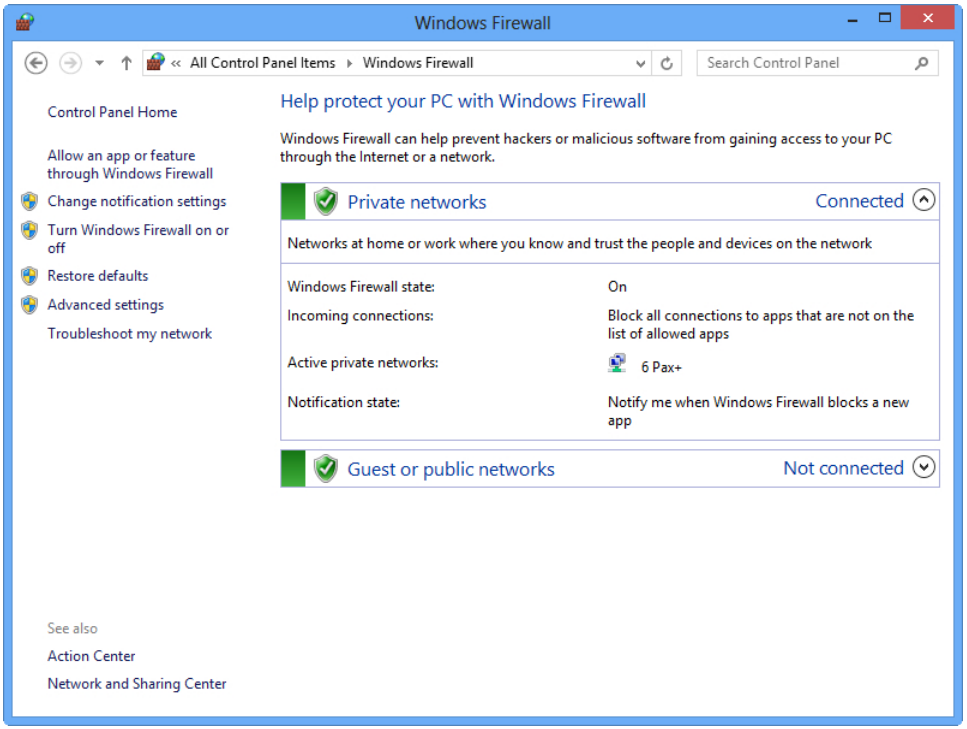

Figure 4-10 The Windows Firewall

By default, Windows Firewall settings provide adequate protection for most situations; however, more advanced controls might be necessary in certain environments, such as in a home where residents play Internet games or share files, or in an office where Windows Firewall could block access to a network or file share.

To correct some Windows issues, especially network connection problems by which a program or service cannot communicate with the outside world or your network, you might need to set more appropriate permissions for the program or service.

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To change these permissions, you need to access the advanced settings. In the blue pane (on the left) of the Windows Firewall main window, click Advanced Settings. The Windows Firewall With Advanced Security window opens with an broad array of options for controlling your firewall and regulating access to and from your computer. I will show you how to use the Advanced Firewall in Chapter 34, "Exploring Windows 8 Firewall In-Depth."

INSIDE OUT

Basic Windows Firewall control

Windows Firewall alerts you when a program is requesting permission to pass through the firewall.

If you accidentally give permission to a program and later want to deny it access, you can do this on the main Windows Firewall options panel by clicking Allow A Program Or Feature Through Windows Firewall. A list of programs that have firewall access appears. Clear the check boxes for the programs and features that you want to block.

Windows Defender

If there's one aspect of Windows 8 that's going to cause confusion, Windows Defender is it. There are two reasons for this. Chief among them is that this is not the Windows Defender that's been present for years in Windows XP, Windows Vista, and Windows 7. This is instead a full version of Microsoft's free Security Essentials antivirus product. Figure 4-11 illustrates the new Windows Defender antivirus tool.

The other reason for some user consternation is that Windows Defender is only really easily accessible from the desktop and Action Center (unless you open the Start screen and search for it).

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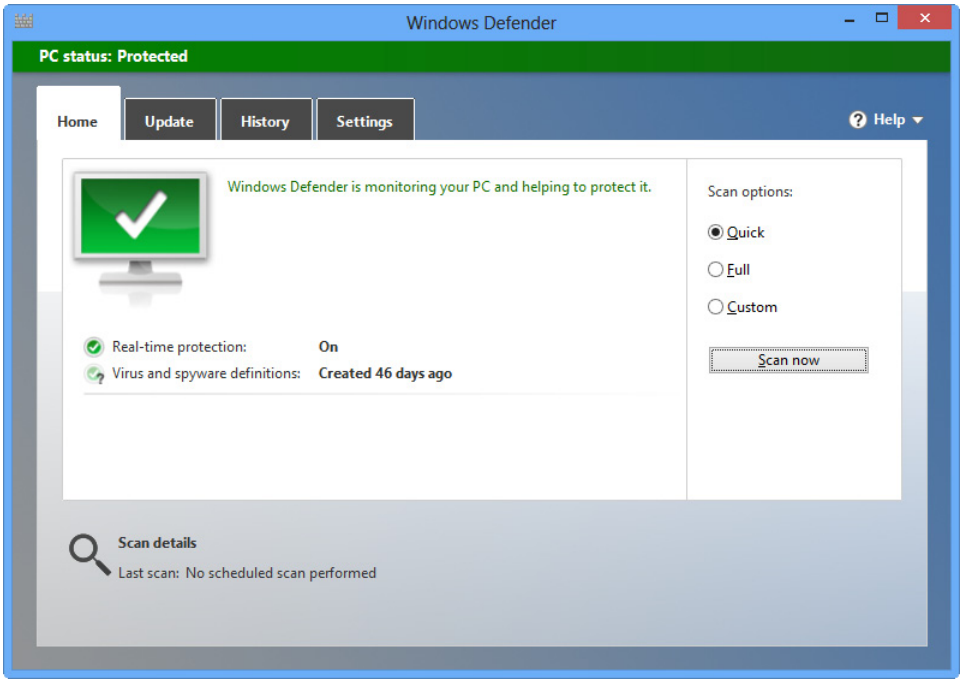

Figure 4-11 Windows Defender is now a full antivirus tool

It's great to see full antivirus functionality finally packaged with Windows, although you might still choose to install and use a third-party package, instead.

If you do elect to go with third-party antivirus protection, you might find that the package conflicts with Windows Defender; thus, you might want to switch Windows Defender off. To do this, open Windows Defender, click the Settings tab, and then click Administrator, as demonstrated in Figure 4-12.

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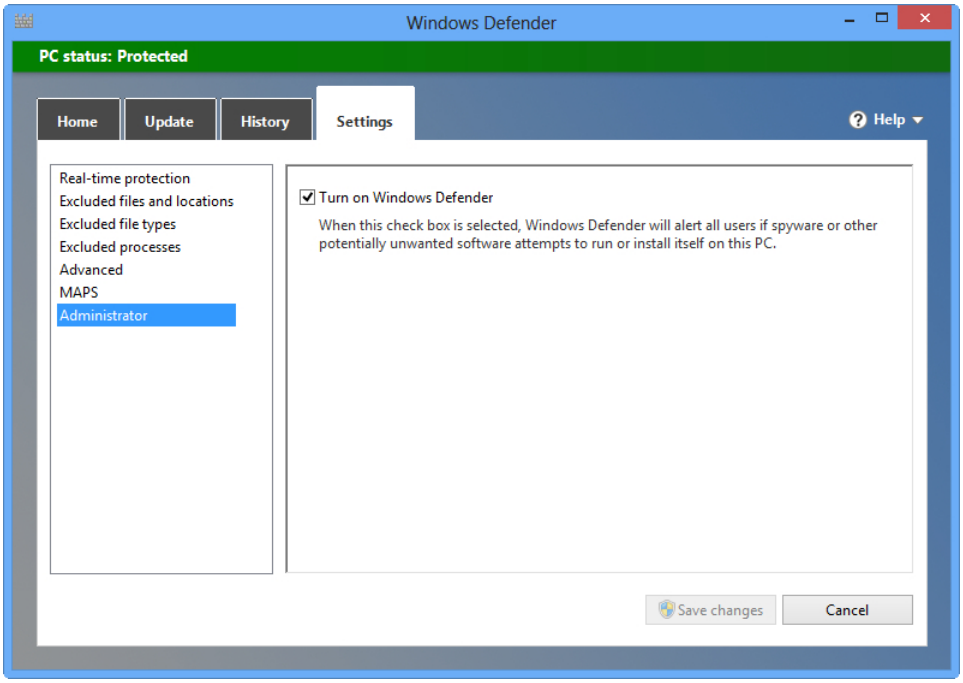

Figure 4-12 You can disable Windows Defender in the Administrator settings

Legacy Program Compatibility

One of the biggest strengths of Windows throughout the years—something that has enabled it to maintain market dominance over other desktop operating systems—has also been one of its biggest failings: compatibility with older programs. Windows 8 is capable of running programs designed for every version of Windows and even some programs designed for DOS, too. That doesn't mean that everything will install and work correctly, or at all. There are several ways to get around problems caused by incompatible software.

Windows 8 maintains the same software and hardware compatibility of Windows 7. Everything that runs on Windows 7 will run on Windows 8. Windows 8 is not *more* compatible, however, with legacy software and hardware, and if you needed a virtual machine such as XP Mode to run some older software, you will still need a virtual machine such as the built-in Microsoft Hyper-V in the Business and Ultimate editions of Windows 8 to use this software without problems arising.

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The Program Compatibility Assistant

Windows 8 is extremely good at detecting software that won't install or run properly via a new feature called the Program Compatibility Assistant. If there is a compatibility problem with software that you're trying to install, Windows 8 displays the Program Compatibility Assistant, which will offer some safe settings with which to attempt installing the program correctly.

INSIDE OUT

Setting compatibility manually

Because software is run from the new Start screen or the desktop Taskbar, it is now more difficult to access the compatibility settings for an individual program. To access this, open the Start screen, right-click the program, and then from the App bar, select Open File Location.

Once you're in the file location for the program, right click its icon and select Properties. In the settings panel that appears, click the Compatibility tab. Figure 4-13 shows the various settings that can be configured on this tab.

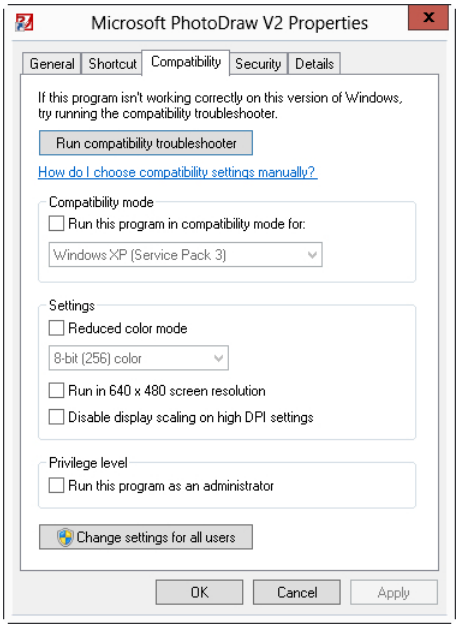

Figure 4-13 Manually setting a program's compatibility

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CAUTION!

Although compatibility settings include versions of Windows that go back to Windows 95, if a feature has been withdrawn, replaced, or significantly changed in Windows, such as Direct 3D used by Microsoft Photodraw V2 (see Figure 4-13), the software will still not run without reporting problems and errors.

INSIDE OUT Administrator mode

The default user account in every version of Windows release before Windows Vista is "Administrator." In this mode, absolutely everything in Windows can be changed, moved, or deleted with impunity. Hackers are well aware of this and write viruses to take advantage of it. User Account Control (UAC), which was introduced with Windows Vista, adds a layer of security to prevent these changes from being made automatically, but it can stop some programs from running correctly.

Some programs require access to root Windows files and areas that UAC protects. If a program can't write files to these parts of Windows, the software can become unresponsive. You should be careful giving administrator rights to any program, especially one you do not know well, because bypassing the essential UAC security feature can potentially cause damage. Some older programs, however, must have administrator permissions to operate properly.

One of the problems facing users who want to use older software and hardware is that the very useful—and free—XP Mode that ran in Windows 7 Professional, Enterprise, and Ultimate isn't supported and won't install in Windows 8.

There is an equivalent in Windows 8: Microsoft's full Hyper-0 hypervisor. I will discuss this in depth in Chapter 10, "Working in a Virtual Environment," including how to use and manage Windows XP and legacy software.

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Summary

For the basic features, Windows 8 might be seen to offer a mixed bag. Casual users might even find it to be too basic, with features such as Windows Defender being hidden away, and with not enough control being available in the PC Settings window. Also, the rebadging of Microsoft Security Essentials to Windows Defender, when Windows Defender already exists as a spyware and light-malware–only detection package in other versions of Windows, will confuse even more people.

This aside, if you are familiar with the basic options in Windows 7, very little has changed. Everything is pretty much where you expect to find it, and it all works in exactly the same manner as previously.

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CHAPTER 5

Optimizing Windows 8 Security

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Windows 8 and Antivirus Software 66
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Beware the Weak Link at the Keyboard 76
Gibson Research 79

IN ITS VARIOUS GUISES, Microsoft Windows is used by hundreds of millions of people worldwide. Currently, Microsoft Internet Explorer, the standard web browser that's bundled with Windows, sits at over 50 percent market share; that means over two billion people worldwide use it.

Both of these facts make Windows and Internet Explorer tempting targets for criminals, hackers, and virus writers. Frankly, security problems in Windows have nothing to do with how secure or insecure it is and everything to do with criminals wanting to hit as many computers as possible in a single attack. Why go for attacks on another web browser or another operating system when you can hit a theoretical maximum of only 80 million people? It's a simple return on investment calculation for the criminal gangs who target computers. Hey, having a sharp business mind and a good grasp of distribution and efficiency isn't the sole realm of the law abiding, you know.

All this isn't to say that there aren't problems with the security of Windows 8. Ironically, what makes Microsoft so successful in the operating system market is also the source of most security problems associated with Windows: legacy code.

Legacy code is the substructure of Windows that allows you to continue to use hardware and software from the earlier days of PC computing as you update your operating system. For example, If you run a DOS application from the heady days of the IBM PC such as WordStar, it will run fine and very speedily on a modern, Windows-based computer. If you want to plug in an old parallel printer and have the appropriate interface on your base unit, you can get it all working fine.

The need for legacy support is to service Microsoft's biggest customer: business. Many large corporations and businesses that collectively pay billions of dollars in subscription royalties every year to Microsoft commonly use software packages that were written many years ago.

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The reasons businesses don't update software regularly are many and varied, but many stem from two simple principles: 1) It's expensive to develop customized software, and 2) if it ain't broke, don't fix it.

At one point in my career, I provided second and third-line information and communications technology (ICT) support for blue-chip corporate clients, including a major international banking group. Every single client used custom-developed software; even my employer used custom applications for call processing and audit tracking. Some clients, including one of Great Britain's largest supermarket chains, used hardware that was decades old to run their checkout systems. All of this software and hardware needed technical support, and all of it is most likely still in use today because it does the job those companies need it to do.

These examples also demonstrate the problems businesses face in developing updates for bespoke software. During my time at the supermarket company, management tried to implement new software across all of the checkouts. Despite extensive testing, unforeseen bugs caused considerable downtime for the upgraded machines.

These types of problems can cost millions of dollars in reduced productivity, lost sales, and extra support time, but more exasperating is that they're all but unavoidable. Thus, Microsoft has announced that Windows 8 will be the last version of the operating system to come in a 32-bit (x86) version. This will make Windows 9 much more robust, though much less compatible with legacy software and hardware.

It is also interesting to note that Windows 8 is the first version of Windows to come with full built-in antivirus protection, although this might serve to confuse many users; the addition of Microsoft Security Essentials, the company's well known free antivirus package, has been rebranded as Windows Defender, the largely ignored malware package that has existed in Windows for the last decade.

Security, Windows XP, and Virtualization

One of the inevitable consequences of the move away from supporting legacy software in modern operating systems is the inclusion of virtualization software. Windows 7 Professional and above included the free XP Mode, a full licensed copy of Windows XP that integrated with the Windows 7 desktop and allowed users to continue to run their legacy software without problems.

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With Windows 8, XP Mode is no longer available, but the 64-bit Professional editions and above do include Microsoft Hyper-V virtualization software, instead, which is more powerful application that was ported from Windows Server, where it is a proven technology.

INSIDE OUT

What is virtualization?

Modern computers come with multicore processors. Your computer might have an Intel Core 2 Duo chip with two cores or a quad-core processor (four cores). Server chips commonly now have six, eight, or even twelve cores.

Each core is its own processor—essentially the heart of its own PC—and is capable of running a full operating system and accompanying software on its own. Virtualization can take advantage of this, running your "host" operating system on one core while allowing other operating systems to run on other cores. It is not necessary to have a multicore processor to run a virtual machine, however.

I wanted to spend some time talking about using Windows XP in Hyper-V, though, or any other virtualization software, even on your standard business desktops, if any still remain.

All support for Windows XP will end as of April 2014. This means that beyond that date there will be no more security, stability, or any other patches or updates available for the operating system. If you are using XP even in a virtual machine and it requires a connection to the Internet, or you need to use the web browser in XP to get online, you need to be aware that after all support ends, malware writers and criminals will be targeting the OS aggressively.

CAUTION!

All support for Windows XP is ending in April 2014. After this time there will be no more security patches available for the operating system, leaving remaining systems highly vulnerable to malicious attacks.

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There is no reason to assume currently that all Windows XP use will end worldwide in the first quarter of 2014, because it is still used extensively in developing countries such as China. With that likely being the case, I discuss how to use Windows XP in a virtual machine safely with Windows 8 in Chapter 10, "Working in a Virtual Environment," but my best advice is that if you *must* still use Windows XP with Windows 8, that you avoid any and all software that makes an Internet connection.

Windows 8 and Antivirus Software

As I mentioned earlier, Windows 8 is the first version of Microsoft's desktop operating system to come with built-in antivirus capability. Windows Defender is a rebadged version of the company's free antivirus product, Microsoft Security Essentials. This is, in turn, based on the company's Forefront Client Security package for Windows Server.

However, you might want to use a third-party package, instead. Perhaps you have always used one from another provider with which you're familiar and comfortable or you are wary about Windows Defender's ability to protect your computer.

I personally am quite happy with Microsoft Security Essentials because it is both free and stays out of the way, both in terms of alerts and also in terms of scanning. The scanning engine, for example, will only run full scans of your computer when you are not actively using it. On modern, powerful desktop computers, this wouldn't make any noticeable difference to performance; however, on cheaper laptops and tablet computers, the effect can be quite pronounced.

Turning Windows Defender Off

If you want to use a third-party antivirus package in place of Windows Defender, you will need to deactivate it so that it and your new package and Windows Defender do not conflict with one another.

To do this, open the Start screen and type **defender** to search for it. When you locate it, open it, click the Settings tab, and then click Administrator, as illustrated in Figure 5-1.

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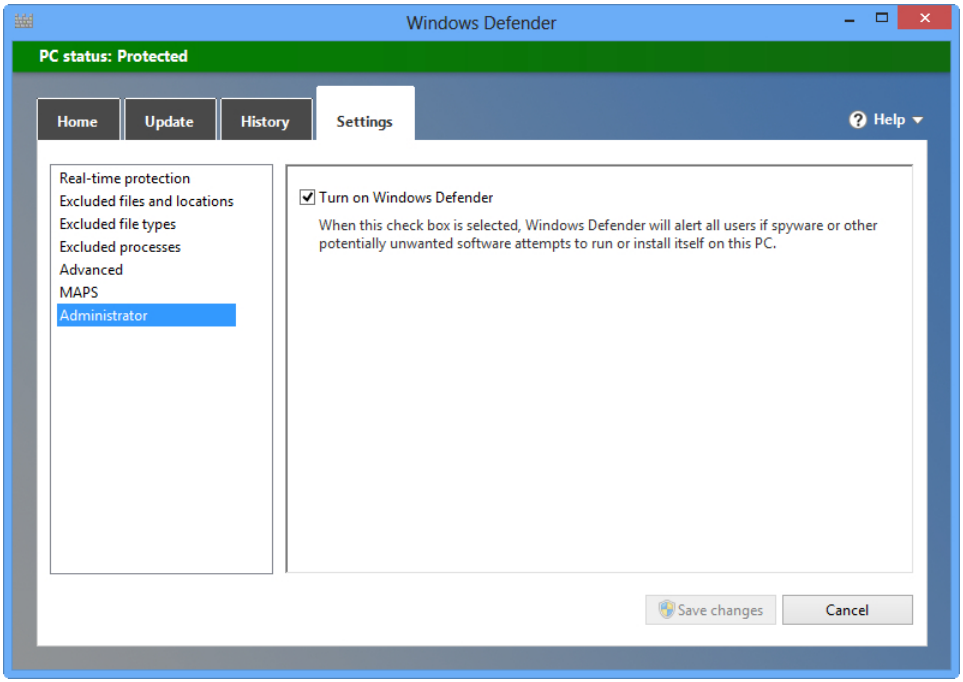

Figure 5-1 Use the Administrator settings in Windows Defender's Administrative to switch it off

Before you do this, you should take a moment to consider which alternative antivirus package you use, and how effective is it? Here are my personal recommendations, based on features and effectiveness.

AVG Anti-Virus FREE

www.free.avg.com

AVG has long been a favorite firm in the free antivirus category for its overall effectiveness in blocking malware and warning about dangerous websites. The current version of AVG is still as effective, but it now comes with some annoying advertisements for the full paid-for version. If you are prepared to tolerate pop-up advertising, AVG Anti-Virus FREE is still an excellent choice to protect your computer.

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Trend Micro Titanium Internet Security

www.trendmicro.com

Of the paid-for security suites for everyday computer users, Trend Micro has a package that offers award-winning protection and a very simple interface that is easy and simple to use. The current version does not contain its own firewall, recognizing that the Windows Firewall is perfectly adequate. That helps it to stay "lightweight."

Kaspersky Internet Security

www.kaspersky.com

For IT professionals and enthusiasts who want more control over their computer's security, Kaspersky is the package to have. It includes an excellent scanning engine with significant volumes of controls for technically-minded people.

Microsoft Windows Malicious Software Removal Tool

If you review the updates your computer receives through Windows Update, you might notice something called the Microsoft Windows Malicious Software Removal Tool. This is an extra tool in addition to Windows Defender that's updated monthly by Microsoft and runs automatically on your computer. It can also be downloaded from the Microsoft website.

As another anti-malware tool, it will check your computer for viruses and malware, try to remove any it finds, and report this information to Microsoft. This is a useful tool, but it should not be considered a replacement for separate antivirus and anti-malware products.

User Account Control

Although User Account Control (UAC) is probably one of the least popular features of Windows, it is nevertheless an essential and worthwhile addition to the operating system.

UAC prevents changes from being made to the operating system, which includes software installations, without an administrator's express permission.

Every time a change occurs that can potentially harm either the computer or the accounts of other users, a UAC dialog will appear, taking the full attention on your screen, and all apps and programs will be temporarily minimized.

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INSIDE OUT

Why do administrators need to run things as Administrator?

People with administrator accounts in Windows have permission to perform any action they want; however, UAC will still alert them when changes might have a detrimental effect on the computer.

However, if an administrator wants to run a program, for example, the Command Prompt, he still needs to right click it and select Run as Administrator.

This is to avoid malware bypassing UAC Security because most computers will be used by their main user (Administrator) much of the time, and having all granted elevated privileges, where that software can also do anything to files in Windows, would also grant elevated privileges to malware.

To access UAC, open the Start screen and search for it by typing **UAC**. It will appear in the Settings results. You can also access it in the Control Panel, in the System and Security section. Figure 5-2 shows the UAC panel.

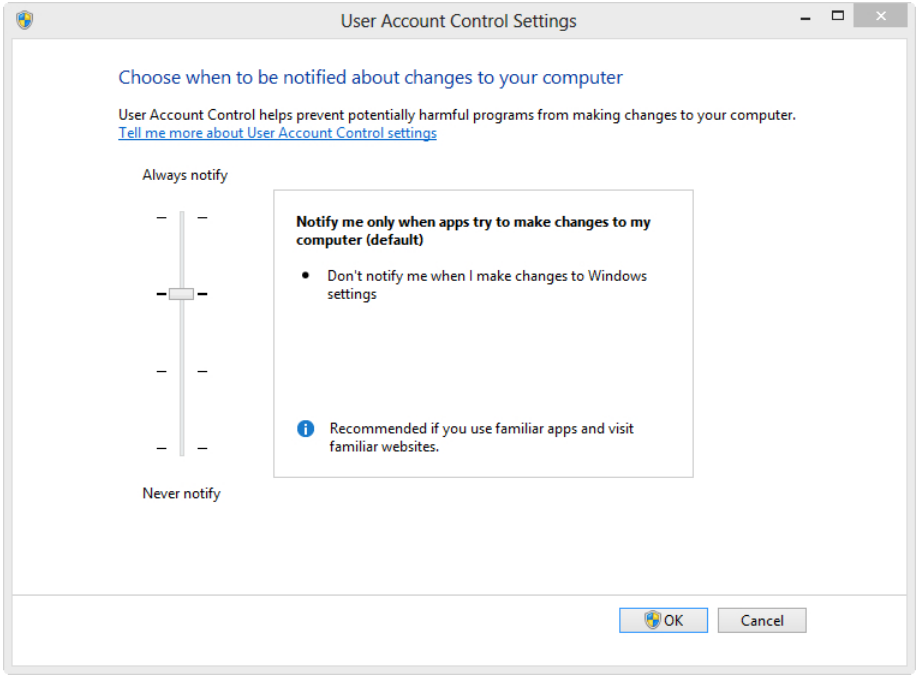

Figure 5-2 Setting the UAC level in Windows 8

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There are four settings, or levels, for UAC in Windows 8.

- **Never Notify** UAC is turned off, so you are not alerted to any changes to your computer or software or attempts to access critical operating system files.
- **Programs Only** You are notified only when programs try to make changes to your operating system settings. You are not notified about other settings changes.
- **Default** With the standard and recommended setting, you are notified when programs and other features try to change system settings, but not when you make changes yourself.
- **Always Notify** You are notified when any system setting changes.

INSIDE OUT **What triggers UAC?**

Windows will give you a visual clue as to what programs and settings are likely to trigger a UAC alert by placing a blue and yellow UAC shield icon over or next to program icons or option links.

As I said previously, many people find UAC irritating. Many people using Windows Vista disable UAC because the only setting options is to always notify the user of all system setting changes or nothing at all. However, in Windows 8, it's easy to leave the system turned on. I recommend this because UAC is an essential defense against viruses, malware, and other malicious software on your PC.

CAUTION!

Windows 8 has changed UAC security slightly, meaning that some software will not be allowed to run if UAC is turned off completely.

BitLocker and BitLocker To Go

Microsoft BitLocker is a feature of the Business and Ultimate editions of Windows 8 that you use to implement full-disk encryption of your copy of Windows and all your files and data.

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It supports multiple partitions and hard disks across a computer and can work in conjunction with a Trusted Platform Module (TPM) chip on your computer's motherboard to securely store the encryption keys. This means that even if your hard disks are physically removed from the computer they still cannot be decrypted.

To access BitLocker on your computer, open the Start screen and search for **Bitlocker** or find it in the full Control Panel.

So what is BitLocker and how does it work?

Method 1: Encrypting a Hard Disk or Partition with Hardware Support

If your computer's motherboard has a TPM chip, it stores the cryptographic keys needed to encrypt and decrypt your hard disk or partition. This encryption key (cipher) is unique to this chip. This means that if an encrypted disk is removed, it can never be decrypted on another computer because the encryption key has been left behind on the old computer.

Method 2: Encrypting a Hard Disk or Partition without Hardware Support

If your computer does not have a TPM chip on the motherboard, then the cryptographic keys are stored within Windows and are not linked to specific hardware. Using this method, you can use the password to access the hard disk if it is plugged into another Windows 8 or a Windows 7 computer.

Method 3: Encrypting a USB Flash Drive or External Hard Disk

This method of encryption is similar to the non-TPM–based hard disk just described in method 2. Windows uses standard BitLocker cryptographic keys to ensure that an encrypted flash drive or hard disk can be used on other Windows 7 or Windows 8–based computers. This method uses the Windows 8 BitLocker To Go feature. To read a BitLocker To Go protected external drive in Windows XP, you can use the BitLocker To Go Reader software which is automatically placed on the drive. BitLocker To Go Reader does not allow writing to an encrypted disk or pen drive.

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INSIDE OUT

What is 128-bit AES encryption?

Advanced Encryption Standard (AES) is a method of encrypting a hard disk, partition, external disk, or files. It divides data into block sizes of 128 characters (bits of data) and performs encryption on each block 10 times to secure it and scramble the data so it cannot be read without unscrambling it.

The blocks of data can only be decrypted with a cipher and a password combination, which is never openly displayed. When you type your password to decrypt data, it is converted into a hash key—a random string of characters created by a set algorithm (or formula) that can never be converted back into the password. The server or computer that contains the AES encryption algorithm does the same with the password it has stored in its password vault. If the two hash codes match, the password is accepted.

Administering Your TPM Chip

The main BitLocker window will display a link in the bottom left corner where you can administer the TPM chip on your motherboard. This chip needs to be activated before you can use BitLocker; however, when you turn BitLocker on, Windows 8 can do this for you automatically.

However, if BitLocker has been used on the computer before, perhaps if you were using Windows Vista or Windows 7 with it enabled, you might want to clear the TPM chip, which you can do in the Administration options. You can also reset a lock-out from the TPM chip if you have had a security problem. The TPM administration panel is shown in Figure 5-3.

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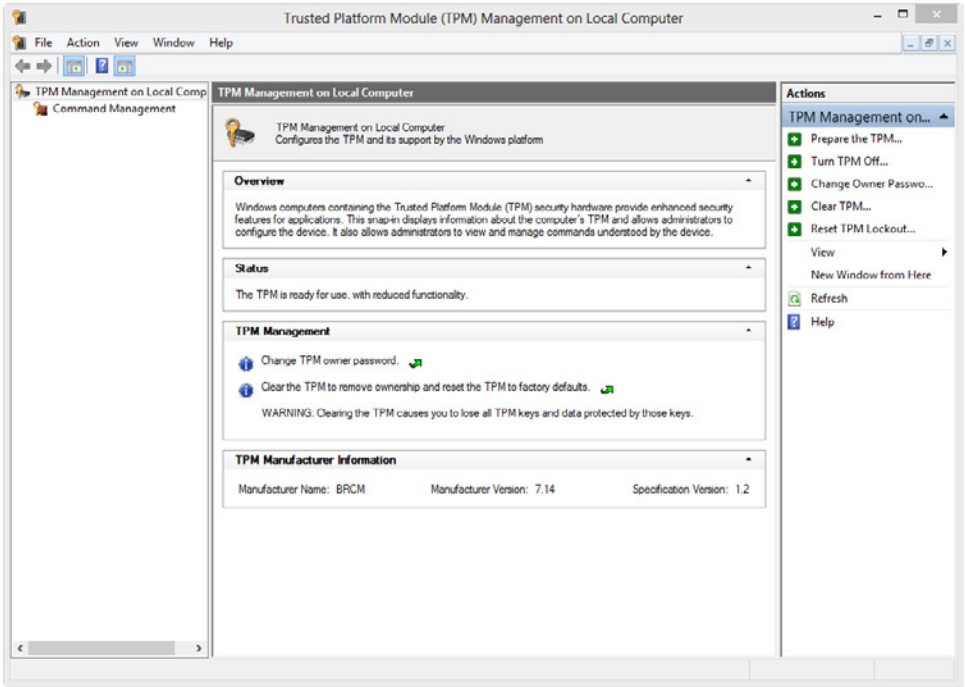

Figure 5-3 Administering the TPM chip in Windows 8

Enabling BitLocker

In the main BitLocker Window, all the hard disks that physically reside inside your computer or, in the Bitlocker To Go section, attached to your computer via USB or Thunderbolt are displayed. Each hard disk has a link next to it labeled Turn on BitLocker, as shown in Figure 5-4.

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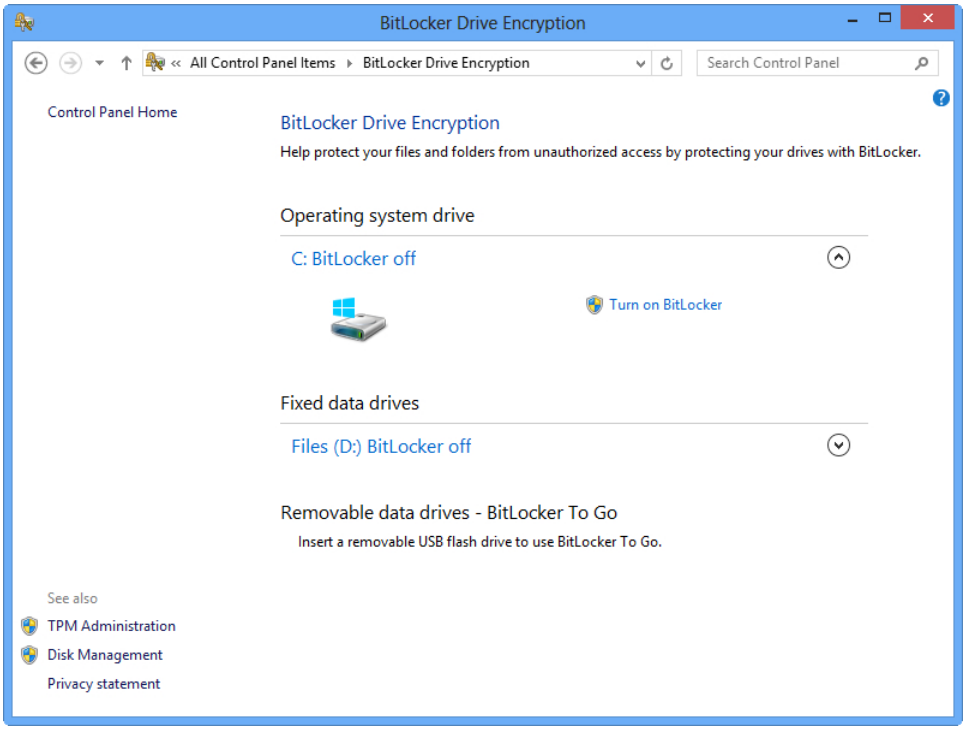

Figure 5-4 The main BitLocker management console

You will need to have your main Windows drive completely encrypted by BitLocker before Windows will allow you to encrypt any other drives; however, if you are decrypting drives, Windows will allow you to select all or several at the same time.

> **Note**
>
> **If you have a lot of data on the hard disk, it will take longer to encrypt, possibly overnight. Moving the data off the hard disk temporarily will speed up the process.**

CAUTION!

BitLocker provides an extremely high level of security and encryption. If you forget the password or if your TPM-equipped motherboard fails and has to be replaced, you may never be able to access that data again. *Do not* encrypt data by using BitLocker if you do not have a backup copy of the data elsewhere.

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Although it can take a while to encrypt your computer with BitLocker, you are free to shut the computer down or put it to sleep. The encryption or decryption process will pause upon shutdown or when going into Sleep mode and resume the next time the computer is used.

INSIDE OUT

Alternatives to BitLocker To Go

Many people find the inability to write to a USB flash drive or external hard disk that has been encrypted with BitLocker To Go annoying. So what are the alternatives?

TrueCrypt (*www.truecrypt.org*) is a free, third-party program for encrypting your files and data. You can carry a copy of the TrueCrypt software on your flash drive or hard disk for installation on a host PC. This software is compatible with all versions of Windows and the Apple computers, and it will allow you to read and write files on the disk.

The limitation of TrueCrypt is that you might not be allowed to install the software on computers for which specific policies are set up to prevent users from installing software. If you intend to use TrueCrypt in a business or educational environment, you should first verify with the organization's IT department that it is indeed supported.

Cloud storage is another way to store files in one place and access them from different locations. Microsoft's SkyDrive service (*www.skydrive.com*) offers 25 GB of free storage space.

The advantages of cloud storage are that you never need to carry a physical device with you, your files will always be safe and encrypted, and you can access your data anywhere you have an Internet connection.

The downside of cloud storage is that you *must* have a working Internet connection to access the files. If you commonly work remotely with a laptop in places where you don't have access to the Internet, or if your Internet connection goes down, you will not have access to your cloud-based files.

Why Use BitLocker?

BitLocker is something that I recommend people use on laptop computers and sometimes for USB flash drives and external hard disks. There might even be legal requirement to do so. Depending on the country in which you're working, if you carry critical information such as personal data about other people, you might be subject to data protection laws that make it illegal to transport unencrypted data. Breaking these laws by not properly protecting the data could lead to heavy fines or even imprisonment.

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BitLocker is also useful for everyday computer users who not only carry a great deal of personal information in their files, but also commonly store passwords for websites in Internet browsers. If you have a laptop and Windows 8 Enterprise or Ultimate edition, it is well worth encrypting your hard disk. If you are considering buying a laptop and can afford to do so, purchase one with a TMP chip and Windows 8 Pro or Enterprise. I believe the peace of mind is worth the extra expense incurred.

If you manage a business for which employees carry sensitive business or customer-related data on their laptops, these should all be encrypted by using BitLocker or another system. Failure to do so is inviting data loss or embarrassment, at the least, and possible criminal prosecution at the worst.

Beware the Weak Link at the Keyboard

If you have antivirus software installed in Windows 8 and UAC enabled, your operating system should be perfectly secure. However, the weakest link in all computer security will always be the user. Here are my top tips for avoiding the user errors that can undermine your computer's security.

Keep Your Antivirus Software Up to Date

First things first: Ensure that you are protected from external attacks by installing antivirus software.

Ensure That You Have a Good, Up-to-Date Firewall

Just as important as antivirus software is a firewall. This is your first line of defense against attack from outside. Again, you need to ensure that it's kept up to date, as well. If you're running Windows XP in a virtual machine, don't rely solely on the built-in firewall; it's not enough.

Keep Windows Up to Date

It's essential that you turn on Windows Update and leave it on. Updates are released by Microsoft on a monthly basis, and although some might require you to reboot your computer, the slight inconvenience is well worth it for the added security and peace of mind.

Keep Your Software Up to Date

Ensure that you regularly check for general and security updates for the software you use the most. You can find these on the websites of the respective manufacturers.

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Always Check Email Attachments Before Opening Them

It's always a good idea to check all email attachments for viruses. Save them to your hard disk first, and then in File Explorer, right-click the file and select Scan With [*Your Anti-Virus Software*] before you open it.

If you receive a suspicious-looking email attachment from someone you know, you could email that person to ask if she did intend to send it to you. It could be that a virus on her computer has forwarded itself to people in her address book, in which case she would probably like to be notified.

Use a Secure Internet Browser

Browsers like the latest versions of Firefox or Internet Explorer provide much of the protection you need. In Windows 8, the protected mode in Internet Explorer that denies any software running in the browser access to the rest of the operating system as well as the Start screen filter for detecting malicious software and websites are an extra bonus.

Get Spam and Phishing Filtering for Your Email Software

Everyone knows what spam is. Phishing emails, however, are the messages that purport to be from a real bank or credit card company asking you to provide your personal details to a website. I've seen some of the most net-savvy people caught out like this.

Never Click Anything You Don't Explicitly Mean To

If you haven't gone to a website with the express intention of clicking items, for instance, maybe to install a browser plug-in or get a specific download, *never* click anything unless you know exactly what it is.

Beware of reputable websites such as YouTube on which viruses are occasionally posted disguised as a codec that is required to play a video. If you are ever in doubt, simply *don't* click it!

Look for the Padlock or the Green Bar

When shopping online or when visiting any website that requires you to enter personal information, look for the padlock, which is a visual method for your browser to tell you that the website is encrypting any data sent back and forth using a valid security certificate. What browser you use will determine where this is located. The latest security convention in browsers is to color code the address bar. The address bar is displayed as green if the site is okay and orange or red if you should use caution or avoid the site.

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> **Note**
>
> **Not all web browsers will use color-coded address bars, and they might display the padlock in different ways and in different areas of the browser. You should refer to the Help menu for your specific browser for more advice on this.**

Never Give Private Details Online Unless You Must

Shopping for a credit card or car insurance is one thing, but many websites will unnecessarily ask for personal details that too many people are all too willing to give away. At best, these details are used to send you spam; at worst, they are used to steal your identity.

Keep Backups

Ensure that you keep regular backups of your data somewhere away from your Windows installation, maybe on an external USB storage device, for instance. Windows has a built-in backup utility, but third-party packages offer backup solutions, too.

Keep Your Backups in a Safe Place

It is not wise to keep your backups on your computer or in the same location as it. Cloud storage is a useful and secure place to which to store backups, but it can be very slow if you have large amounts of files to back up or a slow broadband connection. CDs, DVDs, and Blu-ray discs can degrade over time. If you can afford one an external USB hard disk which is stored off site and brought back monthly to be updated is the best solution.

Keep the Driver CDs and Manuals for Your Computer

Always safeguard the discs and manuals that come with your computer. These will prove invaluable if Windows ever needs to be reinstalled. Make sure you keep them somewhere safe and together.

Get a Windows Installation DVD for Your Computer

Many computers these days do not ship with Windows 8 installation DVDs. This is done as an anti-piracy measure. Instead, they come with pre-configured restore partitions. It is always wise to contact the company you bought your computer from and request—nay demand—a Windows 8 installation DVD so that you have it available should disaster occur and you need it. There might be a postage charge for sending it, but don't be put off: you have paid for your copy of Windows and that includes the installation media!

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Keep Windows Maintained

You will have much more fun on your computer if you keep it tidy and maintained; uninstall programs that you don't need, use the built-in tools or third-party tools to remove unnecessary files, and keep the registry clean.

Be Careful When You Throw Away Your Computer

When your computer comes to the end of its useful life, be sure to use a utility that will securely erase the hard disk by overwriting the data several times. If you can, also remove the erased hard disk and dispose of it separately. Discarded computers can contain a wealth of sensitive information that makes them a bargain find for identity thieves.

Windows 8 includes a new *Reset* option which you can find in the General section of PC Settings. This will completely wipe all user accounts, settings, apps, programs, and files and return your computer to a state where it is suitable to be passed on.

CAUTION!

The Reset option and deleting files will not *securely* erase them. You should use a specific secure erase program if you want to guarantee that files cannot be recovered later. This can be a slow process however so prepare to be patient with it.

Gibson Research

The market for computer security is enormous and includes every type of product that you can imagine. One website that I've found invaluable over the years is Gibson Research Corporation at *www.grc.com*.

Steve Gibson is a highly respected computer security expert; in fact, he's probably the best. His website includes his ShieldsUP! tools, which he accurately describes as, "the Internet's quickest, most popular, reliable and trusted, free Internet security checkup and information service."

There are also a host of other tools at the website for testing the security of your computer, Internet connection, and firewall. I cannot recommend the tools on this website highly enough.

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Summary

Setting security on your computer is absolutely critical, and maintaining it is even more so, given the nature of how we live our lives online these days, and how criminals and malware writers want to exploit the "soft, squidgy thing" that sits in front of the screen.

Windows 8 is more secure than any version of the operating system before it, and some security researchers already asserted that Windows 7 was one of the most secure operating systems on the planet. Security these days though is as much about tricking the user as it is about making a brute-force attack. Always be careful when you go online with your computer, and always be vigilant about your security.

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CHAPTER 6

Optimizing Backup and Restore

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Using Backup and Restore 86
Backing Up the Operating System 91
File History and Version Control 98
Determining How Many Backups you Need and Where to Store Them 100

You might find this hard to believe, but Windows 8 comes with more ways to back up both your files and the operating system than its possible to shake a stick at. In some ways the myriad options are a blessing because they finally make it simple and straightforward to keep backups, file version histories, and system images. In the other ways, though, the options could confuse some users completely. In this chapter, I'll show you what each of these backup options is, how you use them, and why you should use each one.

Moving Your Files Away from Windows 8

In Chapter 2, "Repairing Windows 8 in 30 Minutes or Less," I point out how it's essential to move your files and data to a different partition than the one on which Windows 8 is installed. If there is a critical failure with Windows 8 and it needs to be restored from a backup or reinstalled, you could lose all of your files if they are stored on the same partition.

I described how to create a new partition when installing Windows. But what if you want to move your data to a separate partition *after* you have already installed Windows 8? To help you do this, Windows 8 includes a feature to grow and shrink the size of partitions and then allows you to make extra partitions in the available disk space created.

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The Disk Cleanup Wizard

In preparation for moving your data to a new partition, delete any temporary files that consume space. Windows 8 can shrink the partition it's installed on by only so much. The more files and programs you have installed on the partition, the less Windows 8 will be able to shrink the drive. To remove unneeded files, perform the following steps:

1. Open the Start screen and type free to find the Disk Cleanup Wizard, which will be in the System section of the results, labeled as Free Up Disk Space By Deleting Unnecessary Files, as shown in Figure 6-1.

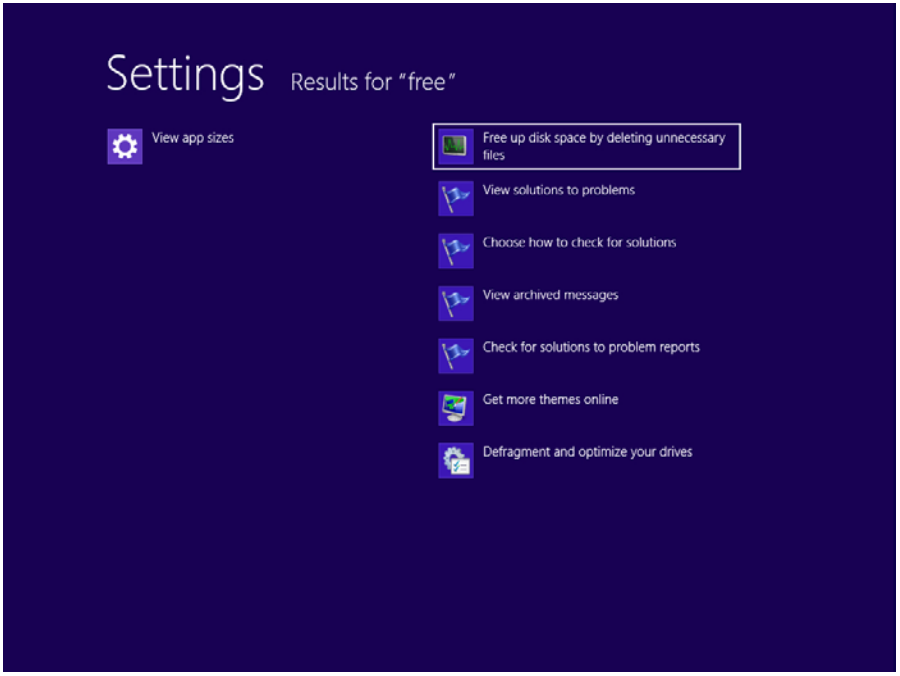

Figure 6-1 Searching for the Disk Cleanup Wizard

2. Run the wizard, indicating which drive you want to clean. (This will usually be the C drive.)

   You will be able to select various options in the Disk Cleanup dialog box for recovering wasted space on your hard disk or Windows 8 partition. It is safe to choose any of the available options in Desk Cleanup, which are illustrated in Figure 6-2.

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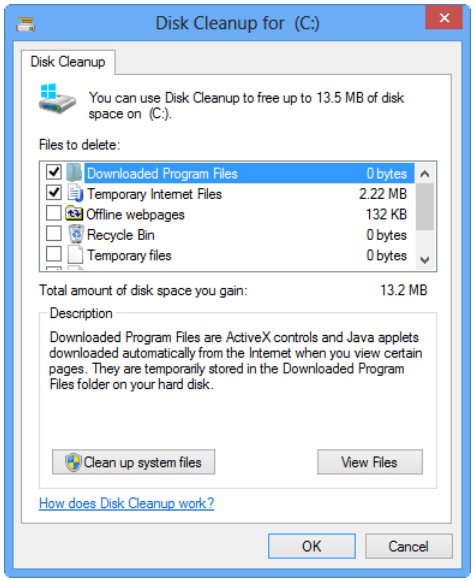

Figure 6-2 The Disk Cleanup Wizard

You might also want to use a third-party utility to help clean up your drives. I recommend CCleaner from *www.piriform.com/ccleaner*.

Shrinking, Extending, and Creating Partitions

The next step toward creating a new partition for your data is to shrink the size of the Windows 8 partition so that you can create space for a separate partition. You can also extend a partition if there is any available space into which it can expand, although you will not need to do this in this instance.

If your files are already on the same partition or drive as Windows 8, you should move them to a separate disk or partition if possible. Having a copy of your files on the same partition you are trying to shrink will severely limit how much it can contract. To shrink a partition, perform the following steps:

1. Open the Computer Management console.

   The quickest way to find this is to press Windows logo key+X to bring up the Administration menu and select Computer Management from the results that appear.

2. In the Computer Management window, in the left pane, click Disk Management.

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3. A list of the available hard disks and their partitions appears in the center panel of the window (see Figure 6-3). Note in the example that I have two hard disks on this particular computer and two backup partitions on a different hard disk than my main copies of Windows and my files. One backup partition is for files and one is for a copy of Windows. I also keep a second backup of my files separate from my computer.

4. Right-click the partition you want to shrink and select Shrink Volume, as demonstrated in Figure 6-3.

   Windows 8 determines the maximum amount it can shrink the partition. On a new installation of Windows 8 with no additional files, this can be quite a lot.

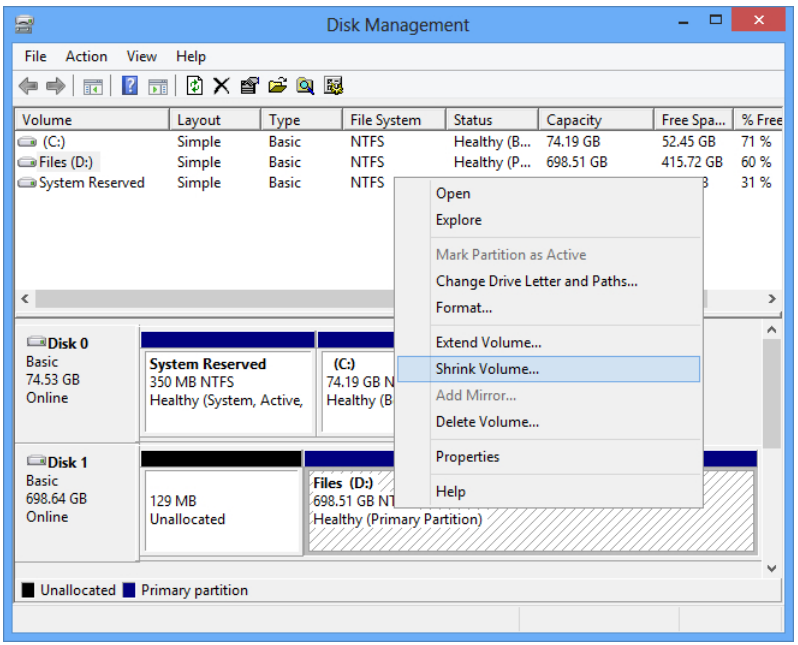

Figure 6-3 Shrinking a partition in the Computer Management Console

5. Choose a new partition size that will meet your needs (see Chapter 1, "Finding Your Way Around Windows," for suggestions about partition size) and then click OK.

6. In the blank volume that you have created, right-click anywhere in the empty space, and then from the options panel that appears, select Create Volume.

   You will want to format the new volume you create so that you can write files to it by using the NTFS option. This is the default disk formatting type in Windows 8.

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Moving the Shell User Folders

If you followed the procedure in the previous section, you now have a spare partition onto which you can move your files. But first you need to move the shell user folders to the new partition. Shell user folders are the pointers within Windows 8 that open the correct folder on the correct disk or partition when you click My Documents, My Pictures, and so on. Follow these steps to move the shell user folders:

1. Open File Explorer on the desktop.
2. At the far left side of the address bar, next to the folder icon, click the small arrow to bring up a menu of folder locations, as depicted in Figure 6-4.

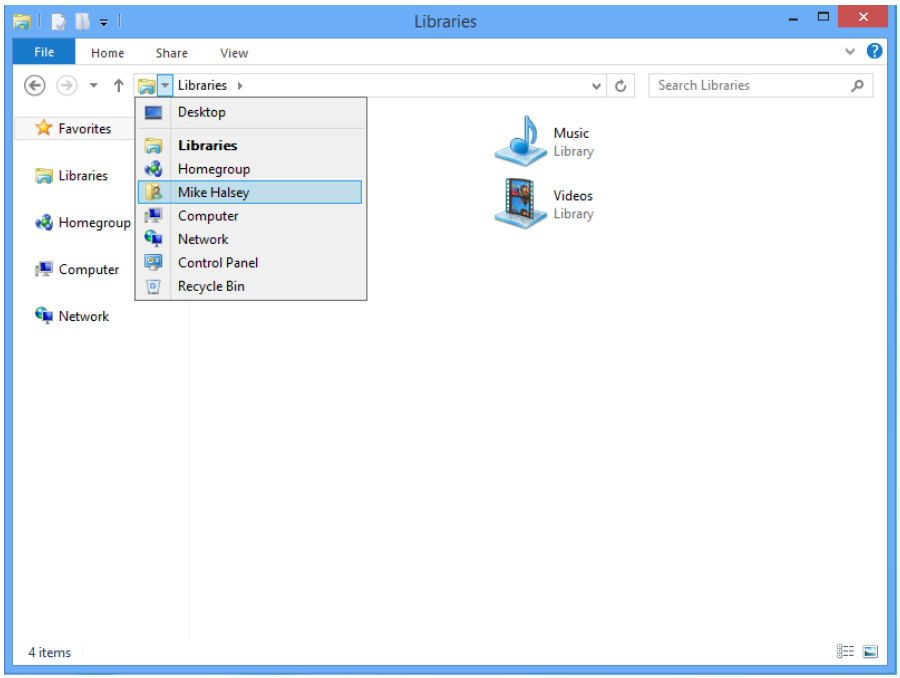

Figure 6-4 Use File Explorer to find your user folders in Windows 8

3. From the drop-down menu that appears, select your username.
4. In your user folder, select the folders that you want to move.

   I would suggest Downloads, Favorites, My Documents, My Music, My Pictures, and My Videos.
5. On the ribbon, click Cut.

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6. Navigate to the partition or disk to which you want to move your user folders.

7. On the ribbon, click Paste.

Using Backup and Restore

Windows has always included a utility for backing up your files and folders. Windows 8 continues to do so by including a backup utility that's easy and simple to use. Of course, you don't have to use the backup utility in Windows 8. However, as an IT professional, I use a third-party solution that offers me more flexibility.

What backup software you use is also determined by where you store your backups. If you exclusively use a cloud service such as Mozy or Carbonite, Windows Backup won't be good for you. It is a good basic backup solution, however, and worth the time to learn how to set up and use.

Backing Up Files and Data

Backup And Restore saves your files as a secure, compressed archive called a Virtual Hard Disk (VHD). Backup and Restore can be very useful if you don't want other people looking through the files you've backed up. However, if you will eventually want to access these files on another computer—for example, if you want to save the backup to a network-attached storage drive on a home or office network, or to an external USB hard disk for working in different locations—you won't be able to access them. If you want to save your backup to an external hard disk, you should consider a third-party backup solution instead of Backup And Restore, and I will cover some of these solutions later in this chapter.

Microsoft has renamed the Backup And Restore option that was offered in Windows 7 to Windows 7 File Recovery. To access it, perform the following steps:

1. Open the Control Panel and click Windows 7 File Recovery.

2. In the Backup Or Restore Your Files window, click the Set Up Backup link, as shown in Figure 6-5.

   The Set Up Backup dialog box appears with a list of locations on which you can store your backup. This list includes any hard disks and partitions on your computer. You can also choose to save your backup to a network by clicking Save On A Network.

3. Indicate a location for your backup and press Next.

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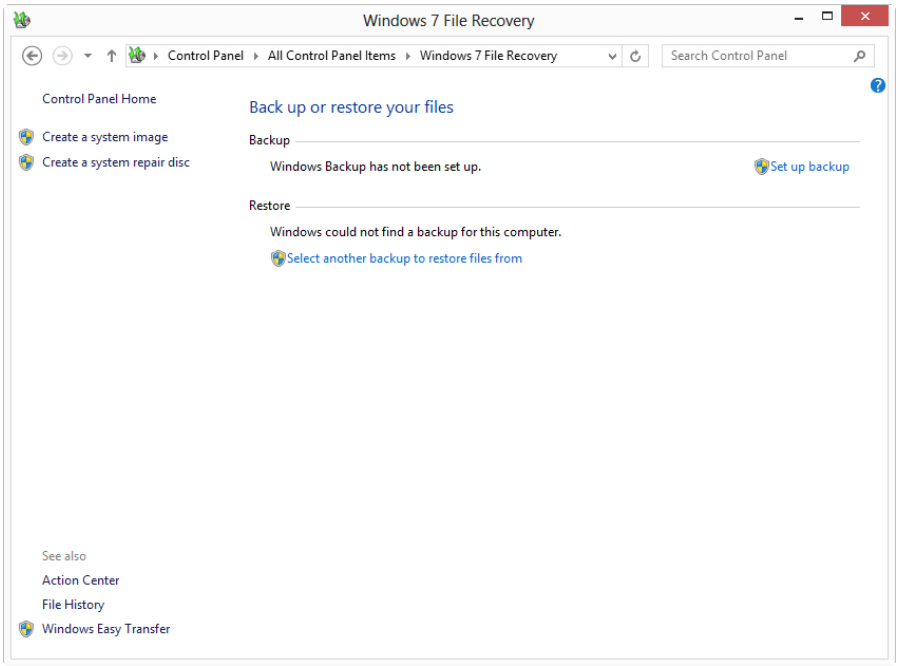

Figure 6-5 The Windows 7 File Recovery panel

INSIDE OUT

Backing up to external hard disks, CDs, and DVDs by using Windows Backup and Restore

If you want to back up to an external hard disk on a regular basis, you will need to ensure that the drive is connected to your computer at the scheduled backup times.

Windows Backup and Restore cannot save regular backups to blank CDs, DVDs, or Blu-ray discs; you will need a third-party solution if you want to store your backups to these media. Keep in mind, though, that you can manually copy any backups stored on an external hard disk to an optical disc.

4. Decide what you want to back up. If you want to assign that task to Windows, select Let Windows Choose (see Figure 6-6). If you want more control over what is backed up, select Let Me Choose.

   You should note that the default option will also create a full backup of your Windows 8 installation. If you have already done this separately, you should select Let Me Choose.

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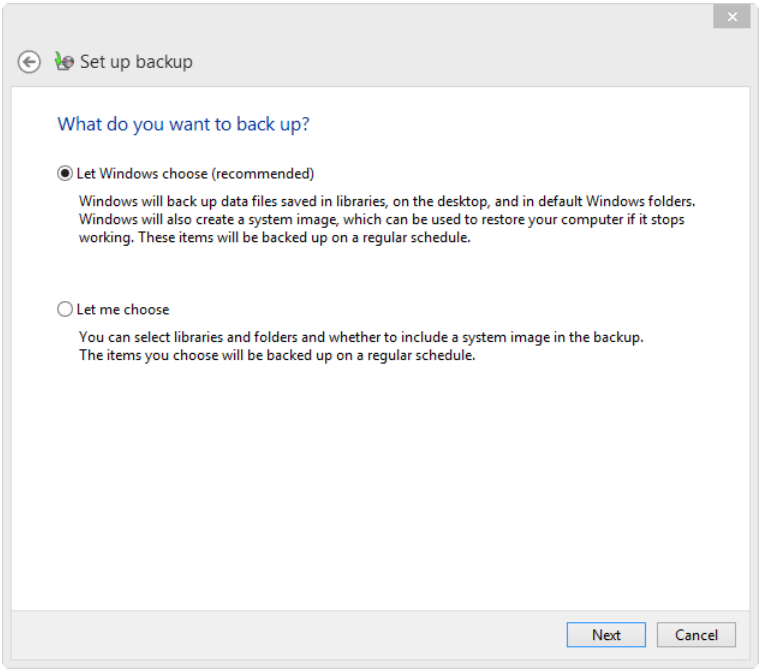

Figure 6-6 Selecting what to back up

5. Choose what files and folders you want to back up.

In Figure 6-7, the item in bold (Mike Halsey's Libraries) includes all of your standard shell user folders for documents, music, photos and pictures, and videos. Select and clear the check boxes as appropriate to indicate which items to back up. Also note that you can choose whether Windows performs a system image backup of your Windows 8 installation. When you have finished selecting the files you want to back up, click Next.

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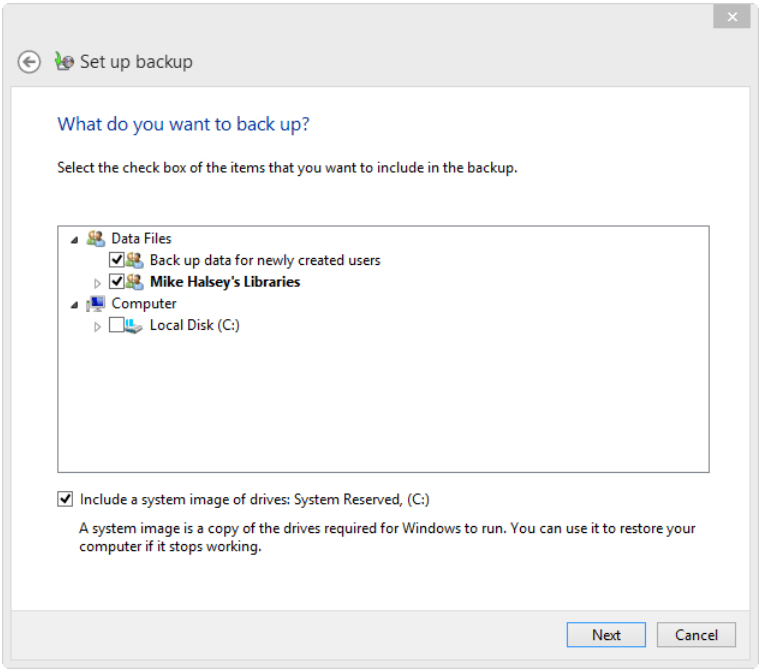

Figure 6-7 Choosing what to back up

A list appears of what you have chosen to back up and the schedule to which the backup will be performed. You can change the schedule to suit your own needs and preferences by clicking Change Schedule.

6. When you are ready to perform the first backup, click Save Settings And Run Backup.

INSIDE OUT

A word of caution about backing up Windows 8 over a network

You should only let Windows Backup and Restore make a backup copy of your Windows 8 installation over a network if your computer is connected to the network by a physical cable. If you connect only via Wi-Fi, the restore software will be unable to see the backup if it eventually must be restored. This is because the Windows 8 System Image Restore tool doesn't run on the Windows 8 desktop; therefore, it cannot load any Wi-Fi hardware drivers. It can only rely on wired networking support provided by the computer's BIOS.

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Restoring Files and Data from a Backup

You can restore your files and data from a backup by using the Backup And Restore tool accessed in the same way as detailed earlier in the chapter.

If you have performed any backups, they will appear in the Restore section of the Backup And Restore window that appears. The backup and recovery tool is automated and will give you the option of choosing to restore all of your files and data or only selected items. The restore tool will find your most recent backup very quickly and will restore all of your files to their original locations.

Backing Up to the Cloud

Cloud storage is becoming increasingly popular, and there are many benefits to keeping a backup of your files online, away from your physical location, not the least of which is that your files and data will always be secure if you suffer a fire at home or at work. It is the ultimate offsite backup.

On the downside, many people are concerned about the privacy and security of files that reside who knows where, accessible by who knows who. However, Services from providers such as Microsoft, Google, and Amazon are very trustworthy, however, and maintain tight security.

INSIDE OUT

Slow backups to the cloud

The rate at which you can back up your files and data to the cloud is dependent on the speed of your Internet connection. If you have a large number of files, you could find that it takes many weeks to complete the initial backup, after which time the software should back up only new or modified files.

Cloud-based backup services include Microsoft SkyDrive, Amazon S3, Carbonite, and Mozy. SkyDrive offers a massive 25 GB of free storage space. Generally, though, you will need to pay a subscription fee to maintain your online backup. The price will depend on the service you use and how much data and the number of files you back up.

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Backing Up the Operating System

For many years the de facto choice for system administrators backing up Windows was to create a system image, and for many years the choices included Symantec Ghost or Acronis True Image. With Windows Vista, Microsoft introduced system image backup for the first time, though only in the Professional, Enterprise, and Ultimate editions.

With Windows 7, this was expanded (much to the praise of IT professionals everywhere—or maybe that was just me again) to every edition of the operating system, and so it remains with Windows 8.

But there's more: there's now a second option in Refresh, which creates an image that can be restored from within Windows 8 by an end user, and that doesn't affect his files, apps, settings, and if a custom image has been created, his desktop software, as well.

So what are these different image backup solutions, and how do you use them? Let's explore those questions in the next sections.

Creating a Windows 8 System Image

A Windows System Image is the backup you would from which you would restore if Windows simply cannot start or if it is very corrupt indeed. You might also want to restore from a system image if you want to completely clear out all the computer and user settings and start again with something that you know is clean and works properly.

INSIDE OUT

What to do before you create a System Image backup

Before you create a Windows System Image backup, you should ensure that all of your software, drivers, and apps are installed and that all your settings and configuration options are set how you want them. Try and keep the installation clean, too, by running software such as CCleaner before creating the backup.

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1. From the Control panel, select Windows 7 File Recovery.

2. In the Windows 7 File Recovery window (see Figure 6-8), in the Control System Home pane, click Create a System Image.

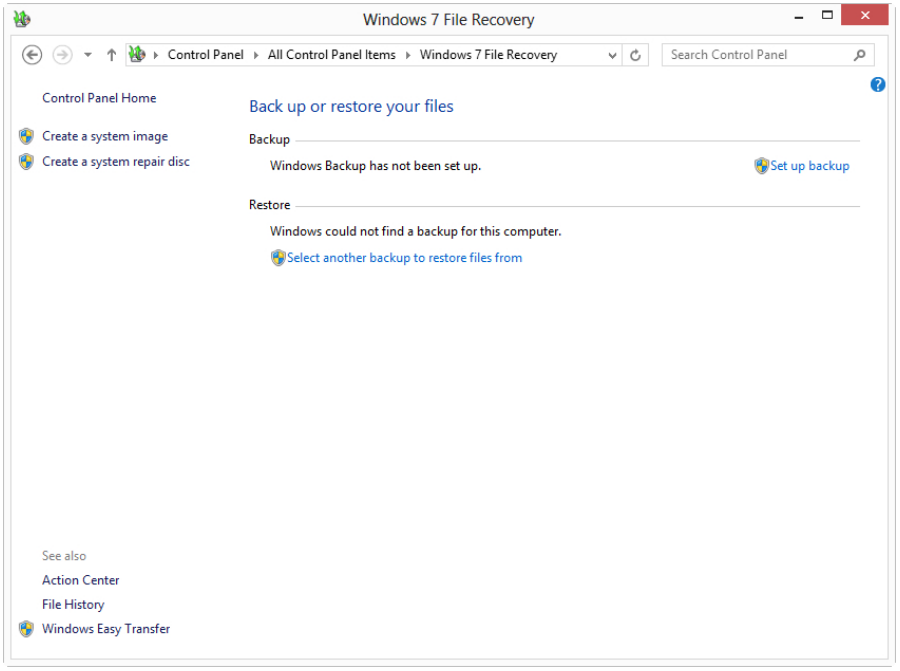

Figure 6-8 The Windows 7 File Recovery window

3. Select the destination for your system image and press Next, as demonstrated in Figure 6-9.

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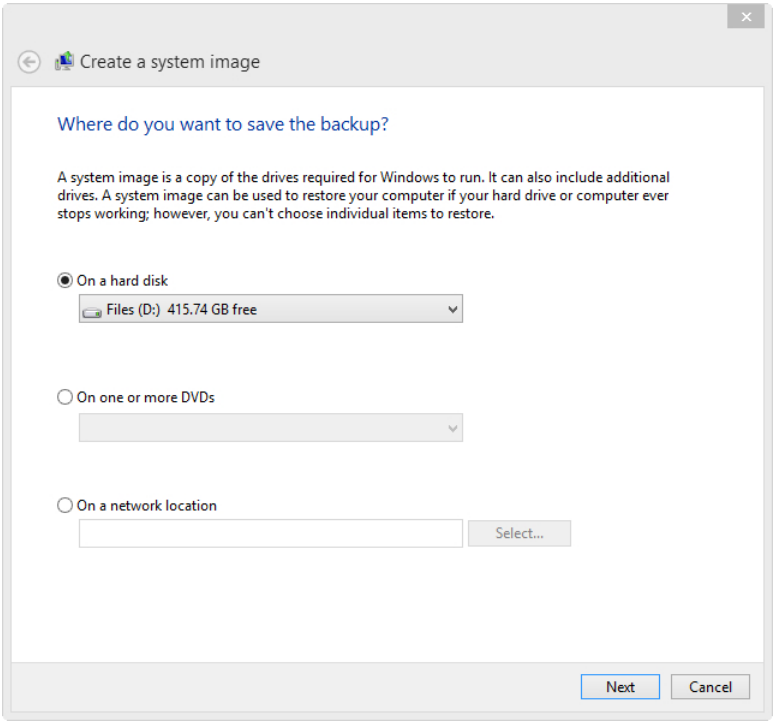

Figure 6-9 Selecting a location for your backup

When the backup has completed, a pop-up window prompts you to create a system rescue disc. This is a bootable CD or DVD that contains the Windows 8 rescue and repair tools.

INSIDE OUT The system repair disc

There are several ways to create a system repair disc. In addition to the two methods detailed in this chapter, you can also use the main Backup And Restore window. You can also create a system repair disc when you create a full system image of Windows 8.

The benefit of having a system repair disc is that if you ever need to recover Windows 8 from a backup, you won't need to access your original Windows 8 install DVD. The original media is valuable and should be kept in a location where it will be safe from scratches, loss, and environmental damage.

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Restoring Windows from a Windows System Image

If you have used the Windows 8 imaging tool to create your backup copy of Windows 8, you will need to either boot your computer from the Windows 8 installation DVD or from a system rescue disc that you create.

Restoring Windows 8 from a System Repair or Install Disc

Before you boot your machine from a system repair or Windows 8 installation disc, you will need to verify that your computer's BIOS is set to boot from the CD/DVD drive before it attempts to boot from the hard disk. You can access the BIOS by pressing F2 or Delete on your keyboard when you turn on the computer. The setting to verify is called Boot Order or Boot Priority.

The system repair disc first determines if there is a copy of Windows on the computer that won't start. Once this process is complete, you will have the option to repair the faulty installed version of Windows 8 or restore it from a previously backed up copy.

- If you are starting your computer from a Windows 8 installation DVD, click through the language and then at the Install Screen, click Repair Your Computer. Windows will search for operating system installations and then present you with repair options (more on this in a moment).
- If you are starting your computer from a System Repair Disc, it will try to repair Windows 8. If it says repairs are completed, you should press a key to restart, press Cancel, or press Esc.

INSIDE OUT

The differences between a system repair disc and a Windows 8 installation DVD

A system repair disc and the Windows 8 install DVD present different options when repairing Windows 8 or restoring it from a backup image. When you boot your computer from the Windows 8 installation DVD, you need to click Repair Your Computer on the initial screen.

1. From the boot options screen, click Troubleshoot if you are presented with it.
2. In the window that appears, you are asked if you want to Refresh or Reset your computer. Click Advanced Options below them.
3. In the Advanced Options window, click System Image Recovery, as depicted in Figure 6-10.

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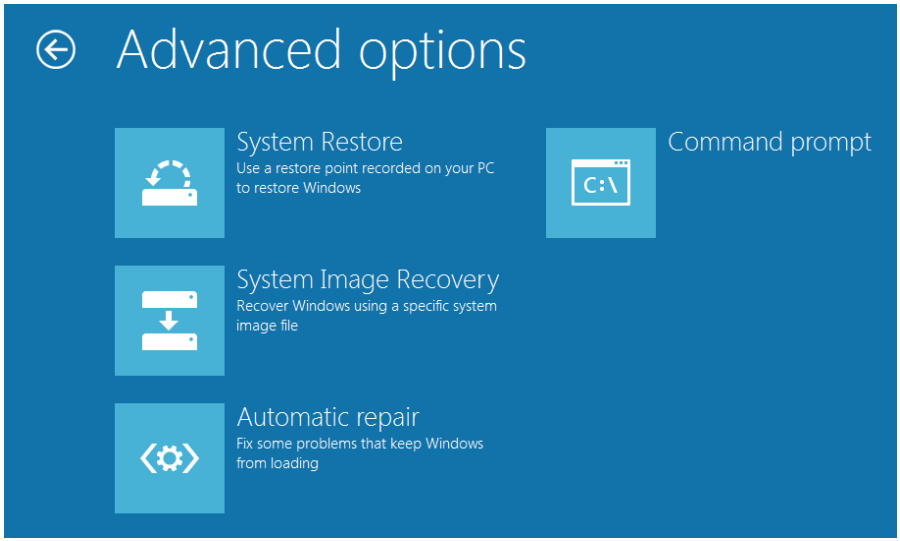

Figure 6-10 The Advanced boot options

4. Windows will find the system image you have created on your hard disk. When you have the correct image selected, click Next to restore it.

Creating a Custom Refresh Image

By default Windows 8 includes a refresh image of the operating system, but even though this might save your apps, it will not save your desktop software. If you want to do this, you can create a custom refresh image by performing the following couple of steps.

1. Open the Command Prompt as an Administrator. You can do this by opening the Start screen and searching for it or by pressing Windows logo key+X on your keyboard.

2. Type the command **recimg -CreateImage C:*Folder*** to create a custom refresh image, where C:*Folder* is the location where you want to store the image.

It really is that simple to create a custom refresh image in Windows.

CAUTION

While a refresh will keep many of your Windows 8 settings intact, settings for some desktop software packages, including Microsoft Office, can be reset during the refresh process. A refresh will also reset your pinned programs on the taskbar.

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Refreshing Windows 8

There are several ways to access the Refresh option, the simplest of which is via the Start screen.

1. Swipe in from the right of the screen with your finger or Press Windows logo key+C on your keyboard, and then click the Settings charm.
2. At the bottom of the panel that appears, click Change PC Settings.
3. Under PC Settings, click General, and then in the Refresh Your PC Without Affecting Your Files section, click Get Started, as illustrated in Figure 6-11.

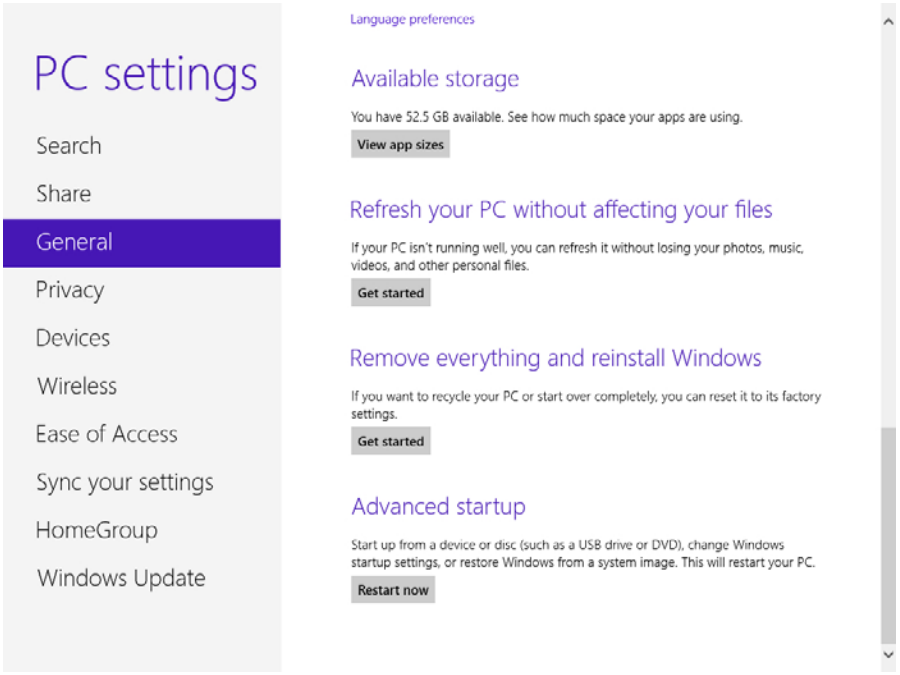

Figure 6-11 The Refresh and Reset options in PC Settings

A window appears, informing you of what Refresh will do.

4. When you are ready to perform the refresh, click Next.

Your computer will reboot at this stage and the refresh will execute.

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Refreshing Windows 8 from the Control Panel

The process of refreshing your computer from the desktop Control Panel is identical to that described above, but it is the Recovery option in the full Control Panel that you need to click to access this feature, as illustrated in Figure 6-12.

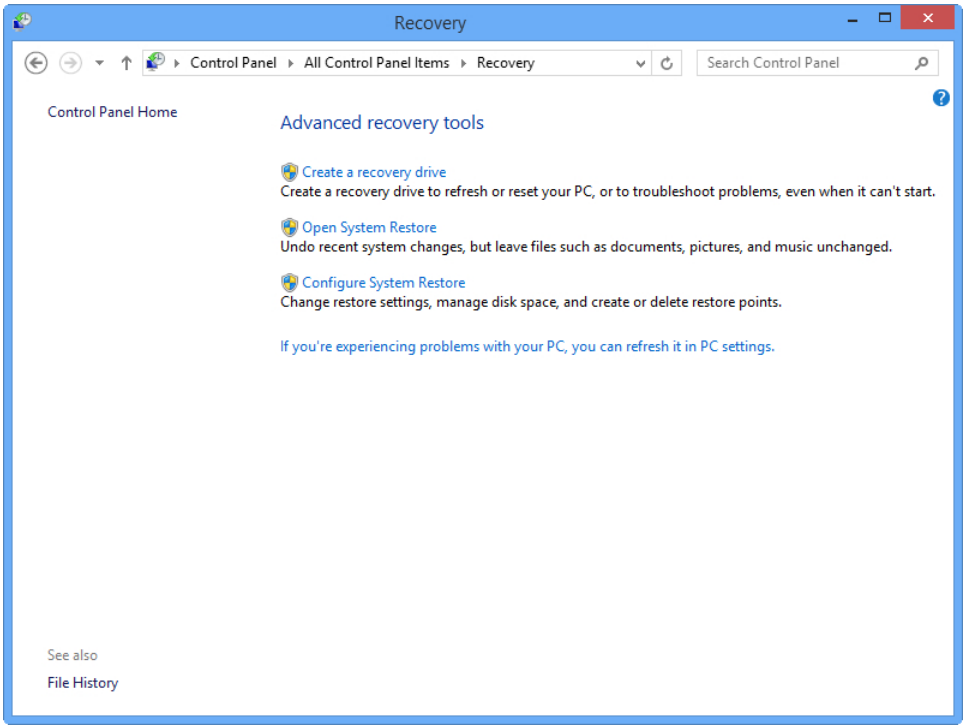

Figure 6-12 The Recovery options in the Control Panel

Creating a Recovery Drive

In the Recovery options, which you can access from the desktop Control Panel, in the Advanced Tools section, you can find the option to create a recovery drive (see Figure 6-13).

Now, don't be confused with CDs, DVDs, and external hard disks here. A recovery drive will always be a USB pen drive from which you can boot your computer in the event of a disaster to perform a refresh or a system image restore.

In many ways, it is the USB equivalent of the system repair disc that I told you about earlier.

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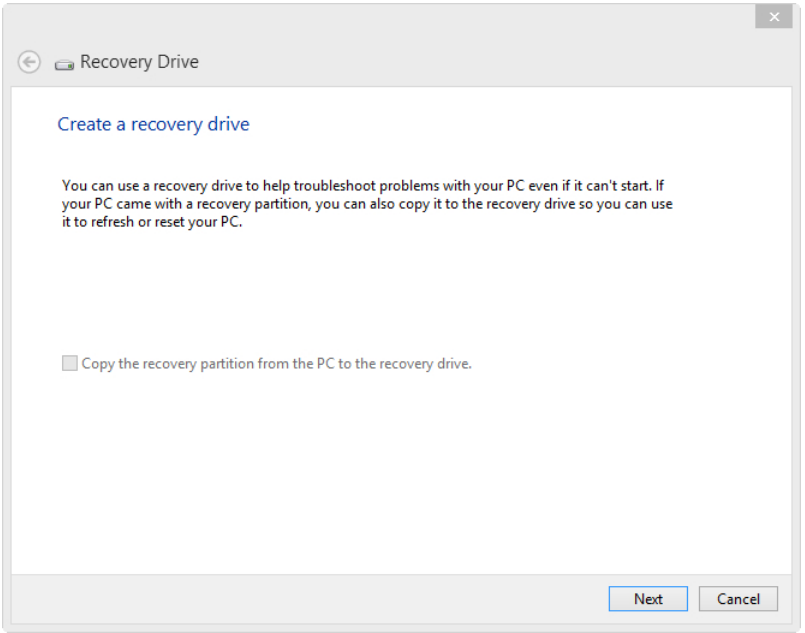

Figure 6-13 Creating a recovery drive in Windows 8

Most new Windows-based computers come with a recovery partition instead of an installation DVD. The DVD is very useful for recovery, and you should always get one if you can (after all, you paid for it), but the recovery partition contains everything you need to restore Windows in the event of a disaster.

If you have a large enough USB pen drive, you have the option to add the contents of that drive to your pen drive, including the system image that came with the computer when it was sold. The pen drive, therefore, becomes a very valuable resource and one that should be kept in a safe place, should it be needed.

File History and Version Control

One of the enhanced features in Windows 8—certainly on the version that existed in Windows 7—is File History, which keeps version-controlled backups of your files as you change them.

You can turn this feature on in the full Control Panel by selecting File History. These previous versions can be stored on a local hard drive or on a network location, and there are various advanced settings that you can modify to customize the service to your requirements, as depicted in Figure 6-14.

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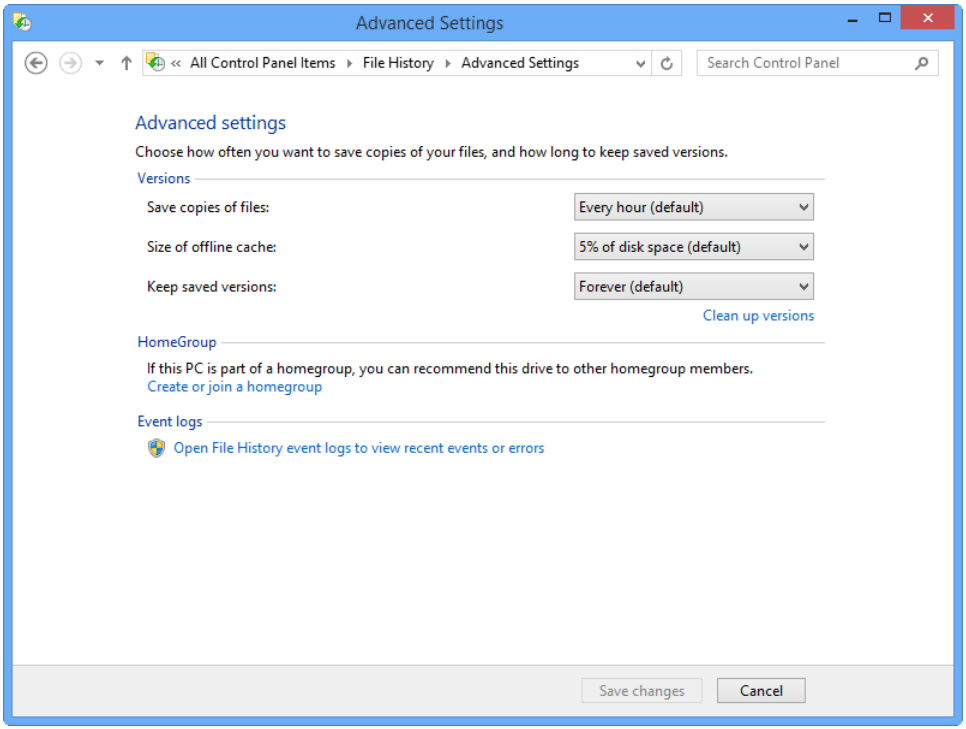

Figure 6-14 The Advanced Settings window for File History

The settings that you can modify include the following:

- Excluding specific folders from the versioning (more on this shortly when I talk about music and pictures)
- The time when file backups are automatically made
- How much of the hard disk is reserved for File Histories
- The length of time Windows should keep saved files

I want to take a moment to talk about music and pictures here, because the topic of how long you should keep saved files is important. If you use your computer at home, you probably play music on it or view pictures and videos. Every time you open one of these files, a file change occurs, even though you don't do a thing to it other than gaze at a photo (or dance with abandon throughout your office, erroneously assuming no one can see you). This is because the *last accessed* tag in the file is altered.

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As a result, you might find that your File History quickly fills up with versions of your quite large music and image files, while the versions that you *actually* want to keep are deleted. To get around this problem you can choose to exclude your music and/or pictures libraries from the File History.

To restore files by using File History, in the File History window, in the left panel, click the Restore Personal Files link.

Determining How Many Backups You Need and Where to Store Them

The nineteenth century playwright and author Oscar Wilde famously said, "To expect the unexpected shows a thoroughly modern intellect," and it's a good motto to live by when deciding how many copies of files, data, and Windows to have backed up and where to keep them.

I keep three backups of my files and data.

- One backup is on a second hard disk inside my main computer, intended for quick restore.
- One is on a network attached storage box in my home office.
- I periodically mail an incremental backup (on DVD) to a friend.

This strategy covers all the basics for me, from getting back files in a hurry to guarding against fire and theft.

I recommend that you always keep two backups of your files and data. You should keep one with your computer, or close to it, in case you inadvertently lose files that you want back in a hurry. You should store a second backup either with friends or relatives or in a cloud service such as SkyDrive, Carbonite, or Amazon S3.

Offsite backup is more important in business because often, the data a business owns is the single most important asset it possesses.

It's not worth keeping backup images of your copy of Windows 8 remotely because in the case of a fire or theft, you would need a replacement computer, so your existing backup wouldn't work unless all the hardware in the replacement machine was identical to the one that had been lost.

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CAUTION

If you keep critical copies of backups on removable optical discs, be aware that they can degrade over time, eventually becoming unreadable. My advice is to periodically verify that the discs are readable and replace them with other full backups at least once every 12 months.

Summary

Windows 8 contains so many more ways of backing up your files, folders, and Windows itself that it can be quite confusing. Especially when you consider that the Refresh option doesn't actually restore your desktop software as well as the more fiddly System Image Backup system.

Despite this, there are good reasons to use Refresh, not the least of which is that although it might not restore the configuration options of all your desktop software, it does at least keep the settings for Windows 8 intact, something that might be more useful in some circumstances, particularly when you just need to keep working in a hurry and can launch programs in the Start screen (where the icons can still be found) while you wait for the computer to be properly re-imaged later.

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CHAPTER 7

Performing Maintenance on Windows 8

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Windows 8 Automatic Maintenance 104
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Don't Install Too Much Software 109
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Keep Auto-Running Software to a Minimum 111
The One-Year Reinstall Rule 113

WINDOWS 8 IS A VERY MIXED BAG when it comes to staying happy and healthy in daily use. With Windows 7 and the other versions before it, I was reminding people that it just wasn't a consumer electronics device; you couldn't just take your computer out of the box, turn it on and have it run happily for years.

Now though, the new version of Windows on ARM architecture, which is not sold online or via retail, and which is only provided pre-installed on tablet computers, and perhaps some low-power laptops in the future *is* a consumer electronics device. It's the first time that Microsoft has done this with Windows, and for those devices, it changes the paradigm completely.

For everyone else though, there is the temptation to believe that because the ARM devices don't need maintaining that the versions running on your desktop, all-in-one, laptop, netbook, and some professional-grade tablets on Intel and AMD processors also won't need maintaining.

These versions are the same as previous versions of Windows, however, and will still need maintaining in the same way as before—almost! In this chapter, I'll talk you through the differences, the new features, and show you how to keep your computer happy and healthy.

Maintaining Windows 8 on ARM

So what is this Windows 8 on ARM business anyway? ARM (ARM Holdings, plc) is a British chip designer whose processors have powered the world's smartphones and tablets for many years already. With Windows 8, Microsoft has engineered a version of the operating system (OS) specifically for these processors.

The advantage of the ARM version is that it doesn't need maintaining. The automated maintenance tool built in to the OS will be all you need, and updates won't come down to the platform in the way they do with the traditional versions of Windows. Instead, the experience of using a Windows 8 tablet will be much more similar to that of using a Windows Phone.

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If you are using a Windows 8 tablet with an ARM processor, you will only have a solid state storage device, which will never need defragmenting; all Apps will be tested for compatibility and malware, so you have fewer stability and security problems; and traditional desktop software simply won't install.

It's fairly clear that maintenance on the ARM versions of Windows 8 is pretty much something that you don't need to worry about.

Windows 8 Automatic Maintenance

Windows 8 includes a new automatic maintenance tool (see Figure 7-1) that performs actions on a specified schedule, including searching for updates, performing antivirus scans, and running system diagnostics. You can find the Automatic Maintenance tool in the Maintenance section of the Action Center.

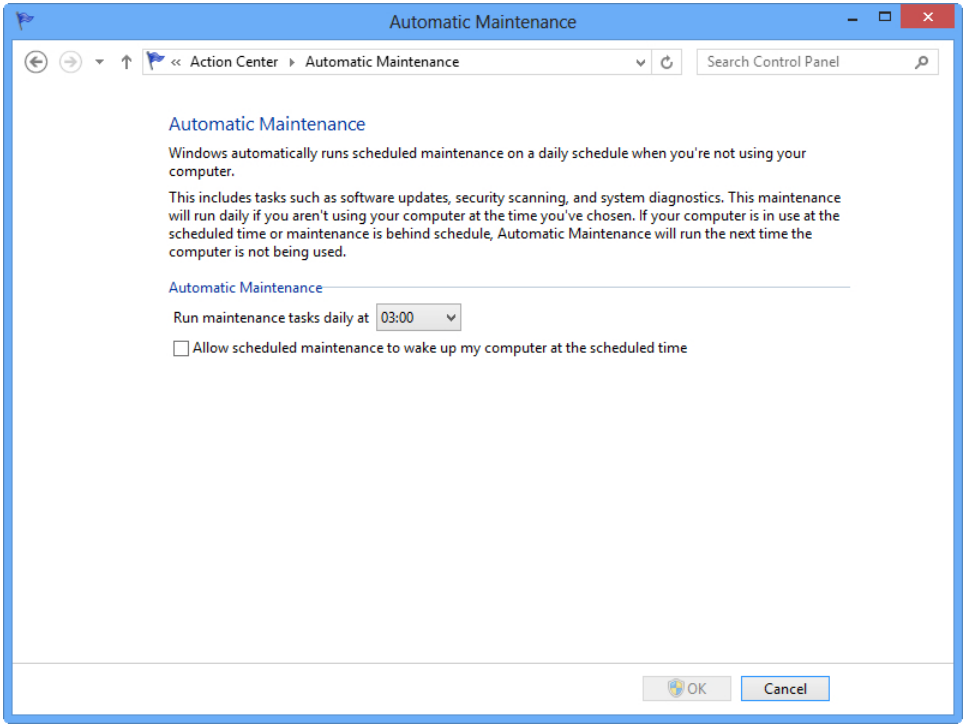

Figure 7-1 The Automatic Maintenance tool in Windows 8

For casual users this tool should be all you need; however, enthusiasts and IT professionals will probably want to have more control over the removal of temporary files, defragmentation, and so on.

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When you open the Maintenance section in the Action Center, you see a link to Change Maintenance Settings. This is slightly misleading because there are two options: the time each day when the tool runs, and if the computer is plugged into an electrical outlet, the computer is allowed to wake from sleep to perform the task.

There is no visible indication that maintenance is running except for a small static timer icon that appears on the Action Center icon on the Taskbar.

Defragmenting Your Hard Disks

So, does defragmenting your disks actually make a difference? Certainly it does with conventional hard disks. But if you have a solid state disk (SSD) in your device, then no, it has no impact at all. These drives are random access, much like the memory in your computer; thus, there's no performance benefit to defragmenting. In fact, because SSDs have a finite write life, it can be argued that defragmenting them only reduces their lifespan, which is quite correct in my view.

For mechanical hard disks, however, fragmentation does occur. When your computer writes small files to the disk, the file system puts them in the best available place. However, when you save large files, there may not be enough contiguous space for the entire file to be stored as a single entity. What happens then is that Windows stores part of the file in one block and other parts in other available spaces, as illustrated in Figure 7-2.

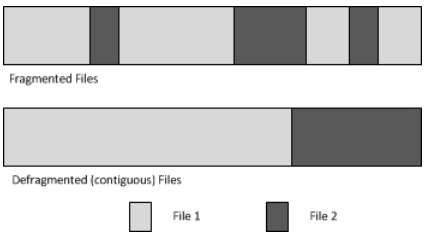

Figure 7-2 A depiction of fragmented and contiguous files

There are no problems with files being fragmented, because with modern hard disks, there's no real risk of data corruption. But, fragmentation can and will slow down access to the files slightly (which makes sense), so if access speed is important to you, especially with Windows operating system files, then regularly defragmenting your computer is advised.

The good news is that Windows 8 can automatically defragment your hard disks. But if you want more control—perhaps you prefer determining what hard disks or partitions are defragmented and how often it's done—you can change the settings manually.

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INSIDE OUT Defragmenting and SSDs

If you have an SSD in your computer, it is advisable that you do not defragment it. These drives are random access and so there is no speed boost, but continually writing to an SSD can shorten its overall lifespan.

If you are unsure if you have an SSD in your device, check the defragmenter; it will tell you. The rule is that Windows tablets and Ultrabooks will include SSDs by default.

To change the defragmentation settings, open the Start screen and search for **defragment**. The Defragment Your Hard Drive link will appear in the Settings search results. Click this link to open the Optimize Drives window. When you run the defragmenter, the window displays the fragmentation status of each hard disk and partition in the computer.

Click the Change Settings button to open the Optimization Schedule window (see Figure 7-3), in which you can choose when the defragmenter runs, if you want to be notified if the defragmenter fails to run three consecutive times, and what hard disks and partitions are included.

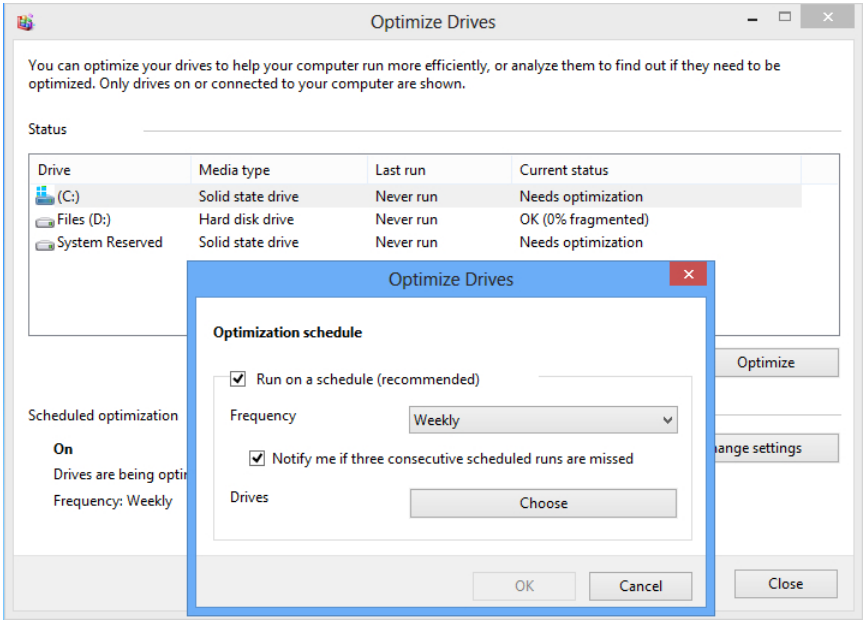

Figure 7-3 The disk defragmenter in Windows 8

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Maintaining Windows 8

Over a period of time, Windows 8 folders become clogged up with all types of old and temporary files, assorted files left over from uninstalled programs, and dead files. These can slow down the computer and certain software. Windows 8 contains a tool called Disk Cleanup that you can use to delete some of these unnecessary files, but other third-party tools are also excellent for keeping Windows 8 healthy.

Disk Cleanup

Use Disk Cleanup to delete some of the temporary and other unwanted program files that can slow down Windows 8. To access it, first open the Start screen by clicking All Programs. Next, click Accessories, and then click System Tools. You can also find this tool by opening the Start screen and typing **cleanup**. In the Search results, click Free Up Disk Space By Deleting Unnecessary Files.

You might be prompted to indicate what drive you want to clean; in most cases, you will choose the C drive. By default, Disk Cleanup recommends what items it can delete, but it also offers additional options if you want to reclaim even more space, as shown in Figure 7-4.

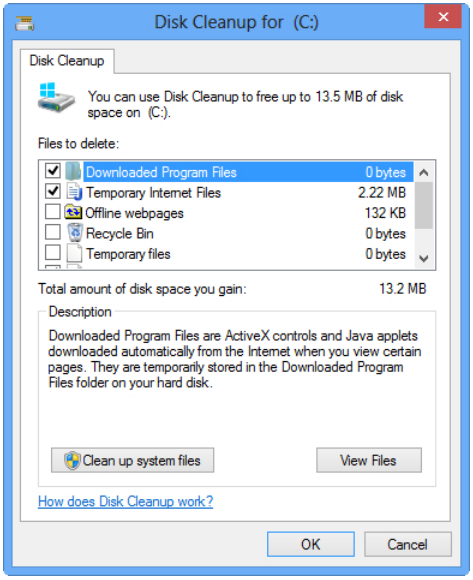

Figure 7-4 The Disk Cleanup tool

Clicking Clean Up System Files displays additional options, including the choice to delete operating system restore files. However, you should remove these only if you are very confident that Windows 8 is running completely fine.

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Internet and Other Temporary Files

Many of the temporary files on your computer are from your web browser. The method to clear these temporary files differs from browser to browser, but with the desktop version of Microsoft Internet Explorer 10, which ships with Windows 8, you can easily locate them for removal and cleaning by clicking Safety on the browser toolbar and then selecting Delete Browsing History. You can also access the Delete Browsing History dialog box by pressing Ctrl+Shift+Delete on your keyboard when in the desktop version of Internet Explorer.

In the Delete Browsing History dialog box shown in Figure 7-5, you can delete temporary Internet files and other items that are not deleted by Disk Cleanup while still preserving the data you want to keep.

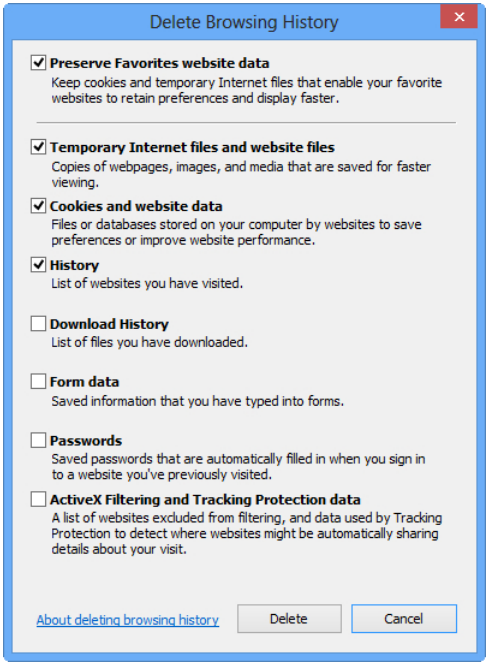

Figure 7-5 Cleaning up temporary files in Internet Explorer

Third-Party Tools and Utilities

Almost all of the tools and utilities for keeping Windows 8 running efficiently are made by third parties. There is one tool that stands head and shoulders above the rest in the opinion of both me and many IT professionals. In fact it's so popular you might already be using it.

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CCleaner

CCleaner (*www.piriform.com/ccleaner*) is widely considered one of the best programs available for tidying up Windows files. By default, it has very sensible settings, but there are some advanced options, too, which should be used only by advanced users. These advanced features include the ability to clean old and unwanted items from the Windows 8 registry.

INSIDE OUT

Do registry optimizers work?

The registry is a database that stores all Windows settings (user profiles, permissions, and so on) and all the settings for the software you have installed. As settings change and programs are uninstalled, the registry can become fragmented in the same way a hard disk can.

However, there is some debate about whether optimizing (defragmenting) this database actually provides any speed improvements. The answer is twofold and can depend on how old your computer is and how much memory it has.

When Windows starts, it loads many of its files into your computer's memory. The more memory your computer has, the more files it can accommodate. Files loaded into memory can be read much faster than those on the hard disk.

There's also the issue of stability. It's a known fact that a database that becomes very fragmented can eventually become corrupt. This could happen to the registry, too, and defragmenting it could be a good option.

However, the simple fact is that nobody really knows for sure what effect, if any, optimizing your registry has. It's something that some software packages do, and you might find it works for you. However, I wouldn't be too worried if your clean-up tool is unable to defragment the registry.

Don't Install Too Much Software

People used to say that Windows had a ceiling of 30 programs that could be installed before the operating system became unstable. Whether there is any truth to this is a great computing mystery. There is no doubt, however, that the more software you install in Windows 8, the more unstable it becomes. The point at which this happens will depend entirely on the software you install. For instance, if you install no software on a computer,

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which isn't very likely, it will run for an extremely long time simply because there's nothing installed that can be incompatible with anything else.

INSIDE OUT Windows 8 and the App ceiling

Although Windows might have had a ceiling of about 30 software packages that can be installed happily, apps in Windows are an unknown quantity. It can take considerable time, even several years, for experts to form opinions on this and even then, they are speculative.

My advice, as always, is to install only the apps and software that you *really need* and *really use*.

Windows often fails or crashes because of incompatibilities with a software component or a hardware driver. This happens because there are so many hundreds of thousands of software packages and hundreds of thousands of hardware devices that no manufacturer or Microsoft could ever test every possible combination for stability. Microsoft offers certification programs for software and hardware in Windows 8, but this still won't test against how a specific piece of hardware or software will interact with other hardware and software, especially packages that haven't been through the optional certification.

INSIDE OUT Software certification and the Windows Marketplace

All new apps in Windows 8 will be available exclusively through the new Windows Marketplace. All apps sold here are engineered using approved development tools from Microsoft, and although they are not tested for stability, they are all scanned for malware.

Windows is built on an open platform, and anyone, including enthusiastic amateurs, can write applications for it. This is why Windows is now the most flexible and extensible computing platform in the world.

Bespoke software written for organizations does not always go through the sometimes very expensive Microsoft certification program. Why send your software to Microsoft to certify when you'll only be using it yourself?

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So, a limitless number of combinations of hardware and software can be installed on a computer. This makes the whole system unpredictable, and although Microsoft has made great strides to make Windows 8 as stable as it can possibly be, problems can still occur.

My tips for avoiding problems with installed software and hardware are as follows:

- Don't buy any hardware that has not passed Windows 8 certification and does not display the *Certified for Windows 8* logo.
- Avoid shareware and freeware that's written by small software houses and individuals if you can.
- Avoid installing *trialware* that will sit unused on your computer and expire after a while.
- Install only software that you'll actually use!

Keeping Windows 8 Updated

One of the most important strategies that you can implement to avoid instabilities with Windows 8 is to turn on Windows Update and have it download updates on a regular schedule. Periodically, incompatibilities are reported and fixed by Microsoft and then distributed through Windows Update on what is frequently referred to as Patch Tuesday—the second Tuesday of every month. These updates can fix all types of issues that can cause Windows to become unstable or unresponsive, so it's important to leave Windows Update turned on.

Keep Auto-Running Software to a Minimum

By default, a great many programs you install run automatically every time you start your computer. This includes common favorites such as Adobe Acrobat Reader and Apple iTunes software.

Some of these software packages are updaters. People have been asking Microsoft to allow third-party vendors to distribute their updates via Windows Update for years now, but it has not happened yet. For some software, it is worth keeping the updater running. Adobe Acrobat PDF files, for instance, are a frequent source of virus infection, so, although you might not want the Adobe Updater software running every time Windows starts, you should run it manually at least every month. However, there's a strong argument to run other updaters, such as iTunes, only when you actually want to run the software.

The problems caused by auto-running software aren't just that they can slow down your computer and even push up your carbon footprint (you'd be surprised how much extra

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money you're paying on your electricity bill by running these things!). They can cause other issues, such as file fragmentation and temporary file clutter, just by being in the background.

Auto-running software is now managed in the Task Manager which you can access by pressing Ctrl+Alt+Del on your keyboard or by right-clicking on the taskbar.

Once you're in the Task Manager, click the More Details button, and then click the Startup tab (see Figure 7-6). Here you will see what programs are set to run at startup and what impact Windows calculates they each have on boot time.

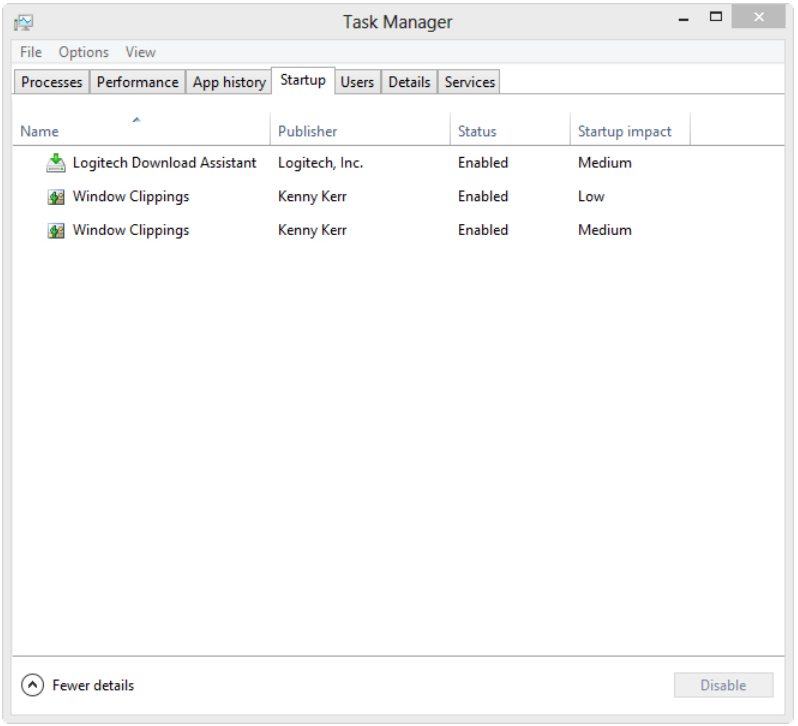

Figure 7-6 Managing Startup Programs in the Task Manager

You can disable a particular application (or re-enable it) by clicking to select it and pressing the Disable button.

You might want to deselect some packages to save file clutter, processor cycles, and yes, even money on your electricity bill. Remember, the more the computer is doing, the more electricity and battery it will use.

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The One-Year Reinstall Rule

With earlier versions of Windows, you needed to format your hard disk and reinstall the operating system regularly as it became unstable. Since the introduction of Windows XP this has become less of an issue, but for computers that are used frequently, amassed temporary files and incompatibilities can cause problems over time. For this reason I recommend that, if possible, you restore Windows 8 from a backup every twelve months or so.

This doesn't need to be a complete reinstall. You can simply restore from a Windows System Image that you have created which contains all your settings and software. Because this is a clean image, however, you can consider the computer reinstalled.

In Chapter 2, "Repairing Windows 8 in 30 Minutes or Less," I talk about how to back up a working copy of the operating system, complete with all of your programs and hardware installed. You know that the copy you have backed up will be fresh and working fine, so I advise that you restore this backup, update it by using Windows Update, update any programs as necessary, and then back up this new system.

CAUTION!

Remember: Don't use the computer too much while preparing it to be backed up. This will help prevent build ups of temporary files or incompatibilities that would then be locked into your backup.

You should set aside one half day or so to reinstall Windows, and take your time updating your system thoroughly before locking it down again in a fresh operating system image backup.

Summary

Unlike previous versions, Windows 8 does a pretty good job of maintaining itself. In fact you could rely on the automatic maintenance tool, the automatic defragmenter, and just run CCleaner occasionally to tidy up temporary files and you'd be perfectly fine.

Some people want more control over their computers, though, and given that you're reading this book, there's a good chance that you're one of them. For you, there are the extra options and features I have detailed, some of which offer considerable levels of control.

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CHAPTER 8

Managing Users in Windows 8

How User Account Control Works 115
Managing User Accounts 116
Family Safety 121
Group Policies 124
Blocking CDs, DVDs, Flash Drives, and External Hard Disks 128

In IT support circles, a great many issues are blamed on a PEBKAC, which is an acronym for "Problem Exists Between Keyboard And Chair." It's impossible to have a computer problem without a user being involved in some way, usually as the cause, inadvertently or otherwise. This is why IT support departments have such strict rules about how users operate their computers. It's also why the people who manage and work in IT departments are often regarded as aggressive and authoritarian. But if a system goes down, it could cost an organization thousands, maybe tens of thousands, of dollars in lost revenue or productivity, and the IT department is ultimately responsible for mitigating such losses.

This is why the first part of this book has been devoted to helping prevent problems before they occur. It doesn't matter whether you're reading it to help fix problems with your computer at home or if you manage a corporate network with thousands of computers, downtime costs in one way, shape, or form, be it in money or in frustration.

This brings us back to the user, which is undeniably the weakest part of any computer system's integrity. I say this because computers can only do things according to their programming. A piece of software or hardware will do things the same way every time. Human beings, on the other hand, are unpredictable, driven by emotion, mood, and circumstance. To prevent issues, you have to be able to control the user, even if that user is you!

How User Account Control Works

With every legacy version of Windows up to and including Windows XP, users are administrators by default. This means that they have complete control over everything in the operating system and can install programs and delete or move files without restriction. This is still the case with Windows 8, but User Account Control (UAC) adds a layer of protection.

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Because of problems running legacy software in Windows, the full security afforded to other operating systems, such as Apple OS X and Linux, isn't possible. But Windows developers recognize that users might occasionally make changes to the operating system, either unintentionally or without understanding the true repercussions. More important, Windows developers know that malicious software and viruses will want to do this, too.

UAC helps prevent inadvertent or malicious changes to critical system processes by putting a security layer between the user and any action that Windows determines could cause harm to or destabilize the operating system. When UAC is activated by a questionable action, Windows 8 drops into a secure desktop where only the UAC dialog box is active and where only a user, not software, can make a selection.

UAC is a useful but not foolproof way to protect Windows 8 from attack. As comedy science fiction author Douglas Adams once famously said, "A common mistake people make when trying to design something completely foolproof is to underestimate the ingenuity of complete fools." Although this observation fails to take into account the simple fact that many people are often bemused or confused by technology, or even tricked by malware into clicking something they shouldn't, it does apply to some degree to UAC. It's still too easy for a user to click Yes without reading or properly understanding the implications of making such a decision. What isn't helpful is that UAC messages are frequently unclear, and it can be difficult to determine what is trying to change what.

Managing User Accounts

There are a great many ways to manage users on a computer and to prevent anyone from installing unauthorized software, making unnecessary changes, and downloading and opening harmful files from the Internet. But managing user accounts can be a complex process. This section covers some ways to manage user accounts.

Setting an Administrator Password

With UAC, a user can bypass security warnings by simply clicking through a dialog box. For better security on a multiuser desktop, you can set the main user as an administrator and all other users as standard users. Standard users have far fewer privileges to change Windows. They are even further restricted if you establish a password for the administrator account so that nobody can click through a UAC dialog box without entering the password.

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INSIDE OUT

The pros and cons of setting an administrator password

On a multi-user computer, protecting the main administrator account with a password prevents other users from logging in as the administrator and upgrading their own accounts from standard users to administrators. But be aware that setting an administrator password can have a downside. Password protection for the administrator account prevents users from making even legitimate changes to Windows or other software that might be required.

To set up additional user accounts on your computer, follow these simple instructions:

1. Open the Start screen and swipe in from the right of the screen or press Windows logo key+C.
2. Click the Settings charm.
3. Click Change PC Settings.
4. Click Users, as illustrated in Figure 8-1.

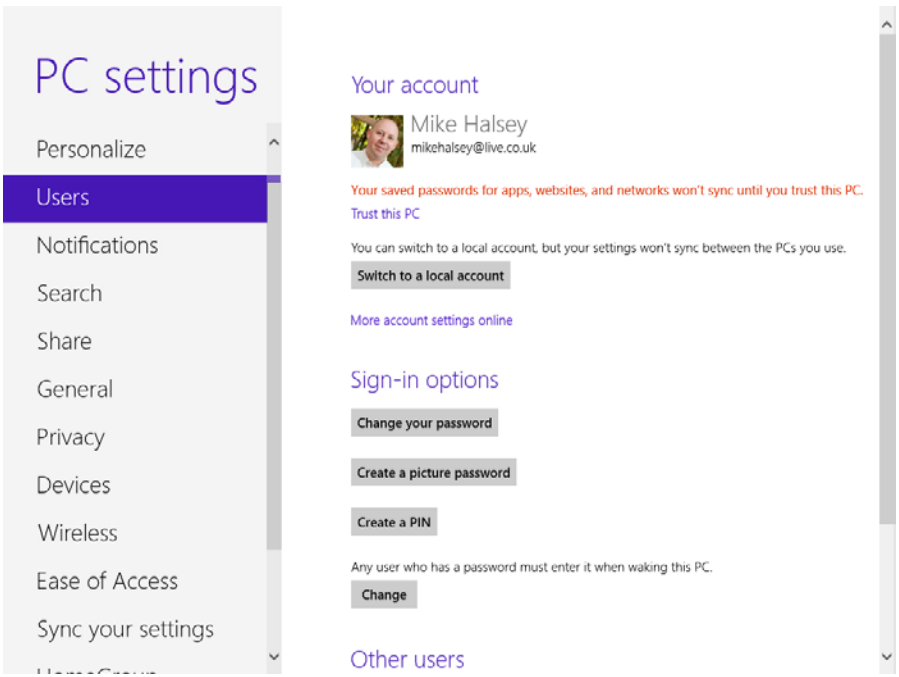

Figure 8-1 Managing user accounts in PC Settings

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5. Click the + (plus) button next to Add A User.

   You now have a choice of whether to allow the user to use their Live ID on the computer or you can click Don't Want This User To Sign In With A Microsoft Account? to create a user account specific to this computer, as shown in Figure 8-2.

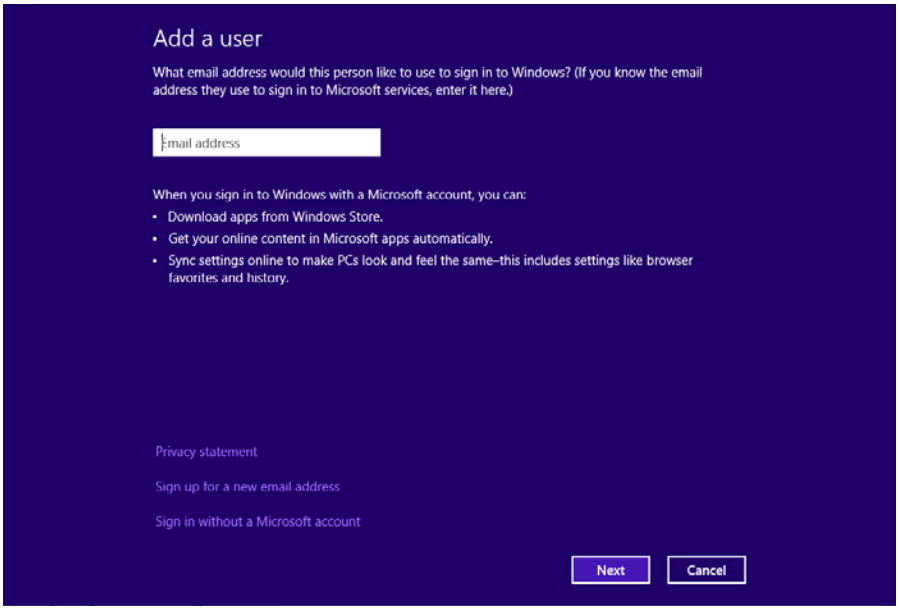

Figure 8-2 Adding a user account

If you sign in with a Live ID the computer will ask for your username and password. If you creating a local account, proceed to step 7.

CAUTION

Signing into a computer that you do not intend to use regularly can leave Internet Favorites and temporary files on the PC that can potentially be accessed by other users. Deleting the user account when you are finished or signing in to the guest account can help prevent these problems occurring.

6. Windows 8 displays an explanation regarding the difference between creating a local or Live ID account (see Figure 8-3). Click Local Account to continue.

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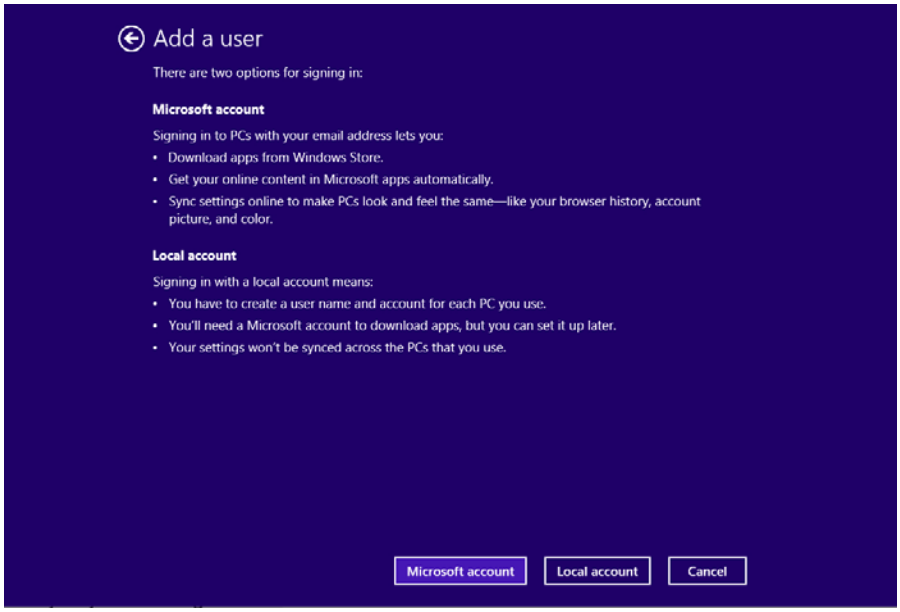

Figure 8-3 Choosing a user account type

7. In the text boxes shown in Figure 8-4, type a username and optional password for the account.

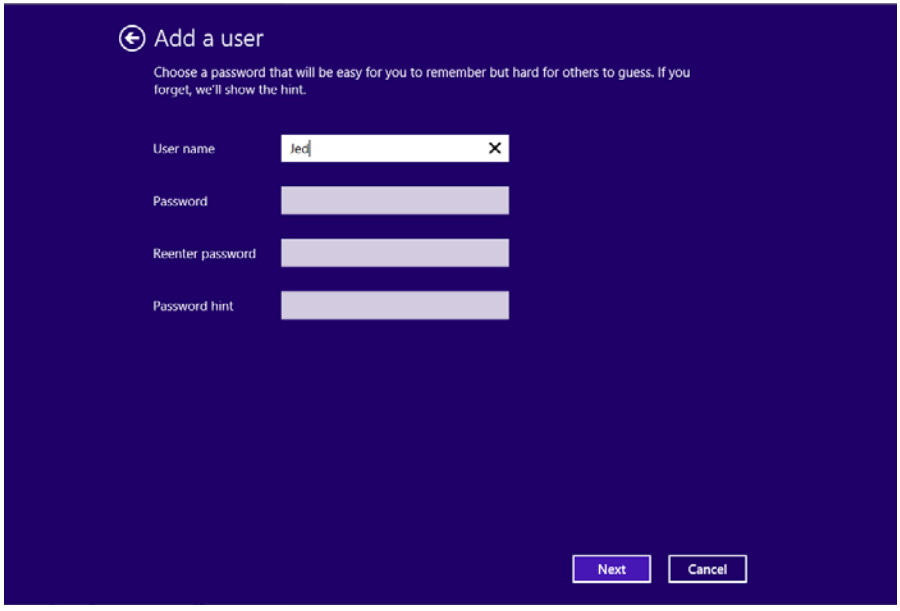

Figure 8-4 Adding user details

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8. When the account has been created, click Finish, as demonstrated in Figure 8-5.

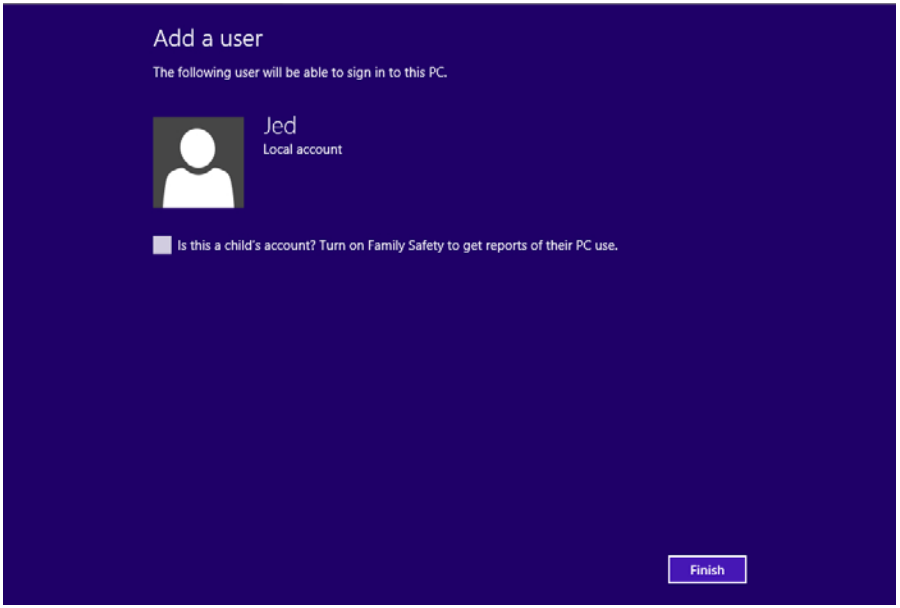

Figure 8-5 Finalizing a new user account

The Guest User Account

The guest account setting in Windows 8 can prevent occasional visitors from making changes on your computer or doing things that can affect other users. It is also a useful way to quickly create a user account when you have visitors or someone new who wants to use your computer.

You turn on the Guest account from the Users section of the full Control Panel. To do this, open the Start screen, search for **User**, and then in the settings search results, click User Accounts.

> **Note**
>
> **A guest account is simply an existing standard user account that can be switched on and off as needed. It should be noted that unless you have a password on your administrator account, anyone logged in as the guest user will be able to click Yes on UAC security prompts.**

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INSIDE OUT

Can other users see your files?

By default, Windows 8 stores your files and data on the same hard disk or partition as your Windows 8 installation. In Chapter 2, "Repairing Windows 8 in 30 Minutes or Less," and Chapter 5, "Optimizing Windows 8 Security," I talk about how to move your files away from your Windows installation to secure them in the event of a catastrophe with Windows 8 itself.

Unfortunately, there's a downside to this when it comes to multiuser systems.

When user files are located on the Windows drive, the operating system hides them from other users. When you move those files to another disk or partition, they become visible to everyone.

In this circumstance, a user will initially be barred from viewing files, but if she has administrator rights, she can Take Ownership of those files and folders and access them.

Windows 8 does not come with a tool for hiding disks or partitions from specific users, but you can set individual user permissions on folders to deny access to other users. Also, there are many third-party tools and tips, most of them free, for hiding disks or partitions and user files.

Family Safety

Family Safety has many more uses than simply stopping your children from playing games late at night. It can also be used to limit access to certain software packages. You might, for instance, have some work-related software on your home computer that you don't want other users to access.

To access Family Safety in Windows 8, open the Start screen and type **parent**. In the search results in the Settings section, click Family Safety.

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INSIDE OUT Using Family Safety in Windows 8

To use Family Safety (see Figure 8-6), you must have at least one Administrator account and one Standard user. It is the latter to which you apply the Family Safety.

The Administrator accounts *must* be password protected for the feature to work; otherwise, the Standard user will be able to log on using an Administrator account and then switch the Family Safety off.

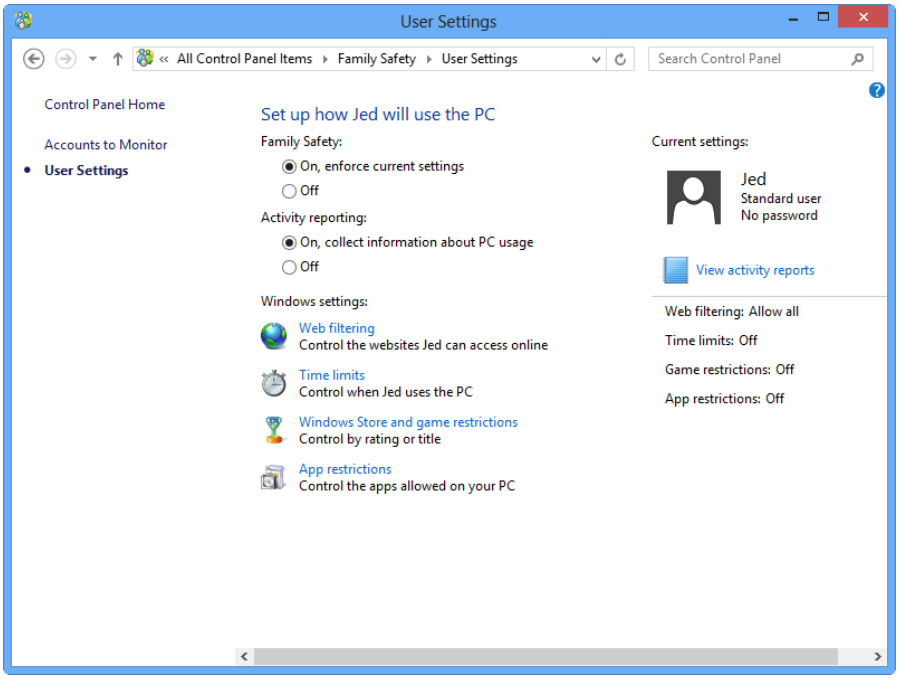

Figure 8-6 The Family Safety in Windows 8

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Windows Web Filter

One new feature in Family Safety in Windows 8 is full website filtering (see Figure 8-7), and it's a feature that is implemented very well, indeed.

This is a feature that can prevent children from accessing inappropriate or unsuitable websites.

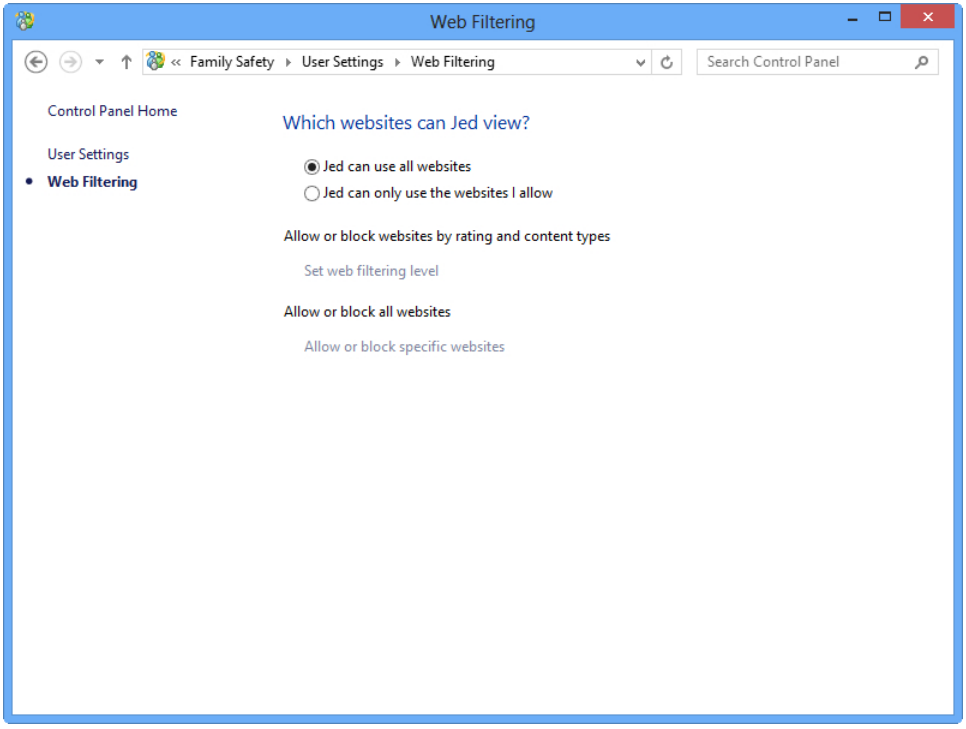

Figure 8-7 The new Web Filter in Windows 8

The new web filter has controls to allow only websites that fall within four categories, Child-friendly, General Interest, Online Communication, and Warn An Adult, and it can also block file downloads.

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These categories can be extremely useful in helping to prevent malware from infecting a computer.

Group Policies

The Windows Group Policy Editor tool is used almost exclusively in business and corporate IT environments, and thus, it is only available in Windows 8 Pro and Enterprise editions. To access it, open the Start screen, type **gpedit.msc**, and then in the search results, click Group Policy Editor.

The Group Policy Editor interface is split into two main sections, Computer Configuration and User Configuration, and functions as follows:

- Computer Configuration covers settings for the entire computer. You will probably not want to change these unless, for example, you are turning off the Windows Firewall or Windows Update in a corporate IT environment.
- User Configuration covers the settings that apply to specific users. These will normally be specified remotely by a Windows Server configuration, but if you are changing these settings within Windows 8, you must do so on a per-user basis while logged on to that specific user account (see Figure 8-8).

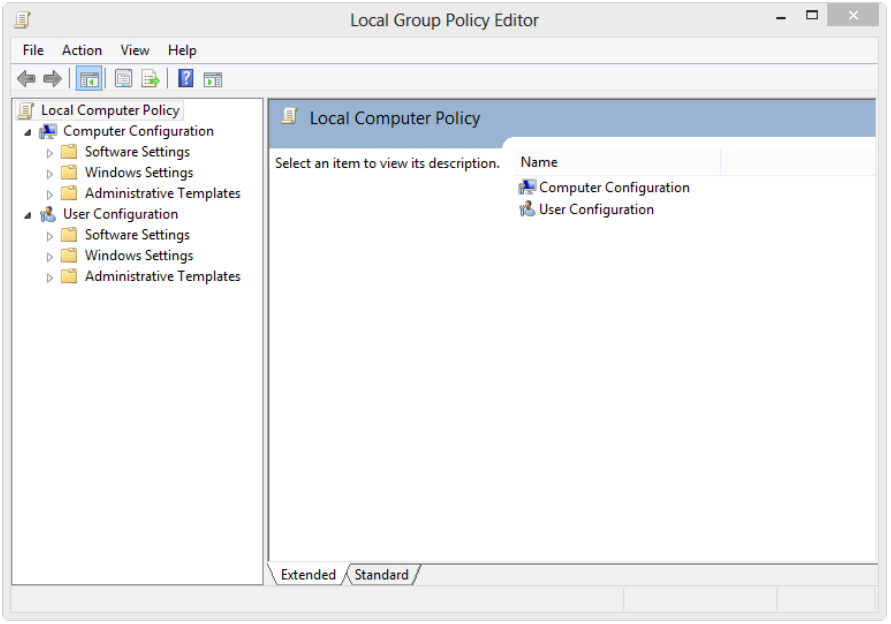

Figure 8-8 The Group Policy Editor

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Each of these sections is subdivided further into Software Settings, Windows Settings, and Administrative Templates.

INSIDE OUT

Group Policy Editor availability

The Group Policy Editor is only available in the Pro and Enterprise editions of Windows 8. It is also not available in the ARM version of the operating system.

It is unlikely that you will ever want to change settings in Group Policy Editor unless you are a system administrator on a company network. However, there might be circumstances for which, to enhance security, you want to block user access to the Run command on the Start screen, deny user access to common Windows features such as Windows Media Player, or change the default Windows security level for opening email attachments.

Fortunately, all of the available options in the Group Policy Editor are clearly labeled, and all include detailed descriptions of what happens when you edit them. This can help you to understand how each selection will affect you and other users on your computer so that you can make informed choices.

Local Security Policies

Another tool used almost exclusively in business and corporate IT environments is the Local Security Policy window, which is shown in Figure 8-9.

This tool is more hidden than it was in Windows 7. To access it, in the full desktop Control Panel, click Administrative Tools, and then click Local Security Policy (see Figure 8-9).

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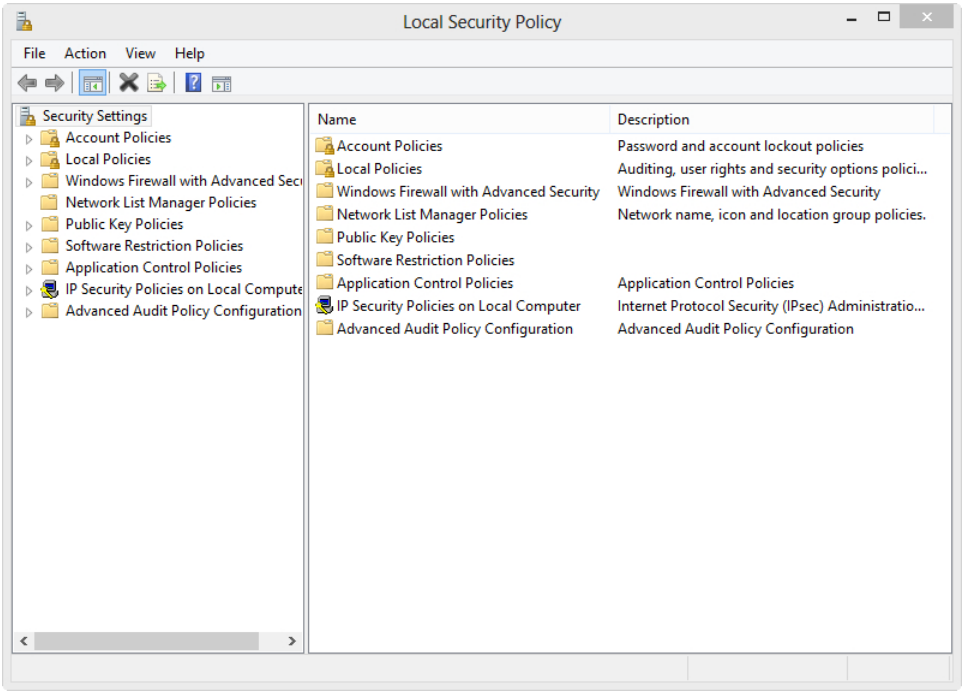

Figure 8-9 The Local Security Policy Settings

There is very little that you would want to change in the Local Security Policy window. However, you can access the following two useful features:

- **Windows Firewall with Advanced Security** This is where you can set and configure specific rules to allow hardware or software through the Windows 8 firewall. This might include games or access to network storage.

- **Application Control Policies** If you have the Enterprise or Ultimate version of Windows 8, you have access to a feature called AppLocker. This tool lets you control what specific software can be installed on your computer, right down to the version number. This can prove useful for features such as graphics card drivers for games and for some plug-ins (for example, Adobe Flash) that will work only with specific software versions. You can use this tool to block the installation of other versions of those applications.

As with the Group Policy Editor, all of the available options in the Local Security Policy Editor are clear and display detailed descriptions when you click their properties. This makes it easy to understand how each option will affect you and other users on the computer and helps you to make informed choices.

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Computer Management

More widely used in Windows is the Computer Management console. This is a centralized location for a wide range of useful Windows 8 settings.

The easiest and quickest way to access the Computer Management console is to open the Start screen and press Windows logo key+X, or on the Desktop, bring up the Administration menu and then click Computer Management. You can see the Computer Management console, as shown in Figure 8-10.

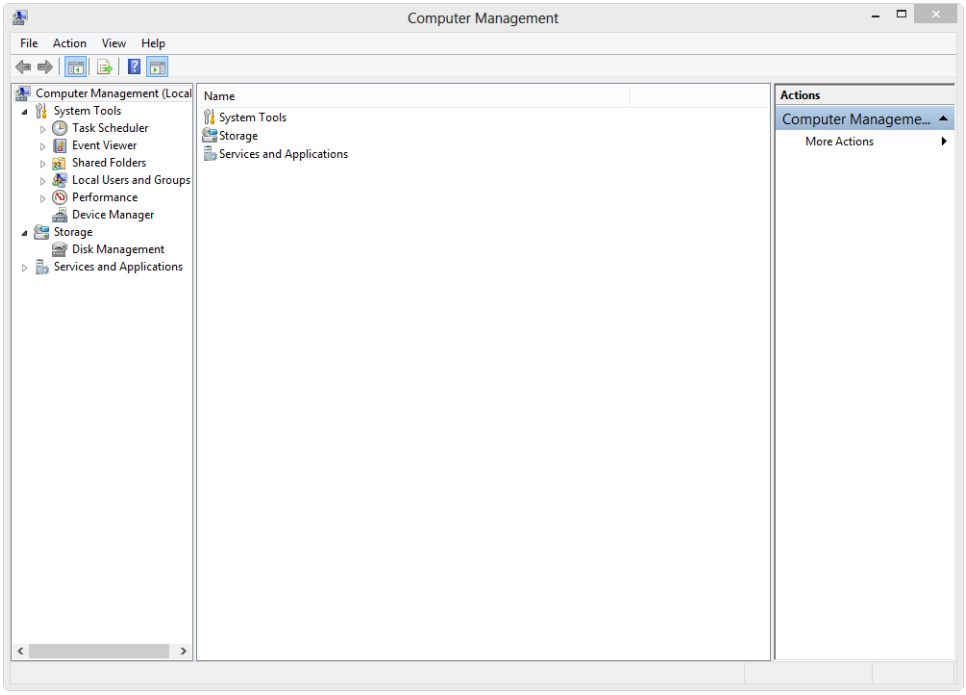

Figure 8-10 The Computer Management Console

The left panel of the Computer Management Console includes links to all the relevant tools and utilities for managing your computer, but there are some I want to highlight.

- **Task Scheduler** You might find that you want Windows 8 to run certain tasks on a set schedule, such as disk cleanup. You can set any task or program to run on a schedule you define by clicking Task Scheduler in the Computer Management console.

- **Event Viewer** This is a useful tool for viewing error and other reports from the operating system.

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- **Shared Folders** You can use Shared Folders to permit and deny access to folders that are shared between users on the same computer or across different computers in a home network.

These and the other features in the Computer Management console are discussed in Chapter 33, "Using Advanced Windows 8 Diagnostic Tools."

I discuss some of these features in much more depth in Chapter 20, "Using Advanced Repair Methods."

Blocking CDs, DVDs, Flash Drives, and External Hard Disks

One of the biggest security problems—certainly one of the biggest in the corporate space—is the use of external flash drives, CDs, DVDs, and external hard disks. If not carefully vetted, these media can transfer viruses and other malware to a computer or be used to steal information. This is because although computer equipment within an organization can be controlled by using group and security policies, external hardware, especially personal flash drives, is not subject to the same rules and could also be used on a third-party or home computer with little or no virus and malware protection. You can use Group Policy Editor to deny access to these devices for specific users or for everyone.

To access the Removable Storage Access settings in the Group Policy Editor (see Figure 8-11), click Computer Configuration, click User Configuration, and then click Administrative Templates and System.

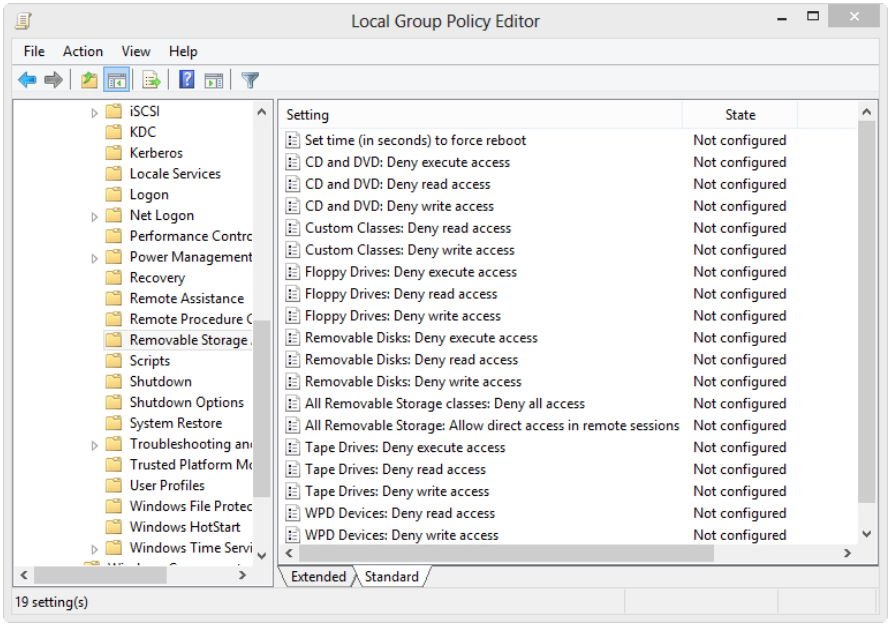

Figure 8-11 Managing removable storage in the Group Policy Editor

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> **Note**
>
> **USB flash drives and external hard disks are classified as *removable disks*. To allow or deny access to a wide range of plug-in drives, right-click any of the settings, click Edit, and then click Disable to block access to the selected group of drives.**

Summary

It can be argued that no user should ever be allowed to use a computer because then nothing can go wrong with it. In practice, however, it is in how individual and groups of users are managed on the computer that can make the difference between a stable and reliable system and one riddled with problems and malware.

