Mike Halsey
Windows documentation expert

Microsoft

Troubleshooting Windows® 7

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Troubleshooting Windows® 7 Inside Out

Mike Halsey

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And, most of all, my dog Jed.

Conventions and Features Used in This Book

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

Text Conventions

Convention	Feature
Abbreviated menu commands	For your convenience, this book uses abbreviated menu commands. For example, "Choose Tools, Forms, Design A Form" means that you should click the Tools menu, point to Forms, and select the Design A Form command.
Boldface type	Boldface type is used to indicate text that you enter or type.
Initial Capital Letters	The first letters of the names of menus, dialog boxes, dialog box elements, and commands are capitalized. Example: The Save As dialog box.
Italicized type	Italicized type is used to indicate new terms.
Plus sign (+) in text	Keyboard shortcuts are indicated by a plus sign (+) separating two key names. For example, Shift+F9 means that you press the Shift and F9 keys at the same time.

Design Conventions

Note

Notes offer additional information related to the task being discussed.

Cross-references point you to other locations in the book that offer additional information on the topic being discussed.

CAUTION!

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

INSIDE OUT

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

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

TROUBLESHOOTING

This statement illustrates an example of a "Troubleshooting" problem statement

Look for these sidebars to find solutions to common problems you might encounter. Troubleshooting sidebars appear next to related information in the chapters. You can also use the Troubleshooting Topics index at the back of the book to look up problems by topic.

Sidebar

The sidebars sprinkled throughout these chapters provide ancillary information on the topic being discussed. Go to sidebars to learn more about the technology or a feature.

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CHAPTER 1

Prevention Is Better Than Cure

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It's always a good idea to prevent problems before they occur, but knowing where to start can be a problem. When you first install **Windows 7**, you encounter a blank **desktop** with just a few items visible on the new **taskbar** and in the Start menu. You may be tempted to get working straight away, and you can do this if you like. However, Windows 7 comes with a great many tools that you can use to help prevent problems from occurring and to make sure that when problems do occur, you can be back up and running quickly. I recommend spending the time to configure your system and software after you first install Windows. Then back up this initial configuration to quickly restore later should you need to.

INSIDE OUT

Why spend time configuring and backing up Windows?

Windows 7 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 7 after the changes are entrenched, you preserve potential problems.

The benefit of taking time to back up a clean, unused Windows 7 installation is that when something goes wrong, your backup will be an exact copy of a fully working Windows 7 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.

Upgrade or Clean Install?

The minor settings changes described in the previous section are a good reason to install a clean version of Windows 7 rather than upgrading your PC in place from Windows Vista to Windows 7. (The Windows 7 install DVD doesn't support in-place upgrading from **Windows XP**). Although it may be convenient to install Windows 7 over your current operating system, keeping all of your programs and settings intact, any problems that exist on the previous Windows installation can carry forward to the new one. Most IT professionals recommend that you always format your **hard disk** and reinstall Windows 7 on a clean drive or **partition**, unless you've lost **software** installation media or you really don't have the time to spend on a clean install.

How to Install Windows 7 to Prevent Problems

Your hard disk is one big area where you can store Windows, programs, files, data, and **backups.** But it's not a good idea to keep all of your data in the same place without making a backup and storing it elsewhere. For instance, if you leave a DVD copy of your **digital** music and photo libraries next to your PC, it could be stolen or destroyed in a fire, along with your PC where the original files are stored. The sensible option is to give your backup **DVD** to a friend or family member to keep it safe. Almost all businesses keep a backup of their data somewhere separate from the originals, because data is the critical part of a computer. **Hardware** is easy to replace, but it's impossible to replace last year's holiday photos, it's difficult to re-enter all of your customer data, and it's annoying to re-**download** all the music and video you've bought.

Although you can fix many Windows 7 problems with no loss of data, some problems require you to restore the **operating system** from a backup or reinstall it completely. Restoring and reinstalling usually require you to wipe the hard disk. What's more, there's no way to know if and when a disaster will occur. If your files, photos, and music are stored on the same hard disk or partition as Windows 7, you could lose them forever.

INSIDE OUT Hard disks and partitions

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. If you use one long plate that's split into several compartments, you can put a different food 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, one for Windows 7, a second for your files and data, and a third for backups, including a backup of your Windows 7 installation. Splitting them between partitions keeps them apart for safety.

A normal hard disk

A partitioned hard disk, split into three "logical" drives

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 failing, 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 won't have the option of splitting your data across different physical drives. You may instead want to purchase a separate **USB** external hard drive.

When you install Windows 7, you can choose the Custom Install option and repartition your hard disk using the tools available in the Windows 7 installer to delete the current single-drive partition and create new partitions. Once you have done this, select the partition onto which you want to install Windows 7 and press Next (see Figure 1-1).

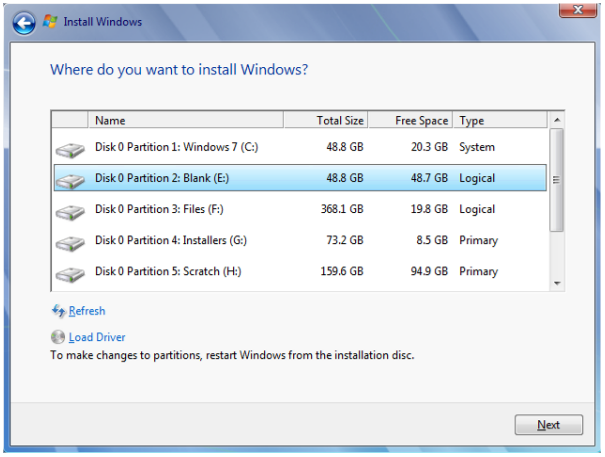


Figure 1-1 Creating and choosing a hard disk and partition for Windows 7 during setup

Keeping Your Installation of Windows XP or Windows Vista

If you really *must* keep your Windows XP or Windows Vista installation, you have two options. First, if you have a spare partition or hard disk large enough to accommodate Windows 7 on your computer, you could install Windows 7 there and create a **dual-boot** system where you can choose at startup which operating system you want to run.

However, many people find this setup clunky and want to be able to use both systems simultaneously. Certain software, such as Zinstall, can help. This software will turn your previous operating system into a virtual machine that will run in a window on your Windows 7 desktop. You need a large hard disk or partition for this since you will essentially have two operating systems installed.

> **Note**
>
> **You can get Zinstall at *www.zinstall.com*.**

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. Your backup partition should be the same size as your Windows 7 partition if you only want to keep a backup copy of Windows 7 on it. It should be bigger if you also want to keep files and software installers there.

Use Table 1-1 as a guide to how large your Windows 7 partition should be. Please note these figures are a guide only. If you use development software (web, programming, or design), you might find you will need more space for your programs.