This chapter is a broad insight into how to manage users and there are always very few settings that will need to be changed to prevent problems from occurring.

As always though, the key to avoiding problems with users is in training and awareness. For users who will just use the Start screen and new Apps, problems can be minimized further. With Windows 8, however, this is an inevitable learning curve, and effective training is needed in conjunction with user and group management to preclude problems.

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CHAPTER 9

Managing Hardware

What's in a Computer? 131
How Can You Clean the Interior of Your Computer? . . . 136
Hardware Health 137
SMART BIOS Monitoring of Hard Disk Drives 138
Peripherals 140
Surge Protection, UPS, and Power Supply 141

Sometimes, when you ask someone to point at his computer, he'll point at the monitor. This is a simple but clear demonstration of how some people need a visual interface. For these people, unless they have all-in-one devices, the screen is the computer. They often forget that the base unit is actually the brains and brawn of the computer, be it a big black box under a desk or the components under a laptop keyboard.

Whatever the size or shape of your computer's components, there are many of them, and they all need care to ensure that they don't fail and leave you with a dead machine, unable to work or play. In this chapter, I'll talk about the hardware in your computer, what it does, what can go wrong with it, and how you can help prevent problems from occurring.

CAUTION

You should always ensure that you are grounded before working inside a computer to avoid an electrostatic discharge that can short out sensitive components. You can do this by wearing an anti-static wristband. If you live in a country that incorporates a ground wire in the electricity circuit, such as the United Kingdom, I recommend leaving the computer plugged into the electric source while you remove the case (be absolutely certain that the power is turned off) and touching your fingers to the power supply inside the case before unplugging the main power lead. If not, ensure that the computer is unplugged when you open the case. This ensures that the computer is properly grounded to prevent static electricity from damaging components.

What's in a Computer?

Your computer is a mass of disparate components, and it's very rare to find any device, be it a laptop or desktop, for which every component is integrated onto a single board. What are these components, and what are the potential problems that can occur with them?

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The Motherboard

The motherboard is where all of the components in your computer eventually connect. The chips and circuits on this board regulate all of the processes and functions of your computer. There are generally no problems associated with motherboards, but some components (listed a little later in this chapter) can cause problems.

Sockets

Sometimes, it can be very difficult to push plugs into the sockets on a motherboard. Take care that the motherboard is properly supported when plugging cables and devices into it to avoid putting too much strain on the substratum and cracking the board.

One clever aspect about the sockets on motherboards is that each component has its own unique plug shape. This prevents users from inadvertently plugging a cable or device into the wrong socket and damaging the system.

BIOS

The Basic Input Output System (BIOS) is software on a chip (firmware) that regulates the computer and gets it started. It initializes all the hardware and allows the software to communicate with that hardware. BIOS checks the components for errors during startup, a process referred to as the Power On Self-Test (POST), and reports any issues either through warning lights or, more commonly, through a series of warning beeps. BIOS software is made by several companies, including AMI, Phoenix, and Award. The name and possibly the logo of the BIOS manufacturer appears when you start your computer.

Warning Beeps There are many different beep codes, and the warning sounds they make will vary depending on your BIOS manufacturer and the manufacturer of your motherboard.

When you start your computer, it will sound one short beep to indicate that the POST has completed and all is well. If you hear combinations of short and long beeps, you should check the manual for your motherboard or the manufacturer's website for the cause.

The BIOS beeps can give you clear information about where a fault or potential fault lies with your hardware.

Resetting the BIOS As previously mentioned, the BIOS is firmware written on a chip on the motherboard. Sometimes it can become corrupt. The BIOS can be reset to its factory default settings easily, and you might need to do this if your computer will not start, cannot detect a specific hardware device, or sometimes after you install new hardware. To reset your BIOS on a desktop computer, follow these steps:

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NOTE

For all-in-one and laptop computers you should refer to the documentation that came with your device on how to reset the BIOS should it become necessary.

1. Ensure that the computer is turned off and disconnected from the main power source. Ground yourself to safely discharge any electrostatic buildup by touching an unpainted area on the computer case with your fingertips. You should also use an anti-static wristband, if possible, to protect against continued electrostatic build-up while you're working inside any sensitive electronic device. Open the side of the computer to expose the motherboard, placing the computer on a level, firm surface.

2. Find the battery on the motherboard. It looks like—and, indeed, is—a large watch battery (see Figure 9-1). Unclip the battery to remove it from the motherboard.

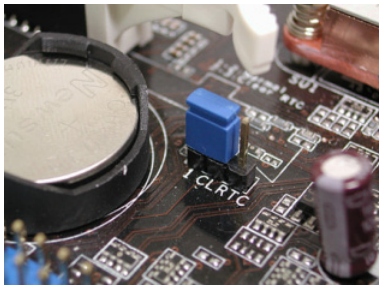

Figure 9-1 A typical BIOS reset jumper and battery

3. There will be a Clear CMOS jumper somewhere on the motherboard, usually close to the battery, as shown in Figure 9-2; check the motherboard manual for the exact location. The Clear CMOS jumper is a three pin socket with a small connector covering two of the pins (refer to Figure 9-1). Remove the connector from the jumper by pulling it straight upward (a small pair of tweezers is useful for doing this) and move it so that it covers the center pin and the previously uncovered pin.

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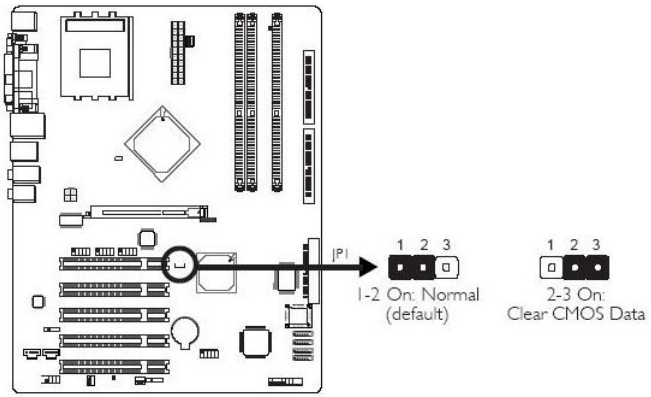

Figure 9-2 A diagram of a motherboard

4. Leave the jumper as described in step 3 for 10 seconds.
5. Move the jumper back to its original position.
6. Replace the motherboard battery.
7. Reassemble the computer case and reconnect it to the main power supply.

The Northbridge and Southbridge Chipset and the PCH

Two of the hottest components on the motherboard—so much so that they often actually have their own heat sink or fan—are the Northbridge and Southbridge chip. These regulate all of the communications between components in the computer; thus, they have a lot of work to do (hence, the heat sinks).

You should occasionally check that the heat sink or fan is free from dust and obstructions such as stray wires or cables and that there is good airflow inside the computer.

Being among the components that generate the most heat, these chip are also the most prone to failure. This is because the chips and all of their circuitry expand and contract as they heat and cool. Over a long period of time, this will cause physical wear and tear on the chip and will eventually be the cause of its demise. Fortunately, these chipsets are designed to operate under extremely hot conditions over a very long period of time and are extensively stress tested by the manufacturers.

In newer computers the Northbridge/Southbridge have been replaced with a Platform Controller Hub (PCH). This gives the processor faster communications than the previous system and provides additional faster data links for graphics and data transfer.

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Processor

The brain of your computer is the processor. The processor is the hottest component in the computer, and like the Northbridge/Southbridge chipset, it has its own heat sink and fan. There are even water-cooled processors, although these are typically reserved for high-specification gaming computers and certain servers.

You should check that the processor fan and heat sink are free from dust and obstructions such as wires and cables. You should also check that the computer has ample airflow inside the case.

Memory

Memory cards are thin cards approximately six inches long that protrude from the motherboard. They can be difficult to fit, so you should always make certain that the computer and motherboard are properly supported when inserting or removing memory cards.

Memory cards are also very prone to damage from static electricity. When you touch them (or any component in your computer, for that matter), ensure that you are grounded by touching an unpainted area on the computer chassis (preferably by using an anti-static wristband) to avoid damaging the components via an electrostatic discharge.

Expansion Cards and Riser Cards

As with other components, it can be difficult to correctly place expansion cards and riser cards (mini expansion cards). As always, ensure that the computer is level and well supported because the motherboard can snap under extreme pressure.

You should also ensure that expansion cards are correctly screwed in or otherwise secured to the inside of the computer case.

Graphics Cards

Graphics cards are another component that might have their own heat sinks and/or fan. Again, ensure that these are free from dust and that there are no wires or cables obstructing the airflow around these cards.

Graphics cards might also require their own power supply. If so, they will have a socket on the top of the card to accommodate this. You should also check that there is a power cable connected to this socket and that the lead is not obstructing any fans.

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Optical Drives and Hard Drives

Optical drives and hard drives are the only components other than fans that contain moving parts; therefore, they can suffer from wear and tear after extensive use and eventually fail.

Power Supply

Although fans are the only moving parts of the power supply, it is one of the most common computer components to fail. You might encounter scenarios in which the power supply fans is functioning normally, which can lead you to believe that the entire unit is working properly, but, in fact, the power supply itself is no longer capable of providing enough electricity to power the computer. Fortunately, the power supply is one of the cheapest and easiest components to replace.

INSIDE OUT **Is your power supply failing?**

If your computer is crashing at odd times or perhaps shutting down unexpectedly, your power supply might be on its way out. It is common for power supplies to be the first component to fail in a computer.

The Computer Case

The case for your computer can contain several fans that can be blocked by dust and carpet fibers. Other moving parts in the case might fail, including the power button, which can stick or break.

How Can You Clean the Interior of Your Computer?

The best way to clean the inside of a computer case is with an unused paintbrush that will dislodge dust. You can then use a vacuum cleaner to remove dust from inside; preferably a battery-powered handheld vacuum if possible.

CAUTION!

You should always be very careful when using a vacuum inside your computer. The computer should be turned off and disconnected from the main power supply. Be sure to place it on a firm and level surface. You should use the paintbrush to dislodge dust as you vacuum, and the suction power on the vacuum should be turned to the lowest level.

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Carefully vacuuming the inside of your computer, including all fans and heat sinks, can extend its life and reduce heat buildup and power consumption. When performing these actions, always be careful to avoid touching components inside the computer case or dislodging cables from their sockets.

INSIDE OUT

Where should you keep your computer?

Keeping your computer on or near a carpet can attract dust and carpet fibers. Your computer can also attract dust if you keep it on a laminate or tiled floor.

A good location for a main computer case is on a raised platform, at least six inches off the floor, or on a desk. These locations will help minimize the buildup of dust and other particles that can be drawn in by the fans and reduce the risk of static electricity buildup.

Hardware Health

Different types of computers can require different care. This section covers the three main types of hardware, although these types also vary by manufacturer.

INSIDE OUT

Turn off your computer when cleaning your room

If you are dusting or vacuuming the room where your computer is set up, it is a good idea to turn off the computer because the case fans can draw in any dust that is thrown up by the vacuum.

Desktops

With computers for which the monitor is separate from the base unit, you can usually open the side of the base unit box via an access panel (although for very small form factor computers this might not be possible). The components are usually accessible for a good blast of air to remove dust and other debris that can find its way inside, and you can carefully open the computer without causing any damage.

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Laptops

Not surprising, laptop and notebook computers comprise many components that are quite different from those in desktop computers, and they are often fixed permanently to the motherboard. There is usually an access port or two on the underside of the laptop that you can open to upgrade and change components such as the memory and hard disk; otherwise, you should not attempt to open a laptop case for cleaning or maintenance. If you need to clean dust from the computer, you can carefully place a vacuum against the heat vents on the sides of the laptop and use low to medium suction.

Ultrabooks and Tablets

If you have an ultrabook or a Windows tablet, you can probably forget about doing any work on the inside. These laptops are so small and light that each component within them is usually custom-designed and very tightly packed inside the case. I do not recommend that you open an ultrabook or a tablet unless there is documentation, such as a technician's guide provided by the manufacturer, which clearly indicates that it's possible to work inside it.

All-in-Ones

All-in-one devices, a desktop computer in which the processor and other components are integrated with the monitor into the same housing unit, share many similarities with laptops; accordingly, you should not attempt to open them for cleaning or maintenance. You can clean dust from the vents by carefully placing a vacuum against them, using low to medium suction.

SMART BIOS Monitoring of Hard Disk Drives

Most motherboard BIOS software (see Figure 9-3) supports a feature called Self-Monitoring, Analysis, and Reporting Technology, or SMART, which monitors the hard disk drives. SMART monitoring reports hard disk reliability indicators to the BIOS with the aim of anticipating any drive failure before it occurs. The benefit of SMART monitoring is that it allows a user to move any data and files off the drive before it fails.

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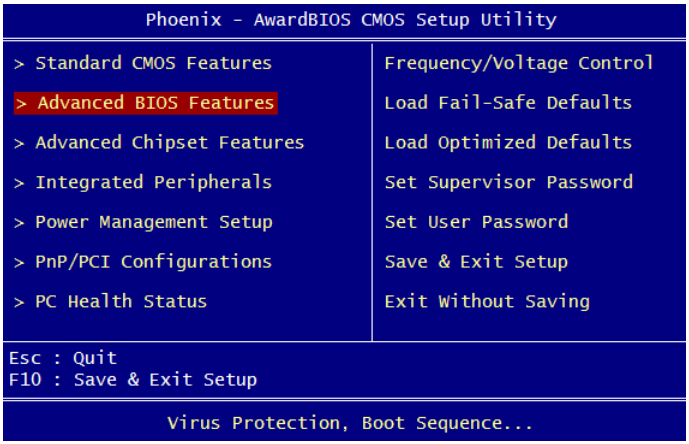

Figure 9-3 An example BIOS screen

The SMART monitoring feature can be turned off for your hard drives in your computer's BIOS console. You can normally access this by pressing F2 or Delete on your keyboard as you turn on the computer. The exact location of the SMART monitoring utility varies depending on your BIOS. You should consult your motherboard manual to determine if this feature is supported and where you can find it.

INSIDE OUT

Hard disk monitoring with UEFI motherboards

All new Windows 8 computers must come with a Unified Extensible Firmware Interface (UEFI)–equipped motherboard. This is mandated by Microsoft, though it will still be possible to buy systems from small independent retailers and build your own system with a traditional BIOS for a few years yet.

UEFI systems will vary considerably and you may not see a specific SMART Monitoring option. UEFI is very good at communicating with your operating system and reporting on hardware, however, and it will probably be configured to send a message direct to your copy of Windows 8.

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Peripherals

Without peripherals, keyboards, mice, and so on, your computer would simply sit in a corner, whirring all day. These important devices also need care and attention to prevent them from causing trouble.

Keyboards and Mice

A commonly reported Windows problem is "my keyboard and/or mouse won't work." Is this problem due to a fault with the hardware driver for the device, or with the hardware itself, or is it just because the hardware is dirty?

It's good practice to keep your keyboard clean by using a small brush to sweep between the keys. You can keep your mouse clean by occasionally wiping it with a dry cloth.

CAUTION!

While I was providing second-line IT support a few years ago, a client from a major British bank was talking on the phone with a colleague of mine about his keyboard. He had decided it was dirty and needed to be cleaned.

The night before, he filled his sink with hot, soapy water and gave the keyboard a good scrub. Realizing it was an electrical device, he hung it up to dry overnight, but was concerned when his computer didn't work the following morning.

My colleague had to break the bad news that the reason his keyboard didn't work was because it was built in to the rest of his laptop!

Monitors

Probably the least problematic hardware component associated with your computer is the monitor. If a problem does occur, such as there is no display, the source of the issue is often caused by something easy to fix, such as one of the following:

- The power cable has fallen out of the monitor.
- The video cable is not properly attached to the monitor.
- The monitor has accidentally been switched to a different video input.

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INSIDE OUT

Windows 8 and touch screen drivers

Windows 8 includes its own touch screen drivers so that you can use touch to install the operating system on a tablet. It is possible though that the driver is not compatible with your system or doesn't load correctly. It is always wise to keep a spare USB keyboard and mouse around for a tablet installation of Windows 8.

Other Devices

You might need to troubleshoot other device problems when a specific device refuses to function or because Windows can't see that device. A useful method for troubleshooting such devices is to test the device by plugging it into another port on your computer, into a USB, for example. If that doesn't work, try the device with a different connecting cable.

INSIDE OUT

The Wi-Fi USB dongle doesn't work

After moving a computer, some people find that their Wi-Fi USB dongle won't connect them to the Internet. Because of the way Windows loads drivers for hardware, you might find that it's just because the dongle is plugged into a different USB port than it was before. Usually, changing to a different USB port on the computer solves the problem.

Surge Protectors, UPS, and Power Supply

Your computer should always be plugged into a spike or surge protector. This will prevent any sudden spikes in the power supply from passing through your computer and damaging sensitive components. Some surge protectors also protect computer components such as network and telephone cabling. Most uninterruptable power supplies (UPS) have this feature built in. These devices can maintain temporary supply of electricity in the event of a power outage or brownout.

I also recommend that you do not plug your computer into the same outlet as any large appliance. Some appliances such as refrigerators can cause spikes in the power supply, which can disrupt other electrical devices. For instance, in an older house, you might notice that the lights flicker when the cooling element in a refrigerator or freezer comes on.

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> **Note**
>
> **If you live in a rural area or even a town or city where the electricity supply is unreliable, investing in a UPS can be a cost-effective way to save data and extend the life of your hardware.**

Summary

A computer is a complex set of technically sophisticated elements, some of which include components that are incredibly tiny and are measured in nanometers. Consequently, these components are highly susceptible to electrical fluctuations and heat.

With the latest ultrabook and tablet computers, which will only become more ubiquitous as the years go on, you can forget about opening them up to maintain them as we did in the past. In most cases though, holding a vacuum cleaner to the heat vents (on minimum to medium suction setting) on the outside of the case is enough to prevent dust from building up inside.

It's important to keep your computer clean and protected from electrical and heat damage. Performing a few simple actions now and again can greatly increase its lifespan.

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CHAPTER 10

Working in a Virtual Environment

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The uptake and usage of virtualization varies depending on the industry and application, but there can be no doubt that even as portable computers and smartphones become more powerful—now equipped with quad-core processors as standard—virtualizing operating systems and software is something of which we'll see much more.

In Windows 7 Professional, Enterprise, and Ultimate, there was a free bolt-on that you could download called *XP Mode*, which contained a virtualized image of a fully licensed edition of Windows XP Pro on which you could install your older software to maintain compatibility. Windows 8 does not support XP Mode, primarily because of *all* support for XP is scheduled to end in April 2014.

Instead, the 64-bit versions of Windows 8 Pro and Enterprise, Microsoft includes Microsoft's powerful Hyper-V virtualization software. This is a full-featured virtualization package that is capable of running any operating system; it is very powerful and flexible.

INSIDE OUT

XP icons on the Windows 8 desktop?

Hyper-V in Windows 8 does not support pinning of your XP or other virtualized software icons to the Windows 8 desktop taskbar, this was a happy side-effect of the way Microsoft's older Virtual PC technology worked, but it isn't supported in Hyper-V.

To access virtualized programs on the Windows 8 desktop, à *la* XP Mode, you will need a copy of Microsoft Enterprise Desktop Virtualization (MED-V), which is part of the Microsoft Desktop Optimization Pack (MDOP) suite. This is available to enterprise users through volume licensing and to other businesses through Windows Intune.

So what is virtualization? Virtualization is an operating system (OS) that runs on software-simulated hardware. This creates what is known as a *virtual machine* (VM). A virtualized OS typically shares the same hardware with another OS or even several of them. To do this, the host operating system shares the computer's resources between the different VMs. This

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includes isolating areas of memory for each VM or, in the case of a multi-core processor, sometimes even assigning a specific processor core to each VM. Each VM then has its own hardware resources and can operate at near the full speed of the computer.

Where does each VM reside? Each VM exists within a file on your hard disk—a bit like a compressed zip folder. The operating system sees this file as a hard disk and operates perfectly from within it.

Using VMs at home or at work affords you many advantages. For example, if your copy of Windows 8 fails, the downtime can be long and frustrating getting everything back up and functioning again. Even if you have a backup image of that copy of Windows, you'll be completely offline for a while until you restore it. If you are running Windows on a VM, however, you simply log on to the master operating system and replace the VM file with a clean backup copy. Essentially, all you do is copy or rename a single file, and you're still able to get things done on your computer while the VM is being restored.

INSIDE OUT **OS licensing and VMs**

You will need a separate and valid license for each operating system that you install into a VM. This means you will need a separate and valid product key for each copy of Windows you install into Hyper-V.

Another advantage of using VMs is that you only need a single computer or server to run different operating systems and tasks simultaneously. This can reduce an entire bank of servers to just a single computer. The effect this has on your electricity consumption and your carbon footprint can be enormous, not to mention the impact it has on your IT costs.

All of this is made possible because modern processors and computers are almost never used to their full potential by everyday computing and server tasks. Why have five computers using only 20 percent of their computing power (but consuming 80 percent of their maximum electricity consumption) when you can have one running full out?

Virtualization vs. Dual Booting

To dual-boot a computer, you need separate operating systems installed on different hard disks or partitions. This is how Boot Camp manages Windows and OS X on an Apple Mac. The disadvantages of dual booting are twofold: first, if the boot sector or boot menu of the computer changes, you might lose access to one of the operating systems, because Startup

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Repair might not rebuild entries correctly for non-Windows operating systems, and those operating systems might not be able to write to the Windows boot loader. The second disadvantage to dual-booting is that if you want to switch from one operating system to another, you have to close all of your programs, shut down the machine, and then restart it.

Virtualization allows you to run different operating systems side by side on your Windows desktop or full screen and makes it easy to switch between them. Furthermore, you still have only one operating system in your Windows boot loader (unless you choose to boot from a virtual hard disk; more on this later in the chapter).

Also, VMs are very easy to back up. They are just files (think of a really large zip file) that can be copied from one place to another when the VM isn't running. This makes them considerably simpler to back up and restore than operating systems installed on a separate hard disk or partition.

Although you can dual-boot between Windows and other operating systems such as Linux, there are limitations on the order in which you can install these operating systems. This is because Microsoft changed the boot loader with Windows Vista to make it much more secure. Many other operating systems use a different, older style of boot loader. This means Windows 8 should always be the last operating system you install because, although it can incorporate the other operating boot loaders into itself, not all operating systems can incorporate the Windows 8 boot loader into themselves. Windows 8 wouldn't be able to start if a non–Windows 8 boot loader has overwritten the Windows 7 boot loader.

Virtualization circumvents this problem by running all of the operating systems from within Windows 8. You can install any other version of Windows or Linux by using Windows Virtual PC. Apple Mac OS X isn't supported, but you can get third-party virtualization packages such as VirtualBox and VMWare, which might support a wider range of operating systems.

Are There Any Benefits to Virtualization?

Virtualization offers significant benefits, one of which is booting into a virtual copy of Windows 8 to keep your main copy clean, protected, and running smoothly. I will detail this later in this section.

Two other benefits of virtualization are software and hardware compatibility. For instance, perhaps you like to use an older printer or scanner that isn't supported with Windows 7 drivers. If there's nothing wrong with the hardware, you could use virtualization to install an earlier operating system with drivers that support the hardware, and install the hardware into that virtualized operating system, instead.

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Similarly, you might require the use of software that won't run in Windows 8, maybe an older application that won't run even in Windows XP Mode. You can use virtualization to create safe test computers into which you can install and test new software, software updates, security updates, and hardware. This is becoming common practice for environments in which system administrators want to know what impact an update or new software package will have on the organization's computers.

Virtual Hard Disks and Windows 8

I want to start, though, by showing you how to work with virtual hard disks (VHDs) in Windows 8. With Windows 8, support for VHD is built in to the operating system for the first time. A VHD is different than a VM but can be used like a VM. Let me explain.

In its basic form, a VHD is simply a file you can "attach" to a copy of Windows 8 so that it appears in File Explorer as another hard disk. You can store any type of file or data on a VHD just as you can a regular hard disk.

Creating a VHD in Windows 8

To create a VHD in Windows 8, perform the following steps:

1. Open the Administration menu (press Windows logo key+X), click Computer Management, and then click Disk Management.

2. In the Disk Management console, open the Action menu, and then select Create VHD.

   You must select where on your hard disk(s) the VHD file is to reside, what it will be called, and how big it will be. You can choose whether the file is dynamically expanding or of a fixed size. The first option doesn't create the full size file but expands it as files are added to it until it reaches its maximum size. This can be useful if hard disk space is in short supply. The recommended option is to create the full-size file to begin with, as shown in Figure 10-1.

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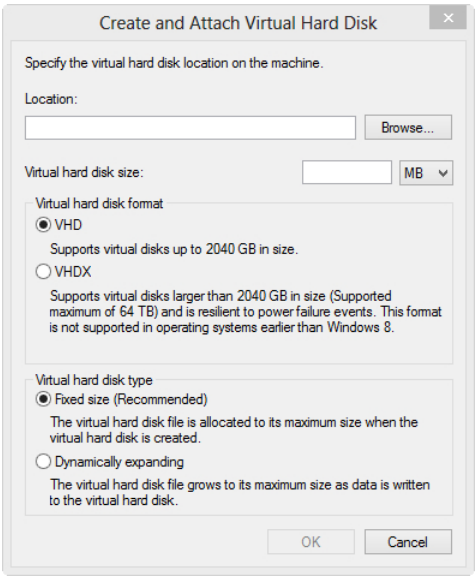

Figure 10-1 Creating a VHD

The new VHD appears in the list of available disks in the Disk Management console. You need to initialize this disk.

3. Right-click the disk's information panel (to the left of the black, disk size block) and then select Initialize Disk.

4. Select a partition style for the disk (I recommend MBR) and click OK.

   You need to place a partition on the VHD so that you can write files to it.

5. Right-click the VHD in the Disk Management console. In the options panel that opens, select New Simple Volume.

   You are asked to select a size for the volume. For a VHD, you should use the default (maximum) size available.

6. You can either assign a drive letter for the VHD or have it mounted automatically as a subfolder onto another drive. You can also choose not to associate a drive letter with a disk or partition, although this will prevent it from appearing in File Explorer views.

7. Assign the VHD a name (Volume Label) and format it by using either a quick or standard format. I recommend the NTFS file structure.

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> **Note**
>
> **New Technology File System (NTFS) is a disk file system that Microsoft first introduced with Windows NT and has since refined. It is more stable and reliable than other formats, including File Allocation Table (FAT), and it supports larger drives than FAT or FAT32, as well. NTFS also supports—and, in fact, is required for—the folder and disk encryption technologies in Windows 8.**

Reattaching the VHD

You will probably need to reattach the VHD you created in the previous section the next time you start Windows. This is normal behavior for Windows 8. If you want to automatically reattach a VHD whenever Windows 8 starts, you can set this up as a task in the Task Scheduler. See Chapter 20, "Using Advanced Repair Methods," for details about how to configure this feature.

To attach a VHD, perform the following steps:

1. Press Windows logo key+X and click Computer Management to access the Computer Management console.
2. In the left pane of the Computer Management console, select Disk Management.
3. On the Action menu, select Attach VHD.
4. Select the VHD file from the location where it is stored on your computer. It appears as a drive in File Explorer.

Booting from a Virtual Copy of Windows 8

With the Enterprise and Ultimate editions of Windows 8, it's possible to install another copy of Windows 7 or Windows 8 inside a VHD and boot from it. You can find an official guide to creating a bootable VHD by going to *www.microsoft.com* and searching for Demonstration: Windows 8 VHD Boot, but this method is very complex. There is actually a much simpler way to do it.

Creating a bootable VHD is an excellent way to keep your main copy of Windows 8 clean and problem free. Quite simply, in this scenario, you'll never use it except for making backups of the VHD and restoring it if you need to. You can also take advantage of this to have a multi-boot environment on your computer that's easier to manage than a traditional dual-boot system.

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INSIDE OUT Licensing and booting Windows from a VHD

If you want to install a copy of Windows 7 or Windows 8 on a VHD, you will need an additional valid product key for that extra copy of Windows.

Also, you can use only the Pro and Enterprise editions of Windows 8 to boot from a VHD. You cannot use this feature to install another, earlier version of Windows (such as Windows XP or Windows Vista) or another edition of Windows 8 (such as Starter, Home Premium, and so on) on the VHD.

INSIDE OUT Breaking the 32-bit barrier with bootable VHDs

Windows Virtual PC and Windows XP Mode supported only the 32-bit (x86) editions of Windows and other operating systems. When you create a bootable VHD, you can install a 64-bit (x64) version of Windows 7 or Windows 8. This is something you would want to consider if your computer has more than 4 GB of RAM so that Windows will be able to see all of your installed memory.

To install Windows on a VHD, perform the following steps:

1. Boot your computer from your Windows 8 installation DVD. If your computer didn't come with a Windows 8 installation DVD, you will need to obtain one.

> **Note**
> **You cannot install Windows this way from within a currently loaded copy of Windows 8. You must start your PC from the installation disc.**

2. Select your installation language.
3. At the install screen, press Shift+F10 to open the DOS command window.
4. Type **diskpart** and press Enter.

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Using an Existing VHD

To use an existing VHD, perform the following steps:

1. Type **Select vdisk file=C:\path1\path2\disk.vhd**, substituting the drive letter and paths where the VHD is stored on your computer, as necessary.
2. Type **attach vdisk**.

Creating a New VHD

To create a new VHD, perform the following steps:

1. Type **Create vdisk file=*C:\path1\path2*\disk.vhd maximum=20000 type=fixed** and press Enter, where *C:* and the paths indicate where you want the VHD stored on your hard disk.

   The 20480 in the example here would create a VHD of 20 GB, so for a 15-GB VHD, type 15360.
2. Type **select vdisk file=*C:\path1\path2*\disk.vhd** and press Enter.
3. Type **attach vdisk** and press Enter.

INSIDE OUT

Fixed vs. expandable VHD files

When you create a VHD file, you can make it a fixed size or expandable. The latter option creates a small file that the copy of Windows 8 on the VHD can expand as needed up to its maximum size.

The downside is that if you run short of available disk space on the drive where the VHD file is located, the copy of Windows 8 in the VHD might report errors when it cannot access disk space that it sees as being available to it.

4. Type **exit** and press Enter.
5. Type **exit** again and press Enter.
6. Click Install and then select Custom: Install Windows 8 Only (Advanced).

   In the panel where you indicate on which hard disk to install Windows 8, the hard disks in your computer are normally referred to as Disk 0 or Disk 1. The VHD will have a different disk number and will stand out. You will probably find it at the bottom of the list of available drives.

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7. Click the VHD and select Drive Options (Advanced).

8. Create a new partition in the space available for the partition by clicking New and selecting its size.

9. Format this new drive.

10. Ensure that the VHD drive is highlighted and then click Next to install Windows on it.

Windows will install and automatically configure the boot loader; however, you will now have two copies of Windows to choose from when you start your computer. Follow these steps to change the names of the programs after either copy of Windows starts.

1. Press Windows logo key+X to bring up the Administration menu and then click Command Prompt (Admin).

2. In the Command Prompt window that appears, type **bcdedit /v** and then click Enter.

3. Locate the VHD copy of Windows in the list. It will be associated with a Globally Unique Identifier (GUID), which is a long string of numbers and letters, as demonstrated in Figure 10-2.

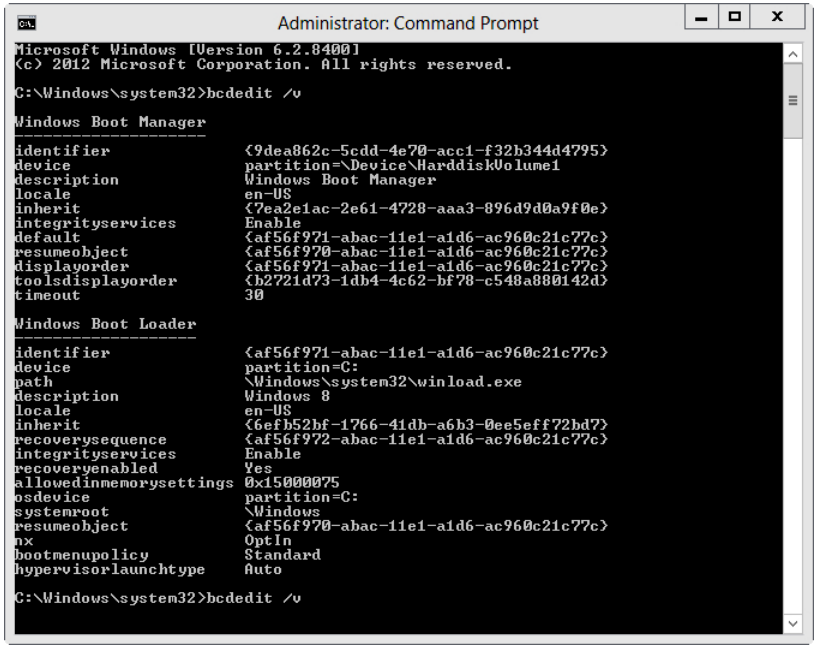

Figure 10-2 Locating the GUID of an installed OS

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4. Type **bcdedit /set {GUID} description "OS Name"** and press Enter.

INSIDE OUT

Cutting and pasting in a Command Prompt window

You can select text in a Command Prompt window by right-clicking anywhere in the window and selecting Mark. Move the insertion point to the beginning of the text you want to select and then press and hold the Shift key while you select the text. Then, press Ctrl+C to copy the text.

To paste this text, right-click in the window and select Paste. This can be very helpful when writing long GUIDs.

5. Optionally, you might want your VHD copy of Windows to be the operating system that loads by default when you start your computer. To do this with any of the entries listed, type **bcdedit /default {GUID}** and press Enter.

INSIDE OUT

Why boot your computer from a VHD?

The primary reason to boot your computer from a VHD is to protect your main copy of Windows 8. When you boot from a VHD, you can use the full features of your computer and still be able to restore it if something goes wrong simply by booting into your original copy of Windows 8 and restoring the VHD file from a backup. Restoring your operating system takes no longer than the time required to reboot Windows 8 a couple of times and rename a file.

Your VHD copy of Windows 8 will be able to see all of your hard disks and all of your hardware. There will be no way of knowing that you are actually running a VM. This can be very useful for organizations in which getting up and running quickly after a crash and preventing people from damaging a copy of Windows 8 is paramount.

Using Hyper-V in Windows 8

To access Hyper-V, open the Start screen and search for **hyper**. There are two options. You use the first option, Hyper-V Virtual Machine Connection, to connect your computer to a VM hosted on a Windows server or running quietly in the background on your computer. You will want to open the second option, the Hyper-V Manager.

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INSIDE OUT Is Hyper-V activated on your computer?

Hyper-V might not be visible when you search for it on your computer. If this is the case, search for Programs and Features and run it from the Settings search results. In the left panel, click Turn Windows Features On Or Off; you will see Hyper-V listed in the dialog that appears. Select the check box to activate it.

Remember that Hyper-V is only supported in the 64-bit versions of Windows 8 Pro and Enterprise.

The Hyper-V Manager looks much the same as most other administration and management windows in Windows 8. The main controls are in Actions pane on the right. To create a new VM, perform the following steps:

1. In the Actions pane (see Figure 10-3), click New and then click Virtual Machine.

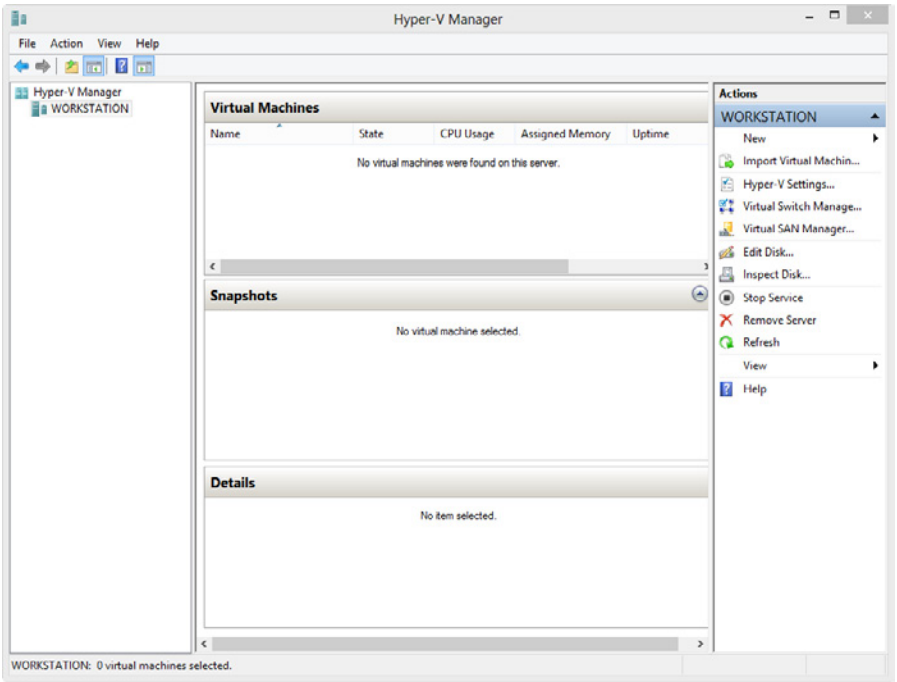

Figure 10-3 The Hyper-V Manager

The New Virtual Machine Wizard opens.

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2. Click through the first page of the wizard. On the second page (Specify Name And Location), assign the name of the VM and the hard disk location where you wish the VHD file to be stored, as illustrated in Figure 10-4.

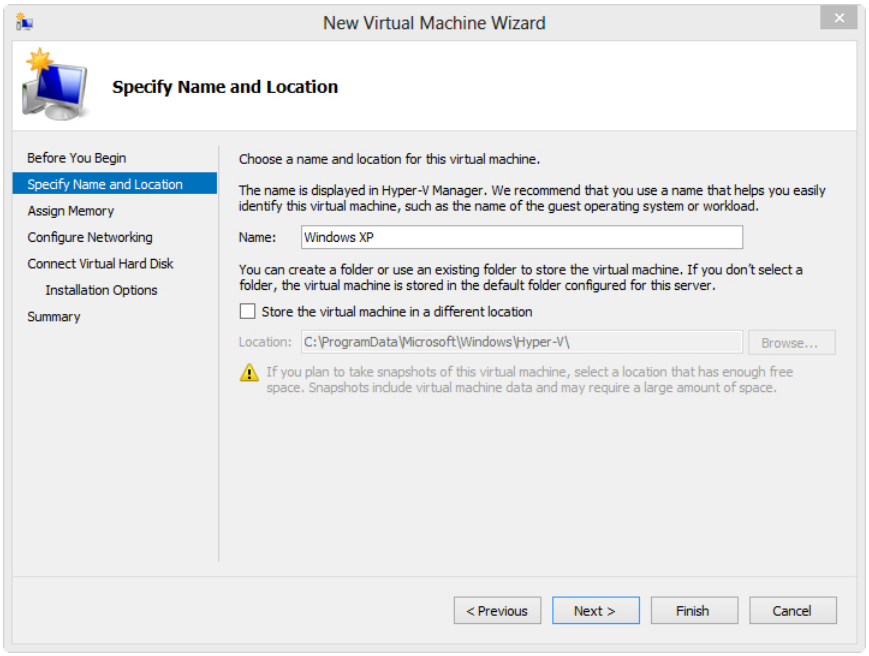

Figure 10-4 Specifying the name and storage location for a VHD

3. On the next page (the Assign Memory page), specify how much memory to allocate to the VM, as shown Figure 10-5.

   If you think you might need more memory for the VM in the future but can't allocate it all at this stage (it can't be changed later), select the Use Dynamic Memory For This Virtual Machine check box. With this selected, Hyper-V can automatically increase the memory allocation to the VHD when required.

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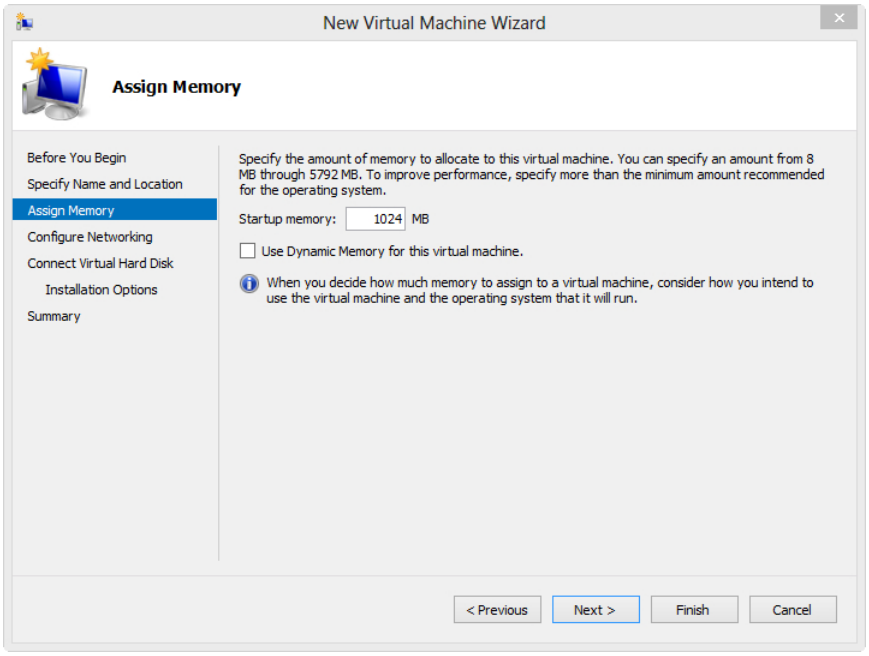

Figure 10-5 Allocating memory to a VHD

4. On the Configure Networking page, specify what network connector to attach to the VM, as depicted in Figure 10-6.

   You might find that there are no available options here; I will show you how to add networking later in this chapter if this is the case.

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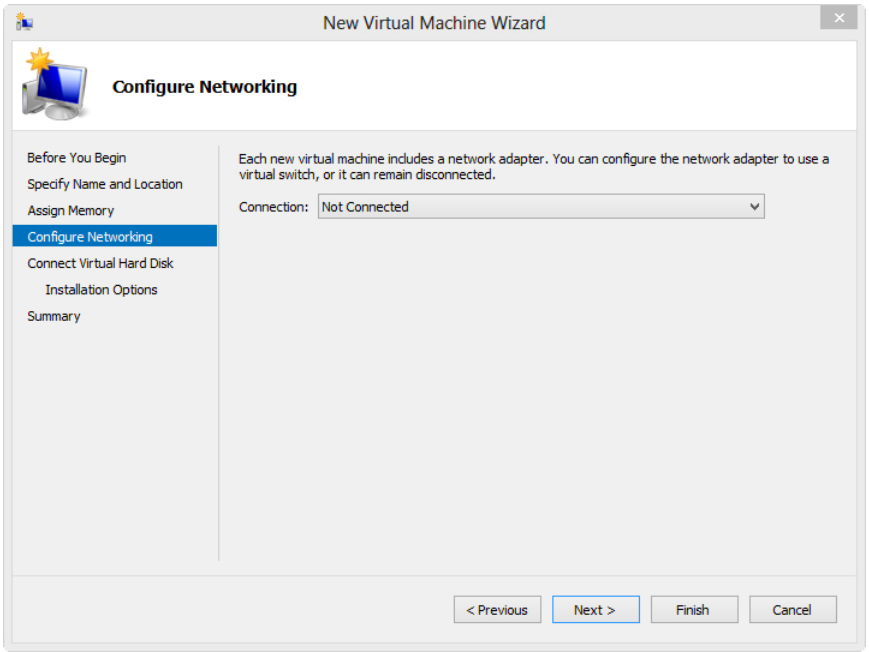

Figure 10-6 Assigning a network adapter to a VHD

5. On the Connect Virtual Hard Disk page (see Figure 10-7), the wizard asks you to specify the size of the VM. You can also attach an existing VM at this point.

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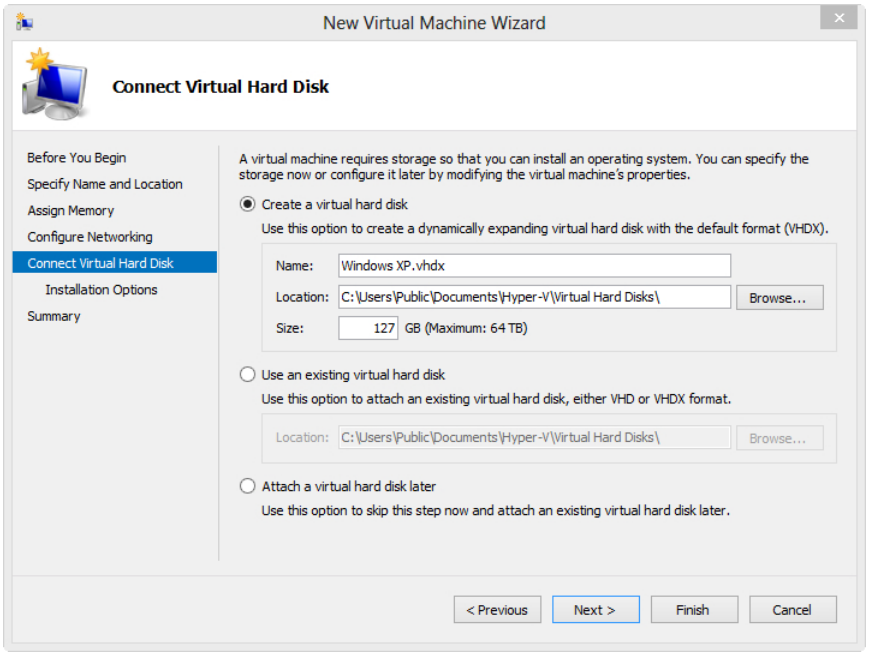

Figure 10-7 Specifying the size of the VHD

6. Lastly, on the Installation Options page, you are asked if you want to install an operating system into the VM now, later, or not at all, as illustrated in Figure 10-8.

You can install an OS from a CD, DVD, ISO file, USB Flash Drive, or even a Floppy Disk. (Do you still have any?)

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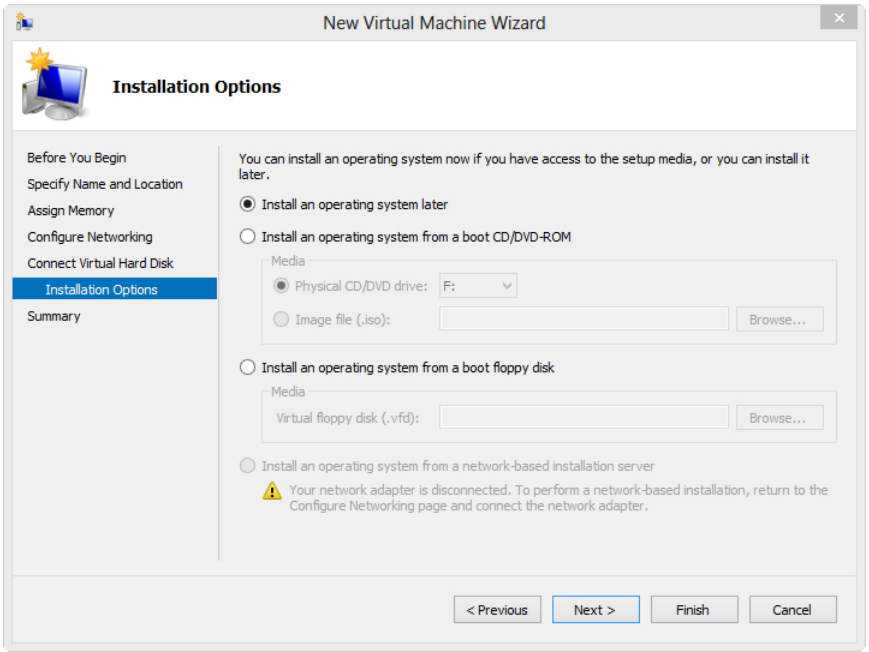

Figure 10-8 Choose whether you want to install an OS into the VM

7. Hyper-V displays your chosen settings for you to review. Confirm the setup and close the wizard by clicking Next, or click Previous if you need to make any changes, as shown in Figure 10-9.

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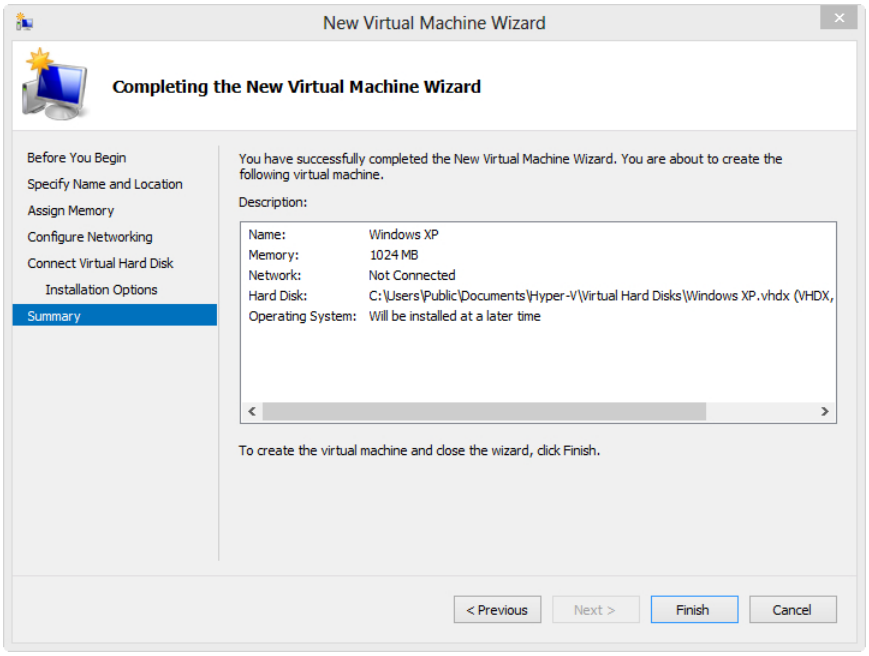

Figure 10-9 Confirming your VM settings

You now need to start the VM so that you can install an operating system in it.

8. In the main Hyper-V Management console, in the Virtual Machines pane (top center), click your VM, and then in the bottom half of the Actions pane, click Connect, as illustrated in Figure 10-10.

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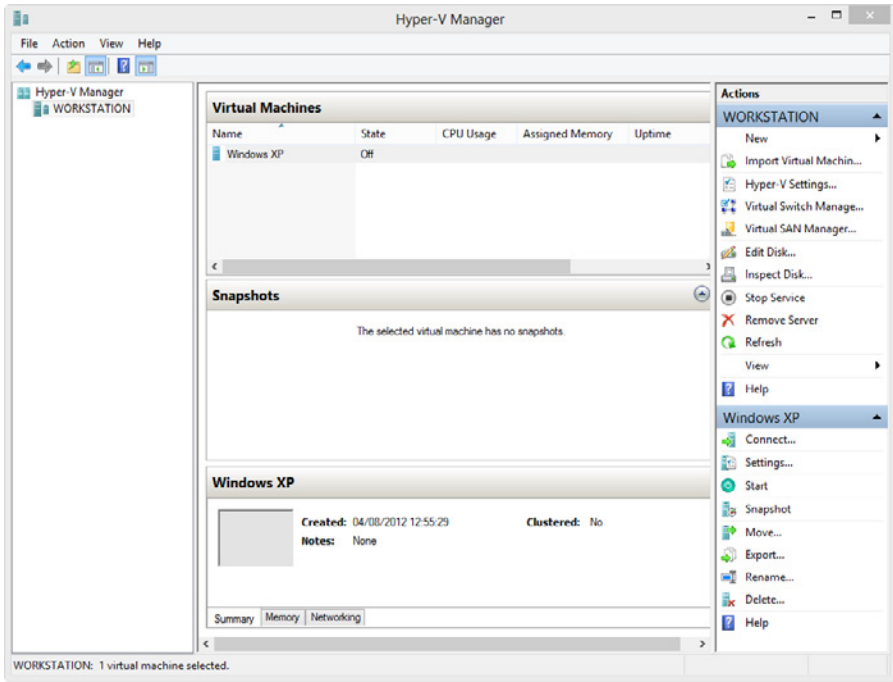

Figure 10-10 You now need to connect to the VM

9. A VM window appears but you still need to start the VM. To do this, on the Action menu of the new window, click Start, as demonstrated in Figure 10-11.

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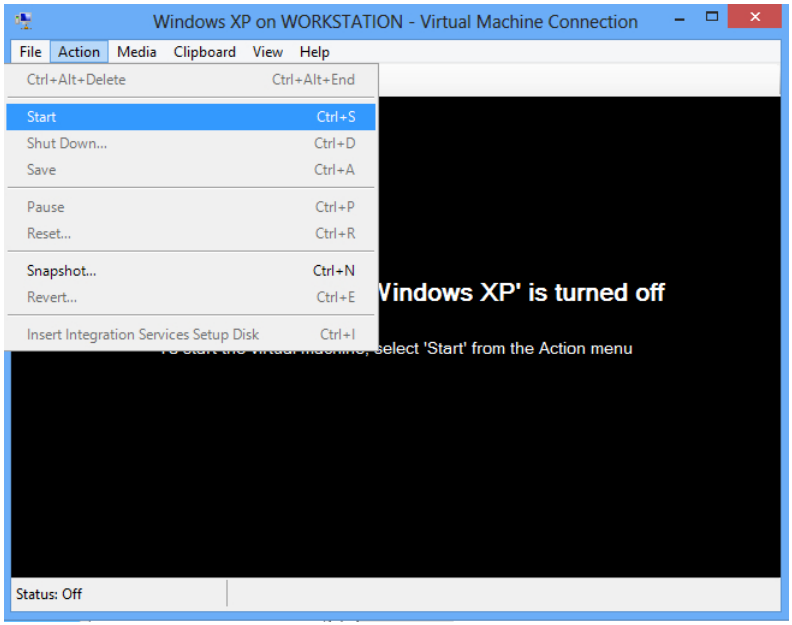

Figure 10-11 Starting a VM in Hyper-V

Your virtual machine is now created and working in Hyper-V.

Creating Virtual Switches in Hyper-V

I mentioned earlier that there might be no available network connections when you set up your VM. This is because you need to create a Virtual Switch in the main Hyper-V Management console. To do so, perform the following procedure:

1. In the Actions pane, in the upper panel, click Virtual Switch Manager, as shown in Figure 10-12.

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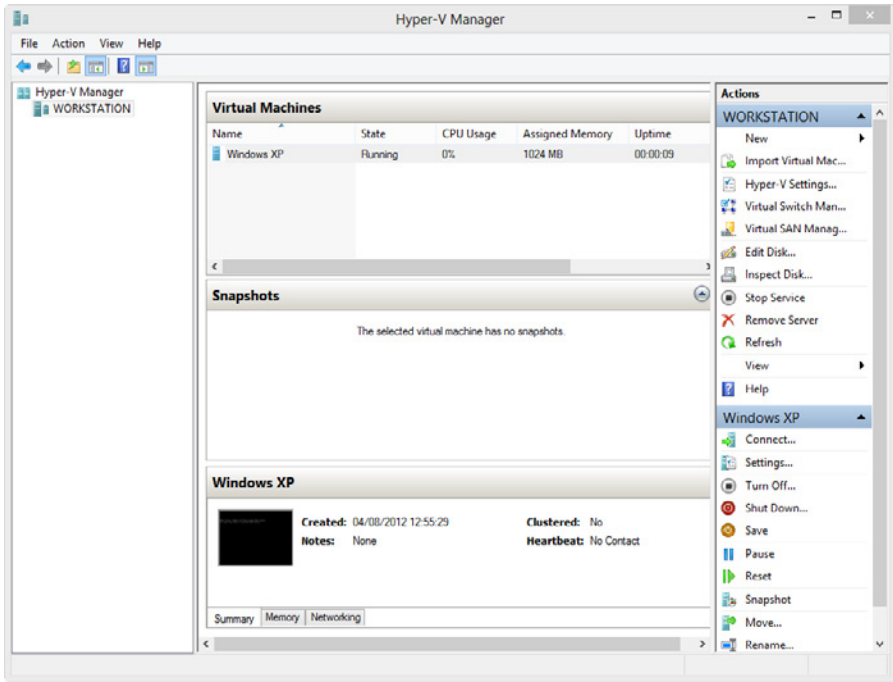

Figure 10-12 Managing VMs in Hyper-V

2. In the window that appears, give the virtual switch a name and then select what type of network connection you want it to have (see Figure 10-13). Only external network types can access storage on the host computer, shared storage on the network, and the Internet. Internal and private networks are only for connecting to other VMs.

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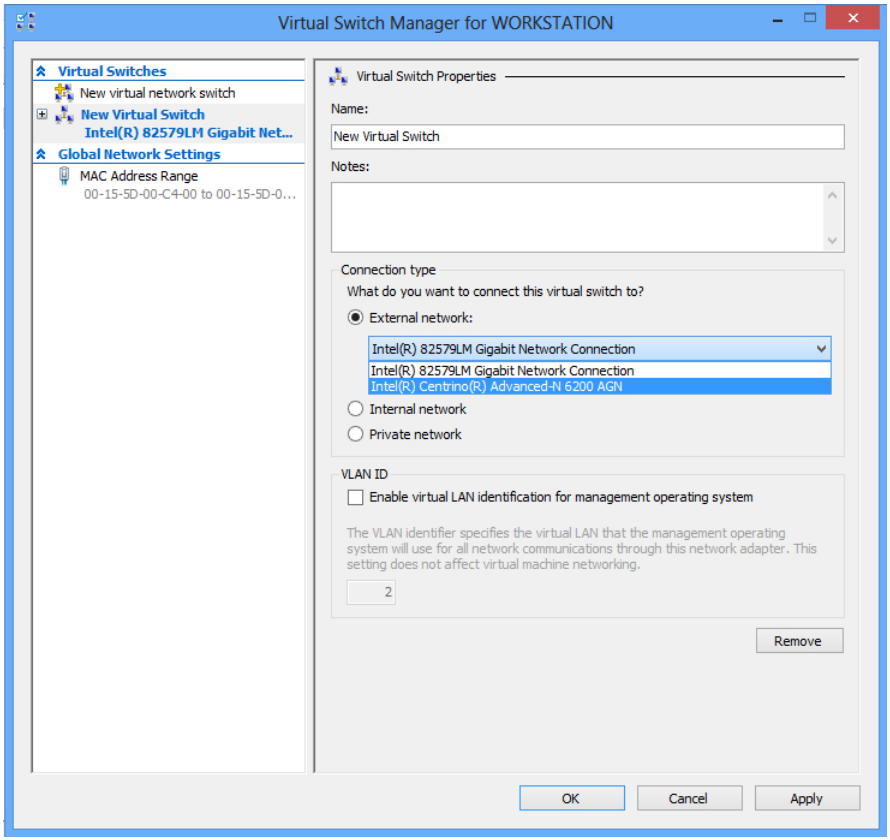

Figure 10-13 Setting up a virtual switch in Hyper-V

3. If you select External Network, you need to specify which network card in your computer the VM can use.

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INSIDE OUT

Isolating Windows XP from the Internet and why you should do it

As I mentioned at the beginning of this chapter, all support for Windows XP ends in April 2014. After this date there will be no more security, stability or other patches and updates.

This makes Windows XP a security nightmare if it is allowed Internet access, because we can be certain that malware writers will target the OS (which is still widely used in the Far East) the moment all support ends. This threat isn't diminished even if the computer is sitting behind a hardware-based firewall in addition to the standard Windows XP firewall, because the security threat to XP from malware is so high, and most malware is delivered by tricking the user into installing it.

You can isolate an installed copy of Windows XP from the Internet, protecting it from malware that doesn't come directly from your own files, if your computer has both wired (Ethernet) and wireless (Wi-Fi) connections but *only* if you use the Wi-Fi connection to get online and if the Ethernet port *does not* have a physical network cable plugged into it.

Choosing the wired connection will allow the VM access to files stored locally on your computer but doesn't grant it access to your home or work network, nor does it grant it access to the Internet.

You now need to connect the Virtual Switch to your VM. Again, you do this in the Hyper-V Manager console by performing the following steps:

4. Select your VM in the Virtual Machines pane (top center) and then in the Actions pane, in the lower panel, click Settings (see Figure 10-14).

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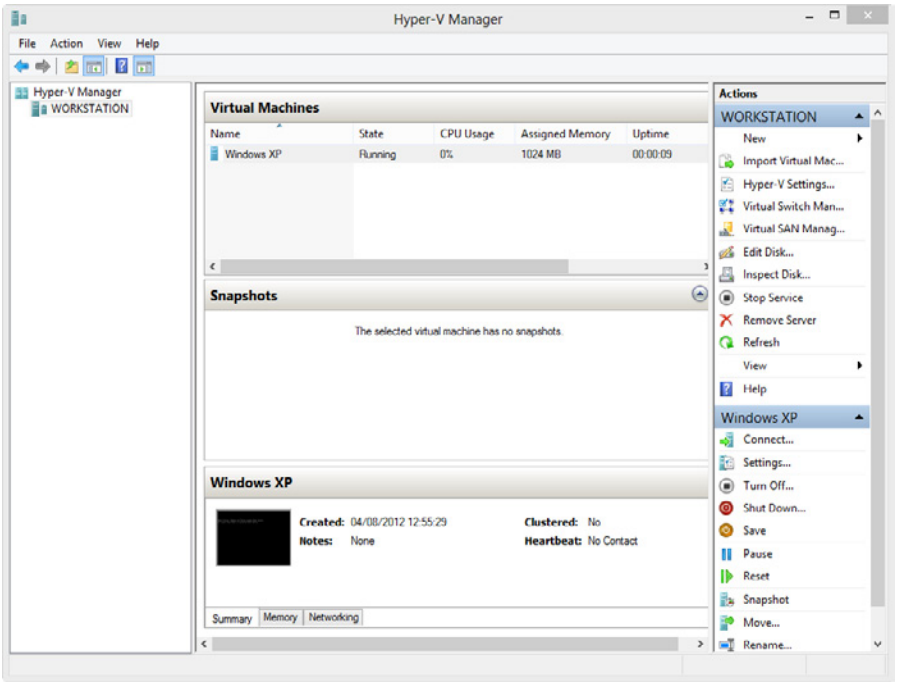

Figure 10-14 You can change setting for a VM in the Hyper-V Manager

5. In the window that appears, in the left pane, see if you already have a Network Adapter listed (see Figure 10-15). If you do, click it and change the Virtual Switch option to the switch you have created.

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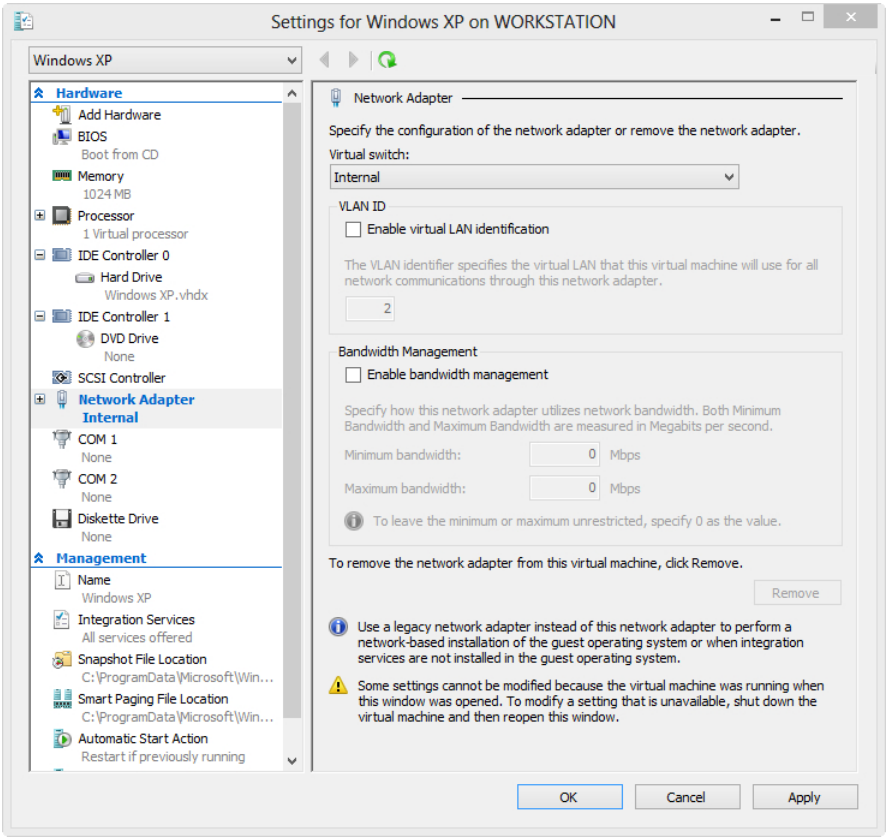

Figure 10-15 Changing the settings for a VM

6. If you do not have a Network Adapter listed, click the Add Hardware link to add one and then add your virtual switch to it, as described in step 2.

INSIDE OUT Integrating other services into a VM

Some operating systems still won't give you Internet or network access at this point. This means that you will need to install the Integration Services into the VM. To do this, with the VM running, on the Action menu, click Insert Integration Service Setup Disk.

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Summary

Hyper-V is not without its issues; for example, not being able to pin VM-installed programs to the Windows 8 desktop taskbar as you could with XP Mode in Windows 7, and having to run your VM-installed software in the virtualized desktop environment rather than on the Windows 8 desktop will be annoying to many.

The inclusion of full virtualization features though will be blessing to others, and in Windows 8, they are many and powerful.

If you really still need to use Windows XP, though, please ensure that it is fully isolated from the Internet to protect yourself and your files from malware.

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PART 2

Applying Easy Technical Fixes

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CHAPTER 11

Dealing with Windows 8 Annoyances

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Common Windows 8 Annoyances. 172
Hardware-Specific Annoyances 197

For as much as we all love Windows, it can be an annoying and frustrating operating system (OS) to use. It is the first version of the OS, however, that can be considered "consumer electronics" in so far as the ARM version of it goes. With Windows 8 on ARM, there's no way of installing it. It just comes pre-installed; you can't access or make changes to the main file system, and it's something that is as simple and easy to set up out of the box as a television set.

On the desktop, however, which is where most of the usage will remain for the coming years, it's still the same old Windows that comes on an installation DVD and has a main file system that can be accessed, written to, and easily corrupted.

Windows has to be all things to all people. It has to be self-managing for end users and flexible for system administrators. It has to support legacy software and hardware, and more combinations of hardware and software than it would ever be possible to count.

All of this needs to be reliable, flexible, and robust.

Despite these challenges, Microsoft does a remarkable job at ensuring that Windows 8 is stable and secure on nearly every platform. There are still annoyances, niggles, and problems, however, as being all things to all people means that you also cannot be everything to one individual, all of the time.

Everything Is Connected to Everything Else

As I just described, Windows has to be all things to all people. To demonstrate this, let's look at an example computer, one used for gaming. Depending on budget and power required, there are hundreds of graphics cards available at any one time. To make matters worse, all of the graphics cards that were released for the past few years need to be supported, too. This makes for thousands of graphics cards running hundreds of different games.

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Very few of these games have ever passed through Windows certification, and if you've ever played some of them—I'll resist naming names—then you'll know that they're frequently full of bugs, require frequent and large patches, and that those patches then cause more bugs.

In addition, these games will sometimes require that you download and install the very latest graphics drivers, which might not have been through the certification process to determine how stable they are; and they certainly will not yet be available through Windows Update.

When you couple this with all of the other software you run on your computer, the thousands of different memory cards available, hundreds of different processors by different manufacturers that need to be supported, and all of the drivers required to make everything work, you're into many billions of combinations.

You'll find that Windows itself causes very few, if any, annoyances. Even the bug that I talk about later in this chapter, by which a USB Wi-Fi dongle only works in a specific USB port, comes down to the way the driver is written and how it interacts with everything else.

Common Windows 8 Annoyances

So, what are the common annoyances that Windows users encounter? This, by no means, is going to be an exhaustive list, but I'll cover the most common of them, at least the ones that you are most likely to face while using Windows 8. These appear in no particular order.

Where Is My Windows 8 Installation DVD?

Let's get this one out of the way right at the beginning because it's by far the biggest grumble people have had about Windows Vista and especially Windows 7.

The reason that your computer didn't come with a copy of the Windows 8 installation DVD when you bought it is entirely predicated on the notion of reducing piracy. It came about because of an agreement between Microsoft and its original equipment manufacturer (OEM) partners, who produce and sell computers.

It's not all bad news though; you have paid for your copy of Windows, so when you are buying a computer, either over the phone or especially online, you should look to see if the inclusion of a Windows 8 installation DVD is an option.

If your Windows 8 installation DVD isn't included as an option when you purchase the computer, then most OEMs will allow you to order one separately, though there might be a nominal postage charge. If you find yourself negotiating to buy a computer from an OEM who flatly refuses to let you have a copy of the installation DVD, my advice would be to spend your money elsewhere, instead.

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Note

If you have a Microsoft TechNet, MSDN, or Action Pack subscription, you will be able to download ISO disc images of Windows 8 that you can use for repair work. These images, however, will not work with your OEM Windows 8 product key.

The Windows 8 Installation DVD is an incredibly useful thing to have when it comes to troubleshooting and repairing Windows problems. And with regard to the issue of piracy, the OEM installation DVDs are commonly tied to the BIOS or UEFI system on the motherboard and simply won't install on other computers (so don't try this at home), which pretty much invalidates the piracy counter-claim.

As a backup, you can create a System Image Disc, which I detail in Chapter 6, "Optimizing Backup and Restore." In fact, I would recommend that you do this anyway. However, I would always recommend you fight for your Windows 8 installation disc if you are going to do any serious repair work.

INSIDE OUT

Windows installation DVDs and ARM tablets

Windows 8 on ARM architecture is supplied only to OEMs and is not available for purchase via retail outlets. Thus, if you buy a Windows 8/ARM–powered tablet, you will never be able to get an install disc. However, due to differences with the way Windows 8 on ARM works, which I will detail in Chapter 15, "Understanding Windows 8," you will never need one.

Fixing Incorrect File Associations

The problem of what program or app opens what type of file will likely also be a contentious issue with PC enthusiasts and IT professionals, because you might not want the new Windows 8 apps opening all your files.

By default, Windows 8 will open music, video, pictures, and PDF files (yup, there's a native reader for PDFs now) in new Windows 8 apps, but it's a simple matter to change the default program or app that is associated with a file if you want to; in fact, it's much easier than it was with Windows 7.

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To change the default program or app, perform the following steps:

1. Open File Explorer on the Desktop.
2. Right-click the file for which you want to choose the default program.
3. In the settings panel that appears, click Choose Default Program, as depicted in Figure 11-1.

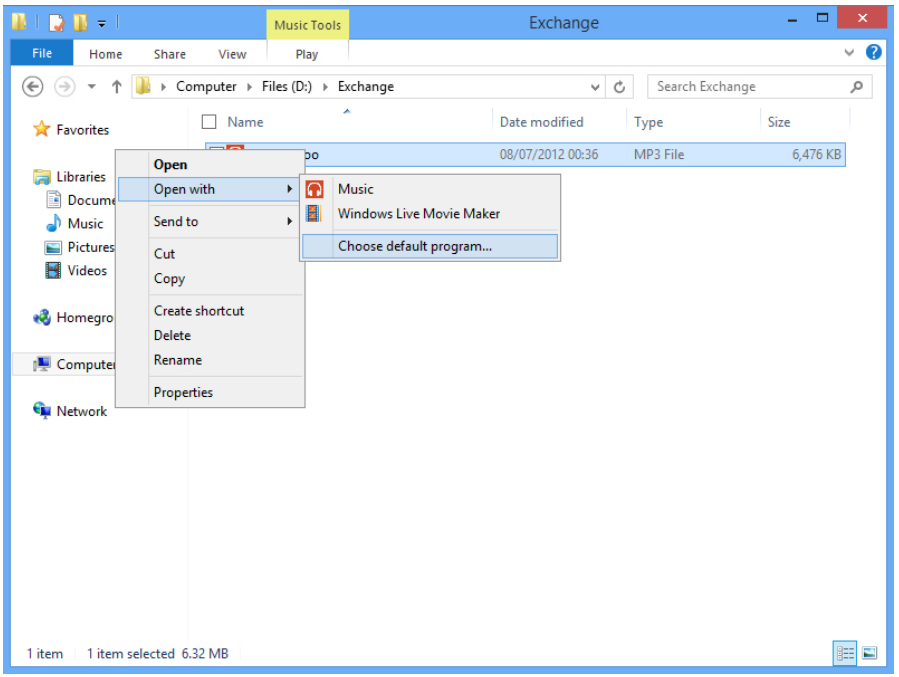

Figure 11-1 Right-click a program to change the association

A pop-up window opens, displaying a list of recommended programs, as shown in Figure 11-2.

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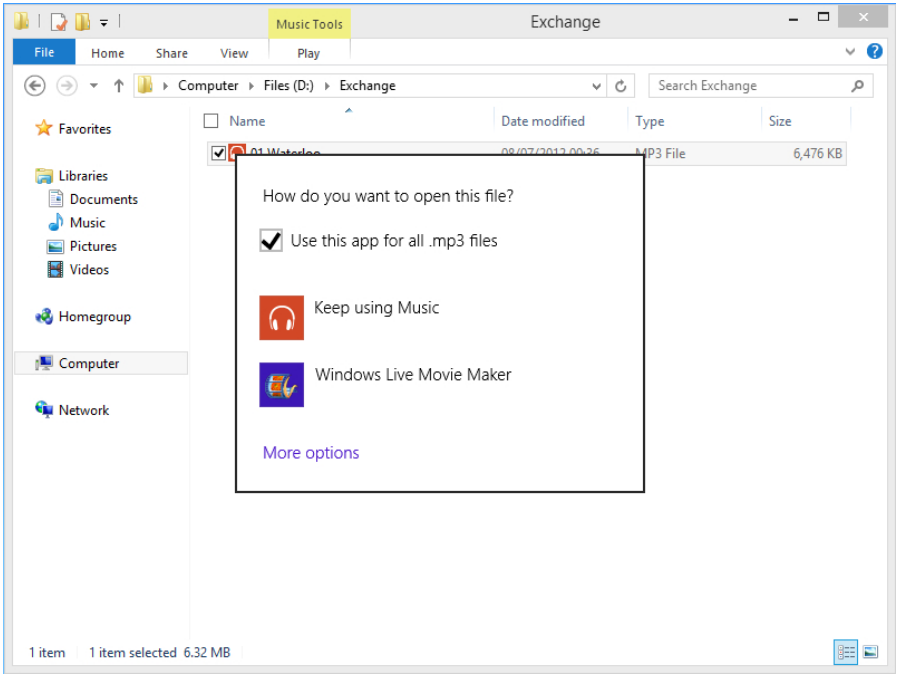

Figure 11-2 Choosing the default program

If the default program or app you want does not appear in the list, click See All at the bottom of the list.

4. If you still do not see the program or app with which you want to associate a file, you can search for it specifically at the bottom of the choices list (see Figure 11-3).

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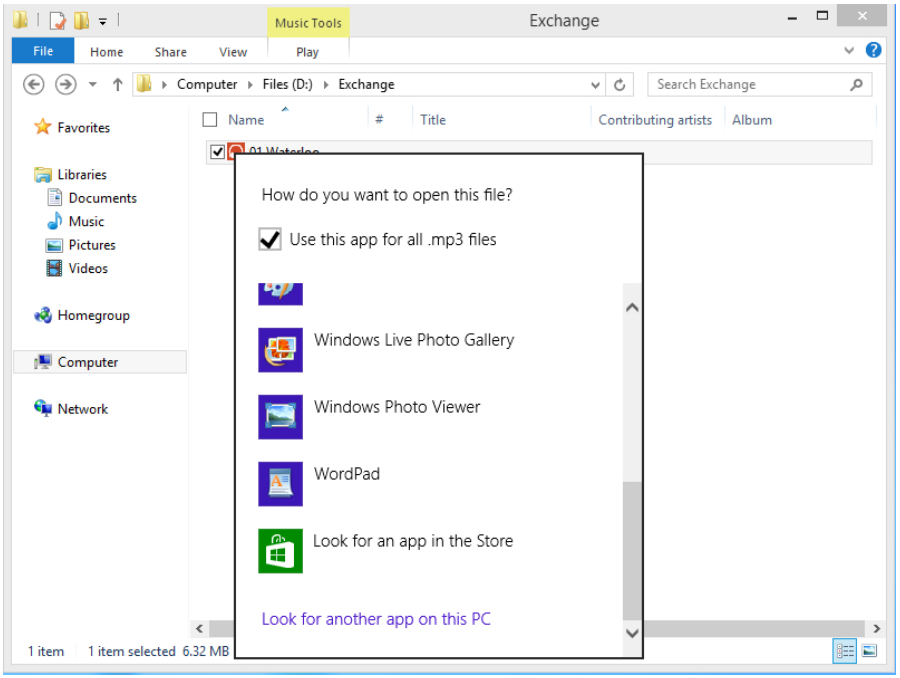

Figure 11-3 You can search for programs and apps

From there on, Windows 8 will always open that file type with the program or app you have selected.

I Can't Get Online to Download My Wi-Fi Driver

Another very common problem experienced by people who have just installed Windows 8 is that they find that, while the operating system is generally excellent at finding and installing hardware drivers during initial setup, it very ironically (and in true "Catch-22" fashion) hasn't found the driver for your Wi-Fi card; of course, without it, you can't get online to download it.

INSIDE OUT

Always keep a copy of your hardware drivers

You should always keep a full copy of the hardware drivers that came with your computer, either by keeping the original driver discs in a dry, safe place or by copying them to an internal partition (which is what I do) or to an external USB hard disk.

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It's not a complete loss though; Windows might still have a compatible driver, but you'll need to know a bit about your hardware first.

You might just have to make an educated guess. If your Wi-Fi is part of your computer's motherboard and your computer was relatively cheap, you should look to the manufacturer of the motherboard for clues. By this I mean that if you have an Intel motherboard, you likely have an Intel Wi-Fi controller. Here's how you can identify the manufacturer of your computer's motherboard:

1. Press Windows logo key+X to open the Administration menu.

2. Click Control Panel. Ensure that you are using the large or small icons view, as demonstrated in Figure 11-4.

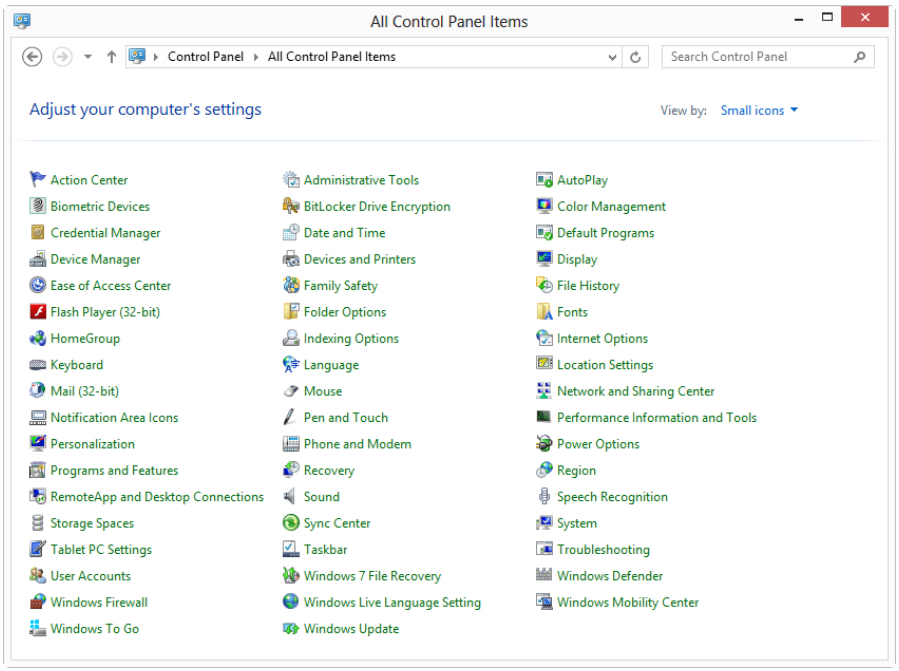

Figure 11-4 The Control Panel

3. Click Administrative Tools to display a list of tools, as shown in Figure 11-5.

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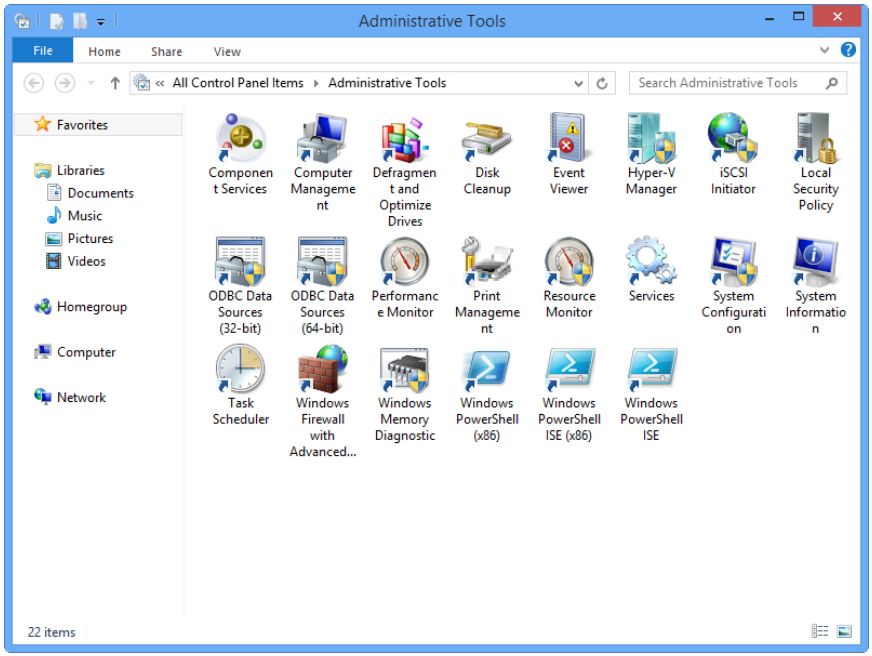

Figure 11-5 The Administrative Tools panel

4. Double-click System Information to open the panel presented in Figure 11-6.

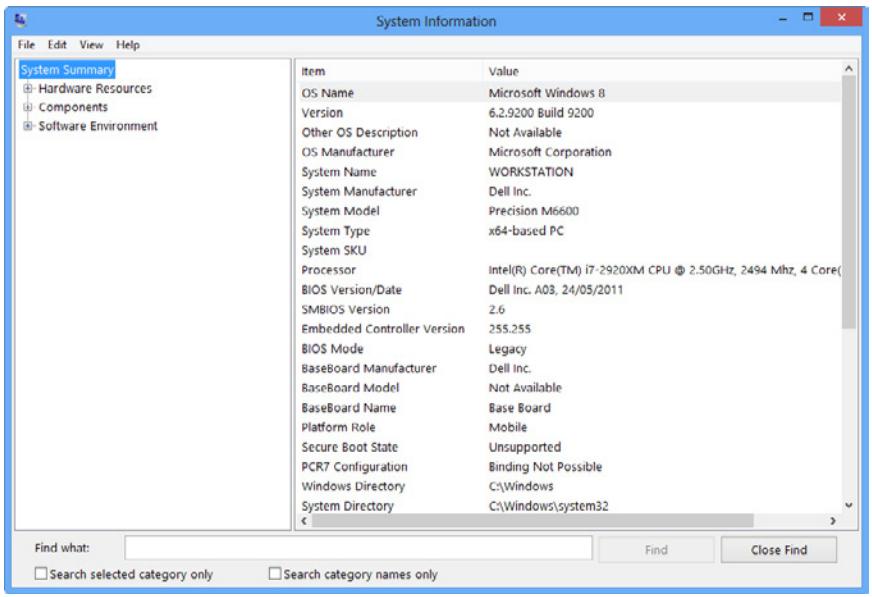

Figure 11-6 The System Information panel

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The system Information panel might display the direct name of your motherboard, or you might at least find clues as to your architecture in the System Summary for your computer. Two other places to look for clues are in the Components | Network section or more likely in Components | Problem Devices.

INSIDE OUT

Use your smartphone to find your hardware

If you can get online by using your smartphone, you might be able to find the make and model of your Wi-Fi chipset by searching for the specifications of your computer model on the computer manufacturer's website.

Now you want to see if you can force Windows to install a compatible driver. Follow these steps to do so:

1. Open the Start screen and then search for Device to open the Device Manager, or open it from the Control Panel.

   The Device Manager window opens.

2. Right-click the offending driver; you will see the nonfunctioning driver highlighted with a yellow warning icon when the driver isn't working, as illustrated in Figure 11-7.

   In the settings panel that appears, click Update Driver Software.

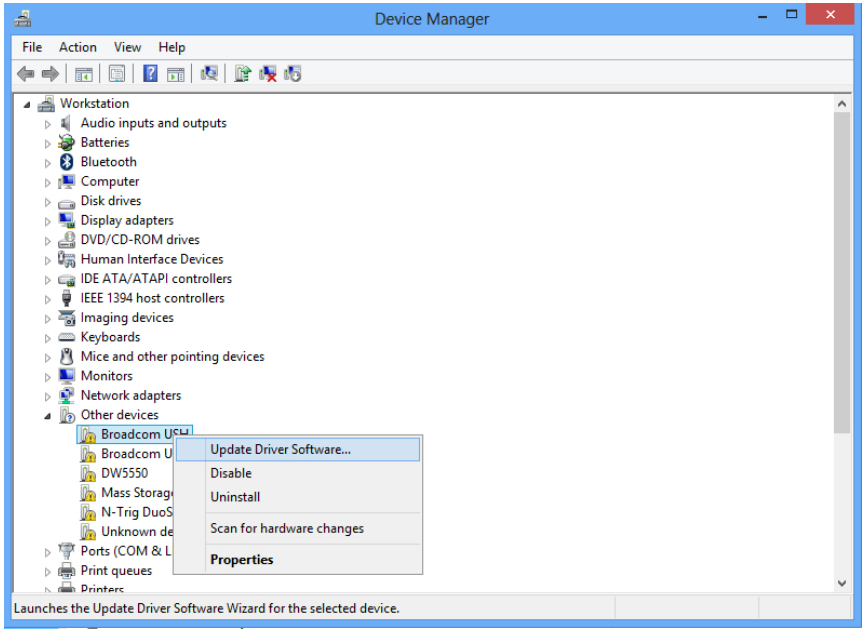

Figure 11-7 Updating a hardware driver

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3. In the next window (see Figure 11-8), click Browse My Computer For Driver Software.

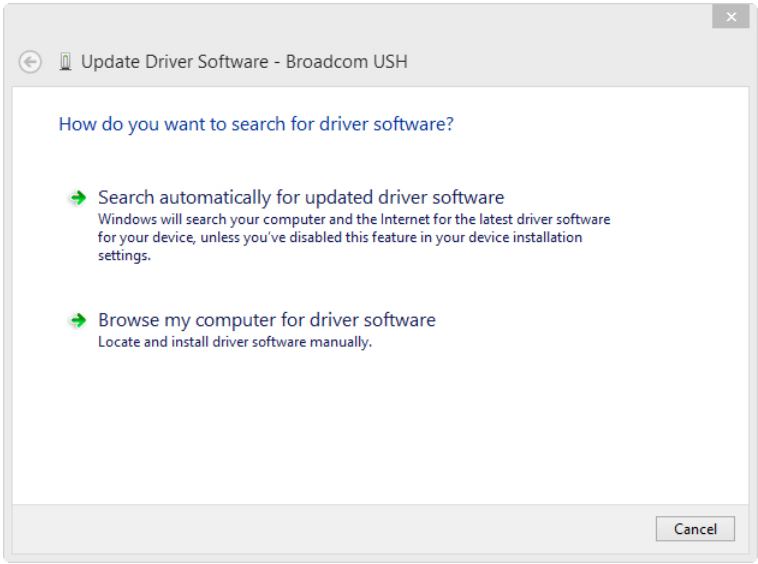

Figure 11-8 Choosing how to install a driver

4. In the window that opens (see Figure 11-9), click Let Me Pick From A List Of Device Drivers On My Computer.

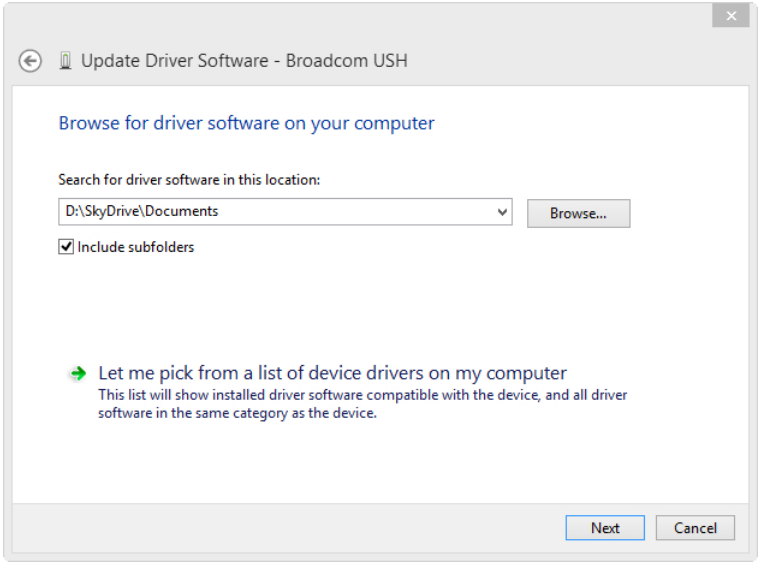

Figure 11-9 You can manually browse for a driver

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5. Clear the check box for Show Compatible Hardware, as shown in Figure 11-10.

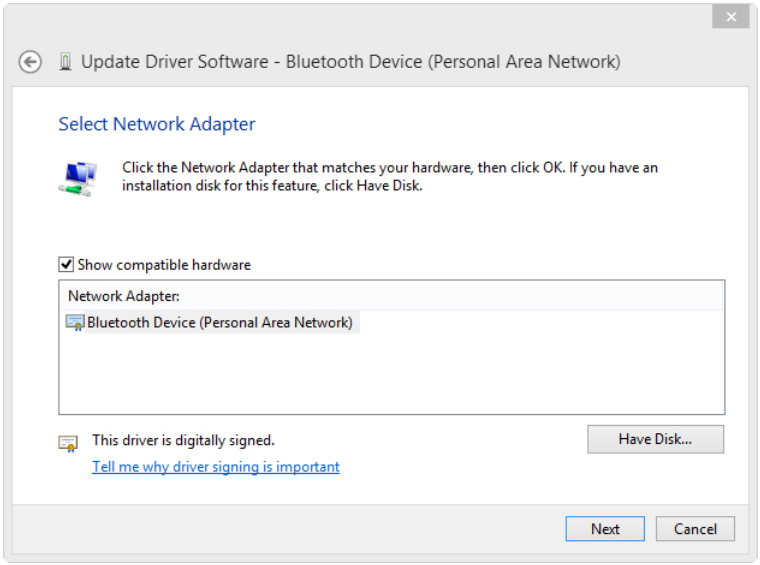

Figure 11-10 Viewing just compatible hardware

6. In the Manufacturer list, look to see if there is a compatible driver for your hardware, as illustrated in Figure 11-11.

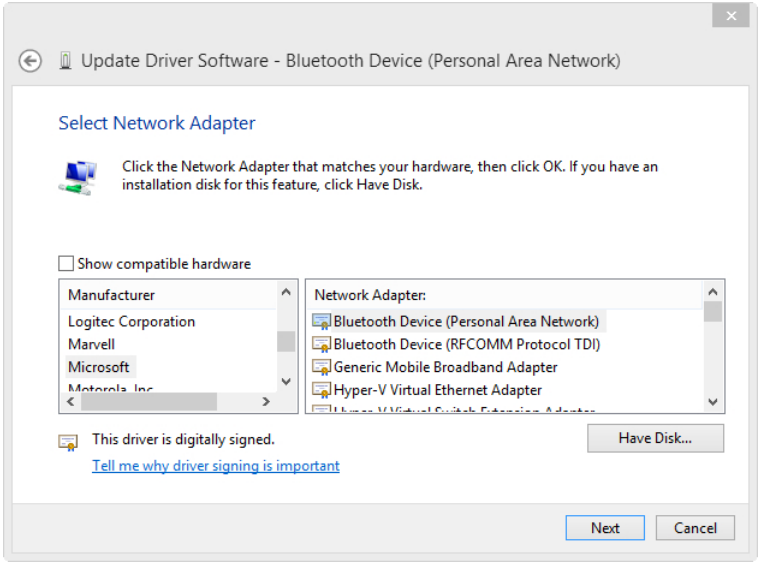

Figure 11-11 Displaying all hardware drivers for a device type

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INSIDE OUT

Windows 8 and newer hardware

If you bought a computer that came with Windows 7 or Windows Vista, there is an excellent chance that your hardware drivers will already be on the Windows 8 installation DVD. However, if your computer includes hardware that was released after Windows 8, you should always have a copy downloaded from the manufacturer's website.

There is no guarantee that Windows will contain a compatible hardware driver, but it might be worth a try, at least to provide a temporary driver with which you can get online.

Obviously, the best solution will always be to download the appropriate driver from the manufacturer's website from another computer. Also, your computer might have a 3G or 4G mobile broadband connection that you can use to download the driver.

You Don't Have Permission to Write Files to a Disk

If you upgraded your computer from a previous version of Windows to Windows 8 by using a format and clean install, and you have stored files on a separate partition on the hard disk or on a USB attached hard disk, you might find that you suddenly don't have permission to access those files any longer.

This is because the Windows user security system locked the permissions to the account that had access to them previously.

You can change these permissions, but you need to be logged in as an Administrator to do so.

1. Right-click the folder or hard disk for which you want to rewrite the security permissions.
2. In the settings panel that opens (see Figure 11-12), click Properties.

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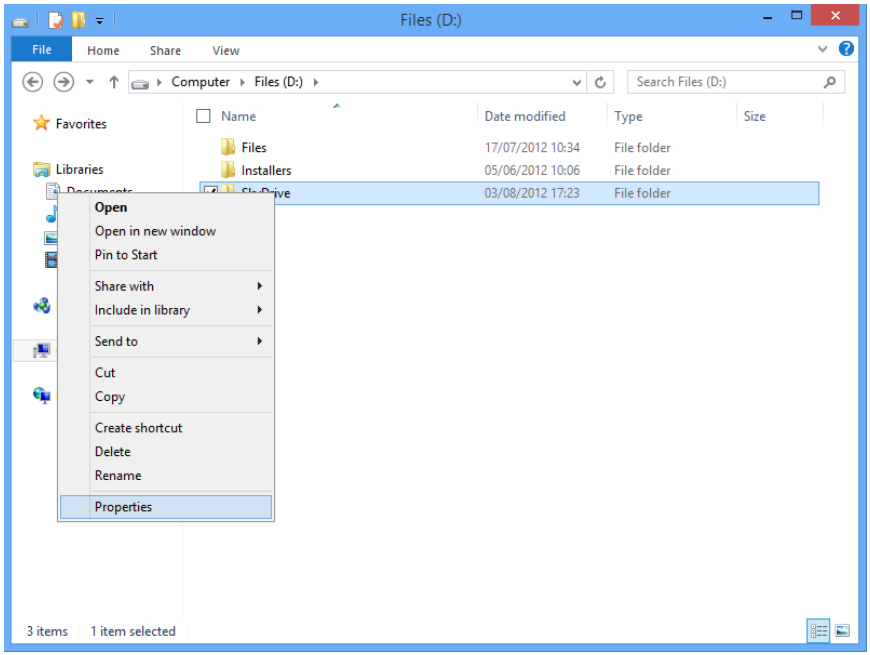

Figure 11-12 Right-click the folder for which you want to change permissions

3. In the dialog box that opens, click the Security tab.

4. At the bottom of the window shown in Figure 11-13, click the Advanced button.

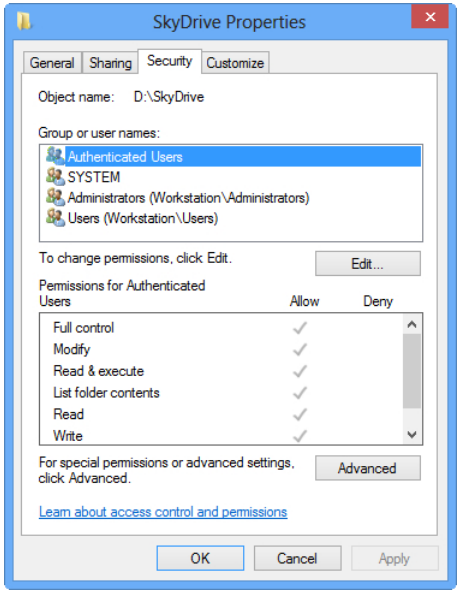

Figure 11-13 Click the advanced button

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5. In the Advanced Security Settings For Files window, select the user for whom you want to change permissions, and then click the Edit button, as shown in Figure 11-14.

   If you don't see an Edit button, click the Disable Inheritance button and then click Convert Inherited Permissions Into Explicit Permissions On This Object.

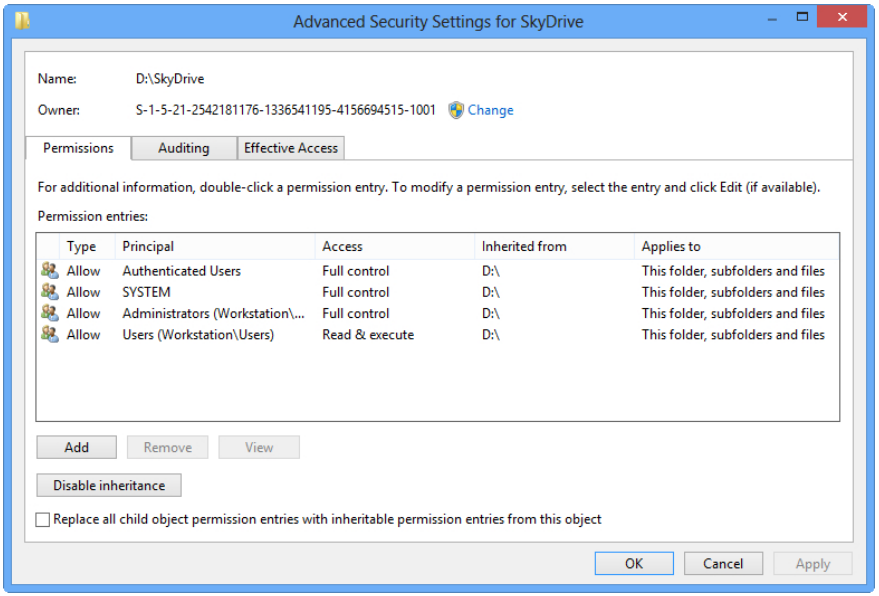

Figure 11-14 The Advanced Security Settings dialog

The Advanced Security Settings For Files dialog box opens.

6. Choose the appropriate permissions for the user. You will probably want to give yourself Full control of the files and folders, as depicted in Figure 11-15.

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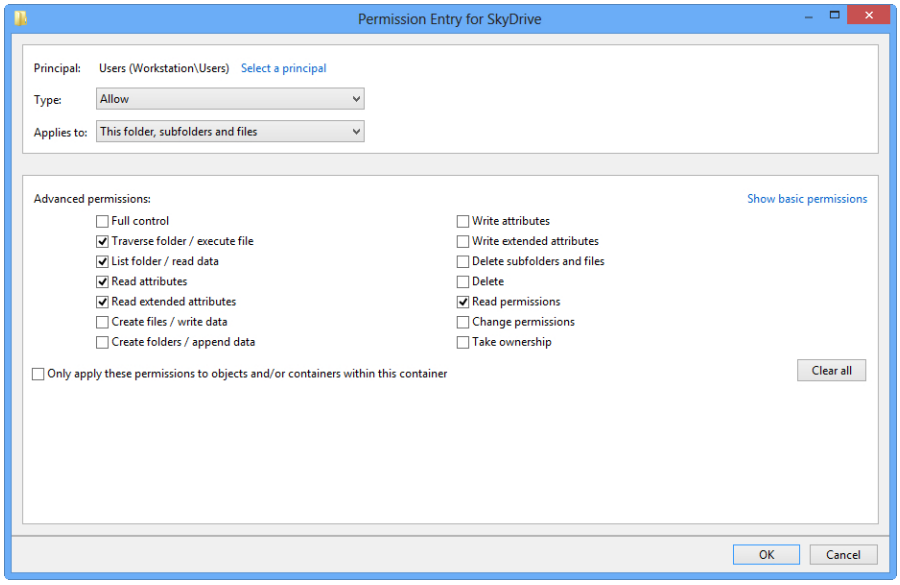

Figure 11-15 Changing file permissions

Windows 8 will now change the permissions on each individual file, and you should not close the dialog that sets permissions while security changes are taking place. Keep your computer on during the process, and be aware that it can take a while if you have a great many files.

"I'm Sorry, Dave, I'm Afraid I Can't Do That"

Anyone who has seen the classic 1968 movie *2001: A Space Odyssey* might remember this haunting line of dialogue that occurred when the rebellious on-board computer, H.A.L., detects that the humans are trying to shut him down. You might even have wondered if this will ever happen on our own computers.

Well, Windows 8 might occasionally refuse to do something for you, as well, citing that "You don't have permission to perform this action." Why wouldn't your own computer give you permission?

In fairness, it's not anywhere as complicated or worrying as in the movies, and you don't have a rebellious AI entity trying to cause you harm. Whatever it is that you're doing, close it, and when you run it again, right-click it, and then from the settings panel that opens (or the Windows 8 App bar), select Run As Administrator. You will now be able to open the pod bay doors.

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You Can't See Your Wi-Fi Network

If you have a new broadband router that's already been configured by using another computer, or if you are connecting to a router for the first time via Wi-Fi, you might find that your computer can't see it. This problem is caused by one or two firewalls that are blocking the connection. The simple way to fix this is to temporarily shut down Windows Firewall and, if necessary, the router firewall, by performing the following steps:

1. From the Control Panel, click System And Security, and then click Windows Firewall, or at the Start screen, type **firewall**, and then select Windows Firewall from the results that appear.
2. Turn off Windows Firewall and then try again to connect to the router.
3. If you still can't see your router, you should plug your computer into the router via a physical network cable so that you can log on to its configuration panel. You normally do this by typing 192.168.1.1 or 192.168.2.1 into your web browser. Once connected, turn off the router firewall, too.
4. Next, connect your computer to the router via Wi-Fi. The two devices will see each other fine.
5. Finally, re-enable both firewalls. Your computer will continue to connect to your router each time you access it via Wi-Fi once you follow this procedure.

Problematic Graphics, Sound, Keyboard, or Mouse Drivers

Sometimes, graphics or sound drivers can cause problems with Windows. DirectX Diagnostic Tool can identify problems with them.

1. Open the Start screen and search for **dxdiag**. Run the program when it appears in the search results.

   The DirectX Diagnostic Tool dialog box opens, as shown in Figure 11-16.

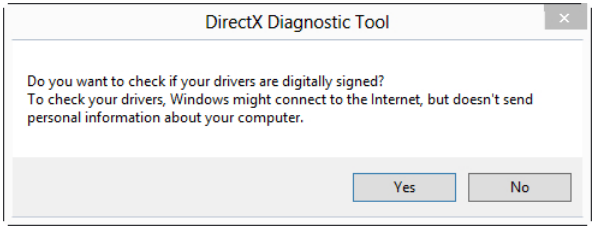

Figure 11-16 Opening the DirectX Diagnostic Tool

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2. The dialog box asks if you want to check if your hardware drivers are digitally signed. Click Yes. This verifies that the drivers have been approved by Microsoft for compatibility with Windows 8.

   The DirectX Diagnostic Tool launches (see Figure 11-17). This checks your display, sound, and input devices for problems.

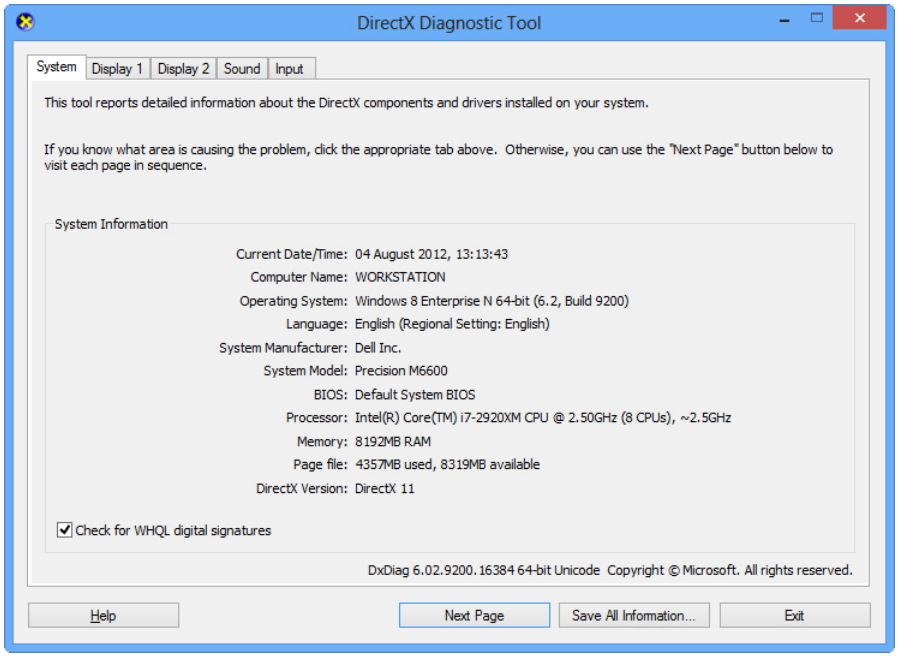

Figure 11-17 The DirectX Diagnostic Panel

If DirectX Diagnostic Tool identifies any problems, it displays them, and you can click the tabs along the top of the screen to review the reports. If problems are found, you will be alerted so that you can use an appropriate diagnostic tool or method to rectify them, as illustrated in Figure 11-18.

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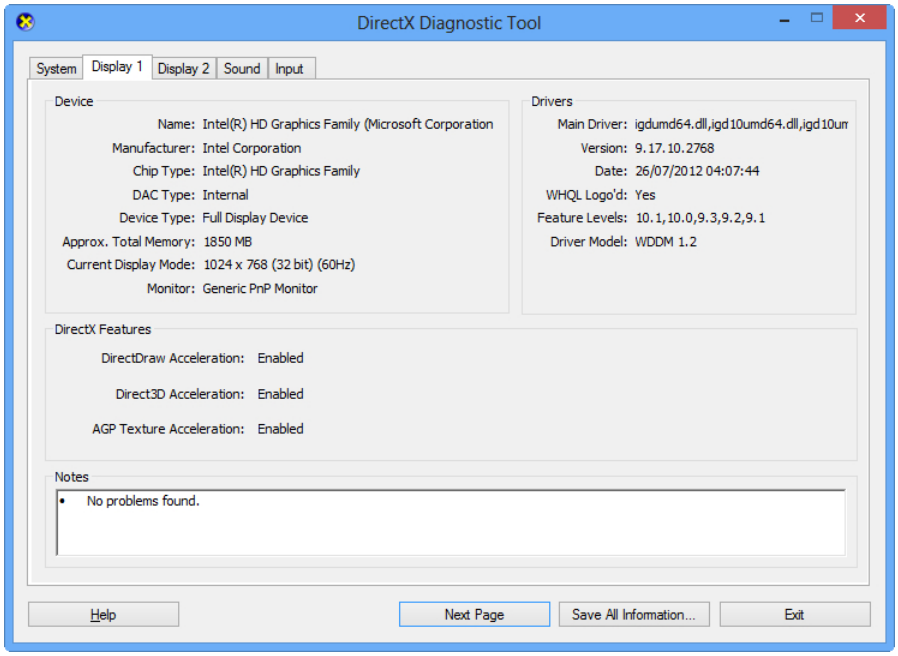

Figure 11-18 The DirectX Diagnostic Tool can report problems

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Troubleshooting USB keyboards and mice

If a USB keyboard or mouse stops working, try unplugging it from the USB port and then plug it in again. If that doesn't work, plug it into a different port. This usually rectifies the problem.

This Copy of Windows 8 Is Not Genuine

Sometimes, even though you have a completely legitimate, fully activated copy of Windows 8, you will be greeted with the message "This Copy of Windows is Not Genuine" when you turn on your computer.

Fixing this is incredibly simple; just restart your computer by shutting it down normally and rebooting. This almost always sorts out this minor glitch, which is the result of a file being read incorrectly at startup.

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Windows Update Won't Install Anything

Sometimes Windows Update becomes stuck and is unable to install any updates. This happens because the temporary files store for the program has become corrupt. To fix this problem, navigate to the *X*:\Windows\Software Distribution folder, where *X* represents the hard disk on which Windows 8 is installed. Delete the contents of this folder to reset Windows Update. This deletes all the temporary files associated with Windows Update. It also resets Windows Updates to the default settings, so any updates you've previously hidden will reappear.

Why Am I Not Getting "Optional" Windows Updates?

The new Windows 8 interface for Windows Update in PC Settings will automatically download all important and critical updates for your computer. What it won't do, however, is install some optional updates for Windows and other Microsoft software that you have installed.

If you find this is the case, use the desktop version of Windows Update (in the Control Panel) to manually install updates on at least a semi-regular basis.

Search Isn't Finding Your Files

If you have moved your files and folders away from your main Windows 8 partition, or if you have files located on another hard disk or partition then they might not be indexed automatically and thus might take some time to appear in search results.

You can add folders and drives to the index by opening the Start screen, searching for index, and then clicking on Indexing Options in the Settings results. In the window that appears (see Figure 11-19), you will be shown all the current folders and drives that are automatically indexed by Windows 8. You can click the Modify button to change these locations and add more drives and folders to the index.

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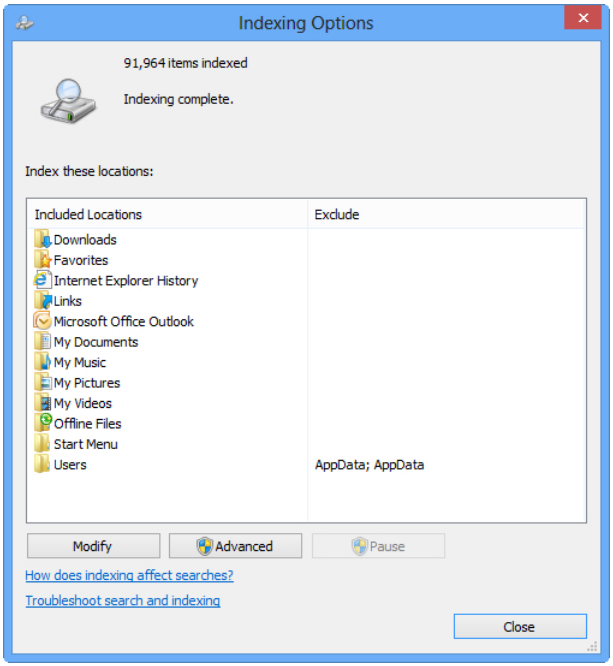

Figure 11-19 The Indexing Options in Windows 8

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Indexing options and network storage

The indexing options in Windows 8 do not allow you to add network attached drives or other external storage, such as USB hard disks, to the index.

Service Pack or Update Install Was Interrupted

Despite Windows telling you "Please do not unplug or power off your computer" while it is installing updates and service packs, it is actually very difficult to break the installation of any update.

Like Windows 7 before it, Windows 8 is extremely resilient in the face of power failures during the update process. You can trust me on this one because it's my job to try to break it, and believe me, I've tried. As yet, I've never actually succeeded in doing so.

There might be times, however, when you experience a momentary power interruption, a power cut, someone tripping over the power lead, and so on.

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Should you find yourself in a situation where Windows 8 fails to start afterward, you can use System Restore to take the computer back to a point before the update was initiated. Details of how to do this are in Chapter 2, "Repairing Windows 8 in 30 Minutes or Less."

Windows Starts Up Very Slowly

Sometimes you might find that Windows is starting very slowly. This will often be caused by software that is running in the background, and you'll be pleased to hear that Windows 8 is very good at diagnosing slow startup software.

The new Task Manager (see Figure 11-20), which you can access by pressing Ctrl+Alt+Del or by right-clicking the Taskbar, has a Startup tab on which you can view the status of startup items. You can also disable startup items if you want.

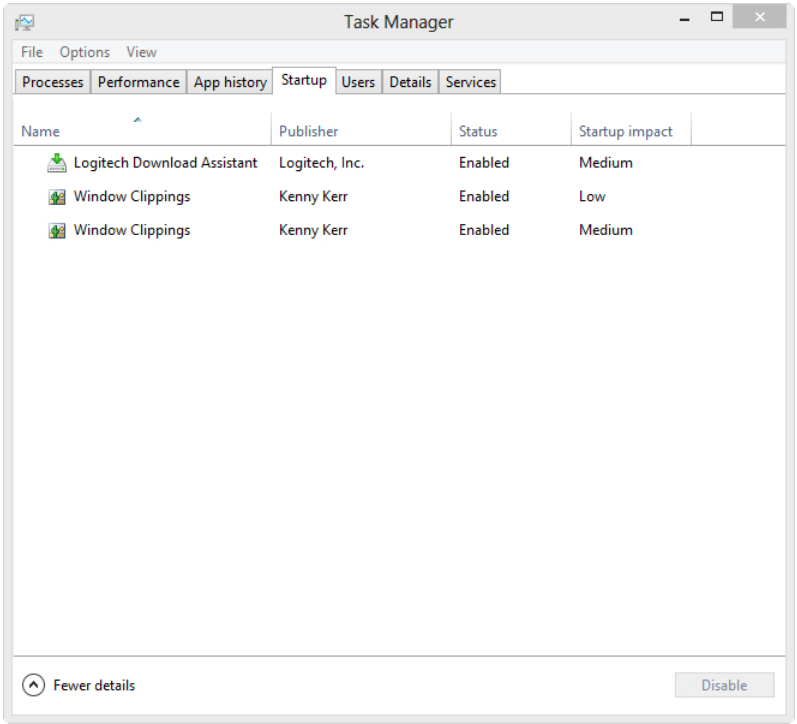

Figure 11-20 Managing startup items in the new Task Manager

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With the Task Manager open, click the More Options button in the lower-left corner, and then click the Startup tab. Here all startup items will be shown with their Startup Impact.

If Windows 8 is reporting that something is slowing down your computer, you can select it and click the Disable button in the lower-right corner of the window.

> **Note**
>
> **The free third-party program Soluto is very popular for weeding out slow Startup items in Windows. You can download it from *www.soluto.com*.**

Windows Shuts Down Very Slowly

Changing a registry setting might fix a slow shutdown problem. To access the Registry Editor, open the Start screen and search for regedit. In the left pane of the Registry Editor window, click HKEY_LOCAL_MACHINE, click SYSTEM, click CurrentControlSet, and then click Control.

In the right panel, reduce the WaitToKillServiceTimeout setting (see Figure 11-21) to a lower number by right-clicking it and selecting Modify. The recommended setting is 3000. (This is the number of milliseconds Windows will wait before terminating the program.) This will close programs more quickly when Windows shuts down.

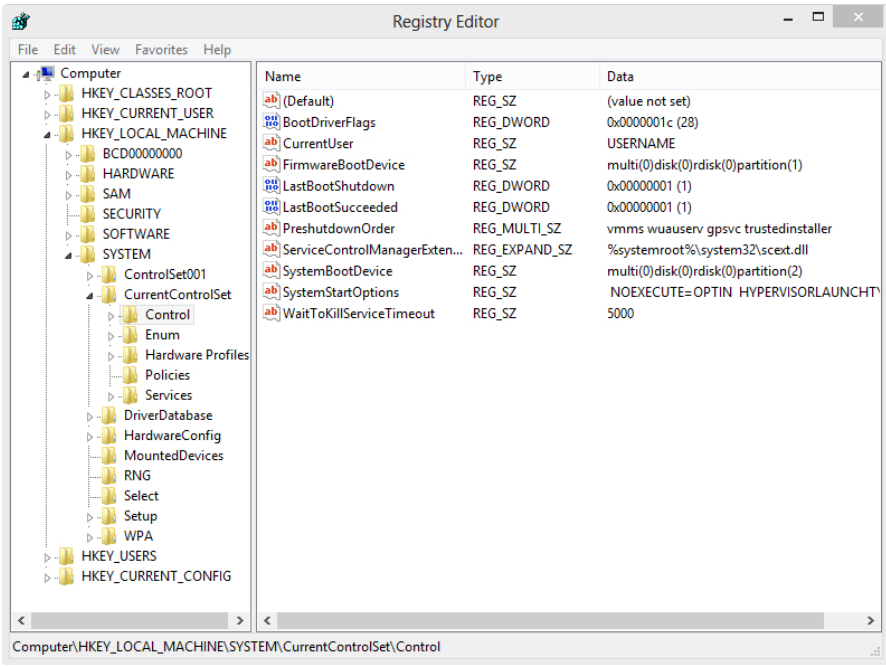

Figure 11-21 Changing the Wait To Kill setting

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CAUTION!

Changing the Wait to Kill setting can prevent some software from saving files or shutting down properly. This can cause problems with the software and perhaps make it unstable.

Sleep and Hibernation Problems

Some people experience problems when Windows 8 goes to sleep, ranging from Wi-Fi reconnection problems to issues with the computer not coming out of sleep mode at all.

If you have problems with Windows in sleep mode, especially if the computer is not coming out of sleep mode, you can change the default action to either turn it off or use hibernate mode, instead. To do this, open the Start screen, search for **power**, and then run Power Options from the settings search results (this is also available from the Control Panel).

Next, click Change When The Computer Sleeps and then click Change Advanced Power Settings.

In the Power Options window that appears (see Figure 11-22), in the Sleep section, you can change both of the Sleep After numbers settings to zero (0) while perhaps changing the hibernate options to what sleep was set at before.

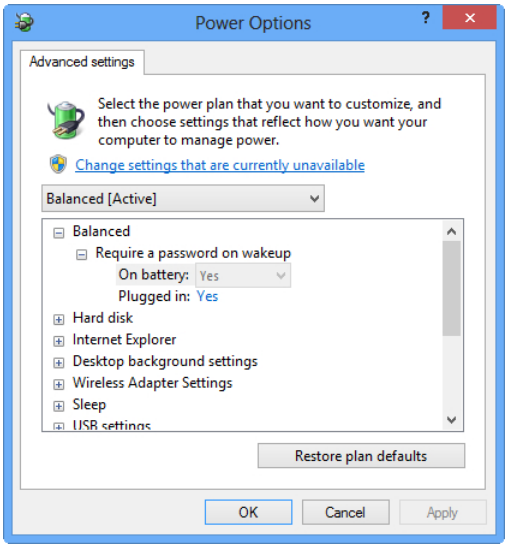

Figure 11-22 Changing the sleep options

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INSIDE OUT

Why change sleep settings here?

If you change the Put The Computer To Sleep setting at the main Power Options screen to Never, this will also change the hibernate setting to Never.

You can also change what the Power and Sleep buttons do on your computer by clicking the link Choose What The Power Buttons Do in the main Power Options window, which takes you to options where you can choose the actions for your physical and on-screen shut down and sleep buttons, as illustrated in Figure 11-23.

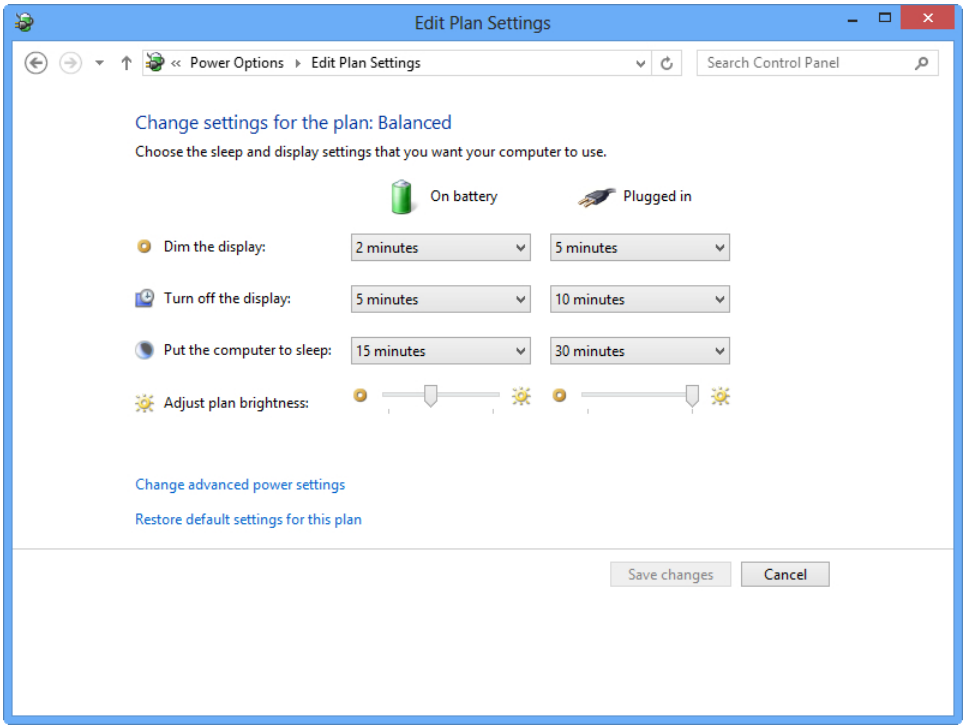

Figure 11-23 Changing the Sleep Button Action setting

You might, for example, want to change the When I Press The Sleep Button action to either Do Nothing or Hibernate.

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BitLocker Has Locked Me Out of My Computer

If your computer and your copy of Windows 8 are encrypted with Microsoft BitLocker, they will occasionally get all confused and lock you out of your own computer. There's absolutely nothing you can do about this other than to ensure that you have a USB pen drive somewhere nearby (though not with the computer itself) that contains copies of your BitLocker encryption keys.

I strongly recommend you keep one handy, especially when travelling. If you have access to another computer and a USB pen drive, you can store a copy of your encryption keys in a cloud service such as SkyDrive.

BitLocker Doesn't Work in My Dual-Boot System

BitLocker does not support dual-boot systems. If you have created a dual-boot system for which one operating system is protected by BitLocker, then you will be asked for your encryption key each and every time you start both operating systems.

If you must have a dual-boot system, the only advice I can offer is to turn off BitLocker drive encryption for your computer completely.

My Dual-Boot System Doesn't Work

Many Windows 8 computers, including all computers from OEMs, have a BIOS replacement system called UEFI on the motherboard. Microsoft has dictated that all new computers must come with a feature called Secure Boot enabled by default.

This system, which is a security feature that is intended to prevent malware from loading at boot time, can also interfere with dual-boot systems.

You can disable Secure Boot in your UEFI system, though its location will vary from one system to another.

I Can't Modify the First Partition on My Second Hard Disk

When you install Windows 8, it wants to create a small System Reserved partition on which it keeps the boot files. If your computer has two or more hard disks, and those disks already contain partitions, you will find that the Windows 8 installer puts those boot files on the first partition of one of those secondary hard disks.

This means that you have Windows 8 installed on one hard disk and the boot files on the first partition of another hard disk. Windows will not allow you to perform any partitioning, resizing, or restructuring on the partition on which the boot system is located.

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Keeping Windows 8 and the System Reserved partition together

You can ensure that the partitions containing the Windows boot information and Windows 8 itself are on the same physical hard disk (which also helps maintain resiliency) by unplugging all your other hard disks before turning the computer on to install the operating system.

This will probably not be possible on a dual–hard disk laptop, so if Windows 8 uses an existing partition on your hard disk for the System Reserved files, you might need to move them later. I show you how to do this in Chapter 25, "Troubleshooting a Windows 8 Installation."

Items on the Desktop Are Too Small

As computer users grow older (it's been known to happen), we can find it more difficult to read items on the monitor. Fortunately, you can rescale text and icons on the desktop to a more comfortable size. To do this, open the Start Screen, search for text, and then click the Make Text And Other Items Larger Or Smaller link in the settings results. In the Display dialog box that opens (see Figure 11-24), you can scale up the size of everything on screen by up to 150 percent. You should note that the Make Everything On Your Screen Bigger option in PC Settings will only scale up the Windows 8 interface.

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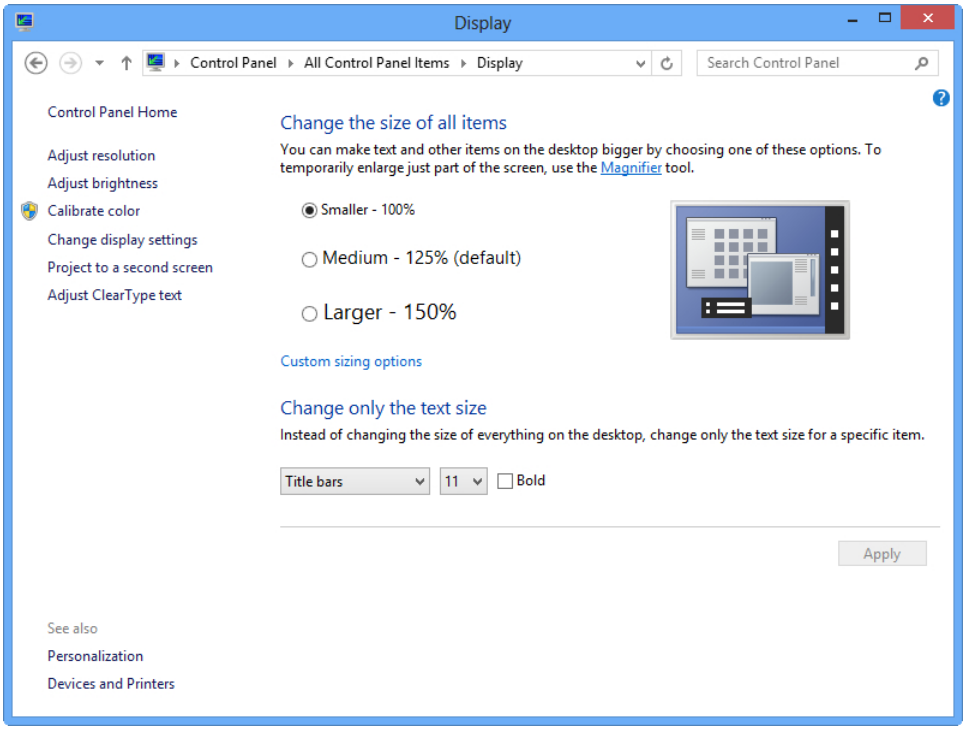

Figure 11-24 Changing the size of text and icons in Windows 8

Hardware-Specific Annoyances

Some common annoyances with Windows 8 can be caused and/or fixed by the hardware you have attached to your computer.

Windows Gets Stuck at Its Loading Screen

There are occasions when Windows gets as far as its loading screen and then just sits there. It doesn't crash; it doesn't load; it doesn't do anything. And no matter how many times it gets this far, it just flat-out refuses to go any further.

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This sometimes happens when you have a network cable plugged into your computer. Simply unplug this cable to and Windows should be able to successfully start. You can then plug the cable back in. Windows should operate properly after this fix.

My USB Wi-Fi Dongle Has Stopped Working

Sometimes, especially after you have moved or cleaned your computer, you might find that you can no longer get online with your USB Wi-Fi dongle. This is caused by a driver problem that can sometimes lock the device to a single USB port.

If you move the USB device to another port, it might not work. This is an odd problem but moving the dongle between USB ports, or preferably back to the port it was plugged into previously, fixes the problem.

My Tablet Touchscreen Isn't Working

If you find that the touchscreen isn't working on your tablet, usually during installation, it will be caused by a driver issue (I show you how to fix these in Chapter 14, "Easy Ways to Repair Windows 8"). I would always recommend having a USB keyboard and mouse available, however, if you have a Windows 8 tablet on which you have an installable copy of Windows 8.

No Operating System Found

If you get a message such as "No Operating System Found," you probably have a CD, DVD, Blu-ray disc, or USB flash drive plugged into your computer and its BIOS is set to boot from this device before your main hard disk. Just unplug or remove the media and restart the computer.

A New Monitor Results in No Picture

If you connect a new monitor but nothing displays on the screen, it's probably because the maximum resolution of your new monitor is less than Windows 8 was set to for your previous monitor. Windows 8 does a good job of auto-detecting screen resolutions, but a quick way around this is to boot into Safe Mode (press F8 after the BIOS screen disappears but before you see the Windows loading logo). While in Safe Mode, you can change the resolution to a setting supported by your new monitor.

Alternatively, if you have a secondary graphics card installed, verify that you haven't inadvertently plugged the monitor into the video output on the motherboard instead of the output of the graphics card? I explain this hardware in Chapter 25.

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Lastly, it is possible that your monitor is set to the incorrect input (perhaps it's set to DVI and you've plugged your computer into the HDMI port). You can change the input in the monitor's (or TV's) on-screen menu.

My Thunderbolt Device Doesn't Work

While Windows 8 comes with full support for USB 3.0 devices, there is no support for Intel's new Thunderbolt interface. This will come through third-party drivers (at least initially; I expect a service pack to fix this). If you cannot use your Thunderbolt device, this will be why. You can find out how to add missing drivers in Chapter 14.

Your Headphones or Microphone Won't Work

Sometimes a pair of headphones or a microphone won't work when you plug them in to your computer. To fix this, you need to set the headphones or the microphone as the default device.

In Control Panel, click Hardware And Sound, and then click Sound. In the window that appears, set the default sound and recording devices, as shown in Figure 11-25.

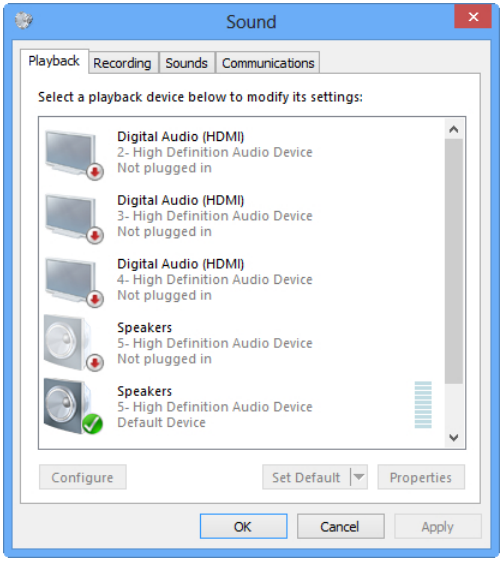

Figure 11-25 Changing the default sound devices in Windows 8

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My Computer Has No Sound

In a very similar way that Windows 8 sometimes won't set headphones or a microphone as the default playback and recording devices, after you install headphones (and this is especially common when you install Windows 8 with them plugged in) the operating system might set them as the default sound device instead of your speakers.

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Get quick access to sound devices from the Desktop

For quick access to the Sound panel, on the taskbar, right-click the sound icon, and then in the settings panel that opens, select Playback Devices.

My DVD or Blu-ray Disc Won't Play

Windows 8 does not ship with a video codec that will play Blu-ray discs. You will need a third-party codec in order to play these movies. These will most commonly be provided with Blu-ray playback software. You can get DVD and Blu-ray codecs by purchasing the "Windows 8 Pro with Media Center" upgrade; however, these discs will then only play through Windows Media Center. You can purchase this by clicking Add Features to Windows in the Control Panel.

The Drive Letter Has Changed on My USB Backup Hard Disk

When you use an external hard disk for backups, depending on the backup software you use, you might find that the second time you try to perform your backup, the software can no longer find the drive.

This happens because when you unplug and reattach a USB drive, Windows 8 can reassign its drive letter. This means that a hard disk that was G:\ the last time you used it could now be H:\, especially if you also have something such as a pen drive attached to the computer.

You can reassign drive letters in the Computer Management Console, and some people have experienced that after doing this a couple of times Windows "remembers" your preference. This could turn out to be just luck however, and if you want, you can find third-party software online that keeps USB drives on the same drive letter, free of charge.

To reassign the letter of a drive in the Computer Management Console, perform the following steps:

1. Press Window logo key+X to open the Administration menu.

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2. Click Disk Management.

3. In the window that appears, right-click the USB drive, and then in the settings panel that opens, click Change Drive Letter And Paths, as depicted in Figure 11-26.

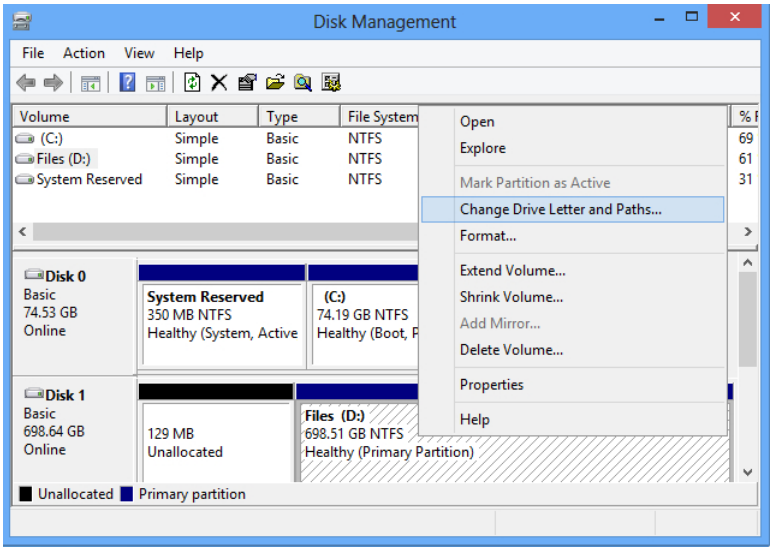

Figure 11-26 The Disk Management console

4. Press the Change button in the dialog box that appears (see Figure 11-27) and select the correct drive letter.

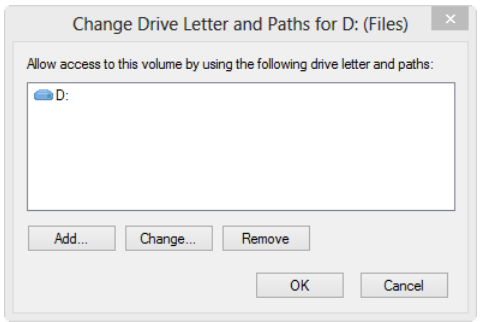

Figure 11-27 Changing a drive letter

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Note

If another disk is currently using the drive letter that you want, you will need to reassign that device a new drive letter first.

My Wireless Printer Has Stopped Working

Although Wi-Fi printers are becoming commonplace, there are some problems associated with them and Windows 8. This is because when Windows 8 installs the driver for a wireless printer, it locks the IP address on your network for the printer.

This is fine if you have only a single computer and a single printer at your location, but you might also have smartphones that connect to the Internet via Wi-Fi, a games console that needs Internet Access, a tablet or two, and perhaps other devices.

If you have a cheap ISP-provided router, they can shuffle devices around on IP addresses when the router is reset (which is common when the Internet connection fails). If you can set the IP address of your printer to Static in the router configuration panel (how to do this will vary from make to make; consult the manual that came with your router).

This means that the next time you want to print something the printer is on a different IP address and Windows 8 can't see it. If this happens, all you can do is uninstall and reinstall the printer.

INSIDE OUT **Why can't my router see my wireless printer?**

Sometimes, just getting your wireless printer connected to your router can be a challenge in and of itself. To correct the problem, press the WPS button on your router and on the printer to connect them.

If this still doesn't work, you should check the manual for the router, or call the free help number for your ISP (you should never have to pay for this type of call) to find out how to get the printer connected.

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My Laptop Battery No Longer Holds a Charge

Modern batteries are much better and more resilient than older battery designs. It is still true, though, that leaving your laptop continually plugged into a power source with the battery still inserted results in a constant trickle-charge than can kill the battery over time.

What this does is set the battery's "memory" lower and lower so that eventually it believes that only a small charge is the same as fully charged. With these batteries (and again they tend to only be the older ones), you can sometimes reset this memory by completely draining the battery and charging it fully several times.

I would also recommend removing the battery from your laptop if you intend to use it on mains power for a long period of time.

Summary

Windows 8 is not without its problems and annoyances, but as I say, these are almost entirely the result of the huge software and hardware ecosystem that the operating system has to support and with which it must remain compatible.

In this chapter, I have detailed all the common problems that I have experienced myself and that people write to me about. I write regularly about Windows troubleshooting and also make regular live webcasts as well as help and how-to videos. You can find all of this at my website, *www.theLongClimb.com*.

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CHAPTER 12

Managing Application Compatibility

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Troubleshoot Problems with Application Compatibility. 209
The Challenges of Using XP Software in Windows 8 . . 212

Although operating systems advance ever more quickly, it would appear that our use of software tends not to move quite as quickly. This is usually because you've found a great application, sometimes many years ago, that does a great job and that you really enjoy using.

You use this *legacy software* because you're used to it, it's as comfortable as an old shoe, it's perfectly powerful enough for the task at hand, or for any number of other reasons. Myself, I have Microsoft Photodraw v2, which was released in 2000. In Windows 7, I had to run in XP Mode (the free virtual machine for Windows 7 Professional and above) because some of the Direct3D capabilities were incompatible with those in Windows Vista and Windows 7.

Now, it's true that Windows 8 is compatible with every piece of software that runs on Windows 7, but it's not any *more* compatible. What is also true, though, is that XP Mode is no longer supported and won't install. The reason for this is that all support for Windows XP ends in April 2014, a good eighteen months before Windows 9 is due to release. After this time there will be no more updates for Windows XP and you can be certain that when this happens cyber-criminals will be all over it.

You can still use Windows XP in the new virtualization client provided in the 64-bit versions of the Professional edition and above for Windows 8, and I'll show you how to set this up later in this chapter. I want to begin, though, by looking in depth at the application compatibility features of the operating system (OS) that can solve many problems on their own.

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Setting Up Application Compatibility in Windows 8

You set up application compatibility via the new Start screen. The reason for this is that with the removal of the Start menu from Windows 8, there's no way to access a program's properties from a taskbar icon. To configure application compatibility, perform the following procedure:

1. Open the Start Screen, right-click the program icon for which you want to configure compatibility (or drag the icon down with your finger) to open the App bar (see Figure 12-1).

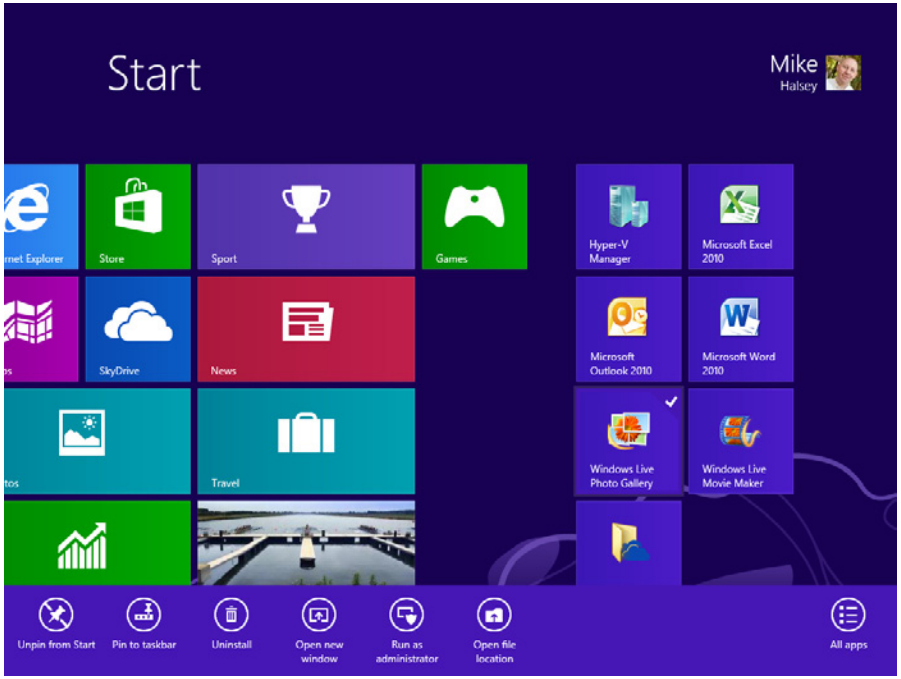

Figure 12-1 The App bar

2. On the App bar, select Open File Location.

3. In the window that opens, right-click the program's icon, and then in the settings panel that opens, select Properties, as shown in Figure 12-2.