Table 1-1 Recommended partition sizes for Windows 7 in different uses

PC Usage	Windows 7 partition size
General Business	30 **GB**, Enter 30000 in the partition size box
General Home	30 GB, Enter 30000 in the partition size box
Power User	50 GB, Enter 50000 in the partition size box
Developer	100 GB, Enter 100000 in the partition size box
Gaming	100 GB, Enter 100000 in the partition size box

Note: Suggested numbers for entering into Windows are approximate sizes and not exactly the same partition size in GB.

What To Do When Windows 7 Is Installed

After Windows 7 is installed, you should install your other software and configure the system to your preferences. I suggest following the following guide.

- Install **anti-virus** and **malware** protection first. Even though you're just loading and configuring your computer, any software you install could be infected with a **virus** or **Trojan**.
- 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 may find it's been upgraded anyway.
- Try to avoid installing shareware or trial version software. While amateur software authors do write some excellent software, 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 required product keys to keep the software from becoming crippled if you need to restore it from a backup.

For a new installation of Windows 7, I recommend a series of steps.

- Run **Windows Update** to make sure you have the latest updates to the operating system. Do this several times, restarting the PC after each update to make sure your computer is fully up to date. You can access Windows Update from the Start menu.
- Make sure Windows 7 is activated. If you don't activate Windows 7, it might become inoperable if you eventually restore from a backup. To activate Windows 7 from **Control Panel**, click System And Security, then click System. The option to activate Windows 7 is at the bottom of the window.
- Modify Windows 7 settings to your preferences (regional settings, for example). Read the following section for details about how to do this.

CAUTION!

It's important you don't do too much regular work while getting Windows 7 ready to create a system image backup. Avoiding regular work helps make sure nothing can go wrong during this important period.

Useful Windows 7 Settings to Change

By default, Windows 7 is efficient to set up and needs fewer options customized than previous versions of Windows, although there are a small few options that, if changed, will make for a happier experience using the operating system. You can access these settings by pressing Start on the taskbar or on your keyboard and selecting Control Panel from the Start menu.

In Control Panel, click the first option, System And Security, and a list of options appears as shown in Figure 1-2.

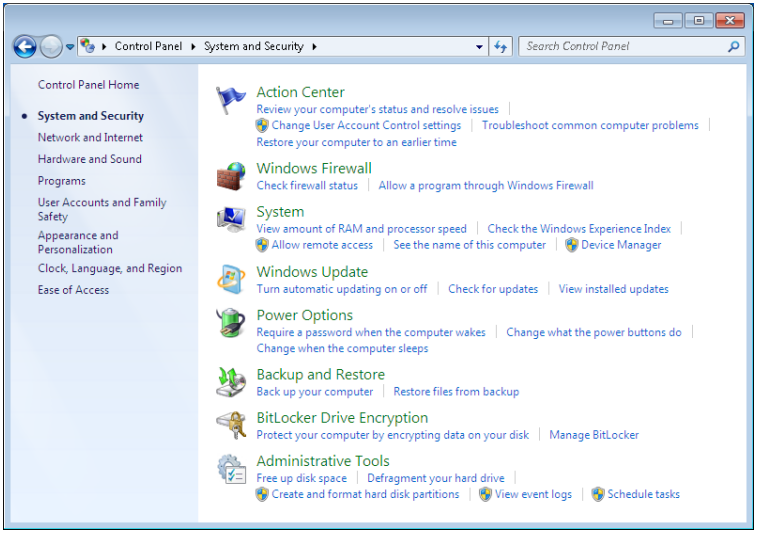


Figure 1-2 The System and Security panel in the Windows 7 Control Panel

Windows 7 uses a space on your hard disk 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 it can grow and shrink and cause problems that ultimately slow down access to the files and data on the hard disk.

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. Click Advanced System Settings in the blue panel on the left side of the window.
3. In the System Properties dialog box, click the Advanced tab.
4. In the Performance section, click Settings as shown in Figure 1-3.

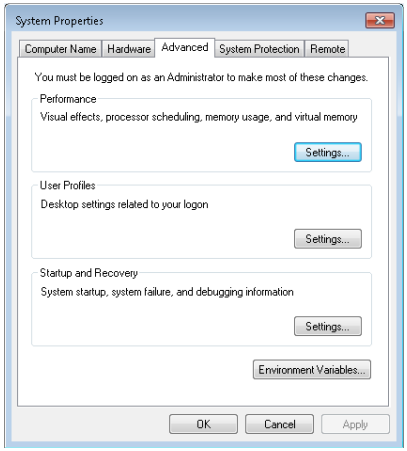


Figure 1-3 The Advanced tab in the System Properties dialog box in Control Panel

You can change the virtual memory settings in the Virtual Memory dialog box as shown in Figure 1-4.

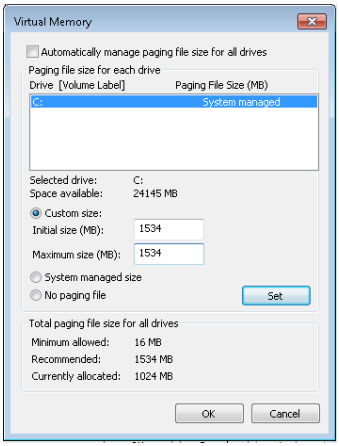


Figure 1-4 Setting the virtual memory paging file size

Clearing the Automatically Manage Paging File Size For All Drives option and selecting the Custom Size option tells 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 (1534 **MB** in the example in Figure 1-4). Enter the recommended paging file size for your computer in both the Initial Size (MB) box and Maximum Size (MB) 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 Device Manager to check that the drivers for all of your hardware are installed (see Figure 1-5).

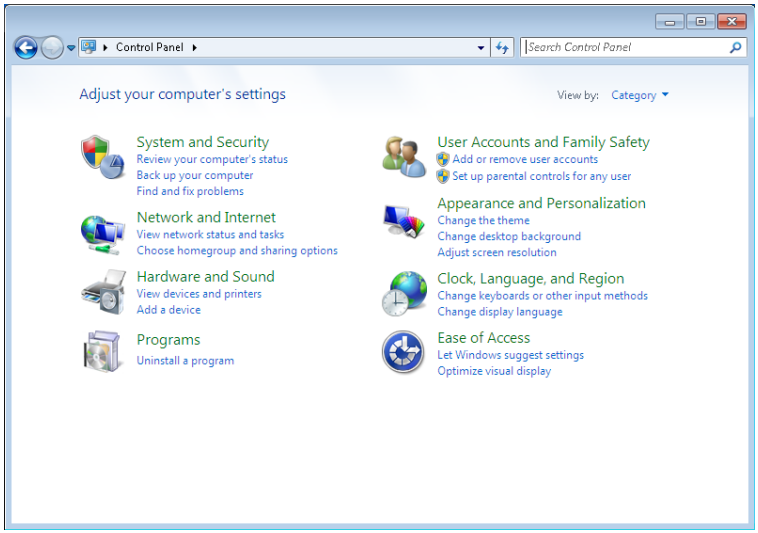


Figure 1-5 Settings to adjust in Control Panel, including regional settings

MSConfig

One of the most useful hidden features in Windows 7, and indeed in every version of Windows, is **MSConfig** (see Figure 1-6). To access MSConfig, click Start on the taskbar or on your keyboard. Key **msconfig** in the Start menu search box, and press Enter on your keyboard. When the MSConfig window appears, click the Startup tab. On this tab, you will see a list of all the programs that start automatically when Windows 7 starts up. You can clear all the programs you don't want to run every time you use your PC. These could include the iTunes Updater or the Adobe Acrobat Loader.