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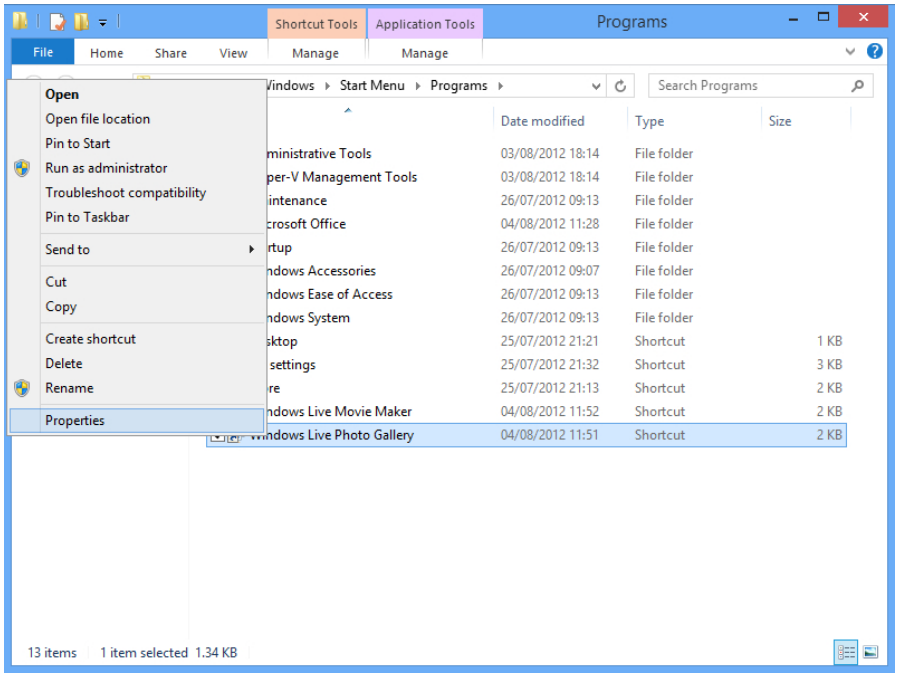

Figure 12-2 Right-click a program and then select Properties

4. In the window that appears, click the Compatibility tab, as demonstrated in Figure 12-3.

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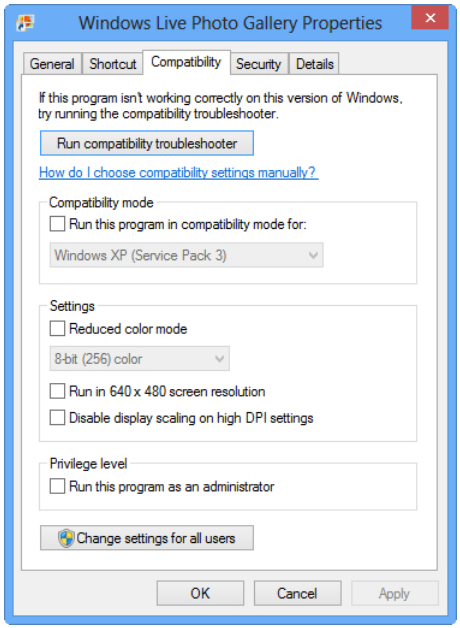

Figure 12-3 The Compatibility tab

This is where you manage the compatibility settings for the OS. The easiest way to do this is to select the Compatibility Mode check box and then choose a version of Windows in which the software ran flawlessly. The version from which you can choose include the following:

- Windows 95
- Windows 98/Windows Me
- Windows XP (with Service Pack 2)
- Windows XP (with Service Pack 3)
- Windows Vista
- Windows Vista (with Service Pack 1)
- Windows Vista (with Service Pack 2)
- Windows 7

You might also see options for Windows 7 with Service Packs.

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While Windows 8 does a reasonable job of accommodating software through Compatibility Mode, it should be stressed that this doesn't run the software in an emulator. What happens is that the program will be marked in such a way that when you run it, Windows 8 knows that it must treat certain aspects of it—such as DLLs—differently from how it would a native application.

Because this isn't emulation, not all the features of the previous operating systems will work. As in the example I gave earlier, Microsoft Photodraw v2 can't work with the current version of Direct3D and thus reports an error when you try to do 3-D work.

The Settings options such as Reduce Color Mode are for software that is either *really* old or that absolutely *must* have Administrator rights.

For the former, you can run software in an 8-bit or 16-bit color mode to emulate the effects of a CGA or EGA graphics card (remember those?) or run it at a maximum resolution of 640 by 480 pixels if it is misbehaving. You can also disable the display scaling feature of Windows 8 if this is making the application misbehave, too.

You might have detected a hint of caution when I mentioned software that absolutely must have Administrator privileges, and you'd be quite correct. Not only does running apps as an Administrator potentially pose an increased security and stability risk (as such software can do whatever it likes with your operating system and files) but it is usually a sign of sloppily written code, which presents yet more risks. Although you can select this check box if absolutely required, I would always advise against it.

INSIDE OUT

Managing application compatibility for all users

You might see an option to just change application compatibility for yourself or to do so for all users. If you are automatically elevating a program to Administrator status, I would advise against doing this for all users, unless it's completely necessary.

Troubleshoot Problems with Application Compatibility

There are two ways for you to troubleshoot compatibility issues in Windows 8. One way is to click the Run Compatibility Troubleshooter button, which is located at the top of the Compatibility tab in the properties dialog box for any given program. You can also access this by clicking the program's icon in the folder view and running it from the settings panel that appears (see Figure 12-4).

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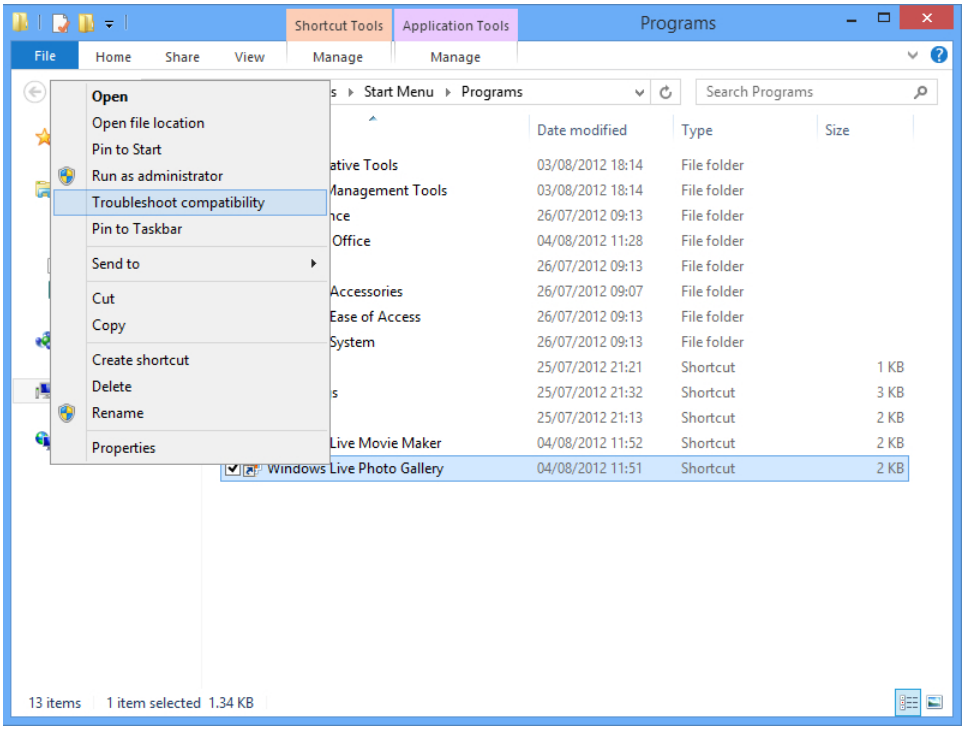

Figure 12-4 Launching the Compatibility Troubleshooter

This troubleshooter will attempt to auto detect the compatibility settings for the program and if it cannot, which is a reasonable likelihood, given the amount of software with which it has to be able to work, it will ask you some questions about the program, as demonstrated in Figure 12-5.

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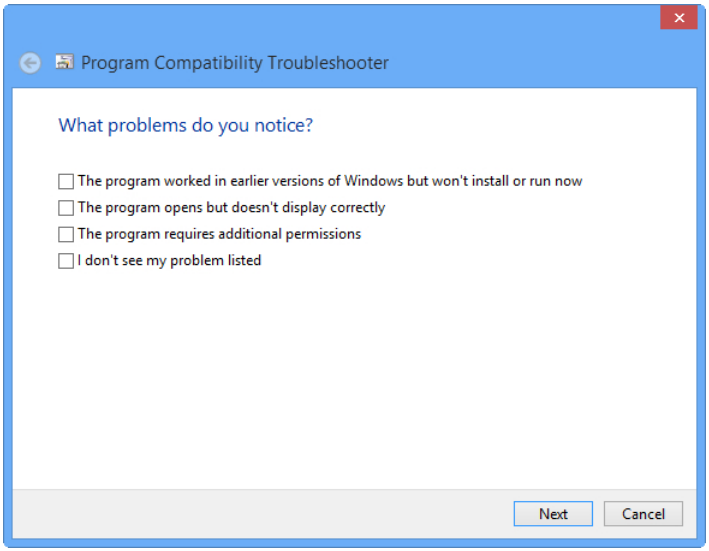

Figure 12-5 The Program Compatibility Troubleshooter Wizard

This is really just a wizard front-end for the manual settings, but it can be a very useful way to rectify problems with some programs that are causing issues in Windows 8.

INSIDE OUT

Auto-detecting compatibility problems

Windows 8 will occasionally (usually upon installation of a program) detect that something isn't quite right with a program and that you will probably need to run the Program Compatibility Troubleshooter. If this is the case you will be automatically prompted by the operating system.

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The Challenges of Using XP Software in Windows 8

When Microsoft released Windows Vista, it changed the entire core operating system underneath and moved to a new OS kernel. This included making changes to hardware drivers, the addition of graphics hardware acceleration for programs, and much more. The upshot of this is that a great deal of older legacy software simply doesn't work in Windows 8.

As operating systems, Windows 8 and Windows XP are just completely different animals in the way they work, in how they manage programs, and in the underlying technologies at work in the OS.

This makes modern Windows software considerably more stable than that running in Windows XP, Windows ME, Windows 98, and Windows 95. This is a good thing, right?

Well, as I said, you might have older software that you just don't want to give up, such as my beloved Microsoft Photodraw. You might however be in a business environment where for reasons of cost, development, or compatibility (but usually cost…), you absolutely have to use either software that runs only in Windows XP or, worse, a web system that works only in Internet Explorer 6.

INSIDE OUT

Forget Friday the 13th, here's Internet Explorer the 6th

I'm not joking when I compare Internet Explorer 6 (IE6) to a horror movie. It was developed at a time when Microsoft had 99 percent of the total web browser market and before websites such as Amazon had emerged. Indeed, the best Internet connection most people could get was a slow 56k dial-up.

IE6 is not equipped for the horror of the modern Internet. It is full of security holes and a management nightmare. If you want to ensure that you *definitely* get a malware infection on your computer, continued use of IE6 is the way to do it!

Managing XP Software Compatibility

So, how can you run legacy software in Windows 8? Well, the Program Compatibility Troubleshooter will help, but not always. Remember that many features in Windows changed beyond recognition with Vista, and if you have anything but the simplest program—for example one that calls features within the OS that have changed in any way—it will malfunction, report an error, or perhaps even crash.

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The best advice I can honestly give you is to try to find a newer alternative. I know what I said about Microsoft PhotoDraw, but that particular software only malfunctions if I try to render text or an object in 3D, which I almost never want to do. Other than that it doesn't crash, doesn't need Administrator rights, doesn't access the Internet, and isn't a stability or security risk.

After all, what's the point in installing a hugely robust and reliable operating system like Windows 8 if you're only going to run software that's going to crash the system, possibly affecting Windows 8 components in the process, to damage the system? That question, by the way, was entirely rhetorical.

Summary

It's common for people to use older software on modern computers, usually because it does exactly what you want, is easy to use, or there's nothing else available to do what it does. Change isn't always easy or welcome, and using new software requires a learning curve. However, if new software does exist that can perform the same or a similar task, it's well worth considering taking the leap, because older software is more likely to cause system problems on your computer overall.

That said, the program compatibility in Windows 8 is every bit as good as in Windows 7, and it's actually very rare that you'll find software that won't work with a tweak to the settings. It's easy to set the compatibility options for a program; Windows 8 takes care of all the hard work underneath so that you don't have to worry about it.

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CHAPTER 13

Responding to Viruses, Malware, and Other Threats

What Are the Threats to You and Your Computer? 215
Malware and Windows 8 on ARM 220
Repelling an Attack 221
Identifying an Attack 226
How to Create a Strong Password 227
Manually Removing Malware from Your Computer . . . 229

Windows 8 is the first version of Microsoft's operating system (OS) to come with built-in antivirus protection in the form of Windows Defender (a rebranded version of its free Microsoft Security Essentials). It is also the most secure version of Windows ever, especially on newer hardware with UEFI firmware. Here, the new *Secure Boot* system can prevent unauthorized software—namely malware and rootkits—from starting with the computer and infecting it.

Windows 8 is not completely immune to attack, however. The inclusion of the Hyper-V virtualization software, into which you can install any OS, including the very insecure Windows XP, presents its own challenges. There is also the fact that most malware today is designed to trick the user into giving it permission to infect the machine and steal your sensitive and personal information, as opposed to using brute force.

In this chapter, I will discuss what threats you and your computer face and how you can keep yourself safe from them. Should a virus infection strike, though, I will also show you how to manually remove it and highlight some of the excellent tools that are available to help.

What Are the Threats to You and Your Computer?

So, what are the threats to your computer and your personal data? I want to talk through these first to look at what damage can be inflicted upon you to your computer and how it can affect you personally.

Today, all viruses and criminal software fall under the umbrella name *malware*. There are very specific types, however, and they can be very different from one another.

Viruses

These are the *traditional* types of infection on a computer. My first ever virus hit a computer I owned back in 1991. All it did was play "Yankee Doodle Dandy" to me every day at five o'clock.

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In a way, I was lucky; that's all it did. Many viruses can be extremely nasty, however. There was a much worse threat ten years later when several major viruses suddenly attacked computer systems worldwide. The Kournikova, Sircam, and Code Red viruses are just three of the viruses that everybody in the technology industry was talking about in 2001.

Now, viruses tend to fall into the *bot* category (more on this in just a bit) due to the commercialization of the malware industry that's sprung up because of trends that include Internet shopping. Occasional stand-alone viruses do still exist, though, and a common example is the "fake antivirus package" (see Figure 13-1). These propagate through websites that pop-up alerts telling you that dozens, if not hundreds of pieces of malware have been found on your computer, but they can be removed if you download their anti-virus software.

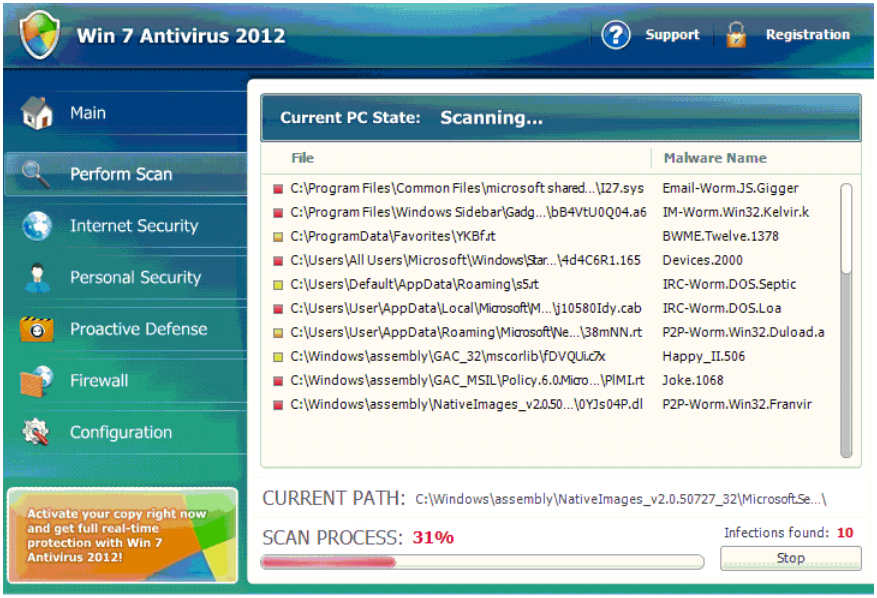

Figure 13-1 A typical fake anti-virus package

This fake software will again say that your computer is loaded with malware but that it can't remove them until you buy the full version. Once you have done this it will miraculously claim that all the malware has been removed, but not before you've surrendered all your credit card and personal information to purchase it and given it permission to install something even nastier on your computer.

The reality is that there never was any virus infection on your computer. In fact, it's impossible for any website to detect malware on your computer, unless you *specifically* give the website permission to do so, such as some of the free online virus scanners that I will talk about later in this chapter.

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CAUTION!

If a website ever tells you it has detected malware on your computer and that it can be removed if you download their software, DON'T GO NEAR THAT BUTTON! This is a scam and you should ignore it.

Trojans

"Beware Greeks bearing gifts," as the saying goes. According to the legend, over 3,000 years ago during the Trojan War (roughly 1,190 BC), the Greeks left a large wooden horse as a gift to the city of Troy. Lurking inside, however, was a force of soldiers that broke out of the horse at night and sacked the city. So, technically, if we want to be pedantic about it, it was actually a Greek horse, not a Trojan horse, but that just doesn't roll off the tongue quite as well.

Anyway, Trojans on computers work in a similar vein. They will always be malware wrapped in a seemingly innocuous package, such as a codec required to play a video or a game.

It is this last method that is commonly used to infect smartphones with malware and the former that's popular on computers. A good example of this is YouTube videos that require you to download a codec to play a video. If you have the Adobe Flash player installed on your computer or an HTML5-compatible browser, you should *never* need to install a codec to view YouTube content!

Trojans are also commonly hidden within Internet browser toolbars and plug-ins, which are things that have long been an annoyance to me and others. I would always advise against installing toolbars into your web browser and you need to be vigilant when installing some desktop software on your computer because some will try to install toolbars from Microsoft, Google, Ask, and more.

Toolbars are completely unnecessary and can only have the effect of slowing down your web browser. Why do you need to install a toolbar for search when you already have a search box in the browser? If you want to use Google search by default in Internet Explorer, it's simple enough to define it as such, and as interesting and amusing as "cartoonizing" your toolbars might be, I'd never advise anybody to install one.

Fortunately, we're slowly moving away from toolbars. The version of Internet Explorer 10 in Windows 8 doesn't support any toolbars or plugins, thus greatly increasing security, and if you have a Windows 8 ARM tablet, you won't find them there, either.

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The widespread adoption of HTML5 also precludes the need for toolbars and plugins. Everything can now be done by the website itself. I would therefore strongly advise that you avoid these wherever possible; you never know what might be hidden in the payload.

Macro Viruses

One of the most popular ways to deliver malware has always been through documents and macro viruses. These are small snippets of code buried in popular file types, such as Microsoft Word, Microsoft Excel, and PDF documents that can trigger malware downloads and infections on your computer.

If you are using Microsoft Office 2007 or later, the protection against this type of attack is extremely good, which is why Adobe's PDF portable document format is the current weapon of choice.

We all need to read PDF files, and the format is ubiquitous, but Windows 8 comes with its own PDF reader, so you don't need to install Adobe's version. It is this software that triggers the macro virus, and they are commonly written to exploit vulnerabilities in the Adobe Reader program.

If you do have or want the Adobe Reader installed on your computer, I recommend that you keep the Adobe updater service running and install all new security and other updates as they are released.

Keyloggers

The next category of malware are programs that record what you type on your computer, including website addresses, usernames, passwords, and credit card details and then pass that information on to criminal gangs.

And let me dispel the myth that using an on-screen keyboard defeats keyloggers. This is absolutely untrue for the simple reason that the messages sent to the OS from either a physical or a virtual keyboard are the same! You should always be careful to run regular virus scans.

INSIDE OUT **Fooling the keyloggers**

Some antivirus packages now come with special virtual keyboards that can be used for logging on to sensitive websites such as banks. Although these keyboards, which scramble the messages a keylogger can detect, aren't completely foolproof, they do offer an additional and very valuable layer of defense on your computer.

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Bots

Probably the most common type of modern malware is bots. These pernicious little programs, which take their name from a truncated version of "robots," sit silently on your computer until activated by a criminal. Bots are connected to networks, sometimes with hundreds of thousands of computers in them, all infected and all for sale to criminals.

They can be programmed to do many things including sending spam emails and subjecting companies, organizations, and even governments to cyber attack. Bots are often used in Distributed Denial of Service Attacks (DDoS), which are a new weapon used by criminals (for the purposes of corporate blackmail) and even governments (to attack the infrastructure of other countries).

It's odd to think at a time when the world is, comparatively speaking, quite peaceful that some countries will buy access to bots so that they can target the power, communications, or other infrastructure of an enemy.

The old patriotic phrase "Your country needs you" now applies to keeping your computer free from bots, because it is through these that future wars will be fought.

Rootkits

Here, we have by far the nastiest type of malware. The rootkit is designed to bury itself deeply within the base (the root) of the operating system to both gain elevated privileges and make their presence extremely difficult to detect.

If your computer is infected with a rootkit, removal is usually extremely difficult and you will commonly have to format the hard disk (possibly all of your hard disks) and reinstall Windows from scratch.

Windows 8 does include a new technology, however, called Secure Boot that takes advantage of a feature found in the new UEFI firmware on motherboards. This feature prevents unauthorized code from executing at boot time and can prevent rootkits from taking hold. It is a condition of sale for Windows 8 that all OEM computers come with UEFI motherboards with Secure Boot enabled.

CAUTION!

It is common for hackers to embed rootkits (and other malware such as bots) into pirated software and operating systems. If you download a pirated copy of Windows 8, Microsoft Office, Adobe Creative Suite, or any other software, you are running an extremely high risk that it will be infected with malware. If you download an operating system, the odds of a rootkit infection are very high, indeed.

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Spam

Probably the most annoying but most harmless threat on modern computers is spam email. For those of you outside Great Britain who don't get the joke, spam (its original name was spiced ham) is a processed meat made from pork, salt, water, and potato starch that was a staple food for the British population during World War II. It was, and still is, much hated. Even the classic comedy troupe Monty Python made a famous sketch in 1970 wherein two customers tried to order food in a café where seemingly everything on the menu had spam in it. This even included the "Lobster Thermidor aux crevettes with a Mornay sauce, served in a Provençale manner with shallots and aubergines, garnished with truffle pate, brandy and a fried egg on top, and spam."

Thus when a name needed to be coined to label the ever increasing volumes of unwanted email that we all receive, spam became the obvious choice.

However, some spam can still be malicious, and it is commonly used by criminals to trick you into buying what you are led to believe are genuine products. This is done to extract personal information from you, such as date of birth, passwords, and credit card details. If the products even exist at the end of the day, they are always fake and can be extremely dangerous.

INSIDE OUT

Beware the little phishes

Phishing emails are those that look like they're from a reputable bank or business that attempt to glean information from you by asking you to log on to your account to confirm your security details, or something similar. The simple rule here is that *no* bank or business will *ever* email you asking you to log on to your account! If you receive such an email you should forward it to *abuse*@companyname.*com* (where *company-name* is the name of the organization that the ruse purports to be) to alert them that a phishing attack is taking place.

Malware and Windows 8 on ARM

The theory goes that modern operating systems running on ARM processors are immune to malware attack. This isn't true, but it's easy to see where people might get that impression. Both Apple and Microsoft require software developers to pay to become registered developers for the iPhone, iPad, Windows Phone, and now also apps for the Windows 8 Marketplace. Each app that is submitted is scanned by Apple and Microsoft for malware

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and if any malware is later found in an app, the developer stands a very good chance of having its account revoked and being banned from future distribution.

Google, conversely, does none of these things, which is why there is a flourishing malware problem on Android smartphones and tablets. The company does regularly take down malware-laden apps from its store, but it doesn't monitor app submissions in the way that Apple and Microsoft do.

You would think then that iOS, Windows Phone, and Windows 8 ARM tablets are completely secure and immune to malware. Not so! Review what I just said a moment ago: "if any malware is later found in an app."

The very fact that all apps are scanned acts as a deterrent to malware writers, and this is what is mostly responsible for the very low incidence of malware that manages to get on to these platforms. These platforms also don't support plug-ins and toolbars, and although the desktop does still exist on Windows 8 tablets, you can't install any software onto it.

Malware writers then can only really resort to trickery through websites to try to get you to reveal personal and sensitive data through phishing emails.

Generally speaking then, Windows 8 on ARM architecture can be considered secure. Third-party companies will always release anti-virus software for these platforms, though, and both iOS and Windows Phone have some available for purchase. We also need to take into account that malware isn't a set type of software; it changes in ways that can be difficult to predict.

All I can say then with any assurance is that while Windows 8 on ARM is *generally* secure, you should always be vigilant and install an antimalware app if you find one that's had good reviews.

Repelling an Attack

So, how can you repel a malware attack in Windows 8? To be honest, much of the time the operating system will do it for you automatically. Secure Boot will help keep rootkits at bay, User Account Control (UAC) will help prevent malware from running, Internet Explorer 10 in Windows 8 will prevent Trojans from being installed, and so on.

There are a few caveats, though, and this is because there is still a weak link—the user. This is the one element that arguably should never be allowed to be a part of the computer's ecosystem.

It was comedy writer Douglas Adams who famously said, "Human beings, who are almost unique in having the ability to learn from the experience of others, are also remarkable for their apparent disinclination to do so."

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Most computer users know somebody who has been the victim of a computer virus, identify theft, suspicious download, or phishing email, but that doesn't stop us from clicking "Yes" to everything online, safe in the knowledge that we're secure in our own home and nothing could harm us here.

I'm being a bit harsh here, really, because I have already said that malware writers and criminals are getting better all the time at tricking us into believing something is genuine and safe when in fact it's not. As human beings, though, we're all fallible and can be distracted, tired, or any number of things that can cause us to inadvertently click "Yes" when we meant "No."

So, what tools come with Windows 8 to help us repel attacks and how can they be used?

Windows Defender

Windows 8 is the first version of the operating system to come with antivirus protection built in. However, given that the name of this feature is Windows Defender, some of you might be skeptical, so I need to be clear here and state unequivocally that this *is* actually a full antivirus program.

Here's why I'm so emphatic about this: Windows Defender has been a part of Windows since Vista and has also been available for Windows XP for years. *That* Windows Defender, however, was just a fairly basic antimalware package.

The *new* Windows Defender in Windows 8 (keep up, please) is a rebadged version of the Microsoft's full-blown Security Essentials antivirus product that is itself based on the scanning engine from its ForeFront security product for Windows Server.

It is set up with the default configuration when Windows 8 is first installed, in that it will periodically check for updates, all of which come through Windows Update, so please don't turn it off; it will scan your computer for threats regularly.

It is maintained through a desktop program (see Figure 13-2), but there is no Start Screen interface for Windows Defender. This is because it shouldn't actually be necessary and also to reduce clutter and keep the things that people don't want to have to worry about, out of the way.

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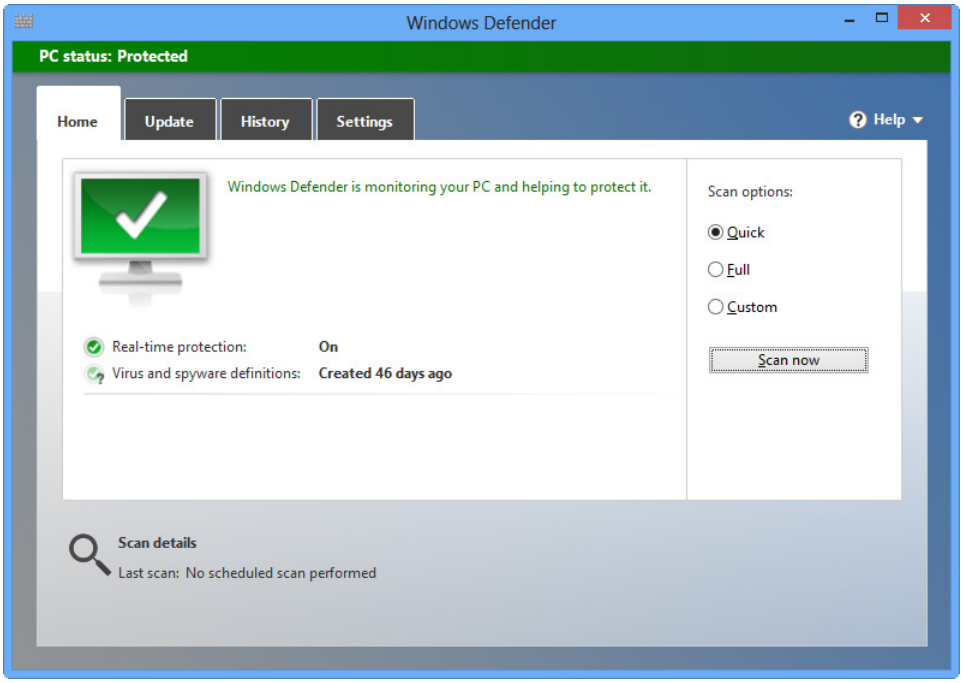

Figure 13-2 Windows Defender, not to be confused with Windows Defender

INSIDE OUT

Disabling Windows Defender when you want to use third-party protection

If you prefer to use a third-party antivirus solution, you can turn off Windows Defender. To do so, open the Windows Defender panel, click Settings, and then click Administrator. In the window that opens (see Figure 13-3), clear the Turn On Windows Defender check box to disable it.

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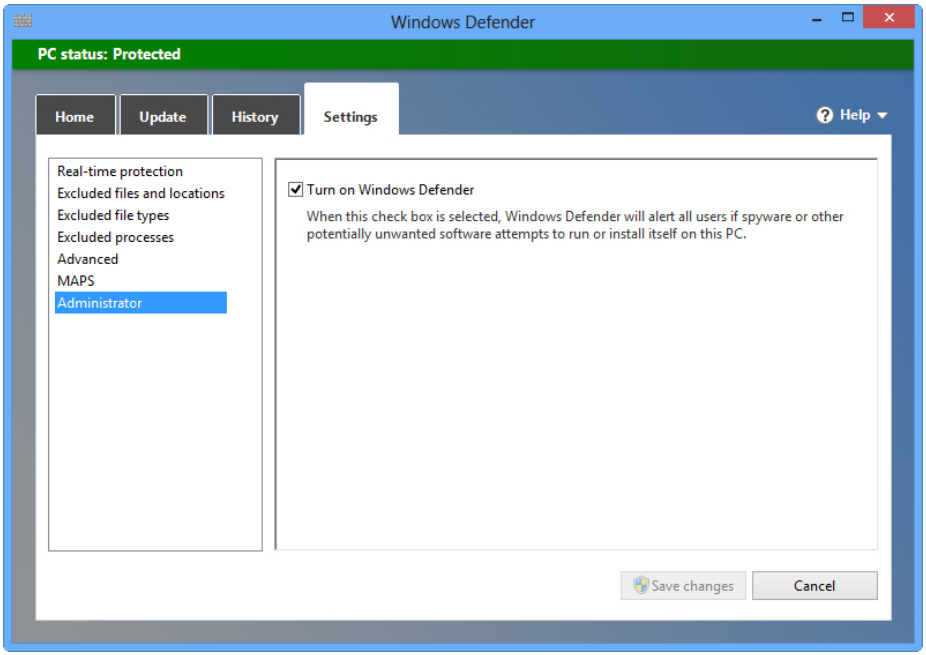

Figure 13-3 Disabling Windows Defender

INSIDE OUT

Only run one antivirus package

Although there are generally no limits to the number of anti-malware packages you can run on your computer, you should have only a single antivirus package installed and operating at any given time. This is because antivirus packages can interfere with one another and compromise your computer's security.

Windows Malicious Software Removal Tool

Once a month, on what is known as *Patch Tuesday*, Microsoft releases the latest updates for the various versions of Windows and Office. Included in these updates is a program called the Microsoft Windows Malicious Software Removal Tool.

This program (see Figure 13-4), which is updated only through Windows Update and not available to run separately from the Start screen, works as additional protection against

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viruses and malware on your computer. The program is also available to download separately from the Microsoft website at *www.microsoft.com/security/malwareremove/default.aspx*.

Figure 13-4 The Microsoft Windows Malicious Software Removal Tool

The Malicious Software Removal Tool scans for and removes only a limited number of viruses and malware. It is not a replacement for other antivirus and anti-malware programs. I recommend the following third-party anti-malware software.

INSIDE OUT

Always keep antivirus and anti-malware software up to date

Your antivirus and anti-malware software packages can keep your computer protected only if you keep them up to date and set them to run regular scans. It's always wise to be proactive and not reactive with your computer's security.

The Action Center

From the desktop, the Action Center shown in Figure 13-5 is the central location for all your security, maintenance, and alert messages in Windows 8. It is signified on the taskbar by a white flag icon in the system tray. When you first click it, you are shown only those messages that are pending, which keeps things simple and helpful. If you want, you can open the full Action Center from this alert box.

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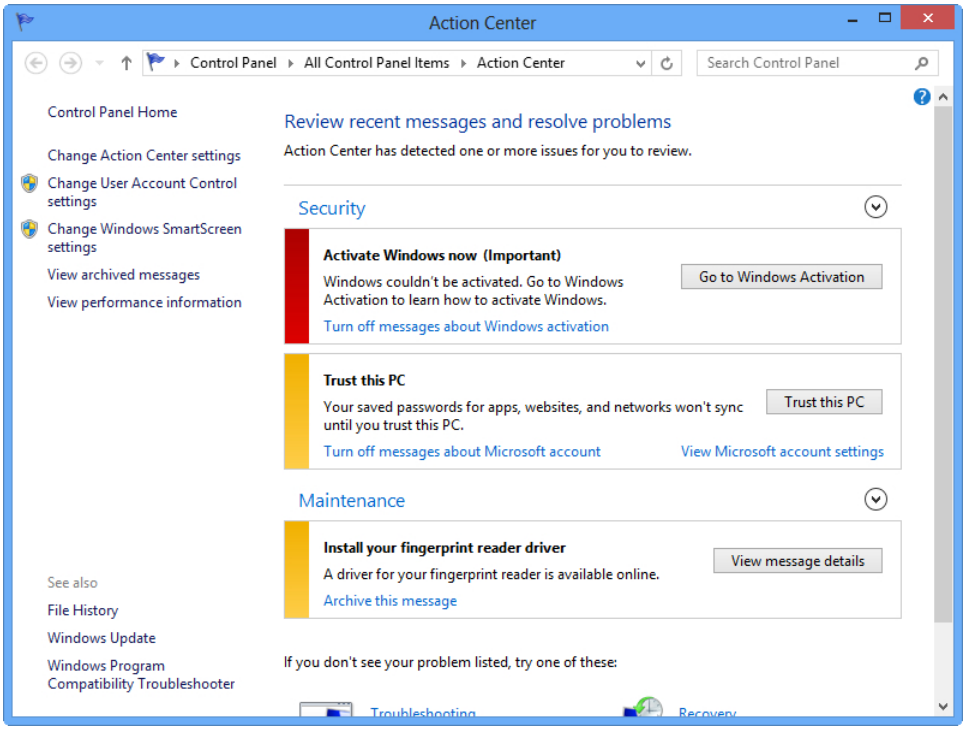

Figure 13-5 The Action Center

Messages in the Action Center are color coded as red, amber, or green, depending on their severity. Each section also comes with a collapsible panel so that you can hide specific messages that you don't need to see, but critical and important messages will always be displayed.

Identifying an Attack

It's almost impossible for a computer to be infected with a virus or Trojan without a human at some point permitting the infection the needed access. In this section, I share some guidelines for ensuring that you keep your computer safe from unwanted software.

Look for the Padlock

Most attacks today will come from the Internet. This is probably where you probably spend more time than ever before, shopping, banking, and visiting websites where you provide all types of personally and commercially sensitive information, so you need to be careful about what information you give and to whom you give it.

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Figures 13-6 and 13-7 show an example of a safe website (from two different vantage points). You can see that the website is safe because there is a padlock in the address bar (in these examples to the right of the website address). Clicking the padlock brings up details about the security certificate associated with the website. You can see in the figure that the certificate is registered to the address paypal.com, which matches the address of the website in the address bar.

Figure 13-6 The padlock, as seen in Internet Explorer 10

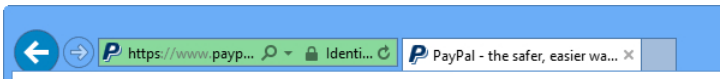

Figure 13-7 The padlock, as seen in Internet Explorer 10 Desktop

INSIDE OUT

Stay safe online

You should never submit personal or sensitive information (such as a password) to a website that does not display the padlock. Some pages do not display a padlock because they might consider the information you are entering—your name for instance—to not need to be encrypted when its collected through the website, but any page in which you enter details such as date of birth or credit card numbers should always display the padlock. Note that different web browsers might display the padlock in different locations, at the top or bottom of the browser window.

You will see that one of the things modern web browsers do is highlight the actual domain you are visiting online, this being the .com, .co.uk, and so on. In these examples, you can see that we are at paypal.com. If this displays anything else, and yet we were expecting to be at PayPal, we have probably been misled.

How to Create a Strong Password

Many people use common dictionary words and names as passwords. These are the weakest passwords you can use, and they can be cracked within seconds by any modern computer. To create a strong password, you should use a mixture of uppercase and lowercase letters, numbers, and symbols.

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Examine your password to determine where you can substitute letters for other characters. Can you slip a capital letter into the middle, substitute an i or an L for a 1, or use a % instead of an o? For example, you could spell the password "microsoft" as "m1cr%S0ft." The inclusion of the characters 1, %, capital S, and 0 make the password much more secure.

> **Note**
>
> **You should avoid using the symbols * (asterisk) and ? (question mark) in passwords. These characters are used to represent wildcards in searches; therefore, many services do not allow their inclusion in passwords.**

Table 13-1 shows how long it could take a criminal with an ordinary computer to crack passwords of varying numbers of characters. Where do your passwords fit in the chart?

Table 13-1 **How Long Does It Take for a Computer to Crack a Password?**

Number of Characters	Numbers Only	Upper or Lowercase Letters	Upper or Lowercase Letters Mixed	Numbers, Upper and Lowercase Letters	Numbers, Upper and Lowercase Letters, Symbols
3	Instantly	Instantly	Instantly	Instantly	Instantly
4	Instantly	Instantly	Instantly	Instantly	Instantly
5	Instantly	Instantly	Instantly	3 secs	10 secs
6	Instantly	Instantly	8 secs	3 mins	13 mins
7	Instantly	Instantly	5 mins	3 hours	17 hours
8	Instantly	13 mins	3 hours	10 days	57 days
9	4 secs	6 hours	4 days	1 year	12 years
10	40 secs	6 days	169 days	**106 years**	**928 years**
11	6 mins	169 days	16 years	**6k years**	**71k years**
12	1 hour	12 years	600 years	**108k years**	**5m years**
13	11 hours	314 years	21k years	**25m years**	**423m years**
14	4 days	8k years	778k years	**1bn years**	**5bn years**
15	46 days	212k years	28m years	97bn years	2tn years
16	1 year	512m years	1bn years	6tn years	193tn years
17	12 years	143m years	36bn years	374tn years	14qd years
18	126 years	3bn years	1tn years	23qd years	1qt years

k = Thousand (1,000 or 10^{-3}); m = Million (1,000,000 or 10^{-6}); bn = Billion (1,000,000,000 or 10^{-9}); tn = Trillion (1,000,000,000,000 or 10^{-12}); qd = Quadrillion (1,000,000,000,000,000 or 10^{-15}); qt = Quintillion (1,000,000,000,000,000,000 or 10^{-18})

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I recommend that any password(s) you use comprise a minimum of 10 to 14 characters, utilizing the character combinations as highlighted in bold in Table 13-1.

One very important consideration is Moore's law. This is a rule of thumb in the computer industry that postulates that the number of transistors that can be fitted on an integrated circuit doubles approximately every two years. This means that the processing power of computers also increases (not quite necessarily at the same rate, but still fast) every few years. What this means is that hackers can take advantage of ever increasing speed to crack passwords with sheer brute force.

As an example of this, in the previous edition of this book, *Troubleshooting Windows 7 Inside Out*, the most up-to-date figures at the time quoted 2.25 years for cracking an 8-digit password that contained uppercase and lowercase letters, numbers and symbols. This figure is now down to 57 days, as you can see in Table 13-1.

The other consideration is how much computing power is thrown at the task. Some modern graphics cards are capable of being used for purposes such as this because they are designed to crunch huge numbers quickly, unlike mainstream processors which need to be more "jacks of all trades." If a powerful graphics card, twin graphics card system, or even a multicore server is given the task of cracking passwords, the times stated in Table 13-1 will be even less. As this technology becomes cheaper, it becomes easier for criminals to crack even complex passwords.

INSIDE OUT **Use an online password checker**

Some excellent online password checkers exist that analyze how secure your current password is and help you to create really strong ones. My two favorites are *www.howsecureismypassword.net* and *www.grc.com/haystack.htm*.

Manually Removing Malware from Your Computer

If your antivirus software cannot remove a virus, you might have to remove it manually. This can be a complex process and usually involves deleting files, removing Windows services, and removing entries from the Windows 8 registry.

The first thing to do—either in Safe Mode with Networking or, preferably, on an uninfected computer—is to search the Internet for instructions on manually removing the virus. Use the name of the virus provided by your antivirus software.

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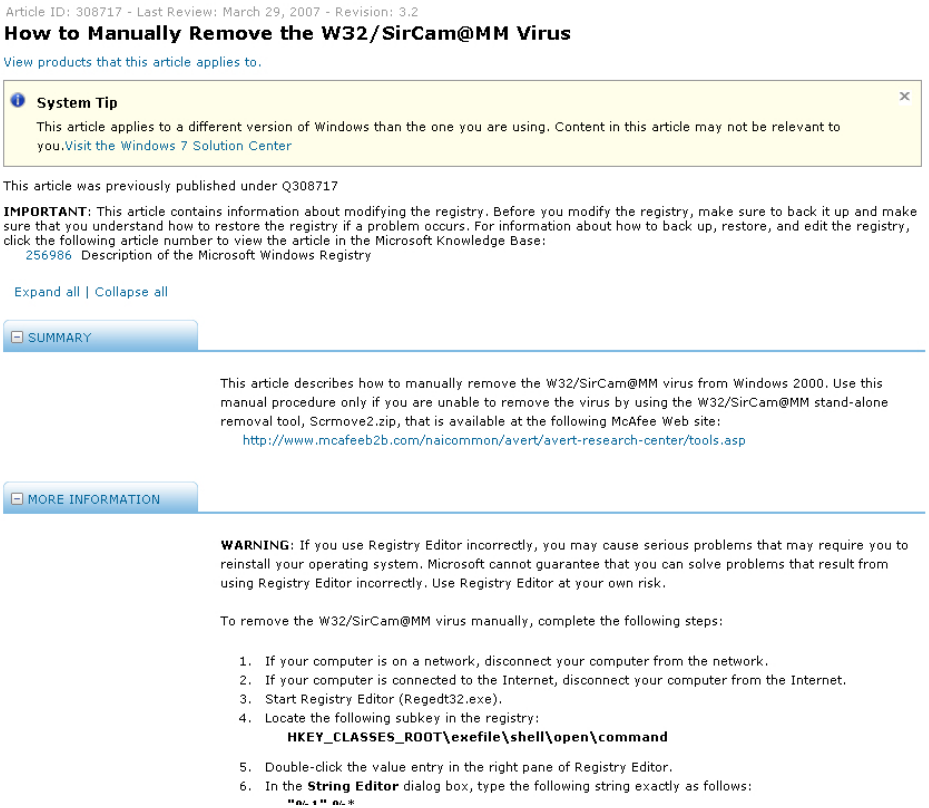
Figure 13-8 portrays an example of the instructions Microsoft provides on its website for manually removing the W32/SirCam@MM Virus. This is one of the major viruses from 2001 that I mentioned at the beginning of the chapter.



Article ID: 308717 - Last Review: March 29, 2007 - Revision: 3.2

How to Manually Remove the W32/SirCam@MM Virus

View products that this article applies to.

System Tip

This article applies to a different version of Windows than the one you are using. Content in this article may not be relevant to you.Visit the Windows 7 Solution Center

This article was previously published under Q308717

IMPORTANT: This article contains information about modifying the registry. Before you modify the registry, make sure to back it up and make sure that you understand how to restore the registry if a problem occurs. For information about how to back up, restore, and edit the registry, click the following article number to view the article in the Microsoft Knowledge Base:

256986 Description of the Microsoft Windows Registry

Expand all | Collapse all

SUMMARY

This article describes how to manually remove the W32/SirCam@MM virus from Windows 2000. Use this manual procedure only if you are unable to remove the virus by using the W32/SirCam@MM stand-alone removal tool, Scrmove2.zip, that is available at the following McAfee Web site:

http://www.mcafeeb2b.com/naicommon/avert/avert-research-center/tools.asp

MORE INFORMATION

WARNING: If you use Registry Editor incorrectly, you may cause serious problems that may require you to reinstall your operating system. Microsoft cannot guarantee that you can solve problems that result from using Registry Editor incorrectly. Use Registry Editor at your own risk.

To remove the W32/SirCam@MM virus manually, complete the following steps:

1. If your computer is on a network, disconnect your computer from the network.
2. If your computer is connected to the Internet, disconnect your computer from the Internet.
3. Start Registry Editor (Regedt32.exe).
4. Locate the following subkey in the registry:
   HKEY_CLASSES_ROOT\exefile\shell\open\command
5. Double-click the value entry in the right pane of Registry Editor.
6. In the **String Editor** dialog box, type the following string exactly as follows:

Figure 13-8 Typical instructions for removing a virus manually

The instructions provided by Microsoft or other third-party antivirus vendors, such as Symantec and McAfee, are sometimes complicated. However, the following instructions might help you make sense of a complicated procedure.

INSIDE OUT Use Your Smartphone

Modern smartphones all have a web browser, and this can be a good way to search for the removal instructions for a virus if you do not have access to another computer.

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1. Note the name of the virus or malware that has infected your computer, as provided by your antivirus or anti-malware program.

2. On an uninfected computer, if possible, search online for ***virusname*** **manual remove**. Choose a link from Microsoft or one of the major security vendors I mentioned in the free online scanner section, earlier in the chapter.

3. Print out the instructions if possible so you have them in hand. You will need access to these Windows features:

   - File Explorer, accessed via the Start screen or taskbar.

   - Services panel, which you can access by opening the Start screen and searching for **services.msc**. This will provide a list of all the Windows 8 components including plug-in and third-party services that make up the operating system. You can view them by status, which you might find helpful because Windows 8 on your computer will not need every service that ships with the operating system. Right-click any service and then in the settings panel that appears, select Properties. In the dialog box that opens, you can disable the service.

   - Windows registry, which you can access by opening the Start screen and searching for **regedit**. This is the database of settings for the OS and all of your software. I cover advanced tasks with Windows registry in Chapter 20, "Using Advanced Repair Methods."

CAUTION!

You should always exercise caution when disabling a Windows service or changing a registry setting. Changing a setting that is critical to the operation of Windows 8 or a program can cause a malfunction or even lead to the entire operating system becoming unresponsive, even after restarting the computer.

Removing Malware by Using Third-Party Bootable Tools

Many types of common malware will do just about anything to prevent you from removing them while Windows is running. For these circumstance, you'll need to boot from another device. There are some very useful third-party and Microsoft tools from which you can start your computer to help with malware removal.

These can be burned to a CD or DVD or used to create a bootable USB pen drive. You will need to ensure that your computer's BIOS or UEFI is set to boot from an optical disc and/or a USB drive *before* it boots from the physical hard disk.

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You should *always* download the latest version of these products before using them to ensure that their virus definition databases are up to date.

Windows Defender Offline

Microsoft now has a free tool from which you can boot your computer to remove viruses and malware. Windows Defender Offline can be run from a CD, DVD, or USB Flash Drive that has at least 250 Mb available. You can access this tool at *windows.microsoft.com/en-US/windows/what-is-windows-defender-offline*.

McAfee Free Tools

McAfee's free online tools have long been a favorite for virus removal, and there are now a great many of them. The most useful, though, for malware removal are the following:

- **GetSusp** Use this for the manual removal of viruses and malware.
- **RootkitRemover** Use this for removing rootkit viruses from a computer.
- **Stinger** Use this to remove common fake antivirus software.

You can access this tool at *www.mcafee.com/us/downloads/free-tools*.

Does Your AntiVirus Software Include a Bootable Tool?

Some commercial third-party antivirus solutions now also now come with bootable tools for removal of malware. These can be very valuable, and if you are weighing which antivirus package to buy, it could swing your decision.

Malware Removal by Using Another Computer

If Windows 8 cannot start even in Safe Mode because of an infection, you can still remove the virus, but you will need another computer or laptop to do so. You can physically remove the infected hard disk from your computer by unplugging its power and data cables. (Always ensure that your computer is switched off and disconnected from the main power source before you do this.) You can connect this hard disk to another computer either by plugging it in inside the case of the alternative desktop computer or by putting it into a USB removable–hard disk caddy (recommended). You can then start this other computer, ensure that it's antivirus and anti-malware software has been updated in advance, and run full scans passively on the infected disk. I say "passively" because you need to make certain that you don't open or run any files on the infected drive during this process because this will risk infecting the second computer with the virus or malware.

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Restoring Windows 8 from a Backup

A good way to quickly and easily remove virus infection is to restore Windows 8 from a clean system image backup. If you created such a backup, you can use it to restore your copy of Windows and all of your software exactly as they existed when the backup was made.

This might be inconvenient, especially if the backup was created a long time ago, because there will be many updates and new software to install. However, it can be a quick and easy way to remove a virus infection.

INSIDE OUT

Run a full virus scan after restoring from a backup

You should always ensure that your antivirus and anti-malware packages are fully up to date and run full scans with them after restoring Windows 8 from a system image backup, because a virus infection might sit in a file on your hard disk. If this is the case, you could re-infect your computer the next time you open the file.

Virus Corruption of the BIOS

Most BIOS firmware comes with built-in protection to defend against viruses rewriting or erasing the BIOS code. Although this feature can on rare occasions interfere with certain hardware, it can also be very useful. You will need to turn off this feature to update the firmware in your BIOS, as shown in Figure 13-9.

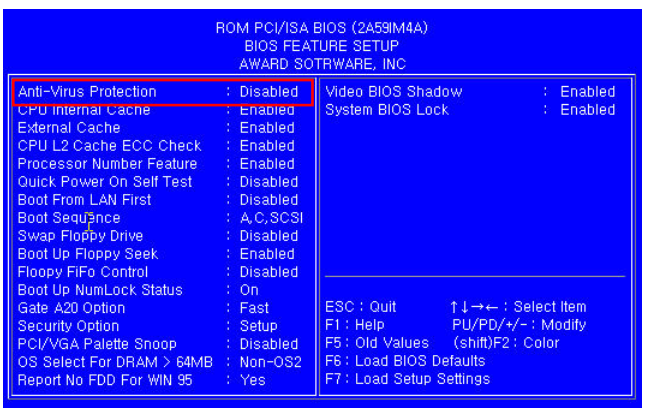

Figure 13-9 BIOS-level virus protection

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In some extreme cases, viruses have been known to rewrite a computer's BIOS chip on the motherboard. If this happens, your computer will no longer communicate with Windows and won't be able to start, as demonstrated in Figure 13-10.

Figure 13-10 A corrupt BIOS preventing a computer from booting

In Chapter 9, "Managing Hardware," I describe how to reset the computer's BIOS. This should be the first thing to try if your computer does not start after a virus attack. Sometimes, however, this won't be enough, and you will need to upgrade the firmware in the BIOS by using a utility provided by your motherboard manufacturer. This software is usually on a CD that comes with your motherboard or computer, and you can find the firmware update on the manufacturer's website.

You should consult the motherboard manual for instructions on exactly how to update the BIOS firmware, but normally you need to create a bootable CD, USB Flash Drive, or even a floppy disk on another computer by using the supplied software. You start the infected computer using this disk, and the utility upgrades the BIOS firmware. This usually fixes the problem.

CAUTION!

You should always be very careful upgrading the firmware for your motherboard's BIOS, because if the process is not done exactly as directed in the manual or if it is interrupted for some reason, your motherboard can become completely unusable.

Fortunately, virus attacks on the BIOS are extremely rare, but they can cause devastating damage to your computer. If upgrading the firmware for your BIOS does not fix this type of attack, you should contact an IT professional for further assistance.

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INSIDE OUT **Virus infection and UEFI firmware**

New UEFI firmware on motherboards, especially those with Secure Boot enabled, is much more resilient to virus infection than the traditional BIOS, which is over twenty years old. It is possible that in the future, however, some methods of UEFI infection might be created.

Where Can Viruses Hide?

Simply getting rid of a virus is sometimes not enough. There are places where viruses can hide.

- **Email** A virus or malware can sit in an infected email, usually as an attachment, although they can also sit in the body of an HTML-formatted email and can re-infect your computer the next time you open it. You should delete all infected emails.
- **Files** Files on your computer can contain viruses. Microsoft Office and PDF files are commonly used to hide viruses. If your antivirus software cannot remove the infection from a file, you should either delete the file or quarantine it (this choice is usually offered by antivirus software) until it can be healed in the future.
- **Backups** Have you backed up your files since your computer became infected? You should check the dates of your backed-up files to see if the virus is there, ready to re-infect your computer if you restore them. If this is the case, consider deleting and redoing the backup.
- **System Restore** This is a Windows service that can roll back critical operating system files in the event of a failed driver or software install. Open the Control Panel and click System Restore. Next, click System And Security, click System, and then click Advanced System Settings. You should turn off System Restore on all drives and restart your computer. Reactivate System Restore only when the virus is gone. To do this, in the System Properties dialog box, on the System Protection tab, click Configure in the System Restore panel, and then disable protection for all drives. It is worth noting that although it was extremely common for viruses to hide in System Restore in Windows XP, it is very rare for this to happen in newer versions of Windows where UAC is enabled.

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Summary

Virus and malware infection is now more of a problem than it ever was before despite operating systems becoming more secure. In fact, while I was writing this chapter a news story broke from a Russian security firm that some 600,000 Apple iMac computers had been infected with a Trojan, with more than half of those being in the United States.

Although OS X like Windows is very secure, the Trojan exploited a weakness in the Java language plug-in that allowed the code to be downloaded from the Internet without user interaction.

Also, comparing the password security table I wrote for the last edition of this book with the one I have now demonstrates how computer processing power has come on, with an 8 character password that was considered strong just two years ago dropping from 2.25 years to just 57 days to crack.

Maintaining vigilance on your computer is essential at all times. Malware writers will try every trick in the book to get you to install their malware, and exploit every weakness possible in software. It is a never-ending battle but it's not too difficult to keep yourself generally safe if you know what to look for.

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CHAPTER 14

Easy Ways to Repair Windows 8

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When things do go wrong in Windows 8—and they do from time to time—you might be surprised at just how easy it is to fix things. This covers any manner of problem from lost or corrupt files through to the operating system failing to start.

It's certainly a case of the right tool for the right job, however. Let's look at restoring the operating system. In Windows 8, there are no fewer than four different ways to do this now and each one has its own peculiarities.

These are good examples, though, that Windows 8 really does include a tool to help with just about any circumstance when it comes to fixing and repairing files, programs, drivers, and the operating system itself.

Using File Versioning with File History

Windows 8 is the first version of Microsoft's operating system with a full file versioning feature. This means that the operating system (OS) keeps copies of your files as they change and as you save them so that if you make a change you didn't intend to make, you can restore an older copy of the file.

You can configure the feature in the File History dialog box (see Figure 14-1), which you can access in the Control Panel by clicking All Control Panel Items and then File History. The range of control that File History provides is a considerable improvement over the Previous Versions feature of...well, previous versions.

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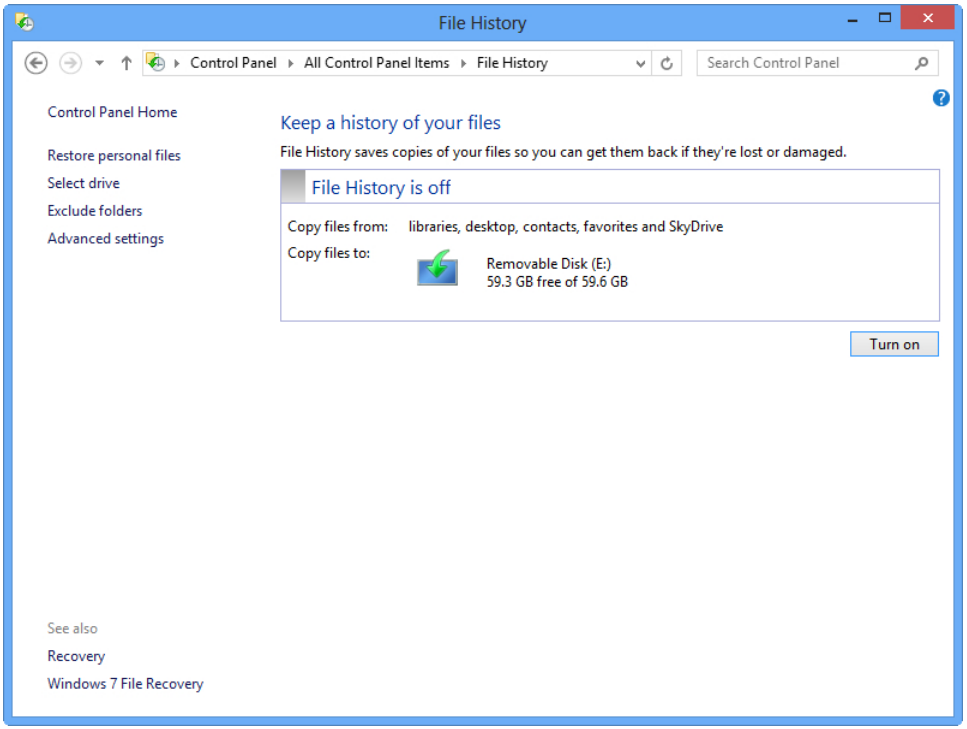

Figure 14-1 The File History panel in Windows 8

The options panel on the left presents four links that you can click to set up File History to suit your needs, and restore files it has saved. For example, you're not tied to saving your previous versions to a specific location; you can choose to save them to an internal hard disk, a USB-attached hard disk, or a network location. You can choose to exclude certain folders, or even turn File History off altogether if you're running short of hard disk space.

INSIDE OUT

Why should you exclude folders from File History?

When you perform any action on any type of file, even if it's only opening it, the file is changed slightly as a result of the *last accessed* date being modified. With files that you access regularly, such as pictures and music, this can result in a significant number of file changes of a considerable size that are marked as changed and therefore saved, which, of course, have had no changes applied to them.

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The result of this is that your free space for File History can quickly be filled up with music tracks, pictures, and other files for which the only change is the "Date Accessed" marker. Thus, you might want to exclude the folders that contain your music video and perhaps your pictures libraries from File History.

In the option panel, click Advanced Settings. The dialog box that opens offers a finer level of control, as shown in Figure 14-2.

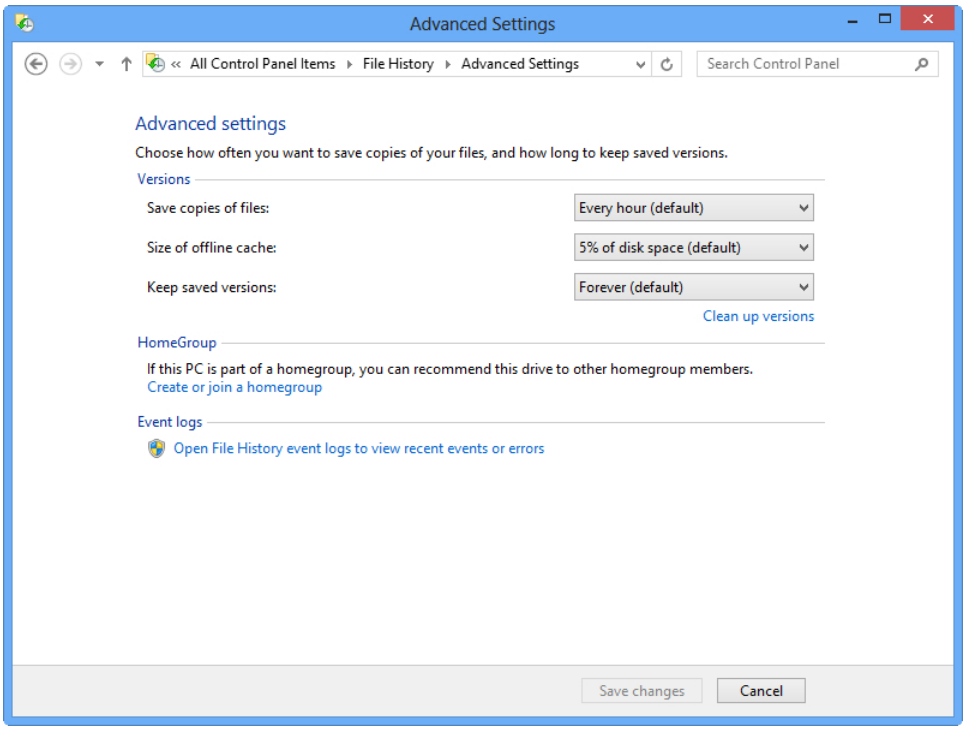

Figure 14-2 Advanced Settings for File History

There are several options in the Advanced Settings dialog box. How you work will determine how you want them set. For example, for the Save Copies Of Files setting, the default time between Windows automatically backing up changed files is one hour. As an author my files are changing constantly, but I only tend to work on them in bursts for a few short days. Thus, a 10-minute period is what I personally prefer. If you do not work on files all that often, however, then perhaps once a day is best, because this will help reduce the amount of disk space that is consumed by the File History feature.

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CAUTION!

File History will only make copies of files that have been saved and are closed. If files are open, they won't be copied to File History.

Use the Size Of Offline Cache setting to choose how much of the total available hard disk space is used for File History. The default is just 5%. The maximum amount of hard disk space you can use is 20%, even if you have an entire spare hard disk set aside for File History.

The Keep Saved Versions setting determines how long you want File History to maintain your copies. You can set it to keep versions of your files forever, although it actually won't because the total amount of disk space available to the feature is finite and this will make the feature much less effective over time. I would generally suggest that a period of three months is normally sufficient for you to realize something's gone wrong with a file, though you may want longer.

Lastly, if you would like to do some housekeeping, you can click the Clean Up Versions link by which you can delete older files if you are indeed running short of disk space.

INSIDE OUT

Can I use File History as an alternative to Windows Backup?

Because File History saves files individually rather than compressing them into a VHD, it could be argued that this makes is a great alternative to the Windows Backup feature. However, because File History can only use a maximum of 20 percent of the total disc space on a drive, and because it prioritizes in that sometimes multiple copies of a single changed file you cannot guarantee that it will have copies of some files at all when you need to restore them. This is because it has to wipe older files when it runs out of space. File History, therefore, should only be used in conjunction with a proper backup solution.

Restoring Files with File History

To restore previous versions of your files, in the File History dialog box, in the options panel click the Restore Personal Files link. In the dialog box that opens, you can view all the saved versions of previous files. It's important to remember, though, that the way this feature

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works is that it saves every file (except in excluded folders) that has been updated in any way, but it has only a finite amount of backup space. This means that when the space is full, the oldest files will be deleted. Thus, it's possible that it you are looking for an older version of a particular file, it might no longer be available.

It is for this reason that File History should never be considered a viable alternative to a full backup solution.

Using System Restore

The System Restore function has been available since Windows XP. It was originally criticized as being a nice hiding place for viruses because Windows XP didn't have a security system in place to prevent them from being written there, and antivirus software couldn't easily remove any viruses that were planted. Also, while performing a system restore after cleaning the virus, the virus would be restored along with the legitimate files. The addition of the User Account Control security system means this feature can now be trusted to restore important and critical Windows 8 files—and nothing nasty.

System Restore takes snapshots of critical Windows 8 operating system files when changes are made, such as when you install new software or a driver for a new hardware device. Should something go wrong—for instance, the driver causes Windows 8 to misbehave—you can restore all critical Windows operating system files prior to the point at which the driver was installed.

INSIDE OUT

Does System Restore affect my files and documents?

System Restore doesn't roll back any changes to your files or documents, nor does it delete any of them. It makes changes only to Windows 8 operating system files.

Configuring System Restore

To set up System Restore, in the Control Panel, click Recovery. In the main panel that opens, expand the Advanced Tools section, and then on the System Protection tab, click the Configure button, as illustrated in Figure 14-3.

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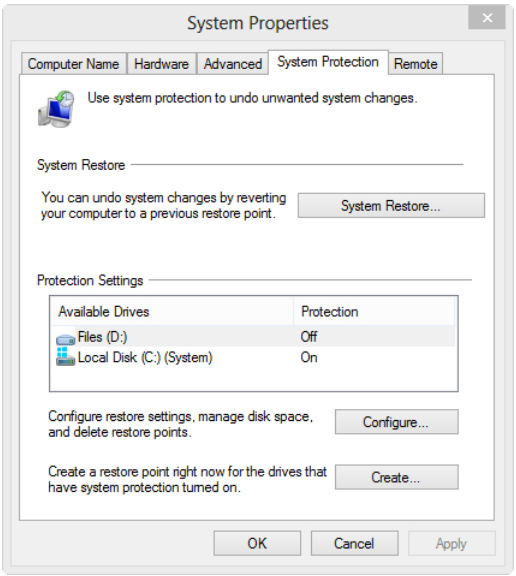

Figure 14-3 System Restore in Windows 8

You want to ensure that the hard disk or partition on which you have Windows 8 installed is set to Restore System Settings And Previous Versions Of Files. The system works automatically in the background, protecting your computer.

INSIDE OUT

Don't deactivate System Restore

Anybody who has had a bad experience with System Restore in Windows XP need no longer worry. Trust me when I say that System Restore in Windows 8 is now an essential tool, and you should leave it on. It is the quickest and easiest to way get Windows 8 back up and running if you make a change that causes the system to become unstable.

Creating a Restore Point Manually

You can also create your own restore points. You might want to do this if you're changing some operating system settings and are not certain what the result will be or if you're installing some software or a hardware driver that you suspect might cause a problem, and you want to ensure that a particular restore point is saved. To set your own restore point, on the System Protection tab of the System Properties dialog box (see Figure 14-3), click Create.

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Restoring Windows 8 by Using System Restore in Windows

You can restore Windows 8 to a specific earlier point. To do so, in the Control panel, open Recovery, expand the Advanced Tools section, and then click Open System Restore. The System Restore window opens, displaying a list of dates and times at which restore points were made along with descriptions of what triggered them, as depicted in Figure 14-4.

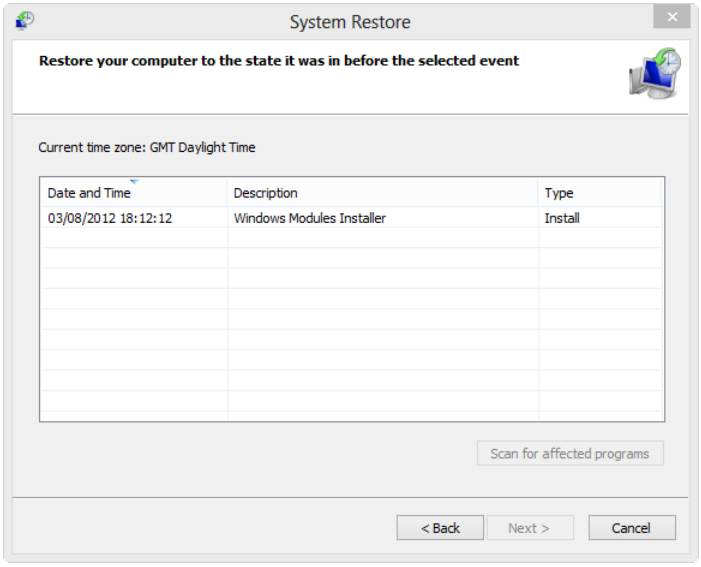

Figure 14-4 Restoring Windows 8 files to a specific date and time by using System Restore

Choose the restore point that best reflects the change you want to undo, such as when you installed a new device driver or application. Click Next to start the process. Keep in mind that your computer needs to restart during this process.

INSIDE OUT

Don't worry about picking the wrong restore point

If you choose a System Restore point that doesn't goes back far enough to undo the changes you made, don't worry; you can simply repeat the process, selecting an earlier point.

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When your computer has restarted and the System Restore has successfully completed, a message will display similar the one in Figure 14-5. You are also notified if System Restore was unable to restore your Windows 8.

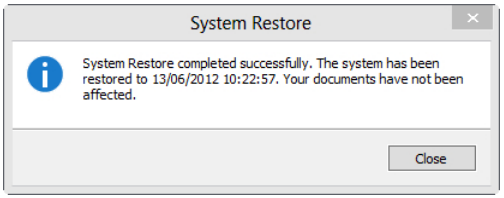

Figure 14-5 A successful System Restore message

Restoring Windows 8 by Using System Restore on the Startup screen

You can also access System Restore on the Windows 8 Startup screen. There are several ways to do this.

- Boot from your Windows 8 Install DVD and click Repair Your Computer
- Boot from a Windows 8 system repair disc (more on this shortly)
- Boot from a Windows recovery drive (more on this shortly)
- Press F8 at Windows Startup and select Repair Your Computer from the Startup Options

In the first dialog box that opens, click Troubleshoot, choose Advanced Options, and then click the System Restore option, as depicted Figure 14-6.

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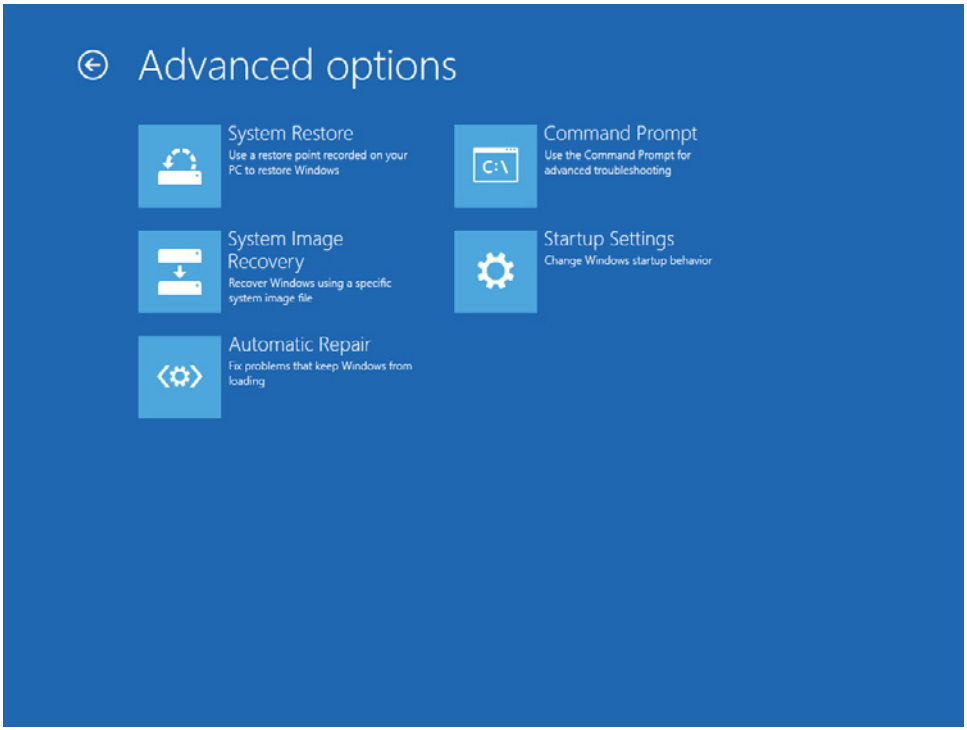

Figure 14-6 Accessing System Restore on the Windows 8 Startup screen

In the System Restore dialog box, you can restore your computer to a previously created restore point.

Can I Undo System Restore Changes?

The simple answer is yes, provided you're not using System Restore from Windows Startup Repair (more on this service later in the chapter) or from Safe Mode. Figure 14-7 demonstrates that a new restore point is created just before your changes are rolled back.

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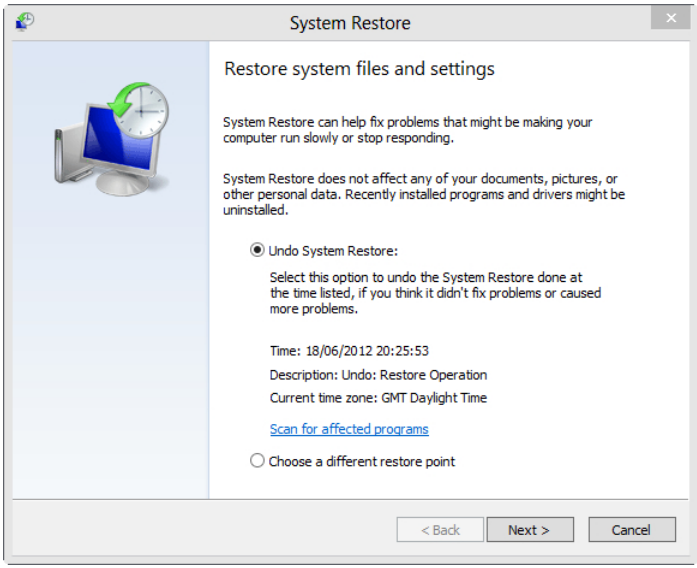

Figure 14-7 Undoing System Restore changes

When you run System Restore again, it gives you an option to undo any changes you've made and restore the system to the state it was in before you used System Restore. You would use this option if, for example, you realized that restoring older files has uninstalled a critical program you need.

You can try again with your other restore points until you find one that provides a stable operating system in which you can work.

System Repair Disc vs. Recovery Drive—What's the Difference?

With Windows Vista and Windows 7, you were able to create a system repair disc. This is a bootable CD or DVD that contains the Startup Repair files for Windows. This is a very useful system because it allows you to be able to boot to the recovery options without the need to carry your Windows installation DVD with you.

The downside is that you are still carrying a physical disc with you, which is quite passé these days. More problematic, however (yes, there are things that are more important than losing style points), is the fact that increasing numbers of new computers, especially netbooks and ultrabooks, don't have optical drives, so you'd have to carry an external USB optical drive, as well—a big hit to whatever style credibility you have left after the disc episode.

With Windows 8, there is another option: a recovery drive. This is essentially the same as a system repair disc, but it can only be created on a USB flash drive.

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INSIDE OUT

Repair disc or recovery drive: which should you have?

My advice is that you should create both (you'll need to create both 32-bit and 64-bit versions by using 32-bit and 64-bit versions of Windows 8). Between the two of them, you shouldn't need a USB optical drive. The reason for still requiring repair discs, especially if you repair computers for a living, is that some of the computers you encounter might not support booting from a USB device (Remember, Windows 8 will run on very old hardware), but typically, computers for which this is the case will almost always have a built-in optical drive.

Creating a System Repair Disc in Windows 8

To create a system repair disc, go to the Control Panel and click Windows 7 File Recovery. In the left panel of the dialog box that opens, click the option to Create A System Repair Disc, as shown in Figure 14-8.

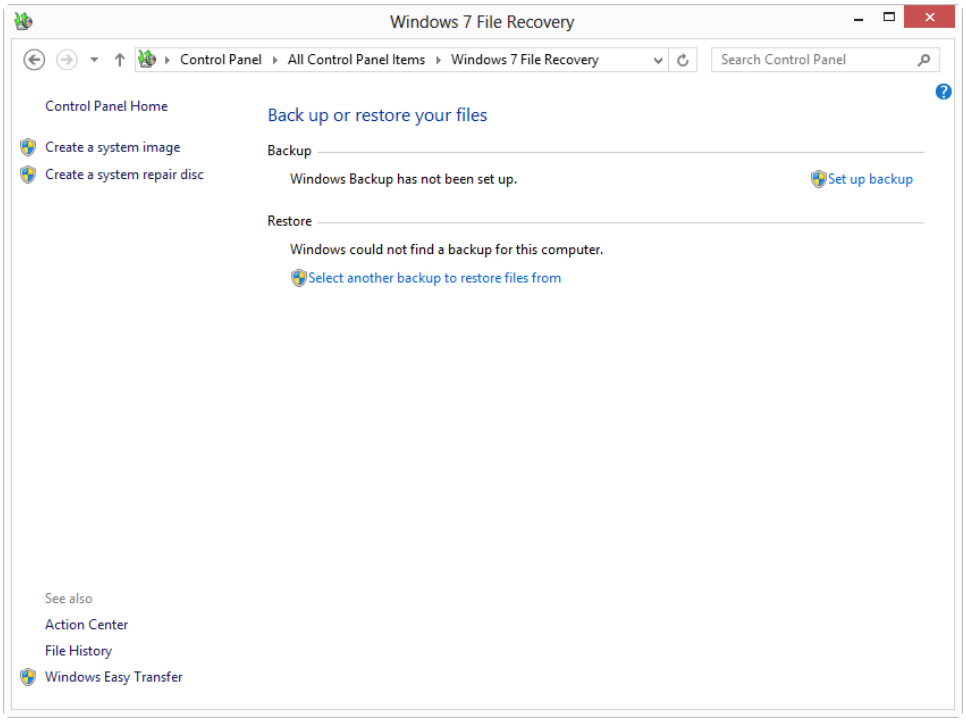

Figure 14-8 You create a system repair disc in Windows 7 File Recovery

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This disc can either be created on a blank CD or DVD (Windows 8 can burn to Blu-ray discs, but this seems an expensive waste). You will need separate 32-bit and 64-bit discs and these can only be created by the respective version of Windows 8. They will also not work with Windows 7, and vice versa.

Creating a Recovery Drive in Windows 8

To create a Windows 8 recovery drive, in the Control Panel, click Recovery. Expand the Advanced Tools section and click the Create A Recovery Drive link, as shown in Figure 14-9.

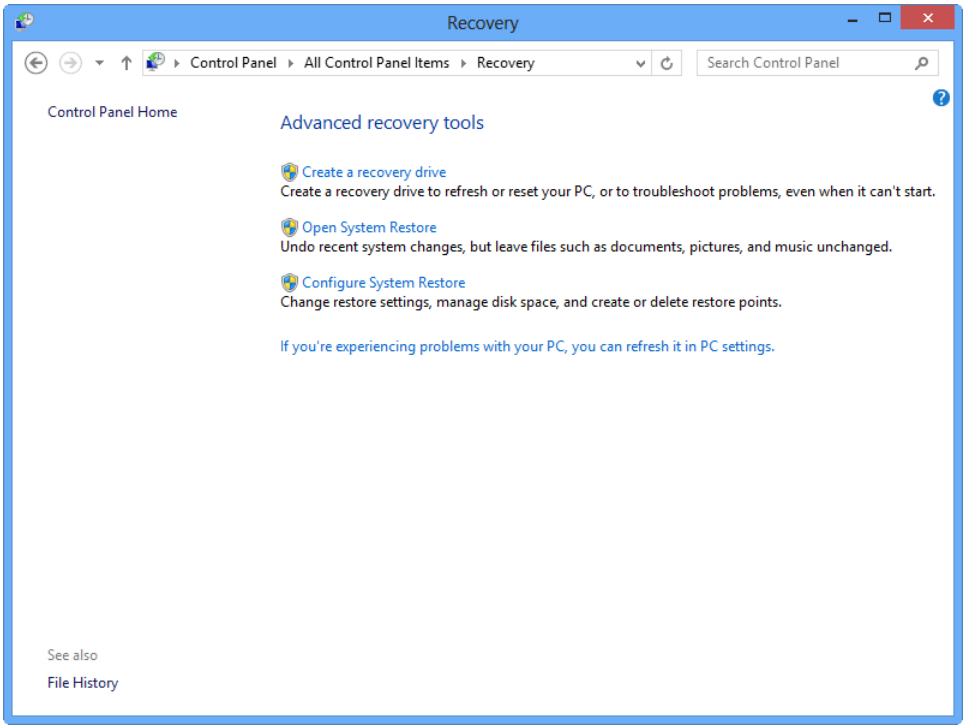

Figure 14-9 You create a recovery drive form the Recovery Panel

A recovery drive can be an extremely useful tool for rescuing a nonfunctioning copy of Windows 8. Because it's a USB flash drive, it's very small and easy to carry around, which makes it an easy-to-access, handy tool. You need a USB flash drive from which you can boot, with a capacity of at least 256 megabytes (MB) (this is a good use for older USB flash drives that you might have lying around). If you provide technical support, keep in mind that you will need to have both a 32-bit and a 64-bit version (each created on 32-bit and 64-bit installed versions of Windows 8; one cannot be used to rescue the other). Also, be aware that you cannot use either version to rescue Windows 7.

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Troubleshooting Software Compatibility

Software compatibility has always been a major issue for Windows users. When users like a particular application and are used to working with it, they typically want to stick with it. Sometimes new features are introduced or perhaps even an entirely different software package is released that tempt us to upgrade. For the most part, though, we stick with what we know and like because it makes our lives easier. End of discussion.

As software grows older and new versions of Windows are introduced, you might find that something that worked perfectly before now won't run without producing errors. The good news is that Windows 8 is technically compatible with all software that runs on Windows 7, but it's not compatible with software for which Windows 7 was incompatible.

Windows 8 is also quite good at detecting when there is compatibility problem with a particular software package, and it will alert you if it believes a program needs to be run in a compatibility mode. Occasionally, though, you will need to set this program compatibility manually.

Manually Setting Program Compatibility

Opening the program compatibility options for a program in Windows 8 is slightly more complex than it was in Windows 7 and earlier. Let's take a look at how it's done now.

INSIDE OUT

You can't set compatibility for Windows 8 apps

There are no compatibility options for Windows 8 apps because these apps are completely new and won't run on any previous versions of Windows. You will only be able to set compatibility for desktop software.

Open the Start screen (or the All Apps view), right-click the icon of the program for which you need to set the compatibility, and then on the App bar, select Open File Location. In the window that appears, right-click the application icon to open its settings panel, and then select Properties.

In the Properties dialog box, click the Compatibility tab, as shown in Figure 14-10, and choose the settings you want to use. Note that some applications, especially those that ship as part of Windows 8, don't have this option available.

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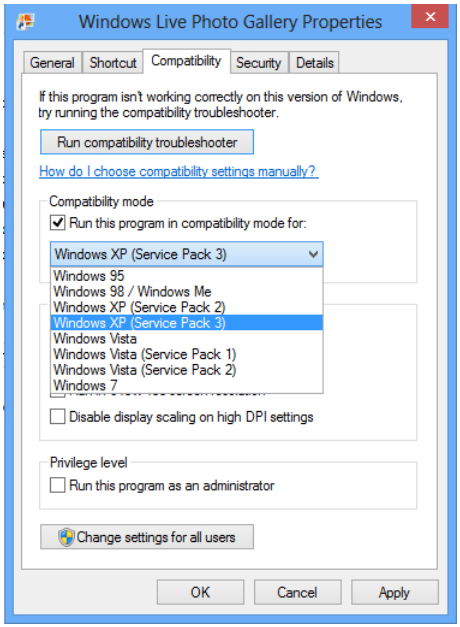

Figure 14-10 Adjusting the compatibility settings for a program

Compatibility mode allows you to emulate every version of Windows going back to Windows 95. You should choose the option for the most recent version of Windows in which the software you want to install worked properly.

If you're not sure which version of Windows to choose, try different settings until you find one that works with the software you want to load.

The program compatibility settings offer more options (see Figure 14-11), the most important of which is the ability to run a program as an Administrator. You should always be careful with this option because it means the program has complete access to and can modify the Windows 8 system files. Some older software, however, especially custom business software, requires this level of access in order to function.

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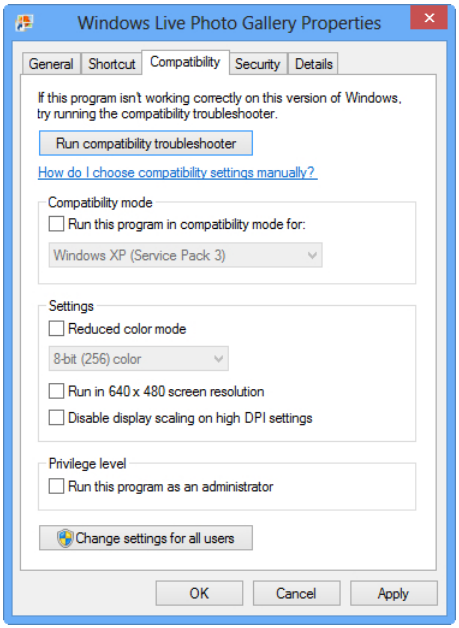

Figure 14-11 More program compatibility options

You will probably never need the remaining options, which exist for particularly old or problematic software, such as a program that causes an error when run under the Aero Glass Windows 8 interface or doesn't function properly on high-resolution screens.

The Automatic Program Compatibility Troubleshooter

If you are not sure of the appropriate settings for a program to maintain application compatibility, you can run the Program Compatibility Troubleshooter. You access this in the same way as the manual compatibility settings, but instead, right-click the program icon in Windows 8 and open the file location; however, when you right-click the program in File Explorer, select Troubleshoot Compatibility.

Figure 14-12 shows the Program Compatibility Troubleshooter, which tries different compatibility settings for the program by asking you questions about how and where the software worked in the past, changing the corresponding settings automatically, and then asking you each time a change is made whether the program is now working properly.

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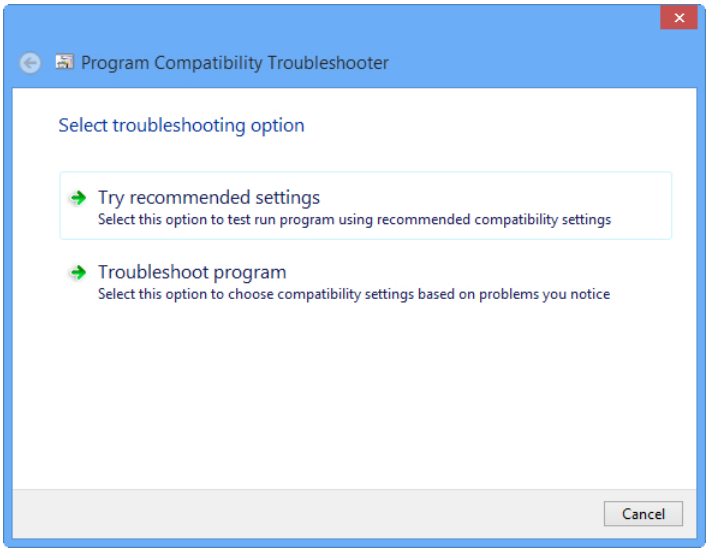

Figure 14-12 The automated Program Compatibility Troubleshooter

This troubleshooter is an automated version of the program compatibility options mentioned earlier, but it isn't as flexible as modifying the program compatibility settings yourself.

Program Compatibility Notifications in the Action Center

Occasionally, the Action Center in Windows 8 (signified by the white flag next to the clock on the taskbar) alerts you to a potential program compatibility problem.

When applications don't work on your computer, you are asked whether you want to send the error information to Microsoft, which gathers a significant amount of detail about programs that fail to work toward the goal of finding a fix.

INSIDE OUT

Can you discontinue automatic notifications to Microsoft regarding program failures in Windows 8?

Some people guard their privacy jealously and don't want Windows sending any information to Microsoft. The data sent to Microsoft doesn't include any personally identifiable data, but you can opt out of sending any information in Action Center.

In the Action Center, in the left pane, select Change Action Center Settings, and then click Customer Experience Improvement Program Settings. In the dialog box that opens, you can opt out of this program by selecting the No, I Don't Want To Participate In The Program option, as demonstrated in Figure 14-13.

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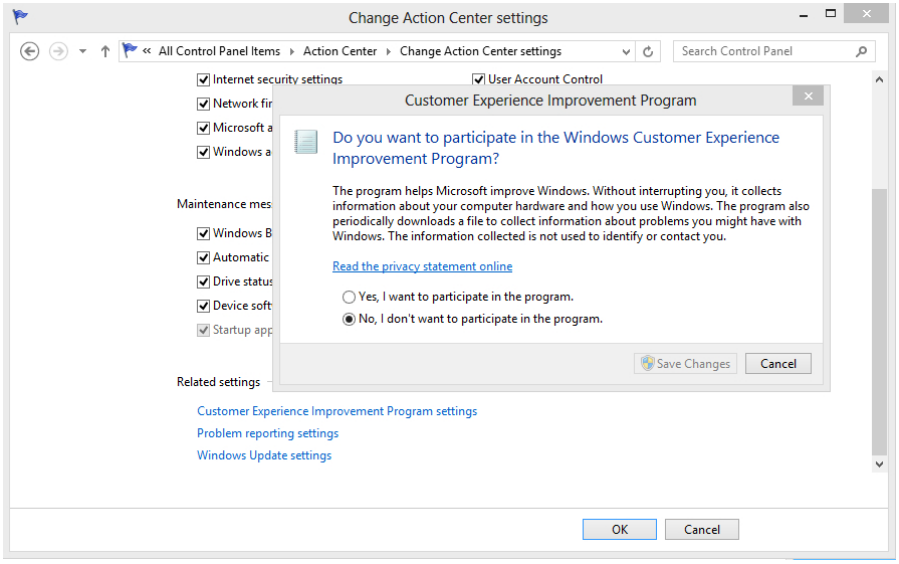

Figure 14-13 Changing the Customer Experience Improvement Program settings in Windows 8

I recommend that you leave option enabled. This tool is useful to engineers and developers as they continually strive to improve the Windows user experience. Plus, turning it off might mean that you don't automatically receive useful troubleshooting advice about Windows 8 from Microsoft.

Maintaining Windows XP Software Compatibility

One of the most significant problems facing computer users is maintaining compatibility with older software that ran perfectly in Windows XP. When Microsoft introduced Windows Vista, it re-engineered the operating system in very substantial ways. This broke much of the program compatibility that users had enjoyed in the past.

In the Professional version of Windows 8 and higher, you will find the Hyper-V virtualization client into which you can install a working copy of Windows XP (you will need a valid product code for it). I will discuss Windows XP compatibility using Hyper-V in more depth in Chapter 10, "Working in a Virtual Environment."

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Accessing the Start Screen When Using Low-Resolution Screens

If you are using Windows 8 on a netbook or other computer that has a vertical screen resolution less than 768 pixels, perhaps just only 1024 × 600, you will find that Windows 8 apps are disabled on your computer by default. You can turn these on; however, I would only recommend doing this if you want to use Windows 8 apps exclusively on the device. To do this, perform the following steps:

1. Open the Start screen and type **regedit in the search text box** to open the Registry Editor.

2. In the Registry Editor, click the Edit menu and search for Display1_DownScalingSupported.

3. When it appears (see Figure 14-14), right-click it, and then in the settings panel that opens, select Modify.

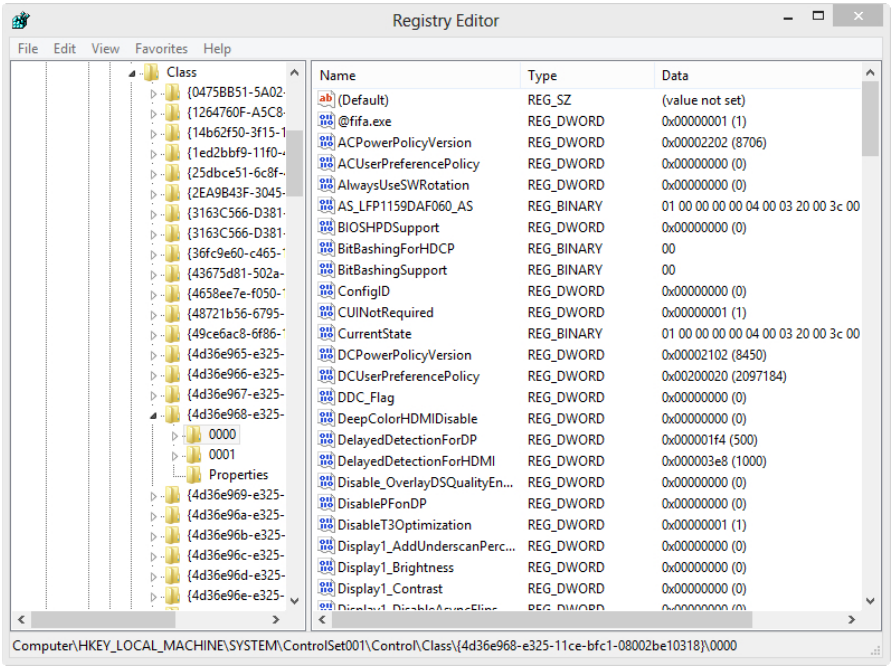

Figure 14-14 Setting the Start screen to work on devices with low screen resolution

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4. Change its value from **0** to **1** and click OK.
5. Press F3 to search for the next instance of Display1_DownScalingSupported.
6. Change the value of all instances of this from **0** to **1**.
7. Restart your computer.
8. On the desktop, right-click the desktop, and then in the settings panel that opens, select Screen Resolution.
9. In the dialog box that opens, there are now larger screen resolutions from which to choose. Select the 1024 × 768 setting.

CAUTION!

This is actually a hack and is unsupported by Microsoft, so please note that some features of Windows 8 and Windows 8 apps will not display properly on your computer.

Windows Won't Start

Occasionally, Windows 8 just won't start. A configuration file or some other minor issue is usually the cause in such cases. Certainly, it's frustrating but sometimes the answer is as simple as turning off your computer and turning it on again.

The Windows 8 Boot Options Menu vs. the Classic Boot Options Menu

Windows 8 includes two Startup Menus, which it maintains for legacy compatibility with older hardware that can't load graphics support at boot time. These are accessed in slightly different ways.

The new boot options menu that's shown in Figure 14-15 is accessible by pressing F8 on your keyboard after the bootloader (or during some UEFI bootloaders). This is a new touch-friendly graphical system. It is lacking some features that are available in the classic boot menu, however, including support for Safe Mode.

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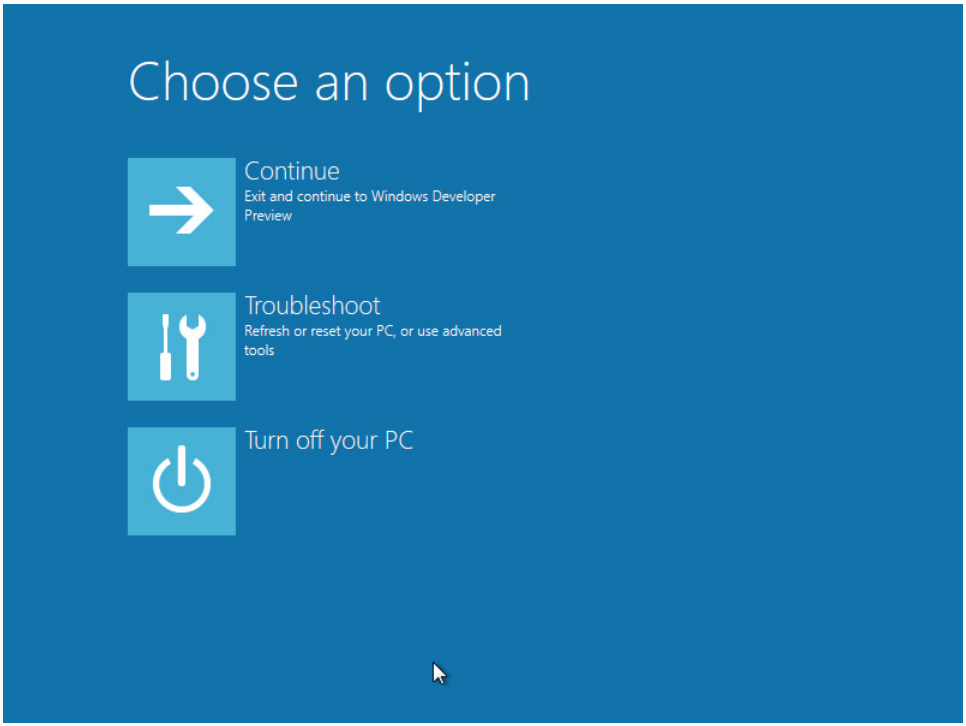

Figure 14-15 The new Windows Startup Menu

If you want the classic boot options menu (see Figure 14-16), you need to press Shift+F8 after (or, as before, sometimes even during) the bootloader. This maintains compatibility with older hardware and also provides additional options not available in the new boot menu system.

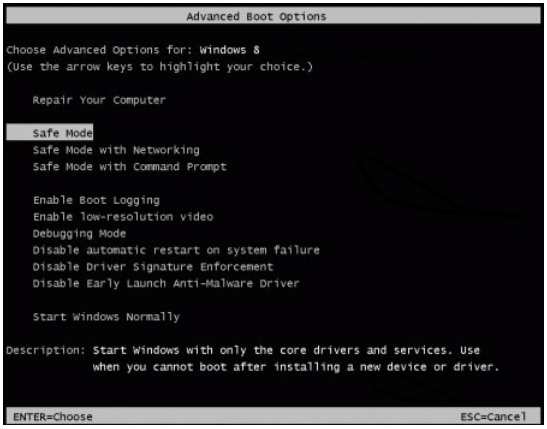

Figure 14-16 The classic Windows Startup Menu

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When You Can't Access the Boot Options Menu

Occasionally, you can't access either of the boot menus, particularly on newer computers and no combination of pressing F8 or Shift+F8 before, during, or after the bootloader will display a boot options menu. But don't worry: if this happens, all is not lost! There are two ways to access the features you are most likely to need in Windows 8.

1. Start your computer from a system repair disc or recovery drive. This will bring up the menu system that will allow you to perform diagnostic and repair operations such as running the automated Startup Repair or performing a System Restore.
2. Use the Boot options in the MSConfig panel to trigger Safe Mode manually. Full instructions on how to do this are in Chapter 21, "Demystifying Windows 8 Problems."

Last Known Good Configuration

When you start your computer, press the Shift+F8 key just after the BIOS screen has disappeared. If you see the "Starting Windows" logo, you've gone too far and will have to try again. Pressing Shift+F8 brings up the Windows startup options, as shown in Figure 14-16.

From these options, select Last Known Good Configuration (advanced) to reset the current Windows 8 instance in favor of the one recorded the last time Windows successfully started.

Windows 8 should now start. Note that this option won't change any Windows settings since you last started the operating system, so it's perfectly safe to use.

Safe Mode

If Windows 8 still won't start by using the Last Known Good Configuration option, you can choose another option from the Advanced Boot Options. Again, press Shift+F8 when you start your computer, but this time, choose the Safe Mode option.

If Windows 8 loads to the Safe Mode desktop, shut down your computer and restart it. Many startup problems with the operating system are fixed by using this option.

INSIDE OUT

Avoid using the reset button

You should avoid restarting your computer by using the reset button, especially if you're restarting only because you haven't pressed F8 in time to show the Advanced Boot Options. If possible, let Windows load to the desktop and then restart your computer by using the Restart charm.

Pressing your computer's reset button at the wrong time can cause essential Windows 8 startup files to become corrupt.

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Windows Startup Repair

If Windows 8 fails to start after three tries, the Windows Advanced Repair Console will appear the next time you attempt to start your computer. Windows Startup Repair is an automated feature in Windows 8 startup. Figure 14-17 shows the dialog box that opens when Windows determines that you should run Startup Repair.

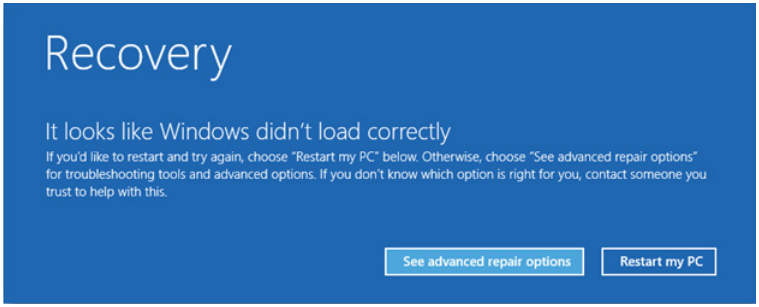

Figure 14-17 The automated Recovery tool in Windows 8

To access the Automatic Repair option, click See Advanced Repair Options. Next, click Troubleshoot, select Advanced Options, and then click Automatic Repair.

INSIDE OUT

Reverting to the traditional boot options menu by default

You also have the option to click Windows Startup Settings to revert to the traditional boot options menu. This returns Safe Mode but you lose new options such as Refresh and Reset, as shown in Figure 14-18.

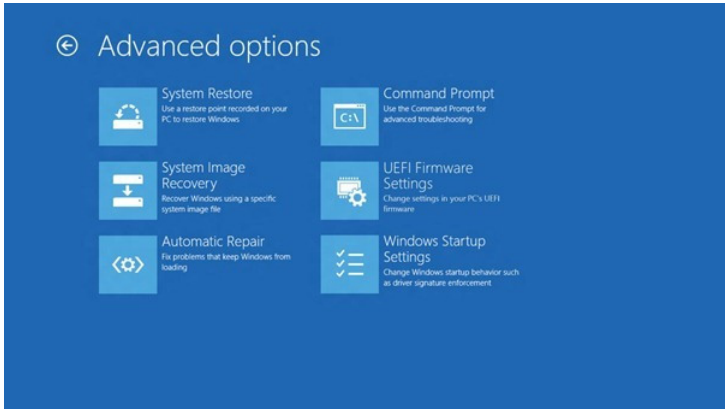

Figure 14-18 Starting Automatic Repair

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This service looks at your Windows 8 installation and tries to identify and fix any problems that are preventing Windows 8 from starting. If the service finds something wrong, it attempts to repair the problem and then prompts you to restart the computer if the problem is fixed.

Figure 14-19 illustrates that if Startup Repair is unable to fix the problem, it offers you Advanced Options by which you can restore Windows from a System Restore point or restore it completely from a backup. A faulty hardware driver or recently installed software are common culprits that prevent Windows 8 from starting.

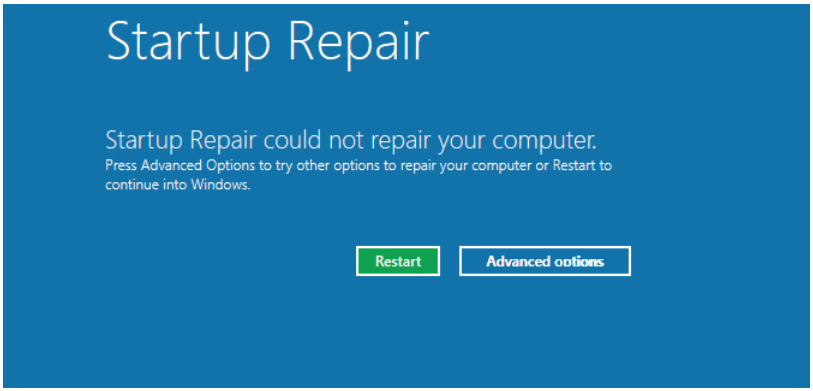

Figure 14-19 Startup Repair sometimes cannot fix problems itself

Running Startup Repair from Removable Media

You can also run Startup Repair from your Windows 7 install DVD, a system repair disc or a recovery drive. These approaches offer you more options for fixing your computer when it won't start. When starting from your Windows 8 install DVD, at the install screen, click Repair Your Computer, as shown in Figure 14-20.

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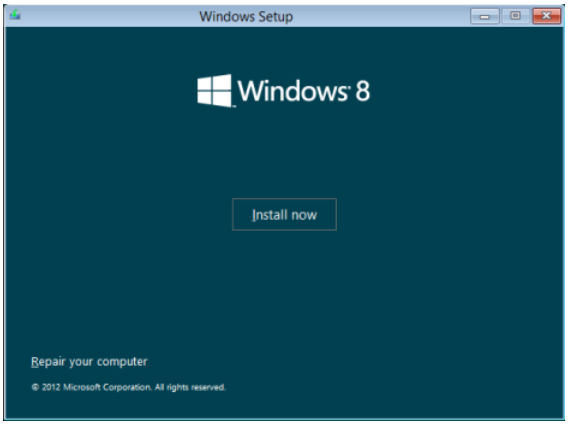

Figure 14-20 Select Repair Your Computer from the Windows 8 Installation DVD

You Did Back It Up, Didn't You?

If you still can't get Windows 8 to start, you should choose System Image Recovery and restore Windows 8 from a backup. I covered backups in Chapter 3, "Preventing Problems Before They Occur." Sadly, if you don't have a system image of your Windows 8 installation, you will need to reinstall your operating system, including all of your programs and updates.

Working with Device Drivers

There are hundreds of thousands of hardware devices for Windows-based computers, ranging from super-cheap components to extremely expensive graphics cards. Microsoft has a certification program for hardware drivers, but it isn't mandatory for the 32-bit versions of Windows 8, and many hardware manufacturers don't want to pay for it.

With the 64-bit editions of Windows 8, driver certification is mandatory, but you can still install drivers that are uncertified. Once you realize that hardware drivers control your entire experience with Windows, you won't be surprised to discover that uncertified device drivers can cause problems with Windows or even cause the operating system to fail to start. Device drivers are one of the principal causes of computer problems.

Fortunately, Microsoft has made working with hardware drivers easy in Windows 8, so if you need to remove, reinstall, or update one, you shouldn't encounter any problems. But before explaining how you handle device drivers in Windows 8, let me warn you of some of the issues that can arise with them.

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Common Problems with Device Drivers

Device driver problems are at the root of many issues with Windows 8. Here are some of the most common ones:

- Windows doesn't start
- A device stops working
- A device starts misbehaving

A problem often occurs for the first time after you've performed one of the following actions:

- Installed hardware for the first time
- Updated the hardware driver manually
- Updated the driver through Windows Update

In Chapter 17, "Troubleshooting Windows 8 Problems in Your Home or Workplace," I tackle the topic of diagnosing device problems in more detail. For now, let's deal with trouble-shooting techniques for specific types of drivers.

Graphics Driver Problems

Some of the most common driver problems occur with the computer's graphics drivers. The graphics card driver differs from other Windows drivers because it is one of the very first drivers to load when Windows starts.

Here are a few common problems caused by graphics drivers.

- Windows loads but displays no image on the monitor.
- Windows shows the infamous Blue Screen of Death (BSOD) while loading. Figure 14-21 shows the new, "friendlier" (well, you're less inclined to want to throw your computer through a window, anyway) BSOD in Windows 8.

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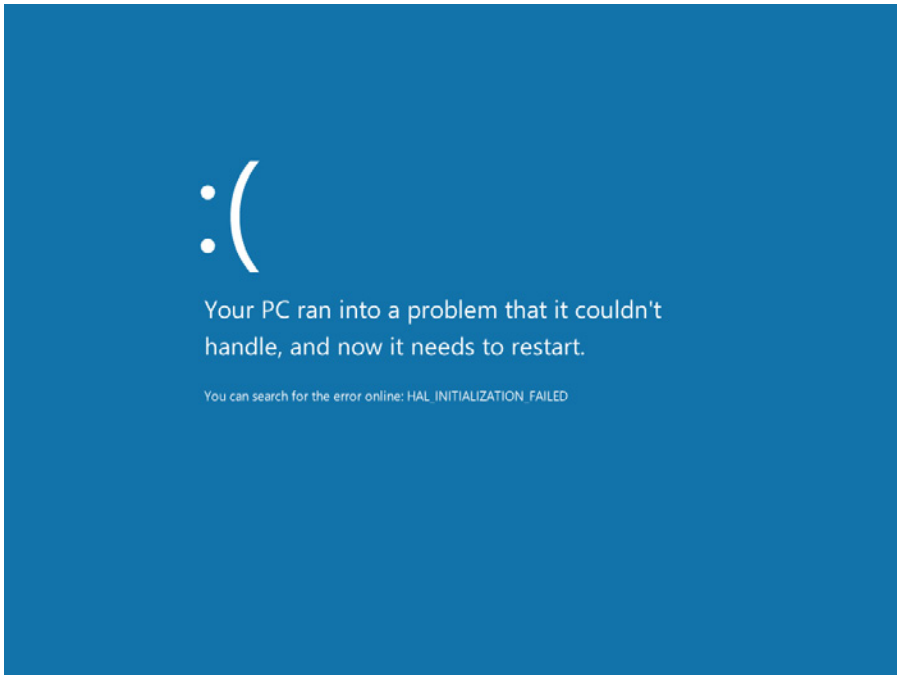

Figure 14-21 The new Windows 8 BSOD

- Your screen resolution is stuck at its lowest settings.
- Windows 8 crashes while loading games.

If you encounter one of the aforementioned problems, it's best to start your computer in Safe Mode. As mentioned earlier in the chapter, you do this by pressing Shift+F8 when Windows starts but before the Starting Windows screen appears. If you see the Windows logo screen, the boot process is too far along and you need to restart the computer again.

Pressing Shift+F8 brings up the Advanced Boot Options screen. From here, choose Safe Mode and then press Enter. This is a reduced functionality mode in which Windows loads only the minimum required drivers and software. Refer to the "Windows Won't Start" section earlier in this chapter for more options.

The Device Manager

The Device Manager, shown in Figure 14-22, is where you can see and control all the drivers for the hardware installed on your computer. You access the Device Manager through the Control Panel by clicking Hardware And Sound\Device Manager. Alternatively, you can open the Start screen and type **device manager**.

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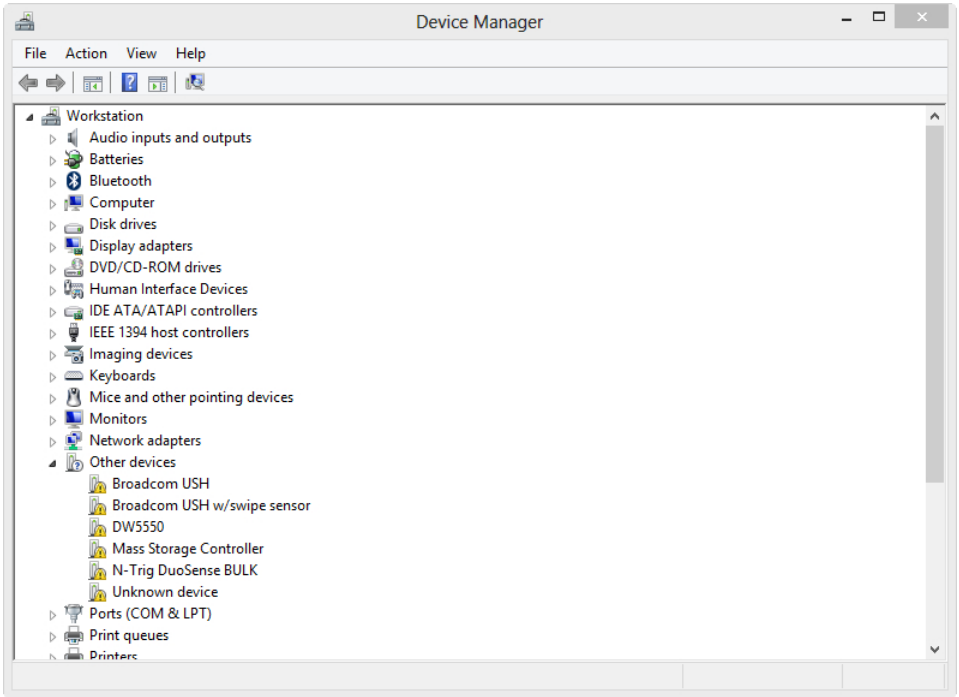

Figure 14-22 The Device Manager

The hardware is organized into categories, most of which are self-explanatory: disk drives, display adapters, DVD/CD-ROM drives, keyboards, network adapters, and so on.

Some categories need more explanation.

- Human Interface Devices is where drivers for hardware such as USB input devices (graphics tablets and remote control sensors) are located.
- Sound, Video, And Game Controllers includes everything from your computer's sound card and gaming joystick to TV tuner cards and webcams.

Click the white arrow adjacent to each category to expand it and display all the hardware within it, as shown in Figure 14-23. In the expanded view, any drivers that might not be working are highlighted with a yellow warning triangle or a red cross, or you can see whether a particular driver is even listed at all.

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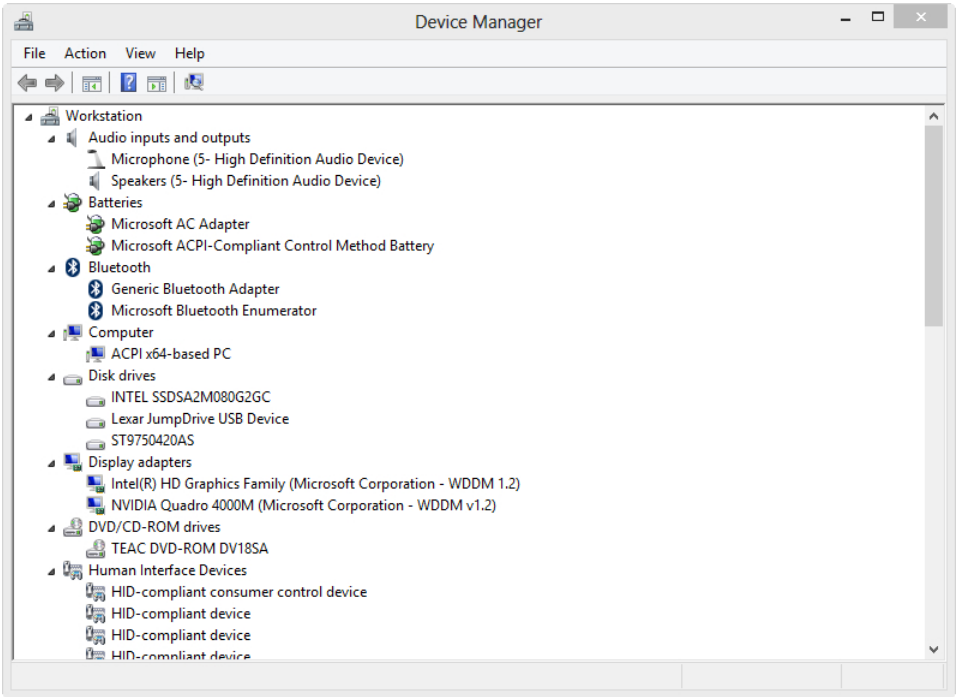

Figure 14-23 Viewing specific hardware in the Device Manager

A yellow warning triangle next to a device (see Figure 14-24) means that the driver either isn't installed or isn't working properly. If any devices have warning triangles, these groups will expand automatically when Device Manager starts.

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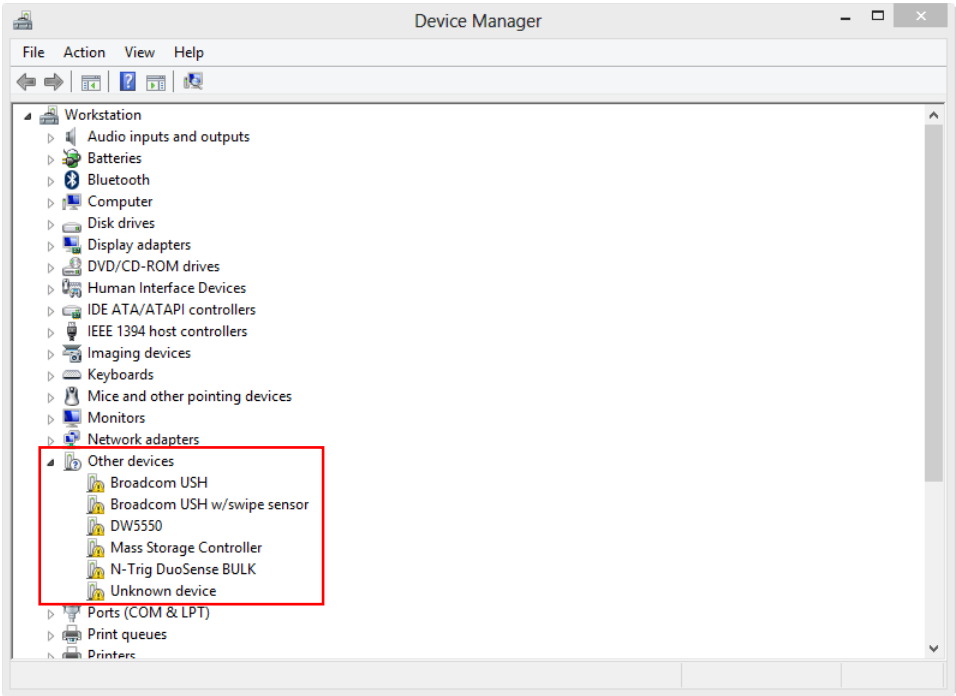

Figure 14-24 Problem hardware is indicated by a warning triangle

If your hardware isn't listed, on the Action menu, click Scan For Hardware Changes, as shown in Figure 14-25. After the scan, your hardware should appear in the list, and Windows 8 might automatically install the correct driver for that hardware. Windows will inform you as to whether it was able to find and install the appropriate driver.

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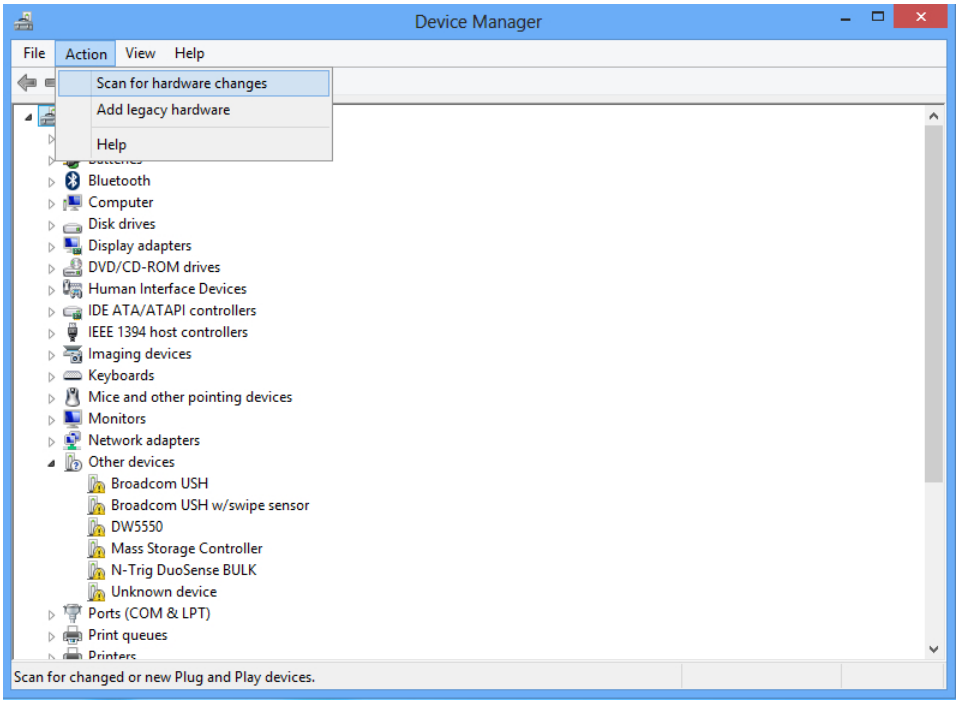

Figure 14-25 Searching for new hardware in the Device Manager

If your hardware still doesn't show up, on the View menu, click Show Hidden Devices, as shown in Figure 14-26. These hidden devices are usually hardware drivers for Windows components, but they can also include your computer's hardware.

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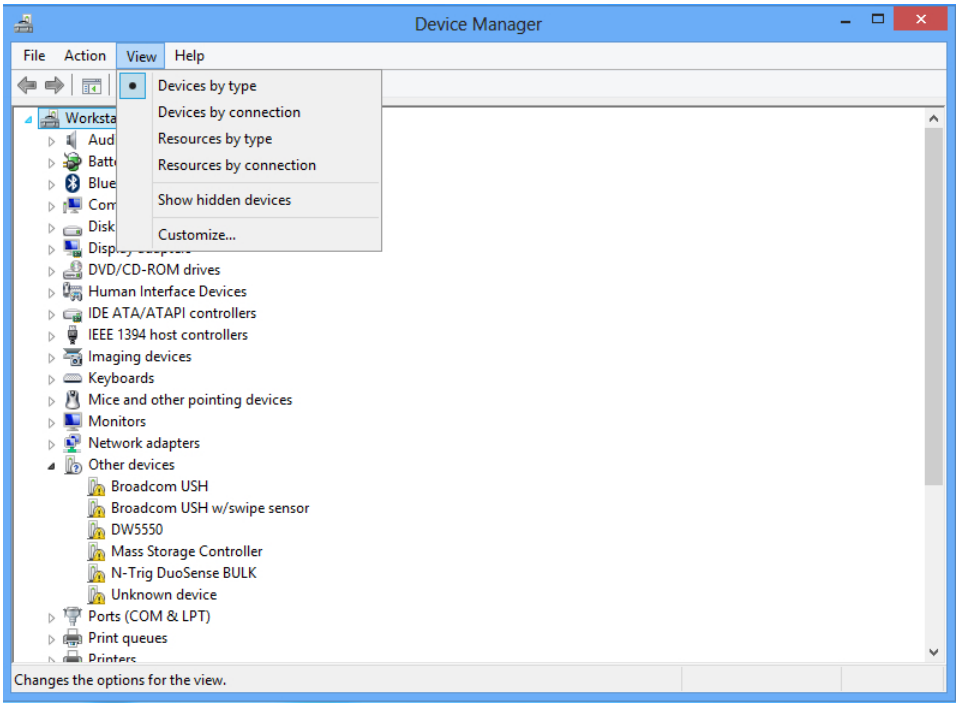

Figure 14-26 Viewing hidden devices in the Device Manager

In the recent example I mentioned in which a network device driver was causing my computer to crash, the driver, which had been digitally tested and distributed through Windows Update, didn't appear in Device Manager until I clicked Show Hidden Devices.

What If My Hardware Still Doesn't Appear?

There are a few situations in which your hardware still doesn't appear in the device list. At this point, ask the following questions:

- Could the hardware be called something else in Device Manager? Look through the list to see whether your hardware shows up with a different name than the one you're expecting. For example, many devices are simply called "Human Interface Device."

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- If the device is removable, such as a USB device, does unplugging it cause something to disappear from the device list?
- Is the device firmly plugged in, and are all the relevant power and data cables attached to it? Ensure that your computer is turned off and disconnected from the main electrical supply before checking this.

With USB and other removable devices, if Windows doesn't make any sound when you plug in your device or you don't see a small notification window on the right of the taskbar informing you that hardware has been found, Windows might not be seeing the device. Following are several things you can try at this point:

- Plug your device into a different port. For example, if your device is USB, try the ports on the front of your computer as well as the ones at the back.
- Try a different connecting cable.
- If your device requires its own external power supply, ensure that it is connected, turned on, and receiving power.
- Leave the device plugged in and restart your computer.

INSIDE OUT **Using older USB devices**

Some older USB devices (and possibly some new ones) require that you install the device driver from the manufacturer-supplied CD before plugging it in to the computer for the first time. Check the manual that came with your hardware or look for FAQs on the manufacturer's website.

If you still can't get your device to work, you need to consider that the device might be faulty. If you have the option, try to use the device on another computer. This test will be much easier with a USB or other removable device. If the device is a graphics card, however, you might want to check the manufacturer's website for support and check out some help forums before trying to install it in a different computer.

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Installing Device Drivers

Windows normally updates the drivers for new hardware automatically. Even though Windows 8 comes with more hardware drivers than any earlier version of Windows, it still might encounter drivers it won't find or be able to install automatically. To update a driver manually, perform the following steps:

1. Right-click the desired driver in the Device Manager. In the options panel that opens, click Update Driver Software, as demonstrated in Figure 14-27.

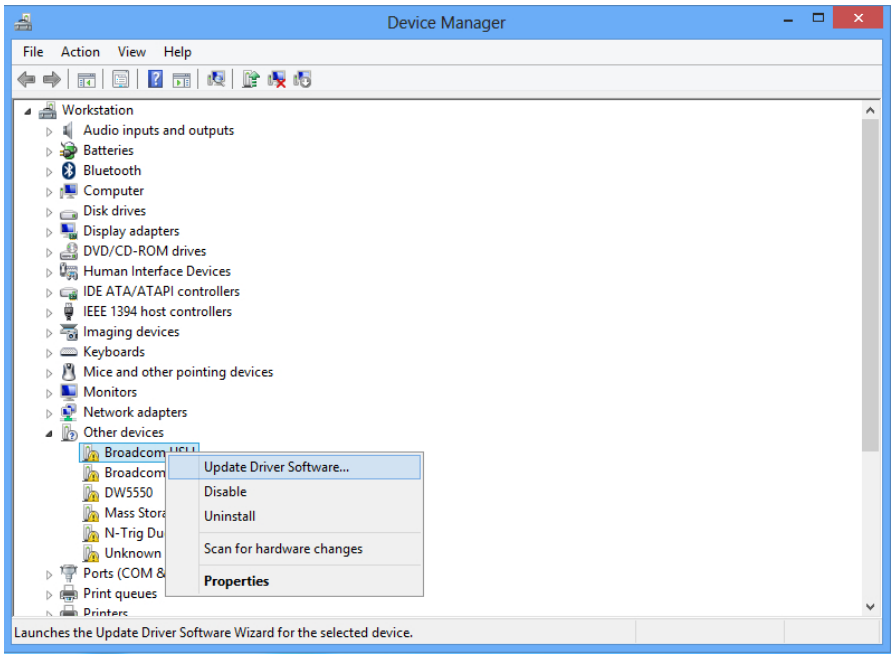

Figure 14-27 Updating the driver for a Device

2. You can choose to have Windows 8 find and install the driver or to install it manually from a disk or another location. If you have a copy of the driver on CD or DVD, select Browse My Computer For Driver Software, as depicted in Figure 14-28.

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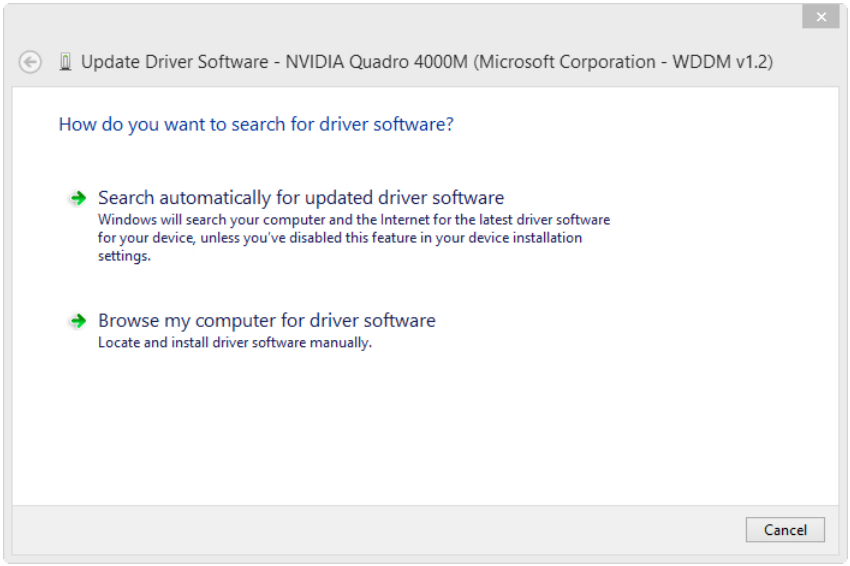

Figure 14-28 You can choose from where on your computer you want to install a hardware driver

INSIDE OUT

Always ensure that you have a copy of your Network/Wi-Fi driver

If Windows doesn't come with a suitable driver for your network or Wi-Fi card, you must make certain that you have a copy on a separate disk ready to install. If you don't, Windows won't be able to search online for a driver for you and the hardware will not work.

3. Windows 8 asks where it should look for a driver. Browse to the location on your hard disk or CD where the driver is located. Sometimes you might need to manually select which driver you want Windows to install, such as for times when Windows 8 is unable to find the exact driver for your hardware automatically. In that case, click Let Me Pick From A List Of Device Drivers On My Computer, as shown in Figure 14-29.

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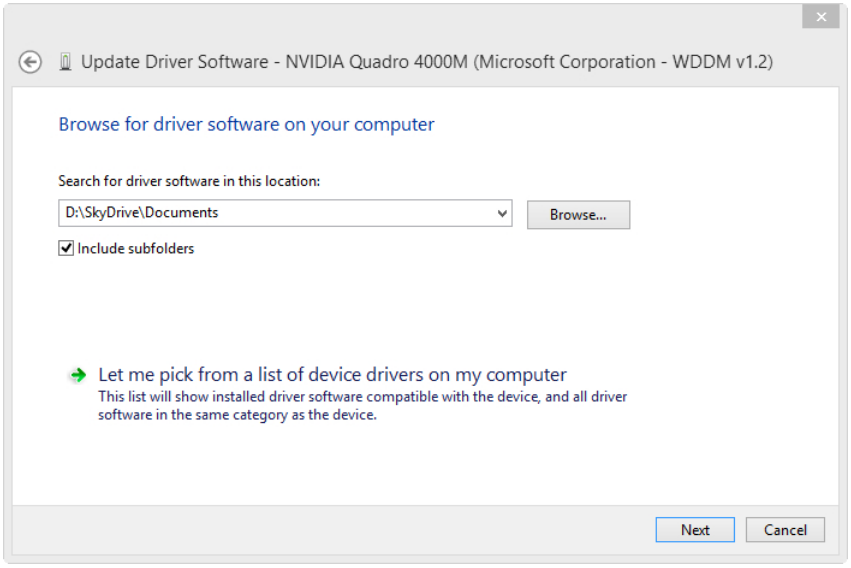

Figure 14-29 Choosing from where to install a hardware driver

4. Click Have Disk (see Figure 14-30) and navigate to the folder on your hard disk or CD where the driver is located. The folder should be something similar to Device Name\Driver\Win8. Only device drivers will appear in this list—no other files type in that location will be visible. Choose the correct driver and then click OK.

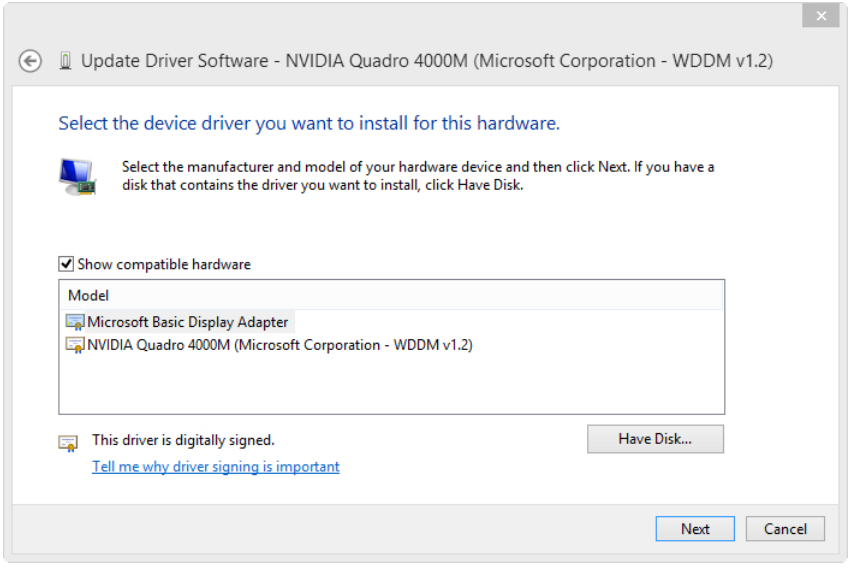

Figure 14-30 Manually selecting a driver to install

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Sometimes, when you're installing a driver manually, the Driver folder will include several driver (.inf) files. You might need to go through the manual driver install process several times to find the correct one.

INSIDE OUT

Why not just install drivers by using the Setup program on the supplied CD?

Installing a driver from the manufacturer-supplied CD can be quick and easy. In certain situations, however, you shouldn't install the drive this way. For example, if the hardware is older and the supplied CD doesn't include Windows 8 drivers, don't install the driver via the CD (although most of the time Windows 7 or Windows Vista drivers will still work).

There are also manufacturers—especially those who make Wi-Fi, graphics, and printer/scanner hardware—that include extra software on the driver CD that by default is set to load every time you start Windows.

Removing and Reinstalling Device Drivers

You might want to remove a device driver from Windows when you are updating it. One of the reasons for doing this is that when you reinstall the driver, Windows might automatically reinstall the previous version of the driver that doesn't work (the one you were trying to get rid of in the first place).

To uninstall a device driver in Device Manager, right-click the device, and then in the options panel that opens, click Uninstall, as demonstrated in Figure 14-31.

With many devices, Windows then asks if you want to delete the driver software for this device (see Figure 14-32). You should select this check box if you want to reinstall a specific driver and don't want Windows to reinstall the current one. The installed driver files are then deleted from your hard disk.

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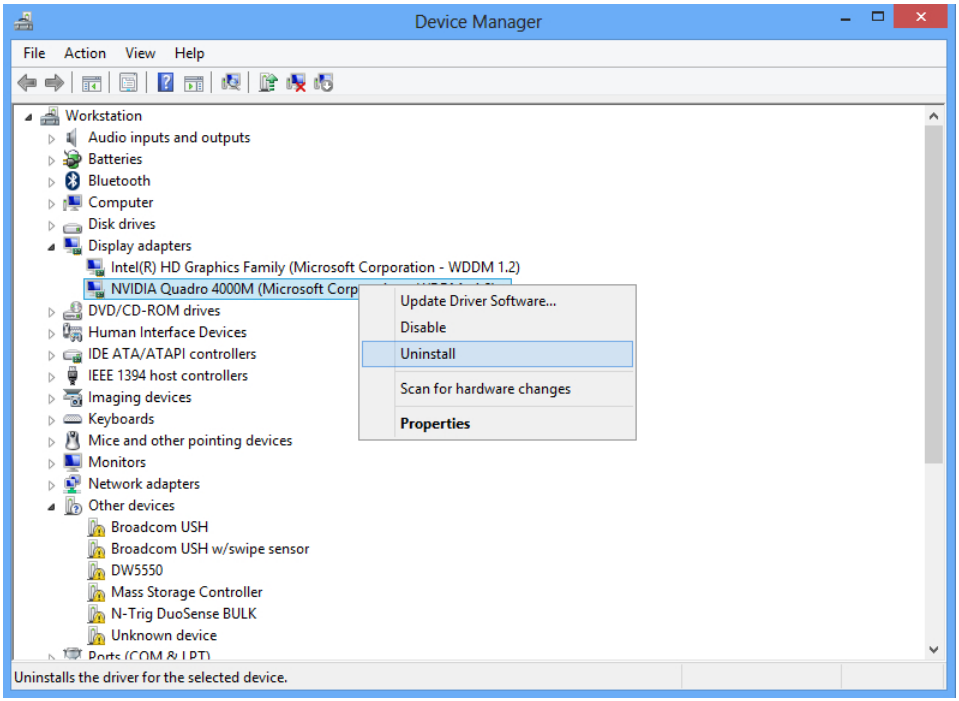

Figure 14-31 Removing a device driver from Windows

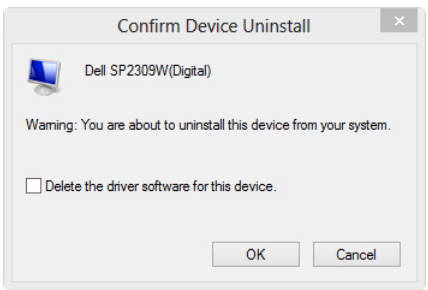

Figure 14-32 Deleting the driver from Windows

You can now reinstall the driver.

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Updating Device Drivers

Windows sometimes offer updates to device drivers through Windows Update, but at times you might need to download the driver from the manufacturer's website.

INSIDE OUT

If it isn't broken, don't fix it!

Do you really need the latest driver for your hardware? If you use your computer for gaming, you probably want to keep your graphics drivers updated for speed and to maintain compatibility with the latest graphics features. For most hardware, however, you might not want to install the latest drivers.

I didn't actually need this driver; the computer ran fine with the existing driver. And as it turned out, this new driver caused it to constantly crash.

To update the driver for a specific device, in the Device Manager, right-click the device, and then in the options panel that opens, click Update Driver Software, as shown in Figure 14-33. Now you can follow the process described in the "Installing Device Drivers" section.

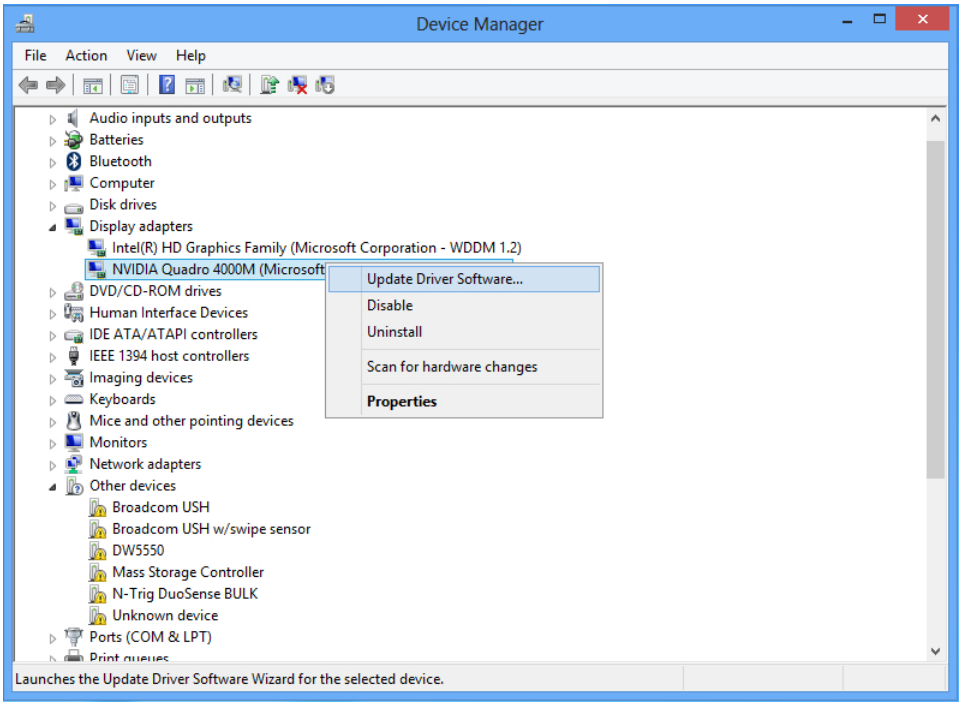

Figure 14-33 Updating a driver in Device Manager

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INSIDE OUT

How to back up device drivers in Windows 8

You can back up all of your device drivers if you want—for example, maybe you've lost the original driver CD for a piece of hardware. You can find these device drivers on your Windows drive (usually C:\) in the Windows\System32\DriverStore folder, as illustrated in Figure 14-34.

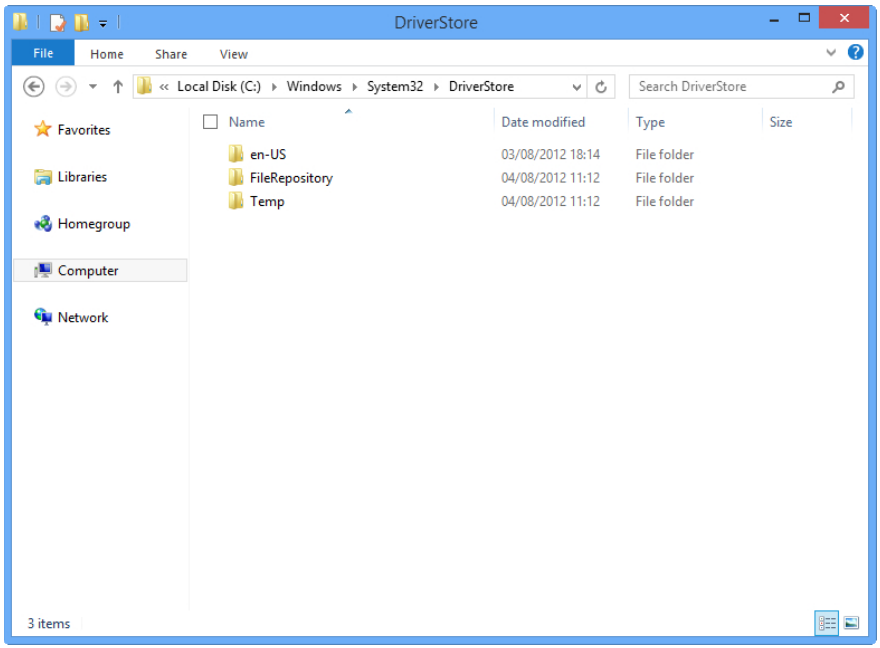

Figure 14-34 You can back up Windows 8 drivers

You can back up this entire folder and copy it back if you need to reinstall Windows. After doing this and restarting the computer, Windows should be able to install the correct drivers for all of your installed hardware.

Rolling Back Device Drivers

Sometimes, as in the case of the updated network driver that caused my media computer to crash, you want Windows 8 to reinstall the previous driver—the one that worked. This is easy to do.

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In the Device Manager, right-click the correct device, and then in the options panel that opens, click Properties. The dialog box shown in Figure 14-35 appears. Click the Driver tab. Here, if there is a previous driver to which Windows 8 revert, you can click Roll Back Driver. This starts an automated process that removes the current driver and reinstates the previous one. Your computer might need to reboot during this process.

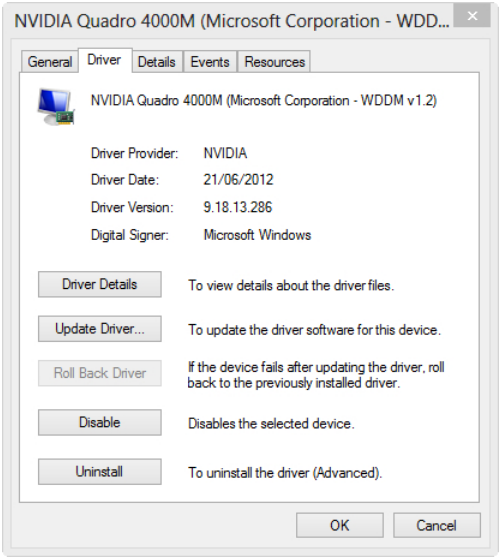

Figure 14-35 Rolling back a device driver

The Action Center Troubleshooters

The Action Center in Windows 8 (the white flag next to the clock on the right side of the Windows 8 taskbar) has an excellent troubleshooting panel that helps you fix common problems in Windows 8. To access it, click the white flag and open Action Center. Next, click the Troubleshooting (Find And Fix Problems) link at the bottom of the Action Center window (you might need to scroll down the window) to bring up the troubleshooters, as shown in Figure 14-36.

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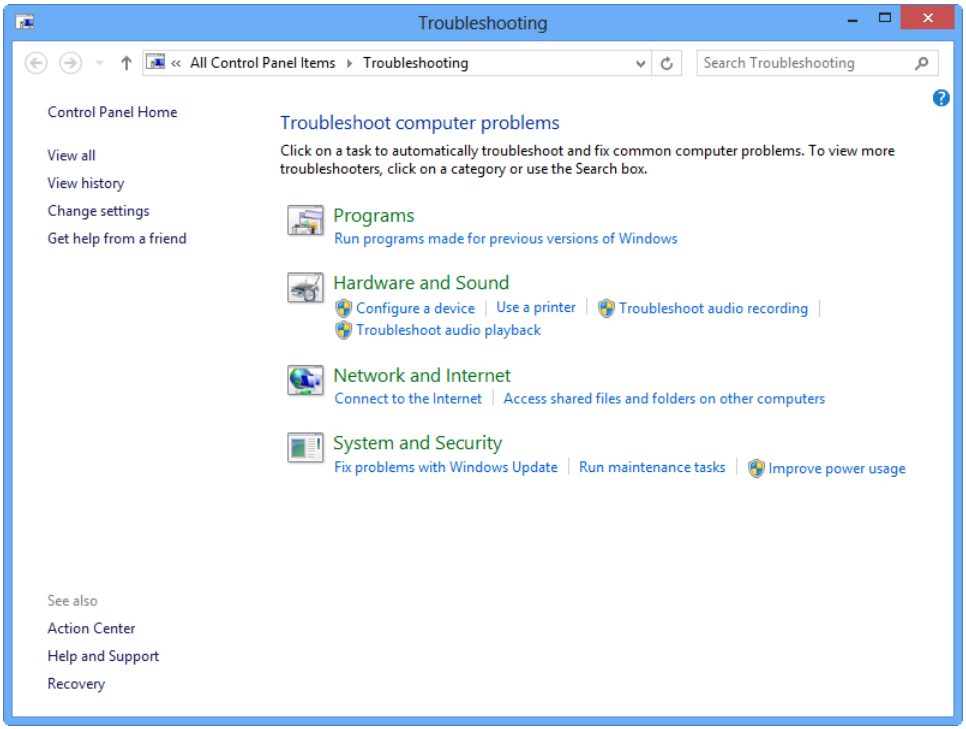

Figure 14-36 The Action Center Troubleshooter

This panel contains many automated Windows 8 troubleshooters that are easy to run. They don't always find and fix the problem with your computer because they work by resetting Windows components to their default state, but this panel is an excellent place to start troubleshooting minor issues.

Microsoft Fix It Center

Microsoft provides an automated problem-solving solution for all versions of Windows called Microsoft Fix It Center, which you can download from *fixitcenter.support.microsoft.com*.

This is an excellent tool that I would recommend you run periodically to check for solutions to problems on your computer that you might not even be aware exist.

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Summary

There are plenty of easy ways to repair problems with Windows 8, but there are plenty of challenges, too, such as some computers refusing you access to the boot options menu where many easy fixes can be implemented. Windows 8 is a very flexible operating system, though, and there are other ways to access features to repair and diagnose system problems.

Again, with hardware driver support, which has notoriously caused problems with previous versions of Windows, there are a great many useful tools and ways to repair problems. In fact, especially coupled with the much improved hardware driver mode, first introduced with Windows Vista, and properly signed drivers in 64-bit Windows, it will be less and less likely that drivers will cause problems in the future. Of course, there is still no way to know how individual drivers will interact with one another.

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PART 3

Using Advanced Technical Fixes

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CHAPTER 15

Understanding Windows 8

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Windows 8 is the latest edition in a series of desktop operating systems and graphical user interfaces (GUI) from Microsoft. Windows 1.0 was released in 1985 as a GUI that sat on top of Microsoft's popular Disk Operating System (DOS). Over the years, Windows has been changed and refined, eventually subsuming DOS and becoming a full operating system in its own right with the launch of Windows 98.

Windows 8 was released in October 2012. It is not exactly the eighth version of Windows; rather, it is the eighth version from its particular branch of the software. There have been two branches of Windows: the original consumer versions and the New Technology (NT) business versions. The original consumer lineup included the popular Windows 3.1, Windows 95, and Windows 98; it ended with Windows ME. The NT series began in 1993 as an offshoot of Windows 3.1, with much of the underlying code re-engineered to make it more stable and suitable for business users. This NT development tree has split off further with the Server, Desktop, and Home Server variations of the operating system. In turn, the NT branch spawned various server versions of the operating system (OS) and then Windows XP, Windows Vista, and most recently Windows 7, and now Windows 8.

There is some debate about whether Windows 8 really is the eighth iteration of the NT family, but it's not the most important concern facing the world today. Windows 8 is officially the eighth iteration if you follow the tree Windows 1.0, Windows 2.0, Windows NT 3.1, Windows NT 4.0, Windows XP, Windows Vista, and Windows 7. Depending on your view, since it first launched until 2010, there have been as many as 28 versions of Windows.

Windows 8 has created two new branches of its own, however, these being Windows RT (Run Time) which is the version for ARM processors and Windows Phone 8. There are many advantages in having a unified core OS across all of Microsoft's products, not the least of which is that it can respond more quickly when a problem occurs.

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Understanding the Windows 8 File and Folder Structure

Windows runs from a series of files and folders on your computer's hard disk. The basic folder structure is extremely logical and has been simplified immensely over the years. There are three basic Windows 8 folders with some extra folders for user and configuration data and temporary files, as shown in Figure 15-1.

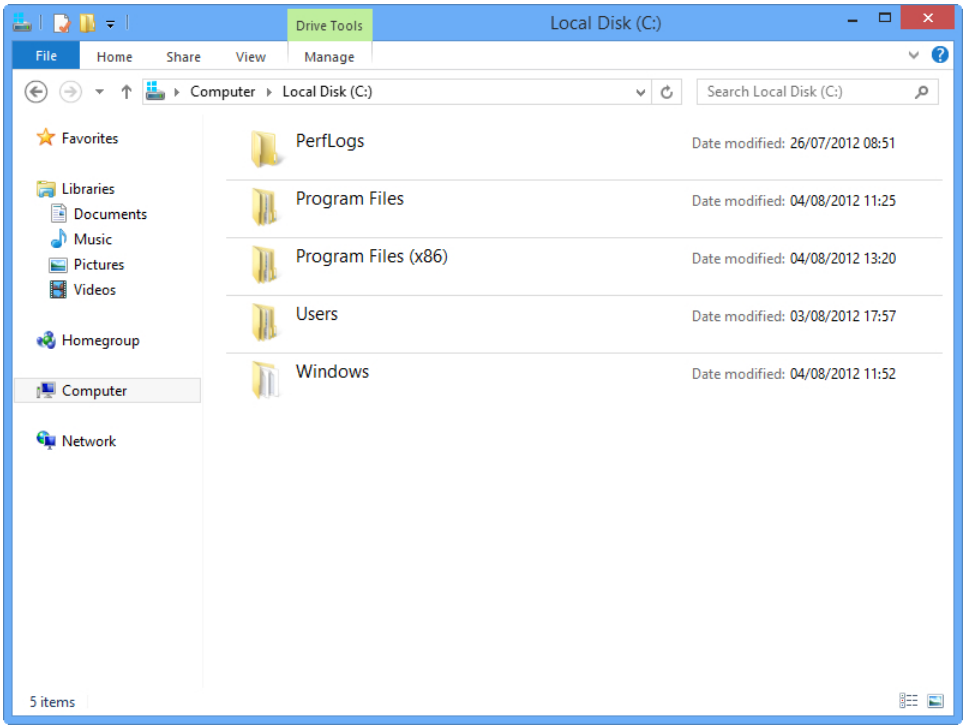

Figure 15-1 The folder structure in Windows 8 64-bit

The following is an overview of the purpose of the three main folders:

- **Program Files** This is where all the files for any programs and software you install in Windows 8 reside. There are two Program Files folders in the 64-bit version of Windows 8: Program Files x86 for 32-bit software and Program Files for newer, 64-bit software. Each program has its own custom folder within one of these folders. In the 32-bit version of Windows 8, there is only a Program Files folder.

- **Users** This is where, by default, all of your documents and files reside, and it is also the location of your registry settings, which sit in a hidden ntuser.dat file with one registry file for each user. Within the main Users folder, there is one subfolder for

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each user and another folder called Public, where shared files and folders are kept. There are also hidden user folders called Default and All Users.

- **Windows** This is the main folder into which the operating system is installed. The main Windows registry files reside in the \Windows\System32\config folder.

Windows also installs hidden system files across the hard disk (shown as slightly dimmed in Figure 15-2).

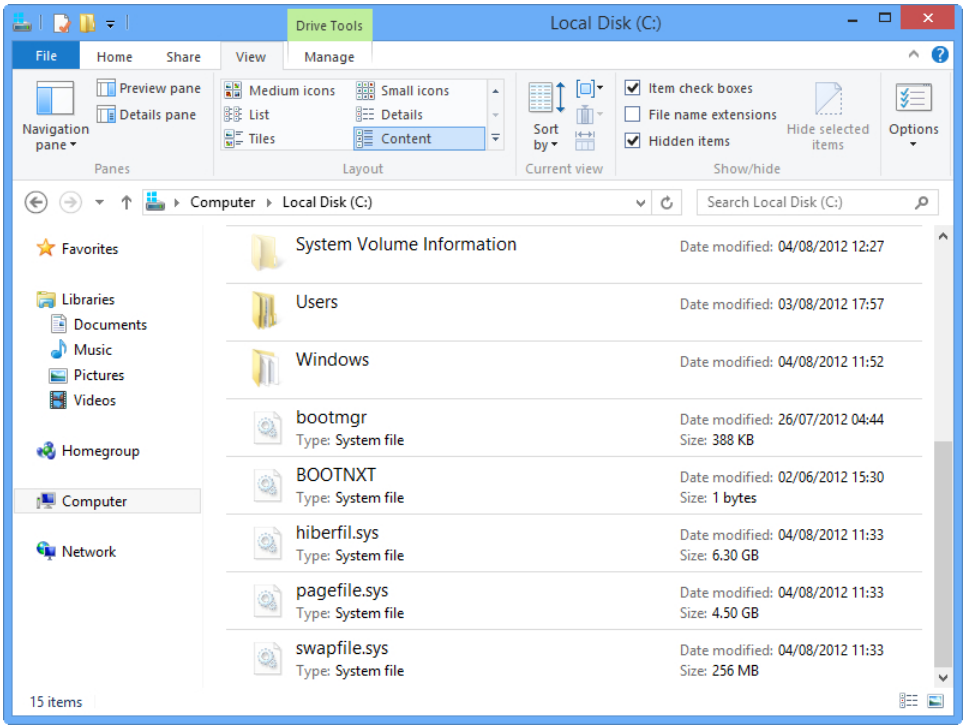

Figure 15-2 Hidden system files installed by Windows 8

These hidden files and folders are where Windows stores operating system recovery software and folders to support legacy software, including Documents and Settings and the hibernation and paging files (virtual memory) for the OS.

Inside the main Windows folder are a great many different folders (see Figure 15-3), some of which exist to maintain compatibility with legacy hardware and software and some of which service specific features within the current OS.

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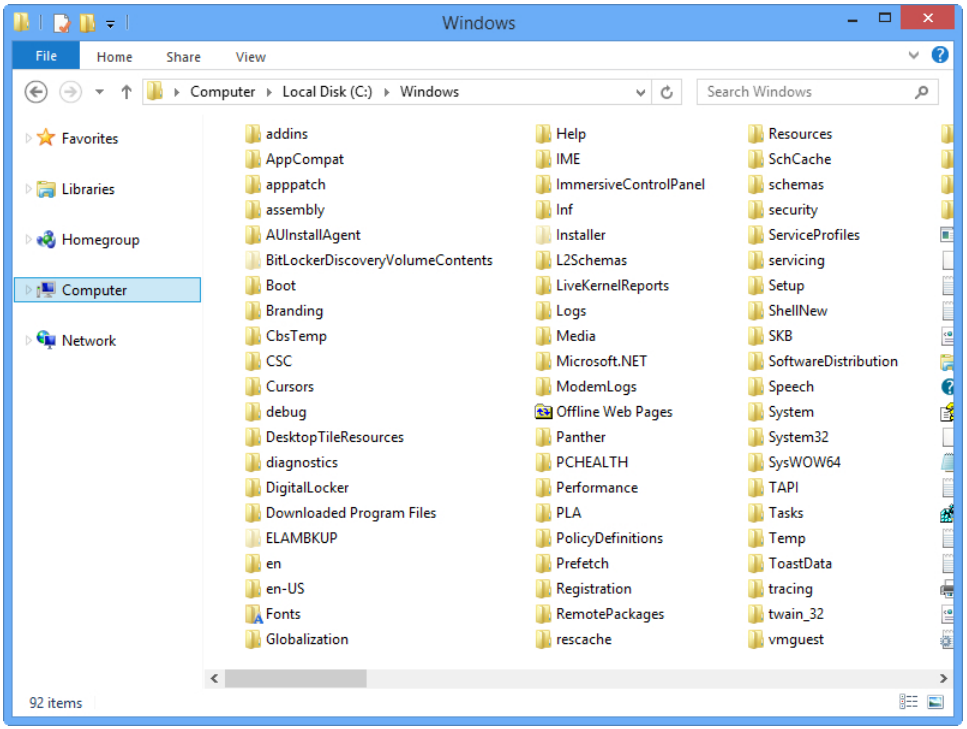

Figure 15-3 The main Windows operating system files and folders

All of these files and folders are essential and you should not move, rename, or delete any of them. One folder of particular note is **System32**, which is the main operating system files folder store. All the central Windows files, including hardware device drivers, are located in this folder.

What Is WinSxS and Do I Need It?

A couple of questions I am commonly asked are what is the WinSxS (Windows Side-by-Side) folder and do I need it? After all, in almost every case, it will run to many gigabytes in size, as demonstrated in Figure 15-4, and if you open it, it doesn't look to contain anything important.

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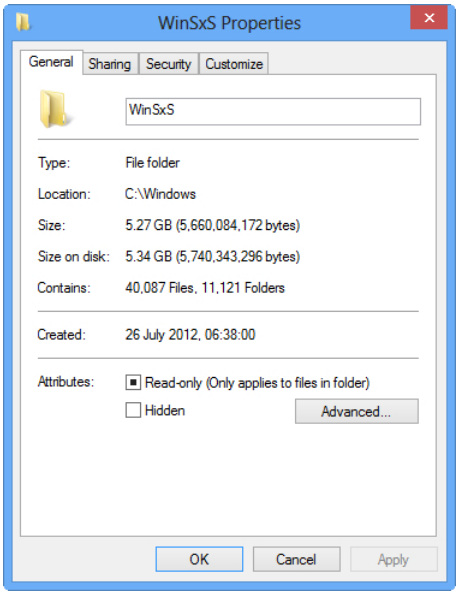

Figure 15-4 The Properties dialog box for the WinSxS folder

In truth, the WinSxS folder and its contents are extremely important, and if you delete it, you will stop Windows 8 from working altogether. So, what is it? For those people who used Windows XP and earlier versions of the OS, you might remember software crashing on a regular basis. This was caused by the conflicting programs trying to load different versions of the same Dynamic-Link Library (DLL) file simultaneously, it was known as "DLL Hell."

With the re-engineered Windows Vista, Microsoft changed things and introduced the WinSxS folder to house all the different conflicting DLLs and other file versions that the OS, your hardware drivers, and your software would need.

Thus, this folder now gives Windows the ability to allow the loading of different versions of system files simultaneously. If you delete it, you will very quickly discover applications crashing.

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Other Important Windows System Folders and Files

Beyond the three basic folders, there are many other important folders and files, including the following:

- 64-bit folders include Programs Files and Program Files (x86) with the former including 64-bit programs in the 64-bit version of Windows 8, and the latter including 32-bit software. There is also the SysWOW64 folder, which stands for Windows on 64-bit Windows; it contains the 32-bit files that are required to maintain full 32-bit compatibility on 64-bit systems.
- The Boot folder contains files necessary for Windows 8 startup.
- Debug contains text file error logs that you can open and read.
- Desktop.ini is a file that contains information about folder customization for the Windows File Explorer, such as how that folder is displayed.
- The Fonts folder is the main store folder for Windows fonts.
- Globalization contains spell-check and other files related to languages.
- The Media folder contains sound and other files associated with Windows, such as error sounds.
- Prefetch is the folder that contains preloaded versions of commonly used files. This is intended to speed up the loading of some programs and Windows components. If you find that programs you use commonly are not opening or opening slowly, you can delete the contents of this cache folder; the next time each application starts it will rebuild its cache files.
- The Resources folder contains desktop and ease of access themes for Windows 8.
- Software Distribution is the folder used for downloading and storing Windows Updates. If you find that Windows Update isn't working and isn't installing updates, you can delete the contents of this folder to reset the service.
- The System Volume Information folder is used by the System Restore feature to store information about changes that have been made to that hard disk.
- System32 \ config is the main folder store for the Windows Registry, the central database for windows, hardware and software settings, and configuration.
- Thumbs.db and ehThumbs.db are files containing thumbnail images for a specified folder. If thumbnails are displaying incorrectly in that folder, delete the thumbs file(s).
- Web is the storage location for lock *screen* and desktop *wallpapers*.

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Where Are Windows 8 Apps Stored If Not in Program Files?

If you look in the Program Files folder—or, if you are using the 64-bit version of Windows 8, the Program Files (x86) folders—you will see all the folders and files for your installed desktop software, but not your Windows 8 apps! So, where are they?

Windows 8 apps are hidden away in the \Program Files\WindowsApps folder, which is hidden by default and cannot be opened without changing specific and complex security settings, as the pop-up window in Figure 15-5 shows. I would not recommend that you change the security on this folder because it is set in such a way as to prevent malware from tampering with and infecting your apps.

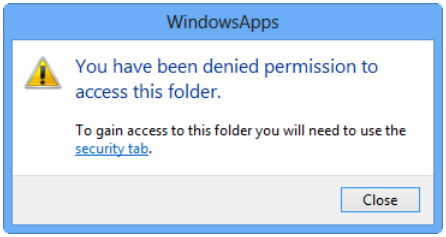

Figure 15-5 The Windows Apps folder is protected

Comparing Windows 8 with Other Operating Systems

The early versions of Windows were built over the foundation of DOS that shipped with the very first personal computers from IBM in the early 1980s. This brought with it several problems, many of which still exist today. The biggest issue is the need to maintain compatibility with legacy hardware and software. DOS did not support nor need to support multiple users or multi-tasking. Support for these has been added with later versions of Windows.

As computers have changed over the past 30 years, and with the introduction of new technologies such as the Internet, the need for extra security has come to the forefront of OS design. Unfortunately, this has meant having to build security over the top of the existing Windows system. This has inevitably led to some compromises and security flaws, which have been exploited by the authors of malicious software.

Most other desktop and server operating systems, including Linux, Apple OS X, and Google Chrome OS, are all built on top of an OS called UNIX. This operating system was developed in 1969. It was initially designed to accommodate multi-tasking and multi-users on mainframe computers.

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This means that user permissions and overall operating system security have always been handled differently in UNIX, with users never being given default administrator access to the operating system files. UNIX has slowly made its way from mainframe and minicomputers over the years to the desktop market, during which time this security system has remained unchanged.

None of this means that Windows 8 is an insecure and unstable OS. Quite the opposite, it is the most secure and stable OS that Microsoft has ever released, and many experts believe it to be every bit as secure as a UNIX-based OS. It is the vast popularity of Windows that has made it such a security target in the past.

Summary

Windows is, as I have said, a hugely complicated piece of software engineering that is built on many layers to provide backward compatibility and stability. Occasionally, however, you'll still need to find something within its thousands of files. Fortunately, the operating system is logically and sensibly organized. This will help you troubleshoot problems and can make verbal instructions from Help Desk technical support much simpler to follow.

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CHAPTER 16

Advanced Windows 8 Troubleshooting Tips

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What Are the Causes of Common Problems? 300
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In Sir Arthur Conan Doyle's novel *The Sign of Four*, the second story featuring the world's greatest detective, Sherlock Holmes, the gallant hero makes one of his most famous statements when addressing his loyal friend, Doctor Watson.

"When you have eliminated the impossible, whatever remains, however improbable, must be the truth."

I have always used this theory as the basis for all technical support because it implies that you have to take a methodical, step-by-step approach to diagnosing problems. I find it much easier and quicker to diagnose what isn't causing a problem than to identify what actually is causing it. This is especially true when diagnosing problems with computers, operating systems (OS's), and software, all of which can be extremely complex.

Taking a Step-by-Step Approach

The first step in adopting this approach with a Windows 8 problem is to perform basic fault isolation by eliminating the impossible. For example, if you suspect Windows is causing an instability issue with a hardware device, unplug all the devices that you can (USB flash drives, joysticks, and so on), leaving only the keyboard, the mouse, and the monitor attached. If the problem persists, you have very quickly established that the unplugged devices aren't part of the problem, and you can move on to investigate another cause. But if the problem goes away, you know that one of the unplugged devices is the culprit. Plug in the devices one at a time. When the problem resurfaces, you will have identified which of the devices is at fault.

Similarly, if you suspect that software is causing a problem, you can shut down all of the software at once. If the problem persists, you can eliminate software as the source of the issue. However, if the problem goes away when all of the software is shut down, you can be reasonably sure that software is the root of the trouble. To identify which program is at fault, shut down each software package one at a time until the problem goes away.

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This all sounds incredibly simple and straightforward, I know, and I am well aware that there are a great many occasions when a technique as simple as unplugging hardware and shutting down software doesn't work. However, this process is an essential first step to identifying what really is causing a problem.

At this point in a troubleshooting book, you probably expect to find a large and very complex flowchart to follow: is it A or B? If it's B then go this way and do X, Y, and Z. However, with computers, there are countless possible causes for the problems you might encounter, and so any such flowchart would by necessity cover a football field and still might not help you diagnose the problem.

You would be amazed how frequently I encounter a problem that neither I nor my colleagues have ever seen before, even after years of providing IT support. There are simply millions of possible things that can go wrong with your computer and your copy of Windows. The Microsoft Knowledge Base that you can access at *http://support.microsoft.com* contains several hundred thousand articles about Windows problems and still does not address them all. This is where taking a more structured and step-by-step approach can help enormously. Because of the structured nature of the diagnosis, you can be certain at all times where your troubleshooting process is at.

Minimum Windows Configuration

Sometimes, it's a good idea to begin with the minimum amount of software running and hardware installed to help diagnose what's causing an issue. The basis of this approach is this statement: reduce your operating Windows system to its minimum configuration to diagnose the problem. You can reduce the amount of running software in several ways. One way is to use the system tray. To access the system tray, on the right side of the taskbar, click the small up arrow. The system tray displays some but not all of the programs that are currently running on the computer (see Figure 16-1). To exit a program, right-click it, and then in the options panel that opens, select Exit, or open it if an exit option doesn't appear so that you can close the program properly.

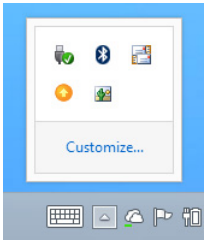

Figure 16-1 Exiting programs from the system tray

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INSIDE OUT

How to open the Action Center

Sometimes, especially after a fresh installation of Windows 8, you might not see the Action Center icon on the Windows taskbar for a while. To open the Action Center without this icon, you can go to the Control Panel where you can find it in the all icons view.

You also need to shut down running apps. The easiest way to do this is on the Start screen. If you move your mouse to the upper-left corner of the screen, thumbnail images of any running apps will appear, as shown in Figure 16-2. Right-click each thumbnail, and then in the options panel that opens, click Close to terminate the app.

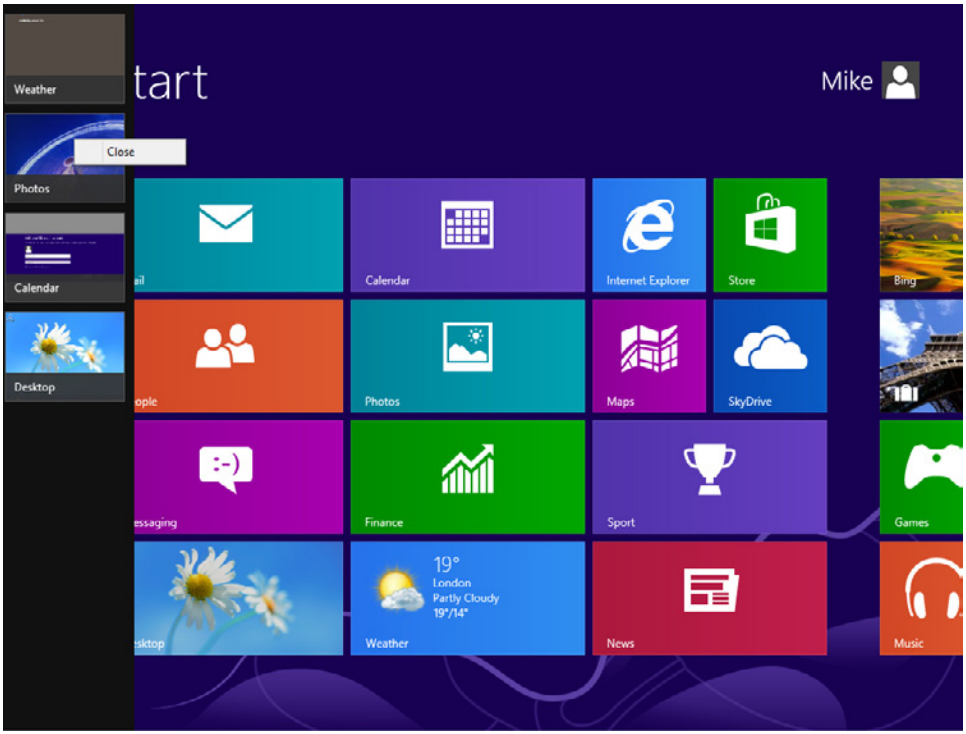

Figure 16-2 Shutting down apps

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You can also exit programs through the Windows Task Manager. To access the Task Manager, right-click the taskbar, and then in the options panel that opens, click Start Task Manager, or press Ctrl+Alt+Del and select Start Task Manager. You can view running applications on the Processes tab. To exit a program, right-click its corresponding process, and then in the options panel that opens, click End Task, as shown in Figure 16-3.

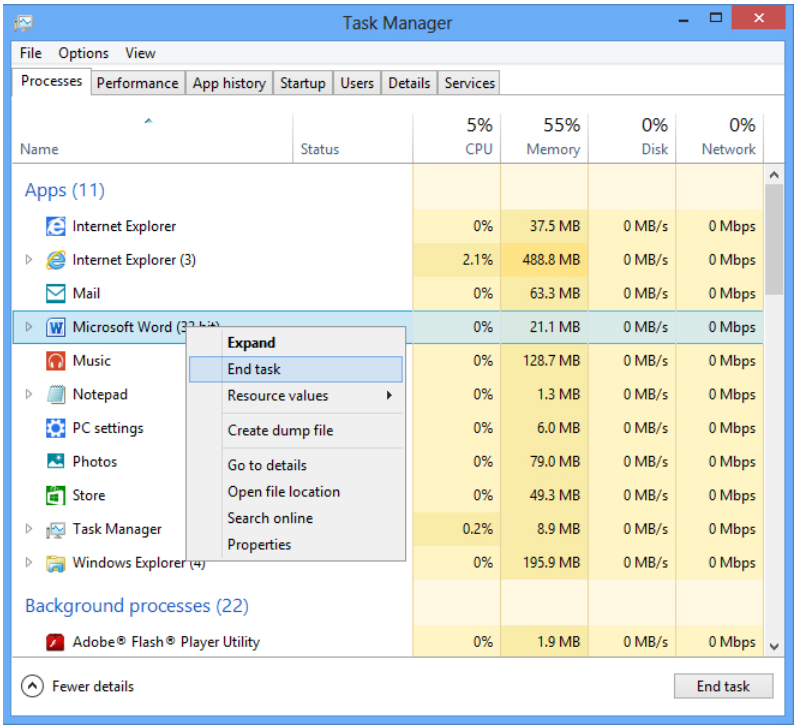

Figure 16-3 Exiting programs from the Task Manager

Note

If you aren't sure what a certain process is doing, you should not shut it down. Each process on the Processes tab of the Windows Task Manager includes a description, which is available on the Details tab. If necessary, you can maximize the Task Manager window and adjust the column widths to read the descriptions. However, sometimes even the descriptions on the Processes tab aren't enough to determine what a process is doing. One quick way to establish if a process is important is to right-click it and select Open File Location to see where the file associated with the process is stored. If it is in your Windows folder, you might want to leave the process alone. Shutting down the wrong process can cause Windows to become unresponsive or crash.

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What is the difference between an application, a process, and a service?

- An application is a program running on your computer. It is typically installed separately from Windows, but Windows 8 does include some applications, including Internet Explorer.
- A process is a component for a program or service. Sometimes an application is constructed from several programs that run together, each providing different functions for the application; for example, one process might be running the application and another one is updating it.
- A service is a program that does not require user interaction and that performs a specific task within Windows, such as running a print spooler or aggregating a media library.

INSIDE OUT

Determining what process does what

You can do a quick Internet search using a process name to find out what it is. For example, a search on the process "vmusrvc.exe" returned the following result: "vmusrvc.exe is a VMUSrvc belonging to Virtual Machine Additions from Microsoft Corporation."

CAUTION!

Shutting down Windows services can be troublesome. Unless you suspect a specific service is causing the problem, you shouldn't shut down any Windows service because doing so can cause Windows 8 to crash or become unresponsive.

Each time you shut down an application, process, or service, check if the problem you are troubleshooting goes away. By doing this, you can eliminate programs from your investigation, and it might even help you quickly identify the cause of the problem.

Safe Mode

Another way to shut down all running programs is to restart Windows 8 in Safe Mode. You do this during startup by pressing Shift+F8 on your keyboard after the BIOS screen disappears but before the Starting Windows logo appears.

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> **Note**
> **This won't work on newer UEFI systems and is only compatible with older BIOS computers.**

This method is probably less useful than other methods because no software will be running (unless it's set as a Windows service such as antivirus software) and only minimal hardware drivers will be loaded at this point in startup. However, if you do restart in Safe Mode and everything is working fine, you can eliminate Windows 8 itself as the cause of the problem.

Manually Launching Safe Mode

As I mention in Chapter 14, "Easy Ways to Repair Windows 8," some computers—especially those with UEFI firmware—won't let you access the boot menu by pressing F8 or Shift+F8 during startup, so you might need to run Safe Mode manually. (It's worth noting that on newer UEFI-enabled computers the time you have to press this key is only around 200 milliseconds, so you'll probably still need to run Safe Mode manually). You can even lock the computer in Safe Mode for a period.

To launch Safe Mode manually, open the Start screen and type **msconfig** to start MSConfig. There is no need to run it as an administrator.

When MSConfig opens, click to the Boot tab (see Figure 16-4), select the Safe Boot check box, and then select the Minimal option (which will become enabled once you select Safe Boot). By default it will select a minimal safe boot; this is the Safe Mode that you will have used in previous versions of Windows.

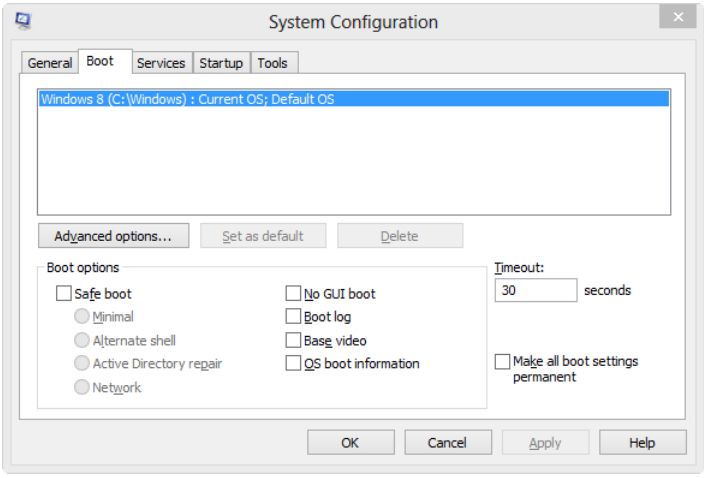

Figure 16-4 Setting Safe Mode in MSConfig for the next restart

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The next time you start Windows 8, it will boot into Safe Mode, and this will continue when you reboot it. To undo this and revert to a normal boot, you must open MSConfig again and clear the Safe Boot check box.

INSIDE OUT **Launching Safe Mode with network support**

If you need to have network access in Safe Mode to help diagnose a problem, in MSConfig, select the Network option under Safe Boot instead of Minimal.

Unplug Your Hardware

As I mentioned earlier, you should also remove any hardware from the computer that you can when you're troubleshooting a problem. I'm not suggesting that you pull out your graphics card or anything like that. Do not remove anything from inside the computer case, but do remove hardware devices such as printers, USB flash drives, scanners, joysticks, and anything else that simply plugs in. After removing each element, see if the problem you're troubleshooting persists.

Hardware and Interrupt Requests

Windows 8 handles interrupt requests (IRQs) far more effectively than previous versions of Windows, so IRQ-related problems almost never occur. You can never tell, however, if a poorly written hardware driver might still cause a problem, and IRQ conflicts can be worth checking occasionally. This is especially the case if you are still using older hardware (some laptops still ship with serial and parallel ports for this very reason). With that having been said, Windows 8 is so good at managing IRQs that it would have to be a particularly poorly written driver to cause a conflict.

To check IRQs, in the Device Manager, on the View menu, select Resources By Type, and then expand the list of device IRQs by clicking the "+" (plus) sign next to Interrupt Request (IRQ). Right-click a device to open its settings panel. On the Resources tab, you will see a list of the IRQ assignments for your hardware, as shown in Figure 16-5.

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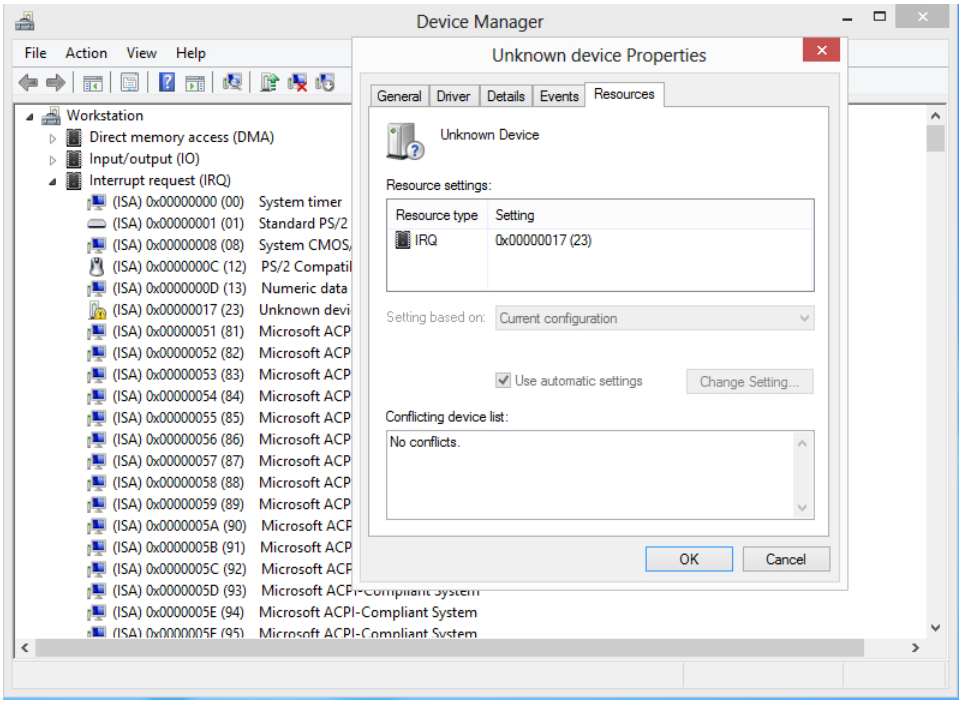

Figure 16-5 Viewing devices by IRQ

IRQs are essentially communications channels that your hardware uses to send and receive data. They're called interrupts because it's impossible for every device to talk to the computer's motherboard simultaneously, so these communications channels take turns, with one channel "interrupting" another to take over a channel. Windows 8 also uses IRQs to manage the power usage on a computer, ensuring that all devices receive the power they require to function.

There are 15 IRQ channels in a computer; any IRQs you see above this number are virtual channels for which Windows 8 is handles all the communication.

The more hardware devices you have plugged into a computer, the more they must share the IRQs. Windows 8 is extremely good at sharing the IRQs, but occasionally two hardware devices sharing the same IRQ cause communication problems with one another. To see if one or more IRQs are being shared by multiple devices, view the resources by type in the Device Manager, as described earlier in this section. On the Resources tab, the Conflicting Device List box will indicate if there are any conflicts for this device as a result of IRQ sharing (refer to Figure 16-5).

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In Windows 8, you can't manually change the IRQ of a device. However, you can move the device to a different channel. This might involve moving a PCI card inside your computer to a different slot (be sure that your computer is switched off and disconnected from its power source before you do this). This will force Windows 8 to reassign the device a new IRQ, and it might fix the problem.

With some motherboards, you can manually set IRQs for devices in the BIOS. It's entirely possible, however, that Windows 8 will simply ignore this BIOS setting and reassign the IRQ anyway.

> **Tip**
>
> **Sometimes IRQ conflicts are caused by a device appearing twice in Device Manager. To resolve this issue, right-click one of the duplicate devices, and then in the options panel that opens, select Uninstall.**

These are the basics of diagnosing Windows problems. By starting with these methods, you should find that you can quickly resolve a great many problems and issues. Chapter 20, "Using Advanced Repair Methods," through Chapter 25, "Troubleshooting a Windows 8 Installation," provide greater detail on how to diagnose more complex problems with Windows 8 and your computer.

Why Problems Occur with Windows

So many things can go wrong with Windows because every single computer is unique. It is highly unlikely—especially outside of a controlled business environment—that another computer exists with exactly the same hardware specifications, installed software, and updates as yours. For the most part, each computer comprises a unique mix of software and hardware components, and there would be no way for any entity to ever test all of the possible combinations for stability. In the words of chief engineer Montgomery Scott from the Starship *Enterprise*, "The more they overthink the plumbing, the easier it is to stop up the drain."

There are logo certification programs for Windows hardware and software, and a great many vendors do indeed put their products forward for testing by Microsoft. All that these tests prove, however, are that on a basic Windows system, that device or that program will be stable and not cause the system to crash. What can't be tested is how that same hardware or software will interact with other hardware or software on your computer, some of which might not have been submitted for certification.

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Keep Things Simple

The sheer number of software packages you have installed or the number of hardware devices you have plugged in can also cause problems on your computer. I always keep my Windows systems simple and uncomplicated. When it comes to hardware, I like multi-functional devices such as printer/scanner combinations, and I avoid unnecessary USB devices, such as USB attached speakers. Your computer already comes with audio-out jacks that are perfectly good.

I also try to avoid installing all the software that comes with a new device. Devices, Wi-Fi adapters, and printers are common culprits when it comes to loading your computer with *bloatware*. If you have a new computer, you might also find that it came preloaded with lots of software that you don't need and will never use. The software packages that come bundled with hardware devices broadly fall into the following categories.

- **Trialware** Software that will expire after a period, normally 30 days. If you do not intend to buy the software after this time, you should uninstall it because it might, especially in the case of trial antivirus software, leave programs and services running that can slow down Windows 8 or cause other problems.
- **Dupliware** Programs that duplicate Windows features, such as Wi-Fi connection software, media players, or CD/DVD burners.
- **Craplets** "Useful" utilities that your computer supplier might have pre-loaded onto your computer. They are intended to simplify certain tasks, such as writing notes or accessing media files. They will always run when Windows launches at start up, although you will probably never use them.

> **Note**
>
> **Occasionally, you will find a utility that comes with hardware to be a useful addition, for example, printer status (and ink/toner) monitoring, a document scanning utility, or a tweaking/overclocking utility for your gaming graphics card. These programs are perfectly fine to keep on your computer, as long as find them useful and they're not just sitting there collecting virtual dust.**

Don't Install Programs that Duplicate Features in Windows

Why would you want to install a program that simply duplicates Windows functionality? By default, the OS can burn CDs and DVDs (including audio discs and ISO image files), open those ISO files, play media (video, TV, and audio), display photos and images, and much more.

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Although a few Windows functionalities such as the Calendar and Email software are only available in Windows 8, you might find that these are enough for you. (Note that these programs for the desktop are also found in the excellent Microsoft Live Essentials Suite, which you can get from *http://download.live.com*.)

The more software you install on your computer, the more problems you invite. If at all possible, avoid having software packages installed that duplicate functionality that's already in Windows. The aforementioned CD/DVD burning software is a good example of this.

INSIDE OUT **The media player exception**

The only possible exception I would make to the rule about not installing duplicate programs is media player software. If you have an iPhone, iPad, or iPod, you will need to install Apple iTunes software on your computer to synchronize your device. Many people also find the iTunes software very good and like shopping in the iTunes store.

Note

A case can be made for choosing only Microsoft software when you have a choice of suppliers. I would argue this is true for Microsoft Live Essentials Suite and Microsoft Office, in particular. Microsoft has complete access to the Windows base code, so you can be confident that Microsoft software will almost always operate without causing any problems in Windows 8. Installing a third-party package will not give you the same peace of mind.

Do Large Amounts of Apps Also Cause Problems?

With apps, the development and delivery process is different and much improved over the "create and deliver it anyhow" method for programs on the desktop. Having a streamlined and coherent process for the coding and delivery of apps does not guarantee the quality of the underlying code, something which Microsoft is unable to check.

It will take some time to determine what, if any, effect installing large volumes of apps on a Windows 8 computer will have to overall stability. The problem here is that smartphones and tablets encourage people to install large volumes of apps that they might never use afterward.

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An advantage other platforms such as iOS or Android have with apps is that it is rare for one to launch automatically at Startup. With Windows 8, an app might have a live tile, which will need to be updated. Although this shouldn't cause any stability problems with the OS, I would still recommend that you only have installed any apps and programs that you actually *need* and will use regularly.

What Are the Causes of Common Problems?

It's very rare for Windows 8 to fail of its own accord. It will only do this if something disastrous happens, such as a power surge or a sudden reset while Windows is modifying a critical system file. Problems are more commonly caused by something outside of Windows, such as software, updates, and drivers. Physical hardware almost never causes problems in Windows, in and of itself; it will always be the driver (its software interface) that fails. (I talk about diagnosing hardware problems in Chapter 24, "Diagnosing Hardware Problems.")

A great many of the problems with Windows are caused by poorly written software or hardware drivers or by having too many devices or programs installed on or in your computer. In my experience, the most common problems within Windows are caused by the following (in order):

1. Device drivers.
2. Poorly written software.
3. Poor security.
4. BIOS corruption. (For more information on resetting the BIOS, see Chapter 9, "Managing Hardware.")

The Domino Effect

Some problems can cause a domino effect, whereby one event sets off a string of other events. One unchecked problem can then lead to others because a malfunctioning process, service, or driver can cause other programs or Windows functions to fail because all of these are often shared by several applications or Windows components. So, it's always advisable to diagnose and repair problems as early as you can after they first appear.

For instance, you might have a problem with Internet Explorer crashing repeatedly. This could be because a component Internet Explorer shares with another Windows program (perhaps File Explorer) is corrupt or because another program or process is causing it to crash. I cover the sometimes complex process of repairing Internet Explorer in Chapter 21, "Demystifying Windows 8 Problems." The point is that the source of a problem is not always

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obvious; a failing program might not be the root cause of the issue. In these cases, you can use more advanced diagnostic methods and tools to diagnose an issue. I cover these in Chapter 20 through Chapter 22, "Utilizing Remote Help."

Have You Tried Turning It Off and On Again?

If you've ever called an IT support department, the first question the support person probably likely asked you is, "Have you tried turning it off and on again?" This is a running joke with IT support professionals for a simple reason; you might be amazed by how often it fixes problems!

It might not be a permanent fix if there is something more serious happening, but for odd occasions when a software package suddenly crashes, restarting the computer will often fix the problem. Software crashes are common, and just because a program crashes once does not mean it will continue to do so. Crashes can be caused by freak conditions that are unlikely to recur, such as two programs trying to access the same file simultaneously.

With all IT problems, be they hardware or software, this is a good thing to try. You should also restart all external hardware devices attached to your computer when you restart the computer by manually switching them off and on again, too.

The Blue Screen of Death

The Blue Screen of Death (BSOD) is notorious and, although not frequently seen in Windows 8, is still feared by many Windows users. The BSOD is the ultimate sign that Windows has died. However, the BSOD can provide some very useful information when you are troubleshooting what caused it.

In Windows 8, the BSOD has been given a makeover, with some now calling it the Blue Smiley of Death or the Blue Emoticon of Death (I can't see either catching on). With earlier versions of Windows there was a great deal of useful information that you could extract from a BSOD, but in Windows 8, there is just a single error message.

Figure 16-6 shows an example of the Windows 8 interpretation of the BSOD. In this illustration, you can see that Windows 8 is giving you just one piece of information: the error name. This makes the BSOD much less useful overall than it was in prior incarnations, in which you would be presented with a longer error code and the specific name of the service, program, or driver that caused the crash, and more.

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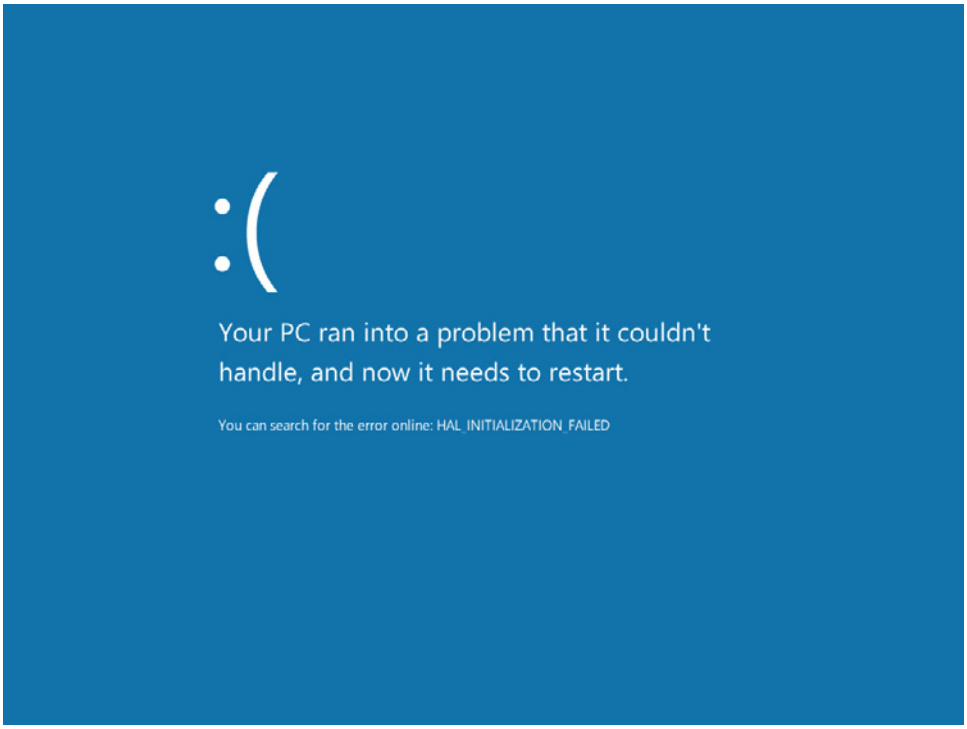

Figure 16-6 The new Blue Screen of Death

By far, the most common cause of BSOD in Windows is a hardware driver error, especially from unsigned drivers that have not been tested and certified by Microsoft. On occasion, other issues, such as a poorly written program, or even a power drop, can cause the dreaded BSOD.

The Perpetual Restart

Sometimes Windows 8 will automatically restart when it encounters a critical error. This can cause terrible problems, including the computer constantly restarting and never loading the desktop.

You can disable automatic restart on the boot menu shown in Figure 16-7. To access this menu, upon startup, press Shift+F8 on your keyboard after the BIOS screen disappears but before the Windows logo appears.

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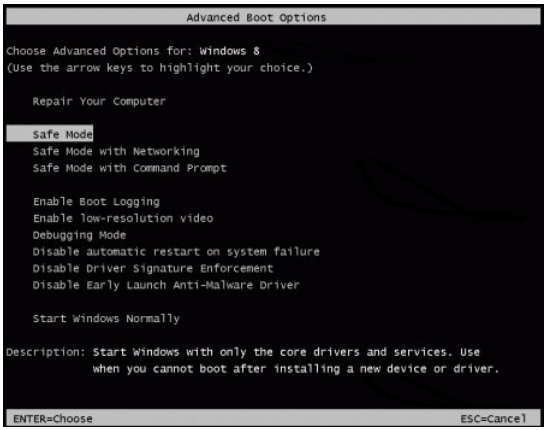

Figure 16-7 Disabling Windows automatic restart on system failure

INSIDE OUT

What if you can't open the Windows boot menu?

Earlier in this chapter, I mentioned that on modern UEFI systems, the time you have to press the F8 or Shift+F8 key is just *200 milliseconds*. On BIOS systems it's also a much smaller window than it was with previous Windows versions.

If this is the case and you can't prevent a perpetual restart, you will need to start your computer from a rescue disc, restore drive or your Windows 8 installation DVD and run System Restore or Refresh to reset the system to a stable condition.

Select Disable Automatic Restart On System Failure from the options list, (refer to Figure 16-7). At the next critical stop, Windows will display the error message on the BSOD instead of automatically restarting. You might discover (unless you're having an extremely bad day) that after making a note of the stop error code, you can start your computer in Safe Mode.

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Summary

One of the biggest problems facing people who need to diagnose a problem with Windows or their computer is knowing where to start. A computer is complex enough on its own, but when you add in the operating system and all your software and drivers, there are literally tens of thousands of individual components, each of which could be the cause.

When it comes to diagnosing problems, it's very important to take a step-by-step approach and to be methodical. It is much easier to diagnose what isn't causing a problem than what is, so this is always a good place to start. With this out of the way, finding the *actual* cause of the problem is a much simpler task.

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CHAPTER 17

Troubleshooting Windows 8 Problems in Your Home or Workplace

Taking a Holistic View of Troubleshooting Windows 8 Problems 305

Troubleshooting Network Problems 307

Managing Peripherals and Equipment on a Network 317

Managing People 319

An important part of troubleshooting problems with your Windows 8 computer is to consider the influence of external factors. If your computer simply won't start, then it is unlikely that external factors will be involved, unless you're also having trouble checking that it's plugged in because the lights are all off in a power outage. ;)

However, for a great many issues, other factors could be involved. And this becomes more common as we become surrounded by more and more connected devices. Tablets, smartphones, games consoles, Network Access Storage (NAS) drives, and much more are becoming ever more common as prices fall.

So, how can you determine if other hardware at your location or factors external to even that, or perhaps the structure of a building itself is causing a problem?

Taking a Holistic View of Troubleshooting Windows 8 Problems

Our environment very much affects us; likewise each computer or computing appliance that we use can impact one another. Moreover, the people with whom we work or live add to the overall complexity of things that can go wrong. Sometimes there is just no way to anticipate how a random event will affect you, your computer, your installation of Windows 8, or the work you are doing at the time.

For this reason, I always encourage people to look at troubleshooting in a holistic way and to consider how external factors might be influencing or even directly causing problems.

Taking a Look Around the Home

If you look around a typical home, you will find ever increasing numbers of devices that attach to our broadband router and home network. These can include several different smartphones, running a variety of operating systems; tablets, for which the variety in operating systems can be even more diverse; games consoles, again with operating system

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diversity; USB-attached hard disks plugged in to the router or maybe Network Attached Storage, for which prices are continually falling; Voice over Internet Protocol (VoIP) telephones as we move to fiber-optic broadband lines; and, of course, the devices that started it all, laptops and desktop computers.

Even the kitchen and bathroom are getting in on the act, with Internet-connected fridges and microwave ovens, intelligent bathroom mirrors (which seem to serve no real purpose other than to remind that you're late again), and so on.

This means that in a household where you once might have had two or three devices with their own IP address, you might now have twenty and not even realize it.

Taking a Look Around the Workplace

In the workplace, things can be even more complicated. If your network is still based on Internet Protocol version 4 (IPv4), for which the maximum typical number of available IP addresses that can be allocated by your router is 256, this ceiling can soon be hit when workers start connecting their smartphones and tablets, especially if you already have many computers and laptops in the office.

It is also becoming more common for offices to reduce costs by using central servers, accessed via a secure Internet connection, and have just some network storage and a switch box internally. With a full server system in an office you have software managing and regulating the allocation and distribution of IP addresses for hardware. Take away the server and things can become more complicated.

Taking a Look Outside

Your IT infrastructure doesn't end at your front door, however. You are connected to your broadband network either through your local telephone exchange or through a dedicated server data center. There are cables under pathways and roads, running around and through buildings and maintenance works, and all manner of other external hardware over which you have no control but that can affect your home or office network.

If there is a fault somewhere in a data center you use, or at your Internet Service Provider (ISP), those problems will ripple outward. These are usually easy faults to spot because they affect all computers simultaneously. You might have a file server in your office, however, that is hanging because it and it alone connects to a virtual private network (VPN) that is inaccessible and, for example, it is trying to perform an action that is causing it to hang or misbehave because the data traffic isn't getting through.

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INSIDE OUT **What external factors really cause problems?**

Although there are a great many factors, both inside and outside your home or office, that can affect your computers and your network, you will rarely find external factors affecting just a single computer.

This can make those factors easy and simple to diagnose, such as earlier when I the tongue-in-cheek example that perhaps all the lights have gone out. It is the internal hardware and factors that can cause problems more directly for individual computers.

Troubleshooting Network Problems

Some of the most common problems associated with external factors are related to the network. These can just as easily be caused by problems on your own computer, however, so how do you determine what is causing the problem and rectify it?

Because networking is such a problematic subject for people, I'm going to look here at diagnosing and repairing problems on your own computer as well as diagnosing what external factors, if relevant, might exist.

Troubleshooting Wi-Fi Connection Problems

There are two types of Wi-Fi connection problem: issues related to connecting to your own network, and issues related to connecting to a public network, including mobile broadband. The latter is what we'll examine first.

The first question to ask with a public Wi-Fi, 3G, or 4G network connection is how many people are using it. If you suspect that there might be many people already connected or if it's a busy period, such as a festival or civil emergency when mobile networks typically become clogged with traffic, you might find that waiting for a few minutes and trying again permits a connection.

With mobile broadband, and indeed calls on your smartphone, the display of four signal bars doesn't necessarily guarantee a connection. Even though the signal might be strong, there is only so much bandwidth to go around and the network is configured to reject phone calls and broadband connections if there isn't currently enough bandwidth available on a given cell tower to support them.

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The same might be the case with public networks in coffee shops or other hot spots. It could be that a connection at that time simply isn't possible due to a router crash or similar technical error. The best way diagnose a problem is to see if any other computer users are also having difficulty. If someone is using a computer or tablet, he might not necessarily be connected to the same network to which you're trying to access.

INSIDE OUT

Try a different USB port

If you are using a Wi-Fi or mobile broadband USB dongle, unplugging it and plugging it into a different USB port can fix many connection problems. Doing this forces Windows to reload the drivers for the device and re-establish a connection as though it were completely new.

Troubleshooting Router Problems

The simplest way to fix a problem with a router is simply to turn it off and on again. Before you do this, however, you should check if anyone else is successfully connected to it and if anybody is making a call on a VoIP system. Resetting the router will temporarily cut these people off.

With cheaper routers provided by ISPs, it's relatively common for them to drop the Internet connection and need resetting. What is also common is for wired network and Internet connections to work perfectly, while at the same time, the Wi-Fi fails. Thus, a loss of Wi-Fi when a cabled LAN connection still works doesn't mean you shouldn't reset the router.

INSIDE OUT

Best practice for managing your ISP

Some ISPs are fond of sending customers extremely cheap routers that regularly drop connections or that don't have signals strong enough to penetrate brick walls or in some cases even ceilings, especially in stone-built European houses.

If this is the case, you should contact your ISP and ask for a different type of router. If it is unable to provide you with one, which is fairly likely, explain the difficulties you are facing and ask for a discount that you can put toward buying your own router. Note that if you use your own router you will need your username, password, and a few other settings for the new router before you will be able to connect to the Internet, so I would advise getting these beforehand.

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Troubleshooting Internet Connection Problems

One of the most significant improvements to Windows 8, at least when it comes to diagnosing network problems, is the improved Task Manager. You can access this either by Pressing Ctrl+Alt+Del or by right-clicking the taskbar.

On the Performance tab, you can see each of your network connections, including your Wi-Fi, LAN, and Mobile Broadband, with live data on upload and download activity displayed in graphs, as illustrated in Figure 17-1.

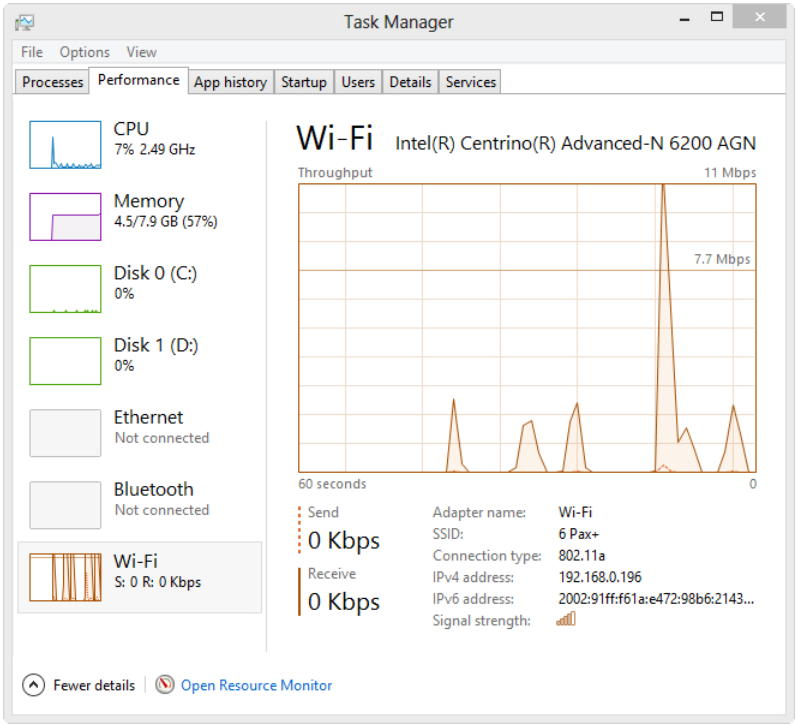

Figure 17-1 Windows 8 includes an improved Task Manager

You can click any of the connections to display additional information, such as numeric details of the current upload and download speeds, your IPv4 and Internet Protocol version 6 (IPv6) addresses, and signal strength, if applicable.

This should be your first port of call so that you can see if you have any live network activity.

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At the bottom of this window is the Open Resource Monitor link. Click this to open a network panel that will display activity for all processes, services, and programs running in Windows for the current live network, as shown in Figure 17-2.

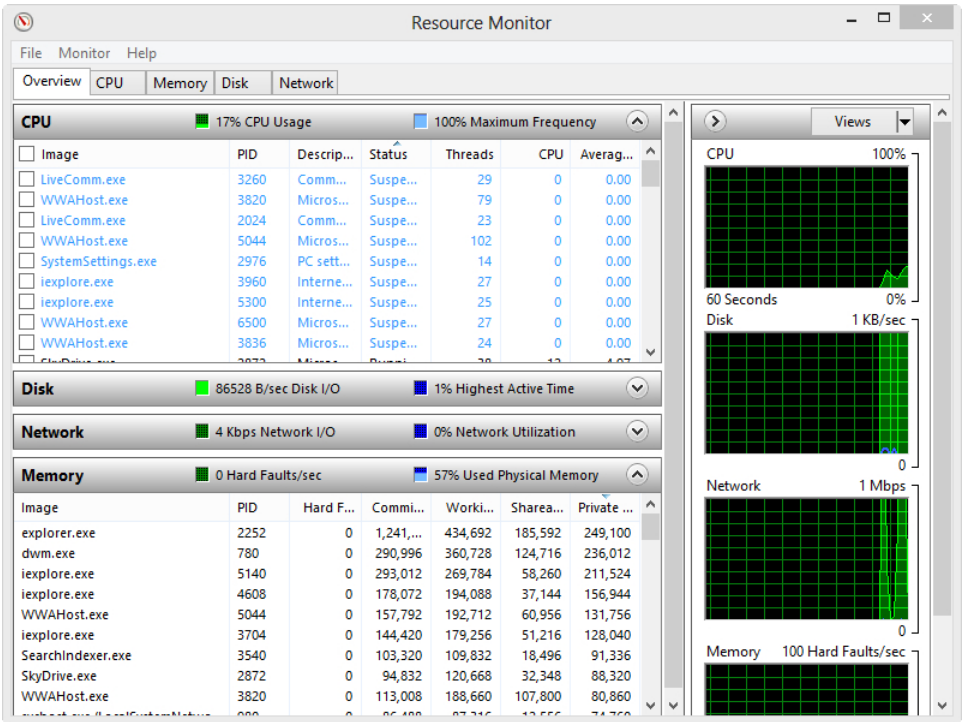

Figure 17-2 The Windows 8 Resource Monitor

INSIDE OUT

Resetting TCP/IP in your computer

Sometimes, network problems in your computer are caused by the TCP/IP (Transfer Control Protocol/Host Protocol) stack becoming corrupt. You can easily reset the TCP/IP stack in Windows 8 by opening a Command Prompt (Admin) window, typing the command netsh int ip reset resetlog.txt, and then pressing Enter.

This is useful if you want to see if a specific program or service is using all your network bandwidth. You might for example have a malware infection that is using your computer

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to perform a spam or Denial-of-Service (DoS) attack. These can typically consume large amounts, if not all of your bandwidth, which is of particular concern if you don't have much to begin with.

Troubleshooting Bottlenecks

If you suspect that a program or service is chewing up all of your network bandwidth, you can shut it down. To do this, go to the Task Manager and click the Processes tab. Right-click the suspect program or service, and then in the options panel that opens, click End Task.

If you can't diagnose and repair the problem from here, you should open the Network And Sharing Center (see Figure 17-3). To do this, right-click the network icon on the taskbar, and then in the options panel that opens, click Open Network and Sharing Center.

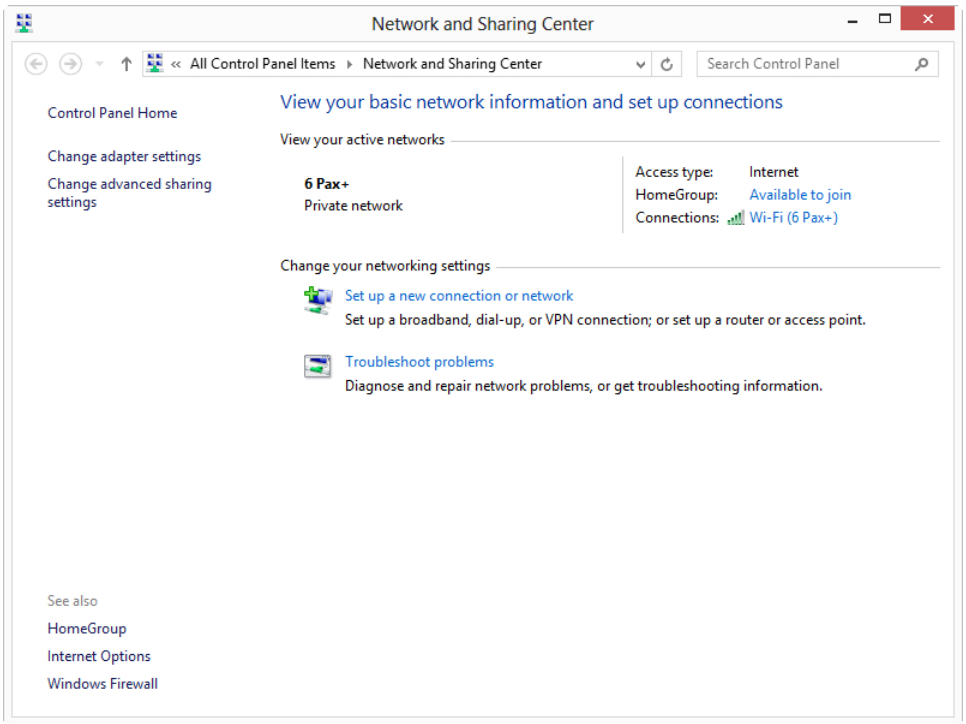

Figure 17-3 The Windows 8 Network And Sharing Center

The Network And Sharing Center displays all the information you need pertaining to your network connection. You can perform automatic troubleshooting here, too (which you can also do by right-clicking the network icon on the taskbar).

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The first thing to consider trying is the automated troubleshooter, which you can launch by clicking the Troubleshoot Problems link in the main panel. The automated troubleshooters of Windows 8 merely reset components to their default configurations, but in the context of network problems, that might be exactly what you need, especially if some settings have become scrambled.

To open a window that displays additional information and properties about your network connection, click the connection's name. Figure 17-4 illustrates how Windows informs you if it detects Internet connectivity and shows statistics on precisely how much data has been sent and received since you connected, including the length of time you have been connected.

You might, for example, find that Windows keeps dropping your connection, in which case the connection time shown for Duration will be short.

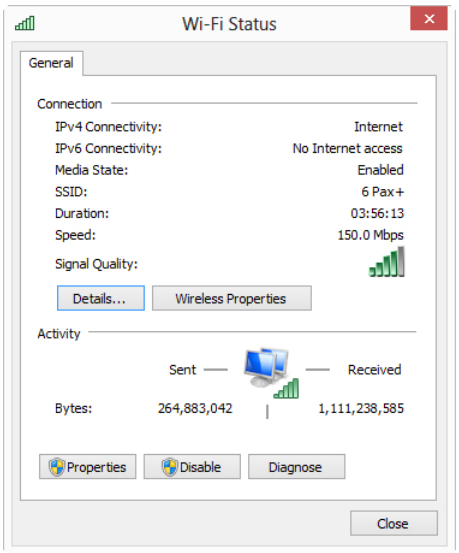

Figure 17-4 You can view additional information about your network connection by clicking its name in the Network And Sharing Center

To display the Network Properties for a connection, click the Properties button. In the dialog box that opens (see Figure 17-5), you can see what services are running for the network connection, such as IPv4 and IPv6. These could potentially cause problems on some networks if they are incorrectly configured for IPv6, and almost certainly if you have accidentally disabled IPv4 on your computer's network connection.

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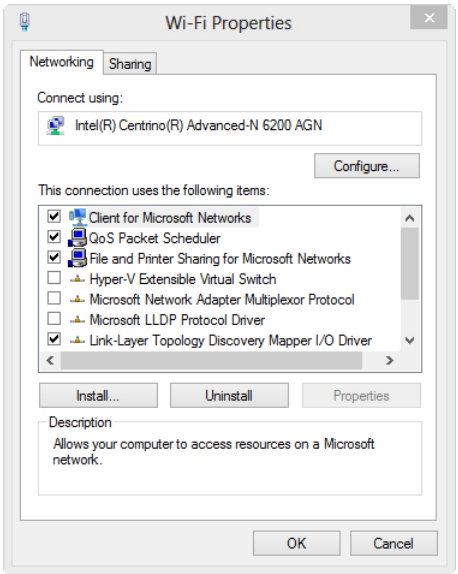

Figure 17-5 The Network Properties dialog box

You can click the Configure button to open a new dialog in which you can check the status of the hardware driver; however, additionally, there is an Events tab on this panel that provides information on the connections that particular network adapter has made. It is possible you could find some useful information here.

I mentioned earlier possible incompatibilities with the relatively new IPv6 standard. If you have older network hardware or are perhaps using your computer in a place where IPv6 has become the norm and IPv4 services might even have been switched off, you can select or clear the check boxes for these services as needed to turn them on or off.

There is also a Properties button here, which brings up a window that will be instantly familiar to anyone who ever tried to set up and maintain a dial-up connection in Windows 98, Windows 2000, or Windows XP, as depicted in Figure 17-6.

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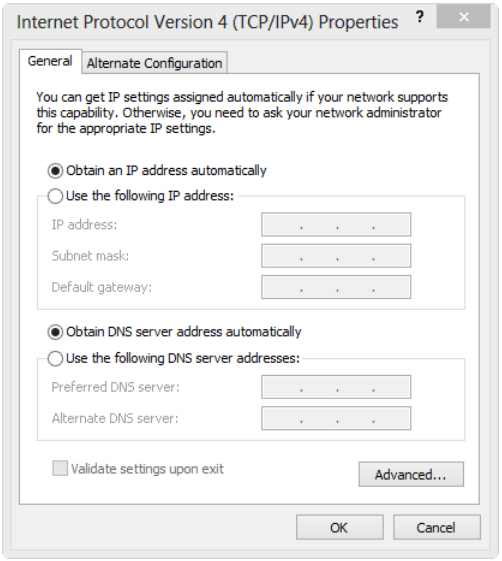

Figure 17-6 Setting advanced network properties

In this dialog box, you can set static IP and DNS server addresses for the network if the connection requires them. For example, you might be having trouble connecting to a business network. This can mean that you're simply on the wrong workgroup (more on this in a minute) or that the network requires you to input specific IP and DNS address information. This is the dialog box in which you can input this information.

INSIDE OUT

Changing the Windows 8 workgroup or domain

If your computer is connected to the wrong workgroup or domain (which is more likely in a work environment), you can change these settings in the System panel. To do this, open the Start Screen and search for system. When the System panel opens, click the Computer Name tab.

On this tab, you can change the name but you might need to change it back after you have finished if this new name then prevents you from connecting to other networks.

Click the Advanced button to display additional options that you should never need to change unless you genuinely are connecting to a dial-up network (and if you are, we should likely have a brief talk following this chapter).

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Troubleshooting Wi-Fi Passwords

Occasionally you might try to connect to a Wi-Fi network for which the password stored on your computer isn't the one the router is expecting, and Windows won't prompt you to re-enter the password.

Should this happen, go to the Network And Sharing Center, click the name of the network to open the Network Status panel, and then click the Wireless Properties button. On the Security tab (see Figure 17-7), you can change the security type and password for this wireless network. The Advanced button also provides an extra setting that might be required when connecting to certain government-related or other secure networks.

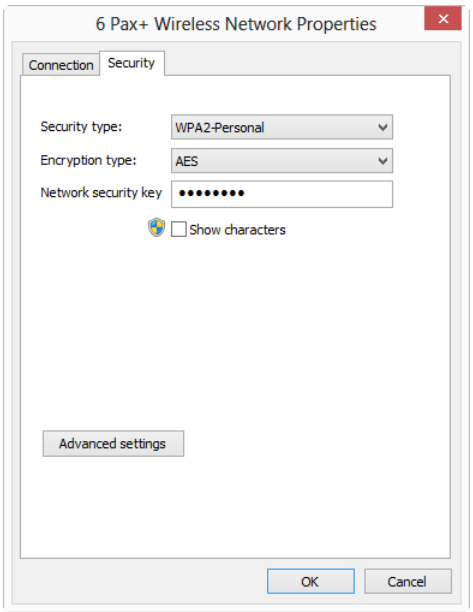

Figure 17-7 Changing the security settings for a Wi-Fi network

Diagnosing Faulty and Misbehaving Network Equipment

Cheap routers are one piece of network hardware that can cause problems, particularly by dropping the Wi-Fi signal regularly. How do you diagnose faults and problems with other pieces of hardware though? If you have a faulty switch box in an office, for example, and some computers have a perfectly good network connection, how could it possibly be faulty?

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In this circumstance, you will almost certainly have more than one computer available, so on the switch panel, find the plug for the faulty computer and find another for a computer that's working properly. Swap the plugs to see if the problem jumps to the other computer.

If you are using a hardware appliance designed to block certain traffic types, is it possible to temporarily disconnect and bypass the device. Be aware that some corporate networks are designed to not operate at all if appliances such as Sonicwalls and firewalls can't be detected by a remote server.

Check to determine if you have an IP address conflict that is causing problems. Windows 8 is generally very good at both detecting and rectifying problems caused by IP address conflicts, but if you have computers running other operating systems—especially older ones—it might not be able to compensate completely.

In this case, you can try switching off all the other computers and network devices temporarily—you will probably want to restart the Windows 8 computer, as well—to see if the problem remains when it's the only computer that's switched on.

Diagnosing Misbehaving Computers

Here is good method for checking if another computer is causing a problem with your network. Perhaps you have a computer running Windows XP in the office, or maybe even Windows 2000. It performs some critical role that can't be done in newer versions of Windows, which prevents you from retiring it. To isolate the cause of the problem, we use a step-by-step approach by which you switch off each computer, tablet, or laptop, one at a time, until the problem goes away.

When this happens, you will know that it was computer X that's at the root of the problem. This is usually that XP box sitting in a corner of the office. It will need then to be repaired or probably re-imaged.

Misbehaving computers doesn't necessarily mean you have some old piece of kit that's buggy and faulty. In modern homes and offices, we are now running an extremely broad selection of operating systems. Tablets might be running Windows 8, or iOS, or Android, or QNX, or WebOS. Smartphones might be running Windows Phone, iOS, Android, or Symbian. NAS drives might be running Linux, so might desktops and laptops, and desktops might also be running OS X or any other version of Windows.

Modern operating systems are generally excellent at working together sweetly, unlike the dark, old days of Windows/Mac incompatibilities which were the result of different network protocols at the time.

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These incompatibilities still haven't gone away, however. The HFS and NTFS file systems used by Apple and Microsoft are inherently incompatible. Add into this the new ReFS file system used by Windows Server 2012 and the Storage Spaces feature in Windows 8 and it's easy to see how even simple file-sharing between different types of computers can cause problems, or fail to work altogether.

Managing Peripherals and Equipment on a Network

Whether you are at home or working in an office, security is a critical part of maintaining a healthy and trouble-free network. Without the correct security in place, it is all too easy for malware to jump from one device or computer to another. You shouldn't consider different operating systems as being immune from this, either.

It's not just about malware, however, there are many factors that can affect the stability and reliability of devices on your home or work network. One such factor is the electricity supply and what devices you have connected to what socket. If you have a high-draw device, such as an air-conditioner plugged into the same circuit as a computer, the sudden drop or spike that results from this device when it switches on and off could be enough to cause a power interruption that can bring on the dreaded Blue Screen of Death (BSOD) or a restart.

Any fatal crash can damage Windows operating system files or files associated with your software. And, of course, you can lose documents that you were open at the time.

INSIDE OUT **Always use a surge protector**

You should always ensure that computer equipment is plugged into a spike/surge protector on your electricity supply. The components inside modern electronics work on micro-voltages, and spikes and surges, especially in areas with unreliable electricity service, can be enough to completely fry sensitive modern electronics.

There is also the matter of leaving devices switched on and plugged in when they're not needed. Setting aside the obvious environmental and financial benefits (though a mobile phone or laptop charger will typically consume just a couple of cents electricity a year when not charging a device) of turning off equipment when you don't need it, if you leave many devices plugged into your computer for extended periods of time, you are possibly inviting problems.

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At the very least, these will include slowdowns of the operating system because it occasionally spins up a USB hard disk for defragmentation, backup, or other automated function. There can also be issues with some poorly written drivers creating incompatibilities with your currently running software and other hardware. Although this scenario is extremely rare, the cost saving benefits alone is usually reason enough to switch things off when they're not in use.

The same goes for equipment attached to your network. It would make sense that you would want to avoid network slowdowns caused by computers constantly pinging a file server or the NAS drive that is left on all of the time, including at night and weekends. The longer computers are left on, the shorter their lifespan will be, and this also applies to Windows 8 computers and the hardware attached to them, such as monitors.

INSIDE OUT

The heating and cooling of micro-electronics

Modern electronics are commonly made of metals, and it's widely known that as you heat up a metal, it expands. When the metal cools, it then contracts. In a computer the process of general use will cause the components within it to heat up, and consequently expand. Over a long period of time this creates stress on the metal and can result in it fracturing.

There are some arguments that you can improve the longevity of these devices by leaving them switched on, such as examples of filament light-bulbs left switched on for decades at a time when one that is switched on and off regularly might last just six months. Modern electronics are fairly resilient, and I would personally prefer to switch devices off, but this is a personal decision each person needs to make.

Similarly—and this was once explained to me in detail by a physicist who was very excited talking about it—in devices that are moved around a lot, such as a smartphone, tablet, or radio, the constant movement of the device places additional stresses on the electronics that exacerbate the effect of heating and cooling the metals. This is why static computers and devices will always have a longer lifespan, and why some older computers fail shortly after being moved.

Should Workers Use Their Own Computers and Smartphones?

One of the hottest topics of debate in the workplace currently is should staff be allowed to use their own computing devices in the workplace for business tasks, or their own computers when working from home.

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Many IT professionals will have to take deep breaths at the very thought of staff members being permitted to use their own devices for work on secure and carefully crafted business networks. Indeed, there is good reason for being concerned. Not only do IT departments have no control over the security on personal devices, they also have no control over who uses them.

If you are an IT administrator, I would ask you to accept that it is fairly inevitable that people will use their own laptops, tablets, and smartphones more and more frequently in the business space in the coming years. The answer to this then must surely be education in how these devices can be made and kept secure and why it is important to do so.

If you are a worker who wants to use your own computing device in the workplace and can see no reason why this shouldn't be allowed, the IT department doesn't usually say no flippantly; there's always a good reason. I would suggest, however, that if you ensure that your computer is regularly updated with security and other patches, run active and regularly updated antivirus software, that you don't install every piece of software that comes along, and that you know how to keep yourself and your computer safe online, you should probably have a reasonable argument for using your own computer. Keeping the children away from the device would also be an extremely good idea.

Managing People

So, how do you manage people when using computers and Windows 8? The answer is in education. I've spoken in this chapter about workers wanting to use their own computers at for business purposes, and sometimes not understanding why this might be a bad idea. I've also spoken about devices being left on and plugged in when perhaps they shouldn't be, and I've explained the problems associated with computers being plugged into the same circuit as high-energy-consuming devices such as air conditioners and refrigerators.

To a seasoned IT practitioner, it might be apparent that if you need to leave a computer switched on overnight, turning off the monitor saves energy, reduces costs, and is one less fire hazard to have. But you would be amazed at how people who are not focused on these issues regularly (and it's not their job to be) simply overlook so many obvious and simple best practices.

Best Practice Advice for Training Staff in Computer Use

So, how do you educate people, both at home and at work, in the safe use of technology so that they can get the best service out of it and so that their Windows 8 computers can give them a long and trouble-free life?

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Although computers are flexible devices that you can use for practically anything, business has for many years struck the right balance with different disk images for a single computer (typically, where they buy hundreds or even thousands of the same computer) so that you can have a computer for sales, or accounting, or management, but not all at the same time.

If you install a program on a computer, a user will inevitably at some point want to see what it is and what it does. The more you have installed on a computer, the greater the chance of an incompatibility (and then a problem) occurring.

It's a good idea then to have a specific computer dedicated for a specific task, if you can afford it. In my own home/work environment I have a laptop that I use exclusively for work, primarily because friends who stay over regularly like to have *Call of Duty* and other first-person shooter games installed on my desktop computer. I also have a tablet that I use exclusively for light web browsing, email, and games. This way, I can keep things neat and separated.

It's a good habit to get into and something about which to inform others. If you have a laptop that you use for work, it's wise not to let the children (or anybody else) use it. Not to mention the enormous data protection and legal issues to which you might expose yourself as a result of such use; downtime is very costly for a business and frustrating for the user.

Although IT departments don't like staff members running Windows Update on their own computers—we prefer a centralized management system—it is good to show users how they can do this, if they need to.

You need to contextualize these things, however, which would mean explaining and detailing what all the threats are. Chapter 13, "Responding to Viruses, Malware, and Other Threats," is a good resource that can help in this regard. You can explain to them how to ensure that they stay safe online and what to look for. By doing this, you are not only helping yourself, you are helping them, too, and they will be grateful for having learned something that will be genuinely valuable to them and their families (what they learn for their work devices certainly extends to personal devices, as well).

As further contextualization, you could point out that the way an IT department manages computers is very much the way families with young children manage their computers. Parents don't want their kids to install any old program, make critical changes to a computer, or look at inappropriate web content.

Managing the Family on Your Computers

So, with the business space out of the way, how do you, as a computer user, manage your own Windows 8 devices at home? What is the best way to keep your family and children safe, and how can you ensure that visitors to your home don't create problems that can crash your computer or worse?

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Best Practice Advice for Managing User Accounts in Windows 8

In the same way that in the workplace you will have your own carefully managed logon with strict permissions, you should set this at home, as well. Children should never have an Administrator account. Administrators can make any changes they want to Windows 8, including installing new software, changing critical operating system settings, or even deleting parts of the operating system itself.

You can create new user accounts in PC Settings, and by default Windows 8 will prompt you to make all new accounts Standard users, and this is what I would recommend. There is no way to access the Windows 8 Family Safety from here, however. To get to these, open the Start screen and search for **family**.

Using Family Safety in Windows 8

The Family Safety options in Windows 8 (see Figure 17-8) are excellent. They are an improvement on what were already superb tools that came in Windows 7. They include the ability to control what times and on what days the computer can be used by a specific user, the game ratings they are allowed to play (though bear in mind that this is by no means a catch all), what programs they are allowed to use (though this control is fiddly), and most important, what types of websites they are allowed to visit.

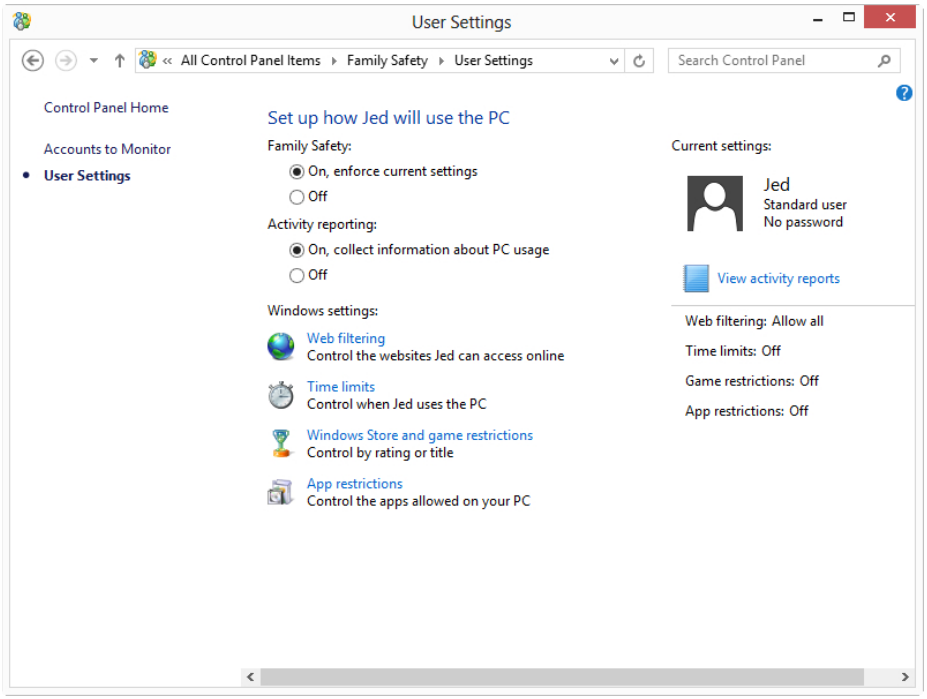

Figure 17-8 The Windows 8 Family Safety dialog box

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These controls are simple to set up and use, and Windows prompts you if you have done something such as set a password on your Administrator account first.

Family Safety can help considerably toward maintaining a healthy Windows 8 system, as can having separate standard user accounts. These users cannot make any changes to Windows that will affect any other user. This can significantly reduce the chance that they can accidentally do something that can cause the computer to become unreliable or unstable.

The Windows 8 Guest Account

Another feature for which you need to go to the desktop is the Windows 8 Guest Account. You can access this in the Control Panel, in the Users section or by opening the Start screen and searching for **guest**, where you will find it in the settings search results.

Figure 17-9 shows Manage Accounts dialog box, in which you can turn the guest account on and off. The Guest account has minimal permissions, but to ensure that you maintain the maximum security, you should have a password on your own account. This will prevent a guest user from being able to pass through UAC controls should she try to change critical Windows settings or install new software.

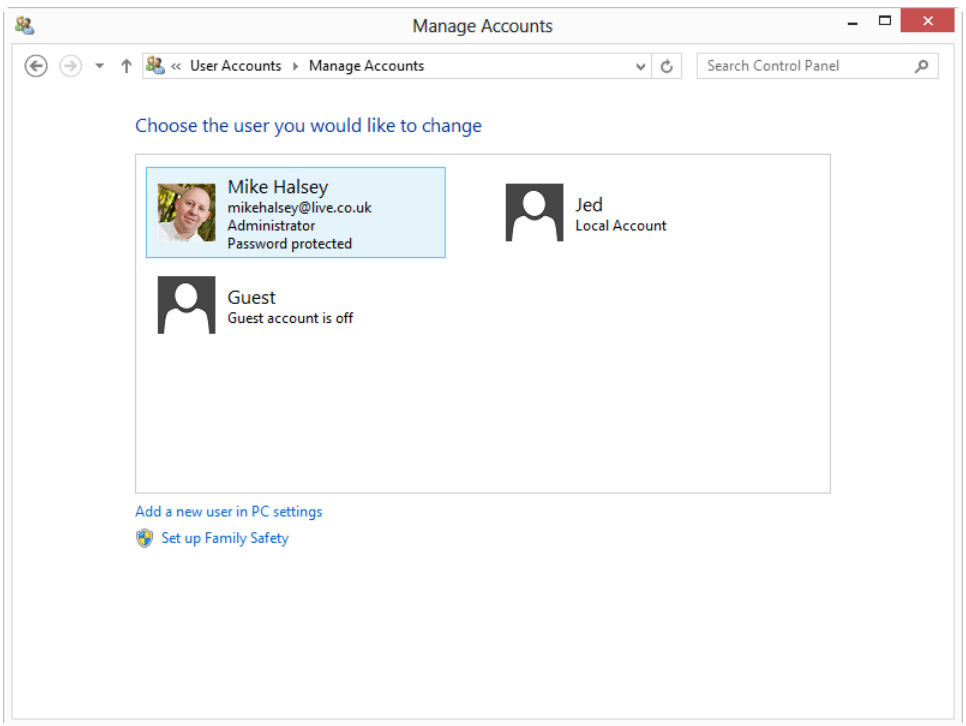

Figure 17-9 Turning on the Windows 8 Guest account

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Summary

When you are diagnosing problems with your Windows 8 computer, it is important to look at the process holistically; more than anything else, this involves using preventative measures.

We use so many different computing devices on our home and work networks these days, running so many operating systems, that complexity is certainly a good word to describe state of affairs. Indeed, the very concept of having a home network was almost unheard of just a few short years ago, when the most people would have was a desktop computer, a laptop, and a games console.

Now, we all have so many devices attached to our networks that it's important to understand how they can occasionally conflict with one another and cause problems on a single for an individual computer, when indeed the solution might just be switching off or repairing another device.

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CHAPTER 18

Troubleshooting Windows 8 Startup

Using Windows Startup Repair 325
Manually Repairing Corrupt Boot Files 327
Windows 8 and Dual/Multi-Boot Systems 329
Editing the Windows 8 Boot Menu by Using BCDEdit 330
Backing up the Windows 8 Boot Partitions 333

THE QUESTION I AM ASKED MOST OFTEN is how to fix a problem involving Windows startup. Obviously, your computer isn't much use to you if you can't start it up and get to the logon screen. The startup system for Windows changed significantly in Windows Vista, and it has changed again with Windows 8. It provides a new Start screen and supports new features such as the Trusted boot.

Using Windows Startup Repair

The easiest way to repair a faulty Windows 8 startup is by using the automated Startup Repair. This will run automatically if the computer fails to start after three attempts, but you can also run it manually in one of the following four ways:

- Press F8 on your keyboard upon Windows startup, select Troubleshoot, and then on the boot menu screen that opens, select Advanced options.
- Press Shift+F8 upon startup and select Repair Your Computer.
- Hold down the Shift key while restarting your computer.
- In the PC Settings dialog box, click the General tab and then click the Advanced Startup Restart Now button.

In the Advanced options on the new Windows 8 boot menu, you can use System Restore to roll back your system if you suspect that a recent update, hardware, or software installation has caused your computer to become unstable.

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Note

Windows 8 now starts so quickly that there simply isn't enough time to press a key at startup to display the boot menu, especially on computers with UEFI firmware. If you can't start Windows to activate the boot menu there, start your computer from a system rescue disc, restore drive, or your Windows 8 installation media. At the Install screen, click Repair Your Computer.

You can restore from a system image if you have made one, or you can run the Automatic Repair tool, as illustrated in Figure 18-1.

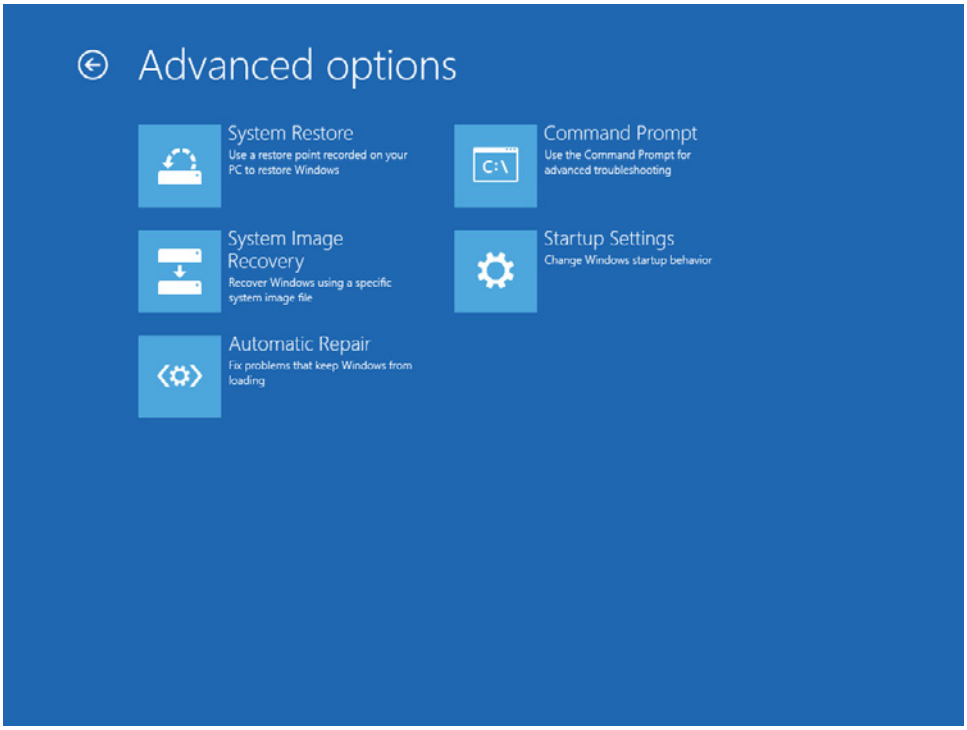

Figure 18-1 The Advanced Options menu for booting

The Automatic Repair option resets the Windows boot system to its default configuration. Thus, it's useful in many circumstances, but not all. For example, if you have a corrupt boot partition, Automatic Repair cannot provide a fix. As a general tool though, it is worth trying.

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Should the Automatic Repair be unable to fix the problem, however, it will create a log file (see Figure 18-2) that you can read (perhaps on another computer), containing information about the error.

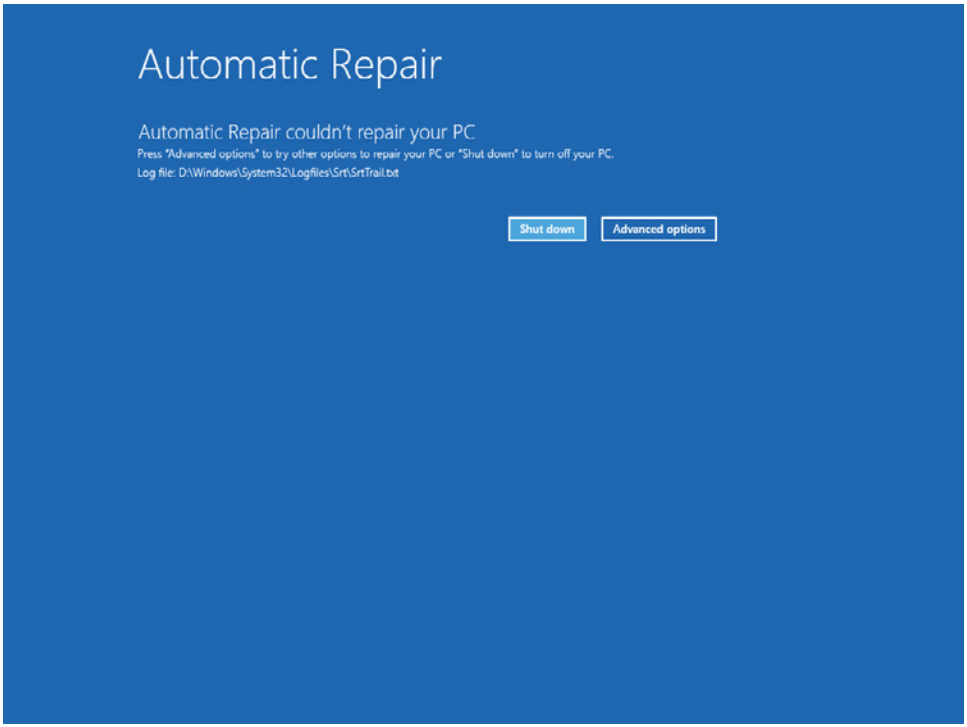

Figure 18-2 Automatic Repair creates a log file if it can't fix the problem

Manually Repairing Corrupt Boot Files

Occasionally, you will need to manually repair the boot files on your computer. To do this, boot into the Windows 8 boot menu, as described previously, and click Troubleshoot | Advanced Options | Command Prompt.

To manually repair the boot menu for a BIOS-based computer (for UEFI firmware computers, there are additional notes below) in Windows 8, perform the following procedure:

1. Type **BcdEdit /export C:*BCD_Backup*** (where *BCD_Backup* is the location at which you want the backup to reside) and press Enter.

   This creates a backup of the current boot options menu so that it can be restored if needed.

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2. Type **C:** and press Enter.
3. Type **cd Boot** and press Enter.

   This navigates to the Windows 8 boot options.
4. Type **attrib bcd -s -h -r** and press Enter.

   This allows you to modify and overwrite the boot options
5. Type **ren C:\Boot\bcd C:\Boot\bcd.old** and press Enter.

   This renames the current boot file
6. Type **Bootrec /RebuildBCD** and press Enter to force Windows 8 to rebuild the boot menu from scratch.

> **Note**
>
> **If you have a dual-boot system, this command might only restore Windows 8 to the boot menu. To restore other operating systems afterward, see the instructions later in this chapter.**

If you are using a computer with UEFI firmware, the BCD registry file is located instead in the EFI system partition. This doesn't have a drive letter associated with it. You can still use the BootRec command, but you should skip steps 2 through 5.

If you need to reimport the backed up BCD file, use step 1 with the **/import** switch.

The following are other switches you can use with the Bootrec command to perform other actions on the Windows 8 boot menu:

- **/FixMbr** This creates a new Master Boot Record file for the disk and can be used if the MBR is corrupt.
- **/FixBoot** This switch writes a new boot sector to the disk. Use this if the boot sector has been replaced with a non–Windows 8 sector or if it is corrupt.
- **/ScanOS** This scans your hard disk(s) for compatible operating systems and reports back the relevant details so that you can manually add them to the boot menu.

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INSIDE OUT **What if Windows 8 still won't start?**

Sometimes Windows 8 won't start even after repairing the boot system. There is little else you can do at this point but reinstall the operating system. I always recommend, therefore, that you keep a System Image Backup copy of Windows that can be restored in the event of this type of disaster.

Windows 8 and Dual/Multi-Boot Systems

Some of the most complex startup problems associated with Microsoft Windows are when you have dual or multiple-boot systems on your computer. You might, for example run a copy of GNU/Linux or an earlier version of Windows (perhaps Windows 7) on your computer.

Due to modifications that Microsoft has made to its boot system in recent years, if you install a multi-boot system, ensure that you install operating systems on your computer in the following order:

1. GNU/Linux, Windows XP or earlier versions of Windows
2. Windows 7
3. Windows 8

Trusted Boot

Windows 8 introduced a new feature called Trusted Boot. This is a UEFI feature by which the firmware can validate the authenticity of software at startup. It is intended to prevent the execution of malware and other malicious code such as rootkits when the computer starts up.

Trusted Boot, which is sometimes referred to as Secure Boot, isn't restricted to Windows 8 computers, either; you can also find it on Windows RT computers and Windows Phone 8 handsets.

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BitLocker and Dual-Boot Systems

It should be noted that if you use Microsoft BitLocker encryption on your computer and want to create a dual-boot system, you will run into all manner of problems with Windows 8 locking you out of your computer on almost every startup.

BitLocker doesn't support dual-boot systems, and although some people on the Internet claim to have workarounds, even they will admit that those workarounds are not guaranteed.

So, if you do need (or simply want) to create a dual-boot system, you will need to turn BitLocker off on your computer.

INSIDE OUT **Trusted Boot is tied to UEFI**

Trusted Boot is only a feature of computers equipped with UEFI firmware; it is not functional on BIOS firmware computers. However, Microsoft has mandated to all OEM (original equipment manufacturers) partners that *all* of the Windows 8 computers they sell *must* have UEFI firmware and *must* have Trusted Boot switched on.

Trusted Boot is a system intended to prevent malware and, in particular, rootkits from infecting your computer, but it can also prevent some operating systems from booting, including GNU/Linux .

You will find that in many UEFI systems, especially on more expensive computers and laptops, Trusted Boot (Secure Boot) can be switched off completely. If you are buying a new computer on which you plan to run multi-boot operating systems, it is a good idea to check the UEFI system first to see if this feature can be switched off. You can normally access the UEFI menus on a computer by pressing the Esc key at startup.

Editing the Windows 8 Boot Menu by Using BCDEdit

Sometimes, you will need to manually edit the Windows 8 boot menu and add in missing operating systems. To do this, you use need to gain access to the Windows 8 command line by using the method I described earlier or by starting your computer from your Windows 8 installation DVD and selecting Repair Your Computer at the Install screen.

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BCDEdit follows the structure *BCDEdit /Command [Argument1] [Argument2]*. Useful commands you will need to add in an operating system are as follows:

- **/?** Displays a full list of BCD commands.
- **/default {GUID}** Sets the default bootloader on the computer.
- **/enum all** Displays your current disk structure. You should run this to make a note of the GUID (identifier) for the operating system(s) you wish to add to the boot menu.
- **/export** and **/import** Backs up and reimports the boot menu.
- **/timeout [num]** Changes the length of time for which Windows waits at the boot choices screen; for example, */timeout 10* instructs Windows to pause for 10 seconds.

To use BCDEdit, perform the following steps:

1. Open a Command Prompt window, as described at the beginning of this section.
2. Type **bcdedit /enum all** and press Enter to show all the data for each installed operating system on your computer.

   You will see Windows 8 listed as {current} and a different entry (or more) for a {legacy} operating system. Note that this might also display as {ntldr}.

To change the name of an operating system that already appears in BCDEdit, perform the following steps:

1. Create a backup of the BCD file in case something goes wrong. Type **bcdedit /export "C:*BCD_Backup*"** (where *BCD_Backup* is the location at which you want the backup to reside) and press Enter.
2. Type **bcdedit /set {legacy} Description "*OS Name*"** (where *OS Name* is the name of the operating system) and press Enter. You can also use {current} to change the name of the main Windows 8 installation.

> **Note**
>
> **To set the entry for a second Windows 8 installation, type bcdedit /set *{GUID}* Description "Windows 8 Alternate", where *GUID* is the long string of numbers and letters.**

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To change the default operating system in BCD, type **bcdedit /default {current}** to set the Windows 8 boot loader as the default. You can also use {legacy}, {ntldr} or a {GUID}.

If an operating system is showing with an incorrect partition, you can change this by using the command **bcdedit /set {GUID} device partition=*X:***, where *X*: is the correct partition. You *must* also then use the command **bcdedit /set {GUID} osdevice partition=*X:***.

However, sometimes an operating system simply won't show up. In this case, you will need to add it to the boot menu manually. To manually add an operating system to the boot menu, perform the following steps:

1. Type **bcdedit /create {legacy} /d "Windows XP"** and press Enter to create a new boot entry for the operating system.
2. Type **bcdedit /set {legacy} device partition=*D:*** (where *D:* is the drive on which the operating system is installed) and press Enter.
3. Type **bcdedit /set {legacy} path /ntldr** and press Enter.

   Note that if your Linux installation is already showing in *bcdedit /enum all* you can change the path to **/linux.bin.**
4. Type **bcdedit /displayorder {legacy} /addlast** and press Enter to add Windows XP to the end of the current boot menu.

Manually Setting Dual Booting for Windows 8 and Linux

If dual-booting both a GNU/Linux installation and Windows 8 doesn't work using the simple commands described in the preceding section, you will need to follow a slightly more complex route. Run the following commands in Linux before installing Windows 8:

1. Boot into Linux and launch a terminal with root privileges.
2. Determine on which parititon Linux is installed by typing **fdisk -l** and pressing Enter.

   The Linux operating system will be on a partition such as /dev/sda1 or /dev/hda1.
3. Install the GRUB boot manager by typing **grub-install /dev/sda1** and pressing Enter.
4. Copy the Linux boot sector by typing **dd if=/dev/sda1 of /tmp/linux.bin bs=512 count=1** and pressing Enter.
5. Copy *linux.bin* to a different partition or USB flash drive as a backup.
6. Install Windows 8.
7. In Windows 8, press Windows logo key+X to launch the Command Prompt (Admin).

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8. Copy your *Linux.bin* backup file to the root (active) partition on your hard disk, which is the one containing bootmgr.

   If you do not know which one this is, type **diskpart** and then **diskmgmt.msc** to determine it. Type **exit** to leave the diskpart tool.

9. Create a GRUB entry by typing **bcdedit /create /d "GRUB" /application BOOTSECTOR** and pressing Enter.

   BCDEdit will return a {GUID} for this entry. You should make a note of this. For this exercise, we will call it {LinuxGUID}.

10. Type **bcdedit /set {LinuxGUID} device boot** and press Enter to specify which device hosts the Linux boot sector.

11. Type **bcdedit /set {LinuxGUID} PATH /Linux.bin** and press Enter to specify the path of the Linux boot sector.

12. Type **bcdedit /displayorder {LinuxGUID} /addlast** and press Enter to add Linux to the end of the boot order.

INSIDE OUT **Software alternatives to BCDEdit**

It's worth noting here that these methods, which are quite complex, should only be implemented if the computer won't boot at all. You can also use software such as EasyBCD (*www.neosmart.net/EasyBCD*) to manage and edit BCD entries.

Backing Up the Windows 8 Boot Partitions

I've talked a lot about GNU/Linux in this chapter primarily because when it comes to dual-booting Windows, this is the operating system that enthusiasts most seem to want as the secondary system.

There is one use for Linux though that Windows simply cannot match: Linux can allow you to create full backups of the Windows System Reserved partition and other boot partitions.

To do this you need to download a Linux ISO file and burn it to a CD or DVD. You can then boot your computer from the disc (don't install Linux), and you will be able to see—and most important—access all the partitions on your computer's hard disk, as demonstrated in Figure 18-3.

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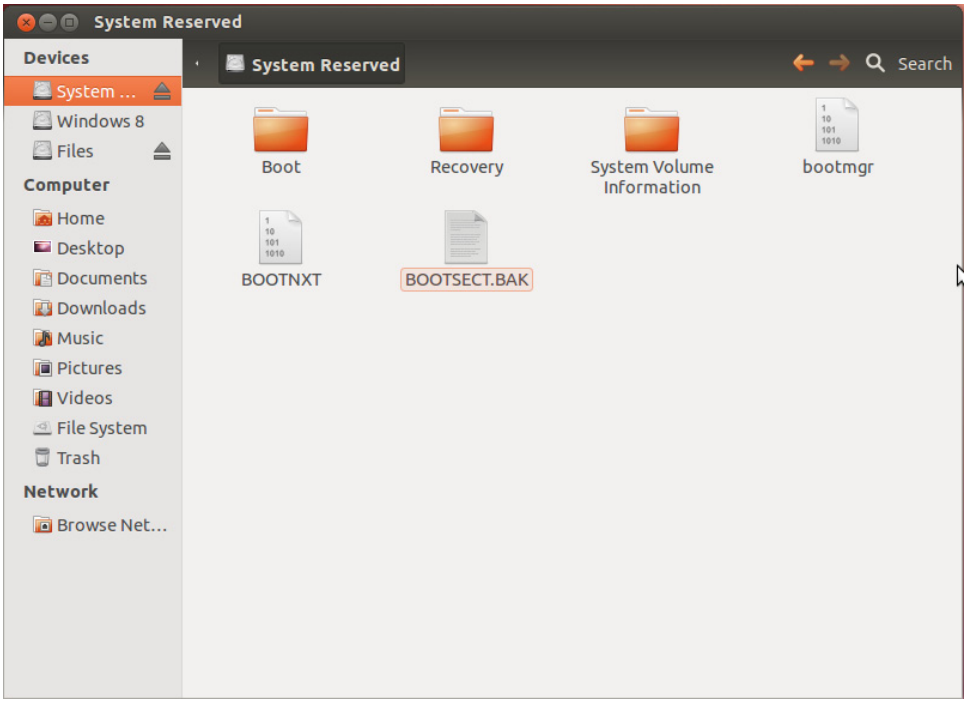

Figure 18-3 Using GNU/Linux to back up the Windows Boot partitions

Here, you can make copies of the partitions, either by copying the files into backup folders (make a note of the partition types and sizes so that you can recreate them later; I'll show you how to get the details shortly), or if you have an imaging tool, you can create an ISO file of each image that you can later copy back, again by booting from your Linux disc.

You can get the full details of a partition by using the Disk Utility in Linux (see Figure 18-4). This will give you valuable information, including data about the following:

- Partition Type
- Label
- Capacity

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You will need all of this information to rebuild the partition if it becomes completely corrupt.

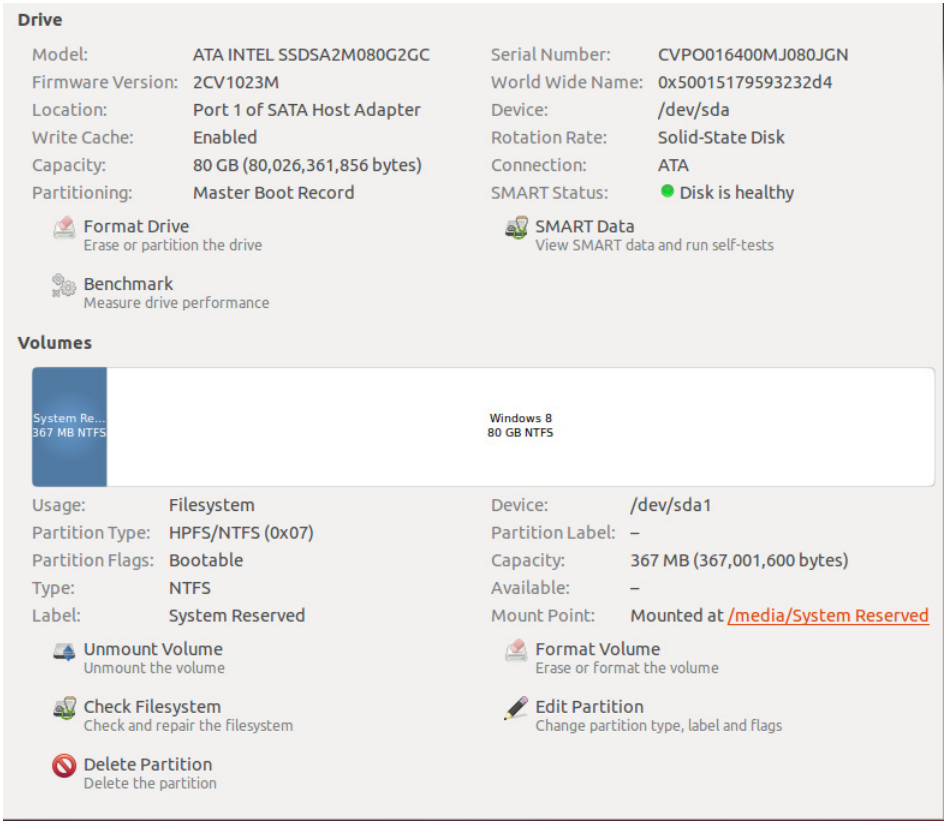

Figure 18-4 Viewing a partition's properties in Linux

Normally, however, just copying the contents of the boot partitions (including System Reserved, which is the most important) means that you can then use a Linux boot disc to copy the contents back afterward if a disaster occurs.

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Summary

There is no doubt that the Windows 8 boot system is complex. Fortunately, there are many resources online that provide in-depth technical information about BCDedit, if you want to do further reading.

The information I've included here is only really if you can't start the computer at all to run software such as EasyBCD, but even then you will only need it if you operate a dual-boot system.

The tools available to repair problems are generally excellent, but even they won't be able to resolve every problem. This is why I always recommend that you keep a System Image Backup copy of Windows 8 that can be restored if you encounter a very serious problem and the boot system cannot be repaired at all.

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CHAPTER 19

Using Windows 8 Advanced Diagnostic Tools

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Using the Windows 8 Performance Tools 357

So far in this book, I've shown you how to use the basic tools—or perhaps more accurately, the more simple-to-use tools—that come as part of Windows 8, which you can use to help you diagnose and repair problems. I've also described the processes involved in diagnosing problems on your Windows 8 computer and how they can be caused not only by a wide variety of local factors, including your software and drivers, but also by a wide variety of external factors, as well.

When it comes to diagnosing more complex problems in Windows 8, you can employ a battery of more advanced tools. In this chapter, I want to show you what those tools are and examine how you can use them in practice.

Performance Information And Tools

Performance Information And Tools is a central location for many types of information about your computer and how Windows 8 performs on it. The easiest way to access Performance Information And Tools is to open the Start screen and then type **performance**. You can access its components separately in Control Panel by selecting System And Security\ Administrative Tools.

The basic function of Performance Information And Tools is to provide a front end to features such as the Windows Experience Index and options for adjusting the visual effects, power settings, and indexing options of your copy of Windows. Once you're in the Performance Information And Tools window (see Figure 19-1), in the left pane, click Advanced Tools to access the advanced tools dialog box, as shown in Figure 19-2.

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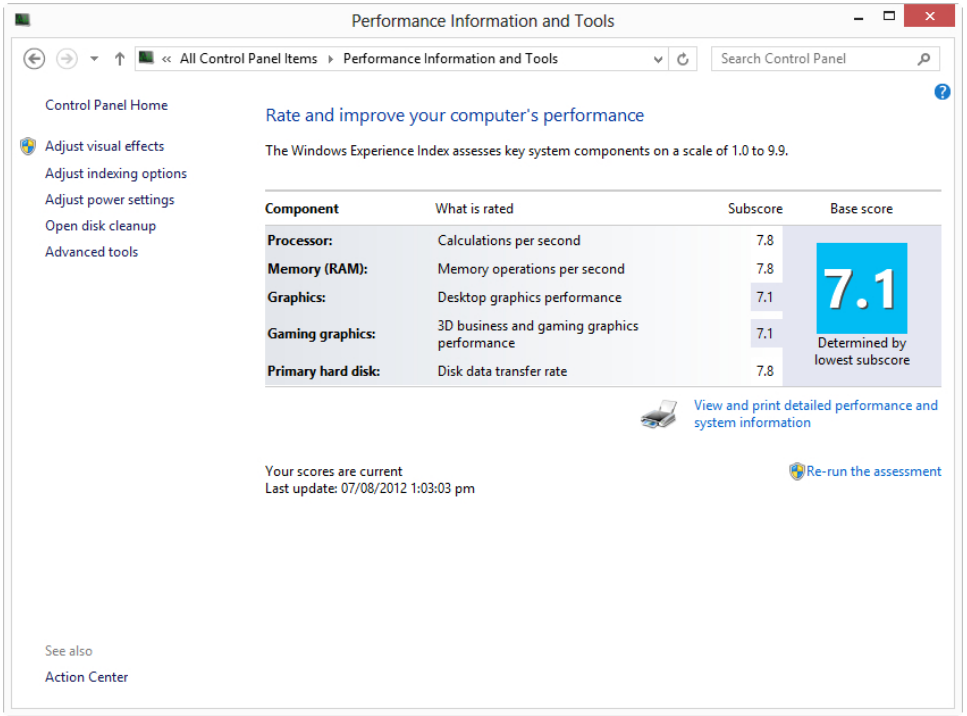

Figure 19-1 The Performance Information And Tools window

These advanced tools are extremely useful for diagnosing performance problems with Windows 8 and your software and hardware drivers. I don't provide details for every tool in this chapter, but I do cover what I consider the vital ones, individually: Event Log, Performance Monitor, Resource Monitor, Task Manager, System Information, System Health Report, and the Computer Management console.

At the top of the Advanced Tools dialog box, in the Performance Issues section, Windows 8 alerts you to any problems that it has detected. Links are provided to fixes, if Microsoft knows of any, or to give you more information so that you can rectify the problem yourself.

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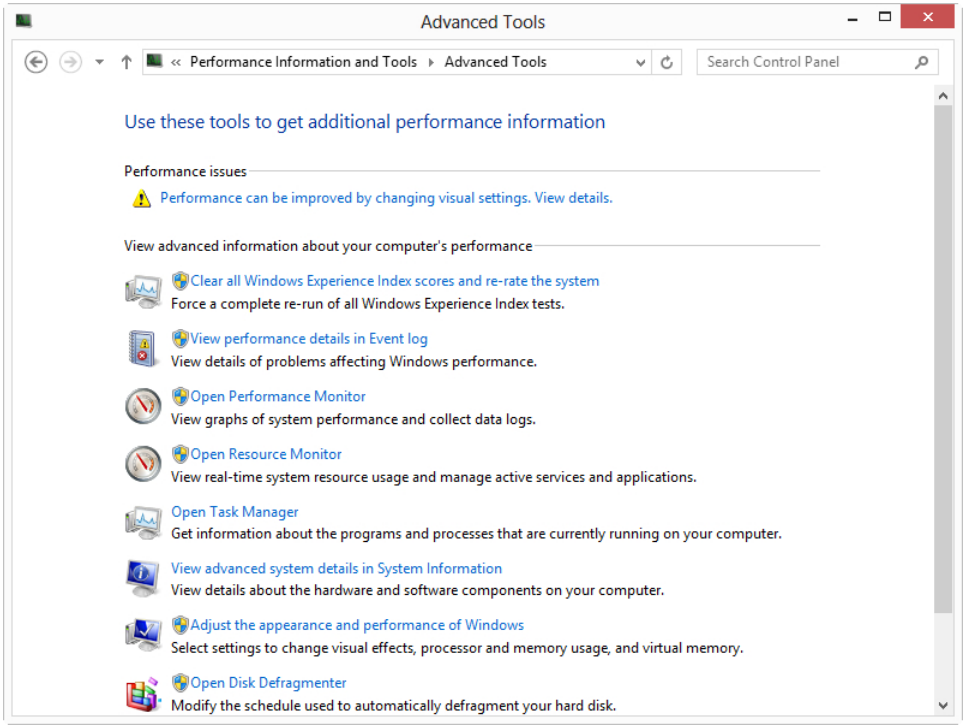

Figure 19-2 The Advanced Tools dialog box in Performance Information And Tools

The Event Log

Everything that happens in Windows 8, from user logons to program component failures that users never even know about, is logged and recorded. You would be amazed by how much information is stored in the Event Log, which you can see in the Event Viewer. The two most important views, however, are those in which you will see most Windows 8 errors recorded.

To find all of the events and errors that Windows 8 has recorded on your computer, in the Event Viewer, click Event Viewer (Local), click Windows Logs, and then click System. Warnings are highlighted with yellow triangles; errors are indicated by a red icon, as shown in Figure 19-3.

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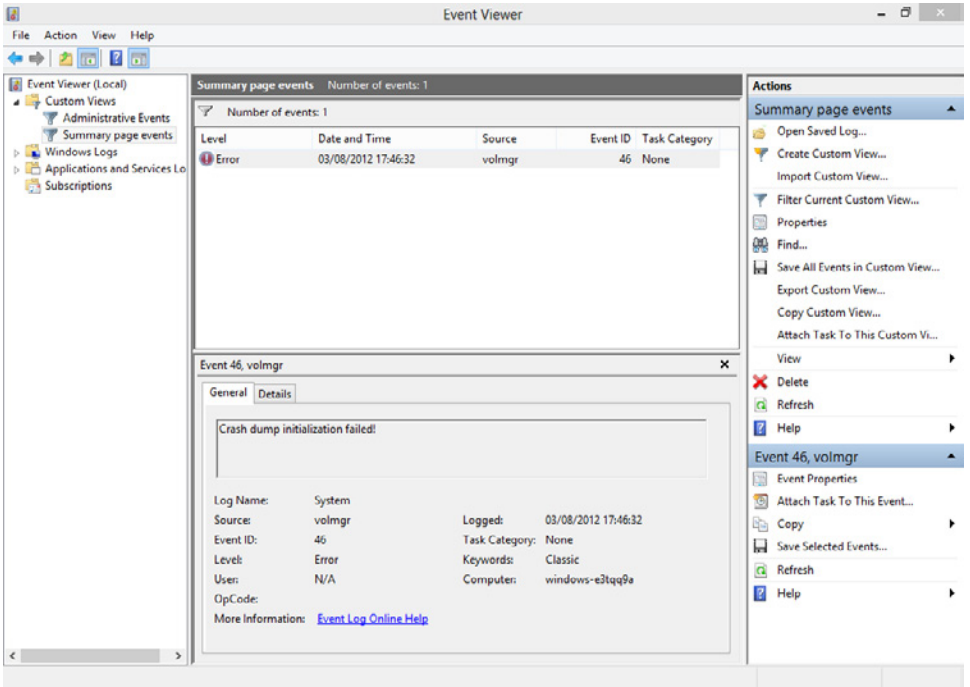

Figure 19-3 The Event Viewer, showing system activity and errors

In Figure 19-4, notice the error highlighted in the Administrative Events pane. Below the list is a description of this error that includes enough information to help you track down the source of the problem and fix it.

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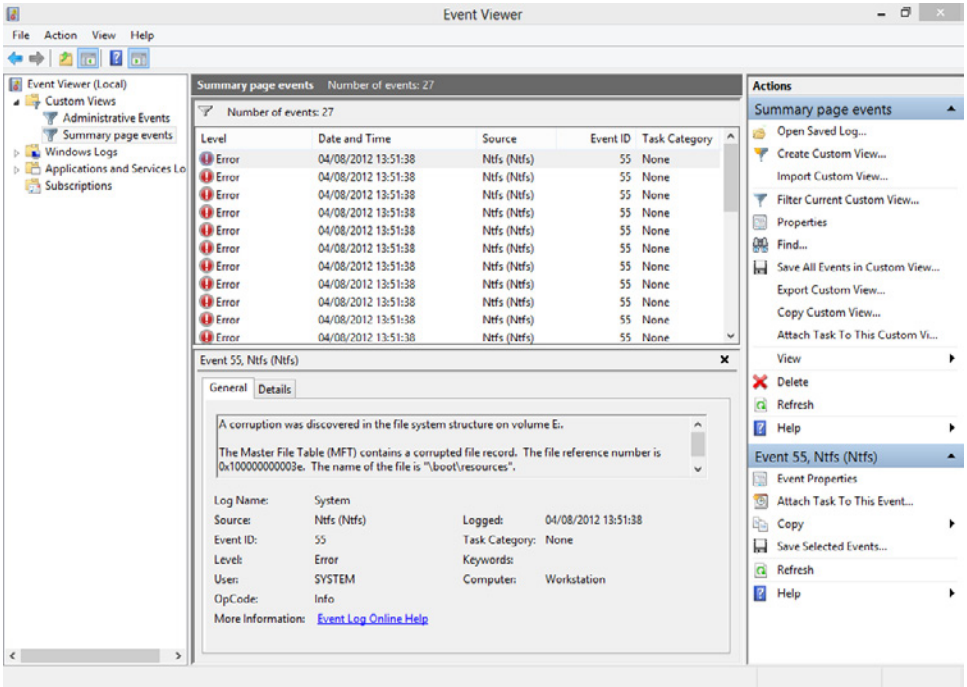

Figure 19-4 Administrative errors displayed in the Event Log

Another useful place to see errors listed in the Event Log is under Event Viewer (Local) | Custom Views | Administrative Events, as shown in Figure 19-5. These errors include events for which you or Windows didn't have permission to perform the specified action.

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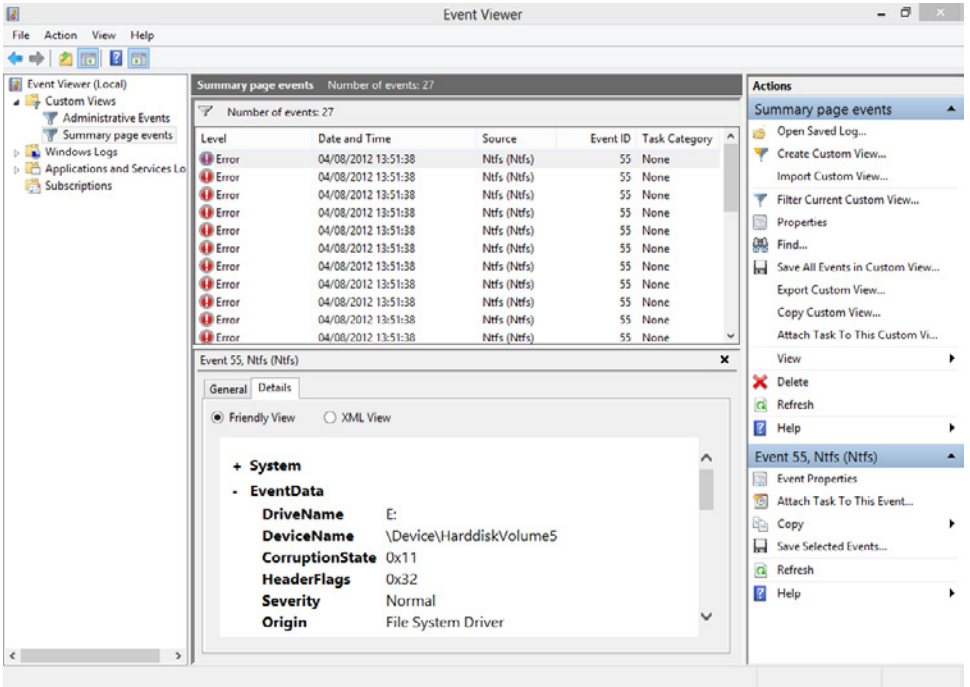

Figure 19-5 Formatted error information, which you can send to third parties

In the bottom pane of the Event Viewer, there are two tabs: General and Details. By default, the General tab is selected, which contains general information about errors and events. You can get much more information by clicking the Details tab. You can also expand this panel upward to read more.

This information can be useful if you need to send specific data about an error to a third-party support person. You can cut and paste it into an email or select an option from the right pane such as Save Selected Events To Email.

To gauge the overall health of your computer, go to the Event Viewer and click Event Viewer (Local), which opens the window shown in Figure 19-6.

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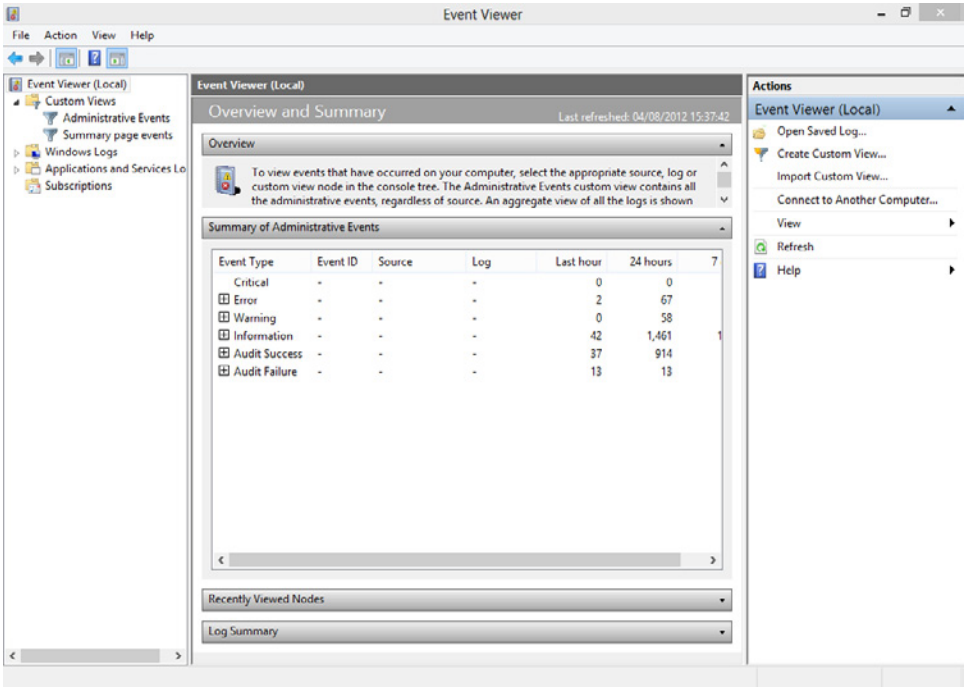

Figure 19-6 The Event Viewer can give you a good overview of a computer's health

This view shows you in clear detail the number of Critical, Error, Warning, Success, and Failure messages that were generated in the last hour, day, and week. You can use this to track the general age of a problem to help diagnose it.

Suppose, for example, that you are encountering a critical error. You can look up information about the error itself, but perhaps it's not giving you a definitive answer as to what the root cause is. If you see that it's occurred a couple of times in the last hour, a few times in the last day but not any more often in the last seven days, you can isolate the cause to something that has changed on the computer within the last 24 hours (or thereabouts).

Here is where your detective skills come into play, determining what has changed during that time. Was an update installed, a new driver, or perhaps new software? Has a new user been on the computer, perhaps for a new role? This information can significantly help in diagnosing errors.

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INSIDE OUT **The Event Log is your friend**

The Event Log is probably the single most useful feature in Windows 8 when it comes to troubleshooting problems. It is certainly the most useful feature in the advanced toolset in Performance Information And Tools because the amount of useful information it provides is far greater than other Windows utilities.

How to Read the Event Log

By default, the events in the Event Log are ordered by date. If your computer has recently encountered an error, you can check for it by date and time, and it's probably near the top of the event list. The Event Log provides essential information about the source of errors, helping you to diagnose problems much more quickly than you could by trial and error.

How Do You Interpret Events?

The information provided by the Event Viewer can commonly be considered to be extremely technical and perhaps not very helpful. So how can you draw meaningful detail from it?

In the example that follows (see Figure 19-7), you will see what likely appears to be a complicated description of this particular event along with some additional information. Ironically, it is usually the complicated-looking numerical or hexadecimal (number base 16) codes that can provide the most information.

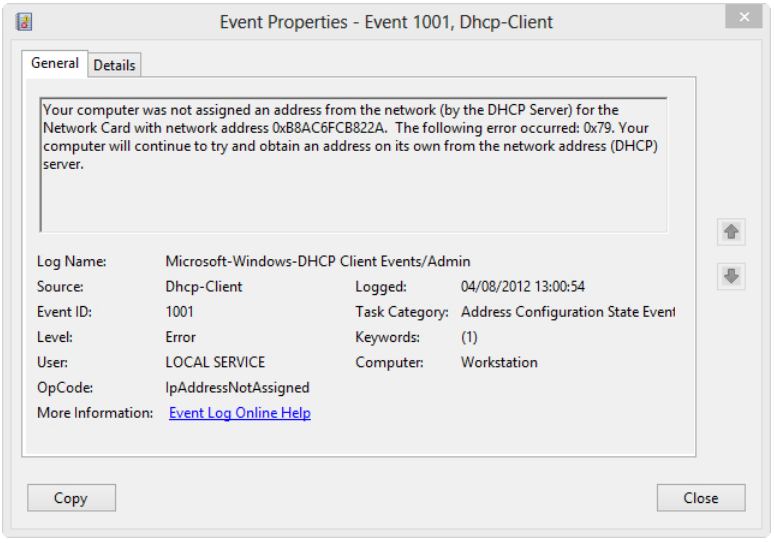

Figure 19-7 Drawing meaningful data from the Event Viewer

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Figure 19-7 presents codes, file names, and other information that you can look up online. In this case, it brings up links to a forum and other posts where other people have encountered the same error, and many of these provide solutions.

The bottom part of this dialog box presents an all-important Event ID. In this case, the Event ID is 1000, which you can also search online. Here you can find more information about the specific event and how you can rectify it.

The Performance Monitor

The Performance Monitor (shown in Figure 19-8) provides real-time information about a wide range of Windows 8 performance data and hardware components events. You can also use it to check whether the Windows 8 reporting tools are activated.

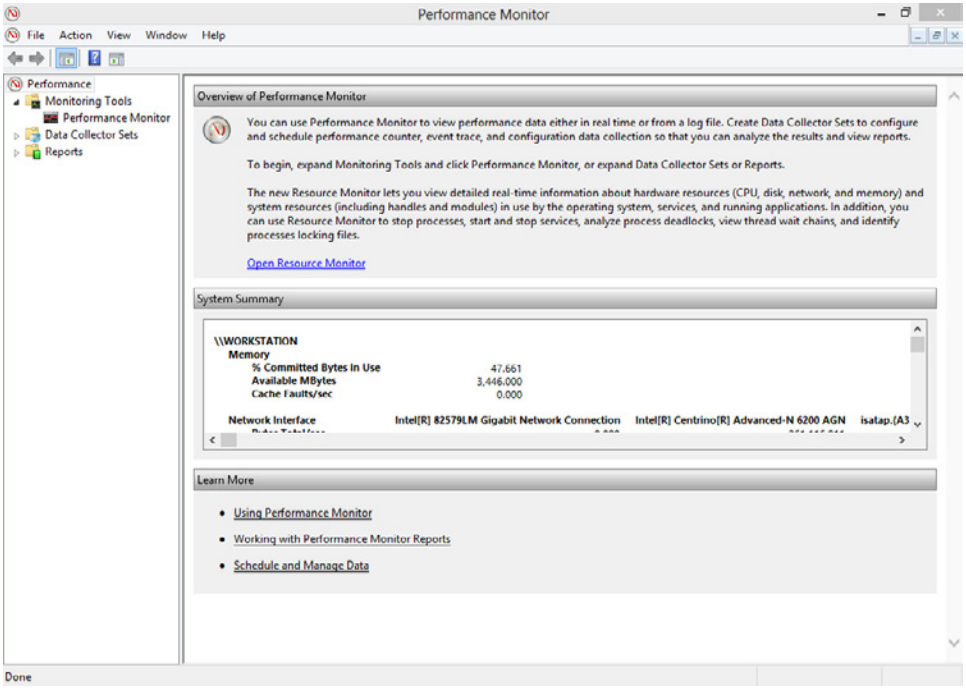

Figure 19-8 The Performance Monitor in Windows 8

You can use the real-time monitoring tools in Performance Monitor to add information about specific criteria such as the read/write data for your hard disk or the power distribution to individual components. In Chapter 33, "Using Advanced Windows 8 Diagnostic Tools," I talk about these tools in much greater detail.

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To view information about specific Windows components, such as the networking, memory, or processor components, in the left panel, click Monitoring Tools, and then click Performance Monitor. This brings up a graph view showing (by default) the processor usage on your computer.

You can add additional lines to this graph by clicking the green + (plus) icon on the toolbar and a list of literally hundreds of additional options will appear, all in collapsible panels, as demonstrated in Figure 19-9.

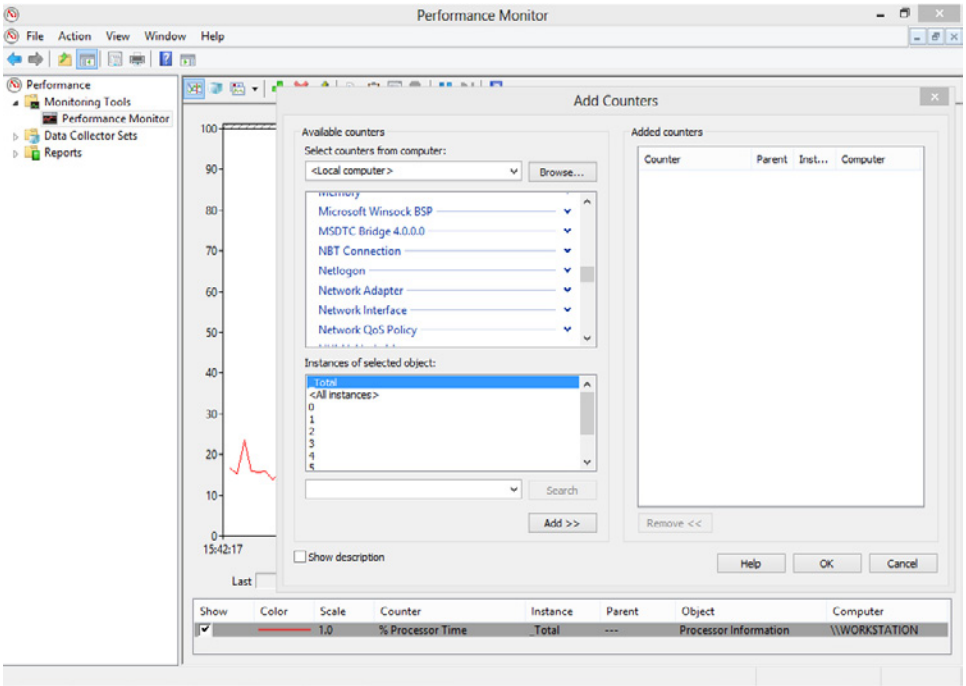

Figure 19-9 Adding custom counters to the Performance Monitor

Once you have added lines to the graph, you can remove them at any time by clearing their check boxes below the graph view. Here, all the currently selected options are displayed with their line color so that you can identify which is which if you have several active at any one time.

For most users, the information provided by Performance Monitor is extremely complex and difficult to interpret. If you need specific information about how a certain component is working—for example, perhaps you suspect that the ReadyBoost cache isn't working properly—you can monitor this feature in real time via Performance Monitor.

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The Resource Monitor

Whereas the Performance Monitor helps you diagnose problems with Windows 8 services and components and can give you a real-time graph showing overall performance for individual Windows 8 components, the Resource Monitor gives you extensive real-time information about every process and service running on your computer. Figure 19-10 shows the information you can find on the Memory tab of the Resource Monitor. If one of your applications is consuming vast amounts of memory, you would find information about it here. Each tab indicates exactly what's going on at a given moment in a different part of your system, from the status of processes and services running (or not running) on your CPU to the current activity on your network.

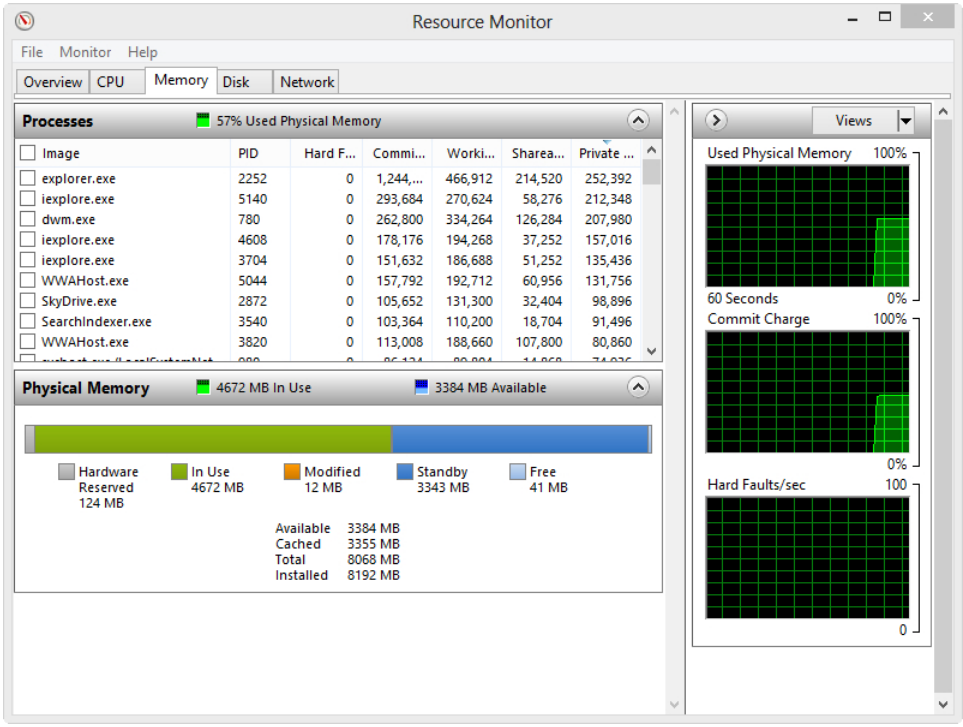

Figure 19-10 The Resource Monitor in Windows 8

The Resource Monitor provides information similar to what Windows Task Manager gives you but supplies many more details, which can be useful when you're diagnosing advanced problems in Windows 8 or in your applications.

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So, how can you use the Resource Monitor? Along the top of the window there are five tabs: Overview, CPU, Memory, Disk, and Network. Click the Overview tab and collapsible panels appear, showing general information about running processes, disk activity, and network traffic. Each extra tab, however, adds to the information provided.

The network tab for instance (see Figure 19-11) can give you specific information about the network activity for specific programs and apps; for example, you can see if Microsoft Outlook is actually connecting to the email server as it says it is.

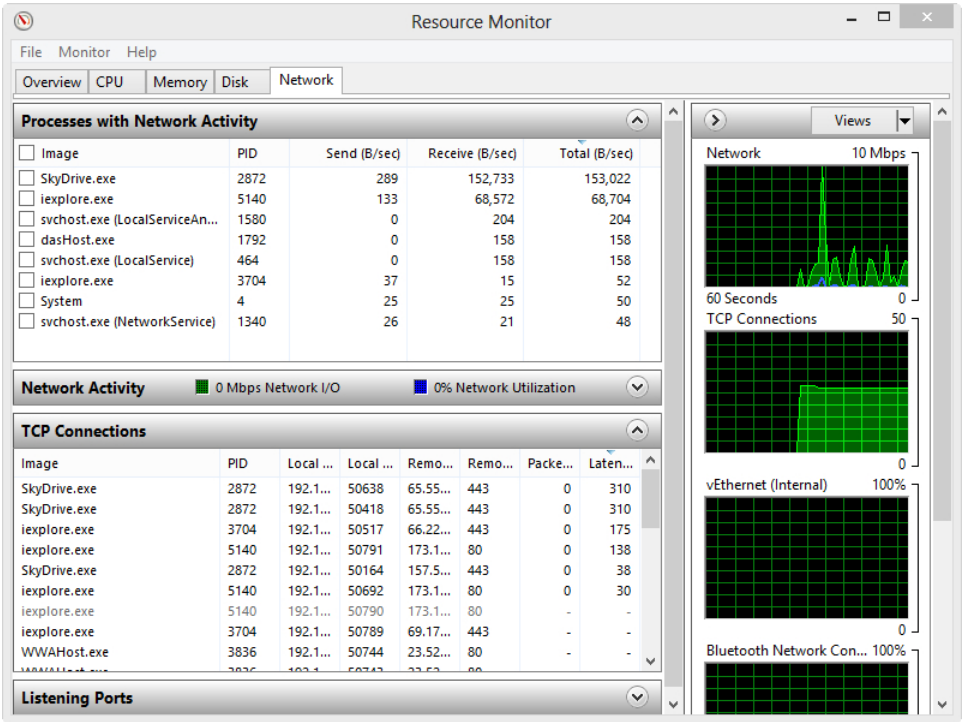

Figure 19-11 You can get a great deal of Network information from the Resource Monitor

On the Network tab, you can also see specific information about TCP/IP traffic for programs and services, so you can examine if a program—or Windows 8 in general—is dropping data packets or suffering from high latency.