The advantage of minimizing the number of programs that run automatically at startup is that the more software your computer is running at one time, the slower it will become and the longer it will take to start up.

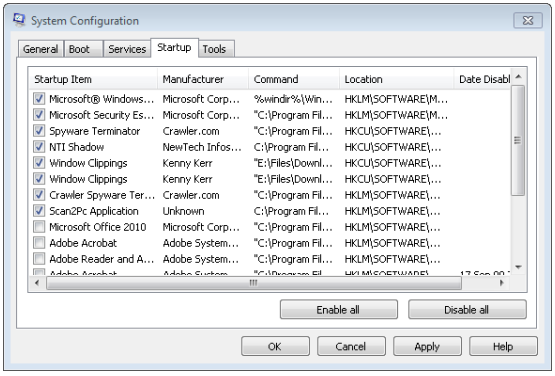


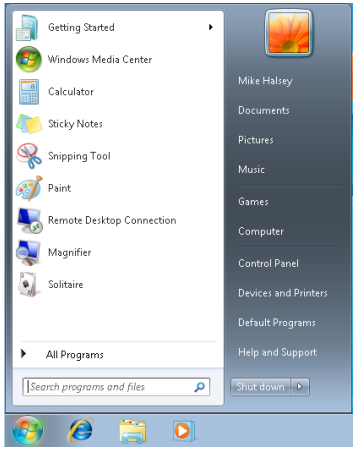
Figure 1-6 Stopping third-party programs from running at startup using MSConfig

> **Note**
>
> **You can resize the columns in the MSConfig window (and in many other parts of Windows) by dragging the vertical line between the columns.**

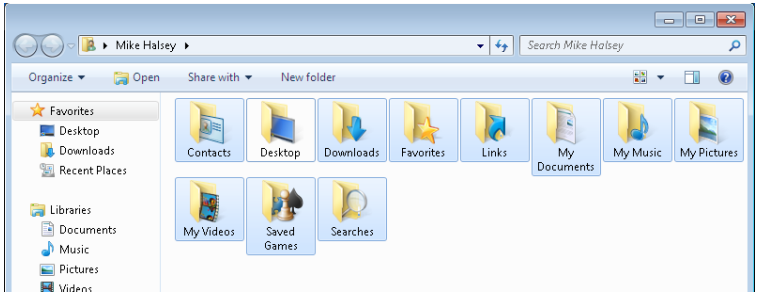
Moving Your Files Away from Windows

By default, every version of Windows stores your My Documents folder(s) on the same hard disk or partition as the Windows installation. Windows developers recognize, however, that it's useful and important to keep Windows and your files separate, and they have finally made this easy to do in Windows 7 with four simple steps.

1. On the Start menu, click your name in the top right.



2. In the explorer window that appears, select all the folders (except Desktop, which should not be moved since doing so can cause problems with the operating system).



3. Right-click in the window and select Cut.

CAUTION!

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

4. Navigate to the drive or folder where you want to relocate the files (for example, E:\Files), right-click in an empty space in that window, and select Paste.

All of your files and documents are moved to the new location.

INSIDE OUT

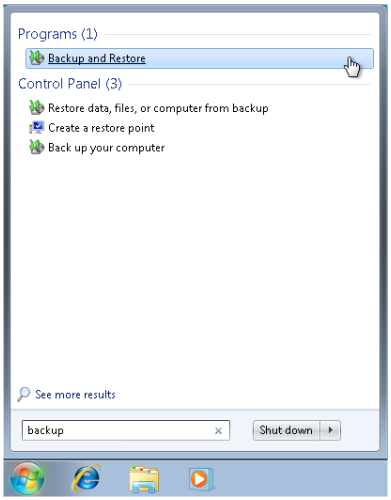
Why move your files away from Windows 7?

Although Windows 7 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 and Windows on your PC.

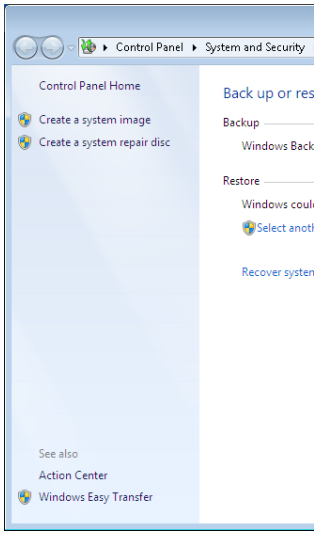
Backing Up Windows 7

When you finish loading and configuring Windows 7, you are ready to create a backup and lock it down by creating an image of the operating system. When you create a backup, you essentially create a snapshot of all the Windows files and settings on your computer. Do not run programs while preparing to back up Windows 7 since this could create unreported errors in the backup file.

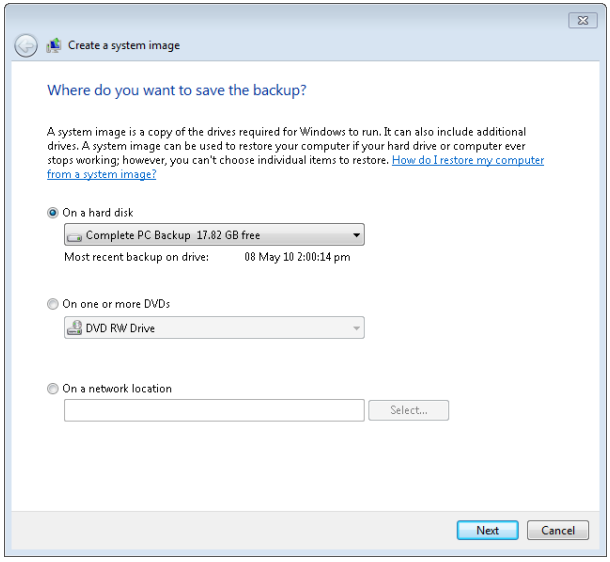
1. In the Start menu search box, type **Backup**.
2. Select Backup And Restore from the list of search results that appear.



3. In the Control Panel Backup and Restore window that appears, select Create A System Image from the blue panel on the left side of the window.



4. In the Create A System Image dialog box, select a location for the backup. You can choose to save the backup to another hard disk or partition on your computer, on a selection of DVDs (note that if you have a lot of software or games installed on your computer, you will need quite a few DVDs), or to a **network** location.



5. Click Next to start the backup

INSIDE OUT

Network backup precautions

Don't back up your operating system to a network location if your PC 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.

Windows 7 is now backed up. If Windows 7 becomes unresponsive, you can restore this backup and get working again quickly. You'll learn more about restoring Windows 7 in Chapter 11, "Easy Ways to Fix Windows 7."

Summary

It's very important to make sure that you have a working copy of Windows 7 backed up somewhere accessible. You never know when and under what circumstances Windows 7 might become unusable or malfunction. Following the steps described in the chapter can ensure that you're never far from being up and running when you need to be.

CHAPTER 14

Advanced Diagnostic Tools in Windows 7

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In Chapter 2, "The Basic Windows 7 Utilities," you learned about the basic diagnostic and help utilities included with Windows 7. In this chapter, I cover some of the advanced tools that come with Windows 7, describing the features and capabilities of each one and explaining how you can use them to help you troubleshoot your Windows 7 system.

Performance Information and Tools

Performance Information and Tools is a central location for many types of information about your PC and how Windows 7 performs on it. The easiest way to access Performance Information and Tools is by typing **performance** in the Start menu search box, as shown in Figure 14-1. You can access its components separately in Control Panel by selecting System and Security\Administrative Tools.

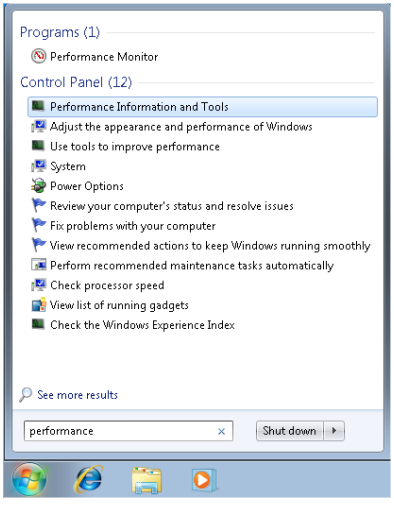

Figure 14-1 Accessing Performance Information and Tools

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, which is shown in Figure 14-2, click Advanced Tools in the left pane to access the advanced tools, which are shown in Figure 14-3.

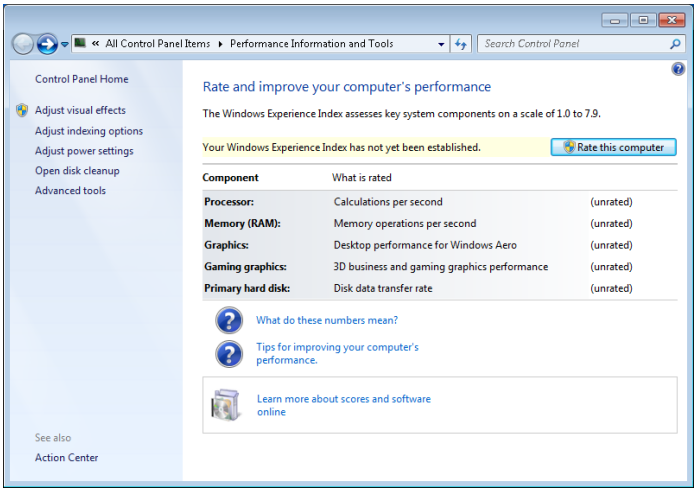

Figure 14-2 Performance Information and Tools window

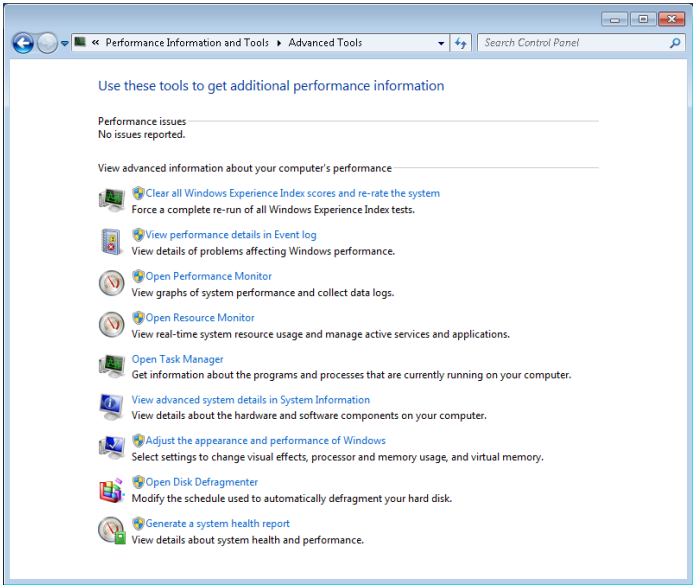

Figure 14-3 Advanced tools in Performance and Information Tools

These advanced tools are extremely useful in diagnosing performance problems with Windows 7 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.

Event Log

Everything that happens in Windows 7 from user log-ins to program component failures that the users never even know about is logged and recorded. You would be amazed by how much information is stored in the Event Log. The two most important views, however, are the ones where you will see most Windows 7 errors recorded.

In the Event Viewer, you can find all the events and errors that Windows 7 has recorded on your computer by clicking Event Viewer (Local), then clicking Windows Logs, and then clicking System. Warnings are highlighted with yellow triangles, and errors are indicated with red icons, as shown in Figure 14-4.