INSIDE OUT

Displaying more graphs in the Resource Monitor

If you need to monitor many different functions in real time, such as various network connections or processors, you can click the Views button above the graphs to reduce the size of each graph. This will allow you to fit more in the window.

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The Improved Task Manager

The venerable Task Manager has remained relatively unchanged since its introduction with Windows NT 4.0 in 1996. In Windows 8, though, it has been given a significant overhaul; indeed, it's almost completely new, but you'll likely find it simple and intuitive to use.

By default, the Task Manager displays only a list of current running programs, but you can click the More Options link in the lower-left corner to display much more information.

The Processes tab shown in Figure 19-12 now provides a heat-mapped chart showing the current processor, memory, disk, and network usage for every running program and Windows 8 component.

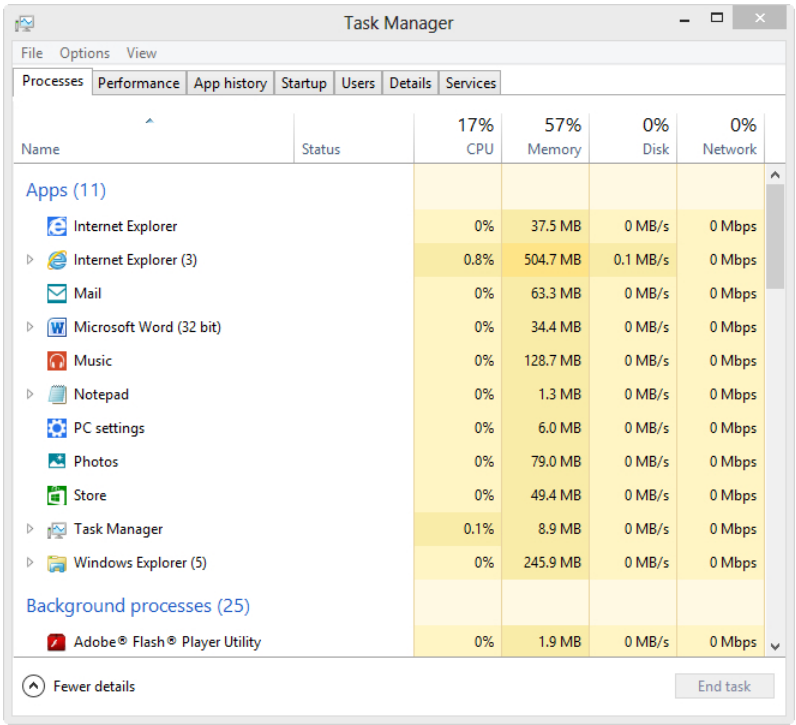

Figure 19-12 The improved Windows 8 Task Manager

This can be extremely useful. Previously, if you wanted to see what was hogging all your processor time, you had to look through a numerical list, which wasn't the friendliest approach. Now, if something is chewing up excess time, Windows 8 will highlight it in red so that you can see at a glance what is causing the problem.

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The Performance tab (see Figure 19-13) provides live graphs that display what is happening on your computer with respect to different hardware components. This is a slimmed-down version of the information provided in the Performance and Resource Monitors, but it can still be extremely useful, especially if you want to keep an eye on something in particular.

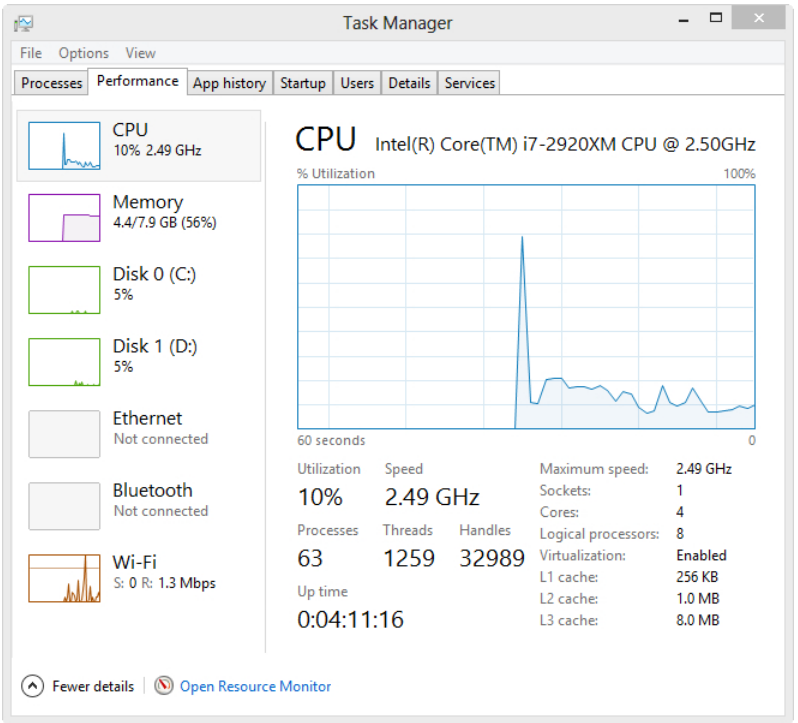

Figure 19-13 The Task Manager can provide live information to help with diagnosing problems

INSIDE OUT

The Task Manager Summary View

Right-clicking the graphs here turns on a Summary View. This will minimize the Task manager to show only the graphs (or just numerical data if you prefer) to help you keep an eye on what's happening with your computer while you continue working.

If you're working with a computer on which a large number of Windows 8 apps have been installed, and something is malfunctioning but you don't know what, then the App History tab is here to help. Again, using a heat map, this tab shows you the total resources that have been used by an app over a period of time.

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You can use this view to see, for example, if a poorly written app is using too much memory or processor time, even when it isn't running, so that you can suggest it be uninstalled or reviewed.

Lastly, the Details tab is where you will find full text descriptions of running programs, apps, processes, and services, if you are unsure what something really is. This is more like the traditional Task Manager view and operates in much the same way.

INSIDE OUT **Ending process trees**

On the Processes tab in the Task Manager, you can end the currently selected task by right-clicking it. However, on the Details tab, you can choose to End [the] Process Tree. This will shut down that task and all other tasks, processes, and services associated with it.

You might want to do this if a complex application has several subprograms running at the same time to support it, such as its own database manager or updater.

System Information

If you need to provide a third party with information about your computer, including data on Windows 8, your hardware, and your installed software, the System Information tool, shown in Figure 19-14, is the place to find that data.

The System Information window is divided into three sections:

- **Hardware Resources** This section contains information about hardware conflicts, IRQs (interrupt requests), memory allocations, and so on.
- **Components** This section includes information about the hardware attached to your computer, with a separate section, Problem Devices, for devices that Windows 8 has identified as problematic.
- **Software Environment** The third section includes information about everything from installed software and drivers to startup programs and recent Windows 8 error reporting.

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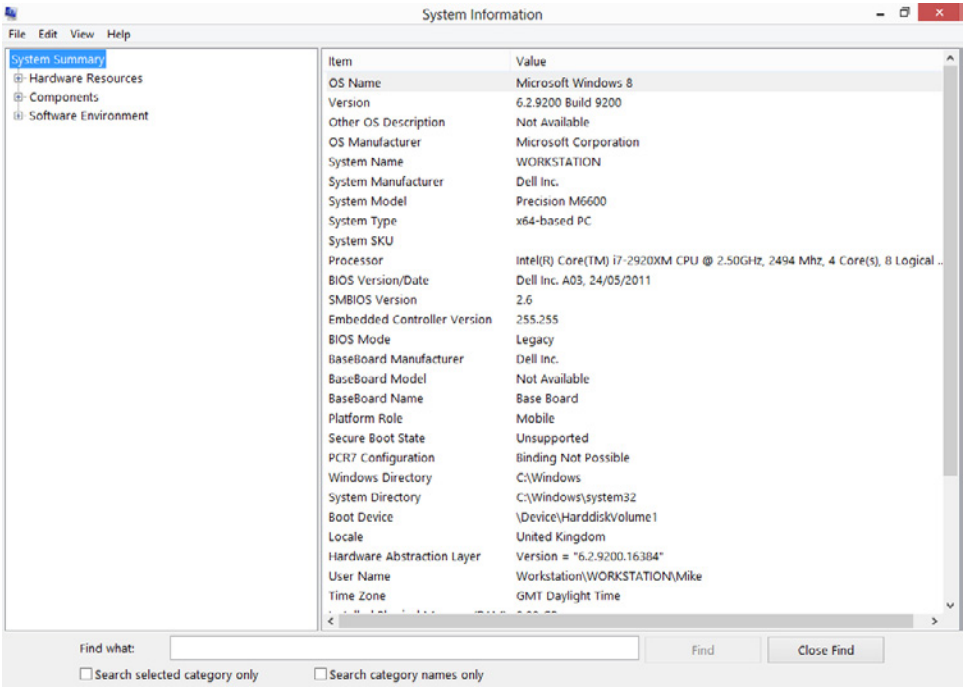

Figure 19-14 The System Information tool

To export any or all of the data from the System Summary as a text file that can be read on any computer, on the menu bar, click File | Export, name the text file, and then save it to any location on your hard disk or to removable storage.

System Health Report

One of the most useful automatic diagnostic features in Windows 8 is the System Health Report tool. To access this access, in the Performance Information And Tools window, in the Advanced Tools section, click Generate A System Health Report. Figure 19-15 shows the Resource And Performance Monitor window that comes up when you click the link. This tool produces thorough and detailed reports of the current status of your computer, checking every part of Windows 8, your hardware, and your installed software. If any problems are found, they are highlighted.

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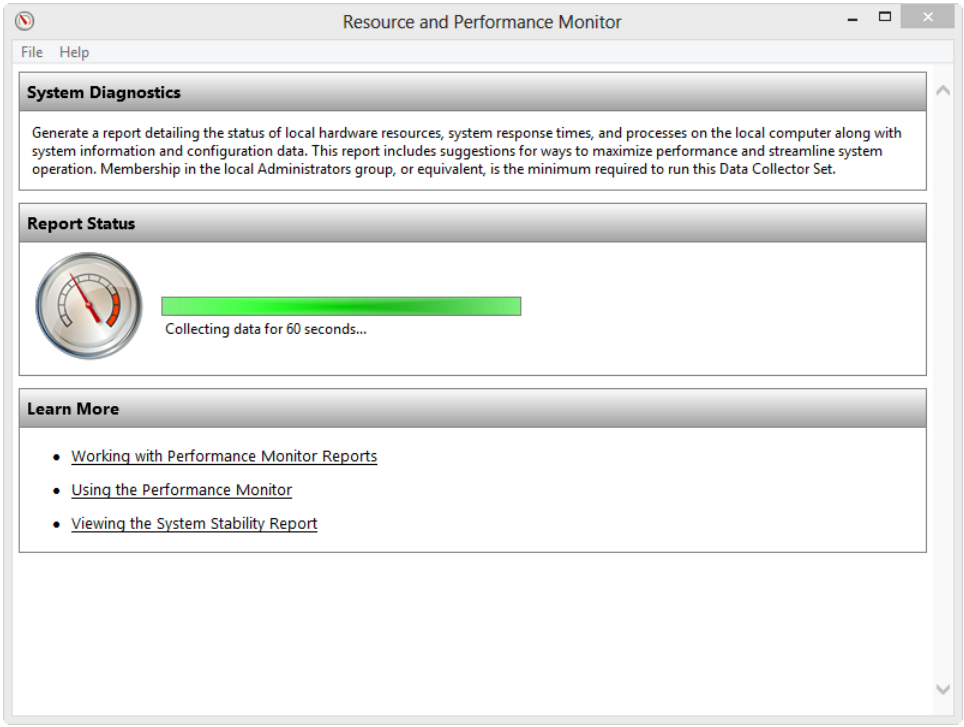

Figure 19-15 The System Health Report tool for generating in Windows 8

The File menu includes options to send the report to the email client configured on your computer, save it as a file to send it through your email software or a web mail application when you can attach the file manually to an email in the same way you would any other attachment you send. This method will vary depending on your email provider.

Before you dive into the details of the system health report, you should read the information that appears in the Diagnostic Results panel, as shown in Figure 19-16. Here, you'll see information on currently detected problems as well as links to helpful articles about these problems on the Microsoft website.

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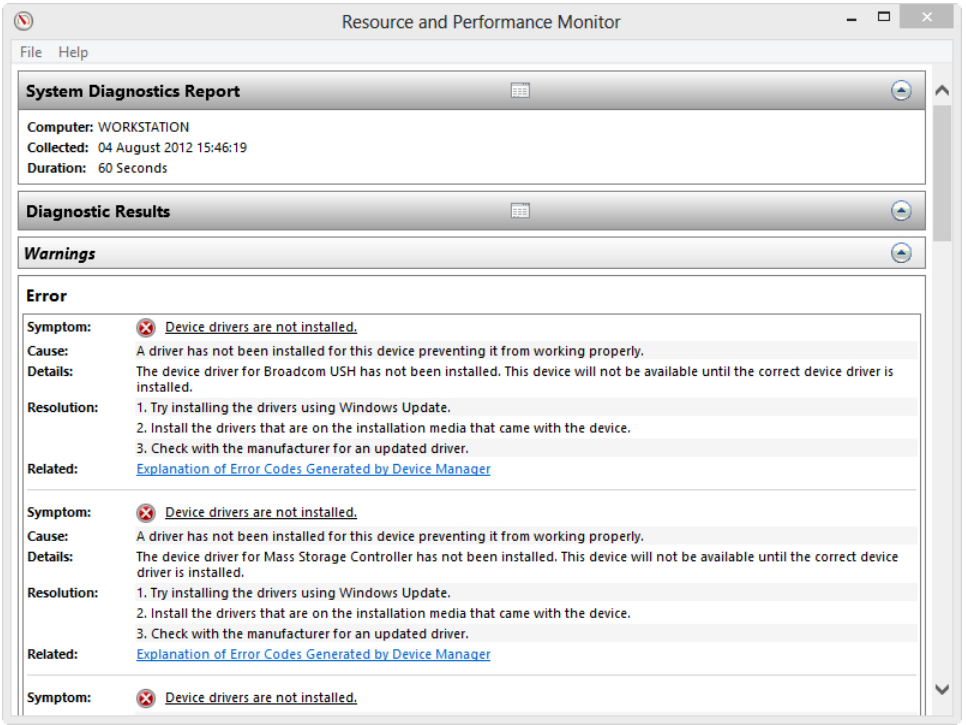

Figure 19-16 A sample system health report

The Computer Management Console

The Computer Management Console is where you can also access the Performance Monitor in addition to other management features within Windows 8. As there is no longer a Start menu, there is a new way to gain easy access to this console.

Open either the desktop or the Start screen (it doesn't matter which), press Windows logo key+X to open the new Administration menu, (see Figure 19-17), and then click Computer Management.

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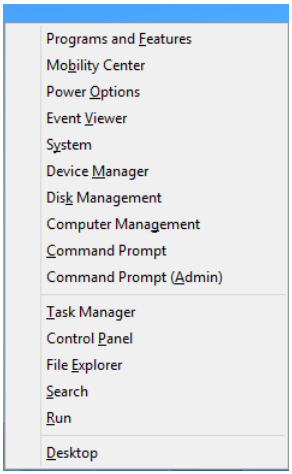

Figure 19-17 The new Administration menu

From the Computer Management window (shown in Figure 19-18), you can view and control System Tools such as the Task Scheduler, Event Viewer, Performance, Device Manager, and the Disk Management storage tool.

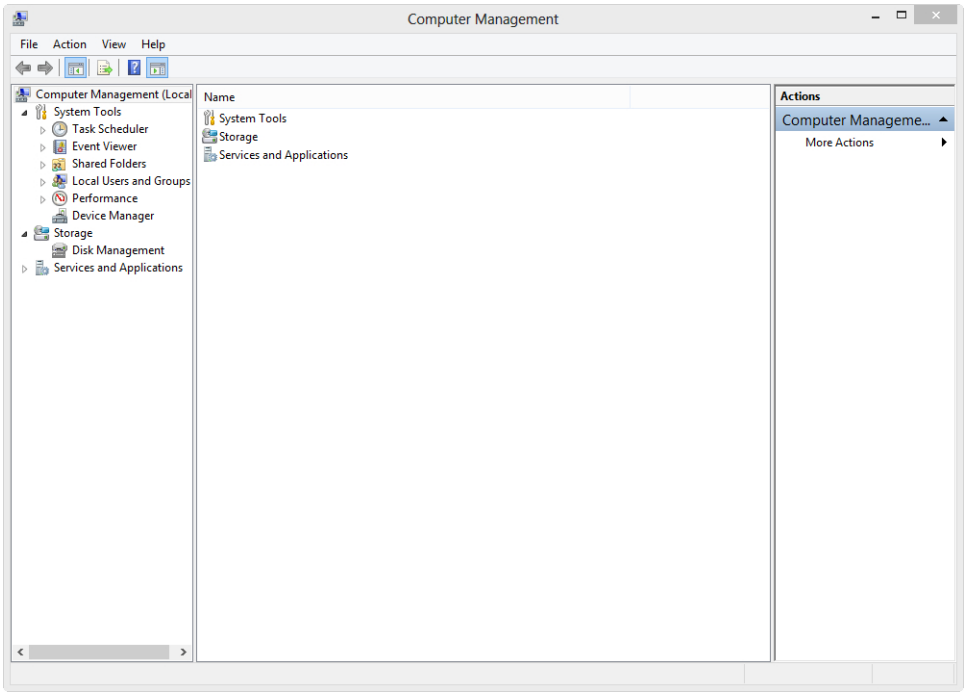

Figure 19-18 The Computer Management console

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When you click Disk Management, the pane in Figure 19-19 appears, in which you can view all the fixed and removable drives in your computer and find problems with them. For example, you might see that a disk isn't being recognized or is being reported as unformatted.

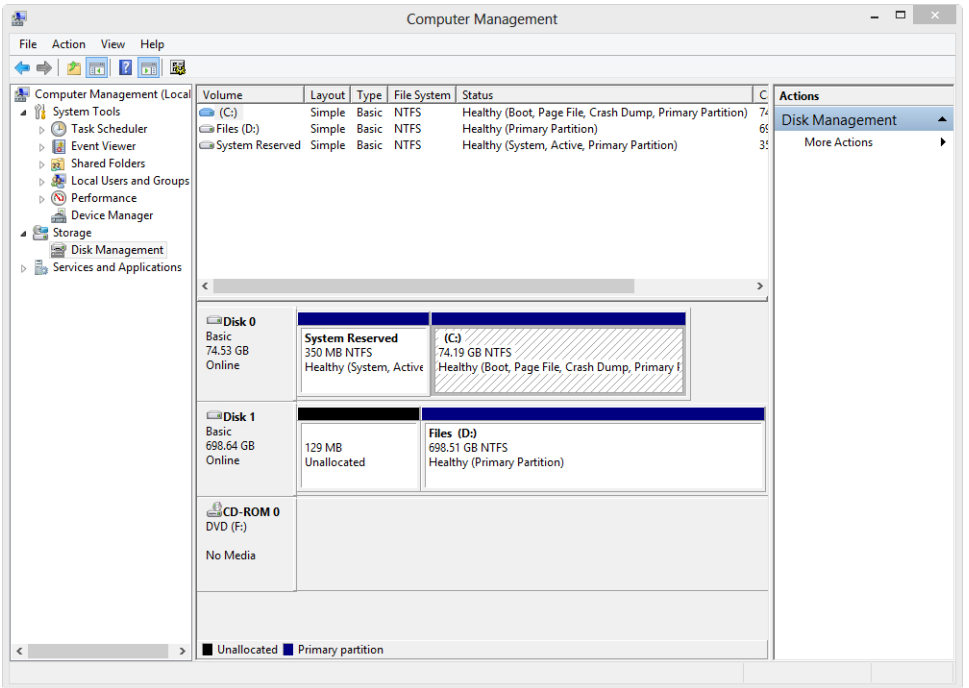

Figure 19-19 The Disk Management console

INSIDE OUT

Get quick access to the Disk Management console

You can access the Disk Management console directly from the new Administration menu. Open either the desktop or the Start screen and press Windows logo key+X to access the Administration menu.

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INSIDE OUT **Be careful when working with suspected faulty disks**

Just because Windows 8 is reporting a disk as "unformatted" or "not initialized" doesn't mean that the disk is really faulty. If the disk has been working fine until now, the problem is more likely with a driver or a corrupt BIOS. Reformatting or reinitializing the disk might not fix the problem.

As I have said, the Computer Management console is a good and centralized place for finding the tools that come with Windows 8 that you can use for repairing problems with the operating system and your hardware.

Using the Windows 8 Performance Tools

The performance tools in Windows 8 offer some extremely advanced information that might be primarily used by IT professionals, either remotely or when working on the computer directly, but that are of use to anyone tasked with diagnosing and repairing problems on a computer. One of the most useful functions of these tools is their ability to quickly display a huge amount of real-time data about your computer, your copy of Windows 8, and your hardware.

It is especially useful because of the different ways that it can present this information and the different levels of detail it goes into, depending on your requirements. For most of your troubleshooting needs, the Event Log will suffice. If you're going to a third party for additional help or guidance or if you're helping someone else, a System Health Report might be required.

Are You Too Close to the Problem?

Sometimes the best troubleshooting tool isn't built in to the system. If you're stuck on a troubleshooting problem that you just can't figure out, I would advise you to step away from your computer. Take a break, maybe even a day, and come back to the problem with a clear mind. The old adage "unable to see the wood for the trees," which means that a person is too close to a problem to be able to understand it clearly, often applies when diagnosing computers, and it can be traced back to the 16th century.

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I've found that if I keep staring at a monitor trying to figure out or fix a challenging problem, my mind can become muddled and I can tend to miss things that I would normally catch. If you (or your company) can't justify such a respite, try reading some of the reports you generated with the Performance Information And Management tools offline. The reports that the Advanced Performance Information And Tools utilities can provide make for excellent reading when you're away from your computer and can't be tempted to try quick fixes. It can give you time to digest a problem and read the logs thoroughly.

Summary

By using tools such as the Event log and the Performance Monitor, it is possible to get a significant amount of information about things that have happened and that are currently happening in your computer and your Windows 8 installation.

Add to this the excellent System Health Report and the ability to get detailed information to a third-party for diagnosis, or even just a fresh pair of eyes, becomes simple and straightforward.

I talk more about the Computer Management Console in Chapter 33, and show you how the additional tools and utilities presented here can further aid with diagnosing problems. The improvements that Microsoft brought with Windows 7, coupled with additional benefits this time around that include a vastly improved Task Manager, now make Windows 8 troubleshooting easier than ever before.

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CHAPTER 20

Using Advanced Repair Methods

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Managing Windows Services 372
Working with the Windows Registry 374
Using the System Repair Disc and Recovery Drive for Advanced Restore. 379
Using Safe Mode 383

There are times when you will need to completely reset a Windows component or identify and repair specific files within Windows 8 itself. For these circumstances, too, Windows 8 includes tools to perform these tasks.

There will also be times when you need to perform some actions manually; in this chapter, I will detail the commands and utilities you will need to perform these tasks and show you how you can quickly get even a seemingly broken copy of Windows 8 to work again.

Repairing Internet Explorer 10

Microsoft Internet Explorer 10 shares many components with other parts of Windows 8, such as File Explorer. Internet Explorer is one of the most heavily used apps in the operating system, and one of the biggest targets of attack. As such, a lot can go wrong with it. However, because it is an integrated Windows component, Internet Explorer 10 can be very hard to fix.

This situation, coupled with the fact that Windows 8 includes Internet Explorer 10 as both a desktop application and an app, can cause confusion because they can appear to be completely separate programs. So how do you fix Internet Explorer when it misbehaves?

Disabling Internet Explorer 10 Add-Ons and Toolbars

Many problems with Internet Explorer—or any web browser, for that matter—are caused by add-ons and toolbars. These elements are at the root of many problems, including very slow startups. Fortunately, it's easy to turn off problematic add-ons and toolbars from within the browser.

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Although the Windows 8 version of Internet Explorer 10 doesn't support any add-ons or toolbars, the desktop version of the software does. From time to time, you will want to disable some of these.

To disable add-ons and toolbars on the desktop version, with Internet Explorer open, in the upper right of the toolbar, click the cog (settings) icon and then click Manage Add-Ons, as shown in Figure 20-1.

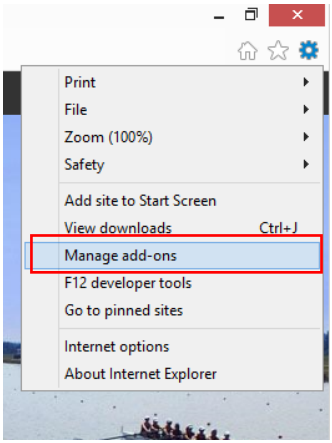

Figure 20-1 Managing add-ons in Internet Explorer

The Manage Add-Ons dialog box opens, displaying details about all of your add-ons and toolbars (see Figure 20-2). Disable each suspicious add-on, one at a time, restarting Internet Explorer each time to see if the problem persists.

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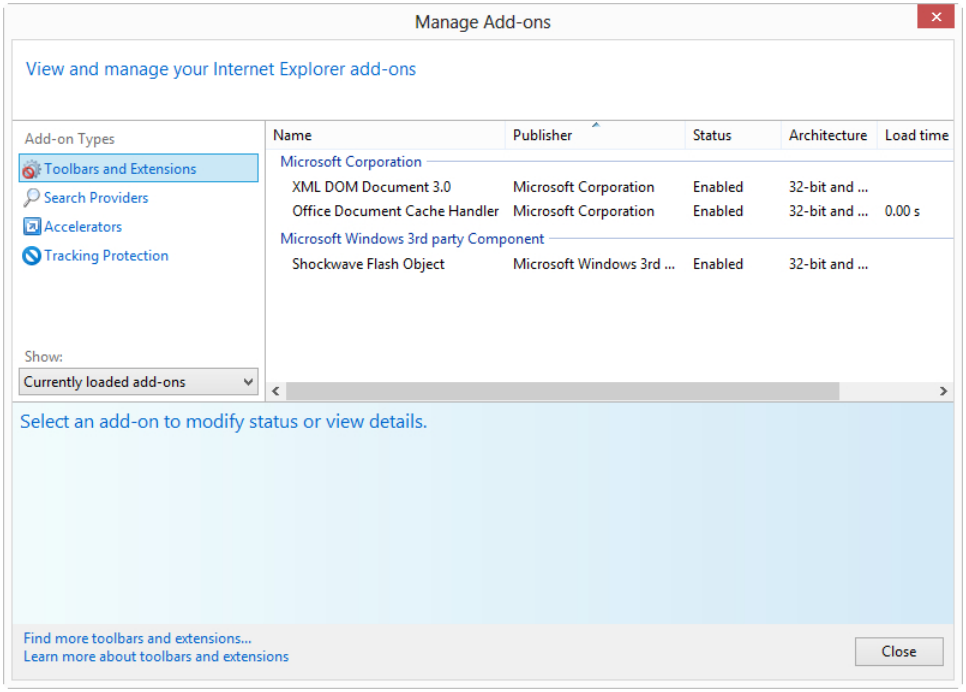

Figure 20-2 Disabling add-ons in Internet Explorer

INSIDE OUT

Keep add-ons and toolbars to a minimum

Add-ons can very quickly slow down your Internet browser, whichever one you use. I recommend keeping installed add-ons and toolbars to a minimum to help with speed and efficiency and to minimize problems and errors.

Managing Add-Ons from the Control Panel

Another way to manage add-ons in Internet Explorer 10 is through the Control Panel, as demonstrated in Figure 20-3.

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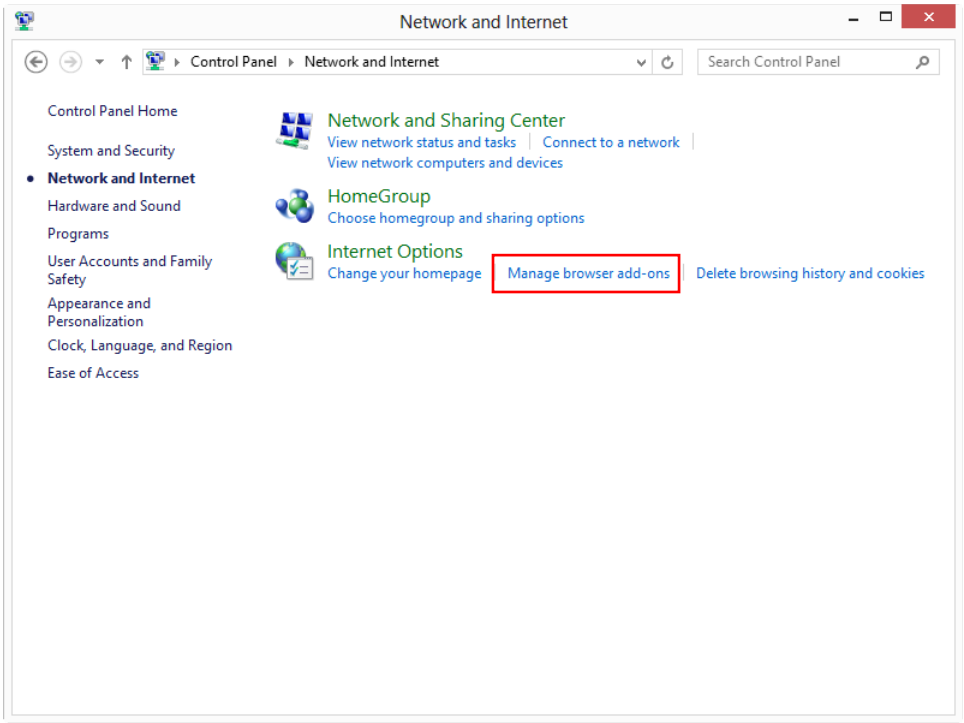

Figure 20-3 Managing Internet Explorer add-ons via the Control Panel

To access the settings, click Network And Internet and then click Manage Browser Add-Ons. In the dialog box that opens, click the Manage Add-Ons button.

Resetting Internet Explorer 10 to Factory Defaults

If the problem with Internet Explorer is not caused by add-ons or toolbars, you can use a Windows 8 option to revert it to its default settings. This will restore the web browser to the state it was in when it was first run.

> **NOTE**
>
> **Resetting the desktop version of Internet Explorer will also reset the Windows 8 app version, as well. In fact, this is the only way to reset the app version if it has problems or stops working.**

To reset Internet Explorer to its default settings, perform the following procedure:

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1. In the upper right of the toolbar, click the cog (settings) icon and then click Internet Options (as shown in Figure 20-4).

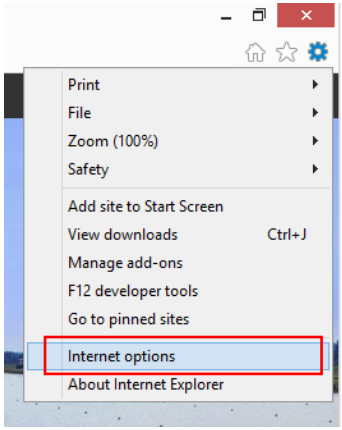

Figure 20-4 Opening the Settings menu in Internet Explorer on the desktop

The Internet Options dialog box opens.

2. Click the Advanced tab (see Figure 20-5), and then in the Reset Internet Explorer Settings section, click the Reset button.

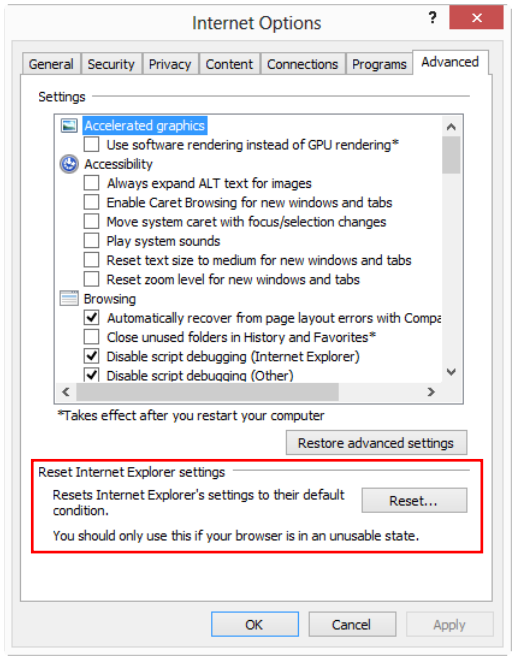

Figure 20-5 The Reset button is on the Advanced tab

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An alert window opens (see Figure 20-6), asking if you really want to reset all Internet Explorer settings. This is a safeguard against pressing the button accidentally, because resetting Internet Explorer will remove all of your add-ons and toolbars and can, optionally, delete all of your settings for the program. Review the information and then click Reset.

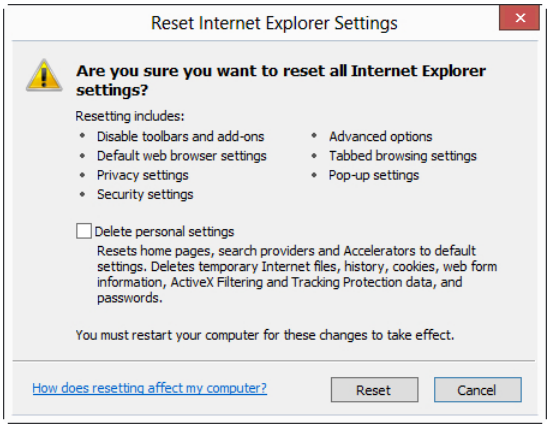

Figure 20-6 Windows informs you as to what will be reset

INSIDE OUT

Resetting Internet Explorer does not delete Internet Favorites

Because your favorite websites are stored in your Windows Users folder and are not a part of Internet Explorer, resetting the browser does not delete them. You can perform this action comfortable in the knowledge that your favorites and bookmarks are safe.

Resetting Internet Explorer When It Won't Start

Sometimes, you can't start Internet Explorer at all and need to reset it from the Control Panel. To do this, open the Control Panel, click Network And Internet, and then click Internet Options, as demonstrated in Figure 20-7.

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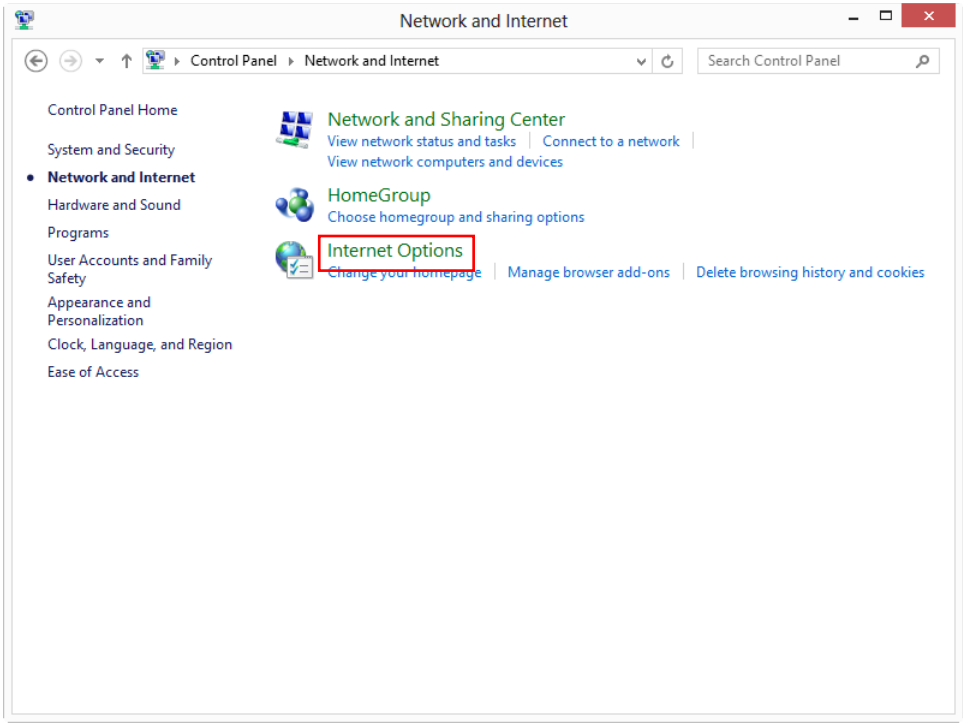

Figure 20-7 Accessing Internet Options from the Control Panel

The Internet Options dialog box appears. Click the Advanced tab and then click the Reset button to reset the browser.

Can You Reinstall Internet Explorer 10?

You can't actually reinstall Internet Explorer 10 for either the desktop or Windows 8 version because Microsoft does not provide a download to support them. If you try to download the Internet Explorer versions for Windows 8, you will be notified that they are not compatible with Windows 8.

You can also reset Internet Explorer by running the System File Checker, which replaces any corrupt files for the program. If it still malfunctions after this is done, you might need to switch it off and use a different web browser if you are unable to restore Windows 8 from a backup made at a time when it was working fine.

To turn off Internet Explorer, click Programs And Features and then click Turn Windows Features On (or Off).

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Updating Internet Explorer via Windows Update

In other chapters of this book, I stress the importance of having Windows Updates switched on. If you are experiencing browser problems, Windows Update might provide an update that can fix them. It's also worth performing a manual update by running Windows Update from the Control Panel to check if any new updates for the browser are available.

Alternatives to Internet Explorer

Some people don't like using Internet Explorer because of bad press the browser received back in the days of Windows XP when the notoriously buggy and insecure Internet Explorer 6 had 99 percent of the overall market.

Since then, Microsoft has turned Internet Explorer into one of the safest, fastest, and most compatible web browsers available, and frankly, I can see no reason not to use it. Given that I regularly advise against installing any software into Windows that duplicates any features that are already part of the operating system, I would say it's fine to stick with Internet Explorer 10.

However, some people still might not want to use Internet Explorer, and so here are my suggestions for alternatives.

Google Chrome

As a rival and mainstream alternative to Internet Explorer, Google's Chrome operating system is really the only one I can recommend. It is quick, stable, and very secure and has been designed with speed in mind. You can download it from *chrome.google.com*.

Mozilla Firefox

Some people like feature-packed web browsers, and the move away from supporting add-ons might be one step too far. In this case, then, the only browser to consider is Mozilla Firefox because it has the best and biggest ecosystem of third-party add-ons of all the web browsers. Please keep in mind, however, that not only will add-ons make the browser slow, they can also pose serious risks to your security and the reliability of your computer. You can download Firefox from *www.firefox.com*.

The System File Checker

The System File Checker has for a long time been the hidden gem in Windows. It checks the integrity of each file that makes up Windows 8 and replaces any that it finds are corrupt, have been tampered with (perhaps by malware), or that have been accidentally deleted with a copy from the original installation DVD or Installation flash drive.

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To open the System File Checker, perform the following steps:

1. From the desktop or on the Start screen, press Windows logo key+X.
2. Click Command Prompt (Admin), as illustrated in Figure 20-8.

   You need to run this option because the System File Checker needs administrator privileges to overwrite Windows operating system files.

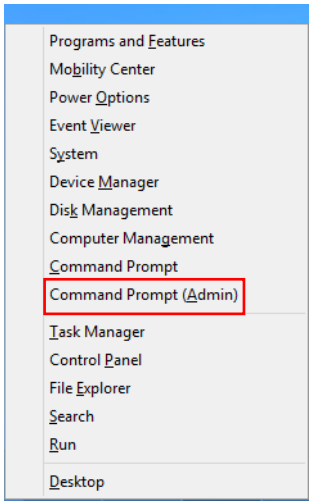

Figure 20-8 Accessing the System File Checker

3. In the dialog box that appears, type **SFC /SCANNOW** and press Enter to start the System File Checker

> **NOTE**
>
> **The System File Checker can verify the integrity of your system files at any time, but if you need to repair any, you will need a copy of your Windows 8 installation DVD with your currently installed service pack integrated into it. I'll discuss this in more detail in just a moment.**

The following are other switches that you can use with the System File Checker in Windows 8:

- **/SCANNOW** Scans all of the operating system files and repairs any that are corrupt or missing.

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- **/VERIFYONLY** Reports on any corrupt of missing files but does not attempt to repair them. This can be run without requiring the Windows 8 installation DVD.
- **/SCANFILE** This scans and, if necessary, attempts to repair a specific Windows file. It is used in the format **/SCANFILE=*c:*\Windows\system32\file.dll**, where *c:* represents the hard disk on which Windows 8 is installed.
- **/VERIFYFILE** The same as SCANFILE but just verifies the integrity of a specific file.
- **/OFFBOOTDIR** This can be used in offline mode to verify the boot files for Windows 8, perhaps if you have a dual-boot Windows 8 system or are starting your computer from a Windows To Go USB flash drive. It is used in the format **/OFFBOOTDIR=d:**.
- **/OFFWINDIR** This is the same as OFFBOOTDIR but performs an offline scan of a Windows folder. It is used in the format **/OFFWINDIR=d:\windows**.

INSIDE OUT

System File Checker and Windows 8 service packs

To run System File Checker in repair mode, you must have an installation DVD or an installation USB flash drive containing the service pack that's currently installed in your copy of Windows 8. This might mean that you need to create a new installation DVD. See Chapter 21, "Demystifying Windows 8 Problems," for instructions on how to do this.

Using MSConfig for Diagnostic Startup

You can use MSConfig to boot your computer into several different diagnostic Startup modes. To access it, open the Start screen and search for **msconfig**. On the Boot tab of the System Configuration dialog box, there are several options that you might find useful.

Select the Safe Boot check box to start the computer in Safe Mode the next time you restart it. This can be useful if you have a keyboard fault or if you keep missing the chance to press Shift+F8 at restart.

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> **NOTE**
> **As useful as the System File Checker is, the question I am asked more than any other is can this be run from Safe Mode, Diagnostic Startup Mode (more on this shortly), or from a system repair disc or recovery drive. The answer to this is no, it will only run from within a bootable copy of Windows.**

Select Boot Log (see Figure 20-9) to create a text file called *ntblog.txt* upon the next startup that will report on everything that worked (and didn't work). This can be an invaluable tool for diagnosing drivers or services that are failing to start when Windows loads. You can find this boot log on your Windows drive in the root folder, as illustrated in Figure 20-10.

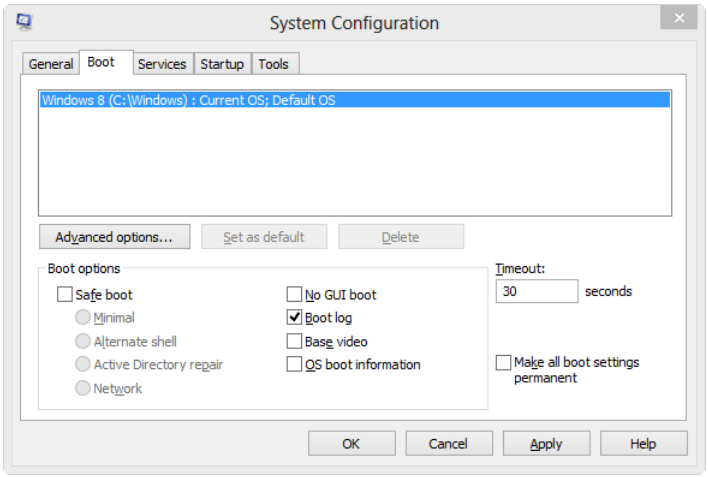

Figure 20-9 Diagnostic startups in MSConfig

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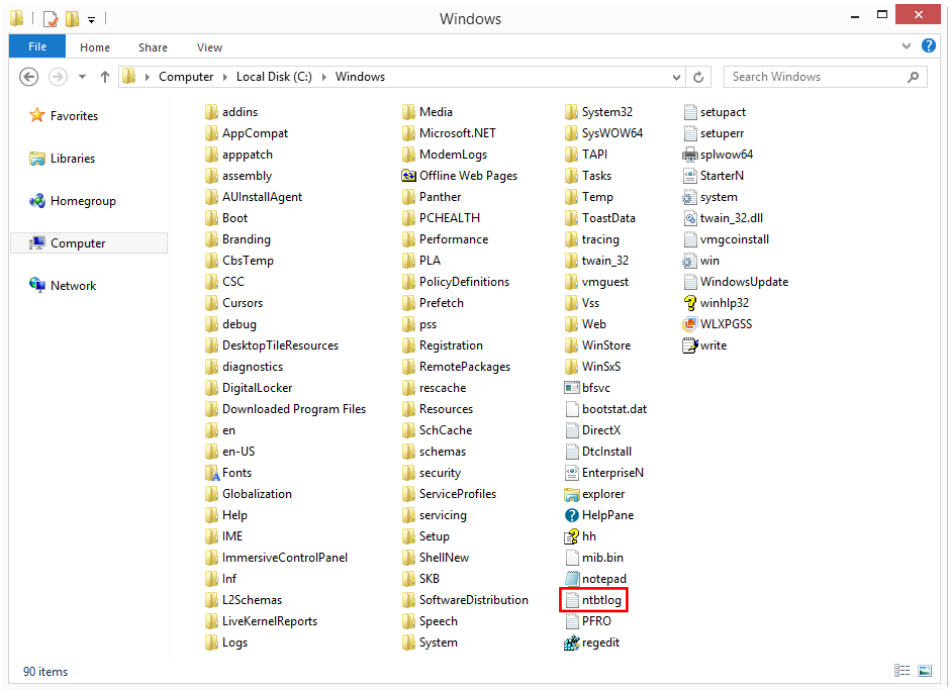

Figure 20-10 Finding the boot log in Windows

Double-click the boot log to open it in Notepad. Figure 20-11 shows that it displays a complete list of every system file and driver that loaded—or failed to load—when Windows started. This can be extremely useful information for diagnosing problematic services or drivers.

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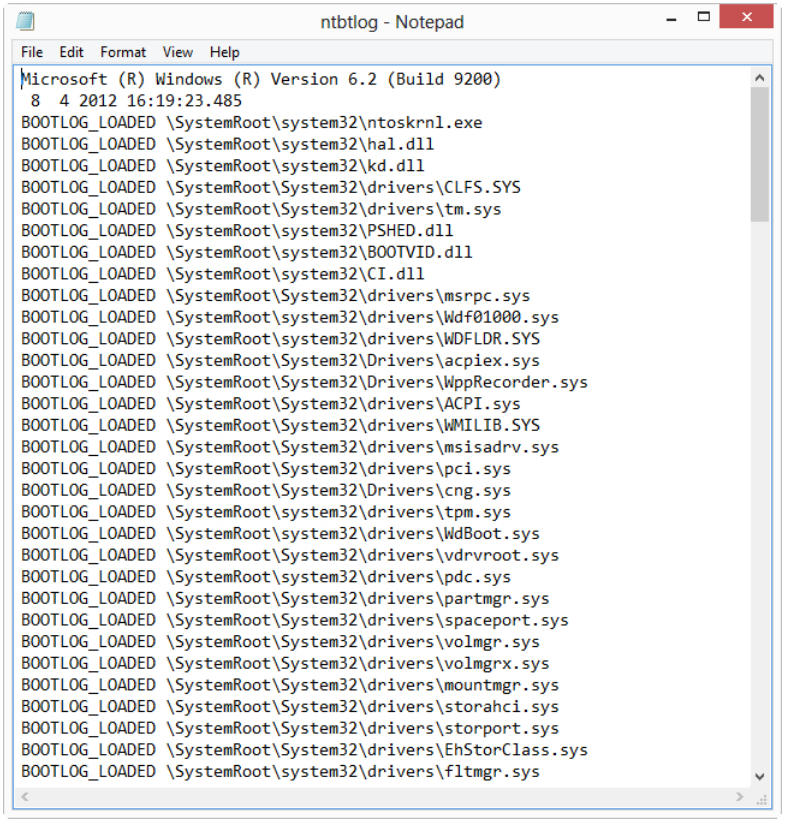

Figure 20-11 The boot log as viewed in Notepad

You can find additional startup options in MSConfig in the System Configuration dialog box, on the General tab (see Figure 20-12). Here, you can disable startup programs and some services to start Windows 8 in a Diagnostic Startup mode that offers more functionality than Safe Mode. This diagnostic mode is a simple version of Windows 8 that you can use to troubleshoot problems.

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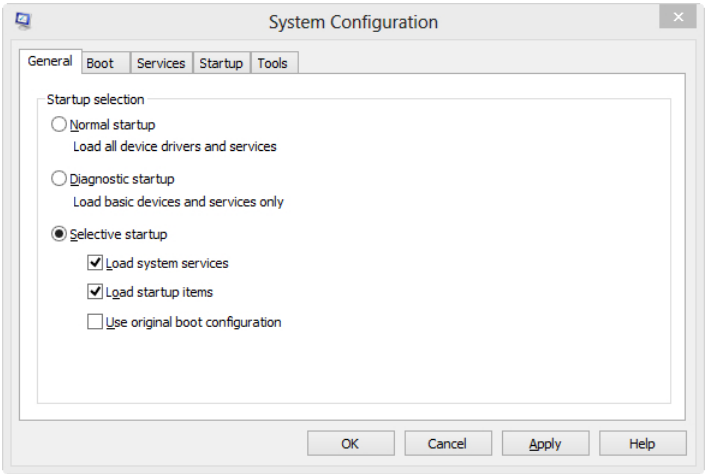

Figure 20-12 MSConfig offers an additional Diagnostic Startup mode.

NOTE

Some Windows features such as the System File Checker cannot be run in Safe Mode or Diagnostic Startup mode.

Managing Windows Services

Services are operating system components that start when Windows loads or when you perform an action that requires a specific feature within the operating system. These services include managing the desktop interface, the firewall, and printer spooling.

CAUTION

You should always be very careful when working with services in Windows 8 because deactivating the wrong one can make Windows unresponsive or even unable to start.

To access the Services panel, open the Start screen and search for **services**. It will appear in the Settings search results as View Local Services.

In the main Services panel (see Figure 20-13), all Windows services are listed alphabetically. You can make columns wider to more easily read the content. The descriptions of the services are very helpful toward ensuring that you do not disable the wrong one.

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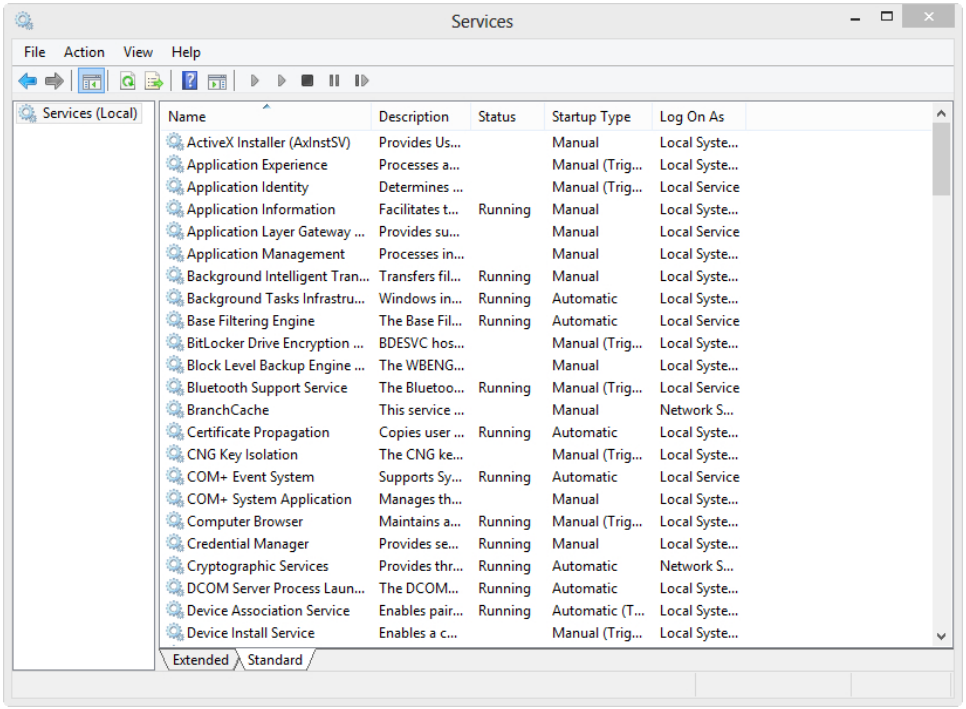

Figure 20-13 The Services panel

INSIDE OUT

When would you want to disable a service?

I would not recommend turning off any services that are a part of Windows, but you might want to turn off third-party software services (such as trialware antivirus software) that are causing slowdowns or other problems. In the Services panel, you can stop these services from running or change the startup type to manual (so that they start only when called).

Right-click a service, and then in the settings panel that opens, click Properties. In the dialog box that appears, click the General tab. Here, you can disable the service if required, as demonstrated in Figure 20-14. Also, on the Recovery tab, you can choose what actions Windows should take if this service stops working for any reason.

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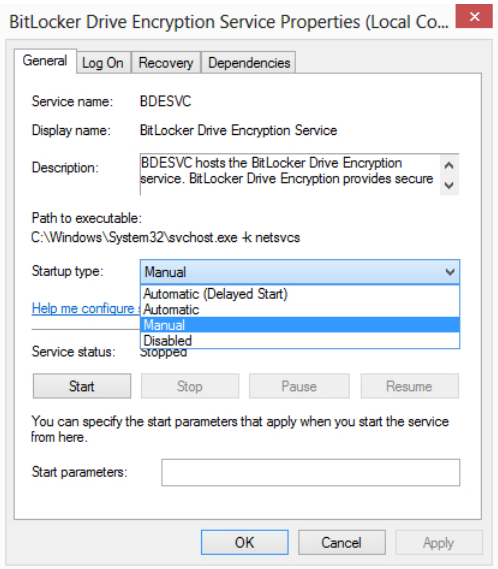

Figure 20-14 Setting the properties for a service

Finally, on the Dependencies tab, you can check if this service cannot run without other services being active. This can help you to determine if shutting down a service will cause another service to crash.

Working with the Windows Registry

The registry is a database in which the settings for Windows and all of your installed software are kept. There is one copy of the registry for each user maintained in hidden files called *ntuser.dat*. These files contain individual settings and preferences for that user. They are located in the root of each user account folder on your Windows drive; the main registry files are located in the \Windows\System32\Config folder.

The Windows registry can be manually edited by using the Registry Editor (see Figure 20-15). To access the Registry Editor, open the Start screen and search for **regedit**.

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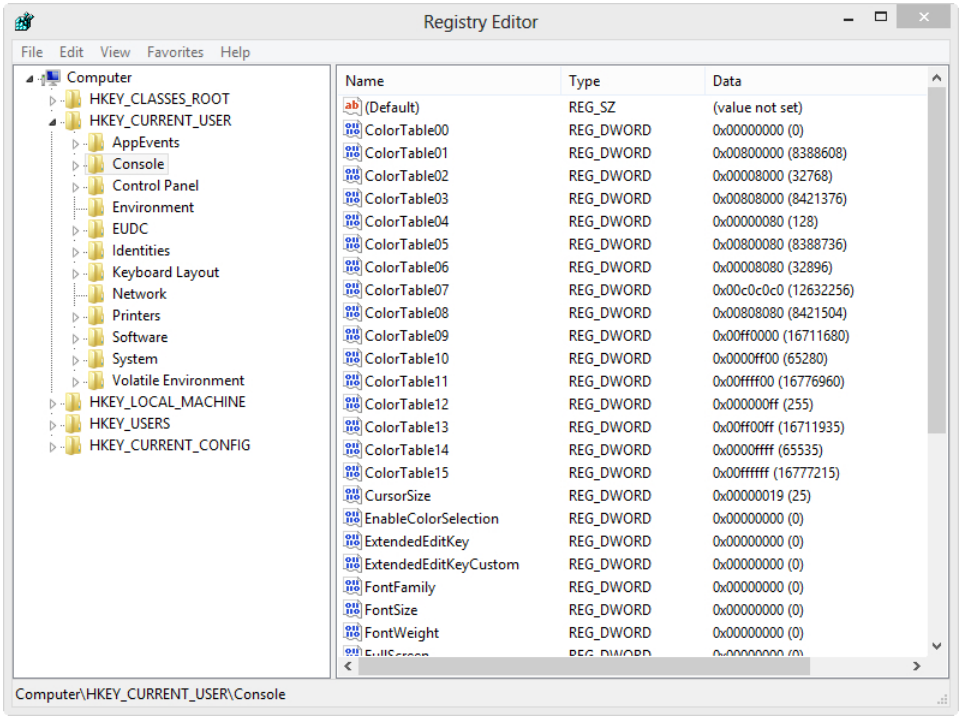

Figure 20-15 The Windows registry

Occasionally, you might need to change or remove a setting in the Windows registry. Do this with great care, because changing the wrong setting in the registry can cause Windows 8 to become unresponsive or unable to boot.

The registry is separated into the following five different sections (I cover how to use the registry in depth in Chapter 35, "Making Changes to the Registry"):

- **HKEY_CLASSES_ROOT** You should not change these settings. They include essential Windows system settings along with other elements such as file associations.
- **HKEY_CURRENT_USER** These are the custom settings for the currently logged-on user. These will include settings for Windows and installed software. These are the most commonly changed settings.

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- **HKEY_LOCAL_MACHINE** This section is for general Windows and software settings. You might need to make changes in this section.
- **HKEY_USERS** This section is for general controls for user accounts; you will not need to change these settings.
- **HKEY_CURRENT_CONFIG** These are additional settings related to your current configuration; you will not need to change these settings.

There are only two situations in which you will really need to change or remove settings in the Windows registry.

- When you are following specific written instructions on dealing with a problem, or tweaking advanced (hidden) settings in Windows 8.
- When you are removing settings left behind by an uninstalled program that are causing problems with Windows 8 or other programs.

As mentioned earlier, I explain modifying the registry properly in Chapter 35, but the most common things you will need to do are create a new setting or change an existing one. To do this, navigate to the correct place in the registry (you might be following specific instructions from a website or manual, which will guide you to exactly the right place in the registry) and right-click either a blank space to create a new setting or an existing setting to change it, as shown Figure 20-16.

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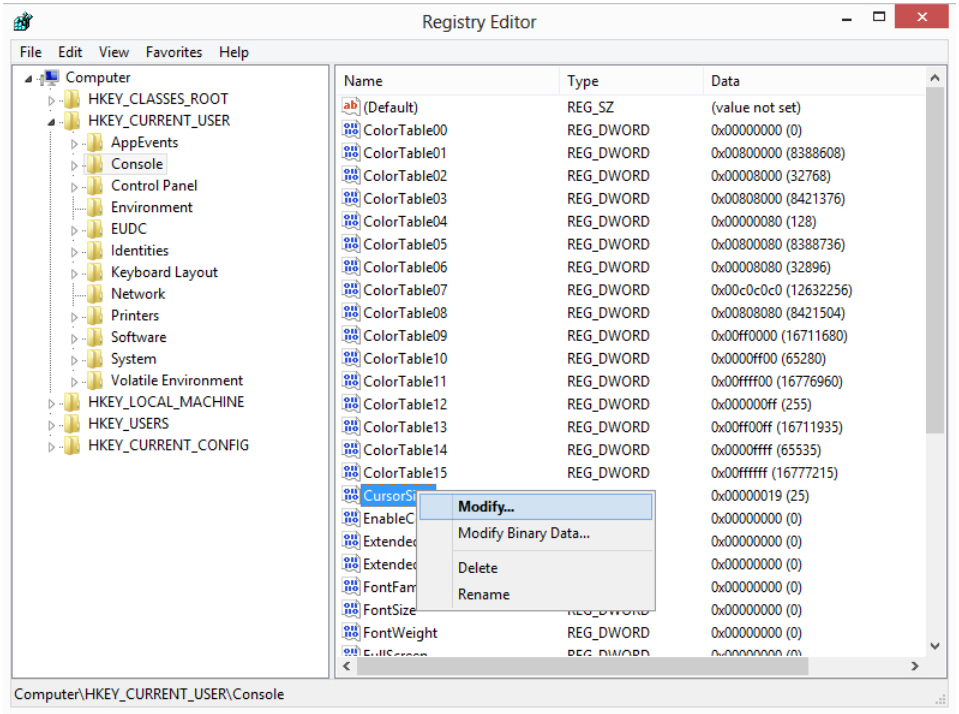

Figure 20-16 Changing a setting in the Windows registry

Removing the Registry Settings for an Uninstalled Program

There are two ways to find settings left behind by an improperly uninstalled program. The simplest way is to use the Find and Find Next controls on the Edit menu in Registry Editor (also available by pressing Ctrl+F [Find] or Ctrl+F3 [Find Next]).

You can also search for the settings manually. You will find them in the following two locations:

- HKEY_CURRENT_USER/Software
- HKEY_LOCAL_MACHINE/SOFTWARE

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You can right-click a setting for a specific program and select Delete to remove it from the registry (see Figure 20-17). You should always be careful when you do this and back up the registry before you make any changes.

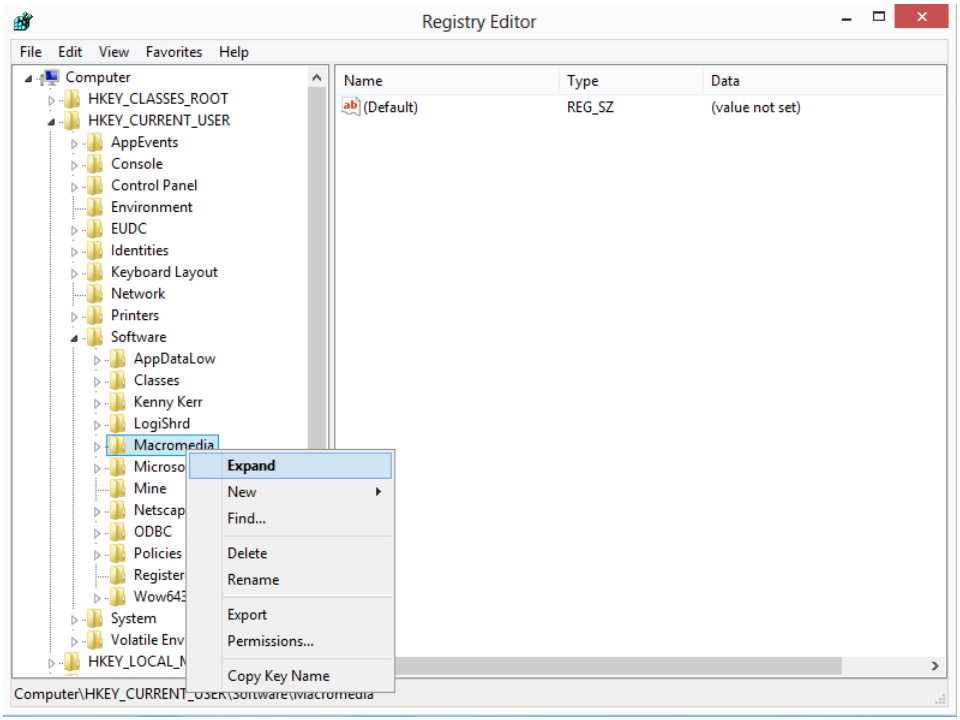

Figure 20-17 Removing unwanted software settings in the Windows registry

INSIDE OUT

Backing up the registry before making changes

You should always create a backup copy of the registry before making any changes to the registry. To do so, on the File menu, click Export. To restore this backup, on the File menu, click Import. (Note that you might need to do this in Safe Mode if the changes you have made render Windows 8 unstable.)

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The Benefits or Otherwise of Registry Optimizers

Opinion is generally divided over the benefits of registry optimization software. Certainly, on computers from by-gone days for which both memory and hard disk space were at a premium and were very expensive, anything you could do to reduce the overall memory and disk footprint of Windows brought noticeable benefits.

Now, however, it's less of an issue and a messy registry is unlikely to slow down your computer. Some packages, such as the excellent CCleaner (*www.piriform.com/ccleaner*) and WinOptimizer (*www.ashampoo.com*) do a great job of removing unused and discarded registry entries. The choice of whether to do this is entirely yours, but I do run these utilities myself once in a while.

Using the System Repair Disc and Recovery Drive for Advanced Restore

In Chapter 14, "Easy Ways to Repair Windows 8," I talk about Windows Startup Repair. This will automatically start when Windows has failed to load after three attempts, but you can get more repair options by starting your computer from your Windows 8 installation DVD or by creating a system repair disc or recovery drive.

INSIDE OUT

Accessing System Recovery Options from the hard disk

You can access System Recovery Options on computers for which it has not been disabled by pressing F8 on your keyboard after the BIOS screen disappears but before you see the Starting Windows logo. In the boot options that appears, select Repair Your Computer. System Recovery Options might not function properly, however, if there is a problem with Windows or your hard disk.

Starting your computer from these discs gives you many more options for diagnosing and troubleshooting problems with Windows 8 startup.

NOTE

Even though you might have a USB3 flash drive, your computer might not recognize it as a boot device in a USB3 port. If this happens, plug it into a USB2 port and it should work as a boot device.

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Click Troubleshoot, click Advanced Options, and then click Command Prompt (see Figure 20-18) to access some very useful options for repairing your computer. You might be pleased to learn that chkdsk is still available at the command prompt in Windows 8. You can use it with the following command-line switches:

- **/F** To fix errors on the disk
- **/R** To locate and attempt repairs on bad disk sectors
- **/X** Force, if necessary, the disk to dismount before checking

There are several other options available by typing **chkdsk /?**.

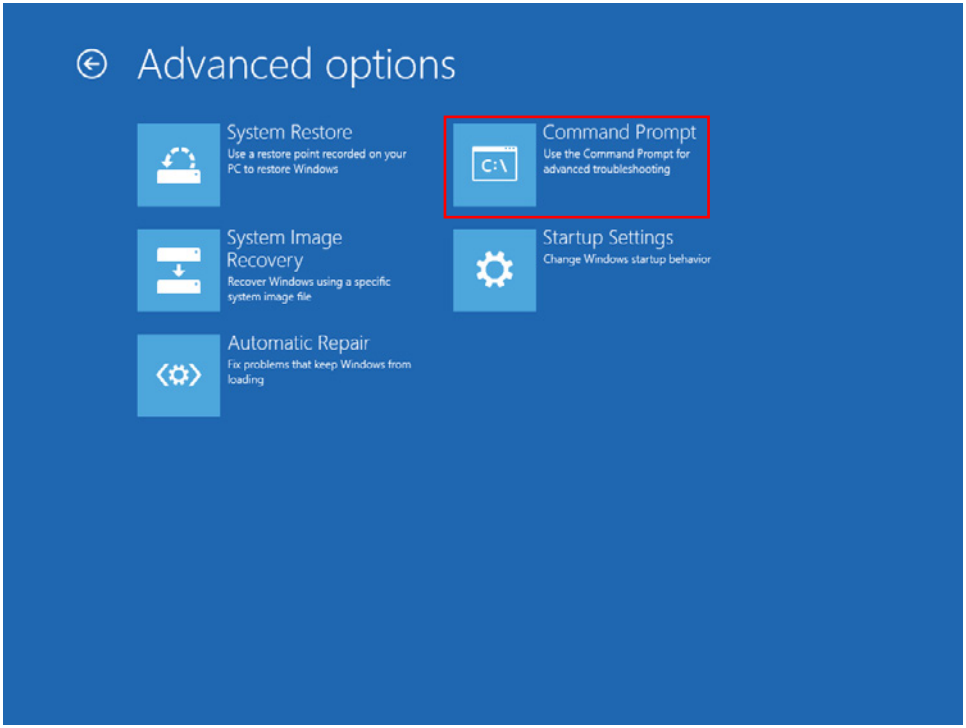

Figure 20-18 The Advanced options in the boot menu

BootRec.exe

If you miss the Recovery Console, fear not; it's still in Windows 8, but in a different form. The new **bootrec.exe** command is accessed from the Command Prompt in System Recovery Options. Using this, you can perform various actions by adding command-line switches.

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Repairing the Boot Menu by using BootRec

The boot menu is the list of operating systems that appears when Windows starts. You will not see this menu if you have only one operating system installed. It can become corrupt, however, and if it does, you will need to rebuild it. You can do this by typing **bootrec /RebuildBcd** into a Command Prompt window, as shown in Figure 20-19.

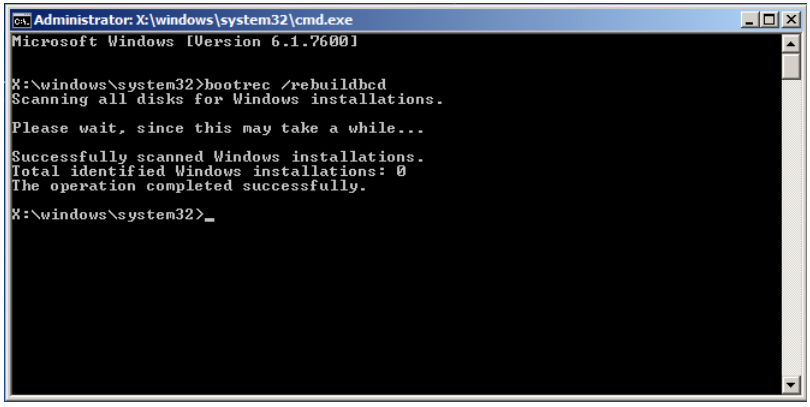

Figure 20-19 Rebuilding the Windows boot menu

Sometimes, this command won't work, and you will need to delete the boot menu and rebuild it from scratch. To do this, in the Command Prompt window in System Recovery Options, type the following commands:

```
Bcdedit /export c:BCD_Backup
c:
cd boot
attrib bcd -s -h -r
ren c:\boot\bcd bcd.old
bootrec /RebuildBcd
```

There are other useful switches for use with the BootRec command.

- **/FixMbr** This switch repairs the master boot record (MBR) in Windows 8.
- **/FixBoot** This option writes a new boot sector to the system disk. This can be useful if the boot sector has become corrupt or damaged, perhaps by trying to install an earlier version of Windows on the hard disk.
- **/ScanOS** This option scans your hard disks for any compatible operating systems that might not be viewable on the boot menu.

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BCDEdit

This is a program used for maintaining, changing, and rebuilding the boot menu in Windows 8. You should not need to use BCDEdit to repair your copy of Windows 8, because the tools I have mentioned already should repair any problems. For instructions on how to use it, go to Chapter 18, "Troubleshooting Windows 8 Startup."

When you are finished with the Command Prompt in System Recovery Options, type **exit** to close the window.

Other DOS Commands in System Recovery Options

Other DOS commands are available in the Command Prompt window of System Recovery Options.

- **Copy** Copies files from one location to another
- **Move** Moves files from one location to another
- **Rd** Removes an empty directory
- **Ren** Renames a file or directory
- **More** Show the contents of a file, one page at a time
- **Type** Shows all the contents of a file without pausing the screen
- **Xcopy** Copies a folder and all of its contents to another location
- **Mkdir** Makes a new directory
- **Diskpart** Loads the Windows disk management program
- **Dir** Displays a list of files and folders
- **Cd** Moves you to a different folder
- **Attrib** Changes the attributes of the file (Read only, and so on)
- **Del** Deletes a file

The switch options for each command are available by using the ***/?*** switch after the command, where *?* is the specific switch.

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Using Safe Mode

You might also want to start your computer in Safe Mode by pressing the Shift+F8 during startup to open the boot options menu. Here, you'll see a stripped-down diagnostic mode of Windows in which you can run tests and check to see if the operating system is functioning correctly.

Summary

Of all the questions I am often asked, questions about the System File Checker are by far the most frequent. This is understandable, because it's an incredibly useful and powerful tool, provided you have a slipstreamed copy of the latest and currently installed Windows service pack on an installation DVD or USB pen drive.

Of the other tools, the continuation of support for the Command Prompt in the rescue system and boot rescue discs and USB drives are probably the two that I would highlight as being most useful. It is here that you can quickly and simply rescue the boot system for Windows (for the most part anyway, as disasters do sometimes happen), but if the boot system fails completely you can back it up in advance, as I detailed in Chapter 18.

I love the tools and utilities I have detailed in this chapter, and judging by the email and comments I have received from readers in the past few years, so do you. These tools should never be underestimated for their usefulness.

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CHAPTER 21

Demystifying Windows 8 Problems

The Core Operating System Files in Windows 8 385
Using Advanced File Restore. 391
The System File Checker 392
Creating a Slipstreamed Install DVD 392

The core structure of Windows 8 is enormous, with tens of thousands of files containing millions of lines of programming code, a huge and complex folder structure, and additional files required for 64-bit or ARM versions of the operating system (OS).

Sometimes, you have to work with this file and folder structure when you are troubleshooting problems or optimizing the OS before you back up a clean installation. In this chapter, I'll show you what does what, and why some things you might not consider important are capable of crashing your system if they're removed.

INSIDE OUT

Show hidden system files and file extensions in File Explorer

By default, Windows 8 hides certain system files and file extensions so that you can't see them when you explore files and folders on your computer. To view these hidden files and extensions, on the ribbon, on the View tab, click the Options button. In the Folder Options dialog box that appears, click the View tab and then select the Show Hidden Files, Folders And Drives option, the [Un]Hide Extensions For Known File Types option, and the [Un]Hide Protected Operating System Files option.

The Core Operating System Files in Windows 8

Figure 21-1 presents the full Windows 8 folder structure. Some of these folders contain files for specific functions. For example, the ehome folder includes Windows Media Center files, and the Fonts folder stores Windows fonts.

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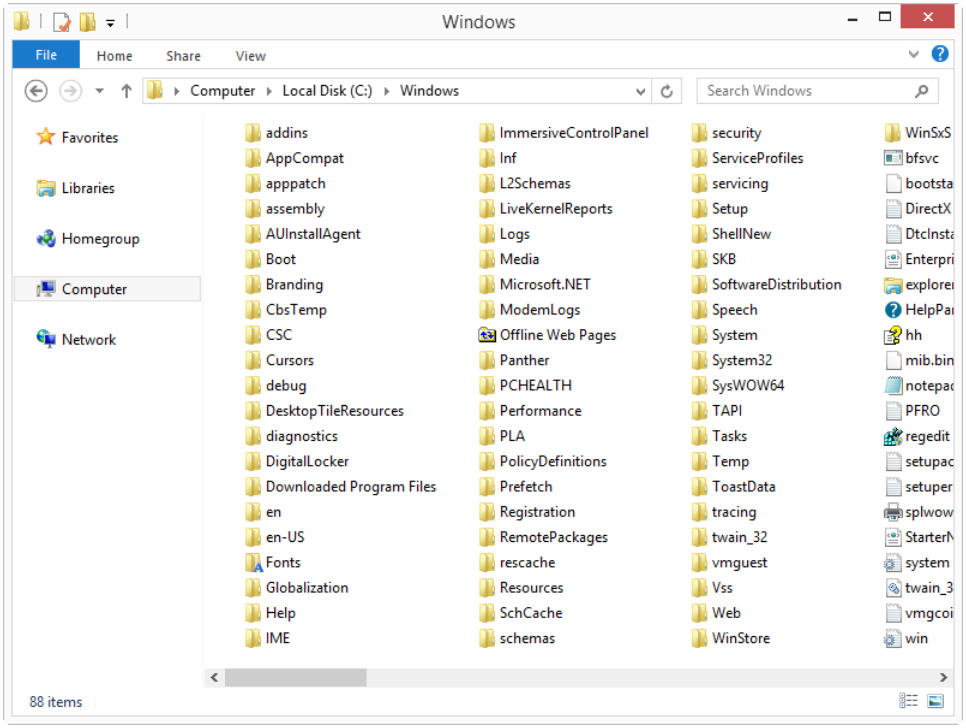

Figure 21-1 The folder structure for Windows 8

A few of these folders contain core operating system files. We'll focus on them because this is where file corruptions are most likely to occur.

- **C:\Windows\Boot** This folder contains files necessary for starting Windows 8.
- **C:\Windows\Help** The Windows 8 help files are located in the Help folder. If you cannot start Help, these files might be corrupt or missing.
- **C:\Windows\inf** Windows uses the INF files in this folder when installing hardware and software drivers.
- **C:\Windows\System32** This folder contains the guts of Windows 8. All the main Windows components are located here. If you have a problem with a Windows file, it is likely located in this folder.

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The following files are commonly located within the C:\Windows\System32 folder substructure.

- **ActiveX Files (*.ocx)** ActiveX is a programming framework that software authors use to design reusable components to be shared across applications. Sometimes, these controls are shared across programs from different software houses, and in older software, there might be incompatibilities with various versions of the .ocx files. For example, one program might require a specific version of the file, but another program needs a different version. Windows 8 is much better at handling these conflicts than older versions of Windows; however, such conflicts can still occur.

- **Applications** Applications are the main programs that comprise Windows 8. If you are trying to launch a built-in Windows feature and it cannot be found, the associated application file might be missing from the Applications folder.

- **Application Extensions (*.dll)** Dynamic-Link Library (.dll) files are shared library files. Like .ocx files, .dll files are program and Windows components that can be shared across software applications. Occasionally, Windows becomes unresponsive because a .dll file is corrupt or is an incorrect version that is not supported by the program or feature trying to access it.

  As with .ocx files, Windows 8 is much better than previous versions of Windows at handling .dll file conflicts, but issues with these files can still occur. Windows 8 includes more .dll files than any other type of file.

- **Control Panel Item (*.cpl)** Windows 8 launches .cpl files when you access features in Control Panel. If an item cannot be found, the associated .cpl file might be missing or corrupt.

- **Microsoft Common Console Document (*.msc)** The Microsoft Management Console (MMC) programs are stored in various folders under the main \Windows folder and have the .msc file extension. If you cannot start an MMC item, the program file might be corrupt. Bear in mind though that to maintain backward compatibility, there might be multiple versioned copies of the appropriate MMC file in the WinSXS folder.

- **VBScript Script File (*.vbs)** Scripts produced in Visual Basic VBScript can be a target for virus writers. Some VBScript scripts are stored in the main Windows 8 folders.

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- **C:\Windows\System 32\Drivers and C:\Windows\System 32\DriverStore (*.drv)** These folders contain all the hardware and software drivers for your hardware. They use the .drv file extension. You can back up these folders and restore them manually if an event such as a driver malfunction or faulty driver upgrade causes problems with Windows 8.

- **C:\Windows\winsxs** Earlier, I discussed side-by-side compatibility protection for different versions of .dll, .ocx, and other files in Windows 8. Windows stores and organizes compatible duplicate versions of files in the winsxs folder. This folder is usually very large and even bigger than the System32 folder.

CAUTION!

Although it can be tempting to look at the C:\Windows\WinSXS folder and ask why you need a 7-GB folder, you should never delete it. This folder contains files that are critical for the operation of Windows 8.

- **C:\Users\%username%\AppData** In each user's folder is a subfolder named AppData, as shown in Figure 21-2. Application-specific files and settings are stored in this folder.

- **C:\Windows\System32\Config** The main operating system Registry files are located separately from the user Registry files; thus, they can be backed up (and restored) independently.

- **C:\Program Files and C:\Program Files (x86)** These are the two store folders for programs and software in Windows 8. If you are running the 32-bit version of the OS or the ARM version, you will only see a \Program Files folder.

- **C:\Program Files\WindowsApps** This is a hidden folder in which Windows keeps the program files associated with any installed Windows 8 apps.

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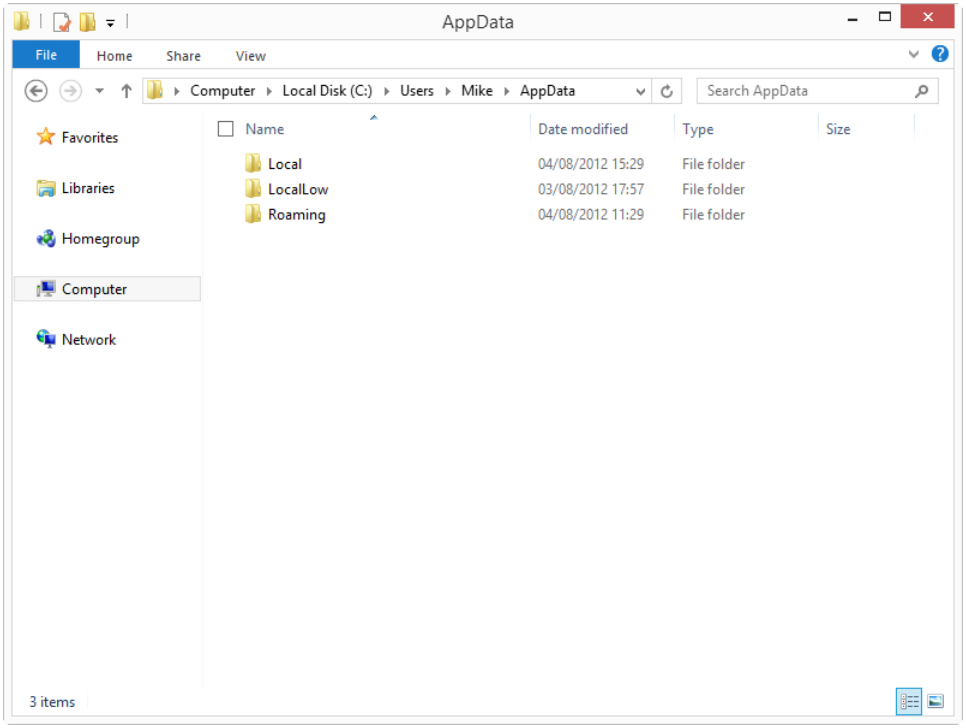

Figure 21-2 The AppData subfolders

The AppData folder is hidden by default, so you will need to change the default setting to show hidden files to see the folder's contents. See the Inside Out sidebar "Show hidden system files and file extensions in File Explorer" earlier in this chapter for details.

Windows 8 Security and Policy Folders

Windows security and other policies that control logon, software, and user behavior and permissions are stored in the following folders:

- C:\Windows\Security
- C:\Windows\ServiceProfiles

The Windows 8 Registry

The registry is a database that contains configuration options and settings for Windows and your installed programs. There is one registry folder for each user named ntuser.sat (see Figure 21-3) and you can make all of them visible by showing hidden and operating

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system files. See the Inside Out sidebar "Show hidden system files and file extensions in File Explorer" earlier in this chapter for details.

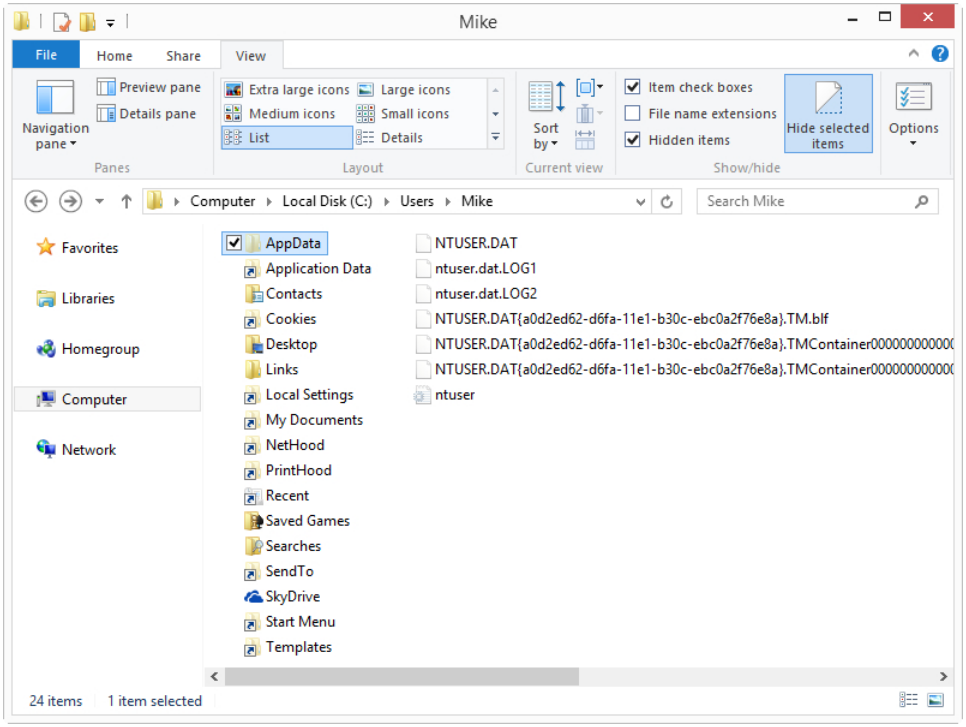

Figure 21-3 The registry files are hidden in user folders

Personalization Folders

The main folders containing wallpapers and other personalization options are as follows:

- C:\Windows\Globalization
- C:\Windows\Media
- C:\Windows\Resources
- C:\Windows\Web

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Windows 8 Logs

Several folders contain Windows 8 logs. You can normally access these logs through the Control Panel and MMC. You can also access the logs manually if you can't get Windows 8 to start. You can find the logs in the following folders:

- C:\Windows\debug
- C:\Windows\diagnostics
- C:\Windows\LiveKernelReports
- C:\Windows\Logs
- C:\Windows\ModemLogs

Temporary Files Stores

You can delete all of the contents in the following Windows 8 folders if you suspect they are causing problems:

- **C:\Windows\Downloaded Program Files** Windows does not usually use this folder, so it will normally be empty anyway.
- **C:\Windows\Prefetch** Windows tracks what programs and files you frequently use and stores this information in the Prefetch folder to preload them when appropriate (for instance, when starting a program that you run often). Sometimes the prefetch files can become corrupt. If you suspect this has happened, you can safely delete the contents of this folder. Windows will then rebuild the prefetch database.
- **C:\Windows\SoftwareDistribution** This folder contains Windows Update configuration options and downloaded files. If Windows Update will not install updates, you can delete the contents of this folder to try to fix the problem.
- **C:\Windows\Temp** This folder is the temporary files store. Its contents can be deleted at any time if you suspect any temporary files are causing a problem.

Using Advanced File Restore

I could write an entire book on the Windows 8 file and folder structure. But the guide presented in the previous section should be enough to help you restore Windows 8 files and folders on a file-by-file, folder-by-folder basis. You can infer from this discussion that you

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do not need to restore folders that contain temporary files; temporary files are unnecessary when restoring Windows to working order, and you could run the risk of restoring a corrupt file. You can also use the preceding descriptions to decide which folders containing user personalization options to specifically include or ignore in a restore.

The most important folders—the ones you are most likely to restore—are the Boot, INF, System32, and WinSxS folders. These folders contain the essential parts of the operating system. Most likely, problems are caused by corrupt or missing files in these critical folders.

CAUTION

If you restore the folders containing security or other computer policies, be certain that there have been no changes since the backup was made. If changes were made, you could encounter additional problems, such as a faulty smart card or fingerprint reader.

The System File Checker

I write about the extremely useful System File Checker in Chapter 20, "Using Advanced Repair Methods." This utility checks every system file in Windows against the original version on the installation DVD. If it finds a file that has changed or become corrupt, it restores the original file.

System File Checker quickly repairs problems with Windows 8, but if you have a service pack installed on your computer, you will also need to *slipstream* the service pack onto the installation DVD before running System File Checker. The following section details how to create a slipstreamed DVD.

Creating a Slipstreamed Install DVD

Slipstreaming is the process of integrating a service pack onto the original installation DVD. You might want to do this for a couple of reasons. First, a slipstreamed installation DVD is useful when you need to reinstall Windows or install it on a new computer. A slipstreamed version of the software is far better updated than the original install. You might also want to create a slipstreamed installation DVD if you want to use System File Checker as mentioned in the preceding section. The installation DVD you use with System File Checker must include the service pack that matches the one installed on your computer; if it doesn't, some operating system files will not match, and System File Checker will abort with an error.

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Sadly, creating a slipstreamed service pack installation DVD image for Windows 8 isn't as simple as it is for Windows XP. With Windows XP, you simply copy the contents of your Windows XP installation disc to your hard disk and use an /integrate switch with the service pack to build it into the file structure. Then you burn back to a bootable DVD. This procedure changed with Windows Vista, and although you can still slipstream, it's a significantly more complex process. Here, however, I'll describe how to do it step by step.

What You Will Need

Before beginning the slipstream procedure, gather the following items:

- A spare hard disk or partition on which you can install a fresh copy of Windows 8.
- The Windows Assessment and Deployment Kit, which you can download for free by searching the Microsoft website for Windows 8 ADK. You will need approximately 4.2 GB of free disk space to install the Windows ADK on your computer.
- A blank CD or DVD.
- Software for creating an ISO file such as UltraISO (available from *www.ezbsystems.com/ultraiso*) or WinISO (available from *www.winiso.com*). You might be able to download a free trial version of the software, which will be fine for a quick job.

Part 1: Creating a Windows Pre-Installation Environment Startup Disc

You first need to create a startup disc for the Windows Pre-Installation Environment (WinPE). To do this, perform the following steps:

1. Run the Windows 8 ADK installer and select Windows ADK Setup.
2. When the Windows 8 ADK is installed, open the Start screen, right-click Deployment And Imaging Tools Environment, and then click Run As Administrator.
3. In the command prompt window that appears, type **C:** and press Enter to access the ADK folder. Then, type **cd C:\Program Files\Windows Kits\8.0\Assessment and Deployment Kit\Deployment Tools** and press Enter again.
4. Use the C:\Program Files\Windows Kits\8.0\Assessment and Deployment Kit\Windows Preinstallation Environment\Copype.cmd script, changing the arguments as necessary to match the locations for your WinPE files and the desired destination folder. (Valid versions include 32-bit [x86] or 64-bit [x64]. Other supported types are amd64 and ia64.)

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Type copype.cmd x86 C:\winpe_x86 or **copype.cmd x64 C:\winpe_x64** and then press Enter.

The command in step 4 creates a folder structure in a new folder. (For the purposes of this tutorial, we'll assume this is C:\winpe_x86.)

5. Copy the base WinPE image to this folder structure by typing **copy C:\winpe_x86\winpe.wim C:\winpe_x86\ISO\sources\boot.wim** and then press Enter.

6. Add disk boot files to the files you have created in steps 4 and 5, ready for burning to a CD or DVD. Type the following commands, pressing Enter after each one:

   a. **dism /Mount-wim /Winfile:C:\winpe_x86\ISO\sources\boot.wim /index:1 /MountDir:C:\winpe_x86\mount**

   b. **copy C:\winpe_x86\ISO\bootmgr C:\winpe_x86\mount**

   c. **mkdir C:\winpe_x86\mount\boot**

   d. **xcopy /cherky C:\winpe_x86\ISO\boot C:\winpe_x86\mount\boot**

7. Add the ImageX disc image creation program to the folder. Type **copy "C:\Program Files\Windows AIK\Tools\x86\ImageX.exe" C:\winpe_x86\mount** and then press Enter.

8. Create the boot configuration data (BCD) file for the disc. Type the following commands, pressing Enter after each one:

   a. **Del c:\winpe_x86\mount\boot\BCD**

   b. **Bcdedit /createstore c:\winpe_x86\mount\boot\BCD**

   c. **Bcdedit /store c:\winpe_x86\mount\boot\BCD -create {bootmgr} /d "Boot Manager"**

   d. **Bcdedit /store c:\winpe_x86\mount\boot\BCD -set {bootmgr} device boot**

   e. **Bcdedit /store c:\winpe_x86\mount\boot\BCD -create /d "WINPE" -application osloader**

9. The command in step 8e returns a GUID value. Type the following commands, substituting the GUID value returned by step 8e for {GUID}. The GUID should look similar to **{21EC2020-3AEA-1069-A2DD-08002B30309D}** but will contain different numbers and letters. Press Enter after each step.

   a. **Bcdedit /store c:\winpe_x86\mount\boot\BCD -set {GUID} osdevice boot**

   b. **Bcdedit /store c:\winpe_x86\mount\boot\BCD -set {GUID} device boot**

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c. **Bcdedit /store c:\winpe_x86\mount\boot\BCD -set {GUID} path \windows\system32\winload.exe**

d. **Bcdedit /store c:\winpe_x86\mount\boot\BCD -set {GUID} systemroot \windows**

e. **Bcdedit /store c:\winpe_x86\mount\boot\BCD -set {GUID} winpe yes**

f. **Bcdedit /store c:\winpe_x86\mount\boot\BCD -displayorder {GUID} -addlast**

10. Finally, create an ISO disc image that you can burn to a CD or DVD. Type **oscdimg –n –m –o –bC:\winpe_x86\etfsboot.com C:\winpe_x86\mount C:\winpe_x86\winpe_x86.iso** and then press Enter.

    If you are building an ISO to an AMD Extensible Firmware Interface (EFI) ISO, instead, type **oscdimg.exe –bC:\winpe-x64-efi\efisys.bin–pEF –u1 –udfver102 C:\winpe-x64-efi\ISO x64-efi-winpe.iso** and then press Enter.

    For Intel Itanium–based architecture, replace efisys.bin with **etfsboot.com**.

11. You will now have an ISO file in the C:\winpe_x86 folder that you can double-click to start the Windows Disc Image Burner, as illustrated in Figure 21-4. Note that not all computers now come with DVD writing drives; you might need to obtain a USB-attached disc burner.

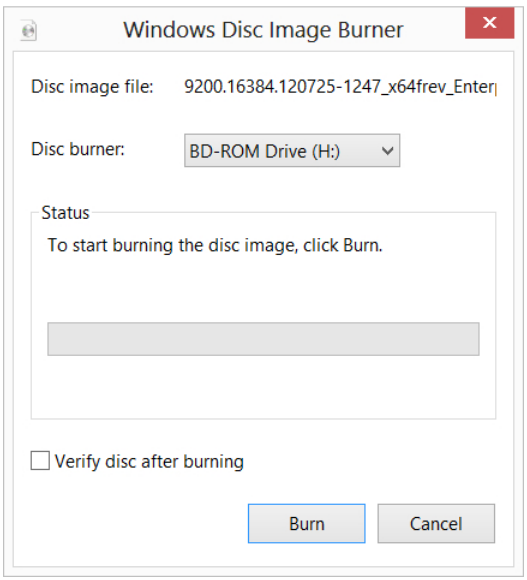

Figure 21-4 Burning a disc image in Windows 8

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> **Note**
>
> **You only ever need to create a single WinPE startup disc (and disc image). You can use the same disc to install a slipstreamed version of Windows 8 on any computer.**

Step 2: Installing a Fresh Copy of Windows 8

1. Using your Windows 8 installation DVD, install a fresh copy of Windows 8 onto a spare hard disk or partition. Use the version for which you want to create the slipstreamed disc; that is Home Premium, Professional, Enterprise, and so on.

2. When Windows 8 is installed and the dialog box asking for your user name and password appears, press Ctrl+Shift+F3.

3. The system restarts in audit mode. Do not close the System Preparation Tool window that appears (see Figure 21-5); you will need it later.

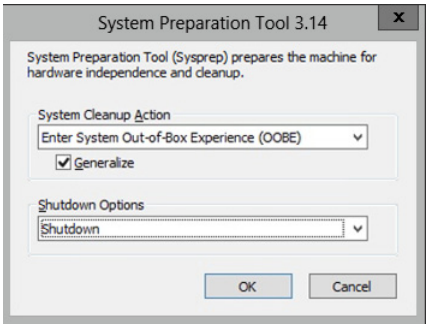

Figure 21-5 The System Preparation Tool in Windows 8

4. Install the appropriate service pack.

   You can either download the service pack or install it from a CD, network, or USB pen drive.

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5. Windows might restart during the service pack installation. If the Windows 8 password screen appears again, press Ctrl+Shift+F3 again to re-enter Audit Mode.

INSIDE OUT

Performing other actions in Audit Mode

You can also perform other actions in Audit Mode, such as installing software, changing Windows settings, or installing device drivers. Be careful when installing drivers if you intend to use this new install image to install Windows on a different computer than the one on which you are creating the image, because the hardware will likely be different. Also take care when installing software; you must leave enough space for the final disc image to fit on a single blank DVD or USB Flash Drive.

6. In the System Preparation Tool dialog box, on the System Cleanup Action menu, select Enter System Out-Of-Box Experience (OOBE), and then select the Generalize check box, as demonstrated in Figure 21-6.

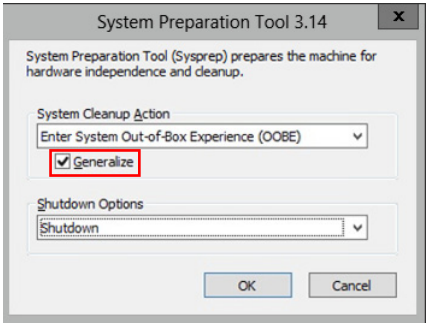

Figure 21-6 Locking Windows 8 by using the System Preparation Tool

7. Place the WinPE startup disc in the CD/DVD drive. In the System Preparation Tool dialog box, on the Shutdown Option menu, click Restart and then click OK when you are ready to create the new Windows image.

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Step 3: Creating a New Windows Image File

1. After you follow the previous procedure, the system starts in the WinPE environment, and a command prompt window appears.

   Noting the following substitution guidelines, type **E:\imagex /compress fast /check /flags "Pro" /capture D: E:\install.wim "Windows 8 Pro" "Windows 8 Pro Custom"** at the command prompt.

   - If necessary, substitute the name of your Windows 8 edition for Pro in the command.
   - Substitute the drive letters of the disks on which you have the second copy of Windows 8 installed and the disk where you want WinPE to store the new Windows 8 Image file. The file will be approximately 2 to 2.5 GB.

Step 4: Creating a New Windows 8 Installation DVD

1. Use ISO creation software to make an ISO file from your original Windows 8 installation DVD (see the following Inside Out sidebar for more information about where you can get this).

2. Using the same ISO creation software, locate the newly created *install.wim* file you created in the previous procedure and add it to the disc image file, overwriting the one that exists there in the \sources\ folder. Double-click the image to burn it to the DVD by using the Windows Disc Image Burner.

INSIDE OUT

Extracting a Windows 8 DVD to your hard disk

Depending on what ISO creation software you are using, you might need to extract the contents of the installation DVD to your hard disk and then add the new *install.wim* file to it there. To reburn your image to a disc, you might need a Microsoft bootable disc image.

To mount a disk image in Windows 8, double-click or right-click it, and then on the options panel that appears, select Mount. Here you can view its contents in File Explorer, as shown in Figure 21-7.

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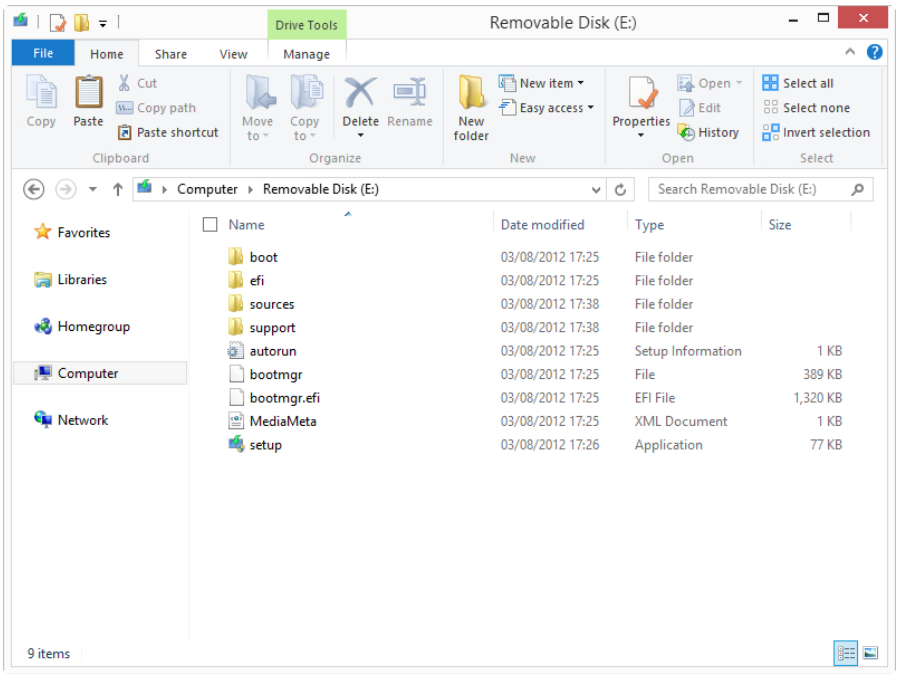

Figure 21-7 Extracting a Windows 8 Image in Windows 8

You will also need DVD-burning software such as Nero (*www.nero.com*) or Roxio (*www.roxio.com*) to burn this new replacement Windows 8 install disc. In Nero, use options for "No Emulation", Load segment of Sectors as "07C0", and Number of Loaded sectors as "4".

Tip

You can delete the second copy of Windows 8 once you are done with the procedures, although I always recommend testing the install disc before deleting anything that's taken a long time to install and configure.

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Third-Party Slipstreaming Software

Third-party solutions are available for slipstreaming Windows service packs, such as RT7Lite for Windows 8, which can be updated to support Windows 8. These third-party programs can simplify the Windows 8 service pack slipstreaming process and can also offer support for creating discs that will install into any edition of Windows 8.

When software becomes available to make slipstreaming Windows 8 service packs simple, I will announce it on my website, *www.theLongClimb.com*.

Summary

Windows 8 is extremely complex and so is the process of slipstreaming and integrating a service pack into your installation ISO file or DVD. In this chapter, I detailed the entire process, but you will no doubt find that third-party utilities exist that automate the process for you, and given the complexity of the task, this is certainly what I would recommend.

It is also common for people to look at the WinSXS folder and wonder why they need a folder full of what looks like 7 GB of temporary files. Believe me, they're not temporary; in fact, they're essential to keeping Windows 8 running smoothly.

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CHAPTER 22

Utilizing Remote Help

Using the Internet to Find Solutions to Problems. 401
Windows Remote Desktop 406
Windows Remote Assistance 410
The Problem Steps Recorder. 415

THE CONCEPT OF GETTING REMOTE HELP with computers has been around for many years; it has been integrated directly into the Windows client since Windows XP. In this chapter, I'll cover how you can quickly find solutions yourself and how you can easily get help from other people over a broadband connection.

Using the Internet to Find Solutions to Problems

You're never alone as long as you have an Internet connection. Whatever problem you face with your computer, you're almost certainly not the first person to encounter it. A great many websites exist to help with computer problems, and technical experts can be very generous about the sharing solutions to problems they've encountered.

I would go so far as to say an Internet search should always be your first step toward correcting a problem. It certainly always is with me, and you might be surprised at just how quickly and easily you can find the answer to any problem you're facing.

The major search engines, including Bing, Google, and Yahoo!, are extremely good at recognizing search queries and providing relevant results. Searching for "network driver for dell laptop," for instance, brings up an entire page of results, all offering appropriate drivers to download.

Sometimes, however, your search entry is more imprecise and returns too many results. This means that you might not immediately find the information you need. In these instances, there are some simple search techniques you can use in all the major search engines to improve the return results.

- **Searching "in quotes"** Putting text into double quotes (as in "dynamode BT878a") is a useful way to ensure that the search engine treats the text inside the quotes as a string and not as separate words.

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- **Adding a plus (+) or minus (–) sign** Adding a plus (+) or minus (–) before a word or phrase ensures that term either definitely is or is not in the search results. For instance, if you are searching for a driver for specific hardware but you don't want search results advertising the item, adding –shop could help filter consumer sites from the search results.

- **AND, OR, and NOT** Use terms in search entries to further tailor your results (although I find the plus [+] and minus [–] signs easier to use). For example, if you are looking for a driver and know the name of your hardware but not the name of the generic driver you need, you might search for connexant OR dynamode BT878a driver (where BT878a is the name of your hardware). Adding the qualifiers linked with OR narrows the search more than just searching for BT878a.

Of course, you first need to know what to search for when trying to find a solution to a problem. Try to pick up clues from the information provided by antivirus or anti-malware software, the Windows event log, or a Windows or other software error message. If you notice a code or the name of a program, virus, or service, write it down right away. You never know when that on-screen message might disappear accidentally or otherwise.

Try not to use irrelevant words in your search terms; keep things short and to the point. If your search item includes characters such as periods or forward slashes (common in virus names), enclose the term in quotes, for example "Win32.Gattman.A".

Finally, use plus (+) signs before specific terms to ensure that they appear in the search results. For example, the search **phrase +"win32.Gattman.A" +"windows 8" +remove** provides only results that include the terms win32.Gattman.A, Windows 8, and remove.

Where Else to Get Help

Plenty of websites provide excellent help and support, including Microsoft sites, and you might be surprised at just how good these sites are and how quickly people can answer your questions.

Microsoft's main support website, found at *support.microsoft.com*, features a huge amount of help and support in an easy-to-navigate interface, which is shown in Figure 22-1.

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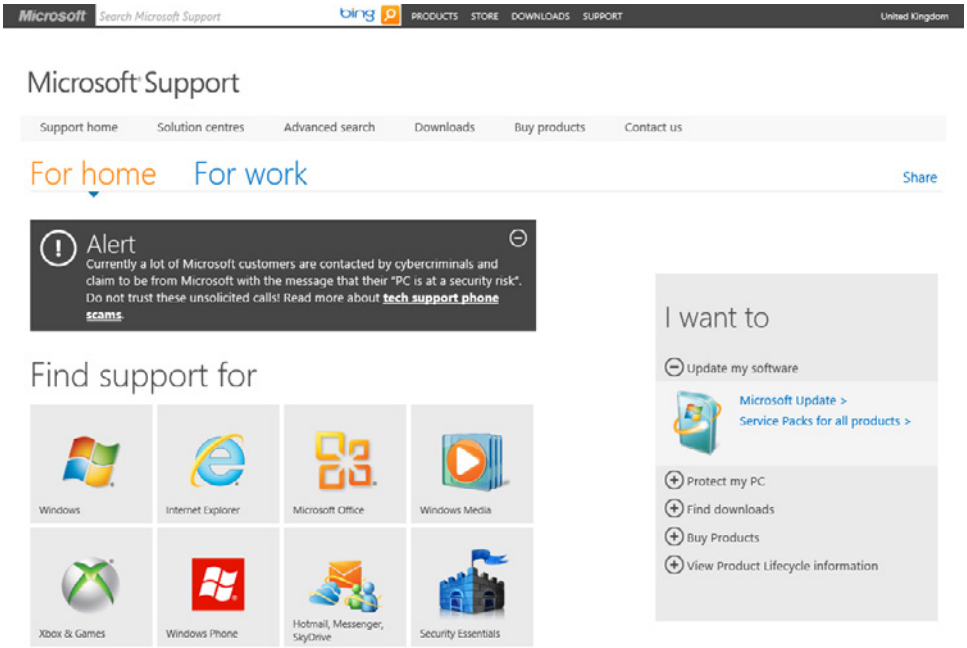

Figure 22-1 The Microsoft Support website

You can customize the Microsoft support center depending on whether you are a home user, an IT professional, or a developer. There are also advanced search tools.

The Microsoft Windows 8 Solution Center presented in Figure 22-2 is easily accessed through the Microsoft Support website by clicking the Find Support For Windows link. It contains a whole host of Windows 8 problems and solutions, all helpfully categorized and written in simple language.

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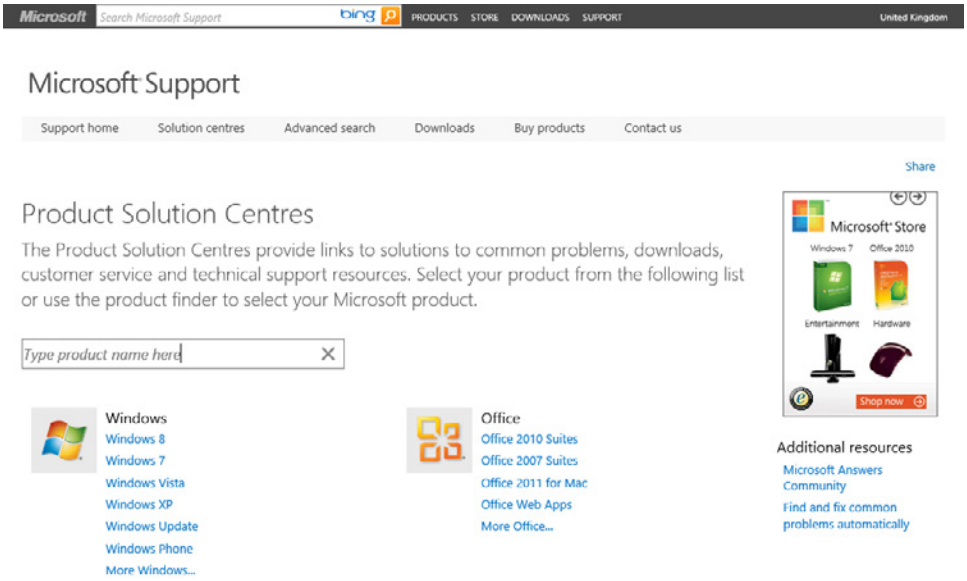

Figure 22-2 The Microsoft Product Solution Center

Also available through the Microsoft Support website is Microsoft Answers (see Figure 22-3). This is an advanced forums tool with which experts can help you find the answers to the problems you have. This site will only grow over time and already contains a vast array of knowledge, all presented in a helpful and friendly way. You can access Microsoft Answers directly at *answers.microsoft.com*.

Figure 22-3 The Microsoft Answers website

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For advanced users, there's also Microsoft TechNet, accessed at *technet.microsoft.com* (see Figure 22-4). Here, you can get advanced help in real time from experts and other users on every aspect of every Microsoft product. You might be surprised at how quickly people will reply to your questions here, too.

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Subscribing to Microsoft TechNet

If you subscribe to Microsoft TechNet, in addition to evaluation copies of Microsoft software and operating systems, you get access to online training courses and forums that are open only to other technical professionals. You can subscribe to Microsoft TechNet at *http://technet.microsoft.com/en-us/subscriptions*.

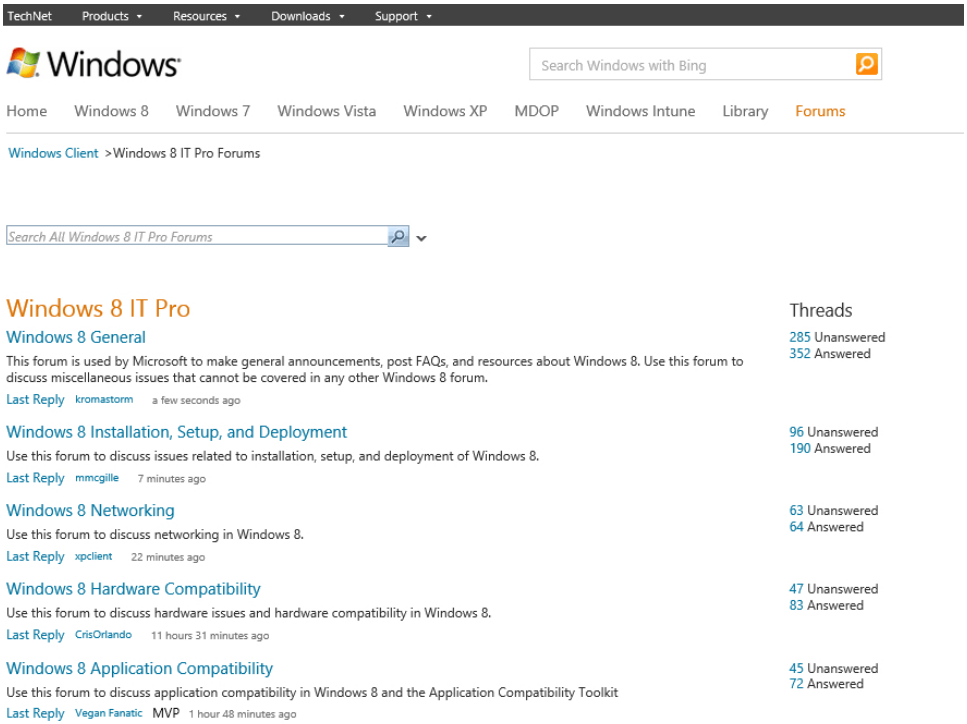

Figure 22-4 Microsoft TechNet

Third-party hardware and software manufacturers almost always host help forums on their own websites, as well. These sites are, if nothing else, a good way to reduce a company's support costs by helping customers to help one another. These manufacturers also have

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their own experts available to help with problems, and a great many companies offer email and technical support, too.

You can find other online forums and articles containing help and advice. The best ones are always free; I don't suggest that you pay to join a help forum. You will need to decide for yourself how valuable a particular website or service is.

I talk more about these forums and websites in Chapter 23, "Finding More Help and Support."

Windows Remote Desktop

If your computer is in a corporate environment, your IT helpdesk might be able to use Windows Remote Desktop (see Figure 22-5) or a similar system to gain access to your computer. You might consider it slightly disconcerting to see your computer being remotely manipulated, but this is a good way for an organization to provide support and reduce overall costs. Before beginning a remote help session, ensure that your computer is on. If you want to set up a remote desktop connection to another computer, on the Start screen, search for **remote**.

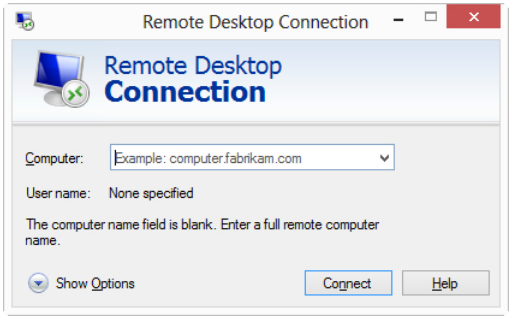

Figure 22-5 The new Remote Desktop App

INSIDE OUT

Third-party firewalls and remote help

Third-party firewalls and even a badly configured Windows Firewall can block Remote Desktop or Windows Remote Assistance attempts to connect to your computer. You can temporarily disable the firewall to allow connection if required. If you are using the Windows 8 built-in firewall, it is already correctly configured for remote help and you won't need to do anything at all.

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You might want to connect to software that's stored and run from a local or remote server. To do this, open the Start screen, search for **remoteapp**, and then in the search results, click to open the Access Remote App And Desktops dialog box, as shown in Figure 22-6.

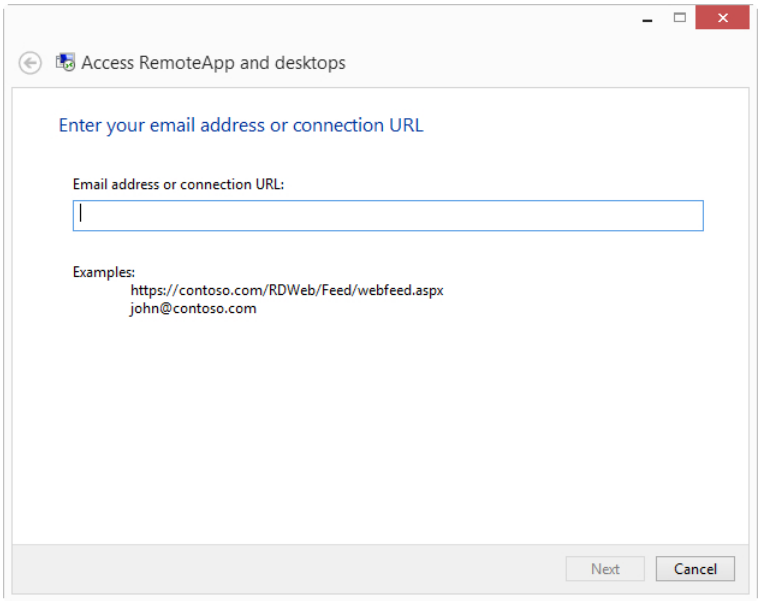

Figure 22-6 The Access RemoteApp And Desktops dialog box

The computer to which you want to connect must be on your network or virtual private network (VPN), and you will need to know its name on the system to connect. Some organizations use Remote Desktop across the Internet to provide support for customers, although others might use Remote Assistance (see "Windows Remote Assistance" later in this chapter).

The target computer also needs to be configured to receive Remote Desktop connections. To access these settings, in the Control Panel, click System And Security, click System, and then click the Advanced System Settings link. In the dialog box that opens, click the Remote tab to set the options to allow remote connections, as illustrated in Figure 22-7.

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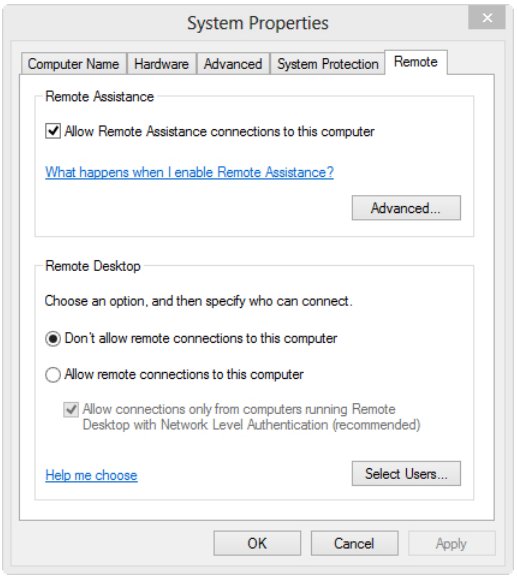

Figure 22-7 Advanced system settings for remote connections

You might need to allow Remote Desktop through your firewall; however, if you are using the default Windows Firewall, Windows 8 will normally take care of this for you. To access Windows Firewall settings, in the Control Panel, click System And Security and then click Windows Firewall. Click Allow An App Or Feature Through Windows Firewall to allow Remote Desktop, as depicted in Figure 22-8.

If Remote Desktop is unable to verify the identity of the computer when you try to connect to a remote computer, a warning will appear, as shown in Figure 22-9. This will happen if Windows suspects that connecting to this device could pose a security risk to your system.

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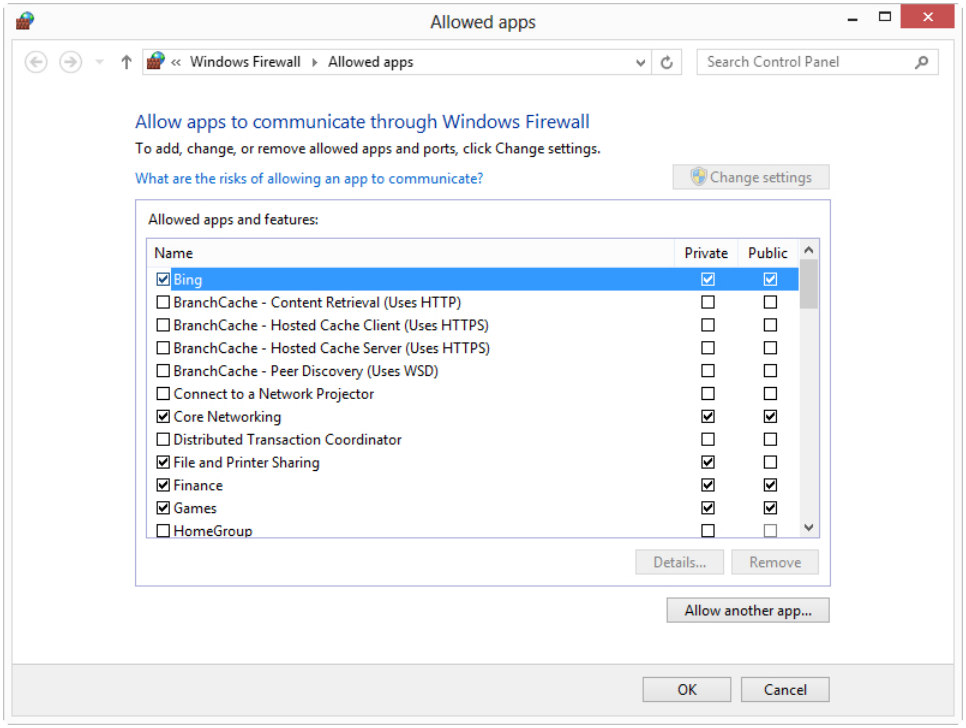

Figure 22-8 Allowing Remote Desktop through Windows Firewall

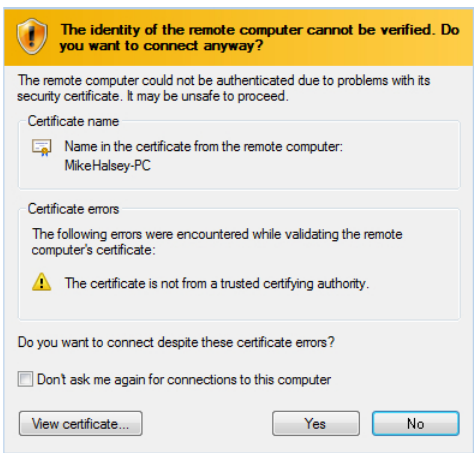

Figure 22-9 Windows displays an alert to potential security threats when using Remote Desktop

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Once connected, the person who initiated the Remote Desktop connection has access to your computer to remotely diagnose any problems, but different levels of access might be required to perform some specific tasks.

> **Note**
>
> **By default, most routers allow a Remote Desktop connection across the Internet but you might also need to configure your router's network address translation (NAT) settings when using Remote Desktop on internal networks. If you cannot connect, however, you might need to log on to your router and change certain router settings such as opening a connection port or permitting Remote Desktop. You should consult your router manual or Help document for details on how to do this.**

Windows Remote Assistance

Although Remote Desktop is helpful and common in organizations in which the computers are owned by the employer and people do not keep personal files and data on them, home users need something that can provide more control over what a remote user can access.

Windows Remote Assistance addresses this issue by enabling the user receiving the support to monitor exactly what's being done throughout the remote help session. Remote Assistance also provides controls to enable a user to regain full control of the computer and terminate the remote connection at any time.

Remote Assistance is intended for use over the Internet; you will need a broadband connection that's not busy with other activities (such as downloading files).

> **Note**
>
> **The computer offering the remote assistance does not need to be running Windows 8. It could be running an older version of Windows that supports this feature.**

1. To access Remote Assistance, open the Start screen, search for **remote**, and then from the settings results, select Invite Someone To Connect To Your PC And Help, Or Offer To Help Someone Else.

2. When Windows Remote Assistance opens, you can select either Invite Someone You Trust To Help You or Help Someone Who Has Invited You, as illustrated in Figure 22-10. Click the second option to help someone if you received an invitation through Easy Connect.

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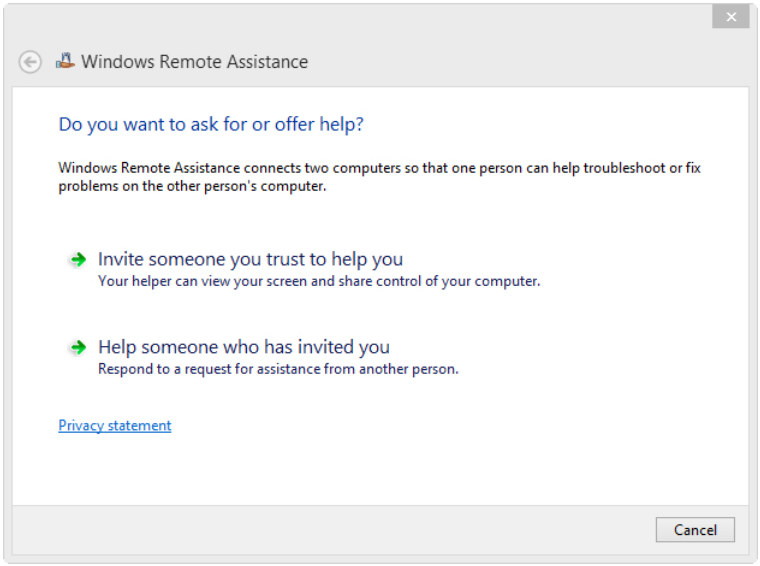

Figure 22-10 The main Windows Remote Assistance screen

INSIDE OUT

Remote Assistance via Easy Connect

You can use Easy Connect to connect two computers running Windows 8 by using Remote Assistance without the need to send an invitation file. This might not always be available depending on whether your router supports the Peer Name Resolution Protocol.

Easy Connect is a very useful and easy way to connect two computers for remote assistance and is worth trying to see if you can get it to work. It uses a secure peer-to-peer network managed by Microsoft to handle the connection.

3. If you are requesting assistance, you will need to indicate how to send a remote assistance invitation (see Figure 22-11). This will commonly be sent via email. If you have an email program installed on your computer such as Windows Live Mail or Microsoft Office Outlook, click Use E-Mail To Send An Invitation. Otherwise, click Save This Invitation As A File and then send it via webmail. Alternatively, you can click Use Easy Connect. (See the Inside Out sidebar "Remote Assistance via Easy Connect.")

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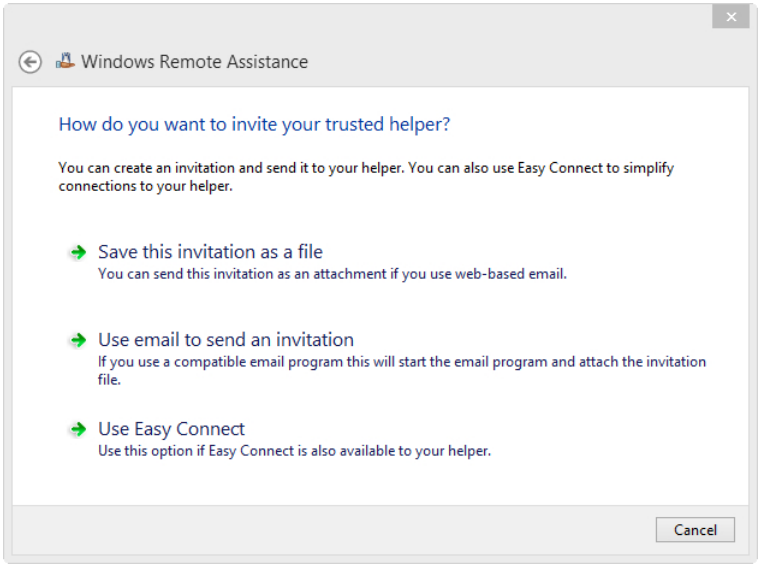

Figure 22-11 The invitation options in Remote Assistance

4. You are now given a password. If you are using Easy Connect, give the password to the person providing the support (see Figure 22-12). Otherwise, email the invitation file that's been saved to your computer.

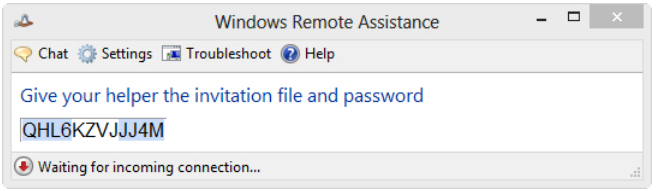

Figure 22-12 The Remote Assistance Password dialog box

5. If you are the person providing the support, either enter the password in the dialog box that appears on your screen or after you have opened the invitation file you received (see Figure 22-13). The individual who is providing the assistance does not need to be using Windows 8; they can be using Windows 7 or Windows Vista.

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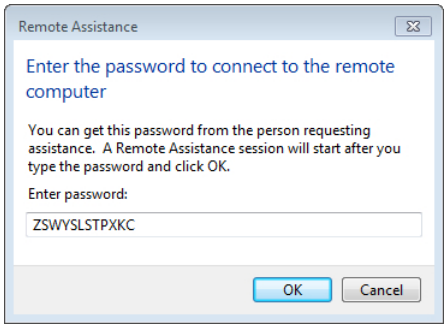

Figure 22-13 Entering a password to gain remote access

6. If you are the person receiving the support, in the dialog box that appears (see Figure 22-14), allow the person providing the support to access to your computer by clicking the Yes button.

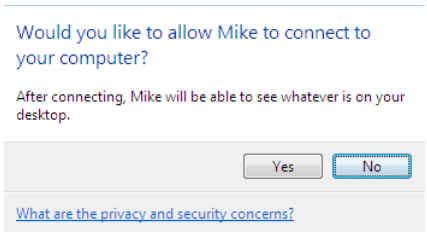

Figure 22-14 The person receiving the request must grant permission

At this point, the person providing the support can look at what's happening on the other computer but cannot control it by default. This can be a useful security feature and handy when you just want to show someone what's happening on your computer.

7. If you are providing support, in the Windows Remote Assistance console, click Request Control, as shown in Figure 22-15.

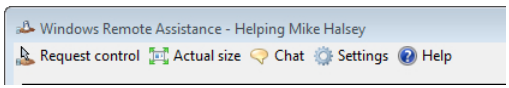

Figure 22-15 The Windows Remote Assistance control toolbar

If you are receiving support, do not be too alarmed about someone taking control of your computer, because you will be able to see at every stage what is going on, see Figure 22-16.

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> **Note**
>
> **In the Remote Desktop settings, you can also set the software to break the connection instantly when you press the Esc key on your keyboard.**

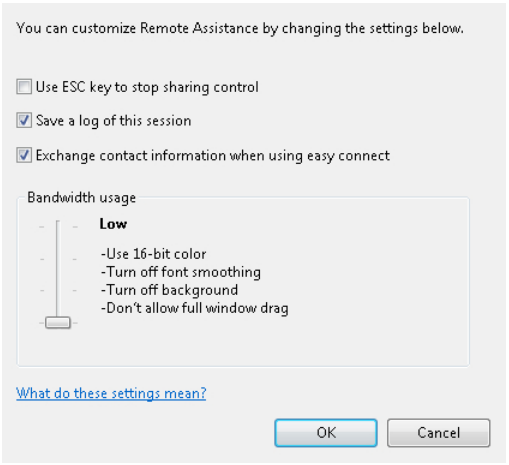

Figure 22-16 Modifying transmission settings to reduce bandwidth

When someone requests control of a remote computer, a dialog box appears requesting confirmation that this is allowed. If you allow the access, you should also select the check box allowing the help provider to respond to User Account Control (UAC) security prompts (see Figure 22-17). This will mean that the person supplying remote support will have full control of your computer to repair it. If you do not select this option, you will need to respond to the UAC prompts yourself. This is a more secure approach and can be used if you do not completely trust the person providing the support, but it can also slow the process and you will need to remain at your computer throughout the entire session.

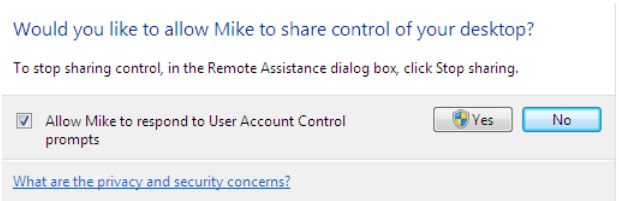

Figure 22-17 Granting permission for a remote person to control your computer

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The Problem Steps Recorder

The Problem Steps Recorder feature was introduced in the Windows 8 beta so that technical beta testers could more effectively report problems to the OS development team at Microsoft. It was so well received that Microsoft kept it in the final release of the OS. This is a hidden feature, which you can access on the Start screen by searching for **PSR**.

This tool records actions on your screen at key points (such as when you click something or an error appears), saving each event as a screenshot. You can click Add Comment on the Problem Steps Recorder to annotate the screenshots and give more information, as shown in Figure 22-18.

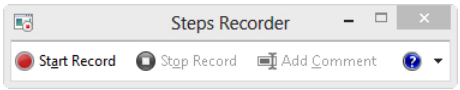

Figure 22-18 The Problem Steps Recorder

When you stop the recording, the Problem Steps Recorder saves all of the information it captured, complete with additional details about your computer and what software was running at the time, as a zip file that can be sent via email to a support person. This zip file contains a document that is viewable in any web browser (see Figures 22-19 through 22-21).

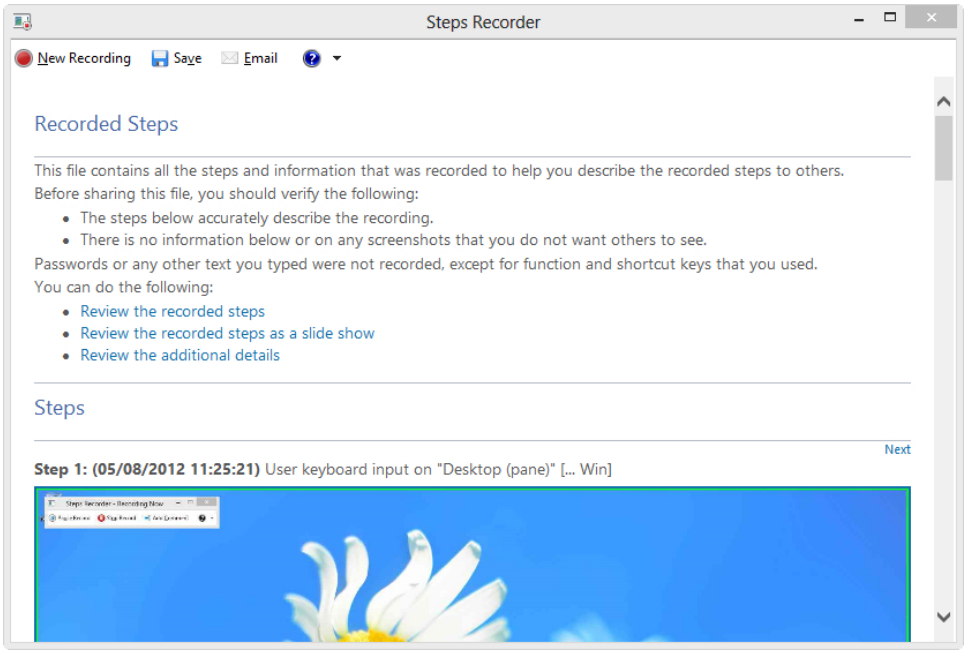

Figure 22-19 The Problem Steps Recorder information file (1 of 3)

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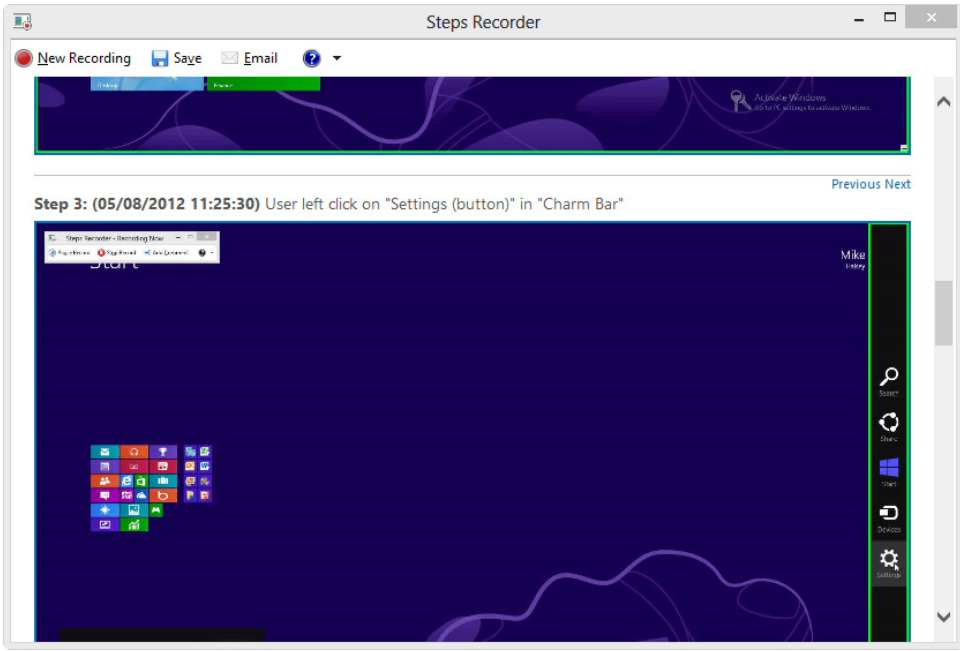

Figure 22-20 The Problem Steps Recorder information file (2 of 3)

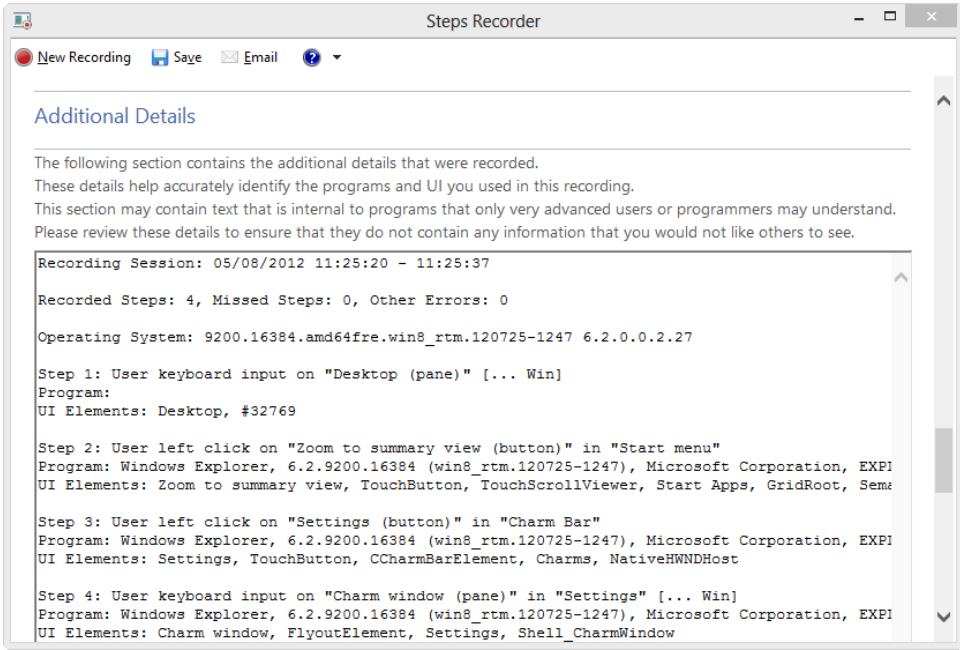

Figure 22-21 The Problem Steps Recorder information file (3 of 3)

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INSIDE OUT

The Problem Steps Recorder and the Windows 8 interface

As shown in Figure 22-20, the Problem Steps Recorder annotates all the screenshots to show what you were clicking when an event occurred, but it does not annotate individual screen items in the Windows 8 interface.

What it does do, however, at the bottom of the report is provide a text description of everything that was clicked, so you can refer to this if you are not sure what was clicked on the screen.

Summary

The remote help and assistance options in Windows 8 are excellent, and in the case of Remote Desktop, much simpler to use than in previous Windows versions.

I cannot stress enough, however, that your first port of call should always be an Internet search. You would be amazed how often a solution to a problem can be found in less than a minute.

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CHAPTER 23

Finding More Help and Support

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Mike Halsey's Help and Support Sites. 422
Windows Help. 424
Third-Party Software 424

Microsoft Windows is used by hundreds of millions of people around the world, so you can be reasonably certain that if you encounter a particular problem, you probably won't be the first person to have done so, at least not unless you're an early adopter of technology or are using software that's only just been released.

Under the hood, Windows 8 is extremely similar to Windows Vista, Windows 7, and Windows Server editions since 2003, and these operating systems share many features, components, and error codes.

There's an enormous ecosystem of help and support for Windows 8, as well, and this started building from the beginning of 2012 with technical community leaders, Microsoft Most Valuable Professional (MVP) awardees (including myself), enthusiasts, and bloggers, all asking and answering questions online.

Use the Internet First!

I want to start with searching online, because this should always be your first port of call. A quick search in Bing or Google can often reveal the solution to a problem or, at the very least, confirmation that other people are facing it, as well. Why is this comfort? Well it can be confirmation that what you're facing is a bug rather than an error. In these circumstances—and especially with new software—there's usually little you can do about it but keep an eye on the forums. This where people will very often post fixes as soon as they are found; these can be valuable sources of information.

So which are the best websites to visit? I will detail some of them in the following sections.

Microsoft Support

Support.Microsoft.com

This is the official technical support website for Microsoft. You will find that it is neatly arranged and organized by product and category. This is the oracle for Microsoft products

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and the repository of all knowledge (allegedly including the answer to the ultimate question of life, the universe, and everything: 42).

Here you will find not just help and support articles but tutorials on how to perform huge varieties of tasks in Windows, such as automating command and PowerShell scripts, using the Windows 8 deployment tools, and much more in addition.

The downside with the Microsoft Support site is that it is written by Microsoft staff. You do occasionally have MVPs contribute and indeed some of my own videos have appeared on this site, but for a lay person, the information here can be very dry and sometimes difficult to understand.

Microsoft Answers

Answers.Microsoft.com

This is where the relatively new Microsoft Answers site comes in. This site has replaced Microsoft's help and support forums; it is here that anybody can post questions and answers for the worldwide community.

One of the best features of the Microsoft Answers website is that you can choose from many different languages, and although the volume of support can change from language to language, this can be a great help for non-English speakers in getting needed help and support.

Microsoft Technet

Technet.Microsoft.com

The TechNet support site is used more by IT professionals, but it does contain technical forums to which you can post questions, and even answers. You don't need to be a TechNet subscriber either to use the forums and the knowledgebase.

If you have more technical questions about subjects including deployment, AppLocker, group policy, or other subjects more commonly found in enterprise environments, TechNet is a great port of call.

Bing.com/Google.com

www.bing.com/www.google.com

Search engines are possibly the best troubleshooting tool at your disposal. A search online for the problem or error can reveal the answer many more times than you might expect.

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Tom's Hardware

www.tomshardware.com

Tom's Hardware is a long-standing website devoted to hardware and hardware problems. This site includes extensive forums containing an enormous wealth of information, and experts are always available to help diagnose and fix difficult problems.

Tech PC Forums

www.tech-pc.com

Tech PC Forums is a forum website that contains an abundance of indispensable information. Experts are available to answer your questions and help solve your computer-related problems.

Computing.net

www.computing.net

This site is run by the people behind Tom's Hardware. Computing.net is an excellent resource for help with complex and difficult computer problems.