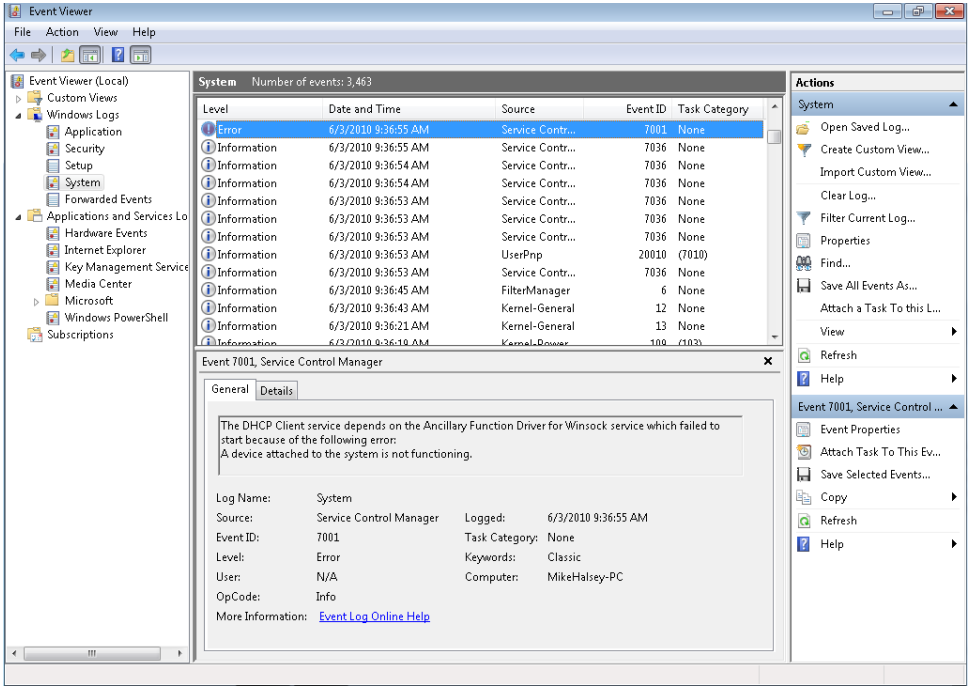

Figure 14-4 Event Viewer showing system activity and errors

In Figure 14-5, notice the error highlighted in the first line of the Administrative Events pane. Below the list is a description of this PrintService error that includes enough information to help you track down the source of the problem and fix it.

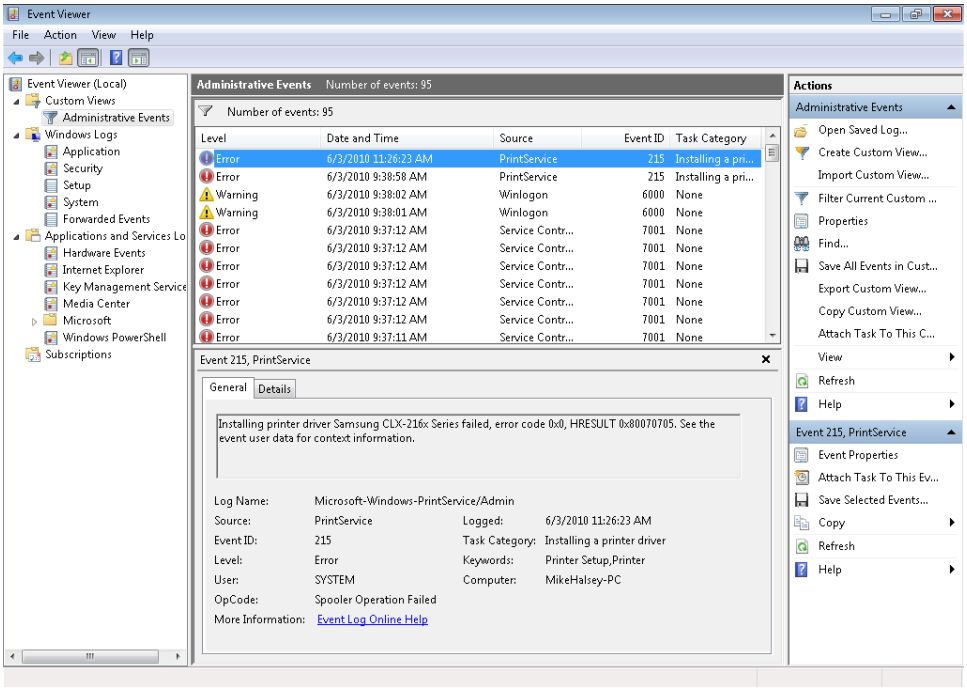

Figure 14-5 Administrative errors in the Event Log

Another useful place to see errors listed in the Event Log is under Event Viewer (Local)\ Custom Views\Administrative Events, as shown in Figure 14-6. These errors include events for which you or Windows didn't have permission to perform the specified action.

In the bottom pane of the Event Viewer are two tabs, General and Details. By default, the General tab is selected, and here you find 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.

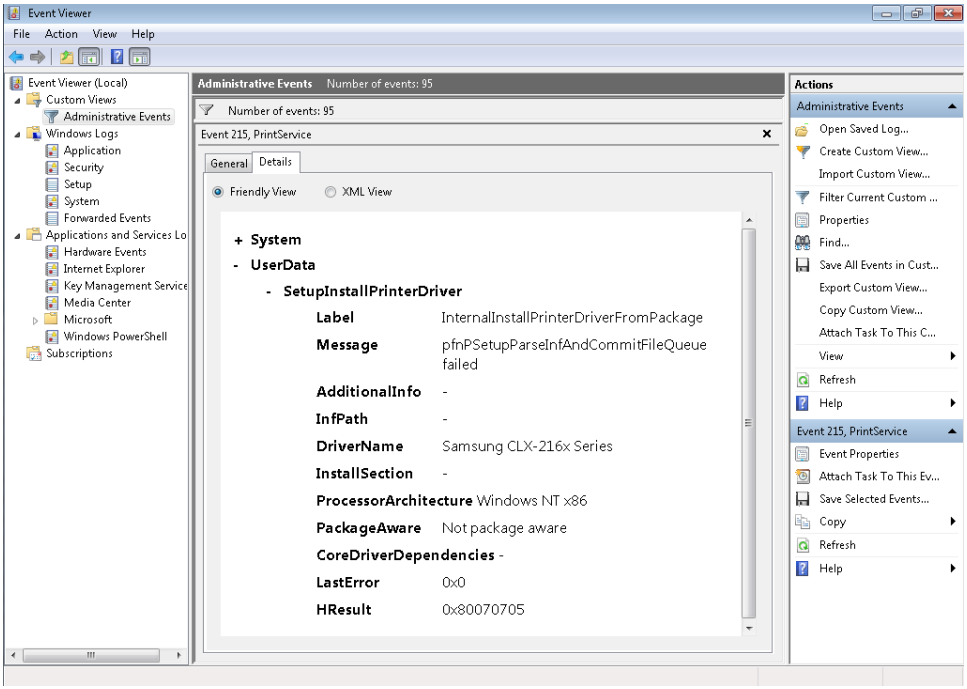

Figure 14-6 Formatted error information, which you can send to third parties

INSIDE OUT The Event Log is your friend

The Event Log is probably the single most useful feature in Windows 7 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. It's probably near the top of the event list. The Event Log provides essential information about the source of errors, helping you diagnose problems much more quickly than you could by trial and error.

Performance Monitor

Performance Monitor, shown in Figure 14-7, provides real-time information about a wide range of Windows and hardware components and events. You can also use it to check whether the Windows reporting tools are activated.

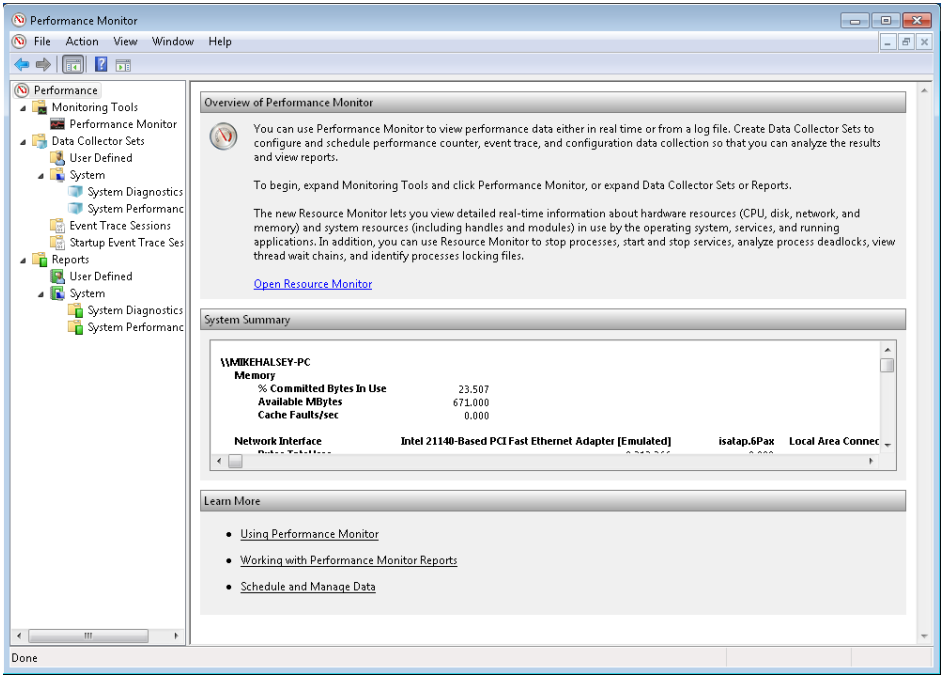

Figure 14-7 Performance Monitor in Windows 7

You can use the real-time monitoring tools in Performance Monitor to add information about specific things, for instance, the read/write data for your hard disk or the power distribution to individual components, seen in Figure 14-8. In Chapter 25, "Advanced Windows Diagnostic Tools in Depth," I will talk about these tools in much greater depth.

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—say, for example, you suspect the **ReadyBoost** cache isn't working properly—you can monitor this feature in real time via Performance Monitor.

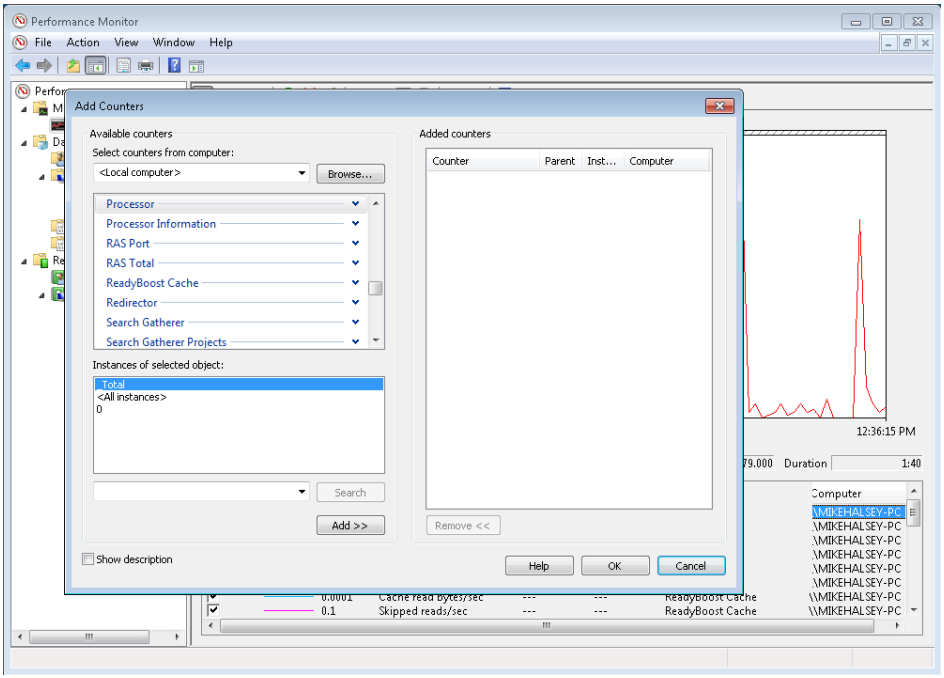

Figure 14-8 Adding custom counters to Performance Monitor

Resource Monitor

Whereas Performance Monitor helps you diagnose problems with Windows services and components, Resource Monitor gives you extensive real-time information about your processor, memory, hard disks, and networking. Figure 14-9 shows the information you find on the Memory tab of Resource Monitor. If one of your applications is consuming vast amounts of memory, you would find information about it here. Each tab lets you know 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.

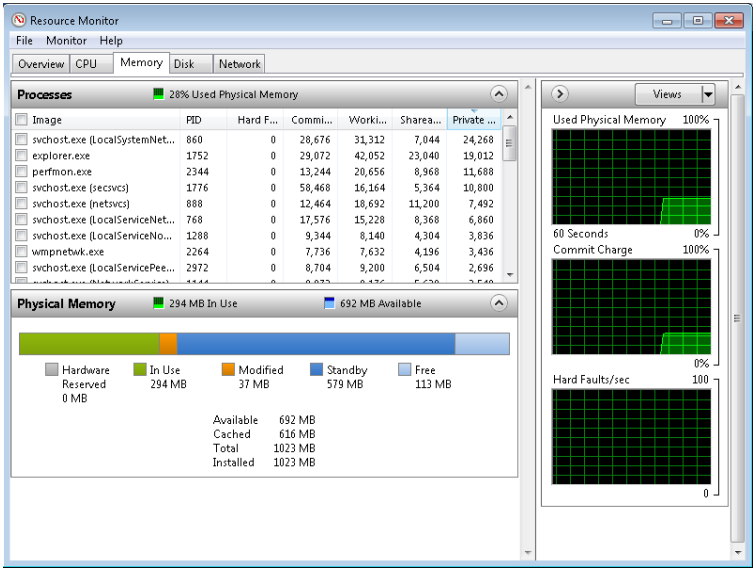

Figure 14-9 Resource Monitor in Windows 7

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 or in your applications.