How-To Geek

www.howtogeek.com

How-To Geek helps you perform a wide variety of tasks in Windows and other operating systems and software packages. Many tasks help resolve computer issues and problems.

Annoyances.org

www.annoyances.org

This is the accompanying website to the *Annoyances* book series by David A. Karp (O'Reilly Media). It's an excellent archive of problems that you can search through to find solutions to common Windows problems.

Gibson Research

www.grc.com

Steve Gibson is a well-respected IT security expert. On the Gibson Research website, he provides many tools to help diagnose and repair security flaws in your installation of Windows.

www.it-ebooks.info

ATI Support

support.amd.com

Graphics card problems are common with Windows. Fortunately, there are only two major manufacturers providing the core hardware for graphics card technology, so help is centralized. You can find support for an ATI-based graphics card at the ATI support website.

NVIDIA Support

www.nvidia.com/page/support.html

Similar to the ATI support page, the NVIDIA support website is the place to visit if you have an NVIDIA-based graphics card in your computer.

MSDN Diagnostics

msdn.microsoft.com/en-us/library/ee663269(v=VS.85).aspx

The Microsoft MSDN site offers an extensive section for diagnosing and troubleshooting Windows 8. This includes the Windows Troubleshooting Platform (WTP) with which system administrators can write custom troubleshooting packs.

Mike Halsey's Help and Support Sites

I provide help and support in a variety of places online and you can contact me through these websites or post questions. I maintain an open mailbag and try to answer as many questions as I can.

Facebook

www.facebook.com/HalseyMike

This account is not hidden, so if you have a Facebook account, you will be able to find it simply by typing in the address above. My Facebook page is very active and this is where the bulk of help and support activities take place.

Twitter

www.twitter.com/HalseyMike

Some people prefer not to use Facebook, so I am also on Twitter, and you can tweet or message me here with your questions.

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The Long Climb

www.thelongclimb.com

The Long Climb is my own website (see Figure 23-1). I offer computer support and updates on security and other issues with Windows and Windows-based computers. I also offer specific help and advice, adding to and extending the content of this book during the lifetime of Windows 8. I can also be contacted through this website with any questions that you might have.

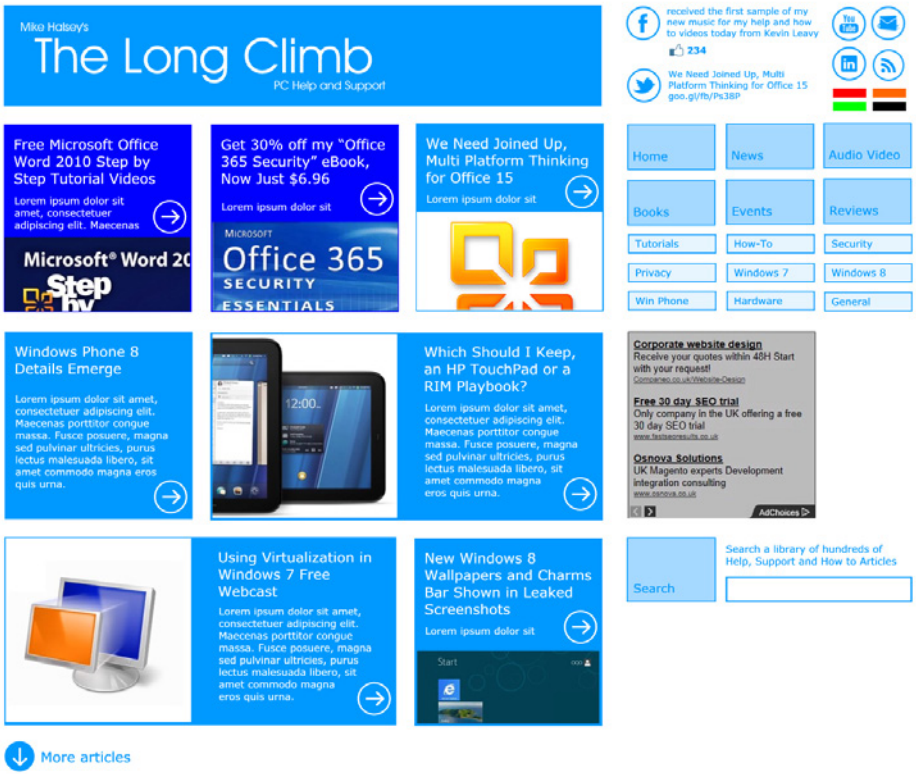

Figure 23-1 *TheLongClimb.com*, my own PC help and support website

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YouTube

www.youtube.com/thelongclimb

I make many Help and How-To videos, which are all available on my website, but they are also available on my YouTube channel.

O'Reilly Webcasts (including Mike Halsey's webcasts)

www.oreilly.com/webcasts

O'Reilly has a great many free and extremely useful webcasts every month covering a wide variety of subjects. I present a monthly webcast on the *first Thursday of every month* on subjects including Windows 8 and troubleshooting.

Windows Help

You can access Windows Help at any time by pressing F1 on your keyboard (only from the desktop, this doesn't work in the Windows 8 interface). You might be wondering why I haven't mentioned Windows Help before this chapter. The reason is that the Help system in Windows is more of a basic manual than anything else. It can be useful for guiding you through unfamiliar features, but it is not exhaustive. There are other resources you can use for assistance, which I cover in this chapter.

Third-Party Software

You can download many different utilities, some free of charge and others for a fee, that can help solve problems on your computer. Some of these are more helpful than others. You will need to decide for yourself about the value of individual software packages, but I recommend the following programs.

SiSoftware Sandra Utilities

www.sisoftware.net

SiSoftware Sandra is an excellent information and diagnostic tool. This package produces extremely detailed reports about every aspect of your computer, including hardware, drivers, and installed software, which can help enormously when diagnosing computer-related problems.

You can use SiSoftware Sandra tools to create diagnostic reports on the current health and status of your computer. These can be very useful if you need to send reports to third parties for diagnosis.

www.it-ebooks.info

AIDA 64

www.aida64.com

An alternative to Sandra is the also excellent Aida64. Using this program, you can benchmark your computer as well as monitor its health and perform diagnostics.

As with SiSoftware Sandra tools, you can create diagnostic reports of your computer simply and easily with Aida64.

Windows Sysinternals

technet.microsoft.com/en-US/sysinternals

Windows Sysinternals is a suite of tools and applications from Microsoft that help you manage, troubleshoot, and diagnose your Windows systems and applications. These extensive tools provide tremendous amounts of detailed data about your computer when troubleshooting problems. However, some of these tools are quite complex and are designed for experienced computer users.

GoToAssist

www.gotoassist.com

GoToAssist is software that performs the same functions as Windows Remote Desktop and Windows Remote Assistance but offers a few additional functions for serious technical support. Most notably, you can use it to restart the remote computer (which can be essential when performing some support functions) and it runs on and from Apple Mac computers, as well.

SpinRite

www.grc.com

Another program that is held in extremely high regard by many computer professionals is SpinRite from computer-security specialist Steve Gibson. This tool runs from a disk or USB flash drive and checks your hard disk for errors, physical or otherwise, that are causing malfunctions and/or data loss and then helps to repair the problems. I describe SpinRite in more detail in Chapter 30, "Using Third-Party Rescue Tools and Services." It is an extremely useful piece of software.

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Windows Memory Diagnostic

oca.microsoft.com/en/windiag.asp

The Installation DVD for Windows 7 contained a memory diagnostic tool, but this has been removed in Windows 8. Microsoft does provide this as a download, however, which can be useful if you suspect there is a memory fault with your computer.

Symantec Ghost

www.ghost.com

Symantec Ghost is one of two packages on this list that create system images of Windows. Although this functionality is already built in to Windows 8, these programs offer additional backup and restore functionality for people who work in a corporate environment.

Acronis True Image

www.acronis.com

Acronis True Image is another system image backup-and-restore application. This package is useful for business scenarios in which you need more control over Windows 8 system images than is available through the Microsoft Windows Image Backup that ships as part of Windows 7.

Paragon Partition Manager

www.paragon-software.com

Sometimes, you need a tool to manage the partitions on your hard disks. Windows 8 includes a partitioning tool, but it's not especially powerful. Paragon Partition Manager can make working with partitions much simpler.

Acronis Disk Director Suite

www.acronis.com

Acronis Disk Director is another partitioning management package that makes working with and managing partitions on your hard disks much simpler.

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Summary

There are a vast number of places online where you can get help and support, usually for free; it's worth asking friends and colleagues where they find help. I'd also recommend avoiding websites that charge for it (notable exceptions being subscriptions to Microsoft TechNet).

The sites and software I've mentioned here are extremely comprehensive and trustworthy. You will probably find most of the answers you need on these sites, but remember, you can also use the help and support on my own website, *www.theLongClimb.com*, and there are more links at the back of this book, in the "About the Author" section.

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CHAPTER 24

Diagnosing Hardware Problems

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Jump-Starting Your Computer 446

IT'S NOT JUST SOFTWARE AND DRIVERS that can cause problems with your computer. Your hardware could cause issues, as well. In this chapter, I'll talk you through the different types of computer hardware and show you how you can diagnose and repair problems with it.

Computer Hardware Guide

A computer is a collection of many assorted parts, each with its own foibles and individual characteristics. Each of these parts works together in an interdependent way.

Desktop Computer Case

The base unit on a computer is the main case that contains all of the parts that make a computer work. In a laptop, notebook, or even an all-in-one desktop, all of these parts are inside the same case as the monitor because there's only a single unit. With a standard desktop computer, however, the base unit is the large case that sometimes rests on your desk or, more commonly, on the floor. Figure 24-1 shows all of the relevant parts of the computer on the front and back of the desktop case.

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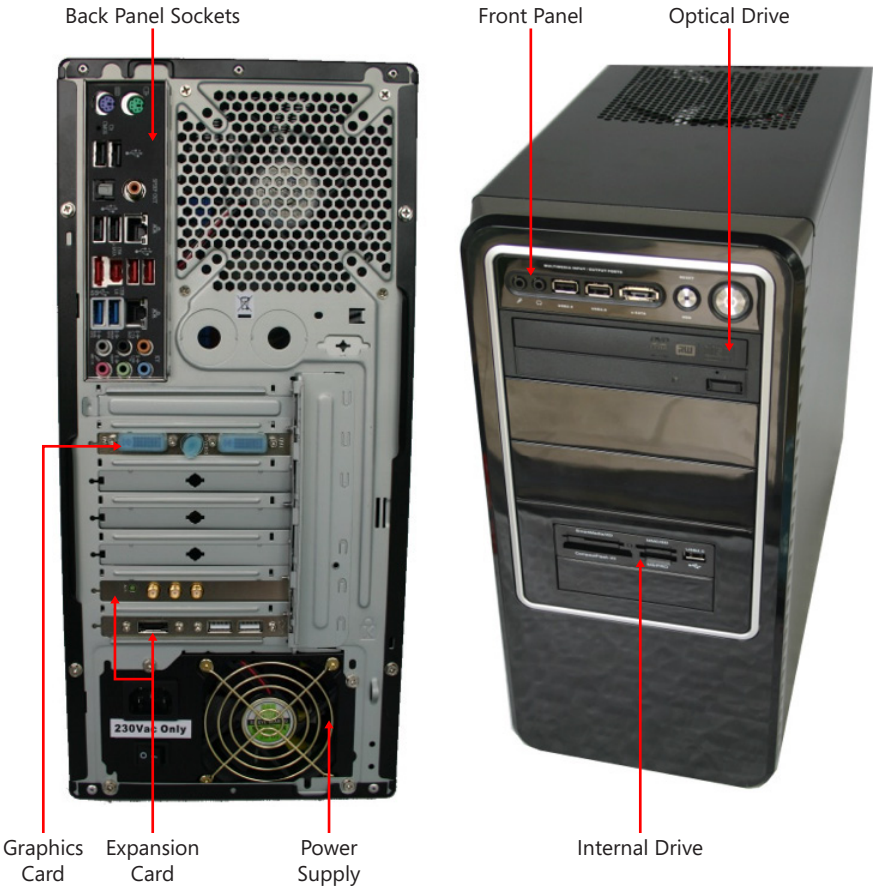

Figure 24-1 A typical desktop computer case

Power Supply

The power supply is probably the part of the computer most prone to failure. Figure 24-1 shows that the power supply is where you plug your computer in to the main electrical supply. It regulates and distributes the power going into the computer and extra components, and it is one of only a few components within the computer to have a fan to keep it cool. Fortunately, the power supply is very simple to replace if it does fail.

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Motherboard

The motherboard is the substrate of the computer. This is the board to which all other components are plugged in or attached, as demonstrated in Figure 24-2.

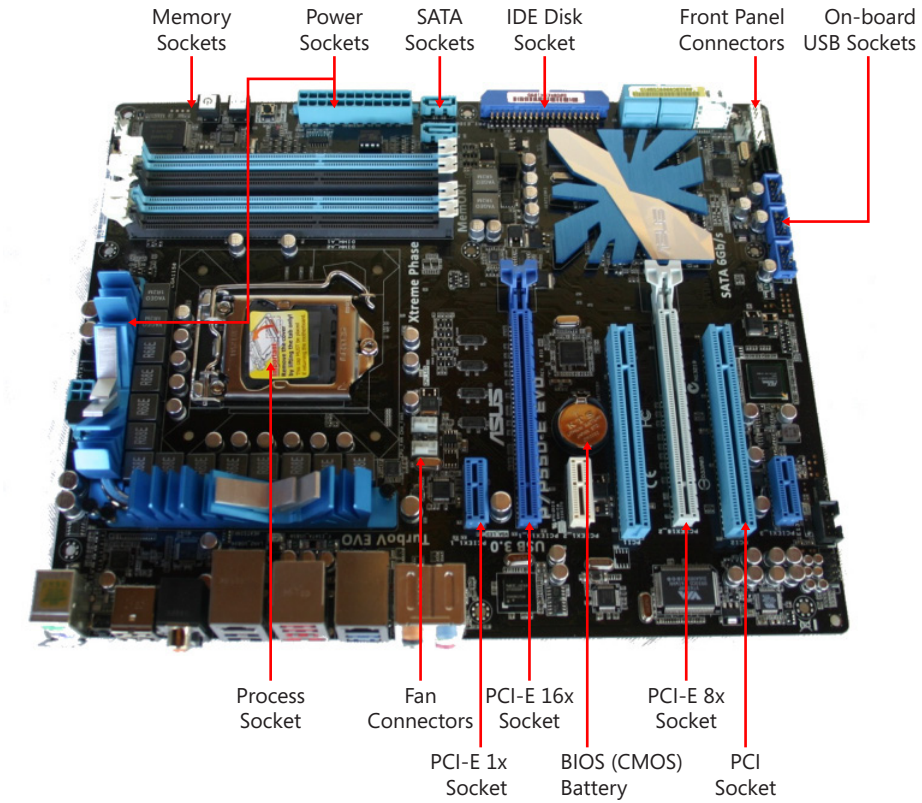

Figure 24-2 A typical computer motherboard

As you might expect, the motherboard is the component located at the very bottom of your computer and is the most difficult to remove if something goes wrong with it.

The back-panel connectors on the motherboard shown in Figure 24-1 and Figure 24-3 are where you plug in additional accessories, such as your keyboard and mouse, speakers, and any USB accessories.

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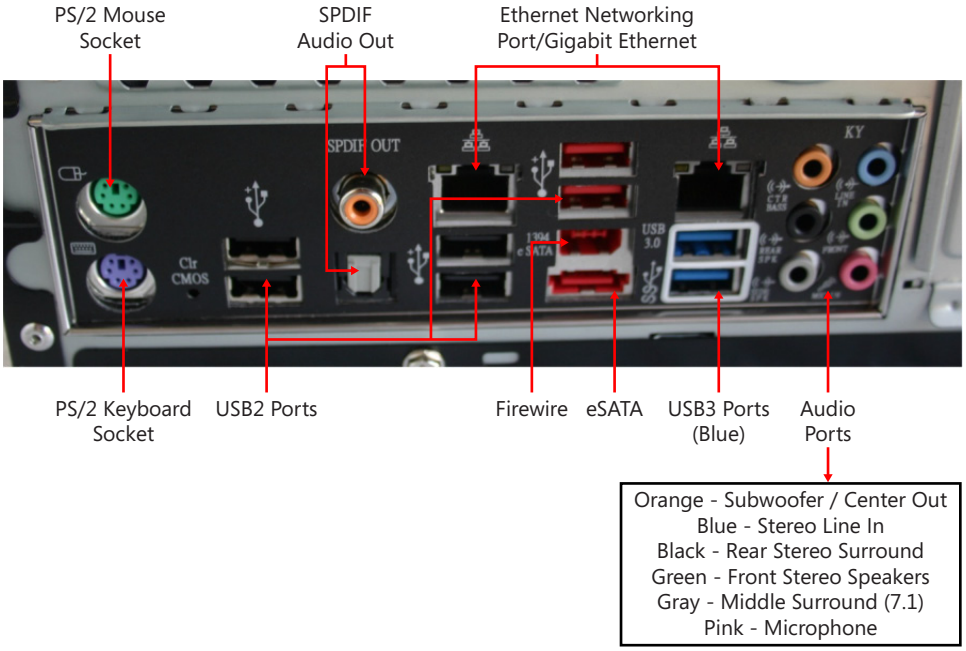

Figure 24-3 The back-panel connectors on a motherboard

Processor

The processor (also known as the central processor unit or CPU) is the brain of the computer (see Figure 24-4); it's the chip that does all the computational work. The processor is quite fragile and needs to be handled with care.

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Figure 24-4 A typical CPU without its heat sink

The processor fits into a socket on the motherboard and requires a heat sink and, often today, a fan to keep it cool. When installing a processor, ensure that you use plenty of silicon paste between it and the heat sink to prevent overheating and cracking.

Memory

Memory in your computer (not to be confused with the hard disk) is where Windows loads files while it works with them (see Figure 24-5). It's a temporary store, and files are wiped from memory when the device is turned off.

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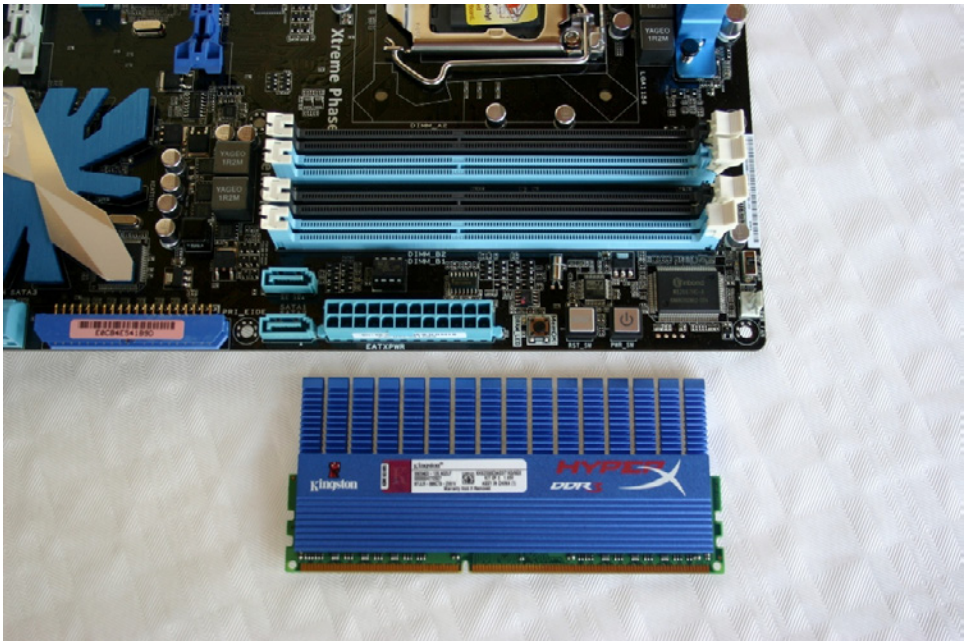

Figure 24-5 Computer memory

Hard Disk

The hard disk(s) in your computer is the physical storage device on which Windows 8 and your files reside. Different types of hard disks have different connectors. Figure 24-6 shows a small, 2.5-inch hard disk (which is the smallest of the three, on the left side of the image) and two standard 3.5-inch hard disks. All three have SATA (Serial ATA) connectors. Older IDE (Integrated Drive Electronics) drives have a long connector with many pins for data and a smaller connector with large pins for power.

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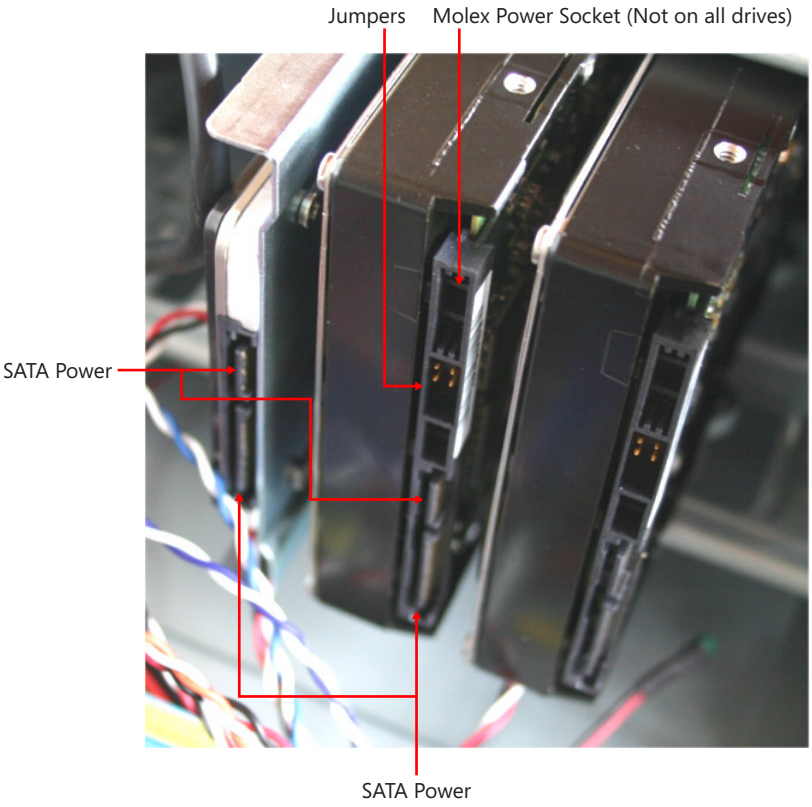

Figure 24-6 Hard disk and optical disk connectors

Optical Drive

The optical drive is the CD/DVD or Blu-ray drive on your computer. An optical drive connects to the motherboard by using either the SATA or IDE connectors, as described for hard disks.

Graphics Card

Your computer probably does not include a separate graphics card if the graphics technology is built in to the motherboard or, as is the case with the newest processors, built in to the processor itself. If you do have a separate graphics card, it might look similar to the one shown in Figure 24-7.

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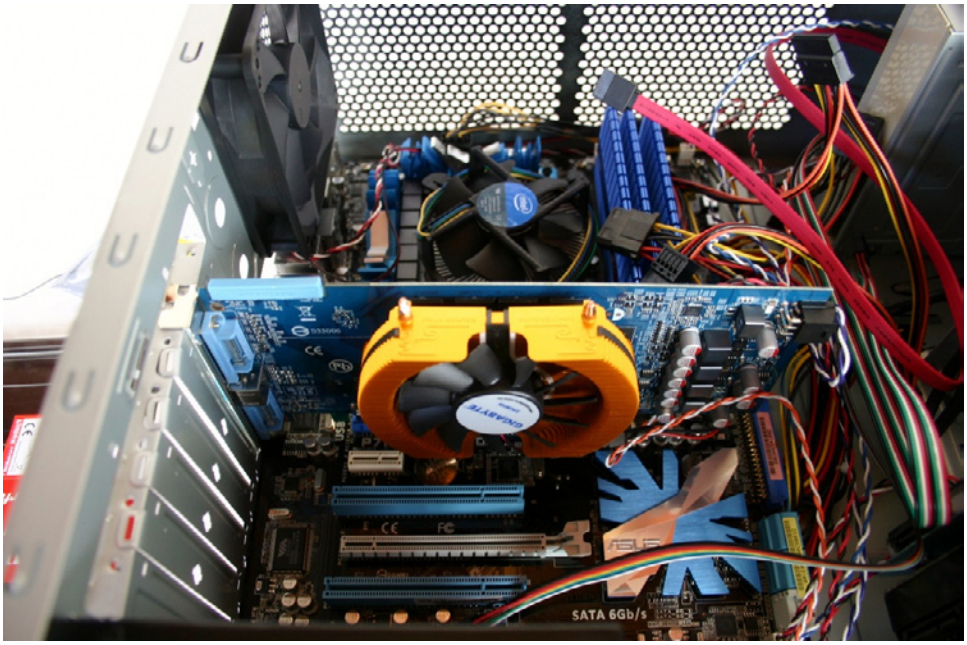

Figure 24-7 A graphics card

This component connects to the monitor and manages what is displayed on the screen.

Expansion Cards

Expansion cards plug into your computer like graphics cards but likely use a different socket (see Figure 24-2). Expansion cards can do anything from connecting to the Internet, to providing more USB ports, to acting as a television tuner.

CAUTION!

Always ensure that your computer is disconnected from the electrical outlet before you work inside the case. This will avoid risk of electrical shock to yourself as well risk of electrical damage to the components, many of which are fragile.

Fans

Your computer has several fans to keep it cool: one or more in the power supply, one on the processor, one on the graphics card, perhaps one on the motherboard, and one or more in the case itself. Fans are important for keeping the components at acceptable

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temperature levels because some components can heat up to temperatures near 100 degrees Celsius. It's a good idea to ensure that these fans are clean and operational. If any are rattling, they might need to be replaced.

Keyboards and Mice

Keyboards and mice don't normally malfunction, but the keyboard will occasionally need to be cleaned, especially if you eat or drink around your computer (which of course, I strongly discourage). I don't recommend washing a keyboard, however. Normally, light vacuuming (on a low setting) and a wipe will do the job.

If you have a ball-mouse, the rollers that the ball runs up against can become clogged with dust and debris from your desk. You can remove the ball by removing a small panel on the underside of the mouse and give the rollers a good cleanout.

Laptops, Netbooks, and All-in-One Devices

In a laptop, netbook, or all-in-one devices, things are slightly different from a standard computer in that all of the components and hardware are integrated in a single, compact case that has removable panels on the underside, as demonstrated in Figure 24-8.

Figure 24-8 The underside of a typical laptop computer

Although there are not many user-serviceable components inside a laptop, those that are can usually be detached simply by removing a few screws. In Figures 24-9 through 24-11, you can see how the optical drive, hard disk, and memory can be replaced quite easily in a laptop after unscrewing the removable panels on the underside of the case.

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Figure 24-9 Removing the optical drive from a laptop computer

Figure 24-10 Removing the hard disk from a laptop computer

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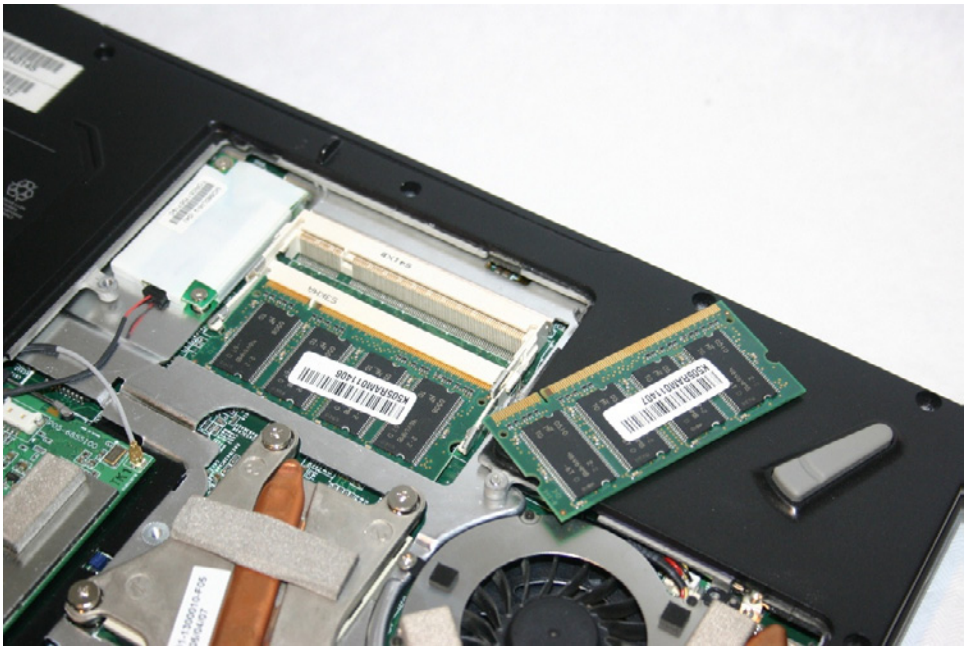

Figure 24-11 Changing the memory cards in a laptop computer

CAUTION

Always ensure that the laptop is not plugged in to an electrical outlet and that you have removed the battery before opening the case. This will avoid risk of electrical shock to you as well risk of causing electrical damage to any components.

Tablets and Ultrabooks

You should consider Windows 8 tablets and ultrabooks to be non-serviceable by the user. These are very thin and light computers, and all of the internal components, the memory, storage, motherboard, and so on, are usually custom-fit items. This means that even if you want to swap in a different or upgraded component there's a good chance that it simply won't fit.

The cases for these computers are also only designed to be disassembled by authorized service personnel and, as the components inside a tablet or an ultrabook are so tightly squeezed into the case, you face the risk that if you open it, you might not be able to close it again.

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All you can really do with a tablet or an ultrabook is, as with an all-in-one device, put a vacuum to the exhaust vents and clean out any residual dust that could cause the computer to overheat.

Safe Working

Many of the components on a motherboard, processor, or memory can be measured in nanometers; they're absolutely tiny and quite susceptible to even tiny voltages of human-transmitted static electricity. To work safely with a computer, follow these guidelines.

1. Make certain that the computer is turned off and unplugged from the electrical outlet.
2. If the computer is a laptop or netbook, remove the battery.
3. Ensure that you are wearing an antistatic wristband, similar to that shown in Figure 24-12. Remove the side or back panel and attach the clip on the wristband to the metal frame of the case. This can be difficult with a laptop, but be absolutely sure that you do not clip the wristband to any operational components.

Figure 24-12 An antistatic wristband

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4. For a desktop computer, touch unpainted metal inside the case with your finger.
5. While still touching the case, pull the power lead out of the back.

You can now work safely with your computer.

INSIDE OUT

Other things to be careful for when working with a computer

Try to avoid working on a computer in a room with thick or nylon carpet because these materials can cause electrostatic charges to build up. Also, always place the device on a flat and stable surface.

Skin is a natural insulator, if it is dry. This means your fingers can accumulate and store an electrostatic charge, so it is very important to discharge this from your fingers before picking up delicate components.

Is Everything Plugged In?

It's not uncommon for a connector in a computer to come loose. If you find, for instance, that the power button has stopped working, check to see if the front-panel connectors have come off their mountings. In the lower right of Figure 24-13, you can see the front panel connectors and connecting wires. Next to the front panel connectors are other connectors for USB and SATA devices. If you are experiencing issues, you can check this area to ensure that all of the cables are properly and securely plugged in.

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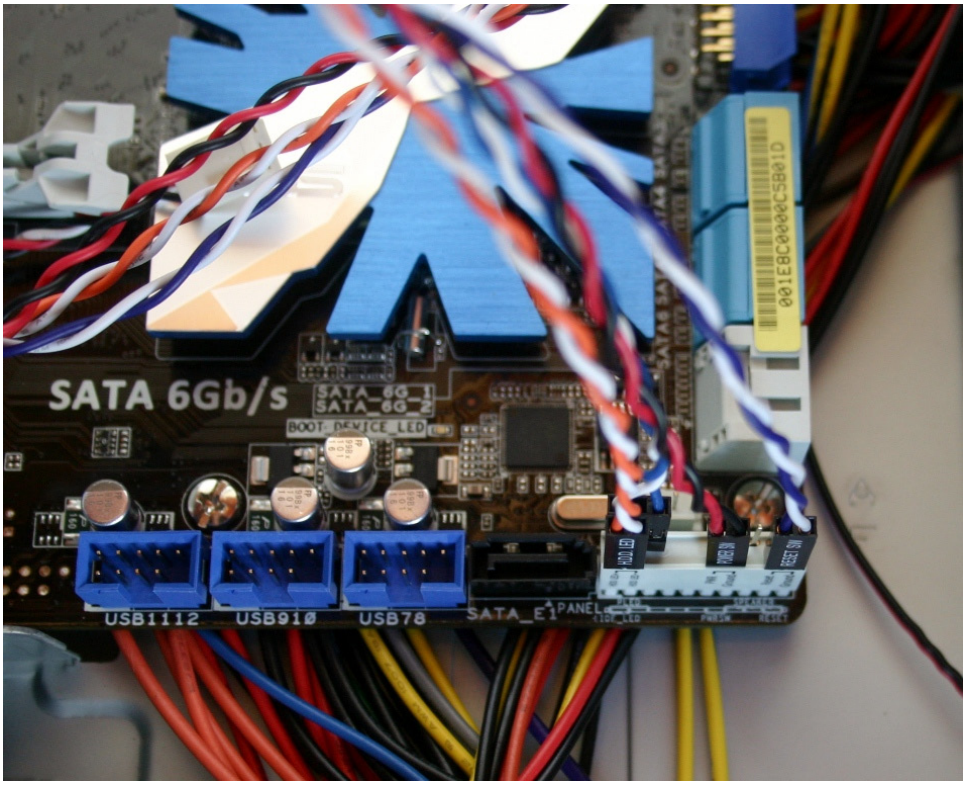

Figure 24-13 The front-panel motherboard connectors

Minimal-Hardware Boot

There are so many components inside a computer that it can sometimes be difficult to determine which one is causing a problem. If your computer won't start or is crashing regularly, the problem could be a hardware fault.

The best way to determine if you have a hardware fault is to perform a minimal-hardware boot. To do this, first remove all external devices from your computer, except for the mouse and keyboard. This includes USB-attached devices.

If your computer is still malfunctioning after you disconnect all of the external hardware, open the case and remove the following components.

- The optical drive
- Any hard disks except the one on which Windows 8 is installed

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- All but one of the memory cards
- Any expansion cards except the graphics card (if present)

By removing these components, you can start your computer with the minimum number of hardware components. If the computer is still malfunctioning, you can conclude that no external devices are causing the problem. Conversely, if the computer works properly, you can begin adding the components back one at a time, restarting and testing every time you reattach a component until the computer again fails to start. This process of elimination can help you diagnose and isolate the hardware component that is at fault.

If you perform a minimal boot and the computer still doesn't work, your task is harder because you cannot remove anything else except the graphics card, and you can do that only if your motherboard has onboard graphics. In this case, the first thing to do is to try each memory card in turn, turning off the computer to change the card and restarting it each time. This will establish whether you have a faulty memory card.

> **Note**
>
> **Sometimes changing graphics cards can result in a blank display if the currently set resolution of the replacement card is higher than your screen can support. When you are changing a graphics card or removing one for testing purposes to use the motherboard graphics chip instead, it's a good idea to first lower your screen resolution to 800 x 600 or 1024 x 768. To do this, right-click any blank area of the Windows 8 desktop, and then in the settings panel that appears, click Screen Resolution.**

If the problem persists, it can only be caused by one of four components: the power supply, the primary hard disk, the motherboard, or the processor. I'll cover how to jump-start your computer in the next section, which can help determine if you have a faulty power supply, but how do you check the other components?

You can check the hard disk by plugging it into another computer as an extra drive and seeing if any problems are transferred with it. Don't try to use it as the boot drive on this second device because the installed copy of Windows 8 won't have compatible hardware for the new computer, and Windows will fail to start.

If you determine that the hard disk is not the problem, the processor or the motherboard might be the culprit. Because you can't start the computer without either of these, you might consider consulting a technical professional. But before you do so, there are some other tricks that you can attempt first.

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Resetting the BIOS

Sometimes the computer's Basic Input Output System, or BIOS as it's commonly known, can become corrupt. This can cause Windows to fail to boot or malfunction when the operating system cannot properly communicate with your hardware. On these occasions, you can reset the BIOS to its default configuration.

The first and easiest way to reset the computer's BIOS is to access it by pressing Delete or F2 on your keyboard during startup and then restoring the default BIOS settings.

Your motherboard, on which the BIOS chip resides, has a CMOS battery and a BIOS/CMOS reset button or jumper. You can remove the battery for between 20 seconds and 2 minutes to reset the CMOS. To do so, perform the following procedure:

1. Place the computer on a level, firm surface and ensure that it is turned off and disconnected from the electrical outlet. Ground yourself by touching an unpainted area on the case, using an antistatic wristband if possible, and open the side of the computer to expose the motherboard.

2. Locate the battery on the motherboard (see Figure 24-14). It looks like a large watch battery (and, indeed, it is one). Unclip the battery to remove it from the motherboard.

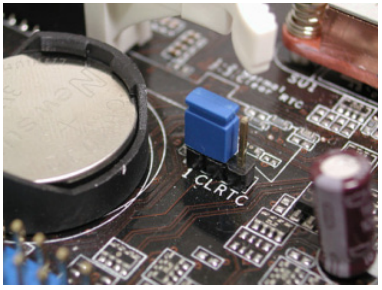

Figure 24-14 A clear CMOS motherboard jumper and battery

Also, in Figure 24-15, you can see a "Clear CMOS" jumper on the motherboard, close by to the battery (check the motherboard manual for the exact location for you computer). The jumper comprises three pins with a small connector covering two of them.

3. Remove the connector and move it to cover the center pin and the uncovered pin. You can use a small pair of tweezers to do this.

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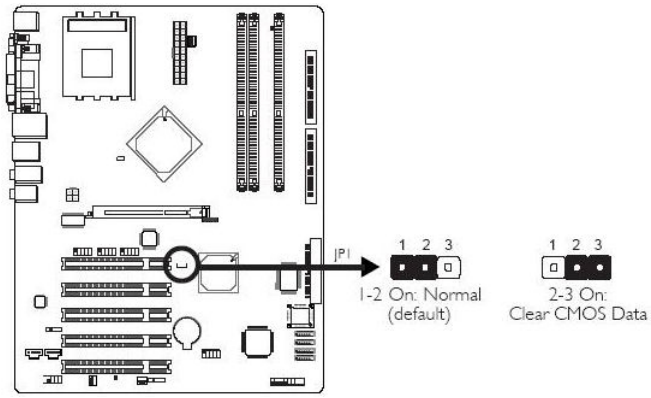

Figure 24-15 The clear CMOS jumper location on a typical motherboard

4. Leave the jumper as described in step 3 for 10 seconds and then move it back to its original position.

5. Replace the motherboard battery.

6. Reassemble the computer case and reconnect it to the main power supply.

On some motherboards, instead of a CMOS jumper, there is a small reset button on the back of the panel, as illustrated in Figure 24-16.

Figure 24-16 Some computers include a Clear CMOS button on the rear panel.

This button, which you can normally press with a paperclip, makes resetting the BIOS a much simpler task.

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INSIDE OUT **Updating the BIOS firmware**

If you find that you can't use new hardware with your computer, you might need to update your computer's BIOS to a newer version. To do this, check your motherboard manual or the support section of the manufacturer's website.

Jump-Starting Your Computer

If you suspect that the power supply has failed on your desktop computer, you can try to jump start it if you have another computer available. To do this, remove the two power connectors from the motherboard in both computers. Place the computers side by side and plug the power connectors from the working power supply into the motherboard in the non-working device. (If the cables aren't long enough. simply unscrew the working power supply, supporting it carefully, and place it in a secure position closer to the other computer.)

Next, try to start the non-working computer. If lights and fans activate on the motherboard, it is drawing power normally, and you can be certain that the power supply in your computer is not working.

Summary

The methods detailed here should help you to diagnose the vast majority of computer hardware problems. If you need to do anything beyond the diagnostics in this chapter, such as check voltages, you will need a multi-meter, and, to be honest, it's worth surrendering the computer to a specialist hardware engineer.

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CHAPTER 25

Troubleshooting a Windows 8 Installation

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A COMMON ASSUMPTION IS THAT PROBLEMS with Windows 8 only start long after you've installed it and are using it with multiple users, complex software packages, and excessive amounts of hardware. However, it's just as possible for a problem to occur when you first install it.

Problems and issues can be caused by anything from incompatibilities with operating systems from which you're trying to upgrade to specific issues that can be caused by the Windows installer that you might not be expecting.

In this chapter, I'm going to show you how to install Windows 8 and create custom install images in such a way as to avoid problems. I'm not going to focus on deployment from a Windows Server as System Center Configuration Manager is a very substantial subject in its own right for which separate books exist.

Troubleshooting Stand-Alone Installation Problems

If you're installing Windows 8 on your own computer for home or work use, you don't need things going wrong. Whether you're performing a clean install of an operating system (for which you need to then spend time reinstalling and reconfiguring your software) or performing an upgrade (which still takes time), the process can be quite stressful and fraught with anxiety, especially for less technical users.

In this section, I'm going to look at specific installation scenarios and guide you through what is and isn't possible with the operating system (OS).

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INSIDE OUT

Unplug all but your main hard disk when installing Windows 8

When Windows 8 is installed (and this also applies equally to Vista and Windows 7), it creates a separate boot partition called *System Reserved*. It places this on the primary hard disk in your computer.

This isn't determined by which hard disk you want to install Windows on to, but rather by the socket on your motherboard to which it's connected. The matter is further confused by mixing SATA and SATA600 hard disks.

If you have the System Reserved and Windows partitions on separate hard disks then you will never be able to remove the hard disk containing it without preventing Windows 8 from starting.

To guarantee that the Windows 8 installer places the System Reserved partition on the physical hard disk as your copy of Windows, it's best to either physically unplug all your other hard disks before installing the operating system, or for an all-in-one computer or workstation laptop, install Windows 8 onto Disc 0 (zero).

Upgrading from x86 (32-Bit) to x64 (64-Bit)

As has been the case with all 64-bit versions of Windows in the past, there's no in-place upgrade path from a 32-bit (x86) version of the OS to the 64-bit (x64) version of Windows 8, and attempting to do so will return an error, as demonstrated in Figure 25-1.

This does include upgrading from Windows XP, for which the 64-bit version of the operating system was withdrawn many years ago by Microsoft following poor driver support.

If you want to upgrade from a 32-bit operating system to the 64-bit version of Windows 8 you should ask the following two questions before doing so:

1. Will you benefit from installing it? If you do not have more than 4 GB of RAM (including your graphics memory) in your computer, there is no real benefit to be had.

2. Can you get 64-bit drivers for all your hardware? It is best to check on the manufacturer's websites before making the move.

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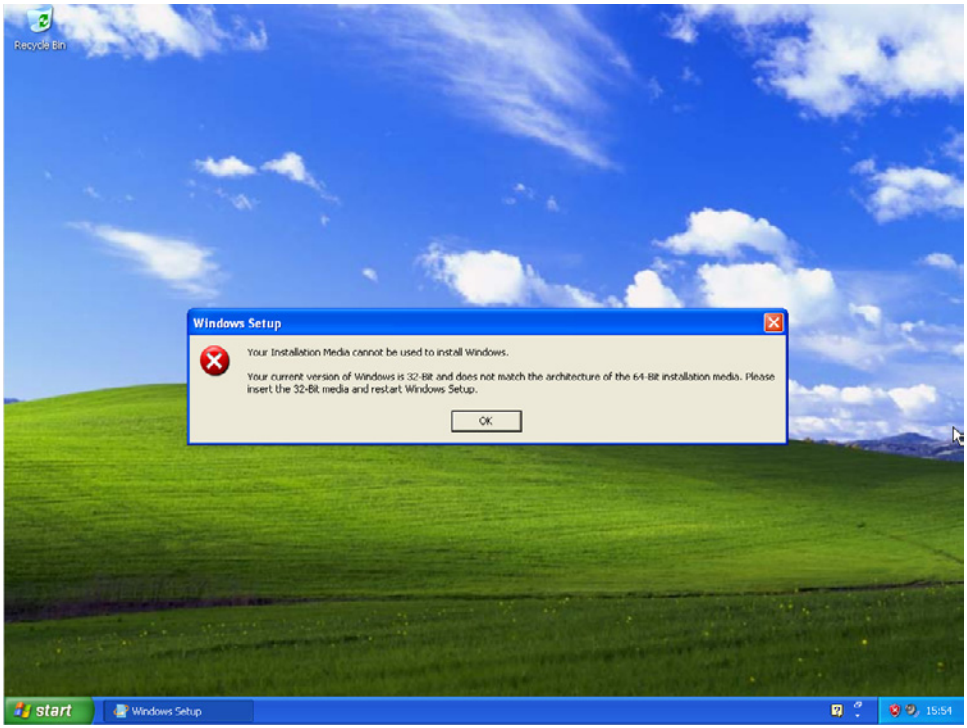

Figure 25-1 Installing a 64-bit OS over a 32-bit version returns an error

On this second point, you might think that the Windows 8 Upgrade Advisor can inform you if 64-bit drivers are available, but this isn't really correct. The reason for this is that 64-bit drivers and 32-bit drivers are completely different and can even be called by different names. Just because the upgrade advisor can check for new 32-bit drivers for your hardware, there is no guarantee it will be able to find updated 64-bit drivers, even if they exist.

Upgrading Windows XP to Windows 8

There is no upgrade path from Windows XP to Windows 8, although the options overall are slightly better than they were with Windows 7.

With Windows 7 you couldn't perform any kind of an upgrade from XP, but with Windows 8, Microsoft has written the installer in such a way as to allow it to keep your files and documents intact, and it will ask you if you want to keep your Personal Files intact early in the installation process, as shown in Figure 25-2.

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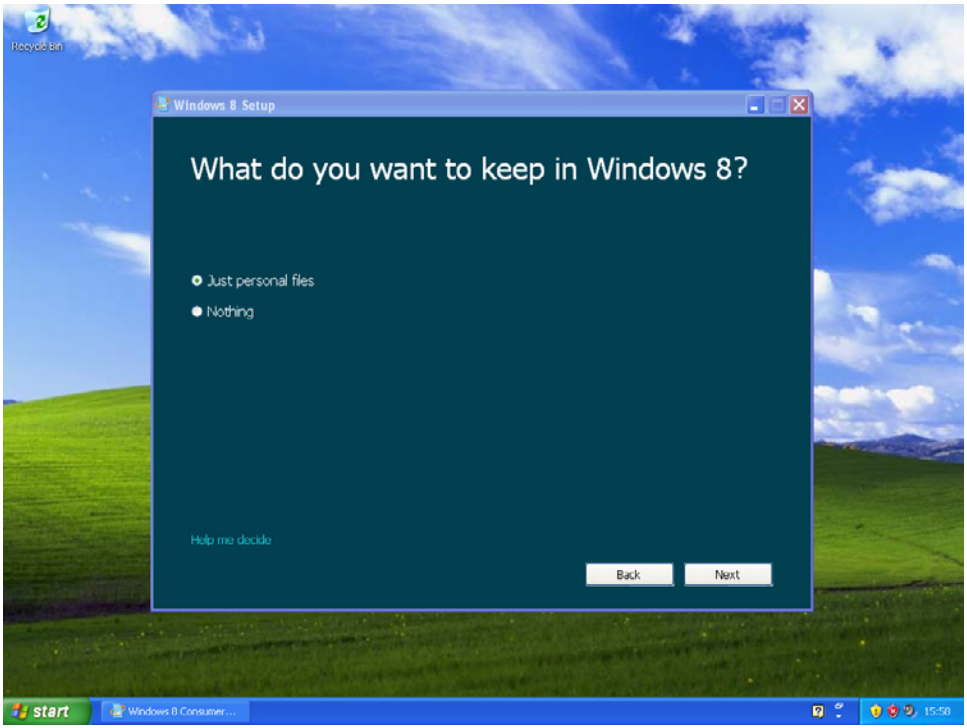

Figure 25-2 Upgrading from Windows XP

The reason you cannot upgrade anything else, especially your software from Windows XP, is because Microsoft changed the underlying code of Windows, and as such, programs run differently. This is the primary reason for software incompatibilities with XP software.

Because the changes are so pronounced, you will have to reinstall all your software after performing an upgrade to Windows 8. On the upside, because nothing is kept from your old copy of Windows except your files, there are no bugs and problems that can be carried forward to Windows 8.

Upgrading Windows Vista and Windows 7 to Windows 8

So, if Microsoft changed the underlying Windows codebase with Vista, it stands to reason that you can upgrade a Windows Vista installation directly to Windows 8 with everything in place…right? Uhhh…no, sorry: you can't (see Figure 25-3).

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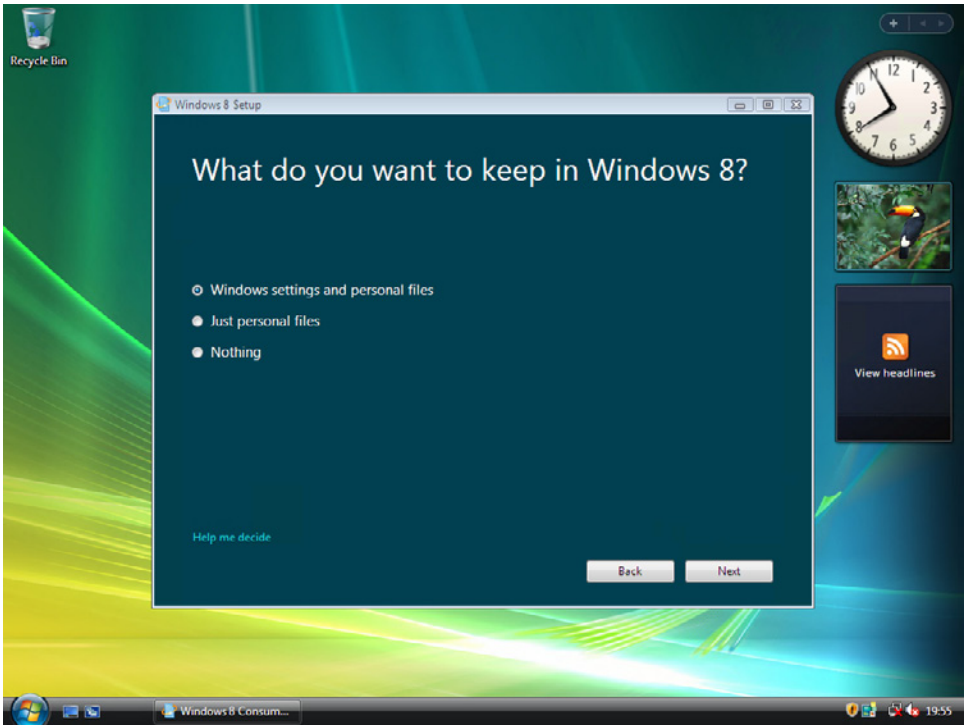

Figure 25-3 Upgrading to Windows 8 from Vista

The reason for this is that the underlying kernel was refined further with Windows 7 and has now been refined even more. Whereas Windows 7 could upgrade in-place from Vista, the differences between Vista and Windows 8 are simply too great.

The options then for upgrading from Windows Vista to Windows 8 are that you can keep your Windows settings, user accounts, and files, but not your installed programs. Personally in this circumstance I think it's far better to perform a clean install (ensuring that you have your files backed up somewhere safe, of course). If you have to reinstall your software from scratch, why risk the Windows installer carrying over problems from your old copy of Vista; it's much safer to format the hard disk and start again.

With Windows 7, the experience is better and you can perform a full in-place upgrade of all your programs, Windows settings, and files, as illustrated in Figure 25-4.

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Figure 25-4 Upgrading from Windows 7

Optimizing a System Image for Deployment on a Small Scale

In Chapter 21, "Demystifying Windows 8 Problems," I detail how you can create a custom installation image for Windows 8 that includes integrated, or *slipstreamed*, service packs. You can also use this technique to build custom install images, but first let's look at why you might want to do this.

Suppose, for example, that you always put a copy of Microsoft Office in your computer, along with the Adobe Flash Player, CCleaner, and other standard software. This is the sort of fare that's commonly found on computers. You can integrate all of these into an installation image and even change some system settings such as the virtual memory so that you don't have to do these again.

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So, what are the advantages and disadvantages of doing this? Certainly, when it comes to changing system settings, you can't change settings that are specific to user accounts. This is because you won't have any users configured in Windows 8 when you first install it, and any that you create afterward will always be configured with the default settings, anyway.

There is also the disadvantage that if you change settings, you'll probably find yourself checking what you did and didn't set after a while, anyway.

There is also the downside that new versions of software come along, and although some have updaters in Windows such as Adobe Flash, Acrobat Reader, and Java, others are manual downloads.

You can change these settings and create a custom Windows 8 installer, however, by following the instructions in Chapter 21, in the section "Creating a Slipstreamed Install DVD."

Changing the Computer Name After Deployment

Suppose that you have either created a custom Windows 8 installer for your computers or your computers are identical so that you have created a *System Image Backup* of one that you then intend to roll out to all the other computers in your office. After all, if all of the hardware is the same, you won't have any driver issues, and this is a very common and popular way for System Administrators to image multiple computers.

The first thing you will need to do is to change the computer name, especially if you are sharing files between computers on a network, but especially if the computer is part of a Windows Server network.

To do this, open the Start screen and search for **system**; it will appear in the Settings search results. On the System Properties panel that appears, in the left pane, click Advanced System Settings, and then in the System Properties dialog box that appears, click the Computer Name tab.

To change the computer name, click the Change button (see Figure 25-5) and then edit the name of the computer.

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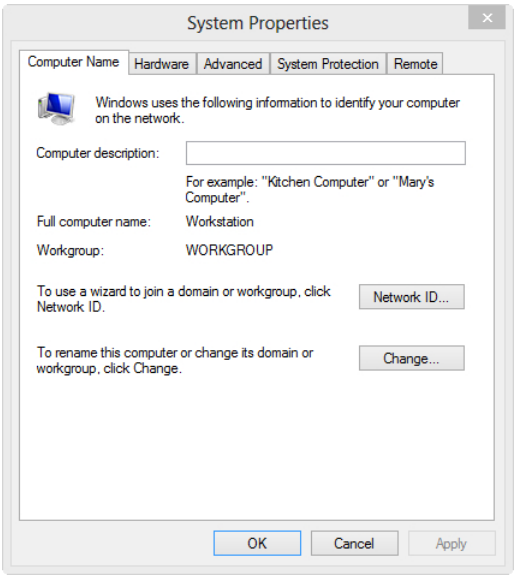

Figure 25-5 Changing the computer name

INSIDE OUT

What should you change the computer name to?

You will want to be able to clearly identify each computer on a network, and you might find that you use the asset tags provided with the computers when you bought them. If you do not use asset tags, find a unique identifier (desk numbers aren't reliable because computers tend to be moved around from time to time) but perhaps a code based on the department to which it belongs and a number that's assigned to a specific user or location.

Moving the System Reserved Partition

One of the biggest problems with installing Windows is when the System Reserved partition ends up on the wrong physical hard disk. I mentioned at the beginning of this chapter that the System Reserved partition is created by Windows 8 upon installation and that it contains the boot, rescue, and restore options for the OS.

By default, Windows 8 always puts this on Disc 0 (zero), even if a partition already exists there. Figure 25-6 illustrates a fairly typical twin–hard-disk structure. You have Disk 0 containing a partition for files and another for a Windows 8 image backup. The reason for

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doing this is that it keeps both the files and image safe in the event of a Windows 8 hard disk failure. On disk 1 you have your Windows 8 installation and a local backup of your files.

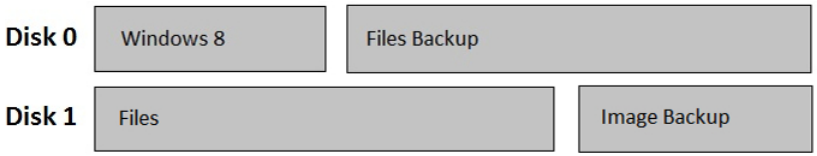

Figure 25-6 A twin–hard-disk system

The reason things worked out like this was that when you had Windows XP installed, the operating system was on Disk 0, but before wiping your Windows partition to perform a clean installation, you pulled the computer apart to give it a good clean, and good on your part for it.

Unfortunately, you didn't pay too much attention to what hard disk plugged into what SATA port on the motherboard, and why should you? Sadly this means that the Disk 0 assignment is now on the wrong drive because you swapped the disk cables inside the case, but you've not worried about this too much and you've installed Windows 8 anyway on what is now Disk 1.

So, you go to create a System Image Backup, but Windows informs you that you can't do this, first because you *must* include your Files partition and also because, as a result, your System Image Backup hard disk is nowhere near big enough.

The reason for this is that when you installed Windows 8, a System Reserved partition had to be created at the beginning of Disk 0. If this was empty space where Windows 8 was to be installed, the installer would have created a small partition just before a new one for Windows 8.

However, because Disk 0 already has partitions filling the hard disk, it can't do this. Instead, instead it places the System Reserved files on the first partition on Disk 0, which in this case contains all your files.

Now, you can't back up Windows without also being forced to back up your files, because the System Image Backup system *must* also back up the System Reserved partition. You don't want to do this because when you restore a backup, you'll restore earlier versions of all your files, as well, quite apart from the fact that you'll end up with an enormous image that'll take a couple of hours to create and restore.

What you need to do, therefore, is to move the System Reserved files to a new location. This is actually fairly straightforward, and they don't even need to be on the first partition on Disk 0 (they don't actually need to be on Disk 0 at all).

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This means that you don't need to reinstall everything (if you swapped the SATA cables over at this point to make the Windows drive Disk 0 it wouldn't boot anyway), so you can create a new System Reserved partition at the end of Disk 1.

To move your System Reserved partition files, perform the following procedure:

1. Press Windows logo key+X to open the Administration menu and then click Disk Management.
2. Right-click any partition on Disk 0, and then in the options panel that opens, click Shrink.
3. Shrink the volume by 400 MB (enter **400** into the Shrink By text box).
4. Right-click in the new empty space you have created and create a new Simple Disk, give this drive a drive letter (this is important), and format it as NTFS.
5. Press Windows logo key+X again, this time click Command Prompt (Admin).
6. Type **bcdboot *C:*\Windows /s *F:*** and press Enter, where *C:*\ is the location of your Windows installation and *F:* is the location of your new System Reserved partition.
7. Type **DISKPART** and press Enter.
8. Type **select volume F** and press Enter.
9. Type **active** and press Enter.
10. Back in the Disk Management console, right-click the new System Reserved partition, select Change Drive Letter and Paths, and then remove its drive letter.

The next time you reboot your computer, the System Reserved files will have been moved to the new drive and you will now be able to create a system image backup.

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Summary

So, is it worth spending time creating a custom installation image for your computers? To be honest, probably not. This is because the versions of the software you use change so often. If you have several or many computers that are physically the same, however, it can be an enormous time-saver to install everything on one computer and then create a system image that you can roll out to all the other computers over the network.

I would also not recommend ever performing an upgrade from one version of Windows to another, it just isn't worth it, because any problems you already have will be moved to the new OS along with the risk of new incompatibilities appearing, as well.

The problem of the System Reserved files ending up on the wrong hard disk is one that rears its ugly head far more often than you might think, which is why I suggest either always unplugging all but the physical hard disk on which you want to install Windows, or ensuring that you install Windows 8 at the beginning of Disk 0 (removing the partition that your previous version of Windows occupied so that the installer can create a new System Reserved drive).

You can find more information about editing and modifying the boot files in Windows 8 in Chapter 18, "Troubleshooting Windows 8 Startup."

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PART 4

Disaster Recovery

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CHAPTER 26

Recovering Encrypted Data

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I'M GOING TO SET SOME EXPECTATIONS right from the start in this chapter. If you have encrypted your files, folders, and data, you have to be ready to accept that sometimes you simply won't be able to recover them if something goes wrong.

You should always keep a backup of your encryption keys, and I will show you how to do this, but you also need to be aware that under certain circumstances, data and files will continue to be encrypted or won't be encrypted after you copy or move them off your computer.

The Types of Windows 8 Encryption

Windows 8 comes with two types of encryption built in: the Encrypting File System (EFS) and Microsoft BitLocker. EFS is a file and folder encryption system; BitLocker encrypts entire hard disks and partitions.

EFS was first introduced with Windows 2000; thus, it's long established but not quite as popular as BitLocker, perhaps for the reasons I will soon explain. The longevity of EFS means that encrypted files will be backward compatible with other versions of Windows as long as you import the encryption key to those computers.

There are other types of encryption you can use with Windows 8, however, and let's not forget Pretty Good Privacy (PGP) and TrueCrypt, which are widely supported across platforms and other operating systems, including Apple's OS X and GNU/Linux. These, too, are file/folder encryption methods, but I would argue that the future of encryption is full-disk encryption such as that provided by BitLocker, and that, certainly from a troubleshooting perspective, you shouldn't be using file/folder encryption except on very small scales.

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File Encryption After Copy/Move

The main reason to perform file encryption after copying or moving data is because of the fundamental difference between file/folder encryption and full-disk encryption. Let's start with BitLocker and have a look at how it works. BitLocker encrypts an entire hard disk or partition. Any files or folders created on or copied to that drive will be automatically encrypted. Because the hard disk itself is encrypted rather than individual files and folders, when you copy any content from the protected hard disk to a non-encrypted storage device, such as a Network-Attached Storage (NAS) unit or USB flash drive, the resulting copied file is not encrypted.

Some might see this as a major flaw, but BitLocker does allow you to encrypt removable devices, as well, including USB hard disks and USB flash drives. What it doesn't allow for, however, is the encryption of network shares such as NAS drives (although Windows Server provides for encryption on drives that it manages, as well).

Let's put this into context for you. When you have a laptop that is fully protected with and you copy files to a NAS drive or burn them to a CD of DVD, those files on the new medium will not be encrypted, and anybody can read them.

So, why am I arguing then that this is preferable to file/folder encryption? To be honest, I'm not; more accurately, I'm actually arguing (strongly) against the use of EFS on your computer(s). Because of the ways that TrueCrypt and PGP work, and because they are so widely supported, there is much less chance that you will lose data when you use them, but when it comes to EFS, the chances of data loss are greater.

Unlike BitLocker, EFS only works on hard disks formatted with Microsoft's NTFS system. If you copy an EFS-encrypted file to a drive formatted any other way—such as FAT or exFAT on a USB flash drive, or the HFS+ file system used on the Apple Mac, not to mention the variety of different ways that Linux-based NAS drives can format their disks and RAID arrays—you run the risk that files can become corrupt.

Certainly this is my own experience, and I have seen several examples over the last few years of EFS-encrypted files that were copied to NAS drives being completely unreadable when copied back to the host computer, even with the correct decryption key installed.

PGP and TrueCrypt-encrypted files and folders don't have this problem because they are platform agnostic and can operate on any file system. For this reason—and frankly I think it's a biggie—I wouldn't recommend using EFS to encrypt any of your files.

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Working with EFS Keys to Recover Data

To export and import your EFS encryption keys in Windows 8, open the Start screen and search for **encrypt**. In the Settings results, click Manage File Encryption Certificates. This is a wizard-type tool with which you can backup and import keys, as depicted in Figure 26-1.

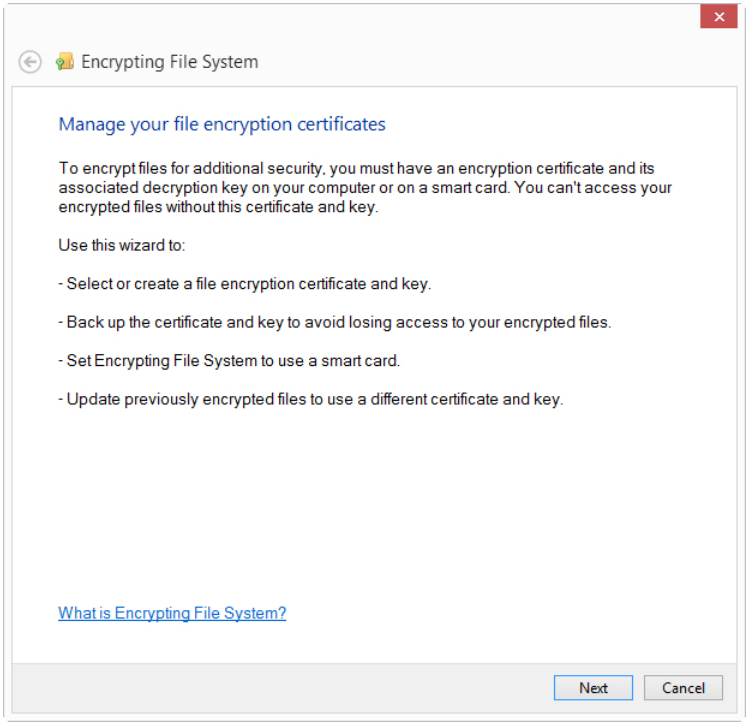

Figure 26-1 Exporting and Importing EFS keys

> **Note**
>
> **It might look like there is no import option. You should instead choose the option to create a new certificate. Here, you will be able to import a previously saved EFS key.**

As I mentioned, this is a simple wizard operation. When you first encrypt files by using EFS, you are prompted with alerts in the desktop system tray to back up your EFS key. You don't need multiple keys for different files and folders that are encrypted. There is always just one that is locked to your user account. It is not only critical that you keep a backup of this key,

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but also that you keep (preferably two) backups in very safe location where they won't be accidentally lost or deleted.

If you have a valid EFS key on your computer, you can decrypt EFS encrypted files and folders by performing the following procedure:

1. Right-click the file or folder(s) you want to decrypt to open its settings panel.
2. In the Attributes section, click the Advanced button.
3. In the Advanced Attributes dialog box that appears, clear the Encrypt Contents To Secure Data check box, as illustrated in Figure 26-2.

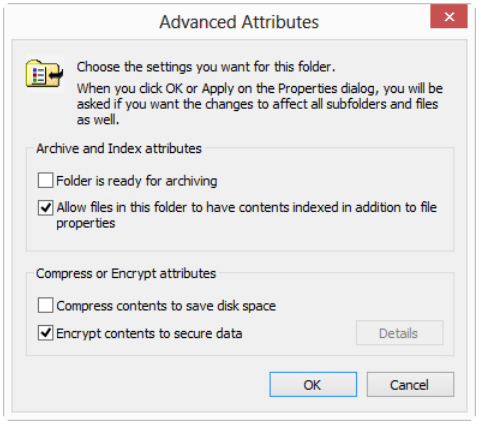

Figure 26-2 Decrypting EFS-encrypted files and folders

4. Click OK to finish.

It is very important that you wait for the decryption process to complete. A dialog box will pop up for each file being decrypted, one at a time. *Do not cancel this dialog box*; if you do, you will also cancel the decryption.

Working with BitLocker to Recover Data

BitLocker is managed through the BitLocker section of the Control Panel (see Figure 26-3), and this includes your internal hard disks and partitions as well as any encrypted external hard disks and USB flash drives.

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> **Note**
> **To manage any encrypted external storage in Windows 8, the device will need to be plugged into the computer; otherwise, it will not appear in the BitLocker panel.**

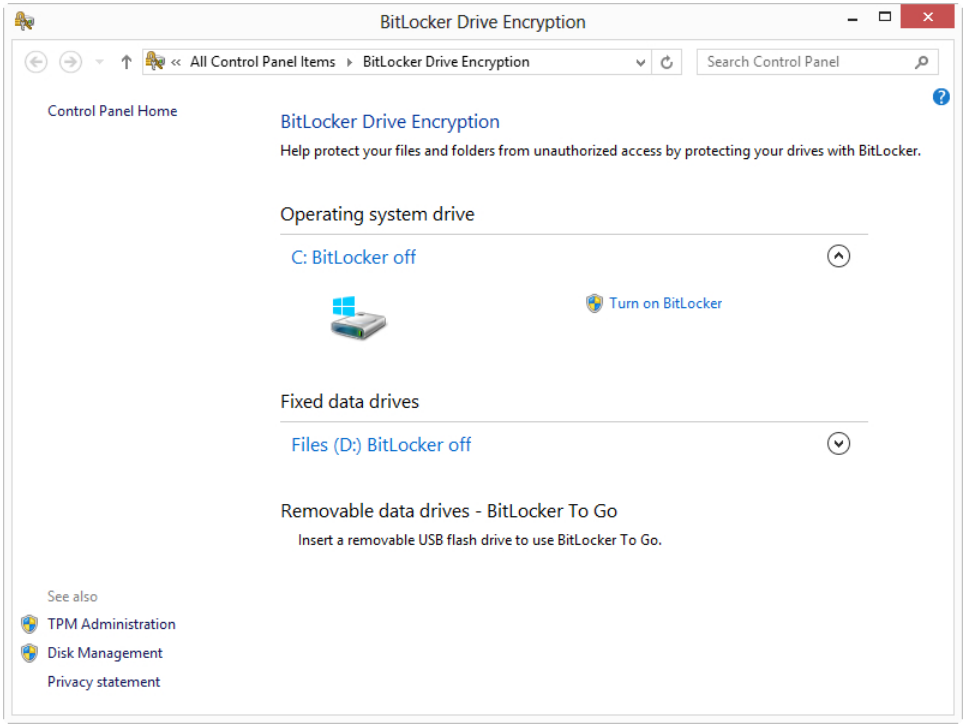

Figure 26-3 Managing your BitLocker keys in Windows 8

The main difference between BitLocker and EFS is that with BitLocker each individual storage device has its own decryption key. It is extremely important that you back up each one separately, because unlike EFS, you do not have just have one key that's locked to your user account.

In the list of hard disks in the main BitLocker panel, you will see a link to back up the encryption key for each encrypted drive.

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CAUTION!

You must never store your backup key for a BitLocker encrypted drive on a disk that is encrypted with BitLocker. Consider the logic; should something go wrong, you will probably never be able to restore the key.

Again you should always store a couple of backup copies of the key(s) in a safe and secure place. Because you are likely to use BitLocker to encrypt an entire laptop or workstation-grade tablet, I would recommend a cloud storage location such as SkyDrive.

Note

If you are travelling with a BitLocker-encrypted laptop or tablet you should also carry an unencrypted USB flash drive with a backup copy of your BitLocker encryption key(s) so that it/they can be restored if something goes wrong and you find yourself locked out of your computer.

You can decrypt BitLocker-encrypted drives from the BitLocker panel, too, by clicking the decrypt drive option.

INSIDE OUT **Saving BitLocker-encrypted data by copying**

As I mentioned at the beginning of this chapter, if you copy files and folders from a BitLocker-encrypted hard disk, the copies will be decrypted on the target volume (if that location is not itself BitLocker-encrypted). This can be a good way to get a decrypted copy of data.

When BitLocker Prevents Your Computer from Starting

In the previous Note, I mentioned that you should always carry an unencrypted USB flash drive containing your BitLocker encryption keys with you when you are travelling, in case the system locks you out of your computer and you don't have Internet access or a flash drive to allow you to unlock the computer.

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Surely, this is folly and a stupid idea; the whole point of using BitLocker is to prevent people from being able to gain access to your data while you are on the move, right? Obviously, I am not suggesting that you keep your laptop and the USB flash drive in the same bag. They should be kept separate so that if one is stolen the other is safe.

Unfortunately, BitLocker can lock you out of your computer at the most inopportune times; I've had it happen to me. You might be experimenting with a dual-boot system, which BitLocker doesn't support, or there might have been some minor disk, BIOS, or UEFI error caused perhaps by a power spike, and suddenly you find yourself locked out.

In this circumstance, you have two options. You can either plug a USB flash drive containing the BitLocker key(s) and the computer will unlock the drives for you automatically or you can manually type in the key.

For some people, manually typing the key might be a better option. You can store this as a text file on a smartphone and protect that smartphone with its own password. This is in many ways much more secure than keeping a USB drive handy, but I personally still prefer the USB drive option for convenience.

Decrypting Data on Another Computer

The methods I have detailed here rely on your being able to boot into a working copy of Windows on the computer on which the encryption was initiated. This isn't always the case, however. Certainly, with a full hard disk or partition that was encrypted by using BitLocker but where a Trusted Platform Module (TPM) chip wasn't used to secure the encryption key, restoration will be possible if you have access to the USB flash drive or other device used to store the key.

With BitLocker To Go on removable storage and with EFS, however, this can be done on any other computer running Windows 8 and also on computers running Windows 7 (with BitLocker) and as far back as Windows XP with EFS.

Because you can import EFS encryption keys into other copies and versions of Windows, you will be able to decrypt files by using the method I have described in this chapter on just about any other Windows computer.

BitLocker To Go is designed to permit encrypted drives created on one computer to be readable on another, and so it is straightforward to decrypt the data on another computer. With this, it is a simple matter of plugging in the encrypted disk; Windows and the host computer will prompt you for the unlock password.

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> **Note**
>
> **With Windows XP and Windows Vista you will see the BitLocker To Go Reader software on the USB flash drive or USB hard disk. You will need to run this software to unlock the drive, and the drive will then be read-only. XP and Vista cannot write to drives encrypted with BitLocker To Go in Windows 7 and Windows 8.**

Summary

As has probably become apparent, it is vitally important not only to back up your encryption keys (for EFS, BitLocker, PGP, and TrueCrypt) but also to keep a couple of copies of them in safe locations. I would always recommend cloud storage for one of those backups.

If you do not have a copy of your encryption key, it can be impossible to recover data, although, as I talk about more in Chapter 31, "Working Safely with Windows 8 Encryption," there are some companies and services around the world that specialize in recovering encrypted data. These services are *not* cheap, however, and are typically out of the reach for most people.

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CHAPTER 27

Using Windows Data Recovery Tools

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AT SOME POINT, SOMETHING BAD WILL HAPPEN to your computer and you won't be able to access your copy of Windows or your files and data. What's more, this kind of disaster always seems to happen at the worst time, typically when you're up against a deadline or planning a vacation, for instance.

You Did Back It Up, Didn't You?!

The easiest and quickest way to get back up and running can be to restore your operating system or files from a backup. Although restoring from a backup can be much faster than diagnosing and fixing the actual problem, you should be wary about restoring your files from a backup too hastily if the backup isn't recent and the originals might still be saved.

If, however, Windows 8 won't start at all and can't be repaired by using the conventional tools, you should be prepared to rely on your most recent files and data backups (unless you keep your files and data on a separate hard disk or partition from that of your copy of Windows).

Even now though, you might be surprised at just how much you can do to rescue your system and get it working again.

Restoring Windows from a Backup

Reimaging a computer has long been the favorite repair tool of system administrators, but let's have a look for a moment at why this is? Until we had Windows XP, there was no image backup and restore feature in Windows, so you had to use a third-party solution such as Ghost. This invariably meant booting into a clunky DOS environment and working with small image backups on commonly unreliable FAT32-based hard disks; the entire thing was a pain.

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With Windows Vista came native image backup for the first time, but only in the Professional, Enterprise, and Ultimate editions of the software, which left many enthusiasts and all home users out in the cold. Windows 7 finally rectified this and brought a simple and friendly method to use image backup and restore to all users.

Windows 8 includes no fewer than *three* different ways to reimage your computer, and Microsoft has gone to great lengths to ensure that the process is so simple to use that the average user, whether at home or in the workplace, can do it without assistance.

So, what are these three options, and how do they vary?

Windows Image Backup

If you've used the image backup in Windows 7 or Windows Vista, you will be instantly familiar with the image backup in Windows 8 because the Control Panel options for creating a backup operate in the same way. (I show you how to create one of these backups in Chapter 6, "Optimizing Backup and Restore.")

The main advantage of a Windows Image Backup is that you can install and configure all of your updates and software. You can add user accounts to your email software, set your ribbon and other preferences in Microsoft Office, customize all of your other desktop software, download your desktop apps, add users, customize your default storage folders for libraries, and much more besides.

INSIDE OUT

Storing your backups on the same hard disk as Windows

Windows System Image Backup warns you if you try to store a Windows system image on the same physical hard disk as your copy of Windows (although, on a laptop this is often unavoidable).

The problem is that if the disk becomes damaged or malfunctions, you could lose your image backup. If you do not have another hard disk in your computer, back up your copy of Windows 8 to a USB-attached external hard disk, instead.

When you restore from a Windows Image Backup, you will find that all you need to do is perhaps download your email again in Microsoft Outlook (because your user accounts and all their settings from when the backup image was taken will still be in place) and hide some Windows Updates that you'd previously hidden.

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This is the reason that system administrators have liked image backups for so many years. As a way to get a computer operating again, quickly and simply, it cannot be beaten.

So, after you've created a Windows Image Backup, how do you restore it? You can start your computer from your Windows 8 Installation DVD, a system repair disc created in the Windows Image Backup panel, or from a recovery drive created in the Recovery section of the Control Panel. See Chapter 6 for more details on how to create these.

All three methods will take you to the same place: the new Windows 8 Boot Options dialog box. From here, click Troubleshoot, click Advanced Options, and then, click System Image Recovery, as demonstrated in Figure 27-1.

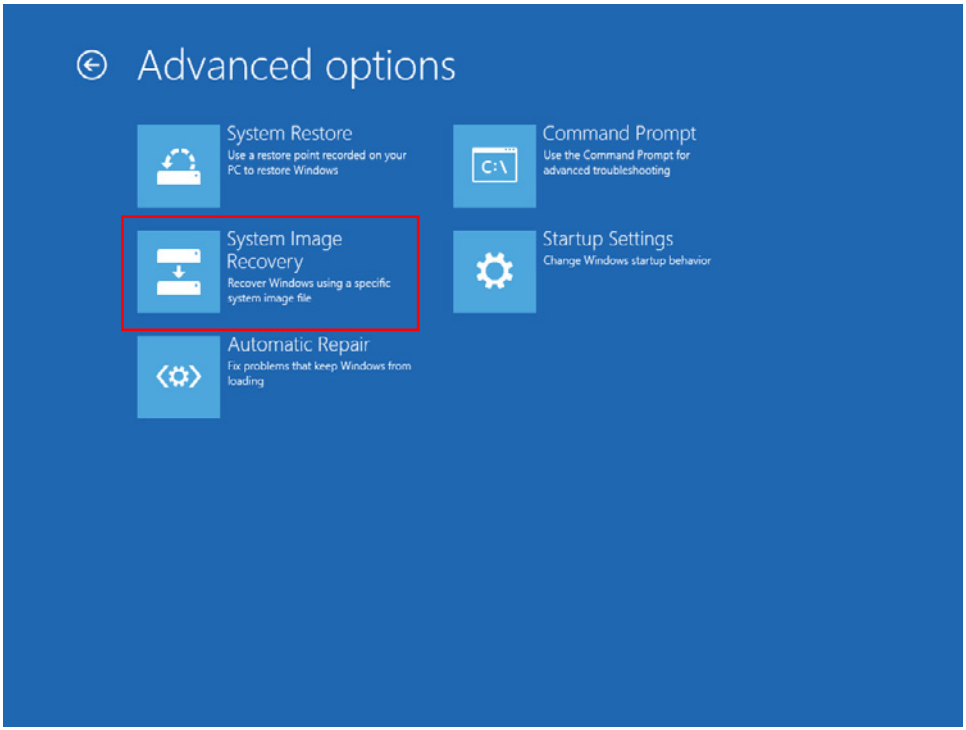

Figure 27-1 Restoring a Windows system image

Windows 8 then searches for and restores the Windows Image Backup that you have created.

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Windows Refresh

Refresh is commonly mistaken for an image backup, but, in fact, it does things quite differently. It doesn't take a snapshot of your entire Windows drive in the way the System Image Backup does; instead, by default, just keeps a snapshot of your default Windows files to which it adds your installed Windows 8 apps.

It is possible to quickly and simply create a custom refresh image. Running as an Administrator, in the command prompt, type the DOS command **recimg -CreateImage *D:\Folder***, where *D:\Folder* is the location where you want your image to be stored.

When you restore from a custom refresh image, though, you will find that even though all of your desktop software will be installed, none of it will be configured because your user preferences aren't included in the custom refresh image.

This means that on the surface, Refresh looks like a great option for system administrators who can finally get end users to reimage their own computers. Unless that user is using exclusively Windows 8 apps, however, she will soon run into trouble.

Starting Outlook from a Refresh results in a clean installation of the program. No email accounts will be present and no options configured. It will be the same for all your other desktop software, as well, although Windows 8 apps should work fine.

This means that Windows Refresh isn't a suitable option for most people who want to reimage their computers and get up and running again quickly. However, if you are providing remote support to a home user who is unlikely to be using desktop software, or who will at least limit it to Microsoft Word, Microsoft Excel, and perhaps a photo editor, then it will be perfectly okay, because it's only IT professionals and enthusiasts who tend to customize their software installations, anyway.

To refresh Windows 8, open the new PC Settings panel, click the General tab, and then under Refresh Your PC Without Affecting Your Files, click the Get Started button, as shown in Figure 27-2.

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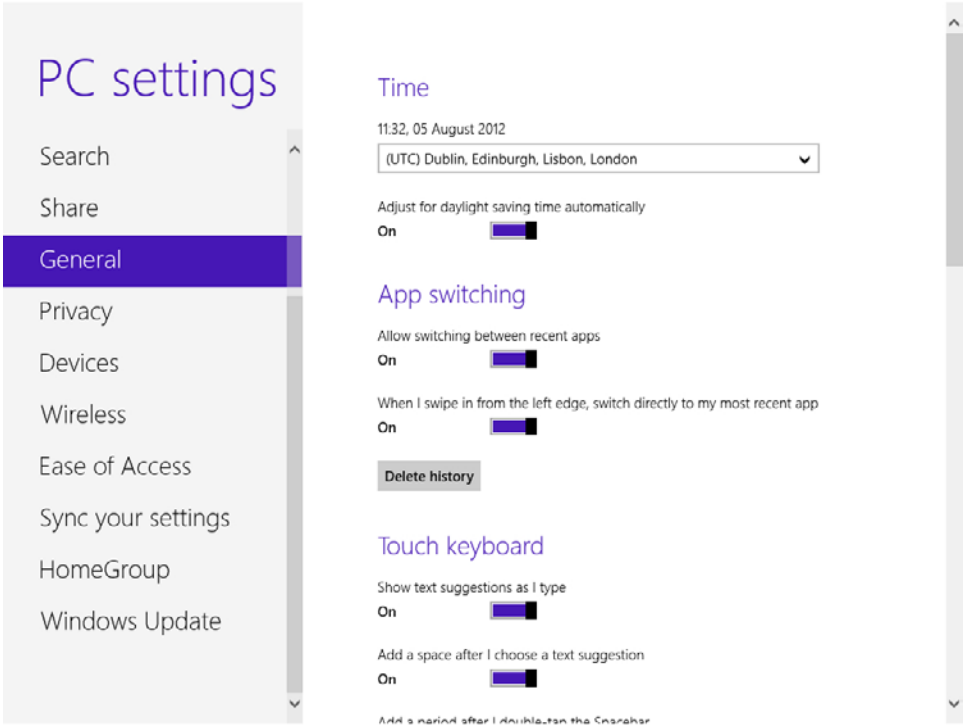

Figure 27-2 Refreshing your computer

Windows Reset

This is the nuclear option; it will completely reset your computer to its factory state. This will delete all your user files (but only if they are still stored in the C:\Users\... folder), remove your user accounts, all installed Windows 8 apps, and desktop software.

To use this option, open the PC Settings panel, click the General tab, and then click Remove Everything And Reinstall Windows. Although it carefully warns you of exactly what it will do, the tendency that end users have to click things without reading the small print will mean that we will all get a few phone calls from panicked users in the next few years, saying that their computer has been completely reset and their user account (and everything else) is gone.

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You can find both the Refresh and Reset options by starting the computer from your Windows 8 installation DVD, a system repair disc, or a recovery drive and selecting Troubleshoot from the main menu, which brings up the Troubleshoot menu, as illustrated in Figure 27-3.

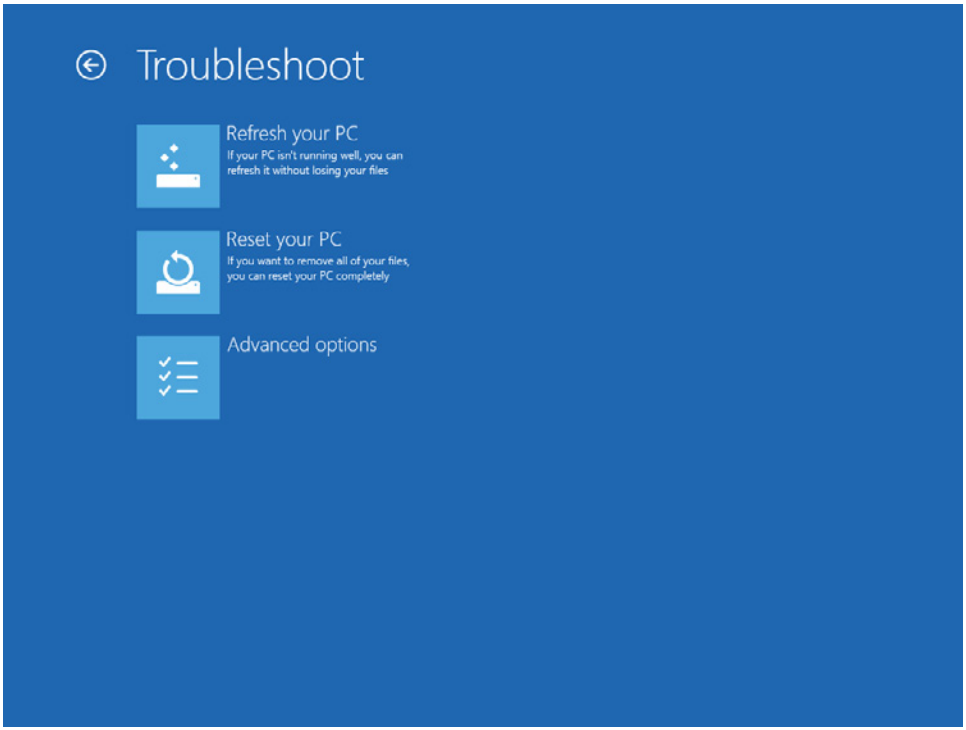

Figure 27-3 Accessing Windows 8 Refresh and Reset

INSIDE OUT

Blocking Windows Reset

In Windows 8 Pro and Enterprise, you can block the Windows 8 Reset option by using Group Policy. To do this, open the Start screen and search for gpedit.msc. Next, navigate to Computer Configuration | Administrative Templates | System | Recovery, as demonstrated in Figure 27-4.

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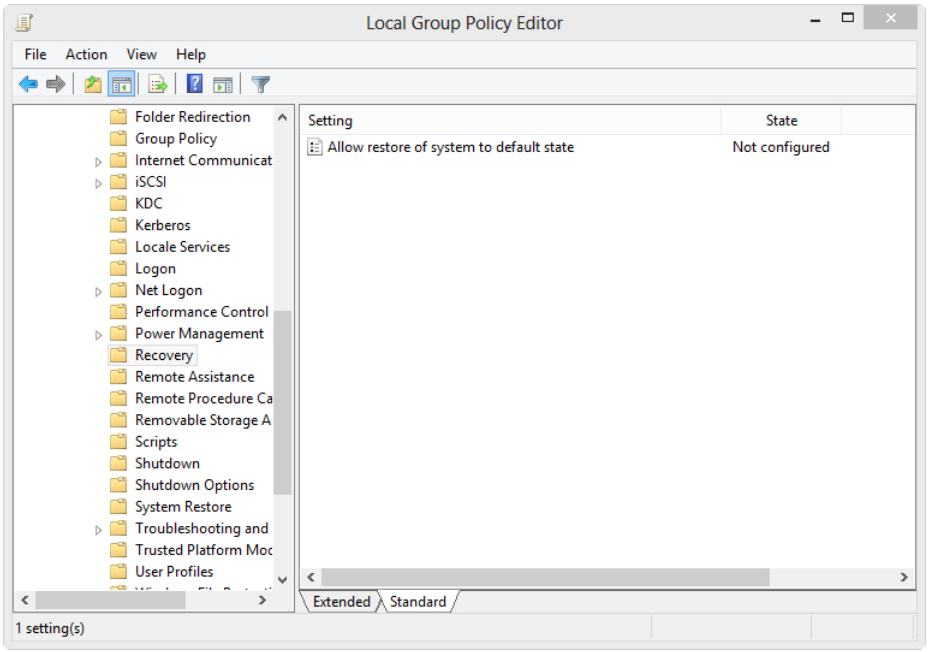

Figure 27-4 Disabling Windows Reset by using Group Policy

Here, you can change the Allow Restore Of System To Default State setting to Disabled. This will block access to the Reset option.

Restoring Data from a Backup

The method you use will vary depending on what file backup software you choose to use. By default, the Windows 8 Backup option compresses all your files into a virtual hard disk (VHD) file. This means that you can open the backup and pull files out of it, but it's nowhere near as friendly or as easy to work with as a standard file-by-file backup option.

You can find the file backup options, as depicted in Figure 27-5 (which I cover in more detail in Chapter 6), in the Control Panel, in the Windows 7 File Recovery section.

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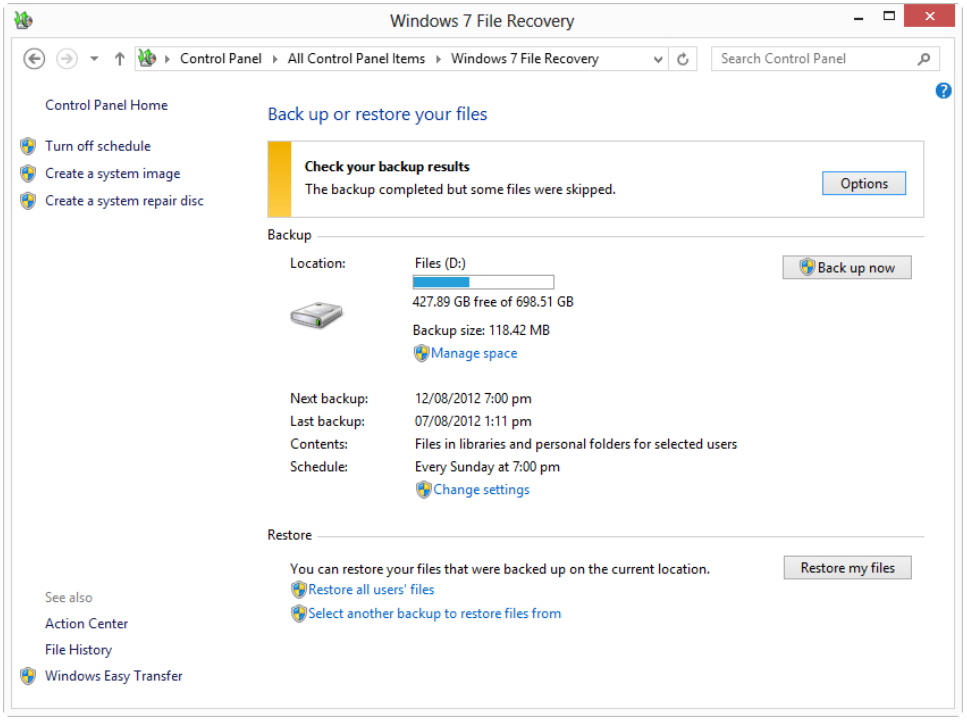

Figure 27-5 Restoring files from a backup by using Windows 8 Backup And Restore

INSIDE OUT

Always maintain at least two backup copies of files

If your only backup copy of your files is on a hard disk inside your computer, there's a chance that it will be lost if disaster strikes. You should always keep at least two copies of backups. Preferably, you should have an extra copy in your home or office for quick restore, perhaps on a Network-Attached Storage (NAS) drive or external hard disk, and another copy off site.

Data Restore via Over-the-Top Reinstall

Even if all of your files and data are on the same partition as Windows 8 and you must reinstall the operating system, you can still save the files from deletion.

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To do this, boot your computer from the Windows 8 installation media. You have the option to select Windows settings, personal files and apps, personal files only, or nothing at all, as shown in Figure 27-6. You should choose the second option, Just Personal Files.

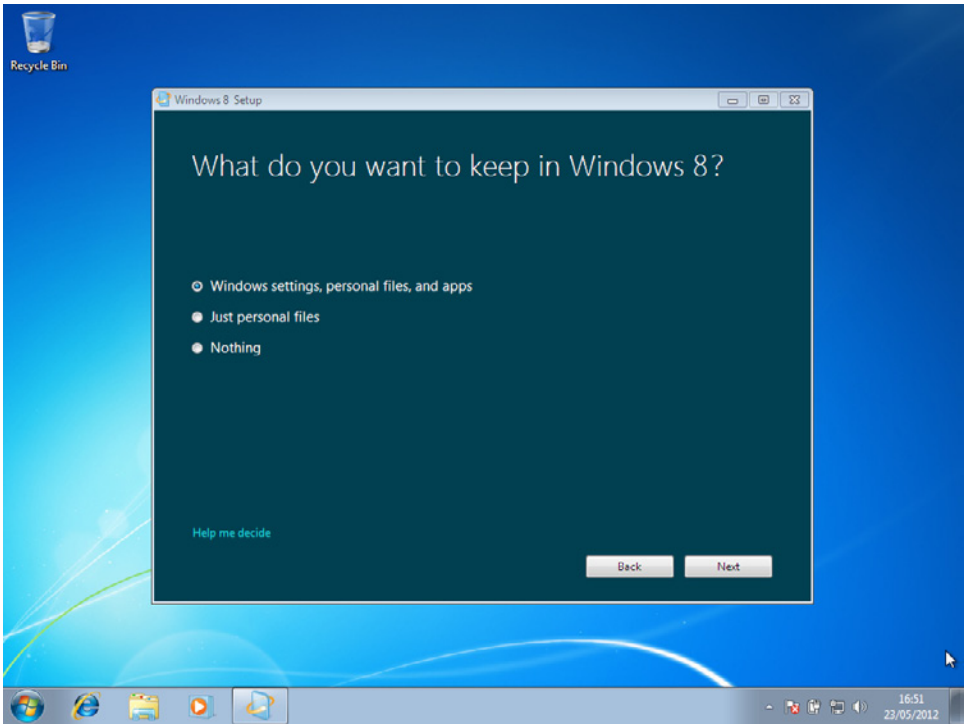

Figure 27-6 Upgrading Windows 8 over a previous installation

So, why should you choose this option rather than the first and thus keep your settings and apps? If you are recovering Windows 8 because something has gone wrong and the operating system is malfunctioning, you might have no idea where the fault lies. There is a reasonable chance, though, that some Windows setting, perhaps in the registry or in the AppData folder which stores settings for your installed desktop software, is the culprit.

Whereas it's only the files that you really need to safeguard, you can use this second option as a safety net. There is nothing preventing you from trying the first option and keeping your Windows settings and apps (note this will still wipe all your installed desktop software) if you are confident that the problem is not being caused by a Windows setting, desktop program (remember how these and Windows settings are very much linked), or an app, the first option might be fine for you and you can always try installation using the second option again should it not work.

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RAID Drives

Sometimes, hard disks are connected by using a system called Redundant Array of Independent Disks, or RAID. This system can help ensure that you don't lose files or data in the event that one of the disks fails, or it can span your files across several disks.

CAUTION!

RAID is most useful for recovering data when a hard disk fails. If that data is deleted or moved from one drive, however, this action will be copied on the other and the data will be lost there, too.

Sometimes, one drive fails to appear at startup and you can't access your files and data. This is not necessarily a crisis, however.

In this situation, turn off your computer and unplug it from the electrical outlet. Remove the side panel and carefully remove and reseat all the data and power cables to the hard disks that are part of the RAID array. This will also involve reseating the cables in their sockets on the motherboard or RAID card. You should be careful to keep plugs in their current sockets.

After doing this, a RAID array will often spring back into life. If you still encounter problems, you should attempt a repair in the diagnostic console for your RAID hardware. Consult your RAID card or motherboard manual for details on how to access the diagnostic panel and perform a repair, as the procedure will vary from one computer to the next.

Managing RAID Arrays from Within Windows 8

You might have a RAID array on your computer that is managed by Windows 8 itself rather than by a hardware solution on your motherboard or add-in card. When you reinstall Windows 8, this array might not be recognized. In this circumstance, it is absolutely essential to have a backup of all the files and data on the array itself.

To manage the array, press Windows logo key+X on your keyboard, and then on the Administration menu that appears, click Computer Management. When the computer management console opens, click Disk Management.

In the main list of your hard disks, you then need to right-click one of the disks in your array and click either New Striped Volume or New Mirrored Volume, depending on the array type you had before. What are the different types though? The following is a brief description of them:

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- A *Striped* array (also known as RAID 0) groups all the hard disks in the array together so that they appear as a single large disk. The disadvantage of this strategy is that one disk failing can occasionally lead to the data on the other disks also being unrecoverable.
- A *Mirrored* array (RAID 1) uses half of the included hard disks—for example, 2 out of 4 disks or 1 out of 2—to create an automatic duplicate of the first hard disk. When something changes on the main hard disk, such as a file save, that change is automatically duplicated on the mirrored hard drive.

Add your other array drives to it but *do not* format the array when prompted. There is no guarantee that your data will be recoverable after this, but there is a reasonable chance that the array will spring back into life.

Using Windows 8 Storage Spaces

Perhaps a better option if you are using Windows 8 Pro or Enterprise is the new Storage Spaces feature (see Figure 27-7). This is a RAID-type feature with which you can aggregate (or pool) the storage of several different hard disks in your computer. The hard disks do not need to be of the same size, and you can dynamically add hard disks to the pooled storage at a later date.

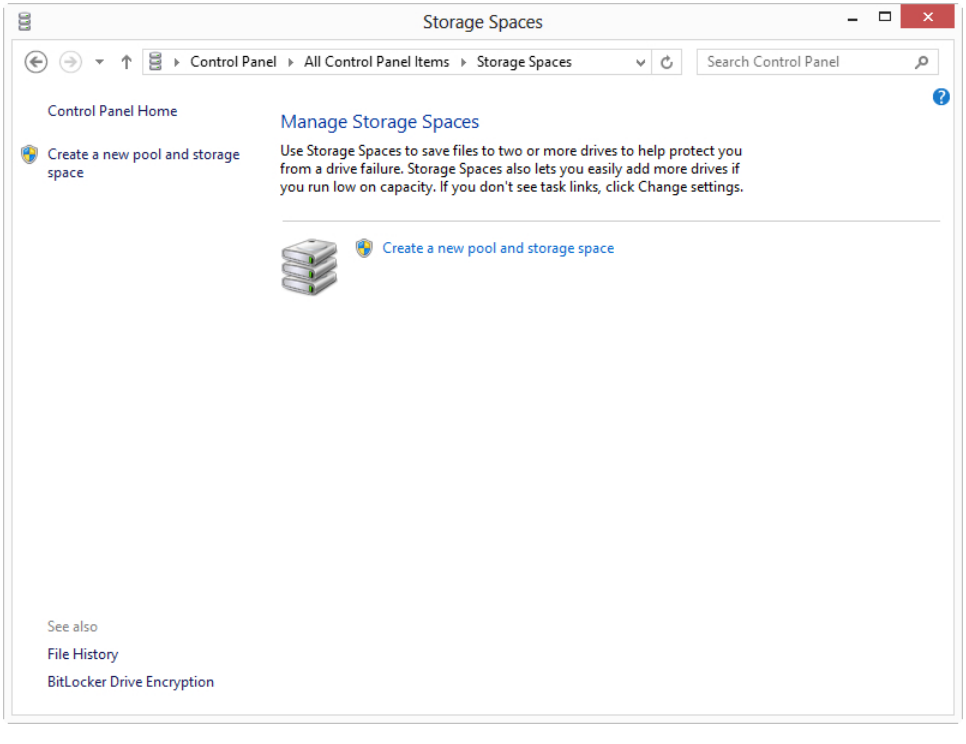

Figure 27-7 Storage Spaces in Windows 8

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You access Storage Spaces through the Control Panel, and one of its advantages is that the data that resides on Storage Spaces hard disks will remain intact even if you have to completely reinstall Windows 8.

After a reinstall, opening the Storage Spaces option should automatically display your existing array because Windows 8 will search for it and identify it. If it does not, you can click Create A New Pool And Storage Space and rebuild the array. You should find that all of your files remain intact.

Backup, Backup, Backup!

Our files and data are the most important thing to us these days. And even though it might be possible to download all your music again, some digital photos and videos represent treasured memories that simply cannot be replaced if lost.

I began this chapter by stressing how important it is to keep backups of all of your files and documents. If I were to stress the three most important rules for using computers they would be backup, backup, and backup.

Summary

Now that we are commonly seeing computer hard disks with capacities of 3 TB appearing in computers, and with high-speed broadband finally making cloud storage and access of files a realistic option for ultrabooks and tablets that only come with small capacity solid-state drives (SSDs), I find myself wondering at the necessity of using RAID arrays at all.

My personal view is that combining various hard disks together in an array that's managed by your motherboard, a separate controller card, the Windows 8 computer management console, or by the new Storage Spaces feature is both risky and unnecessary.

With the price of hard disk storage falling constantly there's no need to utilize disk arrays unless you genuinely need huge volumes of storage, perhaps because you work in 3-D animation or the movie industry.

For everything else, and for peace of mind, I would recommend upgrading to a 2-TB or larger hard disk. These are capable carrying all of the files for an average computer user. Even a power user such as myself has less than 4 TB of files in total.

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CHAPTER 28

Restoring Windows from Another PC

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Restoring a Windows Image Through a Surrogate Computer 484

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Restoring Your Data by Using Another Computer 486

Even if your own computer is out of commission, the chances are that you will still need to access files and programs stored on it. You can do this by unplugging the physical hard disk from it and connecting that hard disk to another computer. You can connect the hard disk to another computer by either connecting it inside the new host computer as the main or secondary hard disk or by putting it in a USB hard disk caddy.

Migrating Your Copy of Windows 8 to a New Computer

When your computer dies, do you need to go without your copy of Windows and all your software? Is it *really* necessary to reinstall everything from scratch on a new computer? Surely, you can just copy a Windows System Image Backup that you've made on one computer over to another and continue working, right? After all, *how hard can it be*?

Well, depending on the computer hardware you are migrating from and to, it can be very hard, but it's not always impossible. The main problem is the underlying hardware of the motherboard and processor on the two computers. In a corporate environment—especially where you are deploying a single image across dozens, maybe even hundreds of computers—you will probably have some that are either identical or very similar.

In a home or small office environment, though, this can be much harder, with the reason being that you'll probably only buy a new replacement computer when your old one breaks beyond repair. Technology changes at such a pace that you can be certain that the new computer's architecture will be very different from that of the one from which you're migrating, and this will result in a dead system from which Windows simply can't recover.

So, is it possible to manually inject the drivers for the new computer into the disk image from the old one?

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To do this, you'll need another Windows 8 computer; the target device with your clean installation of Windows 8 that will have come preinstalled. You'll need to create a new partition or have a second hard disk to which you will copy the Windows System Image Backup that you created on the older computer, perhaps you'll simply plug in the new hard disk or put that hard disk in a dock or caddy and access it from there. It's possible to open this file, because, after all, it's just a virtual hard disk (VHD), but Windows 8 will alert you with User Account Control (UAC) prompts that you probably don't want to do this. Just click OK to these prompts.

INSIDE OUT

The Windows Restore Image

This method can only be done by using a Windows System Image Backup and not a custom Windows Restore Image. This is because the Restore Image creates an *install.wim* file that cannot be mounted as a drive.

You need to drill down through a few folders. The first one will be the name of the computer that's been backed up, and the second will be called Backup *[date of backup]*. Once here, you will be presented with a long list of files, as illustrated in Figure 28-1.

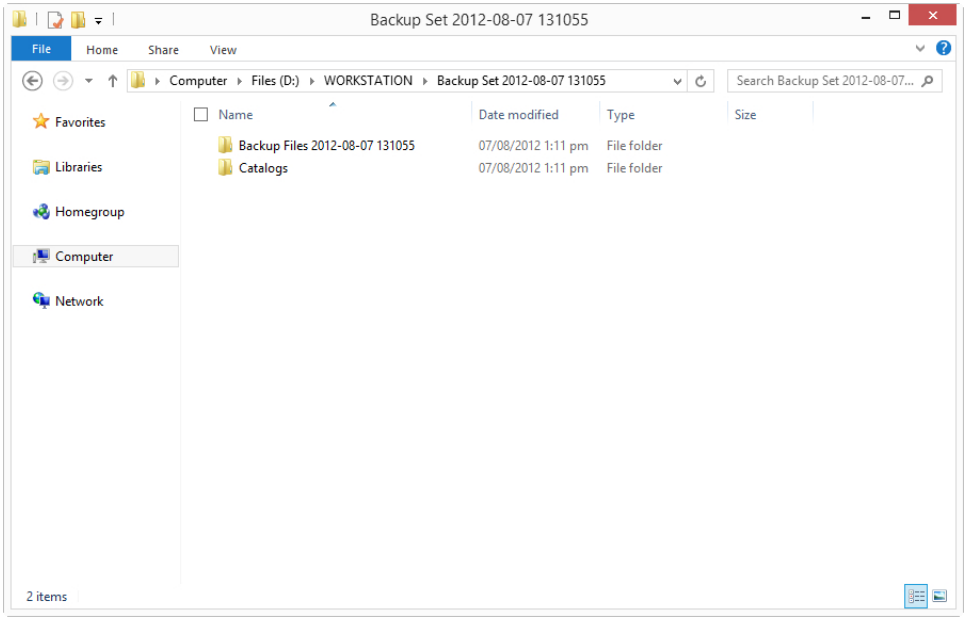

Figure 28-1 Opening a Windows System Image Backup file

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The file you want here is the big one (it will be many gigabytes in size); this is the main hard disk image. This needs to be mounted as a drive so that you can work with it. To do this, right-click it, and then in the options panel that opens, click Mount.

The full Windows hard disk appears inside that image. The driver folders are the ones that you want to change. Go to the \Windows\System32\ folder and then look for the drivers and DriverStore folders.

Rename these two folders to drivers-old and DriverStore-Old and then copy across the equivalent folders from your new computer's Windows 8 installation to inject them into the backup image.

This will give you a backup that can then be restored to the new computer and that will operate in a trouble-free manner. You might find that drivers are not installed for every hardware device you have. Typically, these are USB and other attached devices such as smartphones, tablets, webcams, and so on, but all the critical drivers required for Windows to start should be in place.

Note

If you migrate your copy of Windows to a new computer, you might need to purchase an additional license or product key. The license that comes with an Original Equipment Manufacturer (OEM) copy of Windows 8—that is, the one provided when you buy a new computer—is not transferable.

However, it's still not that simple because the Windows Registry, which points to the "correct" drivers to load, will try to load ones that it can no longer find. This will mean that you'll need to start Windows 8 in Safe Mode by pressing Shift+F8 at startup.

CAUTION!

This won't work on all computers, especially those of the enthusiast-built genre. It is only likely to work on computers that are broadly similar, in that they both run on the same type of motherboard (meaning standard Intel with an Intel chipset) and there isn't much custom hardware installed such as graphics cards.

Should you encounter problems, they can sometimes be circumvented by removing that hardware for the initial boot and reinstalling them once you have a stable copy of Windows up and running.

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Creating a Custom Windows 8 Installer by Using Refresh

In Chapter 20, "Using Advanced Repair Methods," I show you how to inject a service pack into Windows 8 and create yourself a new Windows 8 installer. As a part of this process, you must create a custom *install.wim* file. This is also the same file used by the Windows 8 Refresh and Reset features.

As I have mentioned previously in this book it is possible to create a custom refresh image by using the DOS command (elevated with administrator privileges) **recimg -CreateImage *D:\Folder***, where *D:\Folder* is the location at which you want your image to be stored.

You can use the method I detailed in Chapter 20 to inject this custom *install.wim* file into a standard Windows 8 installer image. This is unlikely to fit on a DVD, but you can burn it to a bootable Blu-ray disc or a USB flash drive.

The advantage that this offers is that you can create a custom Windows installer for your computer that contains all of your software and drivers, and you will get up and running again very quickly.

Restoring a Windows Image Through a Surrogate Computer

If you need to restore an image of Windows 8 from a backup, you can plug the hard disk(s) containing the corrupt Windows 8 installation and the complete System Image Backup into a working computer. You should probably unplug the host computer's hard disk(s) at this point to prevent accidental damage to or deletion of its files.

You should start the computer from the Windows 8 install media, a system repair disc, or a recovery drive. Next, on the boot options menu, click Troubleshoot, select Advanced Tools, and then click System Image Recovery, as demonstrated in Figure 28-2.

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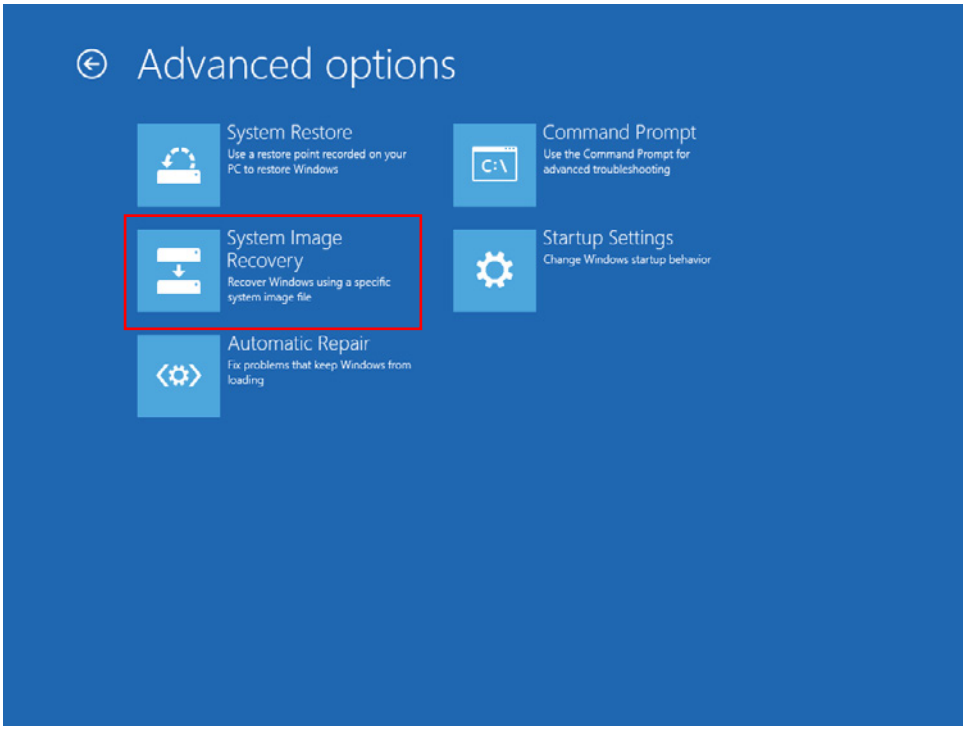

Figure 28-2 Restoring a System Image Backup

Once you have restored the image, you can reinsert the hard disk back in the original computer, which presumably has had to go for repair anyway, and you should be working again, as normal.

Restoring Windows 8 File by File

In Chapter 6, "Optimizing Backup and Restore," I describe how Windows Backup compresses files into VHD files so that they can't be easily opened and read unless you restore them, which discourages some people from using this feature.

Many people find it more useful to boot into another operating system (OS), such as Linux (see Chapter 29, "Using Linux to Rescue Your Windows System") and create a file-by-file backup copy of Windows on another hard disk or partition.

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This approach has many advantages when it comes to restoring a malfunctioning OS. For instance, you can copy back only the driver store folders or the registry files if they are causing the problem. This means that you can restore all of your critical OS files, leaving settings and programs intact. Or, you could replace only the files for a faulty program.

For more information on what-file-does-what in Windows, see Chapter 21, "Demystifying Windows 8 Problems."

INSIDE OUT

To copy the Windows registry or not to copy?

(With all due apologies to The Immortal Bard…) You can choose to copy back every file from your file-by-file Windows 8 backup to its original location. Doing so restores Windows, but software or settings might not work because you will have also copied back old Windows registry files.

You can get around this by leaving the existing registry files on the original hard disk. There is one registry file in each user folder called *ntuser.dat*. This is a hidden file, so you might need to set your computer to show hidden files before restoring your backup to the original computer. It is sometimes easier to simply not copy the C:\Windows\Users folder at all because the only Windows system files it contains is the registry.

Restoring Your Data by Using Another Computer

Although a copy of Windows 8 from one computer won't work on another, accessing your data on an alternative computer is much simpler.

CAUTION

When attaching hardware to a computer, always be careful that the power is switched off and that the computer is disconnected from the electrical outlet. Discharge any electrostatic build up by touching an unpainted section of the computer case, and use an antistatic wristband when installing an extra hard disk into a computer, if possible (see Chapter 24, "Diagnosing Hardware Problems").

By simply plugging in the hard disk from your dead computer into a host computer, you can have access to your files and folders. The hard disk and any partitions from the defunct computer will appear in My Computer on the host device. This way, you will be able to

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recover lost files, but sometimes you won't be able to write data back to that hard disk. This is because Windows 8 on the original computer has set access permissions for the drive's files and folders, and the new computer doesn't have permission to write to them. This is simple to fix, however. In File Explorer, right-click the relevant drive or folder, and then in the settings panel that appears, click Properties to open the Final Properties dialog box. On the Security tab, choose the appropriate user(s) for whom you want to set permissions, as depicted in Figure 28-3.

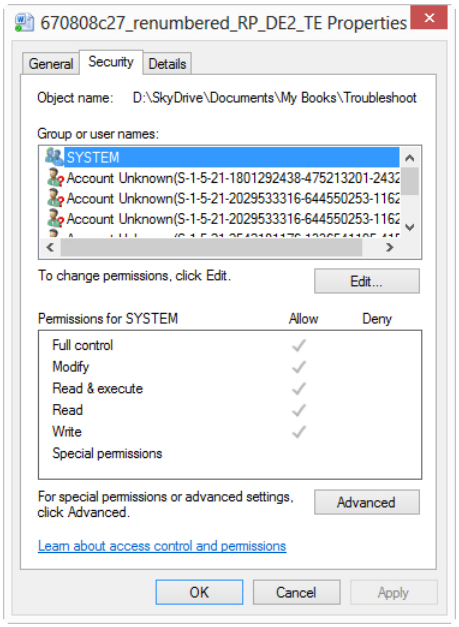

Figure 28-3 Taking ownership of files and folders

Note

If you are trying to rescue data from a Microsoft BitLocker–encrypted hard disk on another computer, the data will not be accessible to you because the host computer's Trusted Platform Module (TPM) chip will be absent and you will be unable to decrypt the drive.

Select the specific user or user group and then Click Edit. In the dialog box that appears, give that user or user group Full Control of the disk or folder.

The system will now set the permissions for all files in that drive or folder. You should allow this process to complete; do not cancel it. Depending on the number of files in the folder, this could take some time.

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INSIDE OUT Your disk isn't appearing in My Computer

Sometimes, new hard disks or partitions won't appear immediately in My Computer on a host computer because they are sharing a drive letter (for example, the D drive) with another drive or partition. This is simple to rectify.

Press Windows logo key+X to open the Administration menu and then click Disk Management. The Disk Management console opens, as shown in Figure 28-4.

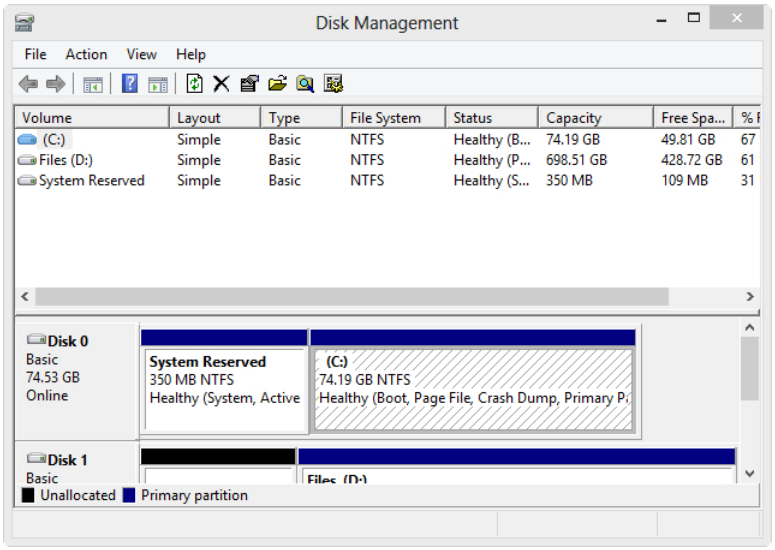

Figure 28-4 Changing and assigning drive letters in the Disk Management console

Right-click any hard disk or partition that is not appearing in My Computer and select Change Drive Letter And Paths. Designate a new drive letter (only unused drive letters appear in the choice list) or set it to appear as a folder on another hard disk.

Unless you store your files and data on a separate partition (which I definitely recommend; see Chapter 3, "Preventing Problems Before They Occur" and Chapter 6), your files and data are stored in the Users folder on the hard disk or partition that contains your Windows 8 installation. This is shown in Figure 28-5.

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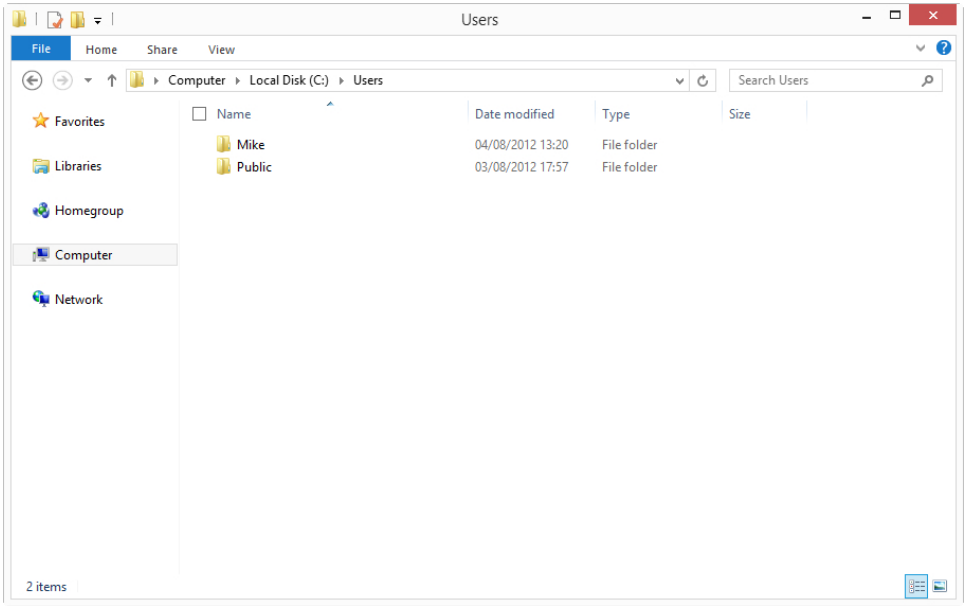

Figure 28-5 The Users folder in Windows 8

Summary

New features such as Refresh and Reset offer some intriguing new ways to rescue your copy of Windows, and the ability to create a Windows System Image Backup and then inject new drivers into it also offers possibilities for rescuing a copy of Windows.

Alas, most of the methods can be scuppered by the hardware on a new computer which can cause your imported image to invoke the Windows 8 interpretation of the dread Blue Screen of Death (BSOD) upon startup. It's not all a loss, however, because being able to use on-disc operating systems such as GNU/Linux to copy Windows 8 back, file by file, can bring additional benefits, especially when you can mount your Windows System Image Backup in the host OS and copy files out of it. I detail this in greater length in Chapter 29.

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CHAPTER 29

Using Linux to Rescue Your Windows System

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CD and DVD Burning in Linux 500
Compatible Linux Operating Systems to Run From a Disc 501
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SURPRISING AS THIS MIGHT SOUND, one of the best ways to rescue a dead Windows installation or your data could be a GNU/Linux distribution (commonly known as a *distro*). There are several advantages to using Linux this way; most important, it's non-intrusive in that it won't change or overwrite any files or settings in your Windows installation.

System or Data Restore by Using Linux

Many Linux distributions can run from a CD or DVD. For example, Figure 29-1 shows the popular Ubuntu Linux, booted from the installation DVD.

Figure 29-1 The Ubuntu desktop

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When you start up a copy of Linux that can run from a DVD, you are asked whether you want to install the operating system on the hard disk or run it from the DVD to test it. You should choose the second option if your intention is to use Linux to rescue a faulty copy of Windows or your files.

> **Note**
>
> **Linux distributions vary, and the locations of the specific items I cover in this chapter might differ depending on the Linux variant you're using or even the version of that variant. Also, some of the tools mentioned in this chapter might not be available in your particular copy of Linux.**

INSIDE OUT

Keep a Linux boot disc on standby

You never know when disaster will strike and you'll need to recover files from your computer or still be able to work with them when up against a tight deadline. I recommend downloading a Linux disc ISO and burning it to a CD or DVD to keep on standby, just in case. You can find download links at the end of this chapter.

One of the biggest advantages of Linux is that it's free to individual users; the distributors make money by charging for optional support contracts. One disadvantage is that many people do not find Linux as user-friendly as Windows, although variants such as Ubuntu have made enormous strides in general usability.

Another disadvantage is that the software you usually use in Windows isn't available in Linux. However, most Linux distributions come bundled with some software already installed, including a web browser, a graphics package, and an office productivity package such as OpenOffice. This software will normally open your files, even the newer Microsoft Office file formats, so you can keep working in the event of a disaster until your own computer or copy of Windows can be repaired.

INSIDE OUT

Linux on a flash drive

Some Linux variants include a tool with which you can boot the operating system from a USB flash drive. As long as your computer's BIOS permits booting from a USB device, this can be a useful tool in the arsenal of any Windows troubleshooter.

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Figure 29-2 shows the Ubuntu computer browser, which you access at the top of the desktop, on the Places menu.

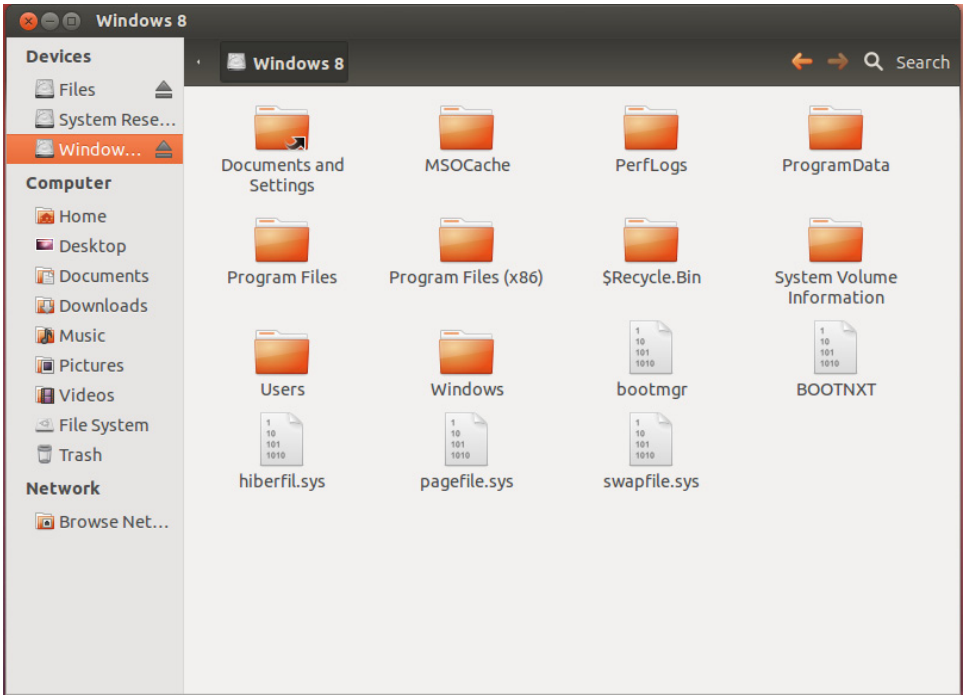

Figure 29-2 Accessing your Windows drive in Ubuntu

You can see all of your unencrypted hard disks and files from within Linux. This means that you can access your files through Linux and back them up to a DVD or to another location, such as a network hard disk or external USB hard disk. You can also use a Linux installation to restore Windows 8 on a file-by-file basis. See Chapter 28, "Restoring Windows from Another PC," for more information on how to do this; the process from within Windows and Linux is identical.

> **Note**
>
> **If any of your disks or partitions are encrypted by Windows Encrypted File System (EFS) or Microsoft BitLocker, they will not be readable from within Linux.**

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Figure 29-3 shows how some Linux distributions include advanced disk management and diagnostic tools. For example, in Ubuntu you can edit and work with drives, sometimes on a far more advanced level than Windows 8 allows.

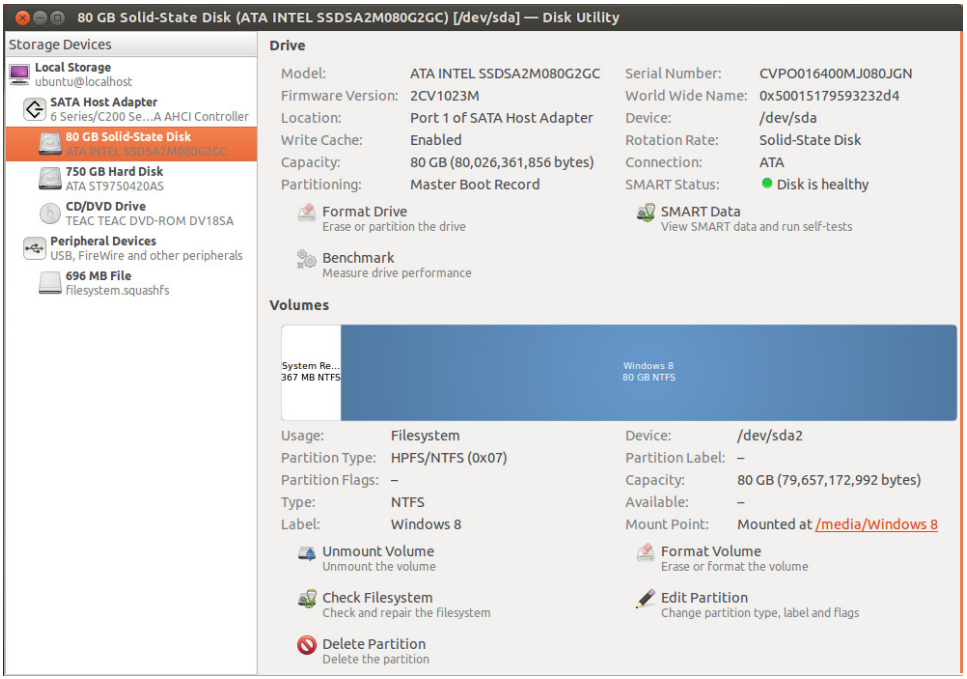

Figure 29-3 Managing drives in Ubuntu

You can commonly find some extremely useful tools in the Storage Devices panel, including some that even Windows doesn't support. These include being able to check the SMART Data for a hard disk, which can determine if the drive is faulty, and being able to make low-level changes to the partitions and file system.

You can also run disk file system checks similar to using the chkdsk command in Windows. Figure 29-3 shows the disk management console that you can access from the System menu at the top of the Ubuntu desktop by clicking Administration and then clicking Disk Utility. (This will vary from one Linux distribution to another.)

> **Note**
>
> **Because many hardware manufacturers do not support Linux, you might be unable to print any documents you need, such as copies of software or Windows product codes.**

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Figure 29-4 shows the Ubuntu partitioning utility. To access this, at the top of the desktop, click the System menu, select Administration, and then click GParted. (Again, this will vary depending on what Linux distribution you use.)

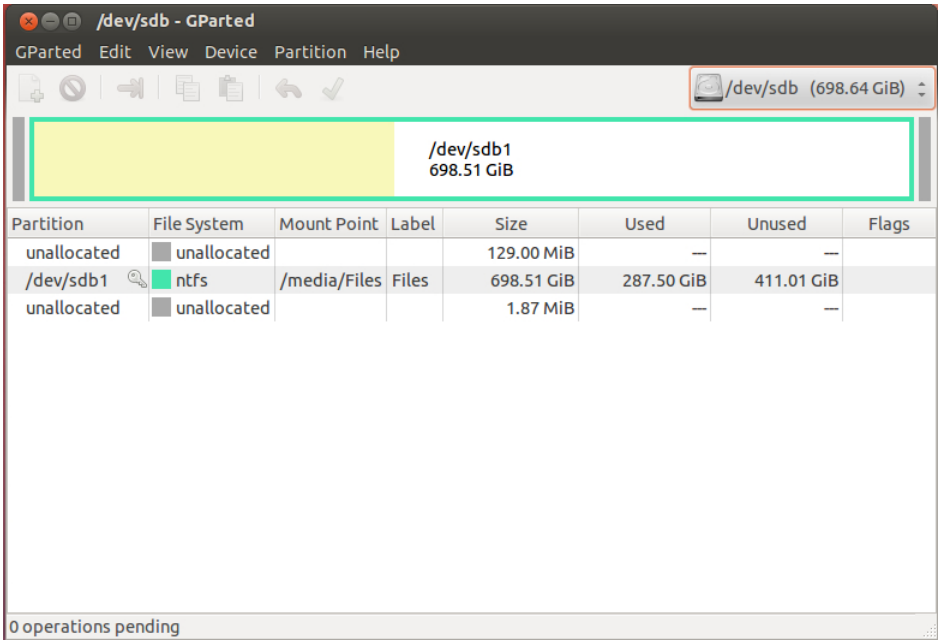

Figure 29-4 Managing partitions in Ubuntu

Many Linux distributions contain a disk partitioning tool. Sometimes, Windows 8 fails because the partition on which it resides has become corrupt. You might be able to repair the partition by using a Linux disk partitioning tool, or, if you have a System Image Backup of Windows 8, you can use Linux to delete the corrupt partition and create a fresh one in its place. You can then restore Windows 8 by booting from the Windows 8 installation DVD and restoring from an image backup by using Complete PC Restore.

CAUTION!

When you boot your computer from a Linux CD or DVD, you have full administrator access to Windows and data drives in your computer. Always be careful not to delete critical system files or data that is not backed up or that cannot be replaced.

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Rescuing the System Reserved Partition by Using Linux

One thing you can do from Linux but not from Windows itself is view the contents of the Windows 8 System Reserved partition. This is a hidden partition that the Windows 8 installer creates just before installation on which it stores the system boot files and other tools such as the system repair options.

You can view this entire partition in Linux (see Figure 29-5), which means that you can perform special operations such as making a backup copy of the entire partition of a healthy copy so that this can be restored in the event of a problem or error.

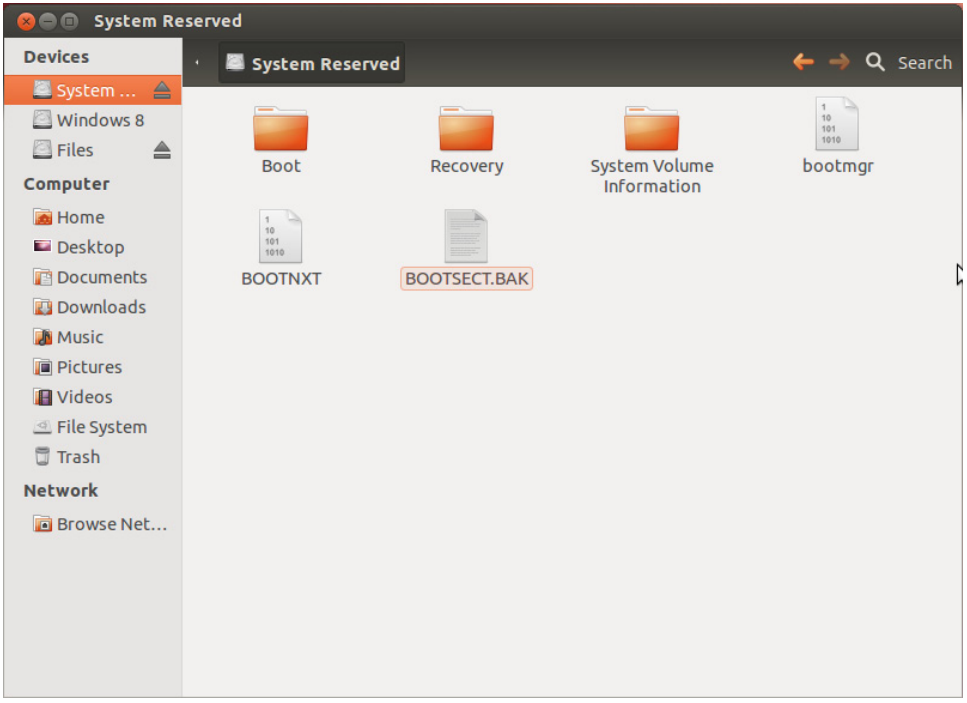

Figure 29-5 Working with the System Reserved partition

If you need to delete and rebuild the System Reserved partition, you need to ensure that it is created with the correct attributes. Figure 29-6 presents these attributes, which include the following:

- Partition Type: HPFS/NTFS (0x07)
- Partition Flags: Bootable
- Type: NTFS

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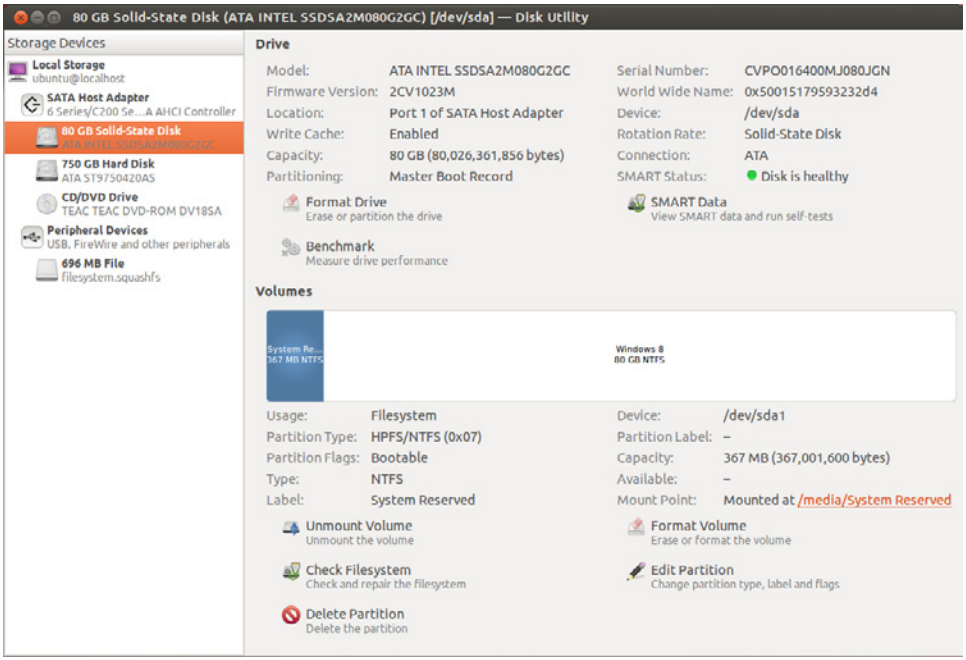

Figure 29-6 The properties of the System Reserved partition

INSIDE OUT

Backing up the System Reserved partition

You might think that only someone in an advanced state of paranoia would back up the Windows 8 System Reserved partition. But in actuality, it can be extremely useful to do so, because if this partition fails, you could find that only a clean reinstallation of Windows 8 will fix the problem. It's much easier to boot from a Linux CD and recreate the partition from a backup.

Useful Software in Linux

The software packages covered in this section vary in name, location, and availability depending on the version (distro) of Linux you are using. However, some are very useful tools in the operating system if you have access to them.

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Remote Desktop

Some Linux packages include remote access software similar to Remote Desktop in Windows, as shown in Figure 29-7. You can use the Linux version of the remote desktop software to allow a remote support person access to your computer so that they can help diagnose and repair problems with Windows 8. The remote support person might need to be running the same version of Linux that you are, but other operating systems and some third-party remote desktop packages are compatible.

INSIDE OUT

Connecting to the Internet in Linux

Hardware driver support for Linux is not as widespread as it is with Windows. You might be unable to get online if you use Wi-Fi on your computer, especially if you connect through a USB dongle. If you intend to use a USB dongle with Linux, from a working computer with Internet access, first visit the manufacturer's website for the USB dongle and see if it supplies a Linux driver that you can install from a CD or flash drive. The best way to get online when using a Linux disc is via a physical network cable.

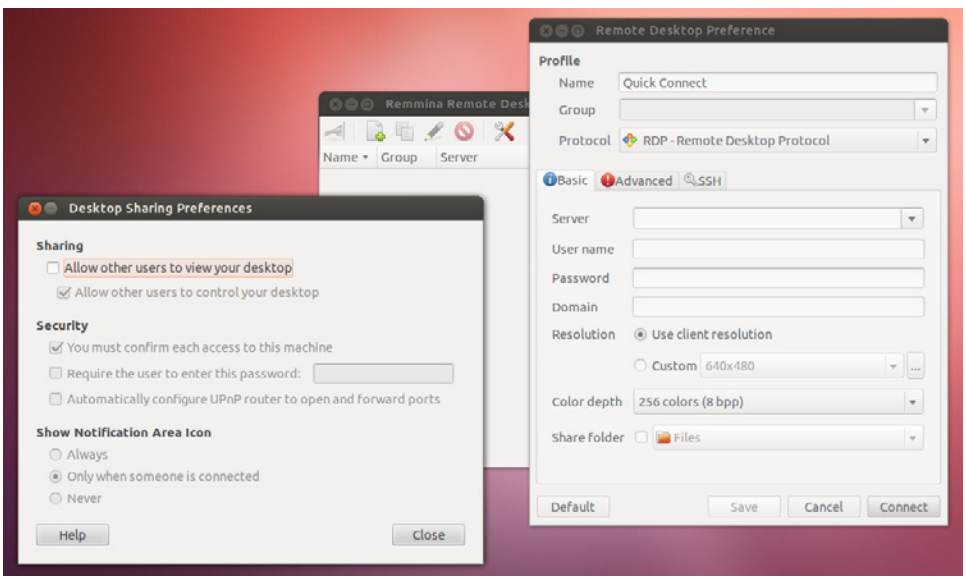

Figure 29-7 Remote Desktop in Ubuntu

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System Monitor

System Monitor in Ubuntu, as in many Linux distributions, is very similar to the live System Monitor in Windows (see Figure 29-8). System Monitor provides live details of CPU, memory, and network activity on a computer. This can be useful for helping to diagnose hardware errors; for instance, it can help determine if you are having difficulty getting online because of networking problems.

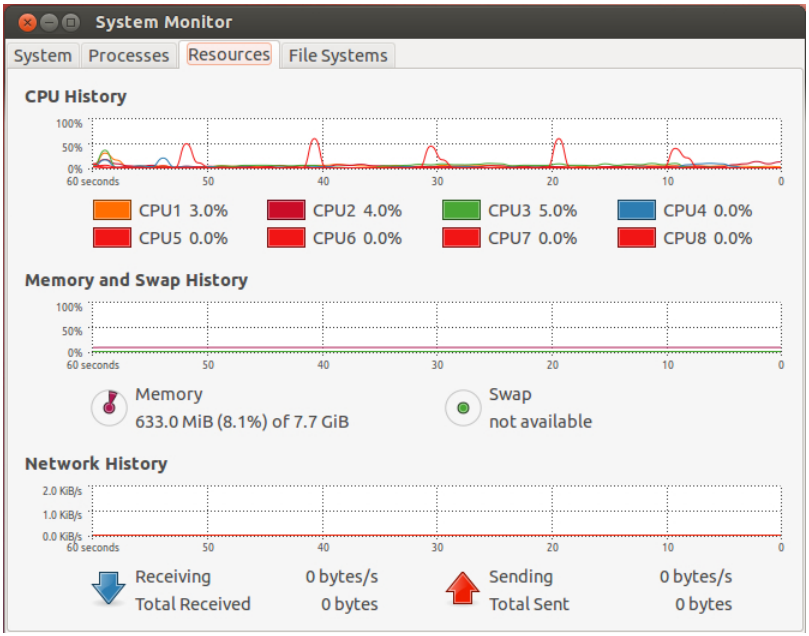

Figure 29-8 The System Monitor in Ubuntu

System Testing

Some Linux distributions come with advanced system testers, such as the one shown in Figure 29-9. These will test many aspects of computer hardware to find and diagnose problems. The system tester in Ubuntu is an excellent example. It tests every aspect of the hardware and guides you through automated diagnostics with a helpful, wizard-based interface.