Windows Task Manager

If you've used Windows before, you're probably familiar with Windows Task Manager. One of the fastest ways to access Windows Task Manager is by right-clicking the Windows taskbar and selecting Start Task Manager.

The information you find in Windows Task Manager is less detailed than what you see in Resource Manager but can provide information that is not shown in Performance Monitor, including what services are currently running and what users are logged in to the computer.

System Information

If you need to provide a third party with information about your PC, including data on Windows, your hardware, and your installed software, the System Information tool, shown in Figure 14-10, is the place to find it.

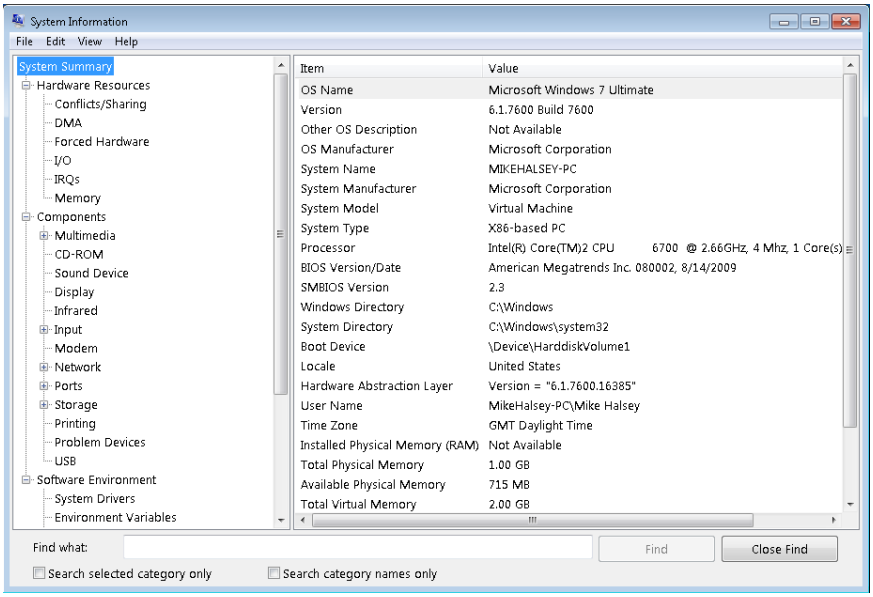

Figure 14-10 System Information tool

The system information is divided into three sections.

- **Hardware Resources** Contains information about hardware conflicts, IRQs (interrupt requests), memory allocations, and so on.
- **Components** Includes information about the hardware attached to your PC, with a separate section, Problem Devices, for devices that Windows 7 has identified as problematic.
- **Software Environment** Includes information about everything from installed software and drivers to startup programs and recent Windows error reporting.

To export any or all of the data from the System Summary as a text file that can be read on any computer, go to File\Export, name the text file, and save it.

System Health Report

One of the most useful automatic diagnostic features in Windows 7 is the system health report tool you find when you click Generate A System Health Report in the Advanced Tools section of Performance Information and Tools. Figure 14-11 shows the Resource and Performance Monitor window that appears when you click the link. This tool produces thorough and detailed reports of the current status of your PC, checking every part of Windows, your hardware, and your installed software and highlighting any problems.

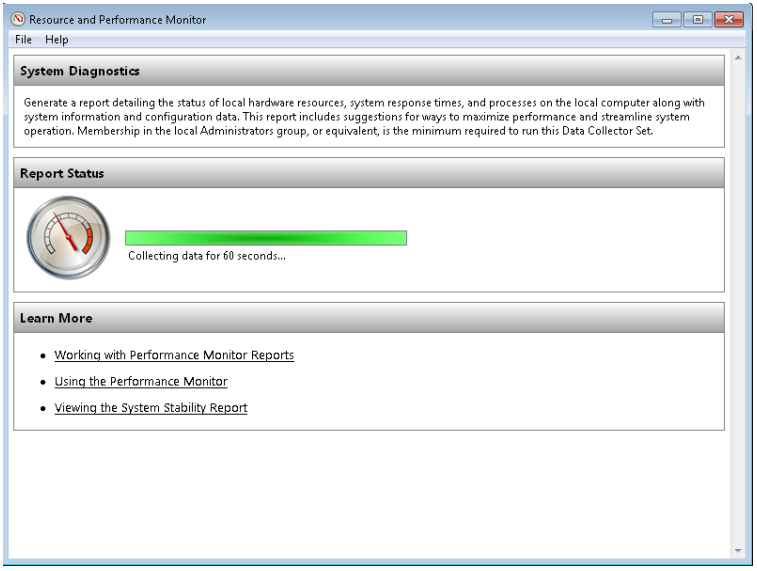

Figure 14-11 Tool for generating system health reports in Windows 7

The File menu includes options to send the report to an **email client** configured on your PC, save it as a file, or send it through 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 14-12. Here you'll see information on currently detected problems as well as links to helpful articles about these problems on the Microsoft website.

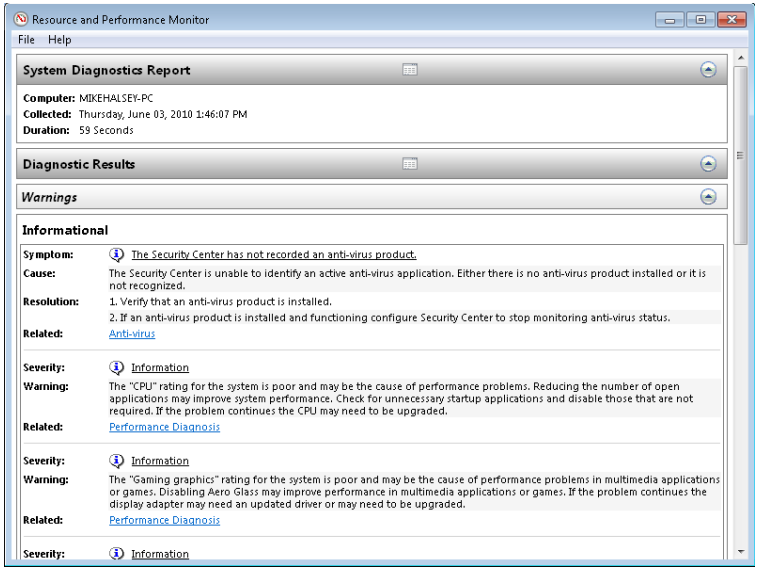

Figure 14-12 Sample system health report

Computer Management

You can access the Computer Management console through Control Panel (click System and Security, click Administrative Tools, and then click Computer Management), but the easiest way to get to it is by right-clicking the Computer link in the Start menu and selecting Manage, as shown in Figure 14-13.