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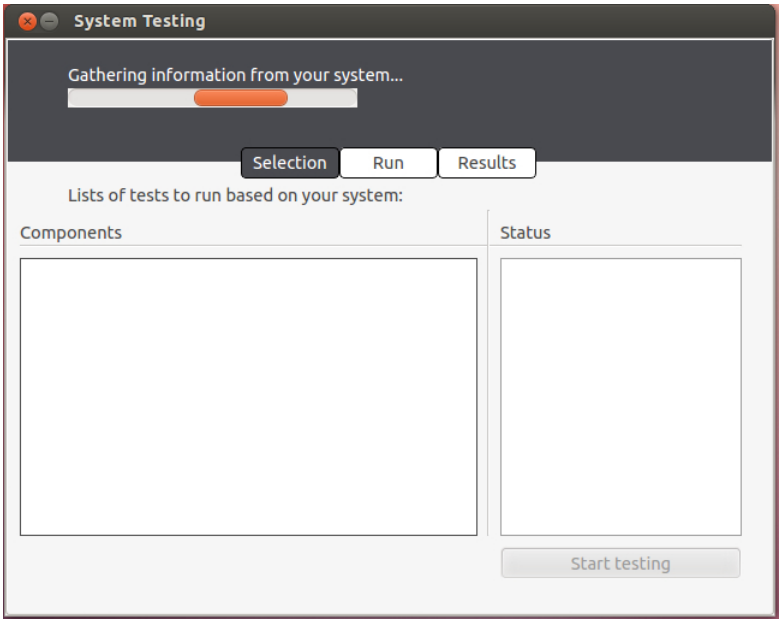

Figure 29-9 The system tester in Ubuntu

CD and DVD Burning in Linux

All Linux distributions come with CD and DVD burning software standard. If you've lost your Windows 8 installation DVD but still have an image of the disc (or of your System Repair Disc), you can use Linux burning software to make another copy of the Windows disc (see Figure 29-10).

INSIDE OUT

Keep an ISO copy of your Windows installation DVD

It is an excellent idea to keep a backup ISO (disk image) of your Windows installation DVD in case you damage or lose your original DVD. A quick online search will reveal a great many software packages (some free) with which you can create a backup ISO.

You can also burn new Windows installation discs from ISO files from within Windows 8 by double-clicking the ISO file to open the ISO Image Burner.

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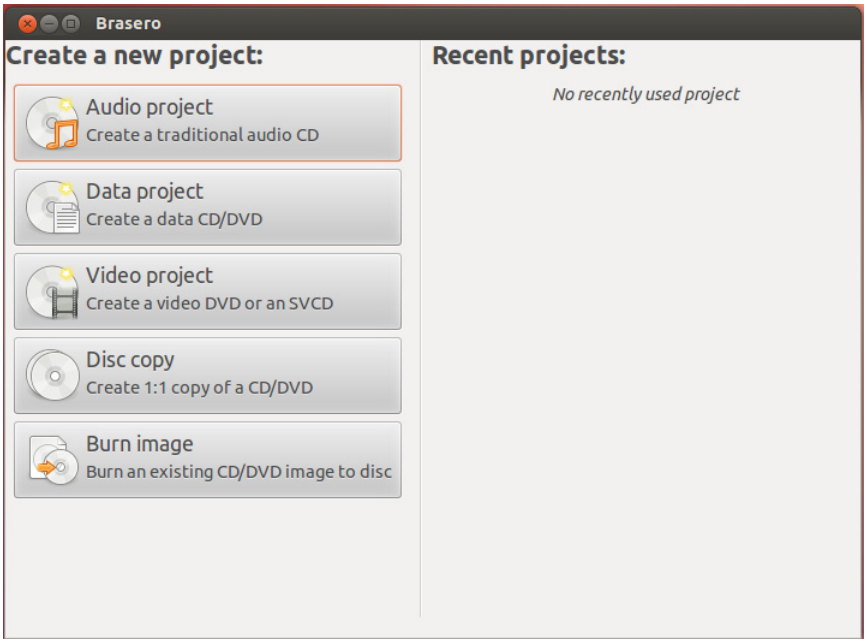

Figure 29-10 Burning a CD or DVD in Linux is pretty easy

Compatible Linux Operating Systems to Run from a Disc

You can find the list of the best and most popular Linux distributions *www.linux.org*. They include those presented in the following subsections.

Ubuntu

www.ubuntu.com

Ubuntu is the Linux variant that I have used to demonstrate Linux throughout this chapter (it appears in Figures 29-1 through 29-10). I used Ubuntu because it's widely considered to be one of the most user-friendly Linux variants and is shipped with some new computers by companies such as Dell.

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Other Variants of Linux

A few other variants of Linux include the following:

- **Debian** *www.debian.org*
- **SuSe** *en.opensuse.org*
- **Fedora** *www.fedoraproject.org*
- **Knoppix** *www.knoppix.com*

Creating a Linux Installation Disc or Pen Drive

All downloadable Linux variants are available as ISO files. Windows 8 now supports these natively, which means that you can burn them to a CD or DVD. To burn an ISO file to a CD or DVD in Windows, simply double-click the file, select the appropriate disc burner, and then click Burn. Note that not all computers come with disc burners these days, especially ultrabooks and tablets (see Figure 29-11), so you might need to obtain a USB-attached disc burner.

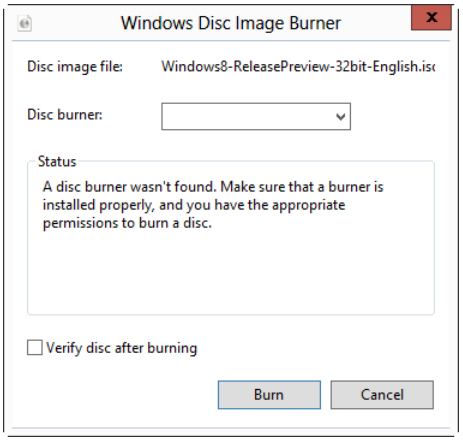

Figure 29-11 Burning a disc image file to CD or DVD in Windows 8

You should check online for the latest utility to write a bootable ISO file to a USB pen drive. Note that if you want to boot your copy of Linux from a USB pen drive, you should check that the computer's BIOS or UEFI firmware supports booting from a USB device and that this is set in the boot order, as shown in Figure 29-12.

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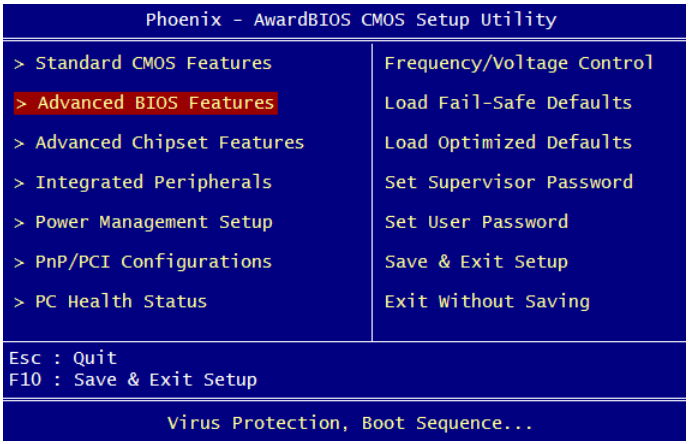

Figure 29-12 Setting the boot options in the BIOS

Summary

Linux is a full operating system in its own right, and, with modern distributions such as Ubuntu, can keep you working if your copy of Windows fails. Although Linux is not as popular because most people prefer the familiarity of Windows, it can be extremely useful when rescuing or repairing a Windows system.

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CHAPTER 30

Using Third-Party Rescue Tools and Services

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Other Third-Party Services 512

There are a huge number of third-party rescue and recovery tools available for Windows 8. These tools vary considerably in price, from free to hundreds of dollars. They can also vary considerably in quality and functionality. This can make it very difficult for you to choose the best recovery and rescue option. In this chapter, I will highlight some of my favorite software and packages that have received general acclaim.

SysInternals

technet.microsoft.com/en-US/sysinternals

This suite of programs, written by a Microsoft employee who transferred from the company that created it, is so good that Microsoft bought it and adopted it as an official tool. There are dozens of high-quality tools in the suite, but some are so good, they're worth highlighting here.

AccessEnum

This tool shows you what access users on a computer have to directories, files, and Registry keys. This is very useful if you're troubleshooting file access.

Autoruns

You can use this tool to see what programs are set to run on your computer automatically at Startup. It provides very detailed information about the programs, including Registry key locations and file locations.

BgInfo

This tool automatically adds information to your Windows desktop wallpaper, such as your computer's IP address, name, details about network adapters, and more.

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Desktops

If you've ever wanted virtual desktops in Windows, like the ones in GNU/Linux operating systems, wherein you can switch between different desktops, each displaying their own programs, this utility can provide them for you.

Disk2vhd

This tool can assist you in turning physical disks in virtual machines.

DiskMon

A disk activity monitor that captures and reports on all disk activity. This is useful if you suspect there is a problem with a hard disk or solid-state drive (SSD).

EFSDump

This tool can display information about encrypted EFS files on a computer.

ListDLLs

This tool displays information about every Dynamic-Link Library file (DLL) running on your computer, including their version numbers.

LoadOrder

With this tool, called LoadOrd.exe, you can see in which order Windows loads device drivers.

MoveFile

This is a tool with which you can schedule file move and delete commands until the next time the computer reboots. This can be useful for removing malware.

Process Explorer

You can use this tool to see what files, registry keys, and programs have processes open, what DLLs they are using, and more.

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Process Monitor

With this tool, you can keep an eye on file system, Registry, processes, and other activity on your computer in real time. This can be useful if you are trying to find the cause of a complex problem.

RAMMap

This is a memory usage analysis tool that can display data in several different ways for diagnosis and reporting.

RootkitRevealer

You can use this to scan your computer for Rootkit viruses.

SDelete

With this tool, you can securely delete files and folders, and clean free space on your hard disk.

GRC SpinRite

www.grc.com

For some years, GRC SpinRite has been widely considered one of the best, if not the best, hard disk rescue and maintenance tool available. SpinRite is a DOS program that runs from a bootable CD, DVD, or other device such as a floppy disk or USB pen drive. Because you boot your computer into SpinRite, the software has full low-level administrator access to the hard disks on your computer.

SpinRite can perform a broad range of checks on your hard disk(s) and includes the following features.

- A real-time graphical status display, showing the health and status of your hard disk (see Figure 30-1). This graph displays data and disk recovery and repair as it happens. All events are also logged so that you can review them later.

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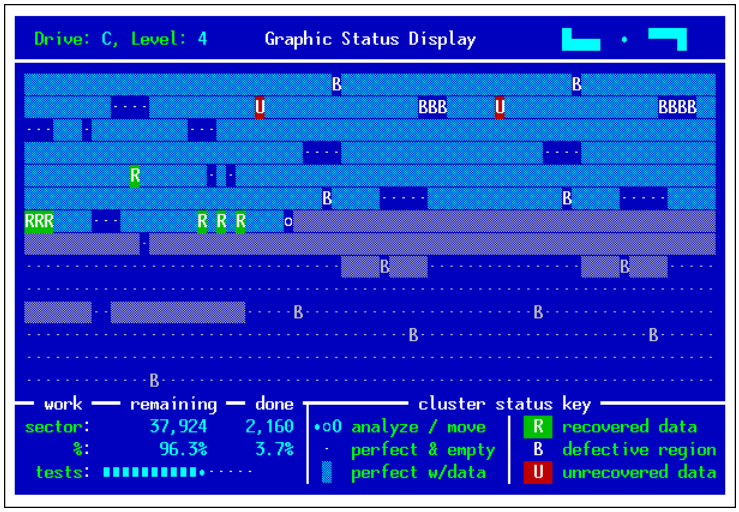

Figure 30-1 A graphical log of the state of a hard disk in SpinRite

- Detailed technical logs of the hard disk (see Figure 30-2). The error information these logs provide includes clear descriptions that can help you to determine exactly where errors are located and what they are. GRC boasts about the clarity of the language they use when providing reports on your hard disks, and I can confirm that the quality of the information SpinRite delivers is excellent, indeed.

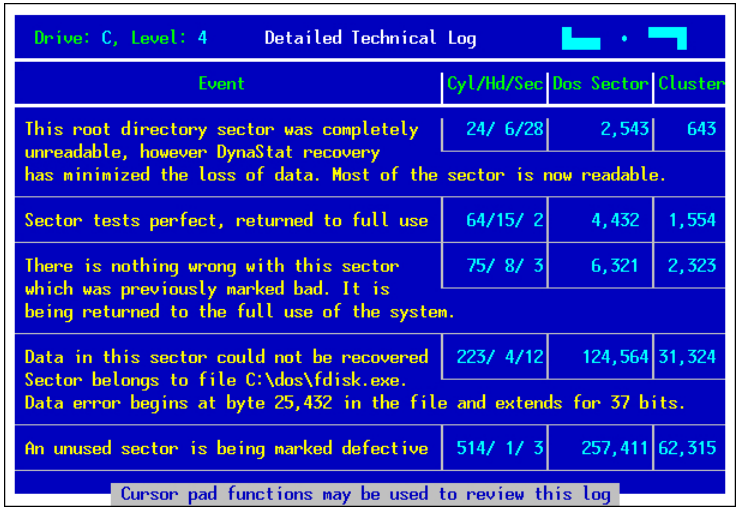

Figure 30-2 Detailed technical information about your hard disk displayed in SpinRite

- The Surface Analysis Monitor, which uses exhaustive techniques to detect defects on the hard disk (see Figure 30-3). It deliberately creates scenarios on your hard disk to

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try to replicate the worst types of failure that can occur. This is an extremely thorough way to check for defects.

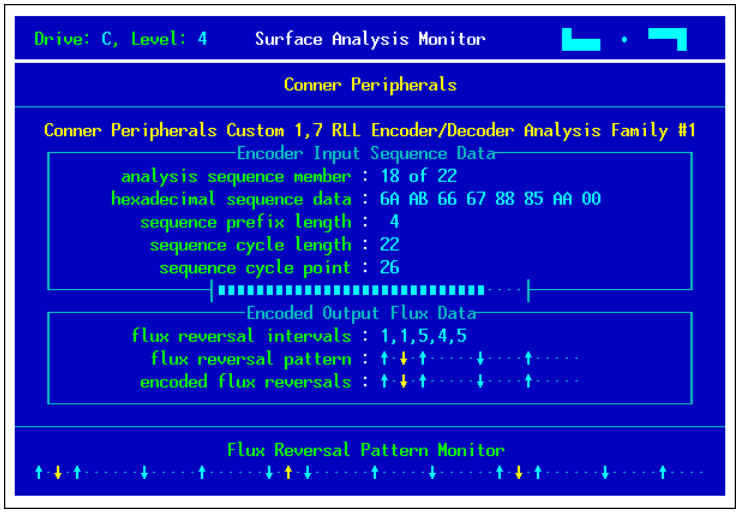

Figure 30-3 Comprehensive disk error checking tools in SpinRite

- Extensive data recovery tools that work tirelessly to recover your data. A special tool called Dynastat appears if SpinRite has trouble reading data on a faulty hard disk. This tool provides more detailed information in real time about the software's attempts to recover your files and data (see Figure 30-4).

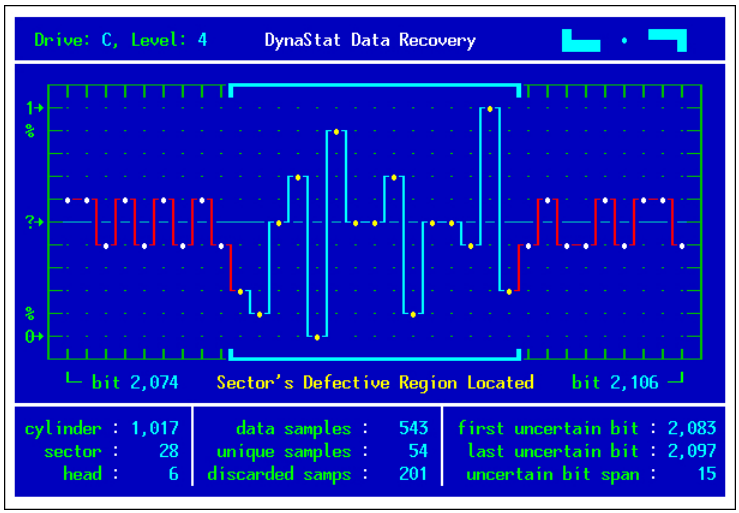

Figure 30-4 SpinRite gives up trying to recover your data only when you do

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- Detailed information about the existing partition structure on hard disks. SpinRite also checks partitions for errors (see Figure 30-5).

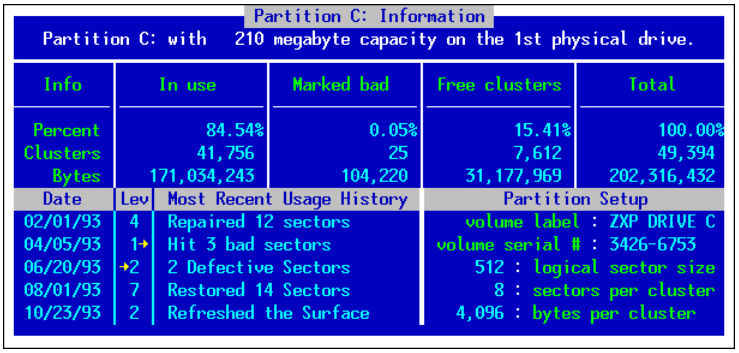

Figure 30-5 SpinRite checks existing partitions on a disk for errors

Finally, SpinRite supports an extensive range of different drive formatting options. In all, this is an invaluable tool for diagnosing and repairing errors on physical hard disks. and it is, as I have said, held in high regard within the technical community.

INSIDE OUT **SpinRite and SSDs**

SSDs operate differently than mechanical hard disks in that there are no moving parts; they store all of your data on silicon chips, not a spinning disk. Therefore, SpinRite is not the best tool for diagnosing errors on these types of storage devices.

Other Third-Party Tools

Many companies provide specialist software for rescuing data or hard disks, and you should try the forums mentioned in Chapter 23, "Finding More Help and Support," for recommendations. Here are details of packages that I recommend.

Ashampoo WinOptimizer

www.ashampoo.com

Although Ashampoo WinOptimizer traditionally has not been used as a tool for rescuing a hard disk or data, it now incorporates a small tool that can help you to do just that. This

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tool analyzes your hard disk(s) looking for defective areas or problems. It provides tools that can then be used to apply automatic repairs and fix some of the more common problems that you might encounter.

CCleaner

www.piriform.com/ccleaner

What would a list of recommended third-party tools be without CCleaner? This is the disk cleanup tool for professional computer users. In all my experience, I've never seen another disk and registry cleanup program as loved and highly regarded as this one.

Disk Digger

www.hiren.info/downloads/freeware-tools/diskdigger

Hiren and Panka have a great many excellent tools available on their home page, including the excellent BootCD. Disk Digger is a useful file and data recovery tool, though, that can scan any kind of storage media, from hard disks to USB flash drives and digital memory cards, to recover lost and deleted files.

O&O Disk Recovery

www.oo-software.com

O&O Disk Recovery is a comprehensive package that performs several useful functions. The most commonly used of these is an unerase program to help recover files and folders that have been accidentally deleted. There are also other functions within the software that can provide recovery in scenarios such as the accidental formatting of a hard disk. This can be extremely useful because with Windows 8, it can be annoyingly simple to accidently format disks.

This software can be useful for rescuing data or a faulty hard disk in your computer. You can even remove a hard disk from your computer, plug it into another computer, and then run these rescue tools on it.

Toolwiz Care

www.toolwiz.com

This is another all-in-one computer optimizer that is, according to its makers, the "ultimate speedup solution." This is a highly regarded and recommended free download to help optimize your computer quickly and simply with just a single click.

www.it-ebooks.info

Ultimate Boot CD

www.ultimatebootcd.com

This is another excellent tool that combines many diagnostic, repair, and data recovery tools into a single bootable disc image. The number of tools that come in this disc image is just staggering and include some of the best and most useful utilities available.

WhoCrashed

www.resplendence.com/whocrashed

When you get a Blue Screen of Death (or as it's known now, the Blue Unhappy Emoticon of Death), you will want to know what crashed and why, and sometimes the standard event logging and the code displayed on the blue screen don't help. This is where WhoCrashed comes in handy. This program examines the crash logs for your computer in detail and can pull out much more meaningful information about the problem than you can find yourself.

Other Third-Party Services

At some point, you might reach the stage where there's nothing more you can do with your hard disk. If it includes critical data that you must recover, you will need to go to a professional data-recovery specialist.

These companies offer extremely comprehensive services, and they can be hugely successful at recovering data from damaged hard disks, but they are not inexpensive.

You can find data recovery specialists in your area by searching in your local telephone directory online or through a search engine.

Summary

The best way to ensure that you can always rescue your files and data is to have at least one backup copy that is regularly refreshed. Windows 8 provides a tool with which you can do this, and there are also many third-party tools that can do the same thing. You can read more about backing up your files and data in Chapter 6, "Optimizing Backup and Restore."

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CHAPTER 31

Working Safely with Windows 8 Encryption

Encrypted File System 513
Bitlocker and Bitlocker To Go 530
Creating a Copy of Encrypted Data 534

Sometimes, you might encounter a situation in which the files and data you are trying to recover are encrypted. Windows provides some tools to aid with unlocking data, but you will need access to the recovery keys specific to the locked data. Windows 8 offers several methods for encrypting files, data, and even entire hard disks.

Encrypted File System

The Windows Encrypting File System (EFS) has been around for more than a decade. It is used to provide file and folder encryption for individual users; for instance, consider the scenario in which two people share a computer and store their files on a different hard disk or partition to their Windows installation, but want to keep their files private from one another.

EFS employs a public/private key encryption method similar to that used by the popular Pretty Good Privacy (PGP) encryption software. It also utilizes methods used by digital certificates to send and receive personal information over the Internet. This public/private key encryption technique uses two keys, one stored on the computer and another to which the user has access.

You need to carefully configure EFS to avoid losing access to your files if something goes wrong with Windows.

INSIDE OUT **EFS and removable drives**

EFS encryption works only on drives formatted with New Technology File System (better known as NTFS). This means that if you copy any encrypted files to a non–NTFS-formatted device, such as a FAT 32–formatted external hard disk or an exFat-formatted USB pen drive, the encryption on those files will be removed when they are copied.

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Setting Up EFS

To configure EFS, perform the following procedure:

1. Right-click the file(s) or folder(s) you want to encrypt, and then in the settings panel that opens, click Properties.
2. On the General tab, click Advanced.
3. In the Advanced Attributes dialog box, select the Encrypt Contents To Secure Data check box, and then click OK.

   When prompted, ensure that you apply the action to the folder and all files and subfolders, as demonstrated in Figure 31-1.

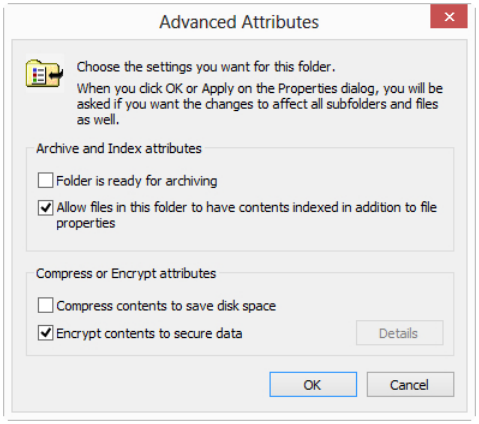

Figure 31-1 Encrypting files and folders by using EFS

The files and folders will be automatically encrypted. When this process is complete, a message in the taskbar notification area prompts you to back up your file encryption key (see Figure 31-2).

CAUTION!

If you do not back up your file encryption key to a safe location, you might never be able to access your files again if you need to reinstall Windows 8.

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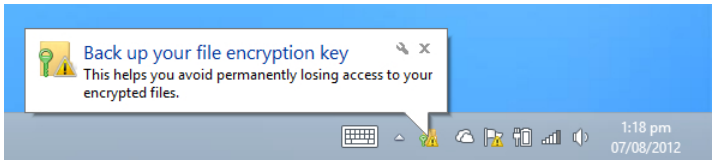

Figure 31-2 Windows alerts you to back up your encryption key

You can choose to back up your key immediately or Windows can remind you to do so the next time you log on. I recommend you make a backup immediately.

4. Click Back Up Now (Recommended), as illustrated in Figure 31-3.

Figure 31-3 You should back up an EFS key immediately

The Certificate Export Wizard opens, as shown in Figure 31-4.

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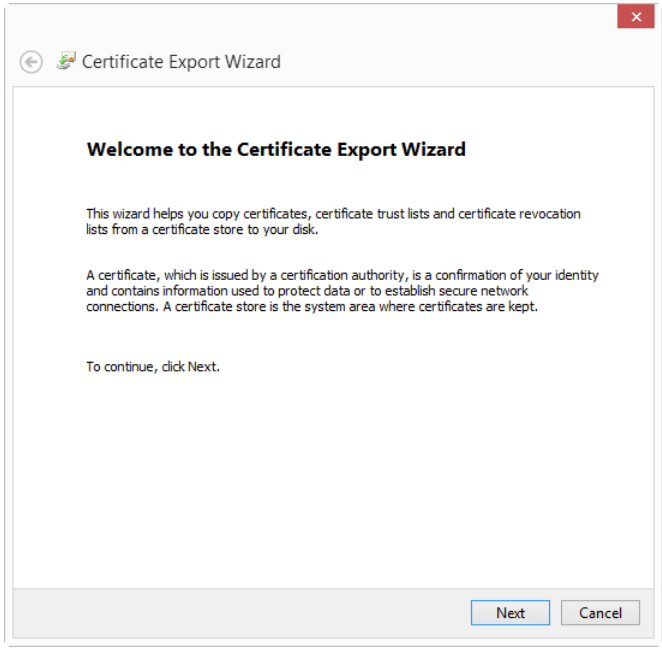

Figure 31-4 The Certificate Export Wizard

5. Click the Next button to go to the Export File Format page, as shown in Figure 31-5.

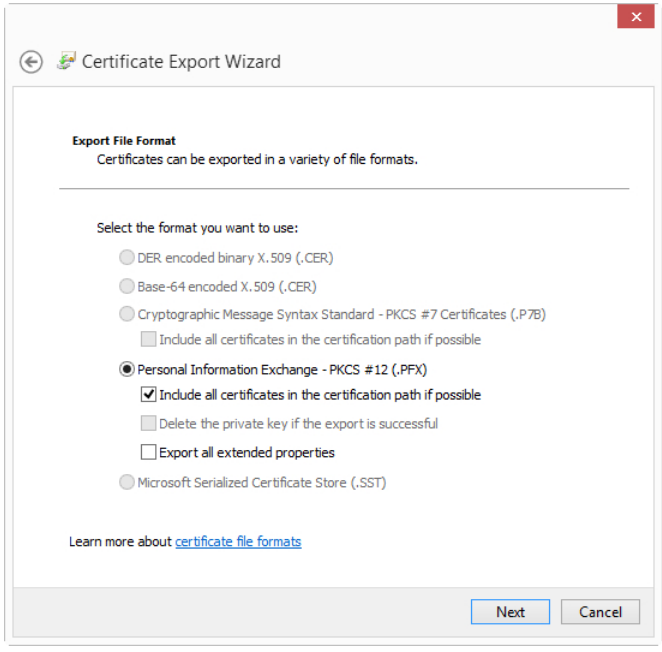

Figure 31-5 Choosing what to back up with EFS

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On this page, you select the preferred file format for your backup file. The standard options will probably serve your needs, but Windows 8 does offer additional options for the backup copy of your file encryption key. Here, you can choose what aspects of your security key you want to back up.

6. Set a password for your backup, as shown in Figure 31-6.

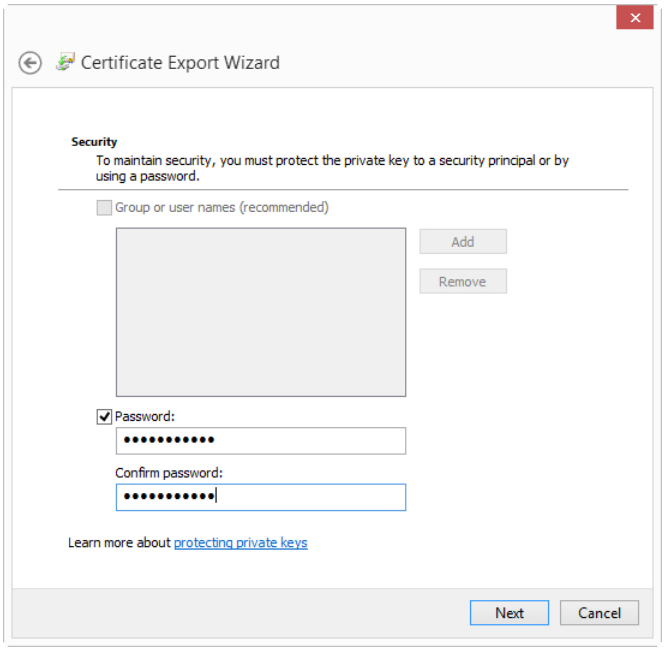

Figure 31-6 Protecting your EFS key with a password

You won't need to enter this password to read encrypted files, but you will need it if you must restore the file encryption key. You should not lose a record of or forget this password.

7. Enter a file name and specify where to store your backed-up file encryption key, as illustrated in Figure 31-7.

Ensure that the backup is kept in a safe location and that you have more than one copy.

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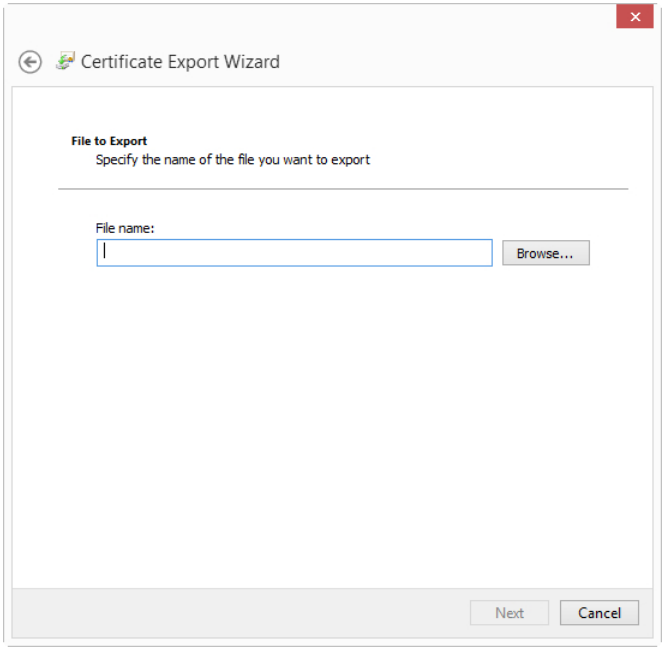

Figure 31-7 Be careful where you store your backed-up EFS key

CAUTION

Once, while performing the last step of the preceding procedure, I mistakenly backed up my file encryption key to a folder that was encrypted by using EFS. Windows won't prevent you from doing this, so be careful. Any key backed up to an encrypted drive will not be accessible if something goes wrong or if you have to reinstall Windows.

Your files and folders will now be encrypted. By default, encrypted files display in a different color in File Explorer (see Figure 31-8), but you can turn this off by going in the Control Panel and clicking Folder Options.

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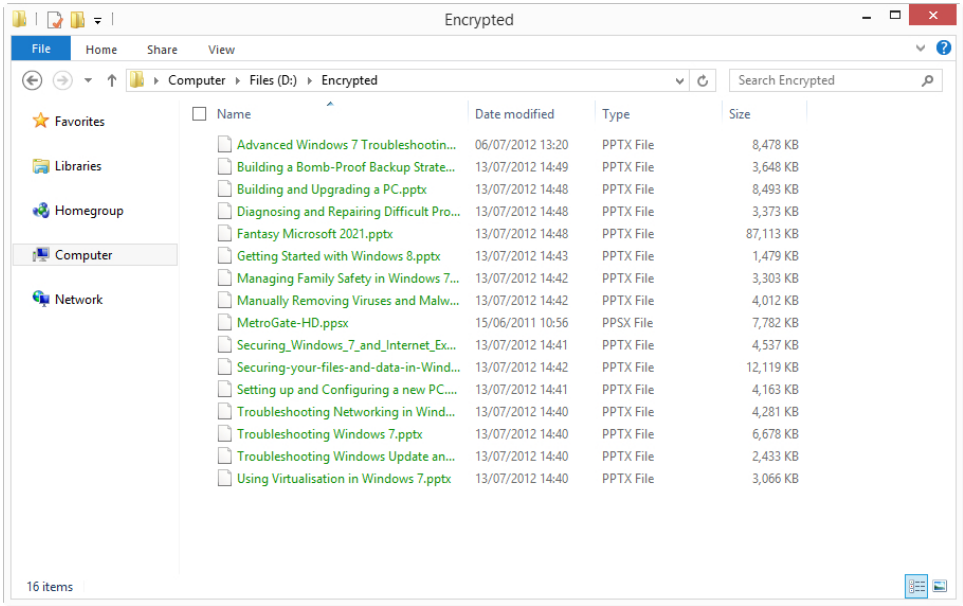

Figure 31-8 Encrypted files appear in a different color in File Explorer

INSIDE OUT

EFS and user passwords

EFS does not require that a user password be set up on your Windows account; however, it provides no protection if your user account is not password protected because anyone can log on to it and have unrestricted access to the files.

Restoring an EFS Key

If you have to reinstall Windows 8, perhaps because of a critical error, your EFS-encrypted files are unreadable until you restore your EFS encryption key by performing the following procedure:

1. Double-click the backup EFS encryption key to open it.

   The Certificate Import Wizard opens and you are asked if you want to import this key for the current user or the entire computer, as depicted in Figure 31-9.

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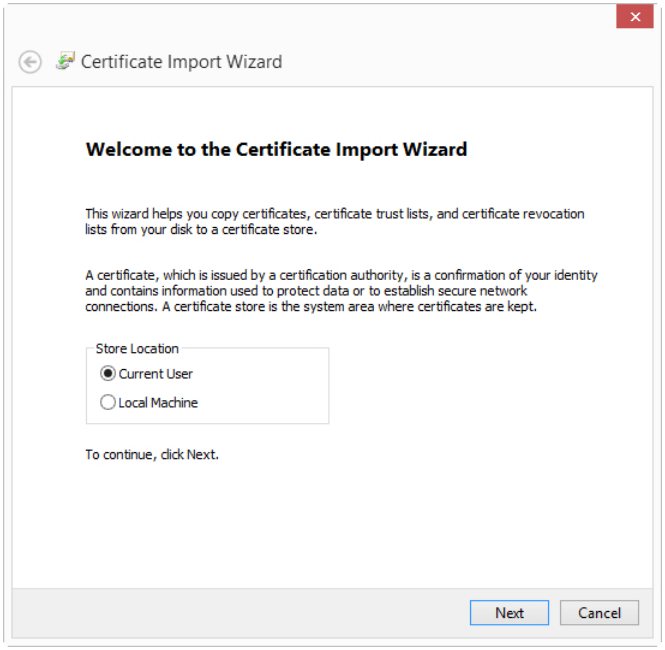

Figure 31-9 The Certificate Import Wizard

2. Confirm the location of the EFS key, enter the password you set when you created the EFS encryption key, and then click Next, as demonstrated in Figure 31-10.

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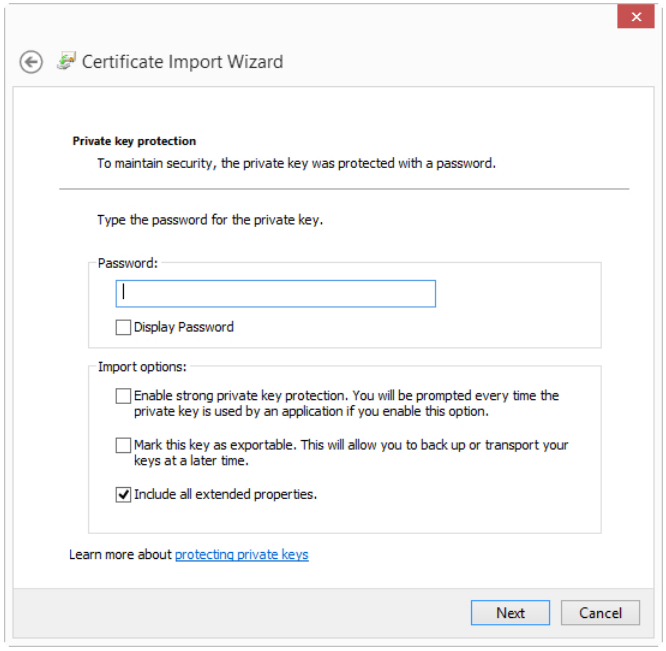

Figure 31-10 Importing an EFS key

3. Restore the certificate to the default store in Windows 8 (see Figure 31-11) or to a different location if your network requires this.

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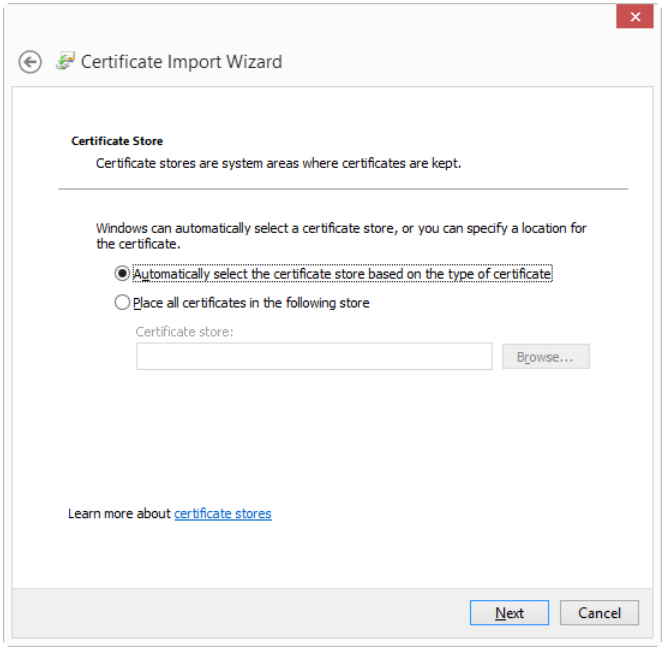

Figure 31-11 The default certificate store is best for a stand-alone computer

The EFS encryption certificate is restored, and you will again have access to your files and data.

INSIDE OUT

When might you need to restore your EFS key?

If the Windows default password store becomes corrupt, you will need to restore your EFS key. Or, if someone tries to forcibly reset your password to access your files and folders, the system will lock out the EFS-encrypted files until you can restore the correct key.

Turning EFS Off

You might want to turn off EFS encryption for files or folders after it has been set up. To do this, you use almost the same procedure as when you set up the encryption.

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1. Right-click the file(s) and folders(s) you want to decrypt, and then in the settings panel that opens, click Properties.
2. On the General tab, click Advanced.
3. In the Advanced Attributes dialog box, clear the Encrypt Contents To Secure Data check box and then click OK. When prompted, ensure that you apply the action to the folder and all files and subfolders.

EFS Certificates

If your encryption key is damaged or lost, you might be able to recover your files and folders by using an encryption key certificate. You can create one of these when you encrypt your files or at any time thereafter by performing the following procedure:

1. Press Windows logo key+X to open the Administration menu and then click Command Prompt (Admin).
2. Navigate to the folder on a spare hard disk or removable storage device where you want to store your EFS certificate.

   To do this, type the drive letter, followed by a colon. For example, type **E:** to move to the E drive and then use the **CD** command to move to the correct folder. Thus, to move to the Backups folder in the Files folder, type **CD Files/Backups**.
3. Type **cipher /r: *file name***, where *file name* is the name you want to assign to the backed-up EFS certificate, and then press Enter.

Windows creates a backup of the EFS certificate, which can be restored by performing the following procedure:

1. On the Start screen, search for **secpol.msc** and run the secpol (Security Policies) program when it appears.
2. In the left pane of the Local Security Policy window that appears, expand the Public Key Policies section, right-click Encrypting File System, and then in the options panel that opens, select Add Data Recovery Agent (see Figure 31-12). Use the wizard that opens to select and install the EFS certificate.

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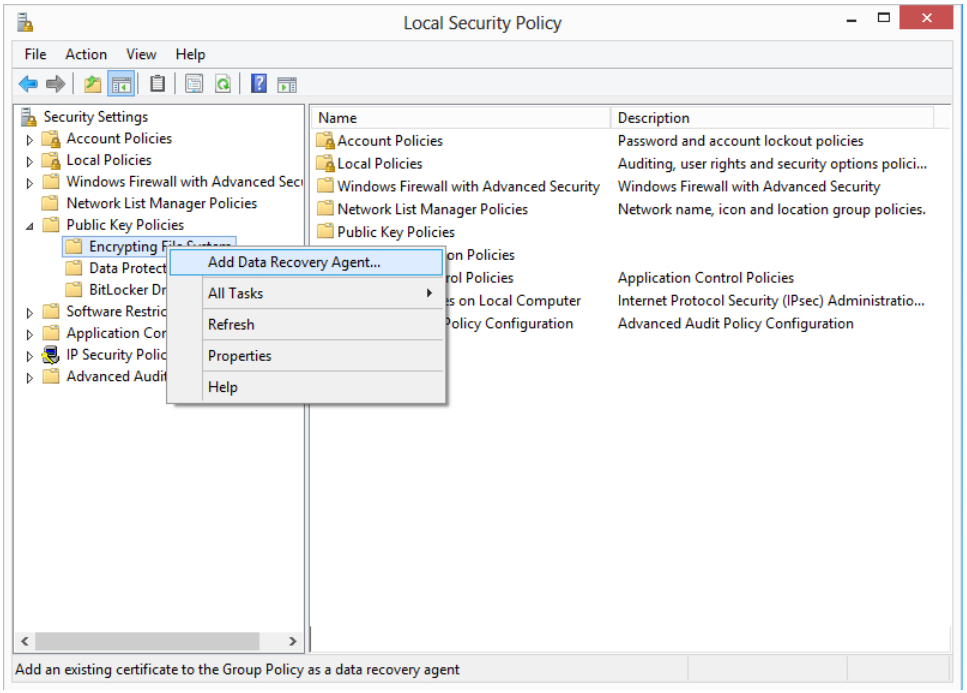

Figure 31-12 The Local Security Policy panel

3. Press Windows logo key+X to open the Administration menu and then click Command Prompt.

4. Type **gpupdate** and then press Enter to update the current Group Policies.

Smart Cards and EFS Certificates

If you use a smart card with EFS to access your data, you will need to back up the certificate for your smart card. To do this, perform the following procedure:

1. Open the Start screen and search for **mmc**. In the search results, click Microsoft Management Console (MMC).

2. On the File menu, click Add/Remove Snap-In, as demonstrated in Figure 31-13.

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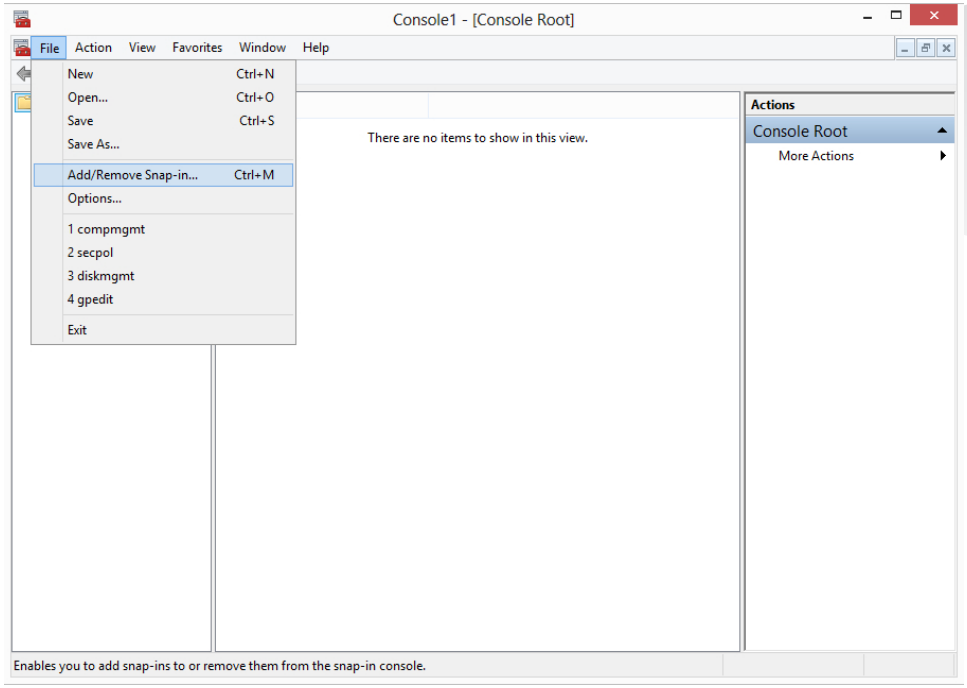

Figure 31-13 The Microsoft Management Console

3. In the left pane, click Certificates, click Add, and then click OK, as shown in Figure 31-14.

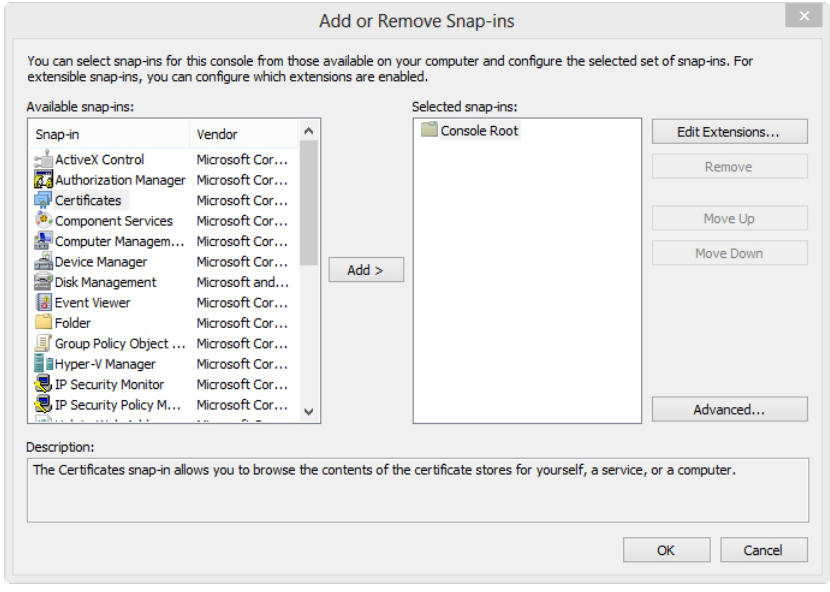

Figure 31-14 Adding a Snap-in to the MMC

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4. In the Certificates Snap-In dialog box, select the Computer Account option and then click Next, as illustrated in Figure 31-15.

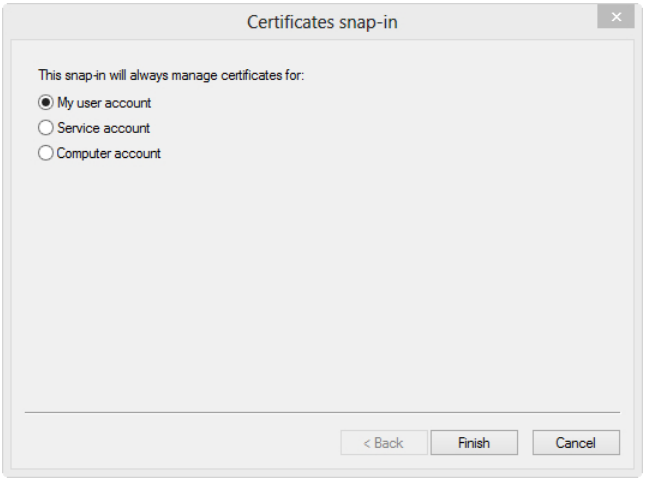

Figure 31-15 Select Computer Account in the Certificates Snap-In dialog box

5. In the Select Computer dialog box, ensure that the Local Computer option is selected and then click Finish, as depicted in Figure 31-16.

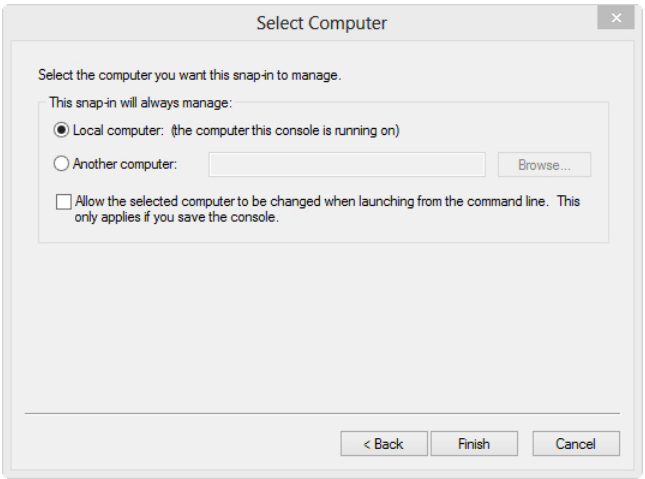

Figure 31-16 You have now added the snap-in

6. Certificates appear in the Selected Snap-Ins section (see Figure 31-17). Click OK to exit this window.

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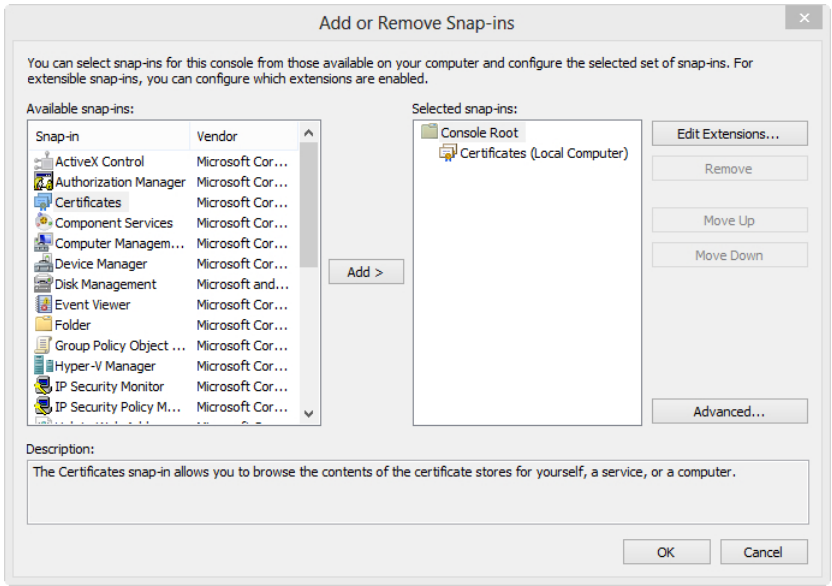

Figure 31-17 Viewing the installed MMC Snap-ins

7. In the main MMC window, click Certificates.
8. Under the Intended Purposes section, click the certificate that lists Encrypting File System. If there is more than one, click them all.
9. On the Action menu, click All Tasks and then click Export.
10. In the Export Wizard that opens, click Export Private Key.
11. Click Personal Information Exchange and then click Next.
12. Assign a password for this file—*don't forget this password*.

    A prompt appears, asking you where you want to save your backed-up security certificate.
13. Specify the location to which to back up your security certificate and then click Finish.

To restore your security certificate, follow steps 1 through 6 in the preceding procedure, and then perform the following steps:

1. On the Action menu, click All Tasks and then click Import.
2. Click Next and navigate to the location of your backed-up security certificate. In the list next to the file name box, select Personal Information Exchange.

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3. Type the password you set when creating the certificate and then finish the wizard.

The File Encryption Certificate Manager

On the Start screen, type **file encryption**, and then in the search results, click to open the File Encryption Certificate Manager, as shown in Figure 31-18.

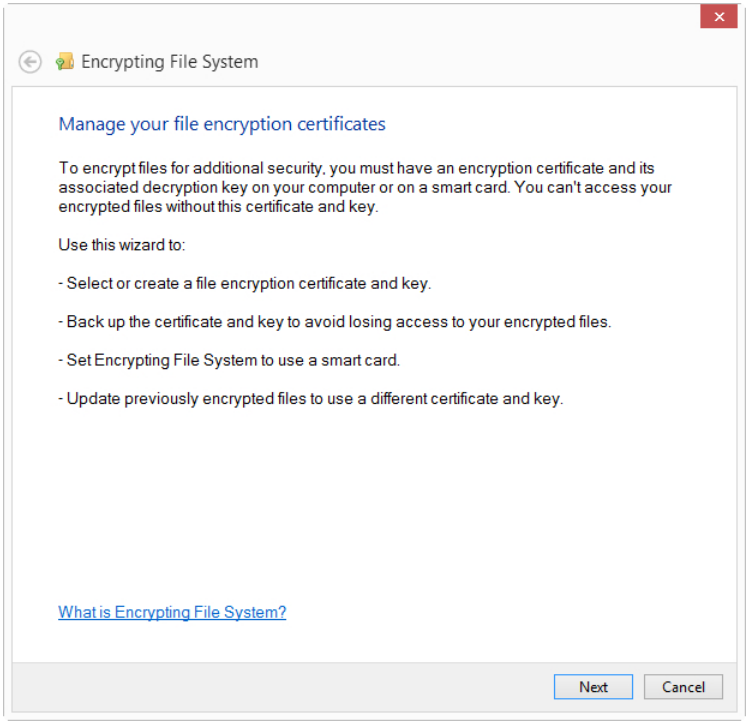

Figure 31-18 Managing your file encryption certificates in Windows 8

Using this dialog box, you can view, back up, update, and restore EFS certificates in Windows 8 via a friendly interface; however, you might not find it as powerful or flexible as the methods described previously in this chapter.

Recovering EFS-Encrypted Files

You should always keep a copy of your EFS encryption key and your password safe. If you lose the backed-up copy of your key, you won't be able to gain access to your files, and if you lose your password, you won't be able to restore the key.

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Although EFS is very secure—it employs a 256-bit Elliptic-Curve Cryptographic (ECC) algorithm cipher to secure your data—it might still be possible to recover your password by purchasing special software or by taking your computer to a computer security specialist. The following are two examples of software that you can use to recover a password.

Advanced EFS Data Recovery

www.elcomsoft.com/aefsdr.html

Advanced EFS Data Recovery is sophisticated software for cracking EFS passwords. The company claims that even if data is damaged or if someone has attempted to tamper with the encryption key, it can still recover data.

EnCase Forensic

www.guidancesoftware.com/computer-forensics-ediscovery-software-digital-evidence.htm

EnCase Forensic is password-cracking software for EFS drives and much more. EnCase Forensic includes a full suite of analysis, bookmarking, and reporting features.

Cipher.exe

Cipher.exe is a command-line tool in Windows 8 that you can access by opening the Start screen and typing **CMD** or **command**. In the search results that appear, right-click Command Prompt or CMD and then run the Command Prompt as an Administrator.

Cipher is a powerful tool for managing encryption and decryption in Windows 8. You can access a list of switches that you can use with the program by typing **cipher /?** into the Command Prompt window (see Figure 31-19).

One of the most useful features of Cipher in Windows 8 is the ability to completely and securely wipe data from a hard disk. This is a very powerful capability and must be used with caution because you cannot later recover files that have been wiped.

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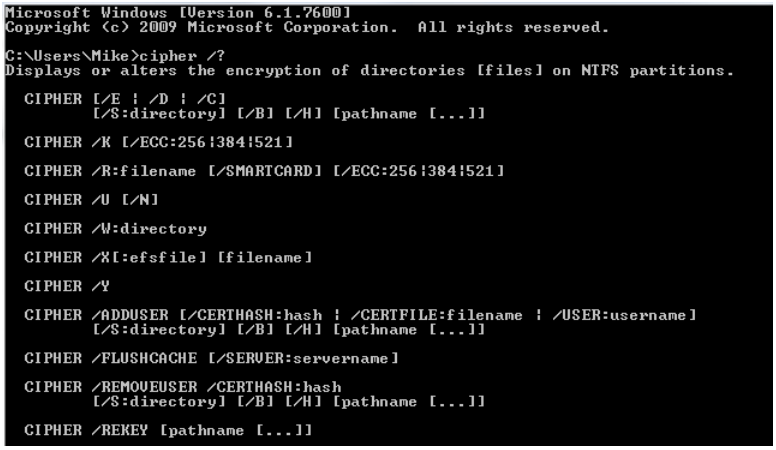

Figure 31-19 The Cipher.exe console

To wipe a hard disk, type **cipher /w *x:\folder***, where *x:\folder* indicates what you want to wipe. For example, if you want to wipe your D drive, type **cipher /w D:**. If you want to wipe a folder called Personal in your C drive users folder, type **cipher /w C:\Users\Mike Halsey\Personal**.

BitLocker and BitLocker To Go

BitLocker is a full-drive encryption method that was introduced with Windows Vista. It encrypts data by using a 128-bit Advanced Encryption Standard (AES) key. BitLocker works at its most secure if your computer's motherboard incorporates a Trusted Platform Module (TPM) chip.

BitLocker works in the following three modes when authenticating the user:

- **Transparent Operation mode** This is used when you have a TPM chip on your motherboard; the encryption key is stored on the chip.
- **User Authentication mode** This mode requires the user to type a password before the operating system boots to provide authentication.
- **USB Key mode** In this mode, the user must insert a USB pen drive containing the encryption key.

You can use BitLocker in Windows 8 to encrypt internal partitions, hard disks, external hard disks, or USB pen drives. These drives can be encrypted only in the Enterprise or Ultimate versions of Windows 8, but they can then be used in any other Windows 8 version and on

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any other computer running Windows 8 by entering a password or by using a smart card or USB pen drive containing the decryption key. (See the following Inside Out sidebar.)

INSIDE OUT

Reading BitLocker-encrypted hard disks on another computer

You can read a BitLocker-encrypted disk on another computer running Windows 8, unless you have encrypted it by using a TPM chip. This chip locks that hard disk to that specific motherboard, rendering it unreadable on any other computer.

You can read (but not write to) Windows XP drives protected by BitLocker To Go by downloading the BitLocker To Go Reader from the Microsoft website at *http://www.microsoft.com/en-us/download/details.aspx?id=24303*.

BitLocker is also more flexible than EFS for encrypting drives because you can easily carry a BitLocker drive from one computer to another without having to go through the rigmarole of exporting and importing security keys and certificates using complex management consoles.

INSIDE OUT

Using BitLocker without a TPM chip

If you do not have a TPM chip on your motherboard, you can find out how you can still use BitLocker with your computer at *http://technet.microsoft.com/en-us/library/ee424319(v=ws.10).aspx*.

Setting up BitLocker on your computer is a straightforward affair, with pages that guide you through each step of the process.

1. To access BitLocker, either open the Start screen, type **bitlocker** and then click the search results, or in the Control Panel, click System And Security, and then click BitLocker Drive Encryption.

2. In the BitLocker Drive Encryption window, you can manage the BitLocker-encrypted drives. In the lower-left corner of the window, click the TPM Administration link (see Figure 31-20) to manage a TPM chip on your motherboard, if you have one.

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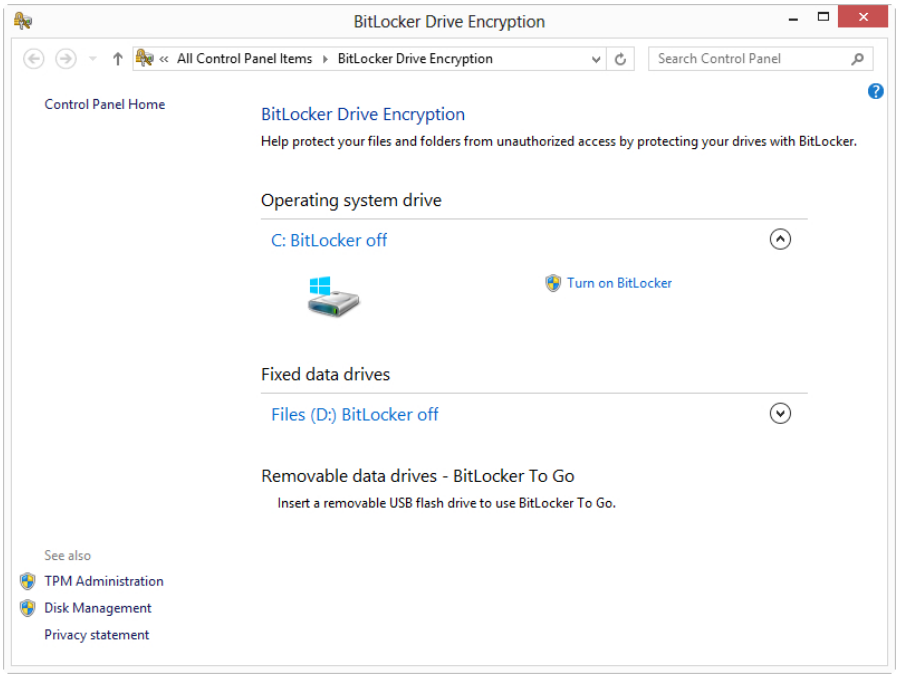

Figure 31-20 Managing BitLocker-encrypted drives in the Control Panel

When you encrypt a drive, you have a couple of options (see Figure 31-21): setting a password or using a smart card. You can use these options to access the drive on another computer. Choose which options you want to use.

Select Automatically Unlock This Drive On This Computer if you intend to use the drive only on the computer where it was encrypted (such as a laptop). For this option to work, the copy of Windows 8 on that computer must also be encrypted with BitLocker.

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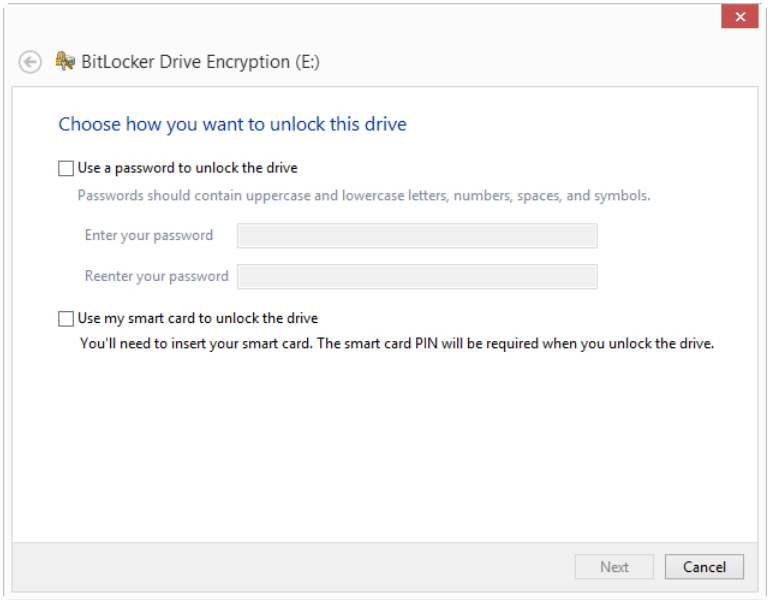

Figure 31-21 Select how you want Windows to unlock the drive

From the BitLocker Management Console, you can change your password, disable BitLocker for a drive, or temporarily suspend BitLocker encryption.

CAUTION!

Unlike EFS, which encrypts specific files and folders, BitLocker encrypts entire disks or partitions and is extremely secure. A hard disk encrypted by using BitLocker will be completely inaccessible on another computer without the password or correct smart card or USB pen drive access.

Some security and data recovery companies offer professional services to recover lost BitLocker encryption keys. Commercial software is also now available, one such program is Passware Kit Forensic (available at *www.lostpassword.com*). This product can quickly recover encryption keys for hard disks protected by BitLocker. Passware also offers other security software that can, for example, recover lost Windows user passwords.

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Creating a Copy of Encrypted Data

Sometimes it can be difficult to determine whether data you encrypt will still be encrypted when you make a copy of it. Table 31-1 presents different scenarios and whether encryption will still be enabled.

Table 31-1 **Scenarios in Which Data Will or Will Not Remain Encrypted When You Copy It**

	EFS-Encrypted Folder	BitLocker-Encrypted Drive	Unencrypted Folder or Drive	CD/DVD
FAT32-Formatted	Not Supported	Yes	No	Not Supported
exFat-Formatted	Not Supported	Yes	No	Not Supported
CDFS-Formatted	Not Supported	Not Supported	Not Supported	No
NTFS-Formatted	Yes	Yes	No	Not Supported

Summary

Whether you implement encryption or not, you should always keep backups of your files and data in secure locations where they cannot be affected by disasters such as fire or theft.

The encryption systems available in Windows 8 are extremely useful, but they can very easily render your data forever beyond your reach, especially if you cannot afford the services of a professional data recovery company. They should always be used with care.

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CHAPTER 32

Applying Best Practices to Windows 8

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THROUGHOUT THIS BOOK, I've shown you how to repair, optimize, and configure many aspects of the Windows 8 operating system (OS) so that you can avoid problems from occurring in the first instance. Let's face it; this is by far the best way of maintaining a computer.

I've also shown you how to back up your data and your copy of Windows 8 so as to make restoration trouble free, because this always needs to be done at the time when you're at your busiest.

What is clear, however, is that there are such myriad ways of doing these things in Windows 8 that it can be confusing knowing what you're supposed to do and why. Take image backup, for example; there are now two separate ways to do this, both of which seemingly work the same way but don't.

This chapter pulls it all together into some short, best-practice guides on how to configure, optimize, and backup your computers so as to avoid problems and give you trouble-free operation.

Best Practice for Configuration

Windows XP was the last version of the operating system that needed tweaking and customizing to get it working. By the time Windows 7 came along, there was almost nothing that needed to be changed. Windows 8 is a slightly different beast, however, and the need for carefully considered configuration has returned.

Optimizing the Virtual Memory

When your computer starts, all the relevant parts of the OS and your programs and apps are loaded into your computer's physical memory (RAM). This memory is significantly faster

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than reading files from a mechanical hard disk, and this is why adding more memory to an older computer is the cheapest and quickest way to get a performance boost.

With modern computers for which 4 GB, 6 GB, 8 GB of memory (or perhaps even more) are the norm, there's plenty of space for those files, but Windows 8 still uses a swap file (Virtual Memory) on your hard disk for some commonly accessed files and data.

Because the swap file is permitted to expand and contract over time, it will inevitably cause fragmentation to occur on your hard disk. Again, with hard disks becoming much larger, it's less likely that Windows 8 will have to split a large file over several small chunks of space spread across the hard disk, but typically, the OS saves a file where it's most convenient at the time, and this won't necessarily keep the file segments contiguous.

But why do we need to worry? By default the Disk Defragmenter in Windows 8 is set to automatically defragment every hard disk, including new disks that you add later on, on a schedule, right? The problem with defragmenting is that it puts tremendous physical strain on the hard disk.

Once, when I was beta-testing Windows 7, a hard disk I was defragmenting physically exploded in the middle of the process. I could hear the shattered platters rattling around inside the casing. Because this happened under the Windows 7 beta, the Windows chief, Steven Sinofsky, became personally involved because he wanted reassurance that it wasn't caused by a problem with the defragmenter tool itself. Fortunately, it was just a faulty hard disk, but the fact that it shattered during defragmentation didn't surprise anyone.

So managing the Virtual Memory is still important but you might be asking why you need this file at all. Surely, if you have a modern computer with large volumes of RAM it's not needed. In this you'd be quite correct, but I would still advise against turning it off or even turning it down to the absolute minimum size.

One reason for this is that some legacy software, even programs written by Microsoft, rely on it being available and some programs will simply refuse to work if they can't find it. There is also the fact that occasionally you might be doing very memory-intensive work such as editing high-definition video. At times like this, especially during encoding, the swap file can be very useful indeed.

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To configure the Virtual Memory to a specific size on your hard disk, perform the following procedure:

1. Open the Control Panel.
2. Open the System panel.
3. In the pane on the left, click Advanced System Settings.
4. In the System Properties pane, click the the Advanced tab, and then in the Performance section, click the Settings button.
5. In the dialog box that opens, click the Advanced tab.
6. In the Virtual Memory section, click the Change button.
7. Clear the Automatically Manage Paging File Size For All Drives check box.
8. Select the Custom Size check box.
9. In the Initial Size and Maximum Size text boxes, enter the Recommended value Total Paging File Size For All Drives, as shown in Figure 32-1. (These values must be the same to avoid fragmentation.)

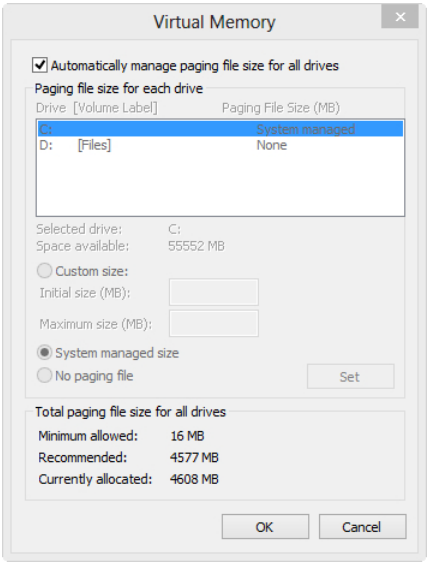

Figure 32-1 Changing the Virtual Memory allotment

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INSIDE OUT **Virtual Memory and solid-state drives**

If you are running Windows 8 from a solid-state drive (SSD), you should still keep the Virtual Memory file but you should set it to the Minimum Allowed size (usually 16 MB), as read speeds from the memory chips inside an SSD are quick enough to not require general use of the swap file.

Optimizing the Start Screen

The new Windows 8 Start screen is the default interface for daily use; the Start menu is gone forever. This doesn't mean however that you're stuck with the Start screen the way it is, it's actually much more configurable than you might think.

Optimizing the Start Screen for Work/Life Balance

The Start screen and Windows 8 apps are a good way to separate your personal and work lives if you use your computer for both. You can strip all desktop software icons from the Start screen and instead pin them all to the desktop taskbar to create two completely separate working environments, both of which are completely different.

Using the Start Screen as a Widget Dashboard

Windows 7 introduced the concept of live widgets that can be placed anywhere on the desktop. In Apple's OS X, the dashboard is a subscreen of the OS X desktop on which you can see live widgets that contain a variety of information which you can access with a single click.

The Windows 8 Start screen can also be turned into a widget dashboard by prioritizing Live Tiles that display information such as email, calendar, instant messaging, social networking, news, finance, and more, as illustrated in Figure 32-2.

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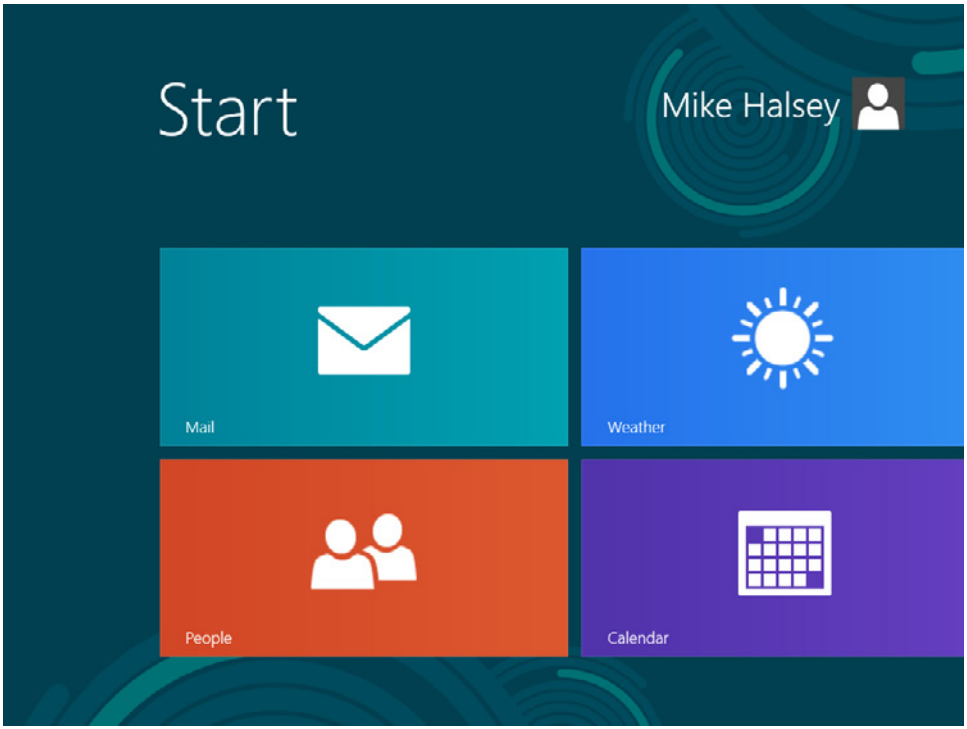

Figure 32-2 Using the Start screen as a widget dashboard

With a single press of the Windows logo key key you can see the latest news and updates. If you press it again, you go straight back to the desktop (your actual desktop icon can be placed wherever you like on the Start screen).

This works because you can use the Ease of Access features in Windows 8 to scale up everything without it affecting the desktop. To do this, perform the following procedure:

1. Open the Start screen and swipe inward from the right edge of the screen.
2. Click the Settings charm.
3. At the bottom right of your screen, click Change PC Settings.
4. In the PC Settings dialog box, click Ease of Access
5. Toggle on the Make Everything On Your Screen Bigger option, as demonstrated in Figure 32-3.

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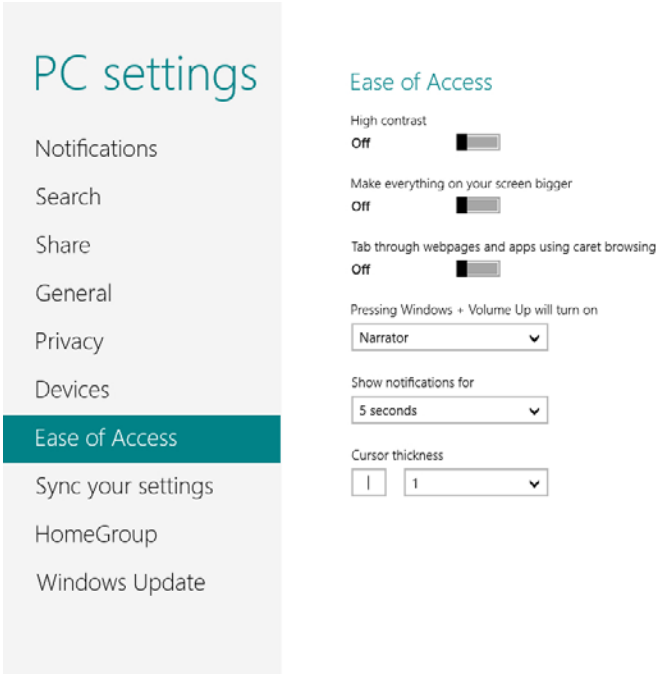

Figure 32-3 Making objects bigger in the Windows 8 user interface

Leave the Basic Security Alone

By default Windows 8 is configured extremely well for security, perhaps the first time in a version of Windows; the Windows Firewall is very well configured, UAC isn't annoying, and there's built-in antivirus protection in the form of the revamped Windows Defender. With this configuration in place you can leave this basic security alone and Windows 8 will just get on with its business of protecting you on its own.

You might want to use a third-party antivirus product, and there's nothing wrong with this. If you do, though, you'll want to turn Windows Defender off. To do this, open Windows Defender, click the Settings tab, and then clear the Turn On Windows Defender check box (see Figure 32-4). This prevents the two antivirus packages from conflicting with one another.

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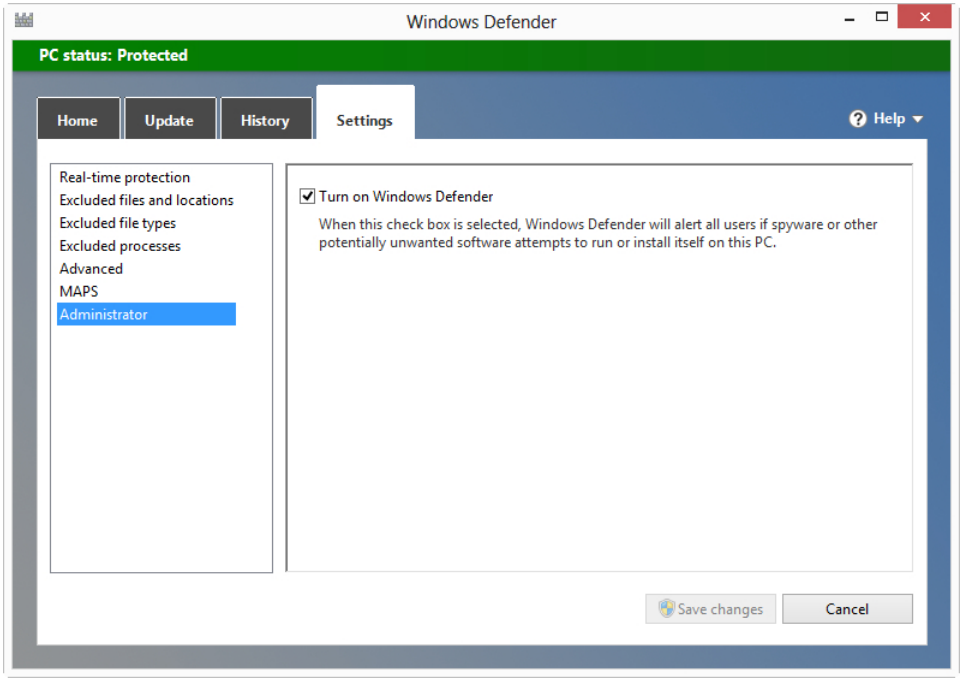

Figure 32-4 Turning off Windows Defender

Blocking Removable Storage on Business-Use Computers

As just mentioned, the default security settings in Windows 8 are well configured. However, if you are using Windows 8 in a business environment, there are other measures that you can take to help maintain excellent security for that particular situation. I would suggest that you deactivate access to USB-attached storage and disc burning, which you can do in Windows 8 Pro and Enterprise by using the Group Policy editor.

Doing this can prevent data theft (I will talk about Data Protection later in this chapter) but it can also help protect the computer from virus and malware infection. To configure this, perform the following procedure:

1. Open the Start screen and search for **gpedit.msc**. Click the search results to open the Group Policy editor.

2. Click Computer Configuration | Administrative Templates | System | Removable Storage Access.

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The Local Group Policy Editor dialog box opens (see Figure 32-5). Here, you can deny access and use of all manner of removable storage media.

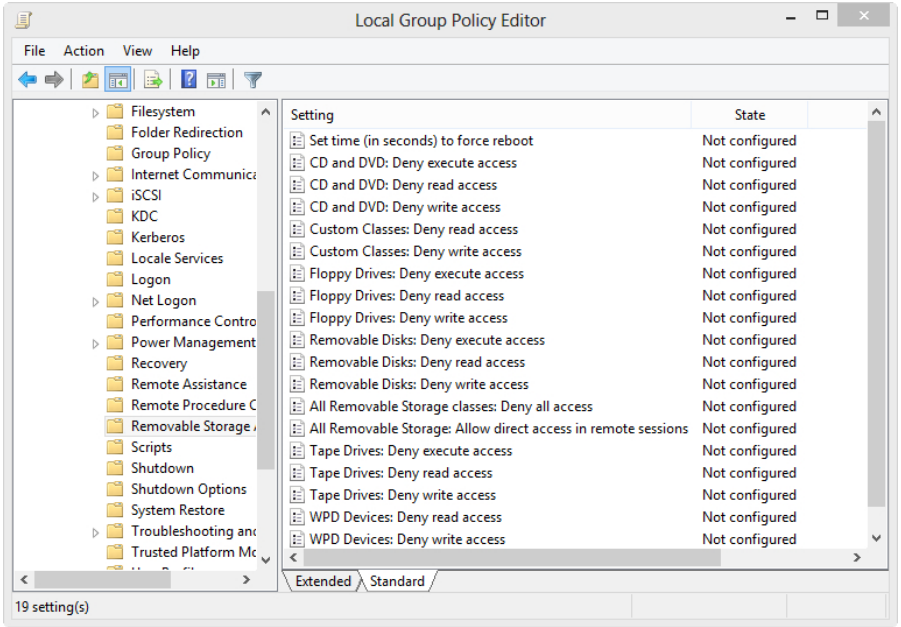

Figure 32-5 Managing removable storage in the Local Group Policy Editor

Download a Copy of CCleaner

If there is one single piece of software that I install on all of my computers, it's CCleaner, which you can download for free from *www.piriform.com/ccleaner*. This is an excellent tool for cleaning temporary files and clutter out of Windows 8, and helping to keep the system running smoothly and speedily. Run this program every month to help keep your computer maintained.

Best Practice for File Storage

You should not keep your files and documents in the Users folder on your Windows hard disk; they should always be moved for the following two basic reasons:

1. If Windows 8 breaks and you are forced to reformat your hard disk, you will lose them all.

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2. When you create a System Image Backup, this image will include a copy of all your files. This will not only vastly inflate the size of the disc image unnecessarily, but when you restore it, you will also overwrite your current files with these earlier versions, losing all new files and changes.

To move your files away from Windows 8, perform the following procedure:

1. Open File Explorer.
2. On the left edge of the Address bar, click the arrow.
3. From the locations displayed, click your username, as demonstrated in Figure 32-6.

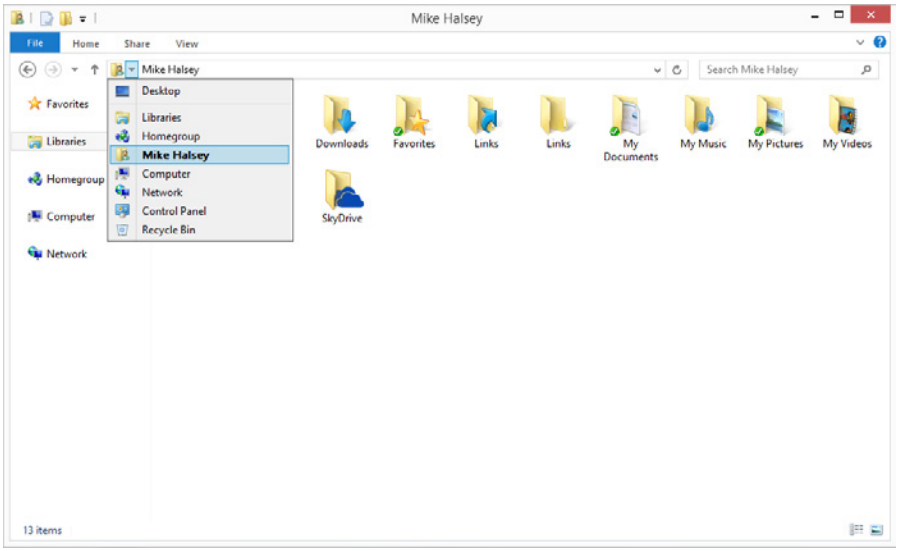

Figure 32-6 Navigating to your user folder

4. Select the following folders:
   - Downloads
   - Favorite
   - My Documents
   - My Music
   - My Pictures
   - My Videos

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5. Right-click the selected folders, and then in the options panel that opens, click Cut.

   It is very important you do not select Copy.

6. Navigate to the spare hard disk or partition where you want to store the files.

7. Right-click in a blank space, and then in the options panel that opens, select Paste.

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Shrinking your windows partition to create a new drive

If you have only the one partition on the one physical hard disk in your computer, you will need to Shrink it and create a new data partition. To do this, press Windows logo key+X to open the Administration menu and then click Disk Management. Next, right-click the Windows drive, and then in the options panel that opens, click Shrink Volume.

After shrinking the drive, right-click in the blank space it leaves and create a New Simple Volume. Make it the maximum size available.

You will need to format the drive (use NTFS formatting) and assign it a drive letter. You now have a dedicated partition for your files.

Best Practice for Encryption

Don't use EFS! Honestly, just don't use it! The reason for this is because it just breaks file access all the time. However, if you are buying a laptop, I cannot recommend strongly enough that you buy one with an integrated Trusted Platform Module (TPM) chip. This allows you to safely and securely use Microsoft BitLocker to encrypt your entire hard disk(s) and partitions.

BitLocker and BitLocker To Go are fantastic tools for encrypting data while on the move to ensure that if your laptop or professional-grade tablet is stolen, the information cannot be accessed by anyone.

Note

BitLocker isn't available on ARM tablets, which have their own encryption system.

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CAUTION

Bitlocker has in the past been susceptible to a hack by which the encryption key was pulled from the sleep or hibernation file on a computer. This does not affect Windows 8's Fast Start feature, which only hibernates the kernel. To be completely safe, shut your laptop or tablet down when you are not using it, instead of putting it to sleep.

Always keep a backup copy of your BitLocker encryption key(s) in a cloud service, such as Microsoft's SkyDrive, because you never know when you might need it. If you are travelling and can't be certain when you will have Internet access, it is also a good idea to carry the BitLocker key(s) on a USB flash drive, though this should always be stored separately from the laptop so that they cannot be lost or stolen together.

Best Practice for Image Backup

Historically if you wanted to make a backup disk image of your complete Windows installation, you had to use a third-party system such as Symantec Ghost or Acronis TrueImage. Vista changed all that by bringing disk imaging to Windows for the first time, and with Windows 7, Microsoft extended this feature to every edition of the operating system.

Windows 8 offers two different methods to image your disk: the Windows System Image Backup tool, and the new Refresh option. On their face, these two features appear the same, but they're not.

The critical difference is that the Windows System Image Backup takes a true snapshot of almost every file and folder on the computer (some folders such as downloaded email in Outlook aren't backed up), and the backup image contains all of your settings for every piece of installed software. The advantage here is that you don't have to reconfigure your settings in software such as Microsoft Outlook, Microsoft Word, or Adobe Photoshop.

The Refresh option backs up all of your installed software, but only if you create a custom image; however, it does *not* back up any of your settings for your desktop programs. This means that when you Refresh your computer from a custom image, you have to set up all your email accounts and software preferences from scratch.

That having been said, the Refresh option does offer a few advantages. It's very simple for a non-technical user to work with, and if someone has a computer on which he is primarily using Windows 8 apps, he will be completely fine. This is an excellent option for friends, family, and businesses with custom Windows 8 apps used for work.

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Refresh also has the advantage of creating an *install.wim* file as the backup image. You can copy this file onto a Windows 8 installer disc image to create a custom installer for the OS with all your software preinstalled.

Let's look at some scenarios for which you should use Windows System Image Backup and Refresh.

- **Windows 8 power user** Use Windows System Image Backup if you have a lot of software preconfigured.
- **Windows 8 gamer** These users will probably have Xbox Live, Steam, Origin, or another gaming service re-sync the correct game updates and settings, so you can create a custom refresh image.
- **Windows 8 Desktop business user** Definitely use the Windows System Image Backup tool; otherwise, you'll have to completely reconfigure software such as Microsoft Office.
- **Casual home user** Use a custom refresh image because these people can refresh the computer themselves, and are more likely to be using desktop software where none or very little configuration is needed.

Best Practice for Data Backup

It doesn't matter how you choose to back up your files (see Figure 32-7), be it a cloud service (such as SkyDrive, Mozy, Amazon S3, or Carbonite), a USB-attached hard disk, or Network-Attached Storage (NAS), just make sure you *do* back things up and that files are set to be backed up on a regular schedule.

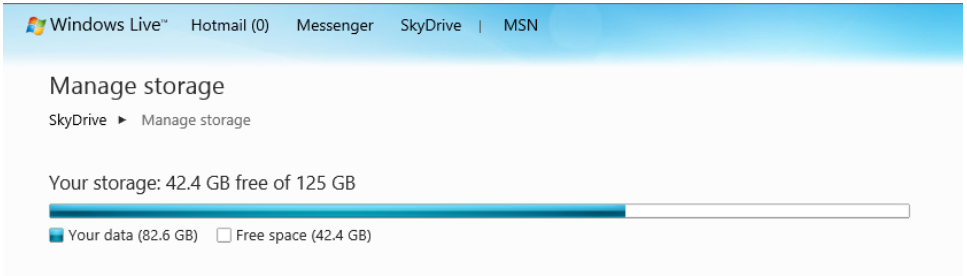

Figure 32-7 Backing up files to Microsoft SkyDrive

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It also doesn't matter what backup software you use. Windows 8 contains a perfectly good backup program, but it creates a virtual hard disk (VHD) that contains all the files and folders. Although you can open this file and read its contents, it's not as good as a basic file-by-file backup solution (which is what I use).

It's simply not good enough to set up an automated backup job and trust it to get on with things over a long period of time. You need to check your backups regularly—about once a month—to ensure that everything is fine with them. A misconfigured or corrupt backup job can quickly wipe out your only extra copy of vital and irreplaceable files.

Finally, you should ensure that you back up files on a regular schedule, no longer than once a month. Many backup packages, especially cloud backup solutions, back up files as they change.

Optimizing Windows 8 File History

Windows 8 File History is a useful feature but you should never rely on it as a backup solution for the following two very good reasons:

1. By default, it stores its copies of files on your Windows drive, and if you need to reformat, you will lose them.

2. It only has so much storage space and will only store the *most recently changed files*. Every time you open a file (such as view a photo or play an MP3 music track) the file is changed as a result of a modification to the *last accessed* data. This counts as a file change. This means you can find your File History fills up with multiple copies of MP3s and when it runs out of room, it excludes precious documents.

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Excluding file locations from File History

In the File History panel (accessible from the Control Panel), in the panel on the left side, you can click the Exclude Folders link to prevent the feature from filling up with multiple copies of music, video, and other files that change every time you play them, and which you likely have backed up elsewhere, as shown in Figure 32-8.

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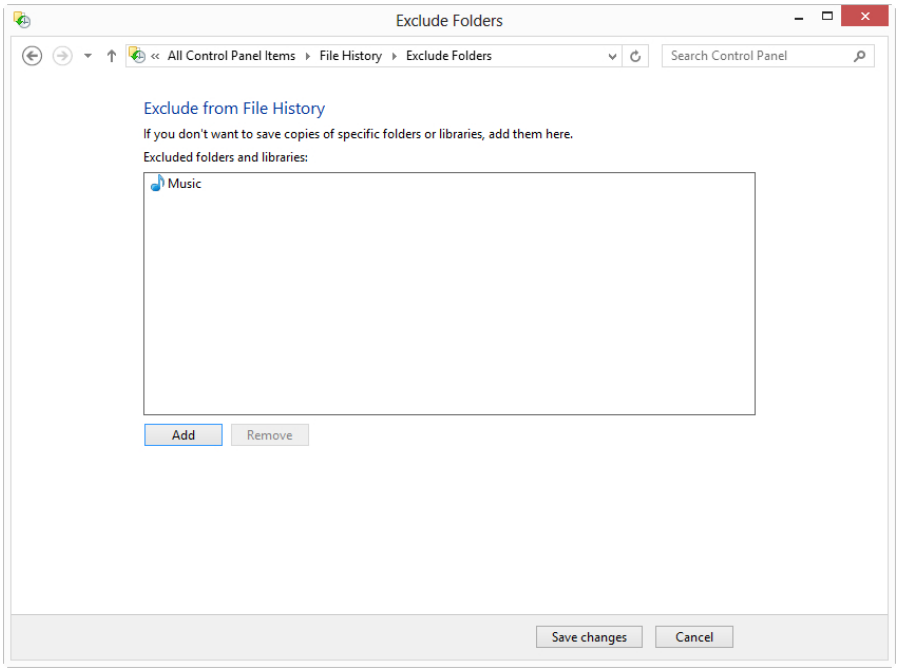

Figure 32-8 Excluding items from Windows 8 File History

Best Practice for Laptops and Tablets

Every day, many thousands of laptops and tablets are lost or stolen worldwide. Nobody knows how many of these are not protected by passwords (more about passwords later in this chapter) or encrypted, but contain sensitive and personal data about individuals.

If you are using a laptop for work, it is essential that you encrypt any data on the hard disk if you carry with you any personal information about colleagues, people at companies you work with, and customers. Even the data you carry in email contacts such as addresses and phone numbers is covered by data protection legislation (more in this later in the chapter, as well).

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If you can afford it, buy a laptop with a TPM chip and use BitLocker to encrypt the disk(s) for additional security. You should also buy a Kensington lock to secure the laptop or tablet in place when you are using it at a desk.

Laptop bags can also be highly visible. When choosing a bag, try to go for a standard rucksack or bag that has a special storage compartment for a laptop. Making it less obvious that you are carrying a computer also makes it less likely it will be stolen.

If your laptop or tablet doesn't contain a TPM chip, is there anything you can do to minimize the impact of theft? Enforcing strong passwords is a start but it doesn't protect against someone physically removing the hard disk. If you can, it's much better to store sensitive data elsewhere and have the laptop connect to it remotely via the Internet or a virtual private network (VPN) when it's needed. This requires an active Internet connection, but it is much more secure than having unencrypted data sitting around.

Best Practice for BYOD

I'm personally not a fan of BYOD (Bring Your Own Device), whereby people use their personal smartphones, laptops, and tablet computers at work. If you are a systems administrator with tight controls on security and updates, the presence of unmanaged computers can cause major headaches.

With Windows 8 ARM tablets, you can at least use Microsoft AppLocker and Windows Server to provide access to dedicated business apps over which you have control, but the lack of Group Policy management on these devices can be a worry.

If your company insists on encouraging BYOD—perhaps to help keep IT costs down or maybe because one of the non–technically-minded directors is convinced it's a good idea because he got an iPad for his birthday—create a separate Wi-Fi network to which these devices can connect. You can isolate this network from your main business network, helping to minimize problems and security breaches.

Windows 8 and Data Protection

If you use a computer for work, you will be bound by the data protection and privacy regulations for every country in which you operate (including business trips abroad). These laws and regulations vary from country to country but are standardized across groups of countries such as the European Union.

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Normally, such legislation requires you to take all reasonable steps to ensure that the data of customers and individuals is protected by using encryption, security measures, firewalls, and so on.

It is critically important that you familiarize yourself with the regulations in the countries in which you operate because the penalties for breaching them can include hefty fines and even possible imprisonment.

Best Practice for Passwords

Passwords are always important, and as computers become more advanced, it becomes much more important for us to choose strong passwords.

I would always recommend your passwords conform to the following rules:

- Have one main strong password.
- Append three characters to this standard password that identify a website or service to make it unique for each use. You can add these characters at the beginning, the end, or in the middle, but stick with a pattern to help you remember them.
- Use a *minimum* of 10 characters in your main password.
- Use a mixture of uppercase and lowercase letters, numbers, and symbols.
- Use numbers and symbols in the place of letters. For example, use the numeral 1 instead of a lowercase i or l, 5 instead of S, 0 instead of o, 3 instead of e, & instead of a, or ^ instead of v.
- Avoid the use of characters that are commonly not allowed, these include *, ?, and @.

Table 32-1 shows how long it could take a criminal with an ordinary computer to crack passwords various lengths and complexity. Where do your passwords fit in the chart?

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Table 32-1 **How Long Does It Take for a Computer to Crack a Password?**

Number of Characters	Numbers Only	Upper or Lowercase Letters	Upper or Lowercase Letters Mixed	Numbers, Upper and Lowercase Letters	Numbers, Upper and Lowercase Letters, Symbols
3	Instantly	Instantly	Instantly	Instantly	Instantly
4	Instantly	Instantly	Instantly	Instantly	Instantly
5	Instantly	Instantly	Instantly	3 secs	10 secs
6	Instantly	Instantly	8 secs	3 mins	13 mins
7	Instantly	Instantly	5 mins	3 hours	17 hours
8	Instantly	13 mins	3 hours	10 days	57 days
9	4 secs	6 hours	4 days	1 year	12 years
10	40 secs	6 days	169 days	**106 years**	**928 years**
11	6 mins	169 days	16 years	**6k years**	**71k years**
12	1 hour	12 years	600 years	**108k years**	**5m years**
13	11 hours	314 years	21k years	**25m years**	**423m years**
14	4 days	8k years	778k years	**1bn years**	**5bn years**
15	46 days	212k years	28m years	97bn years	2tn years
16	1 year	512m years	1bn years	6tn years	193tn years
17	12 years	143m years	36bn years	374tn years	14qd years
18	126 years	3bn years	1tn years	23qd years	1qt years

k = Thousand (1,000 or 10^{-3}); m = Million (1,000,000 or 10^{-6}); bn = Billion (1,000,000,000 or 10^{-9}); tn = Trillion (1,000,000,000,000 or 10^{-12}); qd = Quadrillion (1,000,000,000,000,000 or 10^{-15}); qt = Quintillion (1,000,000,000,000,000,000 or 10^{-18})

I recommend that any password(s) you use comprise a minimum of 10 to 14 characters, utilizing the character combinations as highlighted in bold in Table 32-1.

Enforcing Password Policies by Using Group Policy

In Windows 8 Pro and Enterprise, you can use the Group Policy editor to enforce password policies for all users on a computer. To do so, perform the following procedure:

1. Open the Start screen and search for **gpedit.msc**. Click the search results to open the Group Policy editor.

2. Click Local Computer Policy | Computer Configuration | Windows Settings | Security Settings | Account Policies | Password Policy.

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Figure 32-9 shows how you can use the Group Policy Editor to enforce the use of strong passwords on the computer as well as forcing people to change their passwords on a regular schedule. You can also force Windows to use stronger encryption when using passwords.

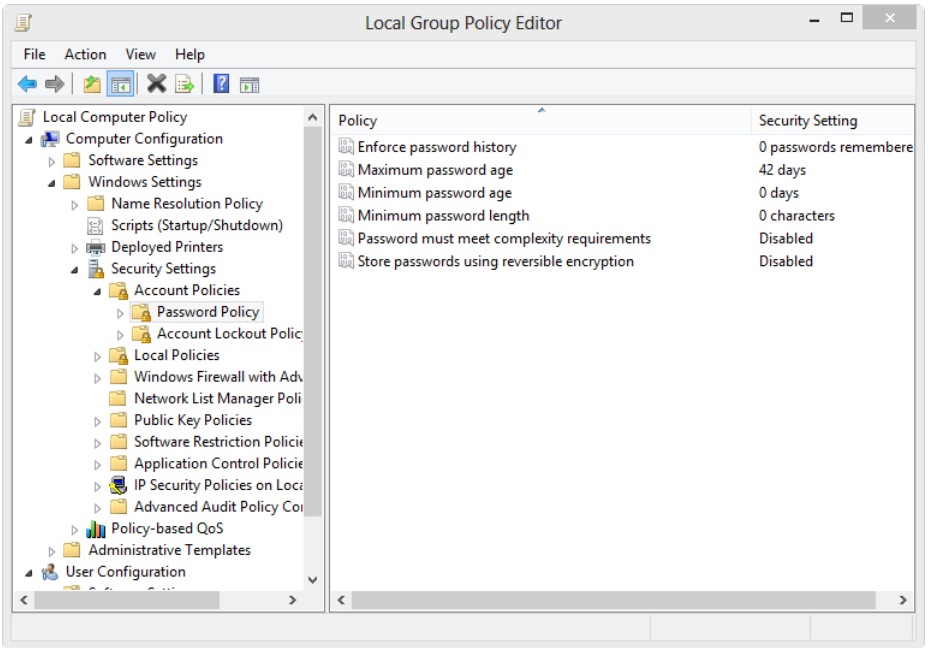

Figure 32-9 Enforcing password policy via the Group Policy Editor

Summary

It's actually very easy to set up Windows 8 to work effectively with very little effort because the basic security configuration for the operating system is excellent. With a few extra tweaks and tools, you can make it much more secure and much easier and simpler to restore if something goes wrong (the Refresh option, for example, will come as a blessing to anyone who has ever had to support friends and family).

The rest comes down to common sense, and although not everybody will be able to afford a laptop or professional-grade laptop with a TPM chip, and although not every IT manager will be able to resist the pressure to allow BYOD, there are things you can still do to minimize the impact of theft, data loss, or malware infection.

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PART 5

Using Advanced Utilities

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CHAPTER 33

Using Advanced Windows 8 Diagnostic Tools

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THROUGHOUT THIS BOOK, I've talked about some of the more advanced diagnostic and maintenance tools available in Windows 8. Now it's time to look at them in depth. There are a great many of these advanced tools, and in this chapter, and I'll show you how to get the very best out of them.

The Computer Management Console

The Computer Management console is the central location for managing and monitoring Windows 8. To access the Computer Management console, press Windows logo key+X, and then in the Administration menu (see Figure 33-1), click Computer Management.

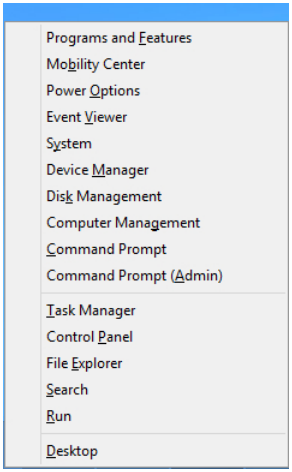

Figure 33-1 Accessing the Computer Management console

In the main Computer Management window, the tools are divided into three categories: System Tools, Storage, and Services And Applications, as shown in Figure 33-2.

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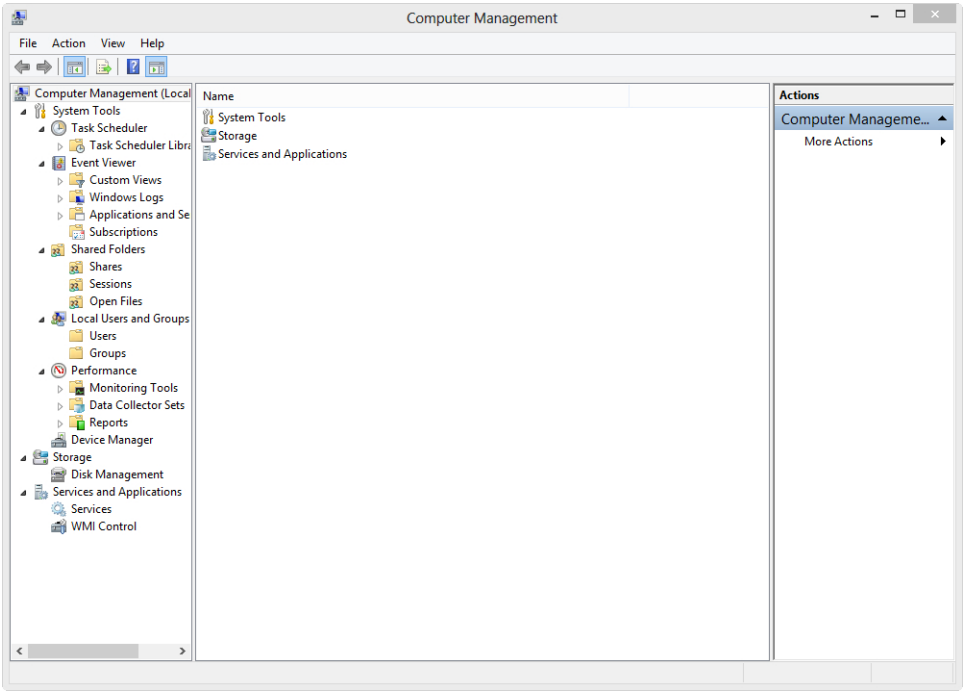

Figure 33-2 The main window of the Computer Management console

System Tools

System Tools manages events, tasks, file and folder sharing, users and user groups, and monitors the performance of your computer.

Task Scheduler

The Task Scheduler in Windows is more than just the means by which you set your programs to run automatically at startup or on a schedule; a great many Windows components also use this feature.

You can expand any item on the list of Windows components under Task Scheduler to see its scheduled tasks (see Figure 33-3). You can use the tabs across the center of the window to modify and set up tasks, as described in the following:

- **General** This tab summarizes information about the task and also contains some basic security options for it. A useful feature on this tab is the option to run a task in compatibility mode for Windows Server 2008 or Windows Vista.
- **Triggers** On this tab, you can specify what (if appropriate) triggers the task.

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- **Actions** This tab indicates what happens when the task activates. Here, you can set programs to start and commands to run.
- **Conditions** The settings on this tab give you more control over a task; for instance, you can specify to only run the task if the computer is idle or if it is plugged into an electrical outlet.
- **Settings** This tab includes additional settings associated with the task.
- **History** If any events are associated with the task, they appear on this tab.

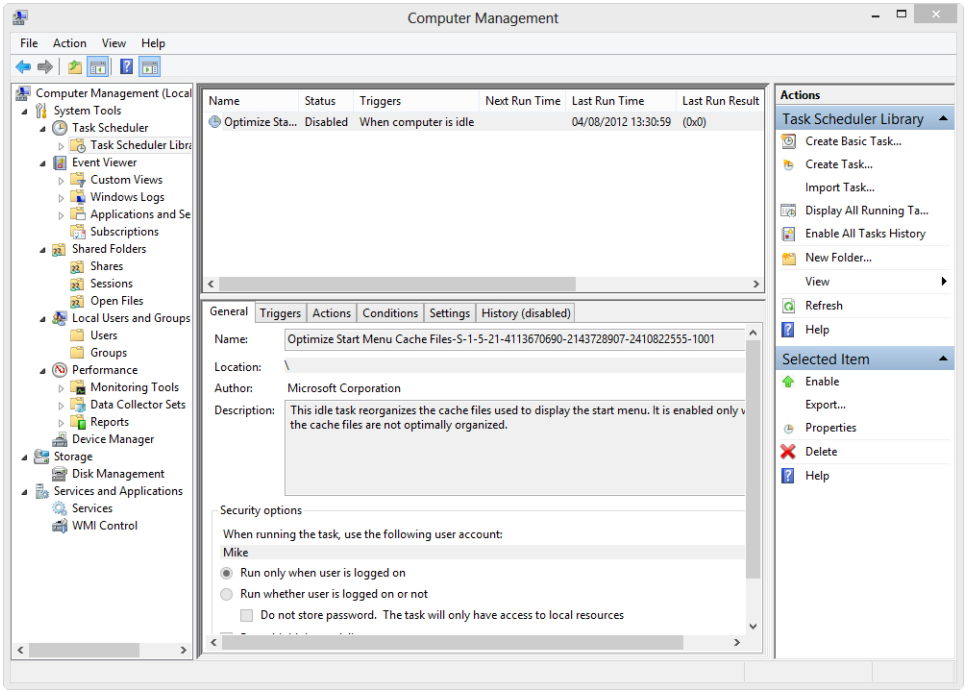

Figure 33-3 The Task Scheduler

Adding New Tasks To create a new task, in the Actions pane on the right, click Create Basic Task or Create Task. The Create Basic Task option launches a simple wizard; Create Task gives you more control. Also in this pane, you can click Import Task to import tasks that you have created previously and saved by using the Export Task options in the Task Scheduler (see the next subsection). In addition, you can select Display All Running Tasks to display all of the currently running tasks or Enable All Tasks History to enable or disable the event history recording for tasks.

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In business or corporate environments where tasks have been created by using the AT.exe tool, it might be necessary to click the AT Service Account Configuration link to set at what user account (that is, privilege level) tasks will run (see Figure 33-4).

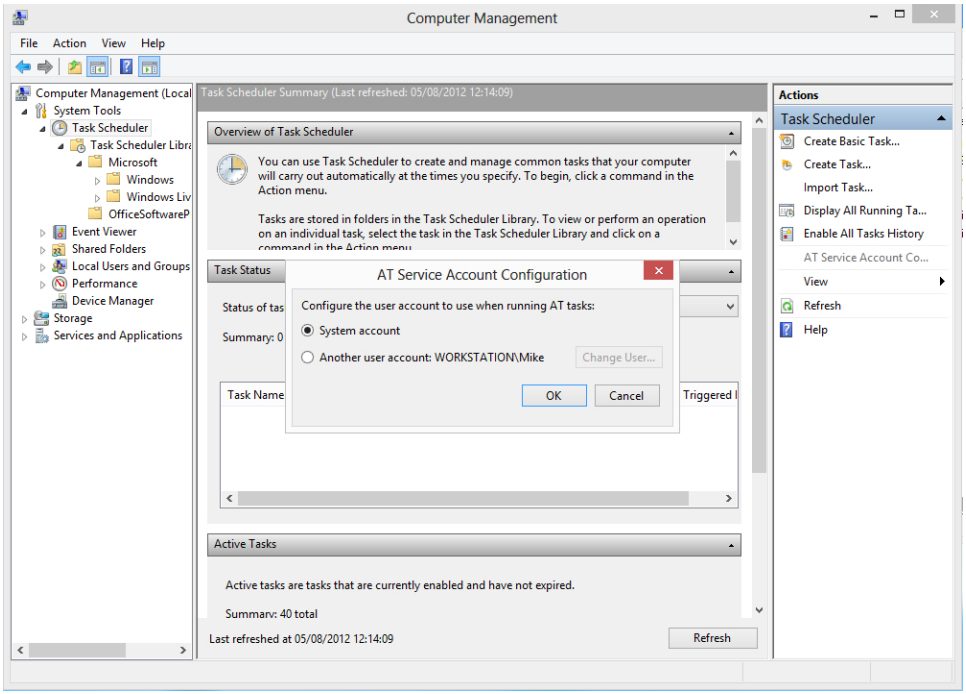

Figure 33-4 Assigning tasks to specific user accounts

Exporting Tasks You can right click any task and select Export to export the task to a file (see Figure 33-5). This can be useful if you want to use a task on different computers, or if you want to keep a backup of the task in case it becomes necessary to reinstall Windows 8.

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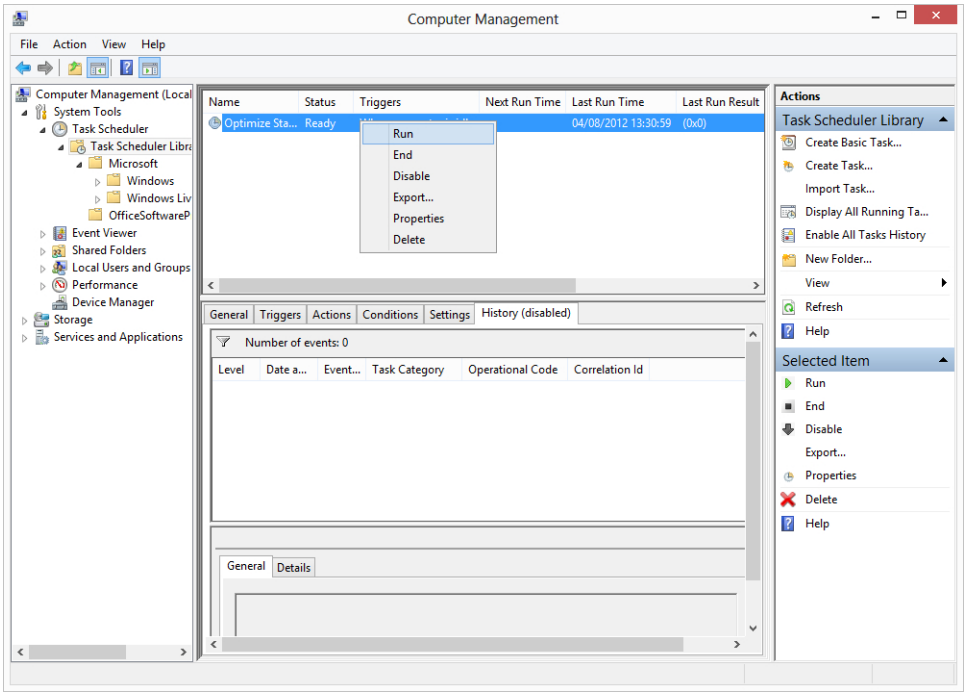

Figure 33-5 Exporting tasks

To see more detail and have more control over the task, right-click it, and then in the settings panel that opens, click Properties.

Event Viewer

The Event Viewer is probably the most useful and configurable troubleshooting component in Windows 8. In the Actions pane, you will find options to save and re-open event logs and to search for specific events, as illustrated in Figure 33-6.

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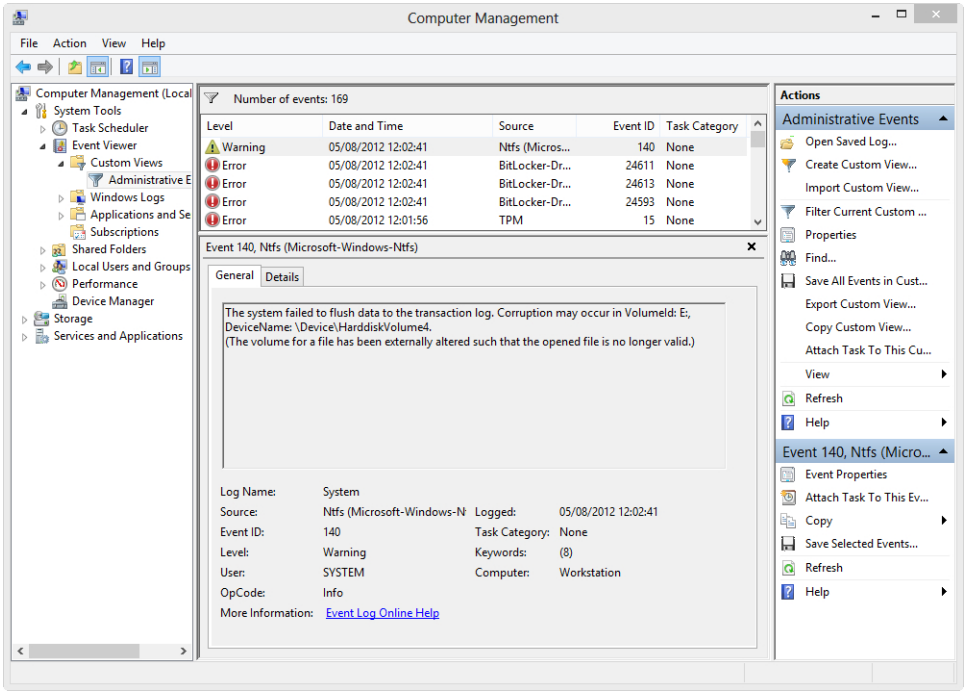

Figure 33-6 The Event Viewer in the Actions pane

Event Log Filtering Also in the Actions pane is the Filter Current Log option. This can be extremely useful for displaying certain types of logs such as critical and error logs, as depicted in Figure 33-7.

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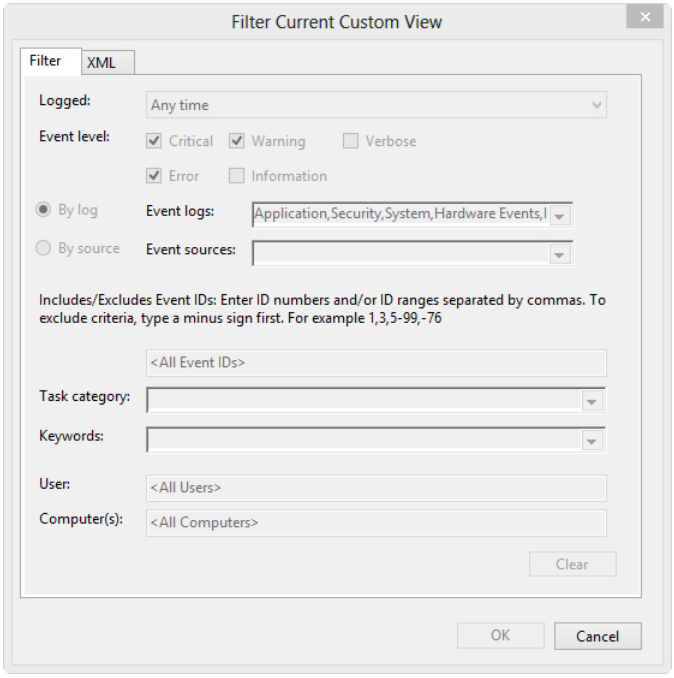

Figure 33-7 Filtering events

Windows 8 stores a great deal of information in its event logs; being able to filter the information by using the Filter Current Log option can prove a real time-saver when you're troubleshooting problems.

You can also filter by the event source, namely by Windows component and by user.

Attaching a Task to an Event You can attach tasks to specific events so that they execute automatically when the event occurs. Examples of this include automatically running the Problem Steps Recorder to alert you that something is happening that you want to see, or to send an email to a support person, letting them know that a specific error or event has recurred. This is useful for problems that occur occasionally that are difficult to diagnose.

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You can also trigger an on-screen message when an event occurs (see Figure 33-8). You might want to use this as an alert that something has happened (remember, not all errors are immediately obvious), and include instructions on what to do when it does happen. To do this, in the Actions pane, highlight an event and click Attach Task To This Event.

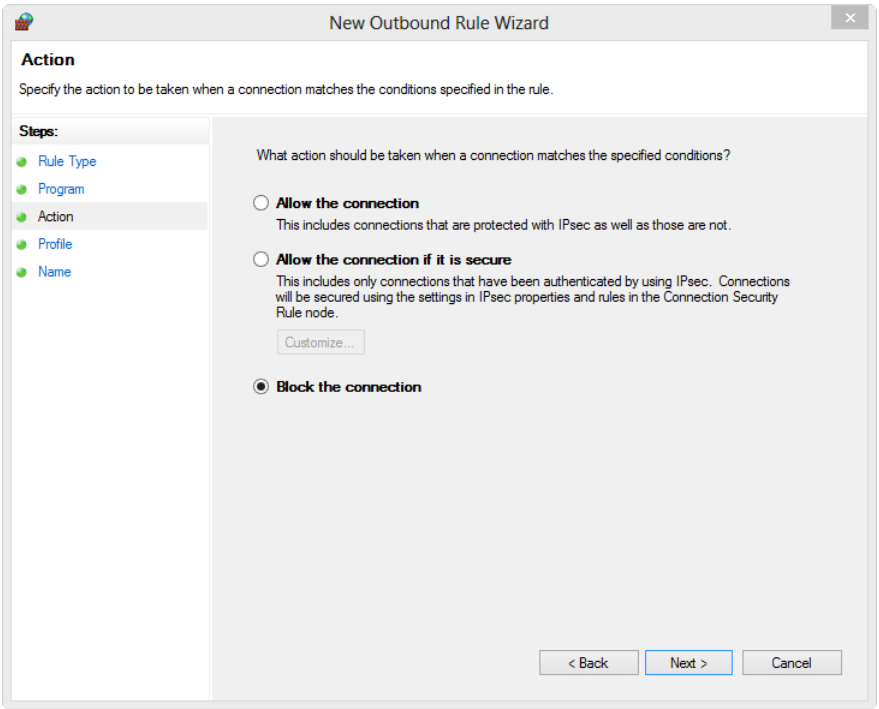

Figure 33-8 Setting up a task to display a message for an event

For instance, these instructions could direct a user to send an email to a support person, detailing exactly what software was running, what was happening when the error occurred, what hardware was plugged into the computer, and what user account was being used.

Creating Custom Views In the Custom Views section in the left pane, you can create new views in Event Viewer (see Figure 33-9). To do this, right-click Custom Views, or from the Action menu, select Create Custom View.

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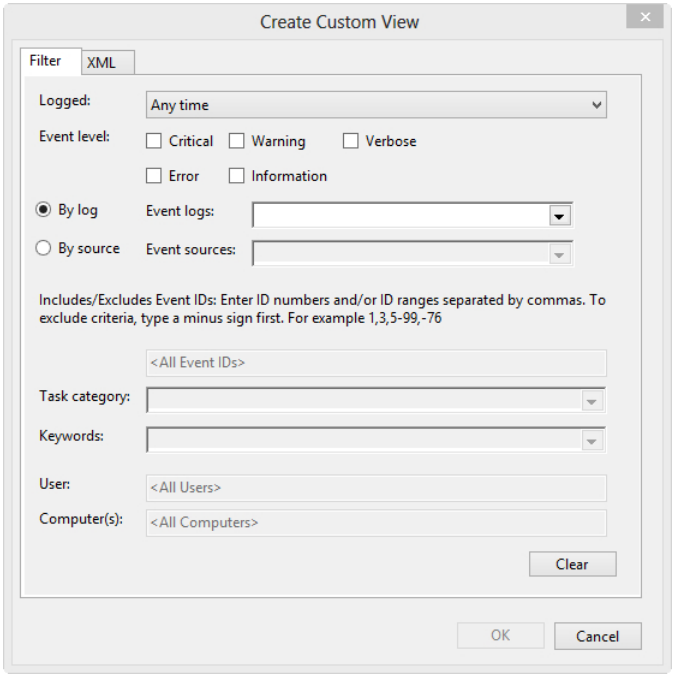

Figure 33-9 Creating custom event views

For the example in Figure 33-9, I created a custom view that reports all errors and critical events associated with the Windows Kernel (startup). If you are troubleshooting a specific part of Windows, this can be an invaluable time saver with which you can create a very detailed and concise error log that can then be exported and emailed to a support person if necessary.

Shared Folders and Local Users and Groups

The Shared Folders and Local Users And Groups options are very similar, so I will deal with them together. Both options give you control over file and folder shares and any users or groups of users on the computer. You can right-click any item in the central panel of this window to review its properties.

This can be useful, for instance, in the following scenarios:

- Shared files are not showing on another computer.
- A file is being reported as open by Windows but does not appear so.
- You want to set specific security or other policies for a user or a group of users.

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Performance

I will talk about the performance tools in more depth later in this chapter.

Device Manager

The Device Manager, shown in Figure 33-10, is a quick and easy way to gain access to the hardware drivers in Windows 8.

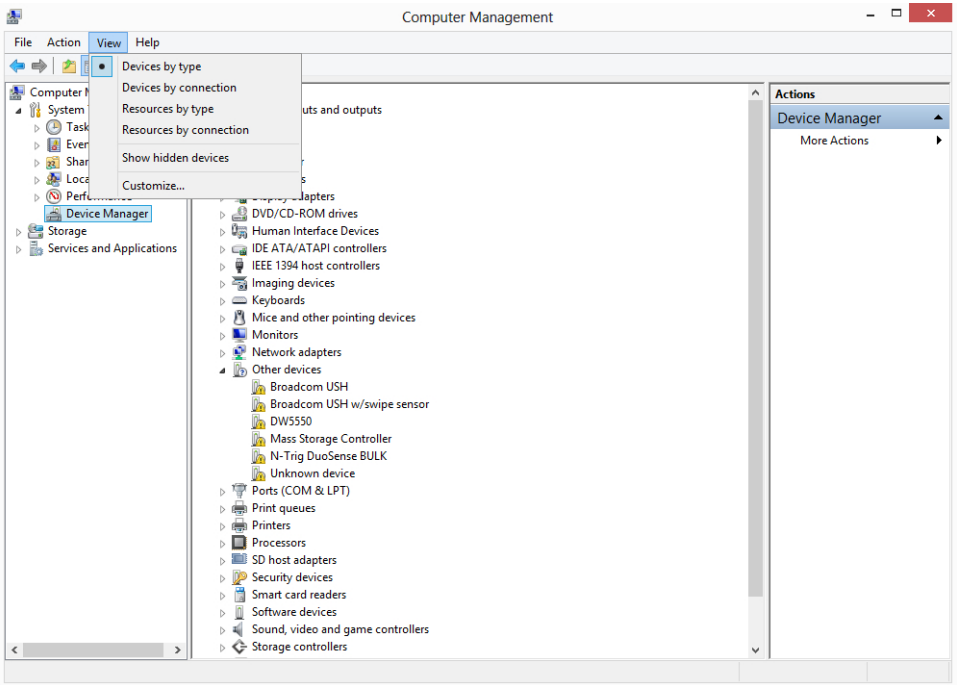

Figure 33-10 The Device Manager in Computer Management

On the View menu, you can find the following options that you might find helpful:

- **Devices By Type** This is the default Device Manager view, showing your hardware devices grouped by their device type.
- **Devices By Connection** This view shows core Windows hardware devices for your computer.

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- **Resources By Type** This can be an extremely useful view, showing you, for instance, what devices are sharing Interrupt Requests (IRQs), memory segments, and Input/Output (I/O) connections with your motherboard. Some hardware problems are caused by IRQ conflicts, and here, you can see if any exist.
- **Resources By Connection** This view shows core Windows hardware devices by I/O, IRQ, and memory connections.
- **Show Hidden Devices** Probably the most useful tool on the View menu, this option shows hidden devices. By default, not all devices appear in Device Manager, and sometimes a device can disappear from the list. With Show Hidden Devices, you can force Device Manager to display all of the devices that are attached to or are a part of your computer.

Working with Driver Properties Right-click a driver, and then in the settings panel that opens, click Properties. Here, you can find significantly more information that can be useful when you're troubleshooting hardware and driver problems.

On the Driver tab for the driver properties, you can see the name or the driver provider, the date it was written and the version number, as shown in Figure 33-11. You can also see if the driver has passed Microsoft Hardware Compatibility Testing.

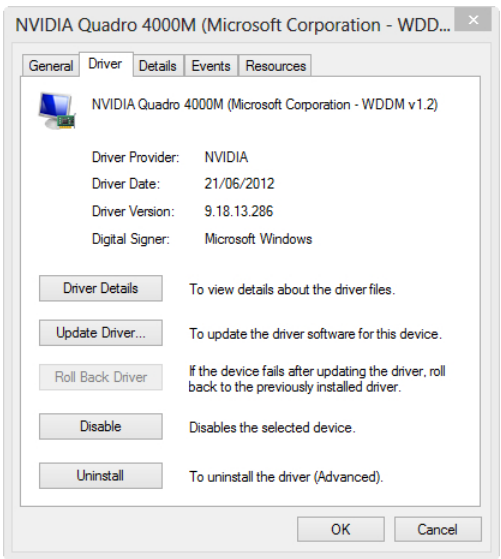

Figure 33-11 Obtaining driver details

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You might have installed a driver from the specific hardware manufacturer because you know it to be stable and later find that the driver listed in the Device Manager shows it has been written by Microsoft. This will mean that the driver has been updated through Windows Update; thus, if it is causing problems, you can click the Roll Back Driver button to restore the older driver.

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Hiding driver updates in Windows Update

If you find that a driver delivered through Windows Update is causing problems and you don't want it to be automatically reinstalled, roll back the driver and then run Windows Update manually. When the driver reappears in the available updates list, right-click it, and then in the options panel that appears, select Hide.

You might also learn here that the driver is quite old and needs updating. Windows might be unable to find a new driver automatically because the manufacturer hasn't submitted its drivers for official testing. In this circumstance, you will need to visit the driver manufacturer's website and obtain the driver manually.

Backing Up an Individual Driver You might also find that you want to back up an individual driver. But, why would you want to do this? Some hardware—especially older hardware that can be problematic to install or hardware that is used across multiple computers—is easier to install if you have all the relevant driver files at hand. This is especially true of some custom and security hardware.

By clicking the Driver Details button on the Driver tab, you can see exactly what files constitute a particular hardware driver. This is important because, as I mentioned earlier in this book, you can back up hardware drivers by making copies of the \Windows\System32\DRIVERS and \DriverStore folders. However, you can see in Figure 33-12 that some hardware requires that files be stored elsewhere within the Windows folder structure.

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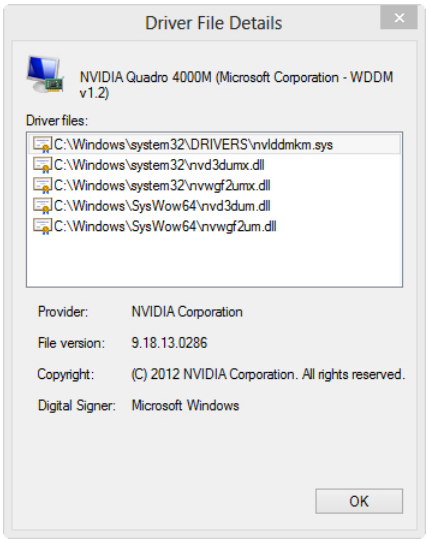

Figure 33-12 Finding the files for a specific driver

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Does a driver require additional software?

There are a great many hardware drivers that we use which require additional software to work properly (or at all). Biometric devices and sensors are good example; Dynamic-Linked Library (DLL) files can be required to plug the sensor controls into the Windows Control Panel.

You will also find that more everyday hardware such as webcams and printers have additional software installed by default that can plug in to panels such as Devices And Printers. These pieces of hardware are unlikely to fail if these files are missing, but functionality can be reduced.

Storage

I cover the Disk Management feature in Chapter 20, "Using Advanced Repair Methods." You use Disk Management to see all fixed and removable hard disks that are attached to your computer and to partition, format, and initialize new ones.

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Services and Applications

Services are programs that require no interaction from the computer user and that perform specific tasks within Windows, such as searching for Windows updates or print spooling. In the Services panel, you can see what services are installed in Windows 8 and which are running. You can also perform actions on them.

I find it useful to click the Status column heading to sort the services by status to easily see which are currently started, as demonstrated in Figure 33-13.

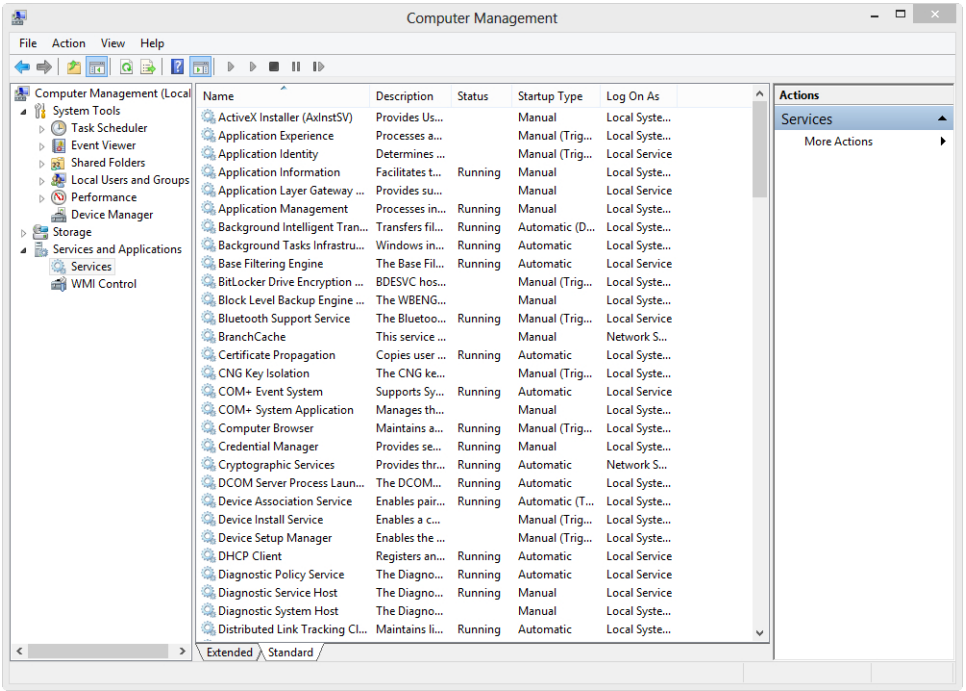

Figure 33-13 Windows services

These useful service descriptions can help you determine what they are and what they do. To view a service's settings, right-click the service, and then in the options panel that appears, click Properties. In the Properties dialog box, you can set the service's status and disable it if necessary.

Figure 33-14 shows the Recovery tab in the Properties dialog box for a service. On this tab, you can set what Windows should do if a service causes a problem and fails. One option is to run a program; for instance, the Problem Steps Recorder.

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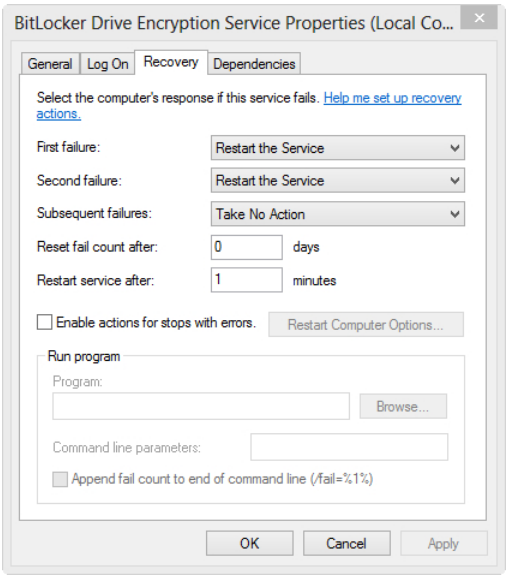

Figure 33-14 The Recovery tab in the Properties dialog box of a service

INSIDE OUT

Launching the Problem Steps Recorder in response to an action

You can start the Problem Steps Recorder by opening the Start screen and searching for PSR, but where do you find it if you want to auto-launch it in response to an event?

You will find the program listed on your Windows drive as \Windows\System32\psr.exe.

WMI Control

Windows Management Instrumentation (WMI) is a way for your computer to access and share management information over an enterprise network. It is used by management tools such as Windows Systems Management Server; it will probably not display anything on your Windows 8 computer when you click the WMI control in the Computer Management console.

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Performance Information and Tools

On the surface, Performance Information and Tools offers a way for gamers and computer enthusiasts to rate their computers so that they can compare their Windows Experience Index score with that of their friends (see Figure 33-15). Delve a little deeper, however, and you quickly find a large number of powerful help and diagnostic tools.

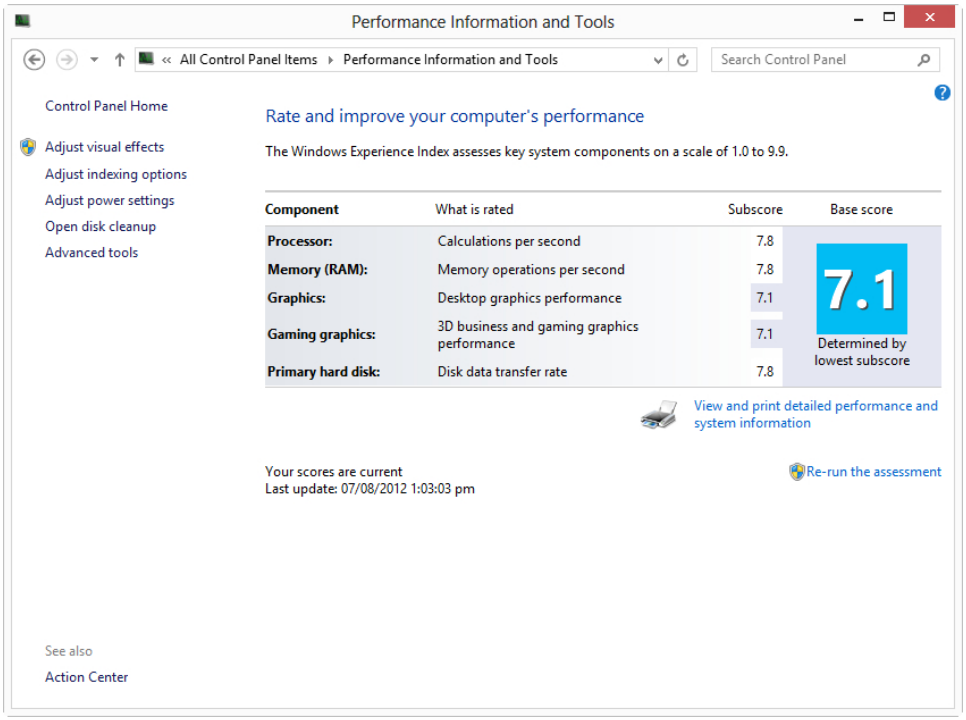

Figure 33-15 The Performance Information And Tools panel

In Chapter 20, I point out the features in Performance Information And Tools on a more cursory basis, but here, I will go into more detail about specific features that can prove invaluable for diagnosing and repairing problems with Windows 8.

Visual Effects

To access the Visual Effects options, in the blue pane on the left side, click the Adjust Visual Effects link. Figure 33-16 shows that the options that are available to you do much more than just change the way some Windows components appear.

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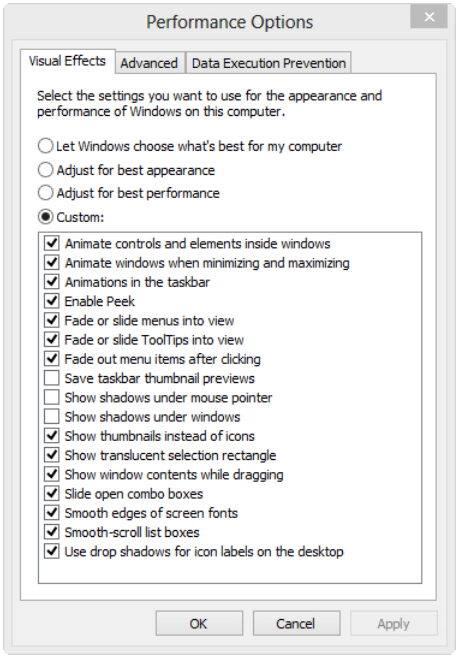

Figure 33-16 Adjusting the Visual Effects

On the main Visual Effects tab, you can turn off effects that are causing Windows to behave sluggishly, such as animation settings. On some computers, particularly older ones or low-power computers such as netbooks and tablets, changing some of these settings improves the performance of the operating system. The Visual Effects tab also includes default settings for running Windows 8 optimized for best appearance and best performance.

The Advanced tab (see Figure 33-17) is where you can find the virtual memory settings. (See Chapter 3, "Preventing Problems Before They Occur," for details on how to change these settings.) On this tab, you can also adjust the performance of Windows for the benefit of either programs or background services. You should select the Programs option unless you are running a dedicated device for a specific task, such as a file or print server.

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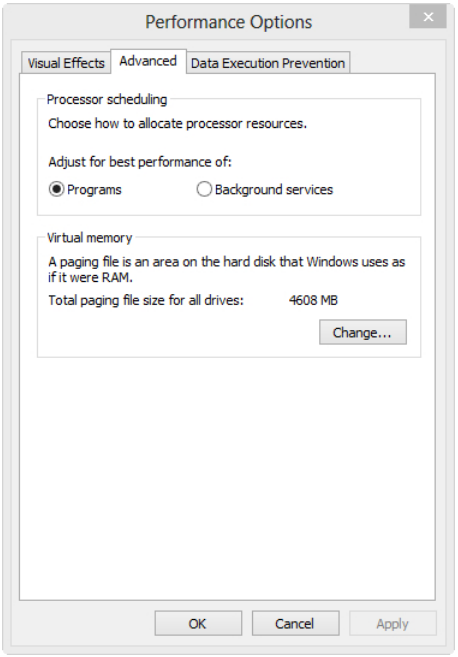

Figure 33-17 Virtual memory and processor scheduling settings

On the Data Execution Prevention tab, you can configure the settings for Data Execution Prevention (DEP), as depicted in Figure 33-18. These settings are related directly to visual settings. DEP is a system to prevent viruses and other malware from running code from non-executable memory. Running code in this manner can cause a buffer overflow in the memory stack and crash the operating system. A buffer overflow is when a program writes data to memory that is reserved and/or being used by another program or service.

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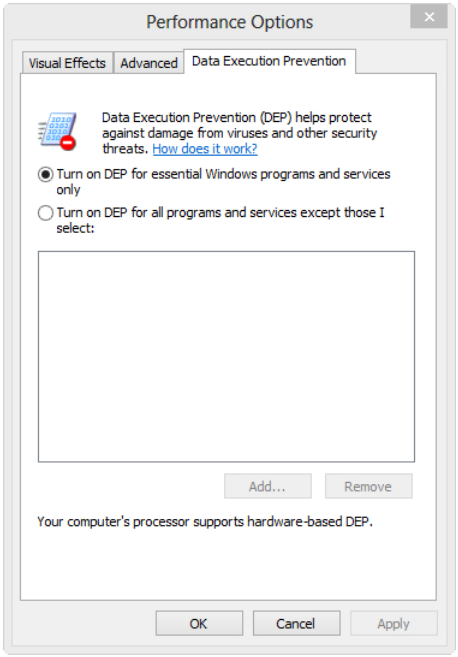

Figure 33-18 The Data Execution Prevention settings

Unfortunately, some software will occasionally be blocked by DEP, especially certain games. If you are having a problem with a program or game, you could try allowing it through DEP to see if it fixes the problem. To do this, perform the following procedure:

1. On the Data Execution Prevention tab, select the Turn On DEP For All Programs And Services Except Those I Select option.
2. Click Add and navigate to the folder where the program is located.

   This will commonly be in the Program Files folder on the C drive.
3. Select the program you want to allow through DEP and then click OK.
4. Add any other related programs (multiplayer mode, for example) the same way. Click OK on the Data Execution Prevention tab when you are done.

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Indexing Options

The Windows 8 Index is a database of all of your files and their contents. If this database becomes corrupt, it can prevent the search facility in Windows 8 from operating correctly. To access the Indexing Options dialog box, on the Start screen, search for **indexing** and then click the Settings search results. You can reset the index by clicking Advanced in the Indexing Options dialog box and then clicking Rebuild in the Advanced Options dialog box, as illustrated in Figure 33-19.

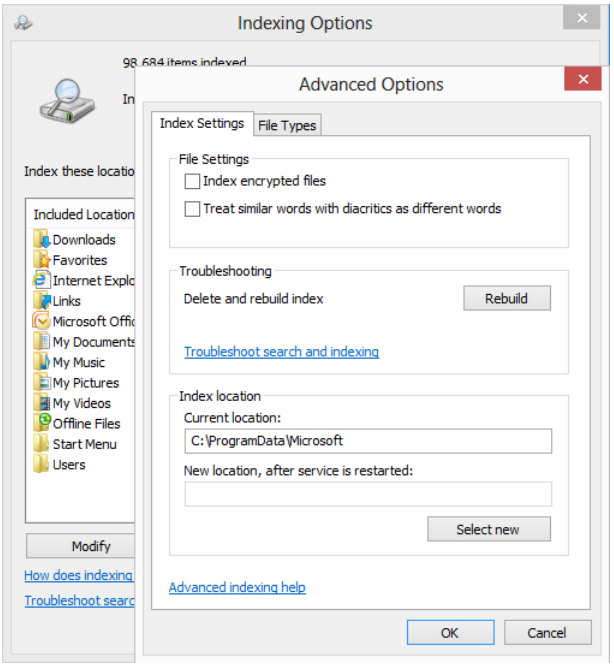

Figure 33-19 Rebuilding the index

Power Settings

I had a problem on one of my own self-built computers that caused it to continually go to sleep every few seconds. The only way around this was to keep wiggling the mouse and pressing a key on the keyboard until I could get into the power options and disable the Sleep function. This can be an annoying first step each time I reinstall Windows 8.

In the Power Options panel (see Figure 33-20), you can change a great many settings for Windows 8 that go far beyond choosing power options for running a laptop on battery power or changing the default action of the power button.

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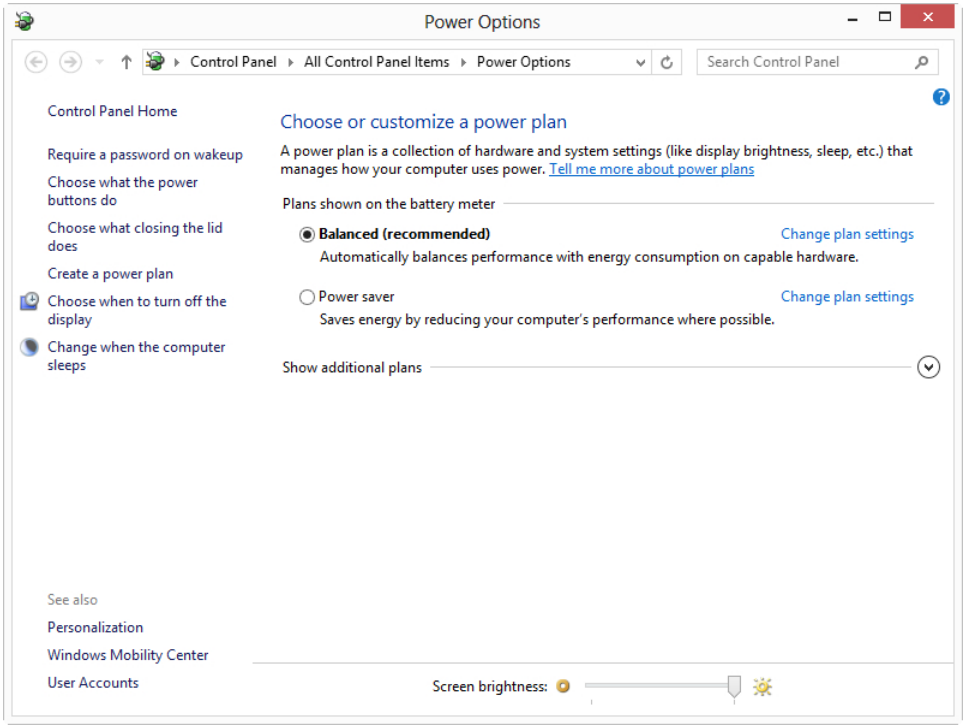

Figure 33-20 The Windows 8 Power Options dialog box

To open the Advanced Settings panel, in the blue panel on the left of the Power Options dialog box, click Choose When To Turn Off The Display (see Figure 33-21). Click Change Advanced Power Settings to change the power settings for a wide variety of Windows components

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Windows 8 on a laptop, netbook, ultrabook, or tablet

On a portable computer, the Power Options dialog box displays additional options by default, giving you much more control over power consumption and battery life.

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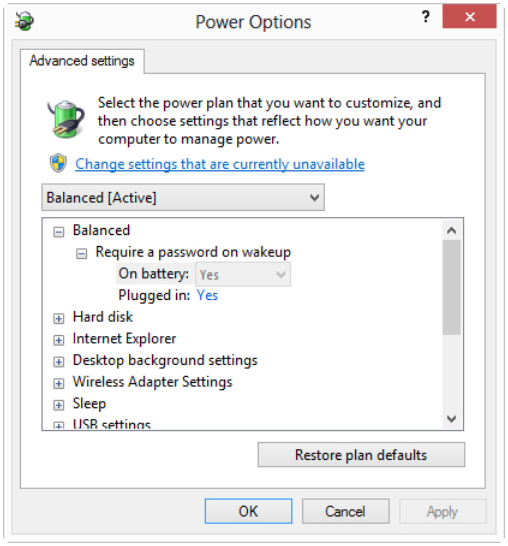

Figure 33-21 Advanced power management options

Sometimes a hard disk or network adapter doesn't function properly after a computer is brought out of sleep. In the Power Options dialog box, you can disable settings such as Sleep and Hibernate modes for your computer.

You might also see a link in the Power Options dialog box to Change Settings That Are Currently Unavailable. Click this link to access yet more power options.

Disk Cleanup

Disk Cleanup is a useful utility that can delete temporary files and other items that can cause Windows 8 to run slowly, including items in the Recycle Bin. Having too many temporary files can cause operating system to slow down if you have a limited amount of free hard disk space.

Advanced Tools

I discuss Advanced Tools (see Figure 33-22) in Chapter 20, but in this section I want to go into more detail about what each tool does and how each one can help you troubleshoot problems with your computer.

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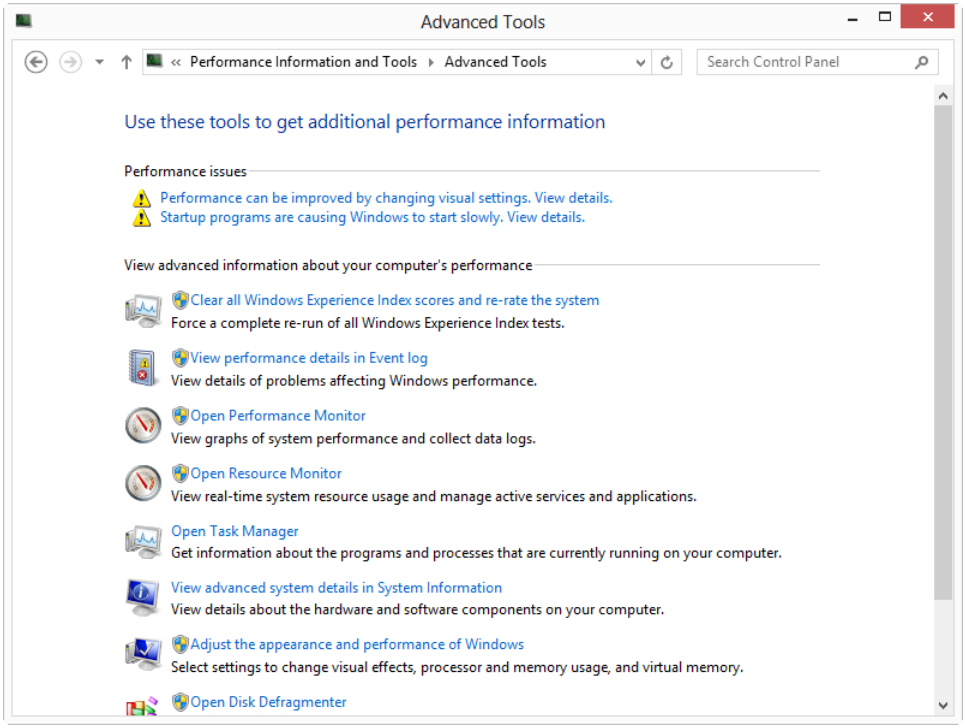

Figure 33-22 The Advanced Tools dialog box

Event Log

You can read all about the Event Log in the Event Viewer section earlier in this chapter.

Performance Monitor

By default, the Windows 8 Performance Monitor shows you only the current processor usage on your computer (see Figure 33-23). It's extremely customizable, however, and all sorts of other tools and features can be added to it.

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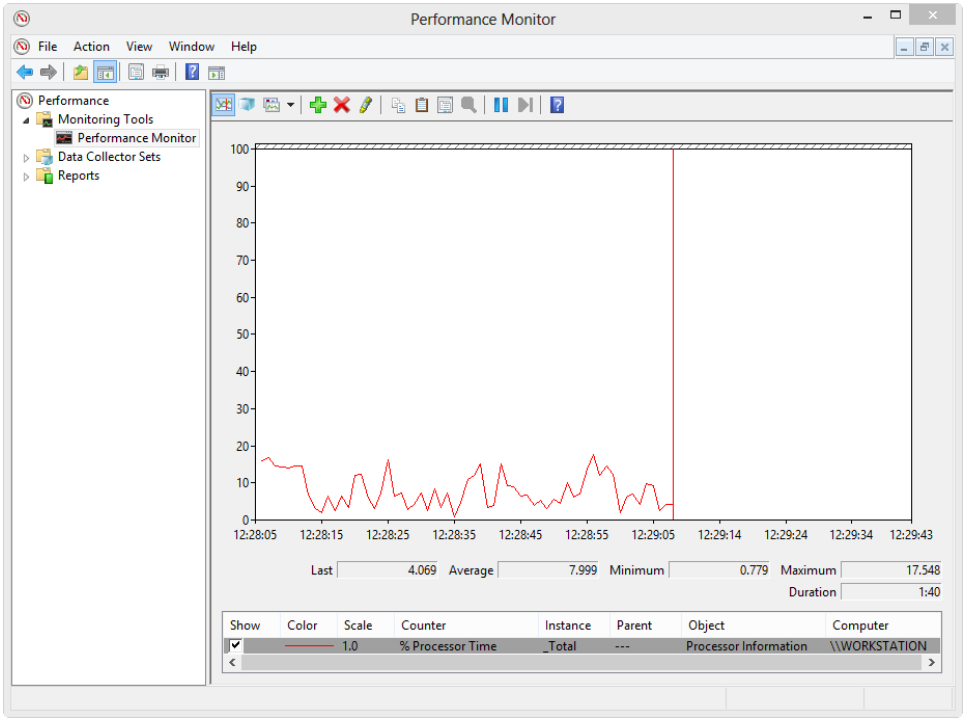

Figure 33-23 The Performance Monitor in action

You can add counters to the Performance Monitor, and as Figure 33-24 illustrates, there are many to choose from. To add a counter, on the top toolbar, press the green plus (+) sign.

Some of the most useful counters you can add are for the network interface. One of the glaring omissions from Windows over the years has been any kind of useful and easy-to-access Internet traffic monitor. The network status monitor can tell you how much data is being sent and received, but the network traffic monitor in Task Manager, which presents the information more usefully as a graph, doesn't show Internet traffic. By adding some of the network interface tools counters to Performance Monitor, you can see a better real-time interpretation of what is going on. This graph view can be more useful than a numeric counter because it makes it easier to see what effect different devices or software are having on your Internet connection.

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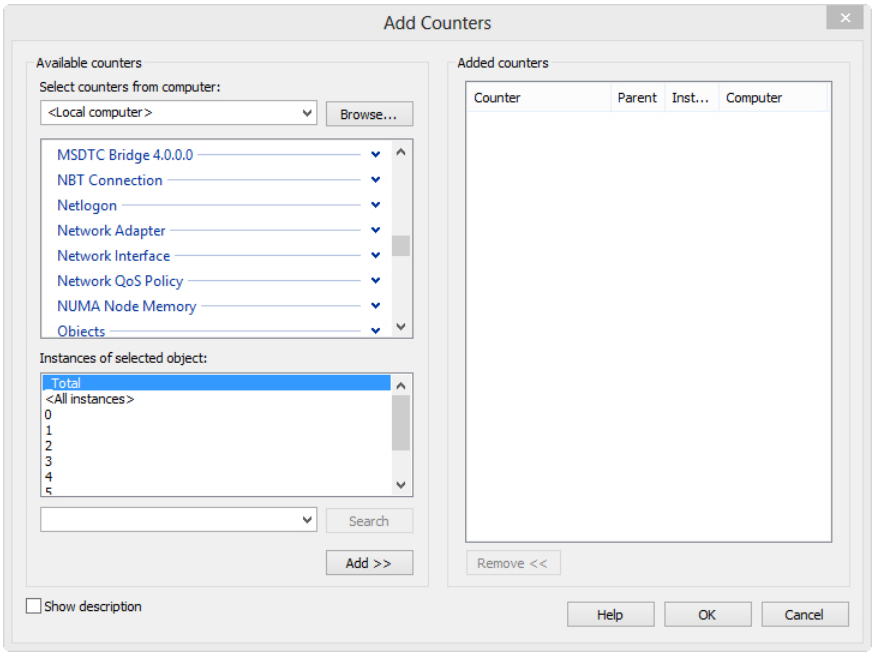

Figure 33-24 Adding counters to Performance Monitor

You can use the pen icon in the toolbar to highlight one or more indicators on the graph to make them stand out. You can also clear any additional indicators in the bottom of the Window to disable them temporarily or permanently.

Data Collector Sets You can save data from the Performance Monitor as Data Collector Sets. You can access these from the left pane in the Performance Monitor dialog box and include predefined system and user-configurable options.

You can export Data Collector Sets so that they can be viewed on another computer by a support technician or imported and viewed in Performance Monitor on your own computer. Data Collector Sets are invaluable in providing specific detail about parts of Windows 8 that cause problems. To create a Data Collector Set, perform the following procedure:

1. In the Performance Monitor, in the left pane, click Data Collector Sets and then click User Defined.

2. Right-click anywhere in the blank space in the main panel. In the options panel that appears, click New and then click Data Collector Set, as shown in Figure 33-25.

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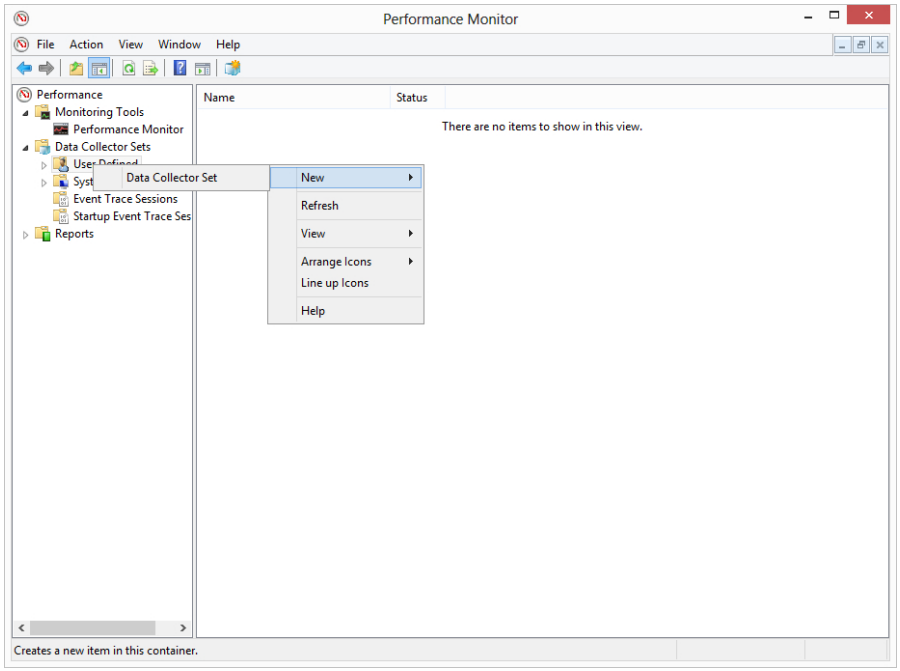

Figure 33-25 Creating a new Data Collector Set

3. Choose to create your Data Collector Set from a template (see Figure 33-26) or choose to exercise more control by creating it manually.

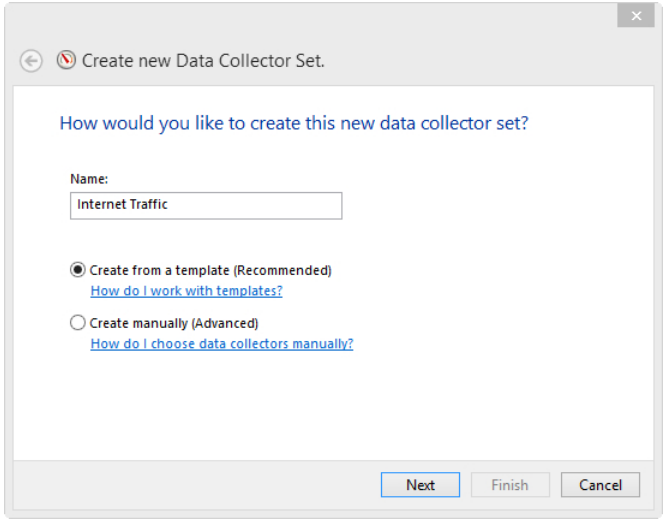

Figure 33-26 Naming your Data Collector Set

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4. When creating a Data Collector set manually, choose the type of information you want collected, as depicted in Figure 33-27.

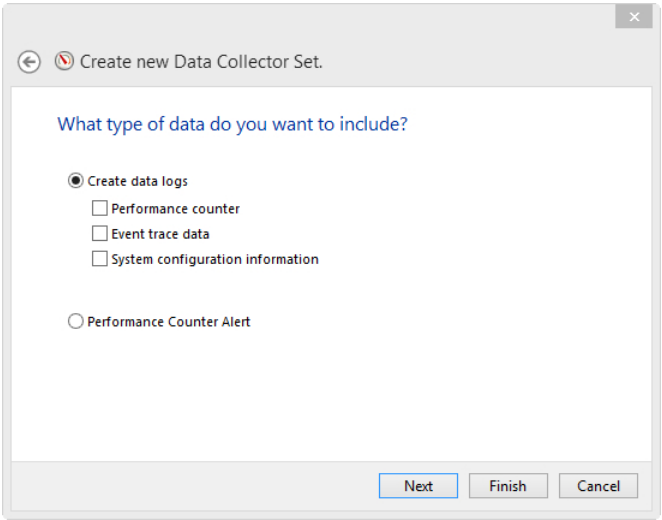

Figure 33-27 Choosing what to include in the Data Collector Set

5. Add specific counters to the Data Collector Set. In the example shown in Figure 33-28, I have added the networking monitors.

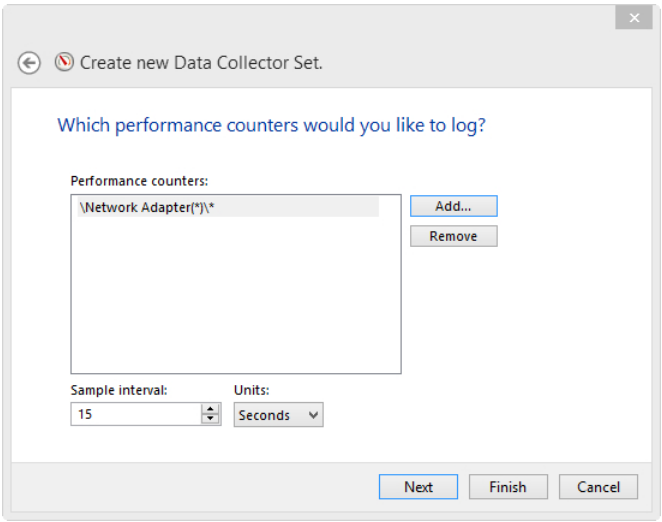

Figure 33-28 Adding counters to the Data Collector Set

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6. Optionally, add event trace providers to the Data Collector Set (see Figure 33-29).

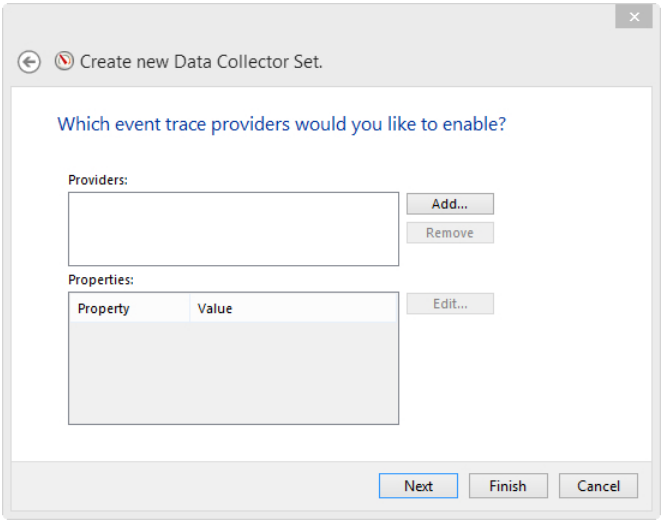

Figure 33-29 Adding an event trace provider to a Data Collector Set

7. Choose a file name and storage location for the logs.

   This can be on your computer or on a network location, as demonstrated in Figure 33-30.

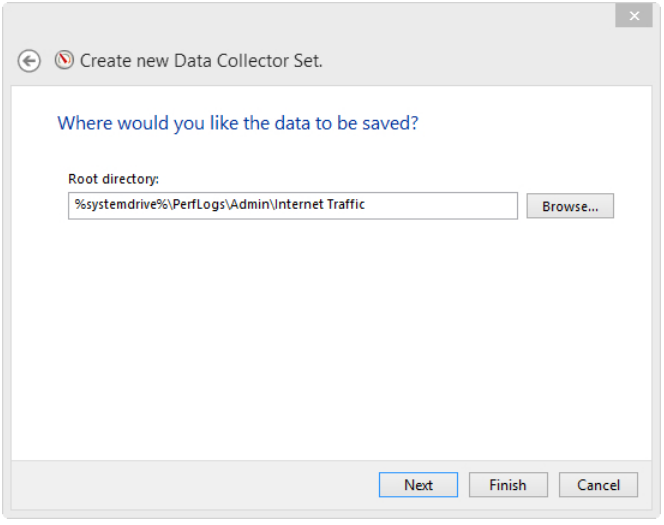

Figure 33-30 Saving the Data Collector Set

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8. Choose a user for which the Data Collector Set should run or leave it as the default (current) user (see Figure 33-31). Click Finish when you are done.

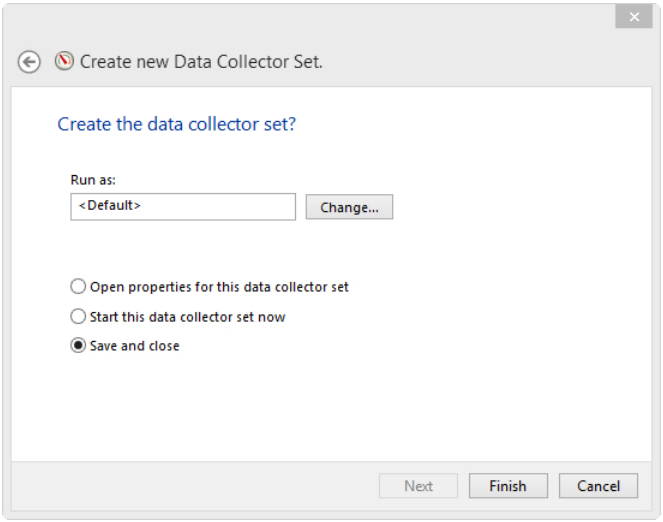

Figure 33-31 Choosing how a Data Collector Set runs

Viewing Data Collector Sets The performance logs for Windows 8 are kept by default on the Windows drive in the C:\PerfLogs folder (see Figure 33-32). Here, you can either open the files to read them or email them to a support person.

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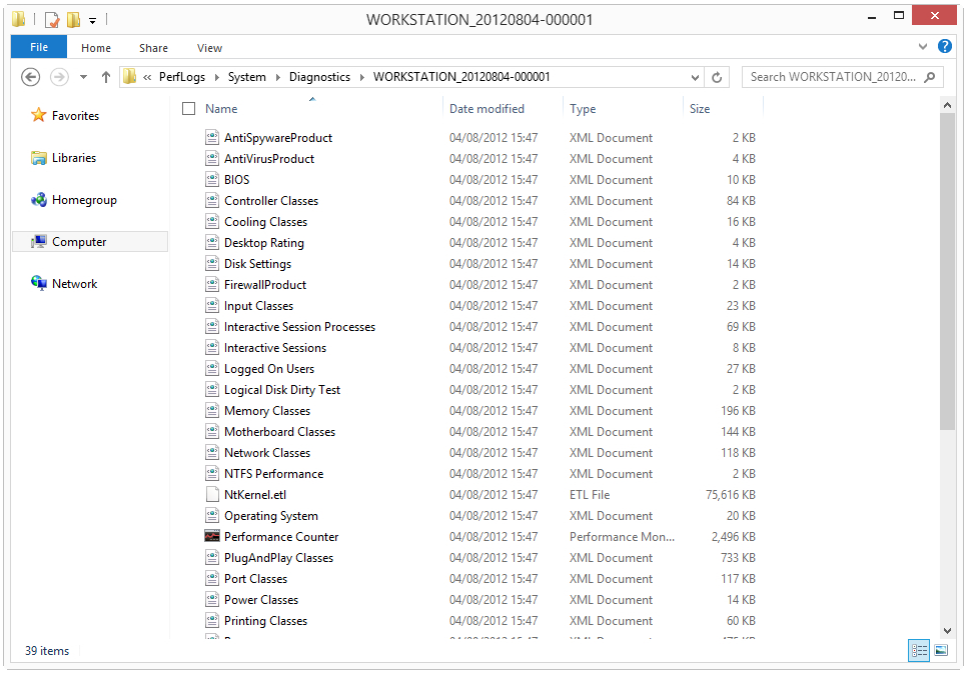

Figure 33-32 Accessing the custom performance logs

Scheduling Data Collection You can schedule data collection to occur at certain times and on certain days. You might, for instance, note that a particular problem tends to occur only on Mondays (when, perhaps, the payroll is processed), so you can set the collection to run only on that day. Alternatively, if you are prone to leaving your computer on overnight, you might want to collect data only during working hours.

To do this, right-click your custom Data Collector Set, and then in the options panel that appears, click Properties. In the dialog box that opens, on the Schedule tab, select the options for when you want data collected. This opens the dialog box shown in Figure 33-33.

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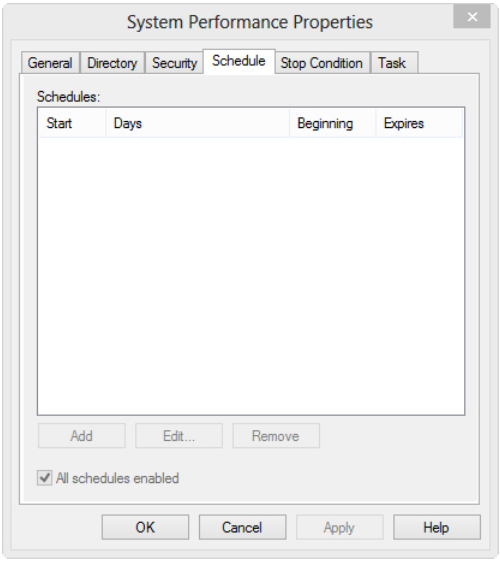

Figure 33-33 Scheduling Data Collector Sets

Resource Monitor

With the Resource Monitor, you can view information about how your hardware and software are operating in real time. You can view data about specific Windows 8 processes or more general information.

Figure 33-34 shows that there are five tabs across the top of the Resource Monitor: Overview, CPU, Memory, Disk, and Network. Each of these tabs provides general or specific information about every piece of hardware, software, or Windows component that is using a resource, complete with the details of how much of the resource each item is consuming.

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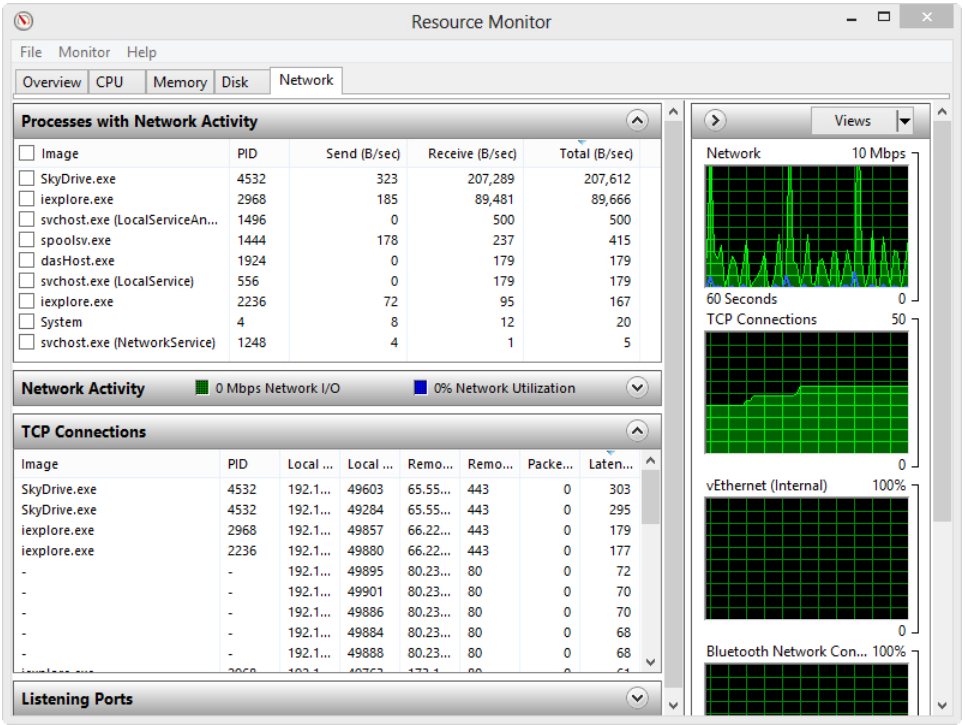

Figure 33-34 The Windows 8 Resource Monitor

Below the tabs are collapsible panels that provide more specific information related to the active tab.

Figure 33-35 shows an active Memory tab. You can see exactly what programs and Windows components are using the memory on the computer. The columns can be sorted and filtered by clicking them. This way, you can quickly find process and programs that are being too greedy or consuming unnecessary resources.

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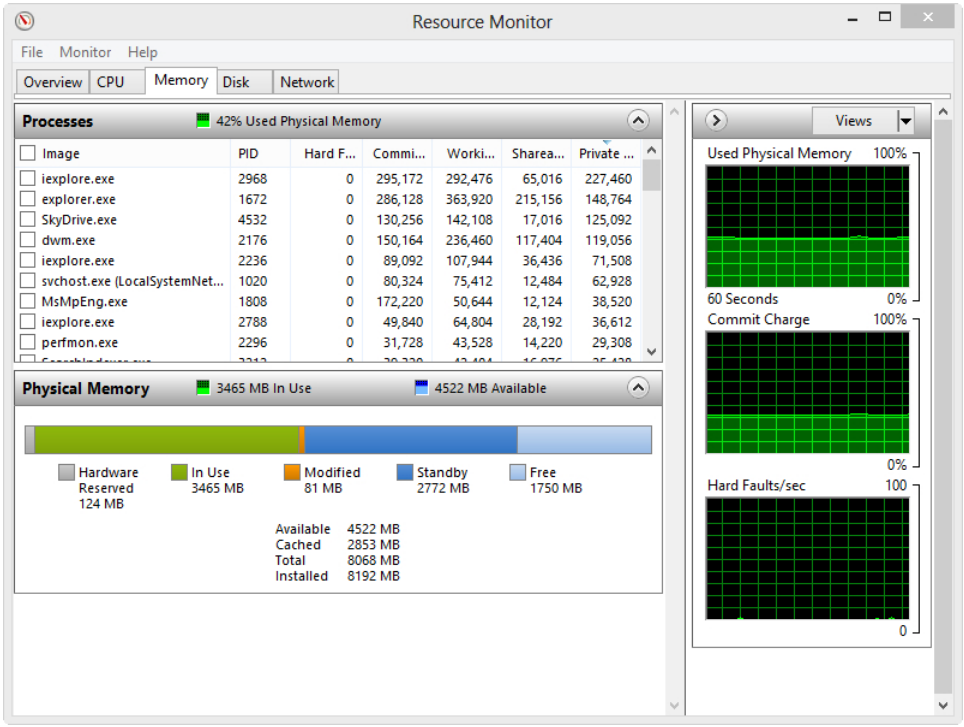

Figure 33-35 You can use the Resource Monitor to find resource-hungry processes.

The Resource Monitor is especially useful for monitoring disk and network activity. On the Disk tab and the Memory tab, not only can you view programs and services that are using those resources, but you can see the throughput of data.

The Resource Monitor offers additional functionality over the Performance Monitor because if there is a problem, you can easily see specifically what disk, program, network device, or process is causing the issue.

INSIDE OUT

Monitor specific processes and programs exclusively

In the main panel, at the top of the Resource Monitor window are check boxes adjacent to running programs and processes. If you need to monitor a specific one (or several), you can select the corresponding check boxes and all the information in the other graphs and panels will change to show information about these selected items, exclusively.

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Task Manager

The Task Manager has been greatly improved from Windows 7 and it now includes some very useful tools, although these still remain a subset of those available in the Performance Information And Tools panel.

By default, the Task Manager only shows a list of the currently running apps and programs. However, you can click the More Details button in the lower-left corner of the window to display much more information, as shown in Figure 33-36.

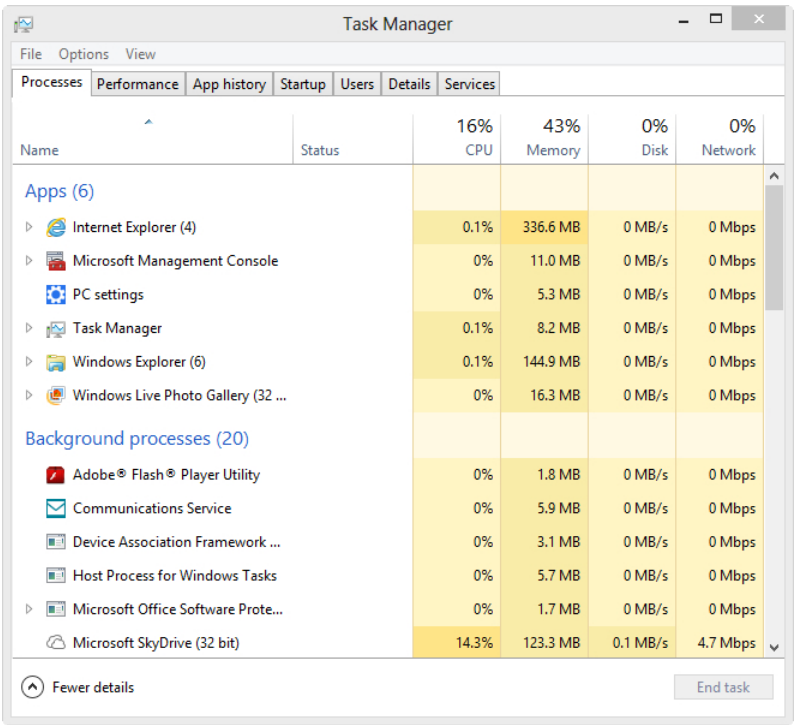

Figure 33-36 The Windows 8 Task Manager

For the first time the information provided, such as the amount of CPU time and memory a program or app is using, are heat mapped. This means that more resource-hungry programs will be highlighted in stronger yellows and reds, making it easy to identify troublesome programs of those using large amounts of your system's resources.

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The Performance tab provides helpful graphs—although nowhere near as detailed as those that I have described earlier—that can give you a quick overview on the desktop of the status of your computer. In the past, some people liked to have software open on their computer that would inform them of CPU, memory, and Internet network usage. You can turn the Task Manager into just such a tool.

To do so, right-click the graphs and then select Summary View, which shrinks the Task Manager down to a much smaller window, as demonstrated in Figure 33-37. This window can then sit on the desktop as a live monitor for your computer's performance.

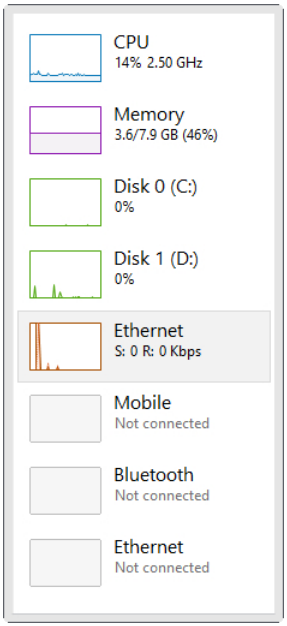

Figure 33-37 The Summary View in Task Manager

You can also right-click the main large graph and select Graph Summary View to view just this single graph on the desktop (see Figure 33-38). You can switch between graphs by right-clicking the graph and selecting another metric from the View options.

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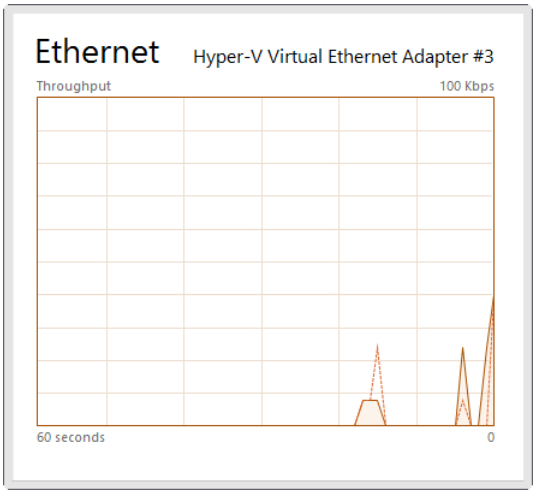

Figure 33-38 The Minimized Graph View

Some of these graphs, such as Network and CPU, also offer additional views and information. For example, you can view all of the processors in your computer individually, as shown in Figure 33-39, or see full and detailed live information about all your network connections (see Figure 33-40).

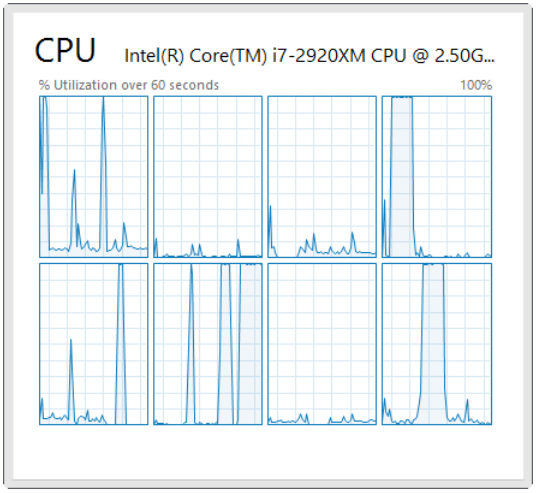

Figure 33-39 Viewing individual processors

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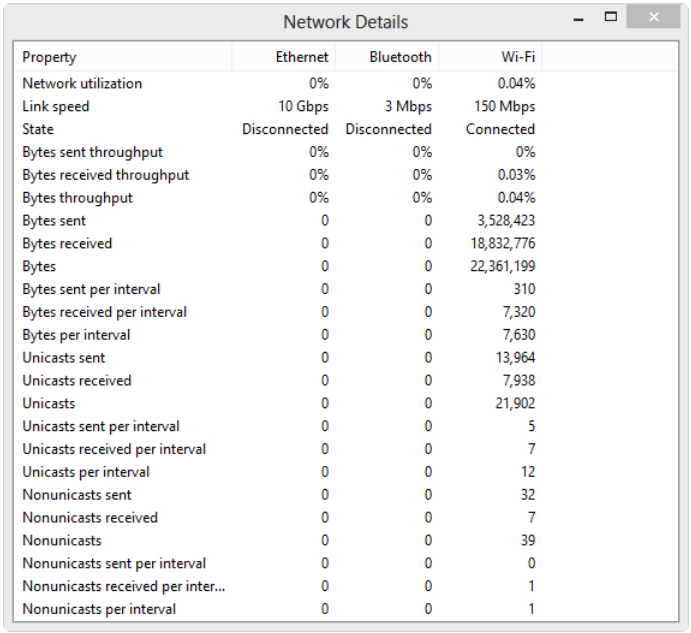

Figure 33-40 Viewing detailed network information

On the App History tab, you can see historical information about Windows 8 apps, such as the total network bandwidth they have consumed both in use and—probably more helpful—how much network bandwidth has been used by their live tiles, as depicted in Figure 33-41. This can be an extremely useful metric to monitor if you use 3G or 4G mobile broadband and do not have a truly unlimited data plan. Again, this information is heat-mapped.

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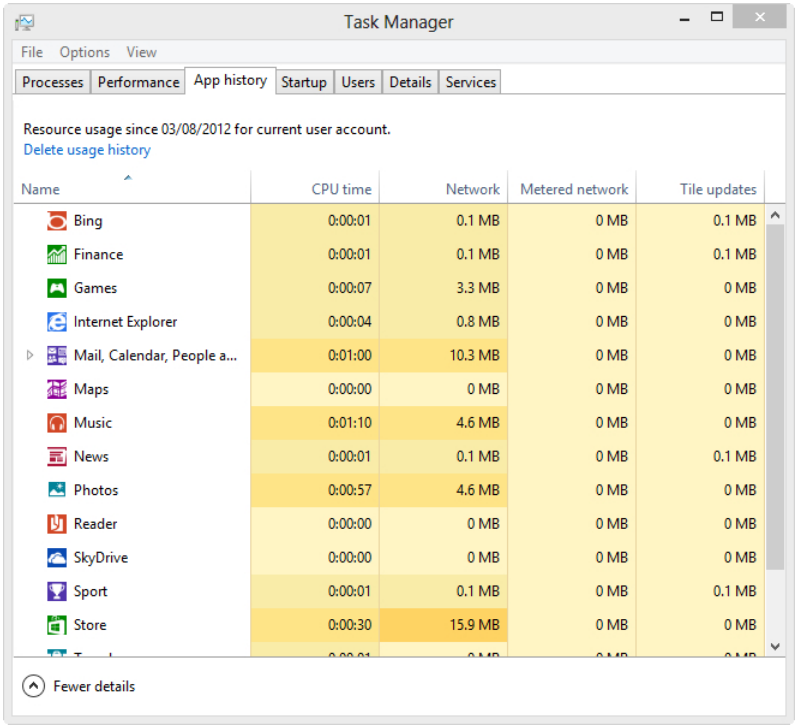

Figure 33-41 Monitoring live tile data usage

On the Details tab, you find the more traditional Task Manager view and information for those who want it, but overall, this first major update to the Task Manager in, uhhhh... well...ever, is extremely welcome and offers some great ways to monitor your computer and quickly diagnose problem areas that you can then explore further by using the more advanced tools.

System Information

The System Information panel (see Figure 33-42) provides a large amount of detailed data about your computer, your copy of Windows, and your system configuration. It can be especially useful if you suspect that something such as a Windows Environment Variable (that is, the pointer to the Windows system folder) has become corrupt or has changed. You can also use it for diagnosing conflicts between hardware driver IRQs.

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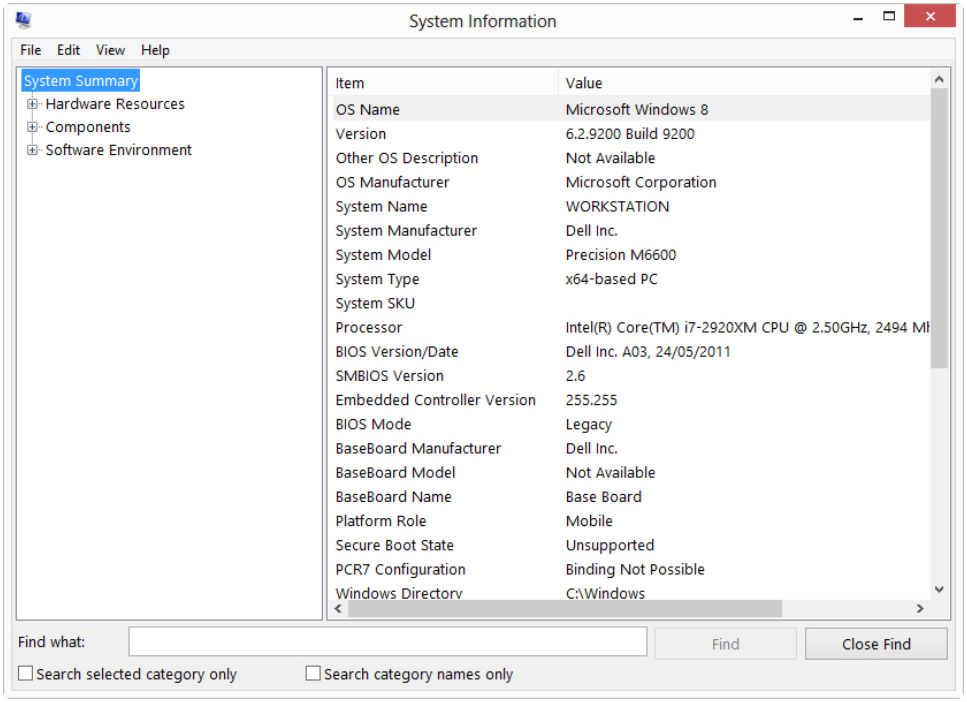

Figure 33-42 The System Information dialog box

Appearance and Performance

Appearance and Performance was covered earlier in this chapter in the "Visual Effects" section.

Disk Defragmenter

With Disk Defragmenter, you can control and monitor the defragmenting of hard disks in your computer. Fragmentation is the splitting of files across the hard disk when there is not enough space to write them as contiguous segments in any one place on the hard disk. This can slow down access to your files. Defragmenting brings all of the pieces of individual files back together for faster access.

INSIDE OUT

Defragmenting and solid-state drives

Because solid-state drives (SSDs) are a random access technology based on silicon chips rather than on spinning disks, they do not need to be defragmented, and doing so will yield no performance benefit.

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System Health Report

A system health report (see Figure 33-43), sometimes known as a system diagnostics report, brings together all of the information from Performance Information And Tools. It is described within Windows 8 as a tool that will:

"Generate a report detailing the status of local hardware resources, system response times, and processes on the local computer along with system information and configuration data. This report includes suggestions for ways to maximize performance and streamline system operation."

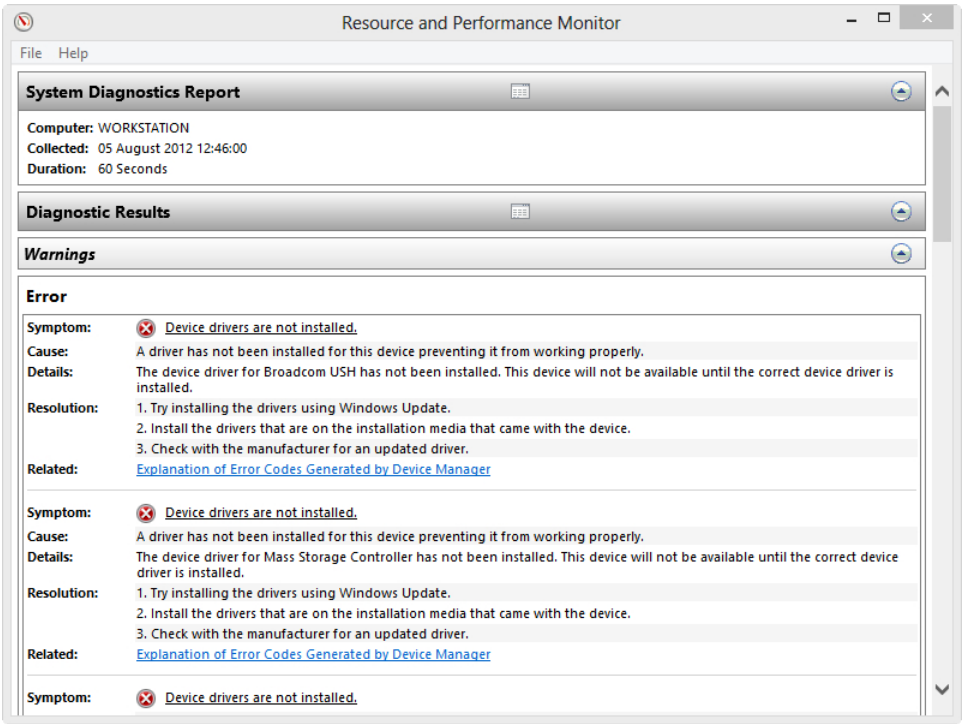

Figure 33-43 A system health report

This report is long and complex, but it is broken into collapsible panel sections, each detailing a specific part of the computer's hardware or software system. This can make it very easy to find the detailed information you require.

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INSIDE OUT

Sending a system health report to a third party

On the File menu of the System Health Report dialog box, you can choose to either save the report as a file or to automatically send it via email if you have email client software (such as Microsoft Outlook) installed on your computer.

Control Panel Troubleshooters

Windows 8 has built-in troubleshooters that are much more useful than small Help wizards to configure the odd option or two (see Figure 33-44). To access the troubleshooters, open the Start screen, search for **troubleshooting**, and then click the Settings results. You can also access it by selecting Troubleshooting in the Action Center, or by selecting Troubleshooting when the Control Panel view is set to show all items (large or small icon views).

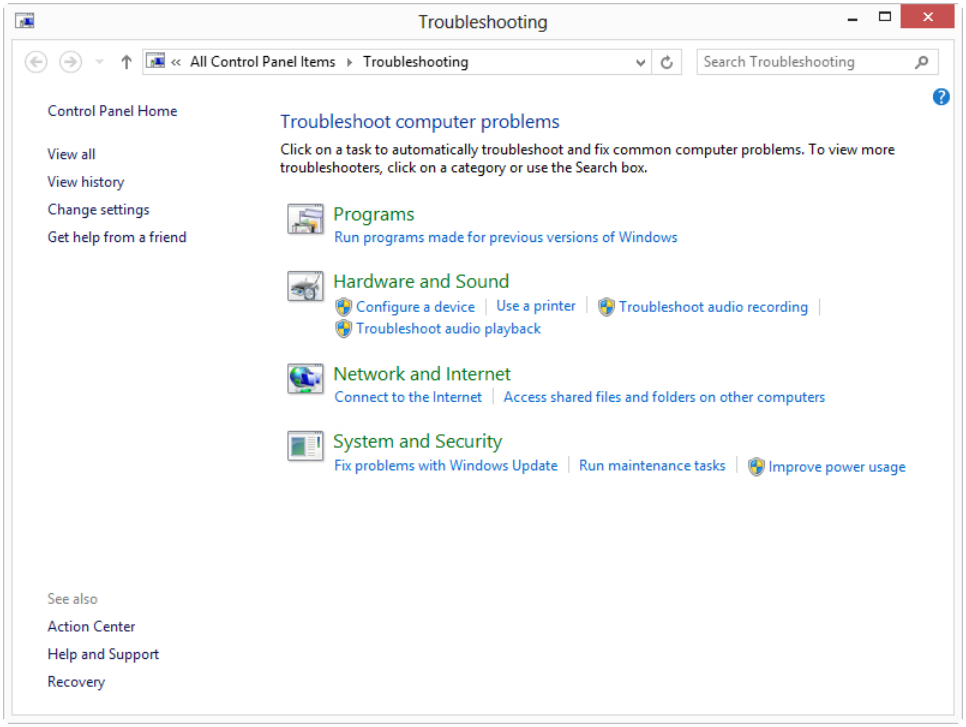

Figure 33-44 The Windows 8 Troubleshooting panel

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Although the Windows 8 troubleshooters can provide useful diagnostics for users, they are also extensible in two important ways. First, as you can see in the example in Figure 33-44, they can be automatically updated over the Internet to provide new features and functionality. Second, there is also the ability for corporate and business users to write their own troubleshooting add-ons for this system.

The troubleshooters are organized into easy-to-use categories and are also searchable using the search box in the upper-right corner (see Figure 33-45, in which I have searched for Internet-related troubleshooters).

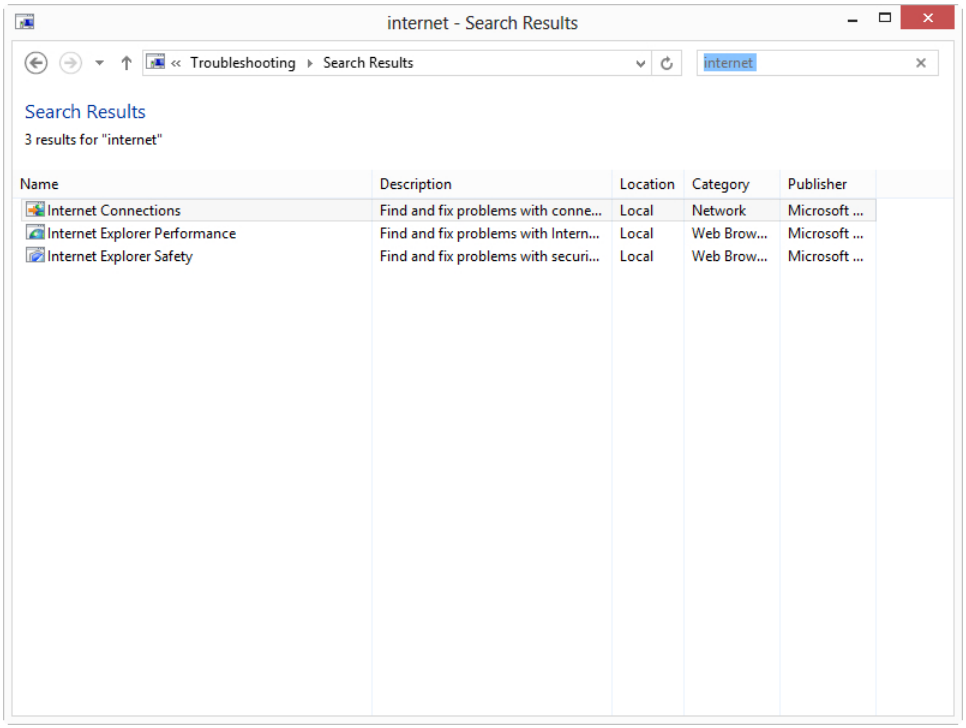

Figure 33-45 Searching for Internet-related troubleshooters

When you run a troubleshooter, you can select the Advanced Options check box that appears in the lower left of the Troubleshooter dialog window. By doing this, you clear the option to have Windows 8 apply any repairs it deems necessary automatically, thus giving you a chance to review them first. You can also optionally run the troubleshooter as an Administrator.

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If the troubleshooter cannot find a problem or a solution, you can click Explore Additional Options. As shown in Figure 33-46, the troubleshooter guides you to sources of help and support online.

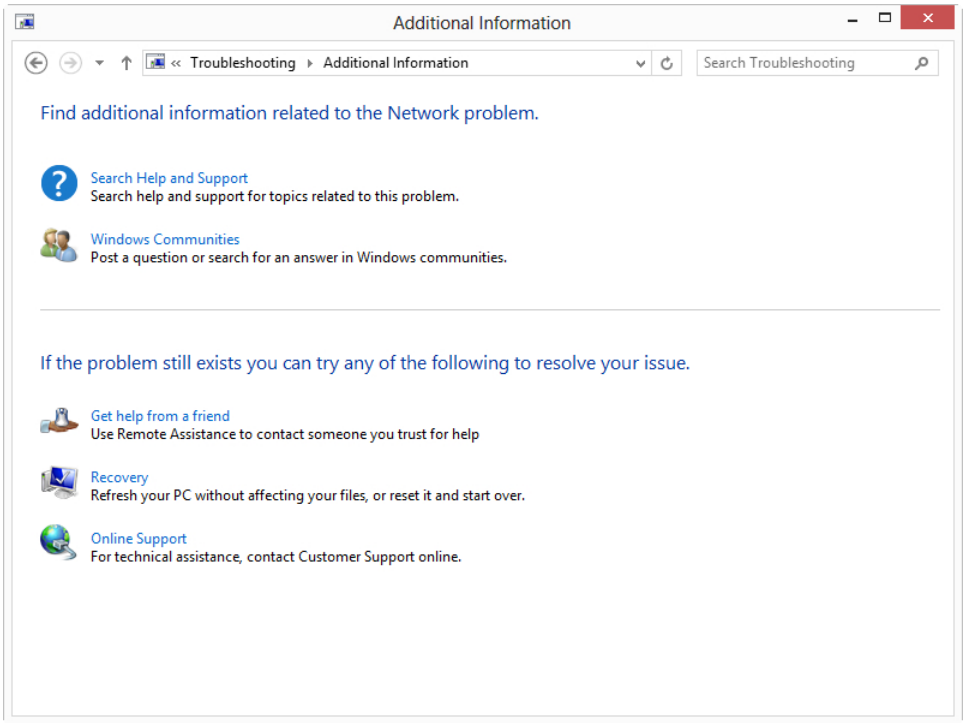

Figure 33-46 The Windows 8 troubleshooters can help you find advice elsewhere.

INSIDE OUT

Not all the troubleshooters fix problems

It's worth noting that not all of the automated troubleshooters fix problems with Windows 8. Some, depending on the troubleshooter, simply reset a Windows component to its default state.

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Summary

The advanced diagnostic and troubleshooting tools in Windows 8 are innovative and, in parts, complex. All they can really do, however, is give you information on what is happening and where. You will need to rely on your own experience and intuition in most cases to interpret this information in such a way that you can diagnose and repair problems in Windows and with your computer.

Certainly the vast improvements made to the Task Manager, many of which might seem hidden, offer new ways to open up basic troubleshooting for even casual computer users. Here, it is easy to see at a glance the status of computer components, programs, and apps.

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CHAPTER 34

Exploring Windows 8 Firewall In-Depth

Windows Firewall 599
Windows Firewall with Advanced Security. 601
Port Control for Routers 612

In Chapter 13, "Responding to Viruses, Malware, and Other Threats," I write about the online threats to a modern computer, how to identify and avoid them, and how to repair any harm done by them. I stress that the biggest part of maintaining security on any computer is ensuring that you are properly educated and informed about the threats and problems associated with carelessly clicking links or opening files that could contain malicious software. Viruses, malware, and hackers can't gain access to a computer without user intervention. If users are careless about what they click online and which websites they visit, they might also be careless about maintaining their antivirus and anti-malware protection, leaving it unattended and out of date. Careless users might even have no antivirus protection at all.

A common belief is that you must have third-party antivirus, anti-malware, and firewall software with Windows. This thinking goes back to the early days of Windows XP and the first vestiges of e-commerce. Originally, Windows XP didn't come with any protection at all, and therefore users were wide open to attack. Now, things are different, especially where it concerns the firewall. Windows 8 includes a perfectly competent firewall as standard with all versions, and in this chapter, I'll detail how you can use it to great effect to secure your computer.

Windows Firewall

Simply defined, a firewall is a barrier between your computer and the outside world. It acts as a gatekeeper that prevents software on your computer from communicating with the outside world, and it prevents the outside world from being able to access your computer. A good firewall protects your computer from even being detected from the outside at all.

Figure 34-1 shows the results of a test done on my computer running only the standard Windows 8 Firewall, in the standard configuration. You can see that the firewall successfully blocks some ports, but not all. The firewall in my Internet router provides an additional layer of support that hides the computer completely.

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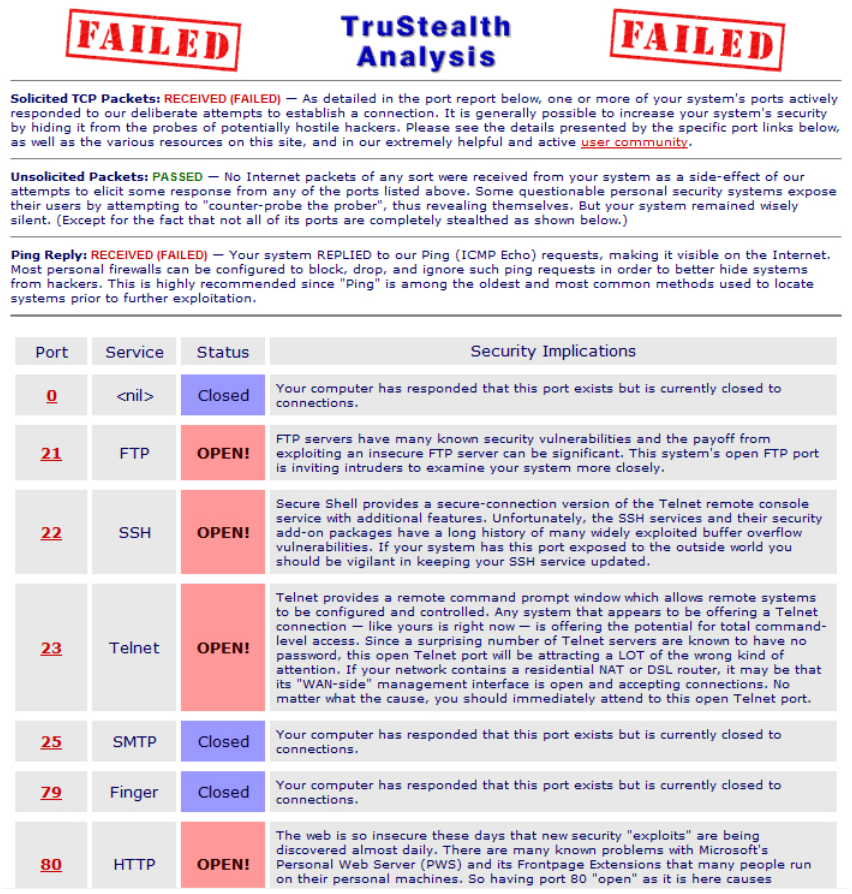

Figure 34-1 A firewall test done at *www.grc.com*

This ShieldsUp! test provides an excellent assessment of your firewall, and you can find it online at *www.grc.com*, which is a site I've recommended elsewhere in this book.

INSIDE OUT

How much extra protection is provided by your router?

If you conduct a firewall test at a website such as the excellent *grc.com*, you might be lulled into a false sense of security because of the additional protection offered by modern routers which can hide computers on the network automatically.

To get a true picture I would recommend running the firewall test on a public network or on mobile broadband. By doing so, you will only see the protection offered by Windows 8 itself.

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To access Windows Firewall settings (see Figure 34-2), go to the Security section of the Action Center, or go to the Control Panel, click System And Security, and then click Windows Firewall.

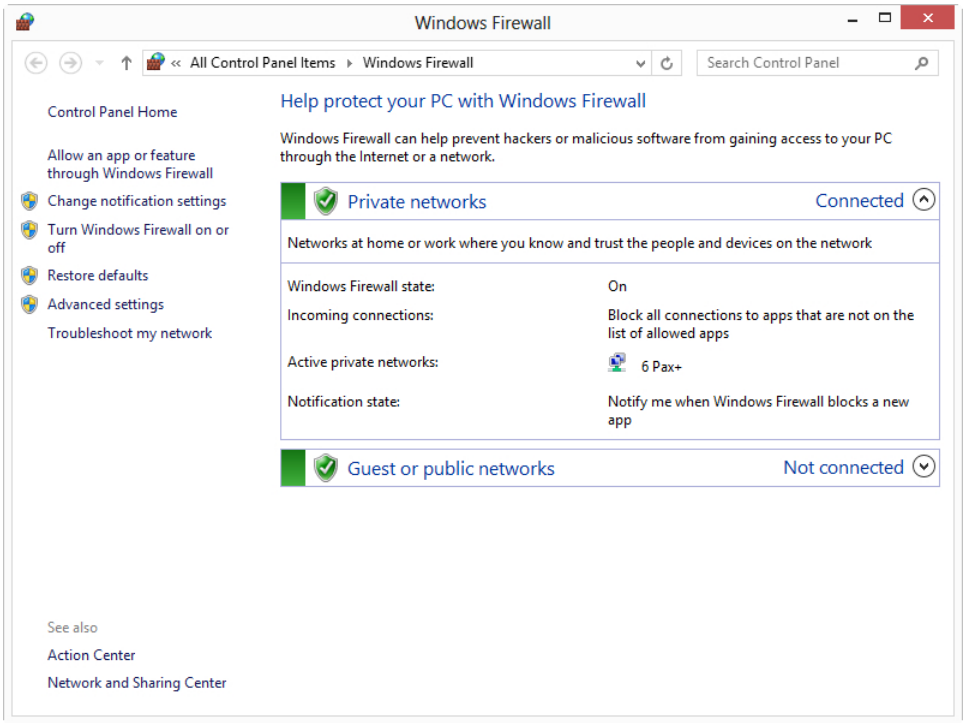

Figure 34-2 The Windows Firewall dialog box

Windows Firewall with Advanced Security

The basic Windows Firewall settings include turning the firewall on and off and allowing a program through it. To increase the level of security, in the blue pane on the left, click Advanced Settings to open the Windows Firewall With Advanced Security management panel, as illustrated in Figure 34-3.

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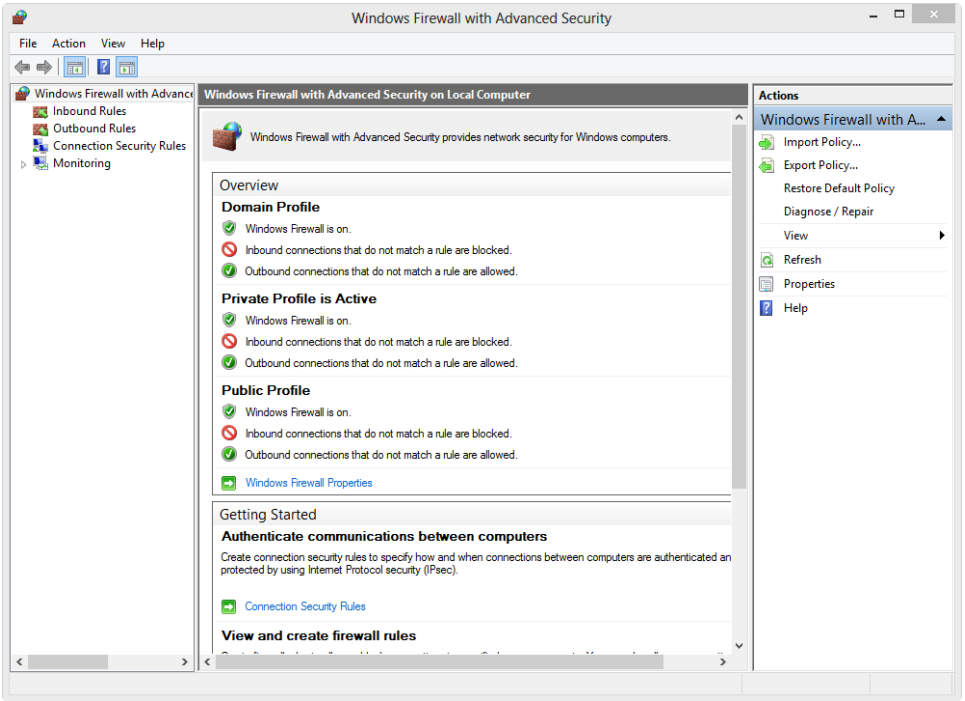

Figure 34-3 The Windows Firewall With Advanced Security management console

By default, the main advanced firewall settings screen includes three panes of information and controls, just like any other management console in Windows 8. In the center pane is status information about the firewall. Below that are some quick links to help you set up advanced rules.

In the Actions pane on the right are links for working with advanced firewall policies once you've set them up. Here you can import and export firewall policies or reset the firewall to its default state if something has gone wrong or become corrupt. You can also use options in the Actions pane to launch the Windows 8 troubleshooters that are relevant to the Windows Firewall.

INSIDE OUT

How to reset Windows Firewall

If something goes wrong with your firewall or the firewall settings become corrupt, you can reset it to the default state by clicking Restore Default Policy, which is located in the Actions pane on the right side of the Windows Firewall With Advanced Security management console.

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Managing Firewall Rules

In the left pane of the Windows Firewall With Advanced Security management console, you can manage inbound and outbound rules. Inbound rules cover connections that are made to your computer from your network or from the Internet. Outbound rules affect Windows software and your installed applications that might want to communicate with your network, the Internet, or other devices.

Click these links to open a list of existing rules. Quite a few of these rules deal with individual Windows components that need to communicate with the outside world, such as Windows Update.

The currently enabled rules are identified by a green checkmark. If you want to turn a rule on or off, right-click the rule, and then in the options panel that appears, click either Enable or Disable. To modify a rule, right-click it and select Properties (see Figure 34-4).

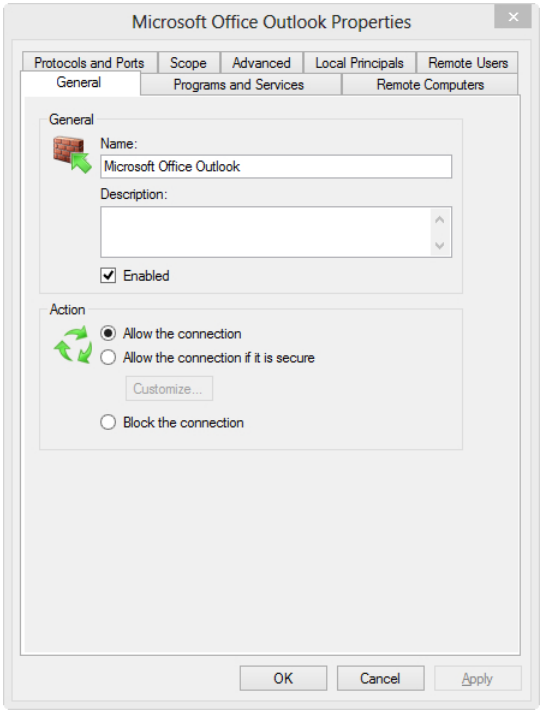

Figure 34-4 Managing the properties of a firewall rule

There are several tabs in a firewall rule Properties dialog box, which I'll describe in the following subsections.

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General

The General tab displays common information about the firewall rule along with controls for switching it on and off or blocking the connection completely.

A useful setting on this tab allows a connection only if that connection is secure. You can set the rule to allow a connection only if certain security measures are in place, such as an encrypted connection across a company network.

Program and Services

If the firewall rule applies to specific programs or Windows services, you can set and configure it on the Programs And Services tab.

Computers

The Computers tab is useful for controlling firewall connections on organization networks. Here, you can limit the connection to certain computers on your network only.

Protocols and Ports

Your computer has 65,535 ports, each of which is a communications "doorway" into and out of it. Some of these ports are reserved for specific functions, some are used by Internet and other communications software on your computer (some used exclusively by external hardware such as your router), and others are user-configurable.

The protocols these ports use to communicate vary, but the most common communication method is Transport Control Protocol and Internet Protocol (TCP/IP), which is used on the Internet.

In a business environment where your computer is connected to a server, you might want to open or block access to specific ports. Or, if you engage in online gaming or peer-to-peer file sharing, you sometimes have to open access to a specific port in Windows and/or in your router to allow communications access.

Scope

Similar to the Computers tab, the Scope tab is where you can limit access to or from specific IP addresses on your network as well as the wider world.

Advanced

Finally, on the Advanced tab you can specify profiles to apply to a rule. For example, you can specify that a rule applies only when you are connected to a public network with a certain type of connection, such as Wi-Fi.

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Adding New Inbound or Outbound Firewall Rules

To create a new inbound or outbound firewall rule, perform the following steps:

1. In the left pane of the Windows Firewall With Advanced Security management console, select either Inbound Rules or Outbound Rules. In the Actions pane, click New Rule to create a new custom rule.

   The New Inbound Rule Wizard or New Outbound Rule Wizard starts. (For this example, it's the New Outbound Rule Wizard.)

2. First determine the type of firewall rule you want to create: a rule for a program, a port, or a Windows service, as demonstrated in Figure 34-5.

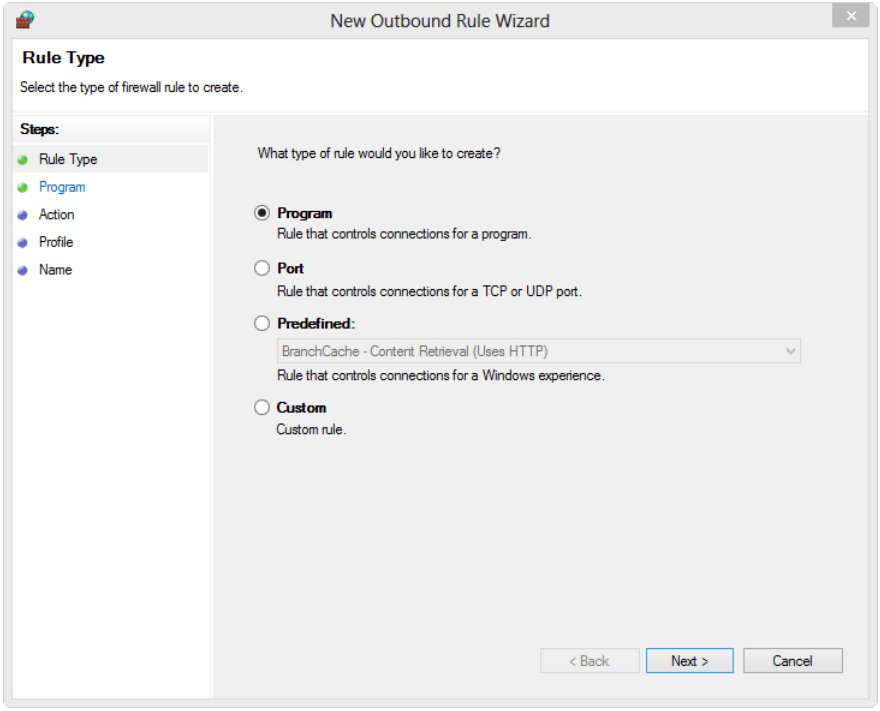

Figure 34-5 Creating a new firewall rule

3. On the Program page, specify the program, port, or service to which the rule applies.

   Figures 34-6 and 34-7 show the options for programs and ports. These will be the most common types of rules you set.

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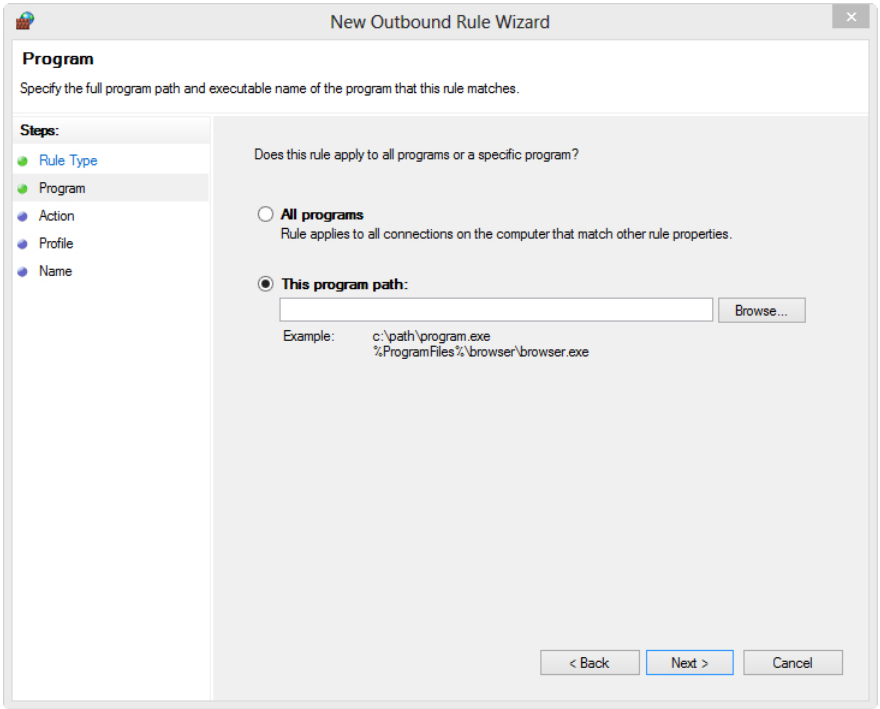

Figure 34-6 Setting the rule to work with a specific program

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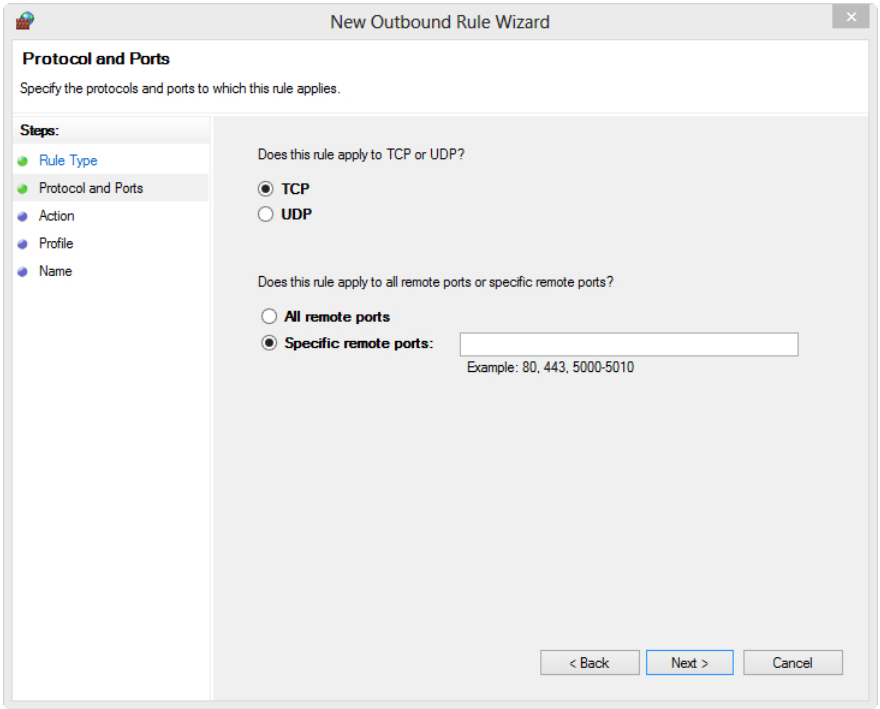

Figure 34-7 Setting a port firewall rule

4. On the Action page (see Figure 34-8), set the firewall action. Do you want to always allow this connection, allow it only if the connection is secure, or are you blocking it?

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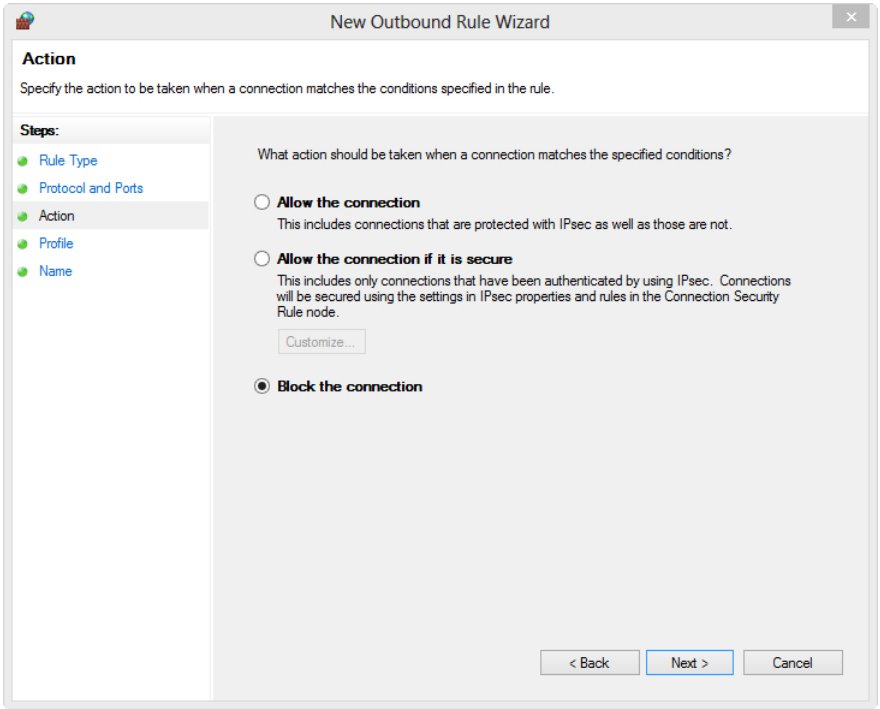

Figure 34-8 Setting a firewall action

5. On the Profile page (see Figure 34-9), indicate to which network types this connection applies. Do you want it to apply to all network types or perhaps just the corporate network or public networks?

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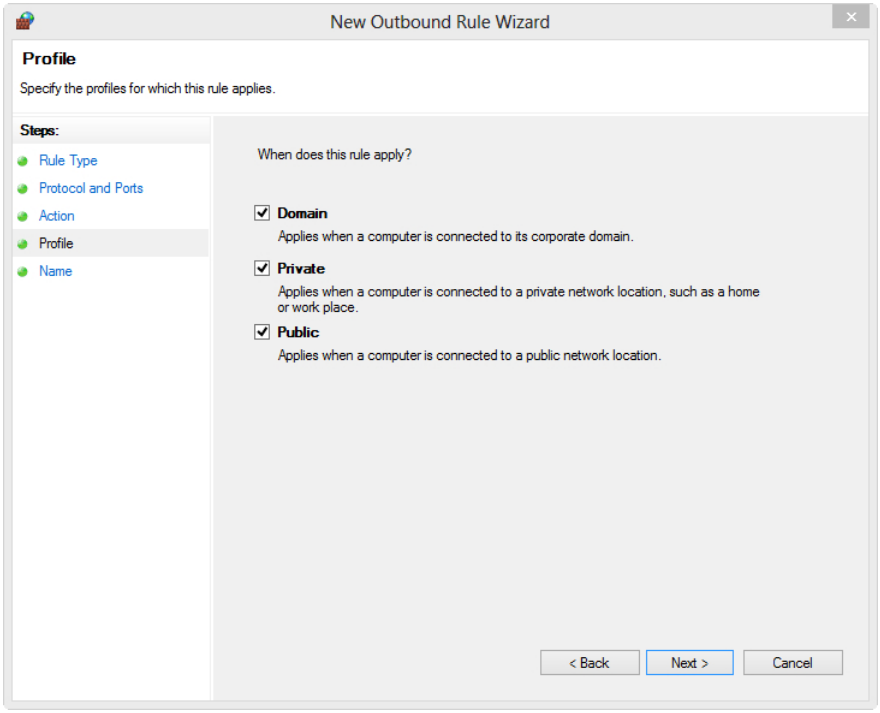

Figure 34-9 Setting to which networks the rule applies

6. On the Name page (see Figure 34-10), give the rule a name and, optionally, a description.

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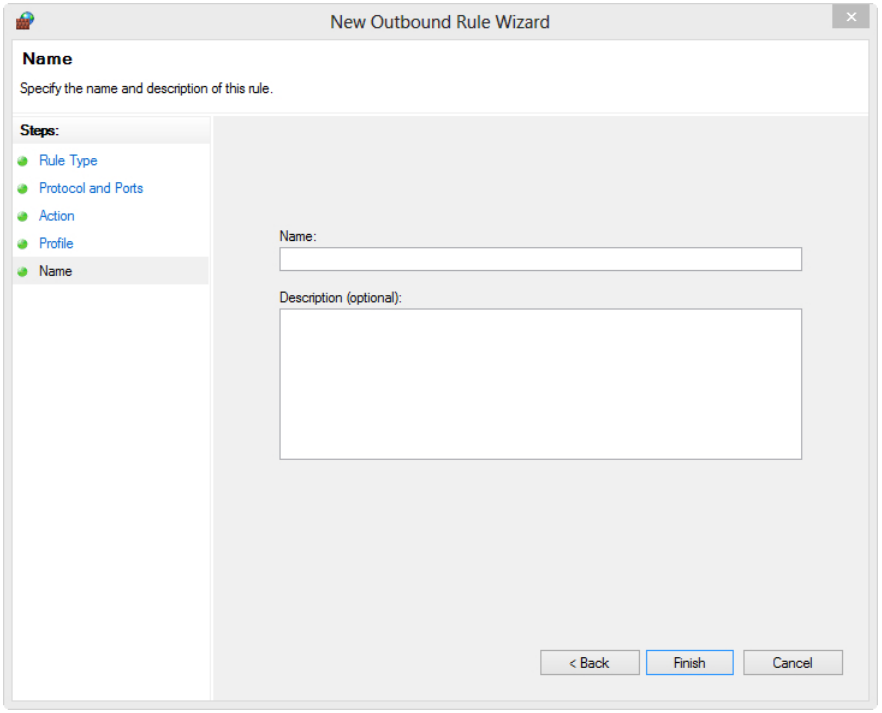

Figure 34-10 Giving the rule a name and description

Setting a Connection Security Rule

In the left pane of the Windows Firewall With Advanced Security management console, below Incoming Rules and Outgoing Rules, you will find Connection Security Rules. You can use this feature to set new rules for controlling connections between your computer and other computers or servers, as shown in Figure 34-11.

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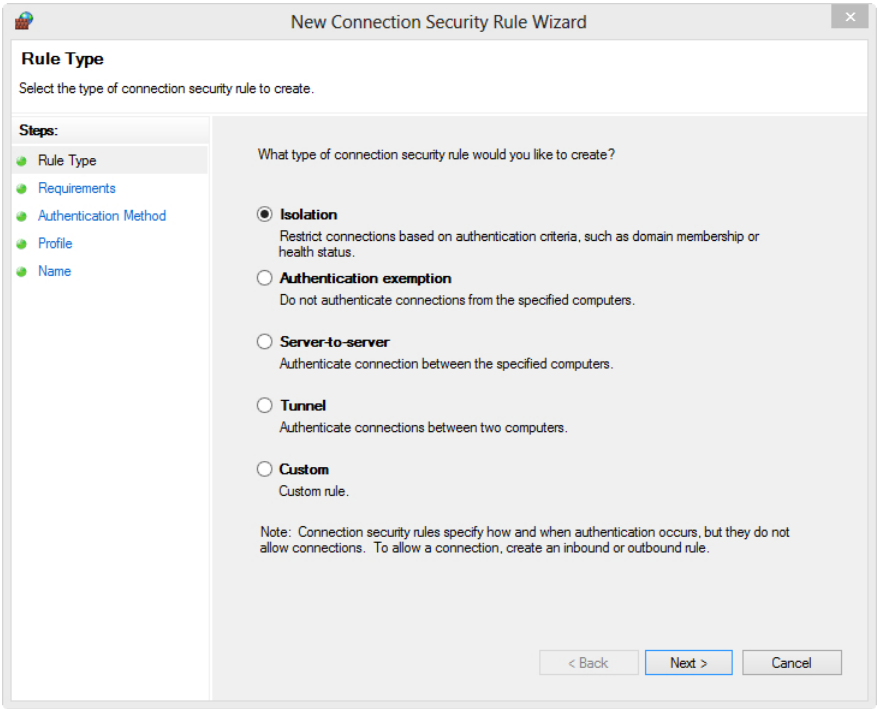

Figure 34-11 The New Connection Security Rule Wizard

This feature can be very useful in any environment for which security is essential. You can use it to set rules for a variety of scenarios, including office-bound computers, computers connected via virtual private networks (VPN), and other scenarios.

You can also use this feature to set a variety of authentication methods between two computers, including the use of root security certificates. With some options, you can also select the encryption method(s) used to transmit data between computers.

Monitoring

In the left pane of the Windows Firewall With Advanced Security management console, click Monitoring to access information on the current status of your firewall and any custom rules you have set up in it.

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More important, opening the Monitoring panel displays the results of the most recent activity of any particular firewall rule. You can check if the rule is working correctly (accessing the correct port, for example) and see what it is allowing through the firewall and what it is blocking.

Port Control for Routers

Some connection problems cannot be solved by using Windows Firewall to allow access to specific ports if these ports are blocked by the router you use to connect to the Internet.

To see your router's firewall settings, you can log on to your router, typically by typing the address **192.168.0.1** or **192.168.1.1** into your web browser, although you should check the documentation that came with your router because this does change with different products and vendors. Figure 34-12 shows a router with firewall options in the left pane. Under the Client IP Filters link, you can see the options to set or block port access for specific computers (IP addresses).

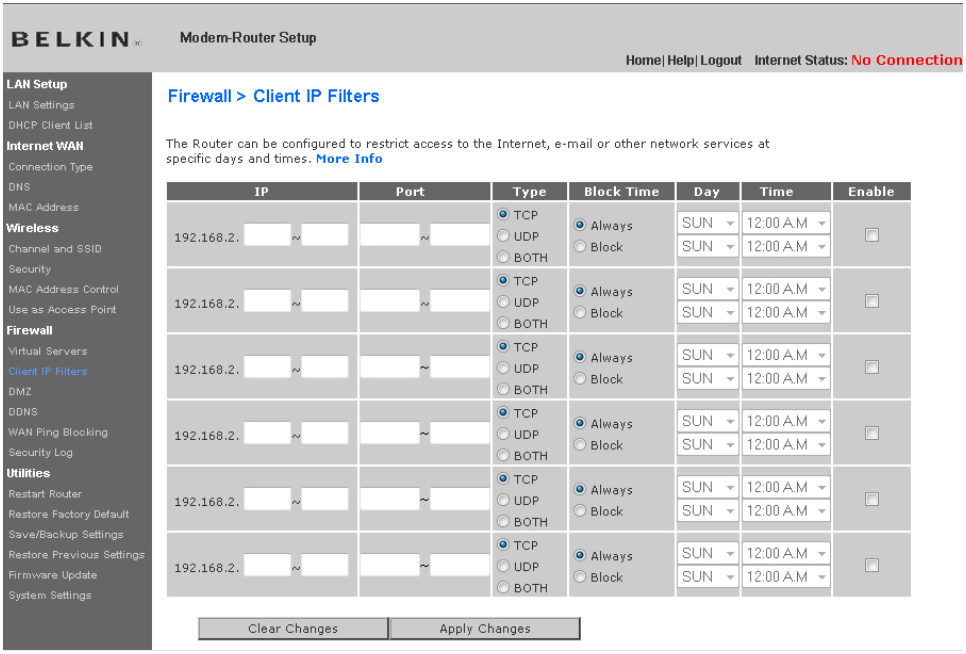

Figure 34-12 Router firewall control

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INSIDE OUT

Troubleshooting router blocks

The router will assign your computer an IP address when it connects. This should always be the same, but sometimes the router assigns a different IP address for your computer, which can cause connection problems.

The router will have a section in its control panel where you can see the IP addresses for all the computers on your network. If you have previously set a port unblocking rule and it is not working, it is worth checking here to see if the IP address assigned to that rule still points to the correct computer.

Summary

Many people prefer to use a third-party firewall with Windows, and you might feel more comfortable doing so, too. However, even the most advanced Windows Firewall settings are easy to use and can provide all the control you need over your networking and Internet connection settings.

Indeed, some of the major third-party security suites have now dropped their own firewalls, recognizing the value of the standard Firewall in Windows. This genuinely is all that you need.

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CHAPTER 35

Making Changes to the Registry

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Registry Keys and Settings 617
Backing Up and Restoring the Registry 618
Working with the Registry 620
Finding Information in the Windows Registry 624

The registry is a database of settings and configuration options for Windows and all of your programs. In its description of the registry on the Microsoft support website, Microsoft describes the operation of the registry as follows:

The registry contains information that Windows continually references during operation, such as profiles for each user, the applications installed on the computer and the types of documents that each can create, property sheet settings for folders and application icons, what hardware exists on the system, and the ports that are being used.

You might occasionally need to change a setting for Windows or for a program that is contained within the registry, perhaps because an error has occurred and a program or Windows component is malfunctioning, or because you are making (or undoing) a tweak to the operating system or a program to change its behavior or performance. If this is the case, you can access the Registry Editor (see Figure 35-1) by searching for **regedit** on the Start screen.

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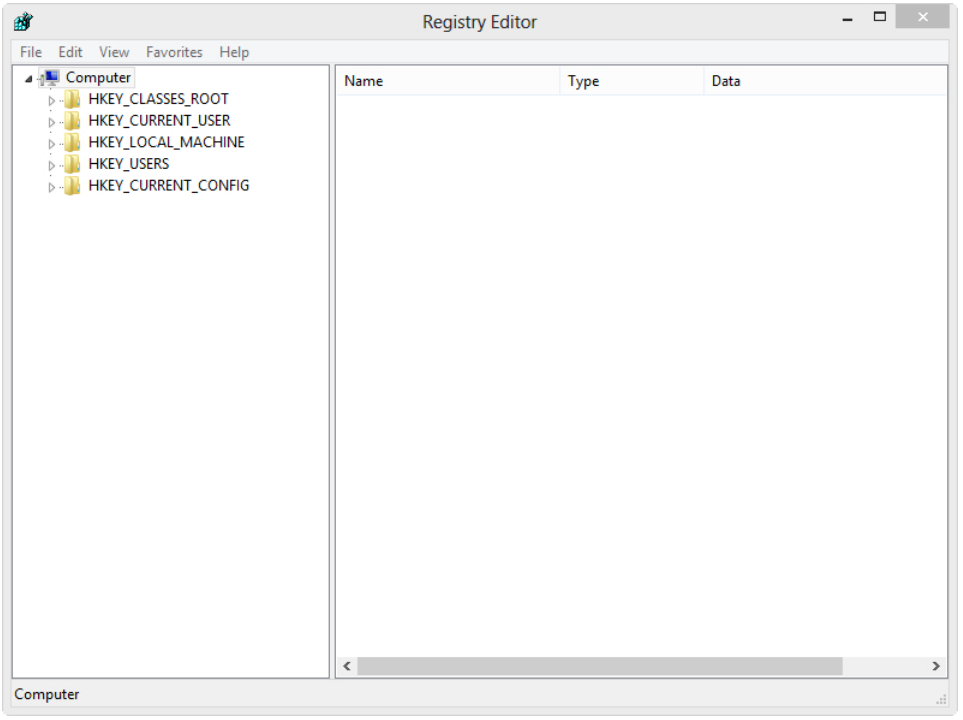

Figure 35-1 The Windows Registry Editor

Each user has an individual registry file called *NTUSER.DAT*, which is a hidden file that's stored in the root of the user's C:\Users\UserName folder.

Registry Sections

The registry is split into five different sections, two for the current user, two for the computer, and one for system startup. I'll describe each of these in the following subsections.

HKEY_CLASSES_ROOT

HKEY_CLASSES_ROOT is a subkey of HKEY_LOCAL_MACHINE\Software. This section stores all of the information for registered applications, including file associations. This key is sometimes abbreviated as HKCR. If you write a registry key to HKEY_CLASSES_ROOT and the key already exists under HKEY_CURRENT_USER\Software\Classes, Windows will use the information stored in the HKEY_CURRENT_USER\Software\Classes as the masterkey, instead. It is unlikely that you will need to make changes to this part of the Registry.

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HKEY_CURRENT_USER

The HKEY_CURRENT_USER section contains configuration options for the current user's profile, including the location pointers to the user's documents folders, display options, and Control Panel settings. This registry key is sometimes referred to as HKCU.

HKEY_LOCAL_MACHINE

The HKEY_LOCAL_MACHINE section of registry keys is the most commonly altered. It contains settings specific to the computer, including installed applications. It is sometimes known as HKLM.

HKEY_USERS

The HKEY_USERS section in the registry contains keys that are subkeys that correspond to HKEY_CURRENT_USER. It stores information for each user profile that is actively loaded. It is sometimes known as HKU.

HKEY_CURRENT_CONFIG

HKEY_CURRENT_CONFIG includes information gathered at startup. Information and keys are stored here temporarily and are replaced when the computer is restarted.

Registry Keys and Settings

There are different types of registry keys and settings. They are usually stored as string values, binary, decimal, and hexadecimal numbers. The following is a description of each:

- **REG_BINARY** Raw binary data for storing hardware component information.
- **REG_DWORD** Data represented by a 4-byte number (32-bit integer). DWORDS are used as the parameters for many settings, including device drivers and software and configuration options.
- **REG_EXPAND_SZ** A variable length data string.
- **REG_MULTI_SZ** A multiple string; for example, a list of multiple values in a format that people can read. These are usually separated by commas or spaces.

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- **REG_SZ** A fixed-length text string.
- **REG_RESOURCE_LIST** A resource list in a series of nested arrays. These are used by device drivers.
- **REG_RESOURCE_REQUIREMENTS_LIST** An array list of hardware resources required by device drivers.
- **REG_FULL_RESOURCE_DESCRIPTOR** Nested arrays used to store resource lists for physical hardware devices.
- **REG_NONE** Data without any particular type.
- **REG_LINK** A Unicode string that names a symbolic link.
- **REG_QWORD** Data that is represented by a 64-bit integer.

> **Note**
>
> **In the same way that 64-bit versions of Windows 8 have two Program Files folders for 32-bit and 64-bit programs, the registry contains different sections for 64-bit registry keys. You can find these in HKEY_LOCAL_MACHINE\Software\WOW6432Node.**

Backing Up and Restoring the Registry

Before you do any work in the registry, always back it up in case a change you make causes Windows 8 or one of your applications to become unstable or unresponsive. To do this, in Registry Editor, on the File menu, click Export, as demonstrated in Figure 35-2.

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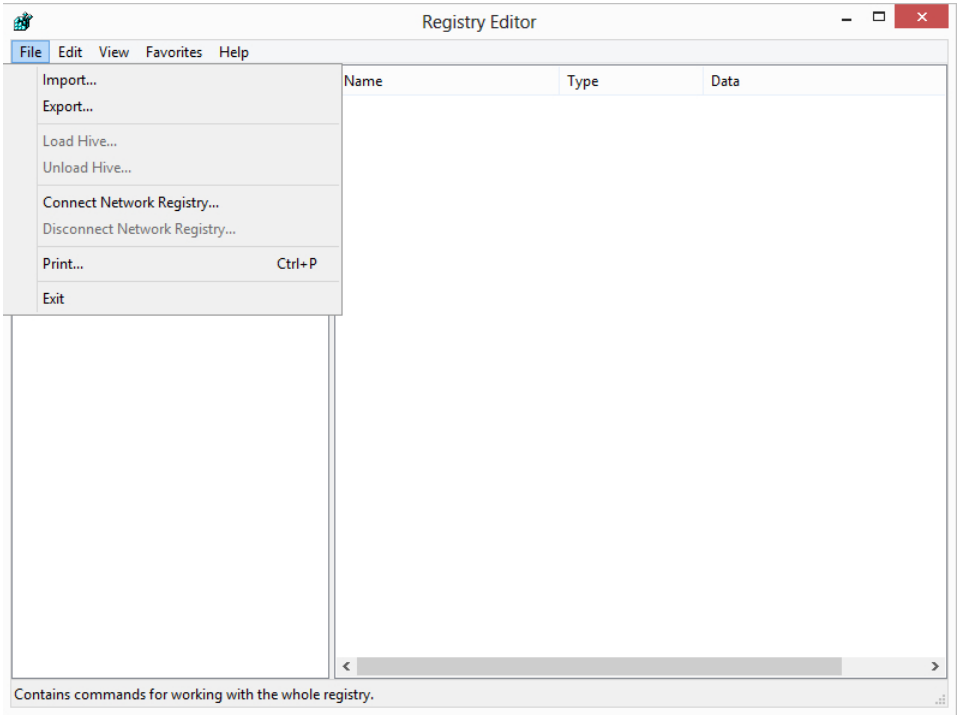

Figure 35-2 Backing up the Windows registry

You can restore the registry the same way. You should always ensure that you have the correct part of the key selected to back up, this is the currently highlighted part. If you need to back up a main registry key and have only a subkey selected, only that subkey will be backed up.

> **Note**
>
> **If changes to the registry have made Windows 8 unresponsive, you might be able to boot into Safe Mode or use System Restore in the System Recovery options to restore the registry. See Chapter 14, "Easy Ways to Repair Windows 8," and Chapter 20, "Using Advanced Repair Methods," for more information on how to use System Restore and Safe Mode to rescue your computer.**

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Working with the Registry

Using Registry Editor is just one way you can work with the Registry. The following list describes some other methods:

- You can use Group Policies and the Microsoft Management Console (MMC) to administer networks, your computer, services, or other operating system components.
- You can use .reg files, which contain registry keys that can be added to the registry by double-clicking to open and run them.
- You can use VBScript or Jscript scripts directly with Windows Script Host.
- You can use Windows Management Instrumentation (WMI), an enterprise-based tool for managing the Windows operating system, to automate certain tasks.
- You can use the command-line program *Reg.exe* in a command prompt window. Type **reg /?** to get a full list of supported commands. You will need to run the command window as an Administrator.

Microsoft provides more information on using these methods at *http://support.microsoft.com/kb/256986*.

Editing, Deleting, or Adding Registry Keys

Right-click any registry key to modify, rename, or delete it, as illustrated in Figure 35-3.

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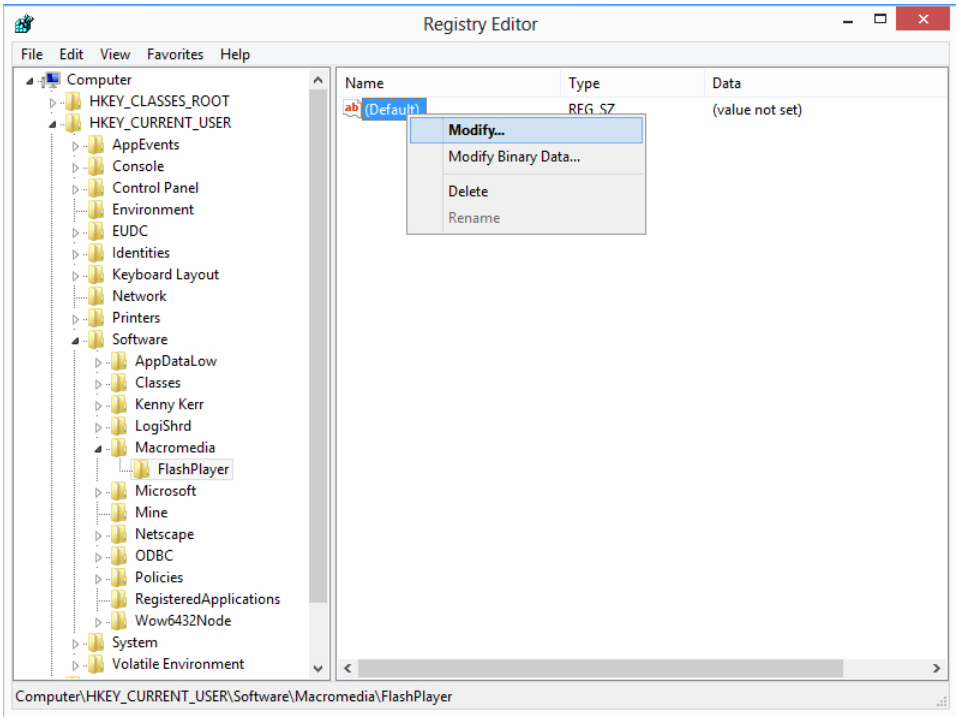

Figure 35-3 Editing or deleting a registry key

To create new registry keys of any type, right-click any blank space in the right pane of the Registry Editor, and then in the options panel that appears (see Figure 35-4), click New.

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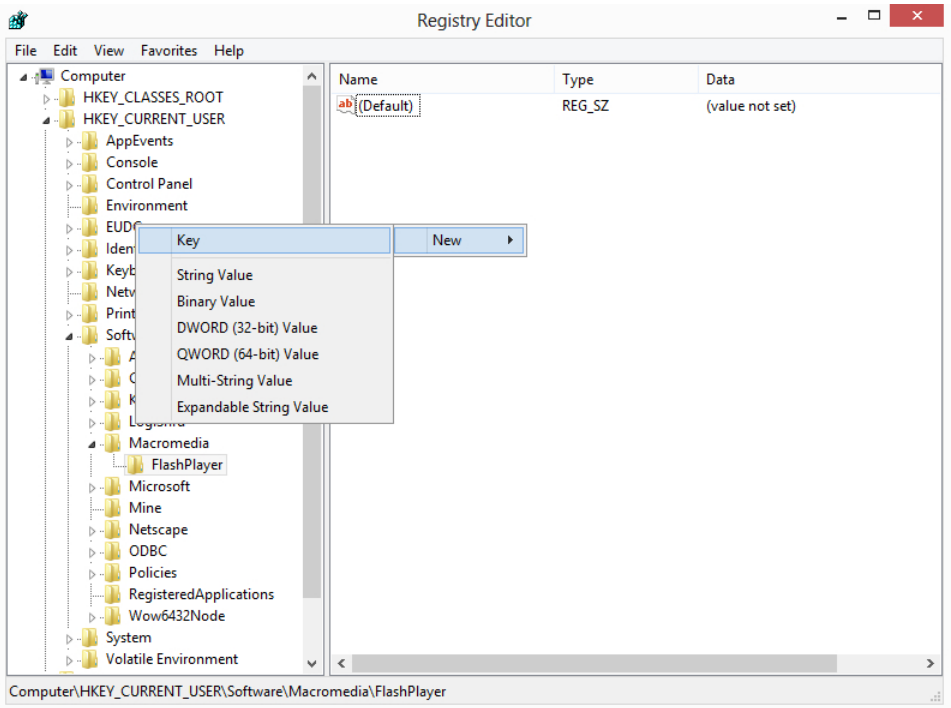

Figure 35-4 Adding a new registry key

Backing Up Specific Registry Keys

You can also back up specific registry keys—or sets of keys—in Registry Editor by right-clicking the folder in the left pane, and then in the options panel that appears, clicking Export (see Figure 35-5). This will create a .reg file that you can later reimport to the same computer or a different one.

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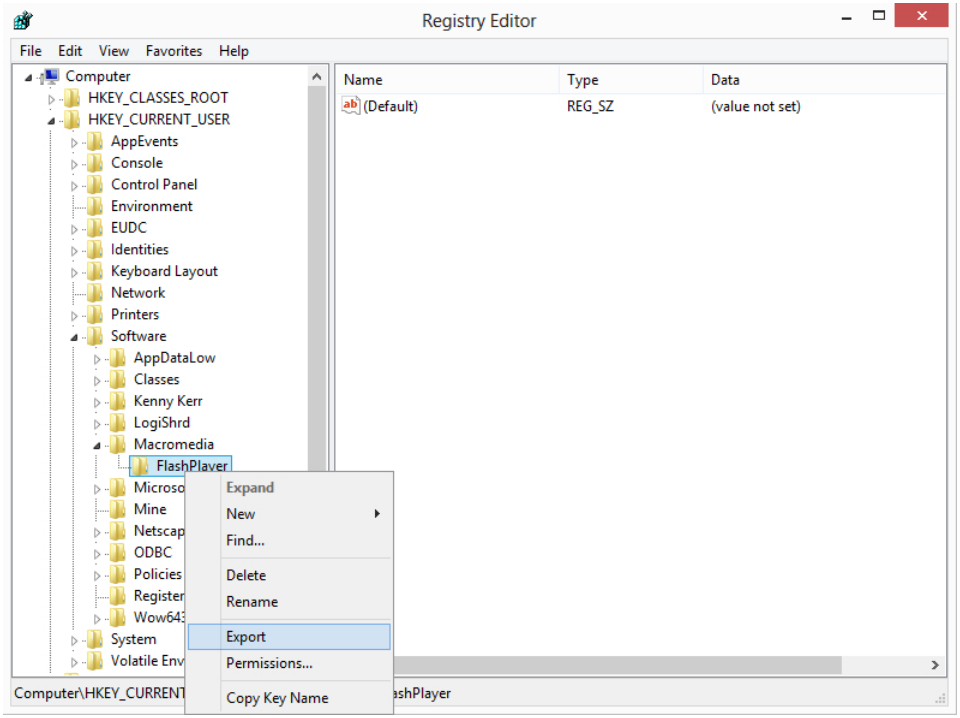

Figure 35-5 Backing up a specific registry key set

Combining Exported Registry Keys

You can't import a registry from one computer into another because so many keys such as the drive assignments, hardware drivers, and installed software will be different. It is quite reasonable however to export specific registry keys for distribution across multiple computers.

Perhaps these will be specific configuration settings for customizing the look and feel of Windows 8 or for specific hardware.

You will not want to have to import multiple .reg files to new computers, though, so these files can be edited into a single file, if need be.

To do this, in File Explorer, right-click the exported file , and then in the options panel that appears, click Edit. This opens the registry file in Notepad, as shown in Figure 35-6.

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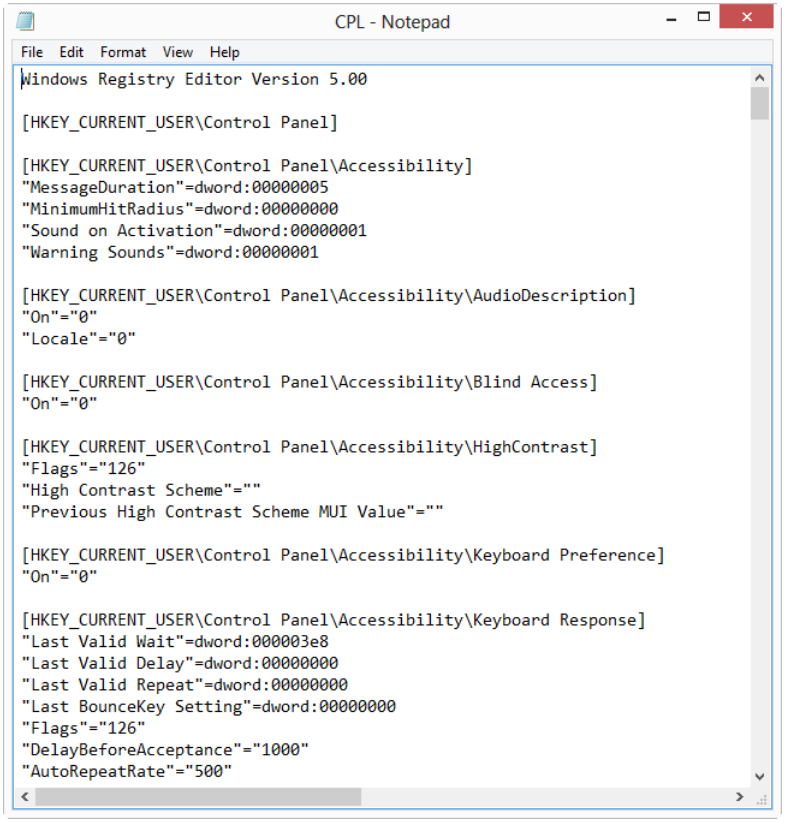

Figure 35-6 Editing a registry key by using Notepad

You can use this file to merge multiple registry files into a single file that can then be saved as a new .reg file.

Finding Information in the Windows Registry

Although the registry is large and complex, it is logically organized. You will find most of the Windows 8 settings, for instance, in the following key:

HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion

Similarly, most of your software configuration options can be found in the following key:

HKEY_LOCAL_MACHINE\SOFTWARE

Registry keys are also sensibly named, so if you are looking for a specific setting, it is usually relatively simple to find.

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CAUTION

You should always create a backup of the registry whenever you intend to work with it. Even the smallest, seemingly innocent, change can cause Windows or one of your programs or hardware drivers to become unstable.

Summary

Precisely what you will want to change in the registry will depend entirely on what you are trying to do and whether it is with Windows 8, a hardware driver, or a software application. If you need more specific guidance on working with the registry, you can usually find a great deal of advice available via a quick search on the Internet. See Chapter 23, "Finding More Help and Support," for details about how to contact a Help and support person.

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PART 6

Appendices

APPENDIX A

Windows 8 Editions and Features by Edition 629

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Windows 8 Keyboard Shortcuts 635

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APPENDIX A

Windows 8 Editions and Features by Edition

Version	32-Bit Memory Limit	64-Bit Memory Limit	Availability	Notes
Windows 8	4 GB	16 GB	Retail/OEMs	
Windows 8 Pro	4 GB	192 GB	Retail/OEMs	Can be upgraded to include Windows Media Center
Windows 8 Enterprise	4 GB	192 GB	Volume Licensing	
Windows RT	4 GB	N/A	OEMs	Used in Windows RT computers and Windows Phone

Note

A minimum of 768 vertical pixel resolution is required for the Start screen; a minimum of 1,366 horizontal resolution is needed for side-by-side apps.

Note

Windows 8 is the final edition of the operating to come in both 32-bit and 64-bit versions. Microsoft has stated that all future versions of Windows will be 64-bit only.

Windows 8 Editions

The following are descriptions of each Windows 8 edition.

Windows 8

This is the main consumer and everyday version of the operating system. It contains all of the features people need when using Windows 8 at home, including the updated File

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Explorer, Task Manager, better multimonitor support, and the ability to "switch languages on the fly," which previously was only available to those purchasing the Enterprise and Ultimate Editions of Windows.

Windows Pro

Windows 8 Pro is for tech enthusiasts and business/technical professionals. It adds features for encryption, virtualization, computer management, and domain connectivity. The Windows Media Center functionality will be available as an add-on to Windows 8 Pro, known as the "Media Pack."

Windows 8 Enterprise

Windows 8 Enterprise is only available through Microsoft's volume licensing subscription service. It includes additional features that are specific to using Windows 8 in a Windows server environment, for which additional management and security controls are required. It also includes the Windows To Go feature by which Windows 8 installations can be distributed on USB pen drives.

Windows RT

Windows RT is the ARM processor variant of Windows 8; it does not include the management features of Windows 8 Pro or Enterprise. It does include a desktop, although the only software that can be run on it are File Explorer, Internet Explorer and the bundled, paredown Microsoft Office programs (Word, Excel, PowerPoint, and OneNote).

Windows 8 Features by Edition

The following is a list of features offered by each Windows 8 edition.

Features in the Windows 8 edition

- Upgrading permitted from Windows 7 Starter, Home Basic, and Home Premium
- Start screen, semantic zoom, live tiles
- Windows Store
- Apps (Mail, Calendar, People, Messaging, Photos, SkyDrive, Reader, Music, Video, Weather, Xbox Live, Finance, Travel, Sports)
- Internet Explorer 10

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- Connected standby (enabling fast boot times)
- Microsoft Account (formerly known as Live ID)
- Desktop
- Installation of x86 and x64 desktop software
- File Explorer (formerly Windows Explorer)
- Windows Defender (a rebranded Microsoft Security Essentials anti-malware package)
- SmartScreen (internet security software)
- Windows Update
- Task Manager (updated in Windows 8)
- Language pack support
- Multiple monitor support
- Storage Spaces (software RAID equivalent)
- Windows Media Player
- Exchange ActiveSync
- File History (file versioning control in Windows 8)
- Mount ISO/VHD
- Mobile broadband (3G/4G)
- Picture password
- PlayTo
- Remote Desktop (Client)
- Refresh and Reset (backup and restore tools for the Windows 8 OS)
- Snap and Shake (usability tools for the desktop)
- Touch and thumb keyboard
- Trusted Boot (UEFI-only boot security system)
- VPN client

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Additional Features in Windows 8 Pro and Enterprise Editions

- Upgrading permitted from Windows 7 Professional and Enterprise
- Microsoft BitLocker and BitLocker To Go (full-disk encryption)
- Boot from VHD
- Client Hyper-V (virtualization client)
- Domain Join
- Encrypting File System (file/folder encryption)
- Group Policy
- Remote Desktop (Host)

Additional Features in Windows 8 Enterprise Edition

- AppLocker (Windows Server software management tool)
- Branch Cache (Remote file access utility)
- DirectAccess (VPN tool for Intranet connectivity over the Internet)
- Virtual desktop access
- VDI enhancements (Virtual Desktop tools for remote access to computers)
- Windows To Go (Bootable version of Windows 8 on a USB flash drive)
- Additional features available through upgrade purchase
- Windows Media Center (available in Windows 8 Pro only)
- DVD playback (available in Windows Media Center only)
- Blu-ray disc playback (available in Windows Media Center only)

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Windows 8 Features Absent in Windows RT

- Upgrading from earlier versions of Windows
- Installation of x86 and x64 desktop software
- Storage Spaces
- Windows Media Player

Windows 8 Features Unique to Windows RT

- Microsoft Office (Word, Excel, PowerPoint, OneNote)
- Device encryption

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APPENDIX B

Windows 8 Keyboard Shortcuts

No modifier	Description
Space	Select or clear active check box
Tab	Move forward through options
Esc	Cancel
NumLock	5 seconds: toggle keys
Del	Delete file (File Explorer)
Left arrow	Open previous menu or close submenu
Right arrow	Open next menu or open submenu
F1	Display help (if available)
F2	Rename item
F3	Search for file or folder
F4	Display items in active List
F5	Refresh

Windows Logo Key	Description
No other key	Toggle Start screen/Last App
PrtScr	Capture screenshot (saved in Pictures as *Screenshot.png*)
C	Reveal the charms
D	Show Desktop
E	Open File Explorer
F	Go to files in Search charm (+Ctrl to find computers on a network)
G	Cycle through desktop gadgets
H	Share charm
I	Settings charm
J	Switch focus between snapped and larger apps
K	Devices charm
L	Lock computer
M	Minimize all windows (desktop)
O	Lock screen orientation

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Windows Logo Key	Description
P	Projection options
Q	Search charm
R	Run
T	Set focus on taskbar and cycle through running desktop programs
U	Ease of Access Center
V	Cycle through notifications (+Shift to go backward)
W	Go to settings in Search charm
X	Quick link power-users commands (opens Windows Mobility Center if present)
Z	Open App bar
1–9	Go to the app at the position on the taskbar
+	Zoom in (magnifier)
–	Zoom out (Magnifier)
, (comma)	Peek at the Desktop
. (period)	Snap an app to the right (+Shift snap to the left)
Enter	Narrator (+Alt to open Windows Media Center if installed)
Spacebar	Switch input language and keyboard layout
Tab	Cycle through App History (use Ctrl to use arrow keys)
Esc	Exit Magnifier
Home	Minimize nonactive desktop windows
PgUp	Move Start screen to left monitor
PgDn	Move Start screen to right monitor
Left arrow	Snap desktop window to the left (+Shift to move to left monitor)
Right arrow	Snap desktop windows to the right (+Shift to move to right monitor)
Up arrow	Maximize desktop window (+Shift to keep width)
Down arrow	Restore/Minimize desktop window (+Shift to keep width)
F1	Windows Help and Support

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Ctrl	Description
Mouse wheel	Desktop: Change icon size; Start screen: Zoom in/out
A	Select All
C	Copy
E	Select search box (File/Internet Explorer)
N	New window (File/Internet Explorer)
R	Refresh
V	Paste
W	Close current window (File/Internet Explorer)
X	Cut
Y	Redo
Z	Undo
Tab	Cycle through App History
Esc	Start screen
NumLock	Copy
Left arrow	Previous word
Right arrow	Next word
Up arrow	Previous paragraph
Down arrow	Next paragraph
F4	Close active document

Alt	Description
D	Select address bar (File/Internet Explorer)
Enter	Properties
Spacebar	Shortcut menu
Tab	Switch between apps
Left arrow	Previous folder (File Explorer)
Up arrow	Go up one level (File Explorer)
F4	Close active item or app

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Shift	Description
No other key	8 seconds: Filter keys, 5 times: Sticky keys
N	New folder (File Explorer)
Tab	Move backward through options
Left arrow	Select a block of text
Right arrow	Select a block of text
Up arrow	Select a block of text
Down arrow	Select a block of text

Ctrl+Alt	Description
D	Docked mode (Magnifier)
I	Invert colors (Magnifier)
L	Lens mode (Magnifier)
Tab	Switch between apps using mouse or cursor keys, stays on screen

Alt+Shift	Description
PrtSc	Left Alt+Left Shift+PrtSc: High Contrast (does not use keys on the right of the keyboard)
NumLock	Left Alt+Left Shift+NumLock: Mouse Keys (does not use keys on the right of the keyboard)

Ctrl+Shift	Description
Esc	Task Manager

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Glossary

3G/4G Mobile Broadband Internet access methods, accessed via a SIM card.

32-Bit Operating systems and programs that operate with binary numbers in chunks up to a maximum of 32 digits, yielding a maximum of 65,535 characters.

64-Bit Operating systems and programs that operate with binary numbers in chunks up to a maximum of 64 digits, allowing for addressing much larger numbers than 32-bit systems.

Action Center This is a feature that aggregates system messages and troubleshooting help. It is indicated by the white flag on the Windows 8 desktop taskbar.

Administrator A user account level that has the authority to make any changes to an operating system or programs.

AGP (Accelerated Graphics Port) A graphics card interface.

ADSL (Asymmetric Digital Subscriber Line) Broadband Internet connection (3 to 200 times faster than dialup). You need to be close to a digital telephone exchange, be connected to cable, or have a satellite dish. You can remain connected permanently.

Alt key Used with other keys in combinations to invoke actions. *See also* Control key.

Antivirus program Software that can spot a virus attached to an email or already on your computer and eliminate it.

App A program such as Microsoft Word or Internet Explorer, also known as an *application*.

ARM (Advanced RISC Machines) A type of low-voltage processor developed by British firm ARM Holdings, based on its Reduced Instruction Set Computing (RISC) design.

ASP (Application Service Provider) Computer companies that provide programs and data storage over the Internet for a rental fee, rather than you buying them outright.

Backup A copy of programs or work in a separate place in case of corruption of the original version. There are various methods. *See* Help, Backup in Windows.

Bandwidth A measure of the maximum amount of data that can be transferred over the Internet or phone system at any one time.

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Beta A program that is in the process of being tested. It is distributed to selected users with the goal of working out any problems before being formally released to the public.

BIOS The Basic Input Output System for the computer's motherboard, *see also* EFI.

BitLocker A full-disk and partition security encryption system.

Bitmap A graphic image which is made up of many tiny dots.

Blog, Blogger An article written (often in the form of a diary) for publication on the web by individuals, organizations, newspapers, and other media personalities.

Blu-ray disc/BD-R/BD-RW An ultra–high-capacity optical disc, commonly used to store high-definition movies.

Blue Screen of Death (BSOD) The screen that appears in Windows when your computer encounters a critical error.

Bluetooth technology A technology that uses radio transmission from your computer to control everything from printers to lights to the washing machine. *See also* Wi-Fi.

Boot To start a computer from cold.

Broadband High-speed Internet connections such as cable or ADSL that offer faster connections.

Browser A program for browsing the Internet, such as Internet Explorer, Mozilla Firefox, Apple Safari, and Google Chrome.

Byte A unit of data that is made up of 8 bits (or digits). A byte represents a single character.

CAB file A compressed file. In Windows, they contains all the files necessary to create the Windows operating system.

Cable modem A device that is required to receive a broadband Internet connection from a cable communications company. (Cable is an alternative method to ADSL.)

Charms A newly introduced interface feature in Windows 8, charms provide access to the following key features: Search, Share, Start, Devices, and Settings.

Chat Text messaging to others online by means of messaging software such as MSN, Yahoo, AOL, and others.

Chat room An "area" on the Internet where people chat (write) to each other in real time.

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Cookie A small text file that is downloaded to your computer by a website. Cookies retain your logon details and record your activities for specific websites for future reference. They can be deleted by using File Explorer or you can block them altogether via Internet Explorer security.

CD/CDROM/CD-R/CDRW Compact Disk Optical storage disc with a maximum capacity of 640 MB.

Chip (Silicon chip) The silicon base used to mount the millions of components that make up a computer processor.

Clipart Ready-made pictures provided with applications that you can use to illustrate your projects.

Cloud (The) Programs or services hosted on and run from Internet servers.

Compatibility Mode A special mode in Windows 8 in which programs can run in an emulated mode, mimicking an earlier version of Windows.

Computer Management Console An interface in Windows for managing programs, services, and components.

Control Panel An important management console in which you can configure the basic functions of your computer.

Control Key (marked Ctrl on the keyboard) Similar to the Alt and Function keys, it is typically used in combination with other keys to invoke actions. Its use can vary from program to program.

Cut or Copy & Paste With most Windows programs, you can cut or copy a selected item (text or picture) and paste it into another place or even another program. Thus, you can copy a picture from one program and paste it into another. Use the Ctrl key in combination with X, C, and V as keyboard shortcuts.

Database A list or collection of data maintained on a computer disk in such a way that it can be edited, searched, or printed.

Data Execution Prevention A Windows service that can make it harder for viruses and malware to cause memory overflows.

Defragment To reduce the fragmentation (scattering) of files across a hard disk so that they can be read more quickly.

Desktop The screen used to display window-based programs such as Microsoft Office.

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Device driver A small program in Windows that handles communications between the operating system and a hardware device.

Digital The method of storing or transmitting data as a series of binary characters, represented by either zero or one. The speed and accuracy with which data can be transmitted and stored has enabled most information to be prepared in this way—from television, photography, all computing devices, and, of course, the Internet.

Directory An organized search facility on the web.

DirectX A free, downloadable Windows program that ensures that graphics programs work with all of the different types of graphics hardware.

Download The process of transferring files from the web to your computer's hard disk. You can download pictures, text, and programs.

DPI (dots per inch) A measure of resolution used in connection with printers, scanners, and monitors.

Drag-and-drop The facility in most programs to select text or a file and drag it to another place or position.

Drive letter An alphabetical letter from A to Z that Windows assigns to a fixed or removable storage device.

DTP (desktop publishing) The process of creating print-ready documents on a personal computer.

Dual-boot Having more than one operating system installed on a computer and being able to choose which one to use at boot time.

Dual core A processor with two physical cores. *See also* quad core.

DVD-ROM Digital Versatile Disk–Read-Only Memory. An optical disc capable of containing much more data than a CD. Used for music, films, and programs.

DVD-RW A rewriteable DVD.

eBook A book that you view on an eReader such as Amazon's *Kindle* or the *Nook* from Barnes & Noble.

E-commerce Business conducted on the Internet.

EFI Also known as UEFI, a new firmware type for computer motherboards to replace BIOS.

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Email Messages sent to people over the Internet. Email addresses always contain the symbol "@" within them.

Email client A program you use to send and receive emails. Examples of these include Windows Live Mail, Mozilla Thunderbird, and Microsoft Outlook.

Encryption Using a cryptography technique to make data unreadable to all but those who are authorized.

Event log Records kept by Windows of events and errors.

Exabyte A billion gigabytes.

ExFAT A disk format compatible with FAT and FAT32 but supporting larger disk sizes.

Family Safety A Windows 8 feature for controlling access permissions for children.

FAT, FAT32 A disk format supporting disc sizes only up to 4 GB. *See also* ExFAT and NTFS.

Favorites (or bookmarks) A list maintained by web browsers that makes it quick and easy to go to your favorite sites on the web.

File Explorer The main file and folder browser in Windows 8, formerly called Windows Explorer.

Firewall A program that ensures that your computer has no open ports by which hackers could gain illicit access.

Firewire A socket on some computers that enables much faster transfer of data than via serial, parallel and USB ports. This is particularly useful if you are transferring large amounts of data; for example, from a digital video camera for editing purposes.

Firmware Software on a chip for a device such as a BIOS or solid-state drive (SSD) that can sometimes be updated.

Flash drive A removable, pocket-sized USB storage device.

Fixed pitch font A typewriter-style font whose characters all have the same width, no matter the letter. Courier is an example of such a font. *See also* proportional font.

Flash drive A small USB storage device.

Floppy disk An outdated form of storage that used a flexible 3.5" polymer-based disk.

Font A collection of characters of a predefined style such as Times or Arial.

Freeware Computer programs that are distributed free of charge.

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Full HD A screen resolution of 1,920 by 1,080 pixels.

Function keys Programmable keys F1 to F12, usually at the top of a keyboard, which can vary in their use.

Gigabyte 1,073,741,824 bytes.

Gigahertz One thousand megahertz.

GPS (Global Positioning System) A system that uses signals broadcast by satellites in geosynchronous orbit around the Earth to determine your position, based on the principle of triangulation. Commonly used by boats, cars, and mobile phones.

Graphics The general term used for pictures and drawings.

Graphics card The part of the computer that processes and sends video signals to the monitor or display.

Group policy Rules that can be set in Windows 8 for managing permissions and allowing certain activities for groups of users.

GSM (Global System for Mobile Communication) A standard whereby you can use your telephone abroad.

Hacker In its original meaning, a hacker is a person who delights in changing software programs to imbue it with more features and get it to do more things. Unfortunately, the term has been hijacked over the years to refer more often to the criminals who use their computer knowledge to write malicious and destructive programs, oftentimes for no purpose at all.

Hard copy Printed material.

Hard disk A set of spinning disks coated with recording material. Hard disks can retain details of programs and data indefinitely. *See also* SSD.

Hardware Any piece of equipment such as the computer, a scanner, or a printer.

Homegroup A networking feature by which Windows 8 computers can share files and printers.

Home page The first page of a website, usually *index.htm*.

Hotmail A web-based email service owned by Microsoft.

Hot corners The four corners of the Windows 8 Start screen. Moving your mouse to any of these will reveal menus.

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Hotspot A location (café, airport, hotel, and so on) at which you can connect wirelessly to the Internet with Wi-Fi–enabled laptops, smartphones, or PDAs.

HTML (Hypertext Markup Language) The coding language on which websites and webpages are built. Your web browser interprets the language to show you intelligible pages. DHTML stands for Dynamic HTML, which is an advanced form that can make webpages more animated. *See also* XML.

Hyper-V Virtual machine technology built in to Windows 8 Pro and Enterprise.

Hyperlink A link on a webpage that takes you to another website, webpage, a document, or many other digital targets. Hyperlinks are often text elements, colored and underlined so that they stand out, although images and maps can also act as links. The cursor pointer changes shape to that of a hand with a pointing finger when hovering over a link. *See also* surfing.

Hypertext links These are the addresses of other sites or pages, which might be on the same site or on the other side of the world. They are often colored and occasionally underlined. When the cursor pointer hovers over one, it will change its shape to that of a hand with a pointing finger to show it is over a link that you can click. Mostly, you will see Hypertext when connected to the Internet and the World Wide Web, but you can also find them in digital products such as encyclopedia CDs. When you click one of these types of links, it might take you to another part of the document (such as a cross-reference or a table of contents), or your computer might go online to access the site.

Icon A graphic representation of something such as a shortcut to a program or file.

IM (Instant Messaging) Text-based messages to people online, using Microsoft or AOL Instant Messenger, or other services.

Inkjet Printer The most common type of printer, it "squirts" microscopic droplets of ink onto the paper to compose text and images.

Internet A network of linked computers that can be accessed by people who are connected to the World Wide Web.

Internet Explorer The most popular and most used web browser. Internet Explorer is issued free by Microsoft. Other browsers include Mozilla Firefox and Google Chrome.

ISP (Internet Service Provider) A company that provides you with access to the Internet.

Java and JavaScript A programming language used on some webpages to give them greater functionality.

Kilobyte (Kb) 1,024 bytes.

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LAN (Local Area Network) Computers connected "locally," within a company or home, so that they can communicate and share programs and data.

Laser printer A printer that uses a laser to create an image on a light-sensitive drum, which then attracts a powder-based toner and transfers the image onto paper. These types of printers are faster and more economical than inkjets when a large amount of printing is needed.

LED (Light Emitting Diode) Some "laser" printers use this to create the image on their light-sensitive drums instead of a laser.

Linux A free, open-source operating system, often known as GNU/Linux.

Live tile An icon on the Start screen that displays live information generated by the app it represents.

Malware Unwanted and malicious software.

Macro A small program within another program which, at the touch of a couple of keys, performs a series of actions.

Megabyte (MB) 1,048,576 bytes. *See also* byte, kilobyte, gigabyte, and exabyte.

Megahertz A measure of how fast your computer's central processor unit (CPU) operates. One megahertz equals one million "vibrations" or cycles per second. One instruction takes place within each cycle.

Memory Hardware in a computer that Windows 8 uses to store files it is working with and needs to operate.

Microsoft Account The ID used to sign in to Microsoft services such as Hotmail and Xbox Live. Also called a Live ID.

Monitor The computer screen.

Motherboard The main circuit board of a computer to which other components are attached.

MP3 A highly compressed form of music that can be downloaded from the Internet and played on a computer or a portable MP3 player. It stands for Music Program Expert Group Audio Layer 3 (or MPEG3).

MSCONFIG A Windows feature for controlling startup and diagnostic startup options.

Net A term used loosely that refers to the Internet.

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Network A general term for connected computers. *See also* WAN and LAN.

OCR (Optical Character Recognition) A program that can convert scanned text into editable documents.

Offline Not connected to the Internet. Some things, like writing emails, can be created before going *online*.

Online Connected to the Internet.

Operating system A software interface for a computer with which you can run programs and control devices.

Outlook Express The free Microsoft program for handling emails used by previous Windows operating systems.

Parallel port Almost always a 25-pin female socket on the back of a computer which is used for printing but also to attach devices such as scanners and other external equipment. *See also* USB port.

Partition A physical hard disk can be separated by using software into several logical partitions, each appearing as its own disk in Windows.

Path The location of a file or program on a disk; for example, C:\Users\Public.

PCI slot (Peripheral Component Interface) A type of connector—usually white—which enables you to add components to your computer.

PCI-Express A more recent version of the PCI standard.

PCMCIA Originally stood for Peripheral Component MicroChannel Interconnect Architecture. Typical devices include network cards, modems, and hard disks.

PDF (Portable Document Format) A platform-independent file format developed by Adobe Systems for creating documents that can be read across disparate devices.

Performance Monitor A Windows 8 feature with which the user can track the performance of the operating system and installed programs.

Phishing This is the name given to a scam by which you receive an email, supposedly from your bank or other source that you are intended to trust, requesting that you confirm your password or other personal data, which the attacker can use in criminal fashion.

Picture password A way of logging into Windows 8 by using a photograph or picture.

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PIM (Personal Information Manager) A program that acts as a diary—it can even include an alarm clock.

Pixel (picture element) A tiny element that, along with millions of other, makes up the image you see on a computer screen or a photograph. Cameras are often classified in *megapixels*. A megapixel is one million pixels. The more pixels in an image, the better the detail of the picture. However, more pixels also means more memory is consumed.

Problem Steps Recorder A program with which you can create annotated screenshots of a problem and send them along with notes as a file to a support person.

Plug-and-Play An architecture by which modern computers and hardware (printers, sound cards, DVD players, and so on) can recognize when they are connected together, thus enabling easy installation or use.

Point size The height of a printed character. A typical email correspondence is usually around 12 points in size.

Port Either a physical socket on your computer, such as USB, parallel (printer), or Serial (communications), or part of the operating system through which communication with your computer takes place (the latter are numbered, for example, Port 110).

Processor A physical silicon chip on a motherboard that is the "brain" of a computer.

Proportional font Proportional fonts use varying-width characters, depending on the particular character (as opposed to a fixed-space font, for which all character widths are the same). For example, the width of a lowercase L (l) is much narrower than that of an upper-case W.

Quad core A processor with four physical cores.

Quicktime A program from Apple with which you can view images and videos.

RAID (Redundant Array of Independent Disks) A hardware-managed system for linking hard disks together to create larger "logical" disks or automatic backups.

RAM (Random Access Memory) The temporary storage facility on a computer.

Recovery drive *See* System Rescue Disc.

ReadyBoost A Windows feature by which you can use USB pen drives as an extra memory cache.

Refresh A way to return a faulty copy of Windows 8 to a properly working copy.

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Registry A file (one per user on a computer) that contains a database of settings for Windows, user preferences, and installed software and hardware.

Remote Assistance A feature by which another individual (for example, a Help desk technician) can remotely control a computer over a network or the Internet.

Remote Desktop A feature by which you can assume remote control of another computer on a network.

Reset A feature to return Windows 8 to its factory settings.

Resource Monitor A Windows feature for viewing the computer resource usage in real time.

Ribbon The tabbed interface of context-sensitive commands that is a central interface element in the Microsoft Office suite of applications and Windows 8 File Explorer.

Safe Mode A startup mode that boots Windows in its most basic form, with no background programs in operation. In Safe Mode, the screen displays a very basic (large) layout. Safe Mode is used to troubleshoot and repair various problems in the operating system, including virus removal and defragmentation. To enter Safe Mode, press Shift+F8 upon startup.

Scanner A piece of equipment capable of digitally recording a picture or text for use on a computer.

S-Video A higher-quality video connection. It carries brightness and color information separately.

Search engine A program, usually accessed on the Internet, that you use to search for information by entering a few words.

Serial port A socket on the back of an older computer, which was used to attach a mouse, a modem, or a printer. This is also referred to as a COM (Communication) port.

Shadow copies Automatic backups of previous versions of files.

Shareware Computer programs or software that are free to use, but to which you are invited to make a contribution toward its development and maintenance costs.

Shell folder A pointer toward a physical folder on a disk.

Site or website An area on the Internet that has its own unique web address (URL). A typical website has a Home page followed by other pages that are linked to the Home page via hyperlinks.

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SkyDrive Microsoft's free online cloud storage solution, which you can find at *http://www.skydrive.com*.

Slipstreaming The process of integrating a Windows service pack into the operating system installation disc.

SmartScreen A Windows feature that checks websites and downloads against blacklists of malware that are maintained by Microsoft and other security companies.

Software Programs of all kinds that make the computer act in a particular way to perform certain functions.

Spam Unsolicited advertising that usually arrives as emails.

Spyware Software that installs itself on your computer without your knowledge which monitors and reports back your activities to its originator. Scary!

Spreadsheet A mathematically-oriented program that contains formulae to automatically work on the figures that are entered by the user.

SSD (Solid-State Drive) A storage device that uses nonvolatile memory chips for storage instead of the traditional spinning disk.

Start screen The new default interface in Windows 8.

Startup Repair A Windows feature for automatically repairing a Windows installation that will not start.

Storage Spaces A feature of Windows 8 that can aggregate local and USB hard disk storage into a single, large storage area.

Streaming Receiving sound or pictures continuously over the Internet (rather than downloading first).

Style sheet A previously arranged document with specific type styles, weights, and sizes. *See also* Template.

Surfing Using the hypertext links embedded in a webpage to jump from one website or page to another.

SVGA (Super VGA) The later type of computer monitor (and video card) capable of displaying more colors and higher resolution.

System File Checker A Windows feature that compares all the currently installed operating system files against the originals on the install disk to find and replace corrupt files.

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System Health Report A windows tool for generating a text-file report of the current status of Windows 8, your drivers, and programs.

System Image Backup A backup copy of the installed copy of Windows, stored as a single file.

System repair disc/recovery drive A bootable CD, DVD, or USB flash drive that can be used to launch Startup Repair.

System Restore A Windows feature that takes copies of critical system settings and files before changes are made, that can be restored later if required.

Tab key Located on the left of the keyboard, you can use this key to jump certain fixed distances across the page when using a word processor, or to jump from one text box to the next when filling out forms, or to move from one table cell to the next when working in a table editor.

Tablet A small handheld computer operated entirely by a touch screen interface.

Taskbar The bar containing program icons that normally appears at the bottom of the Windows desktop.

Temporary files Your Internet browser, some installation programs, and even your own programs might use these files on a part of your hard disk as they perform their work. They often use a .tmp extension. Temporary files can usually be deleted later.

Template A standard letter or spreadsheet that forms the basis, or framework, for new documents. Templates can be modified to suit the needs of the current document.

Thunderbolt A high-speed communications port similar in use to USB 3.

Tile An icon on the Start screen. *See also* Live tile.

Toolbar An array of icons often found at the top of a program such as a word processor that represent tools and functions you use to carry out tasks.

Touch A way to interact with a computer's screen using your hands.

Trojan A virus program that is disguised as something else. It invades your computer and can be accessed by a hacker.

Trusted Boot A feature of UEFI firmware systems that does not permit “unsigned” and unauthorized code to run at computer startup.

TWAIN A standard for acquiring images from image scanners. The word TWAIN is not officially an acronym; however, it is widely known as “Thing Without An Interesting Name.”

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UAC (User Account Control) A security system in Windows that helps prevent unauthorized changes from being made to the operating system.

UEFI *See* EFI.

UI (user interface) A schema to display the user controls for a computer on a monitor. Modern UIs are usually designed to be friendly, intuitive, and usually graphical manner.

User folder A folder containing a user's files, documents, and settings.

URL (Universal Resource Locator [or web address]) These always start with "http://" and are usually followed by "www." and then the remainder of the address.

USB port (Universal Serial Bus) A more recent, versatile communication port, which can transfer data faster. The sockets are about half an inch long and very thin. It also contains a power supply so that equipment such as webcams do not need a transformer.

USB 2.0 At 480 megabits per second (Mbps), this architecture is even faster than USB. It looks the same as USB and the slower devices can also be attached to it.

USB 3.0 The current fast standard for USB, dubbed SuperSpeed, with speeds of up to 4.8 gigabit per second (Gbps). USB 3.0 is backward compatible with earlier USB standards, running them at their native speeds.

VDU (visual display unit) A older name for the computer's monitor.

VGA (Video Graphics Array) An older type of color screen.

VHD (virtual hard disk) A file containing an operating system and files that can appear as a physical disk.

Videoconferencing Using a computer as a video phone.

Video phone Using a microphone, speakers, and a webcam to see and hear others over the Internet.

Virtualization The process of running multiple operating systems simultaneously on the same computer.

Virtual memory Otherwise known as a Swap of Page File. This is a reserved space on a hard disk that Windows uses as a memory cache.

Virus A malicious program that can harm your computer. It is spread through programs—either from disks or from the Internet. It is the graffiti of the Internet. Viruses are also called Trojans or Worms.

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Web browser A program to help you navigate the Internet, Examples include Internet Explorer 10, Mozilla Firefox, Apple Safari, and Google Chrome.

Webcam A small camera that you can attach to a computer (or is integrated directly in the computer) with which you can send video images over the Internet.

WEP An encryption method for wireless networks.

Wi-Fi A wireless interface that uses radio to link together computers and other devices. A snappier name than the 802.11n standard. *See also* Bluetooth.

Windows 8 The latest edition of the Windows operating system on which this book is based.

Windows Explorer Renamed to File Explorer in Windows 8.

Windows Phone Microsoft's latest smartphone operating system, now based on Windows RT.

Windows RT A version of Windows 8 that is modified to run on ARM processors.

Windows To Go A Windows 8 Enterprise feature by which a bootable copy of Windows 8, including software, can be run from a USB flash drive.

Windows Update A feature in Windows for automatically updating the operating system with the latest updates and patches.

Wizard A program that helps you through processes such as installing new software or hardware.

Word processing Creating documents on a computer that can easily be edited (processed).

Worm A virus program that spreads by sending itself to people in your email address book.

WPA An encryption method for wireless networks.

WWW World Wide Web.

ZIP file A compressed file. You can recognize these files by their .zip file name extensions.

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Mike's mailbag is always open, and he always welcomes questions and comments from readers. He sincerely hopes you have enjoyed this book and that you will consider reviewing it online.

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