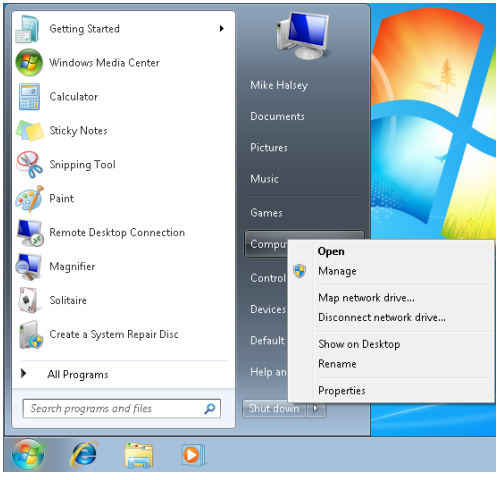

Figure 14-13 Accessing the Computer Management console

From the Computer Management window, shown in Figure 14-14, you can view and control System Tools such as Task Scheduler, Event Viewer, Performance, Device Manager, and the Disk Management storage tool.

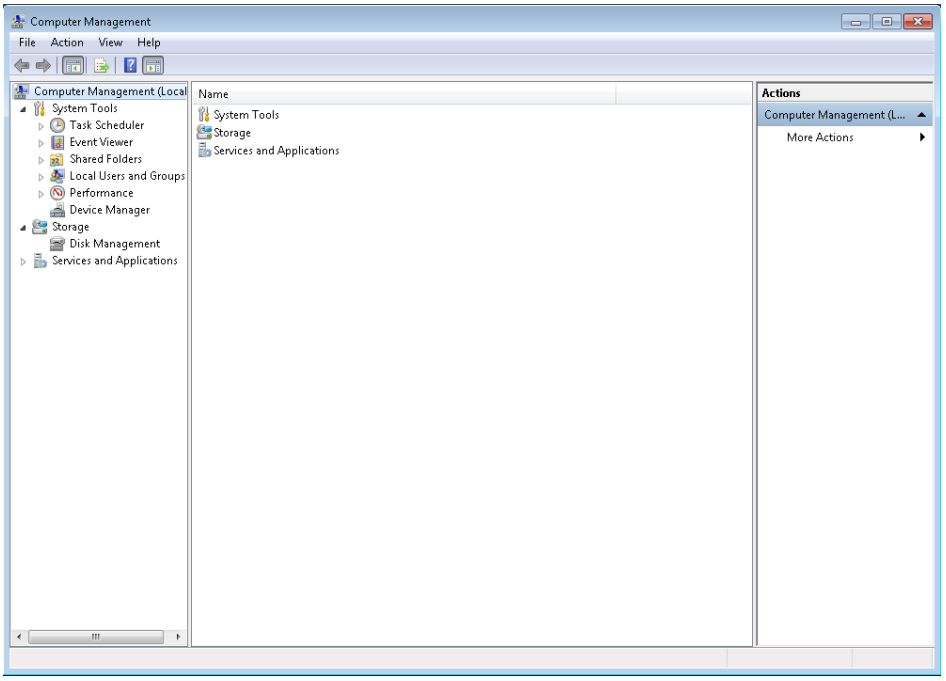

Figure 14-14 The Computer Management console

When you click Disk Management, the pane in Figure 14-15 appears. Here you can view all the fixed and removable drives in your PC and find problems with them. For example, you might see that a disk isn't being recognized or is being reported as unformatted.

INSIDE OUT

Be careful when working with suspected faulty disks

Just because Windows 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.

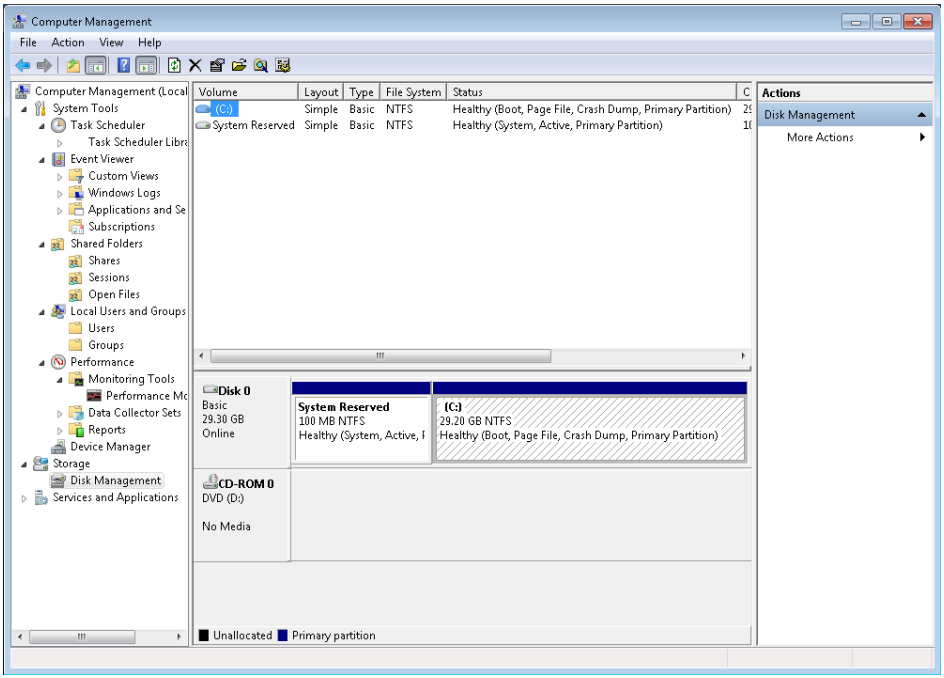

Figure 14-15 Disk Management console

As I have said, the Computer Management Console is a good and centralized place for finding the tools that come with Windows that can be used for repairing problems with the operating system and your hardware.

Using the Windows 7 Performance Tools

The performance tools in Windows 7 offer some extremely advanced information that may be primarily used by IT professionals, either remotely or when accessing the PC directly, but that are of use to anyone working with diagnosing and repairing problems on a PC. One of the most useful functions of these tools is their ability to quickly display a huge amount of data about your PC, your copy of Windows, and your hardware.

They are especially useful because of the different ways they can present this information and the different levels of detail they 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.

Take Time to Step Back

Sometimes the best troubleshooting tool isn't built into 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. I've found that if I keep staring at a PC screen 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 Performance Information and Tools offline. The reports that the Advanced Performance Information and Tools utilities can provide make for excellent reading when you're away from your PC and can't be tempted to try quick fixes. This can give you time to digest a problem and read the logs thoroughly.

Summary

I will talk about the advanced tools included in Performance Information and Tools in much more depth in Chapter 25. These tools are versatile and useful in many contexts as well as highly customizable. What I hope to have shown in this chapter is that even a novice user can gain useful data and information from the advanced maintenance and troubleshooting tools in Windows 7.

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