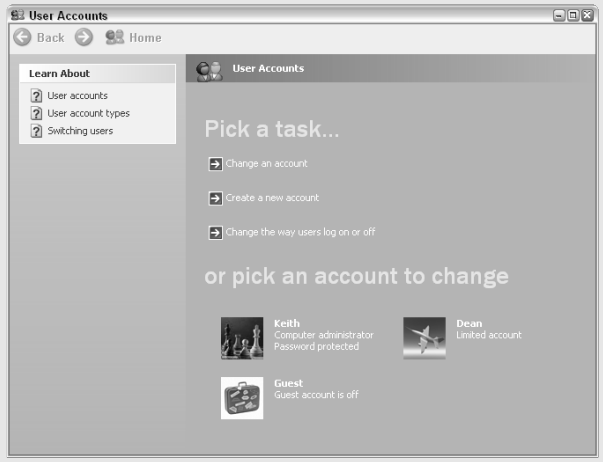
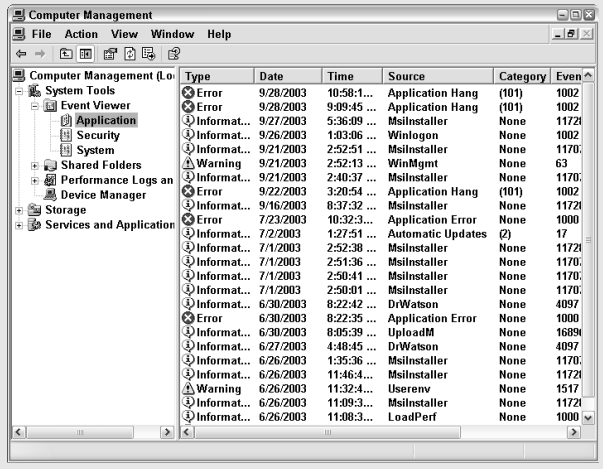
CHAPTER 1

TAKING COMMAND OF WINDOWS XP

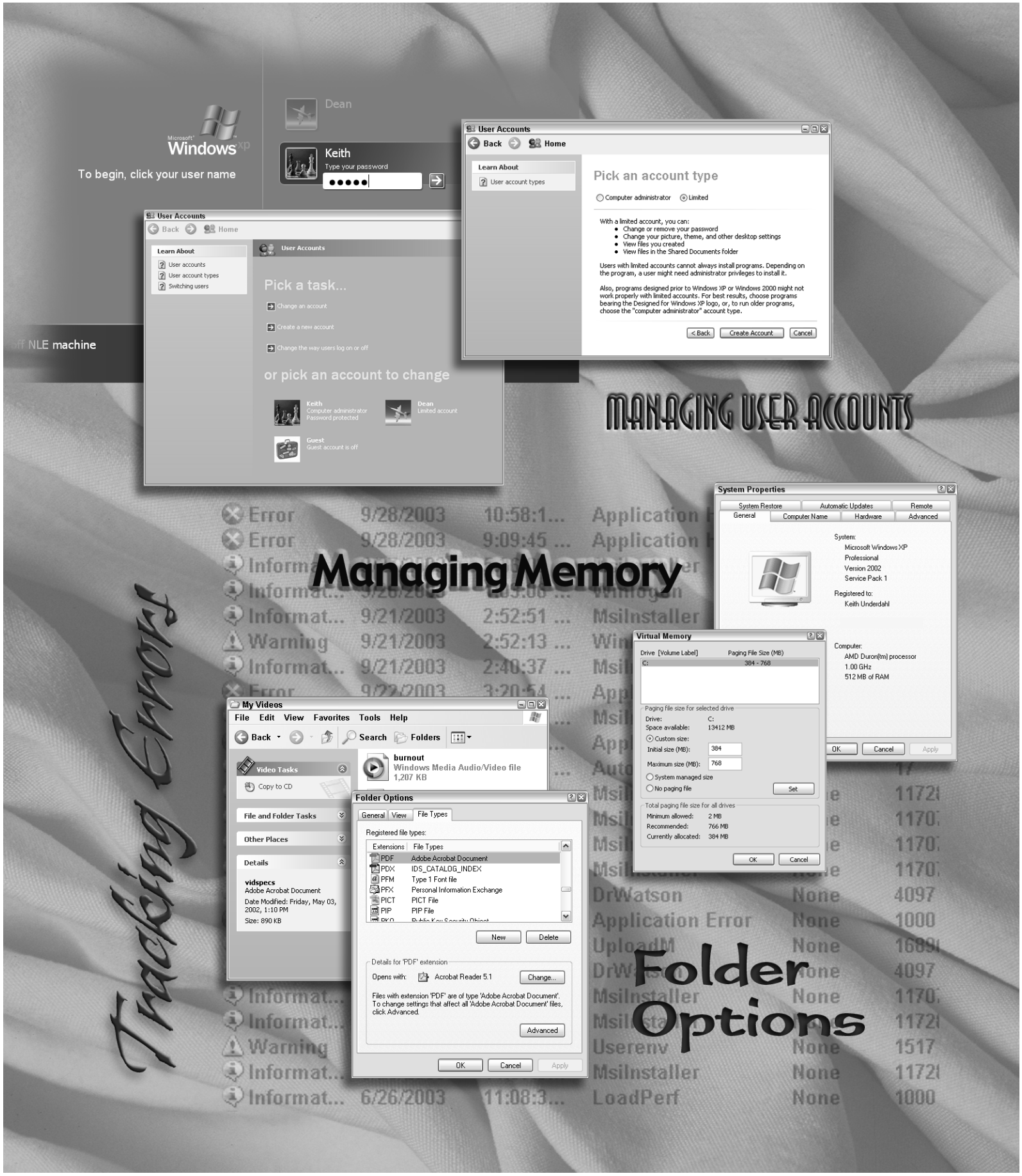




Consider this story line: Man creates technology; technology gains power; technology controls Man. This story line is a popular theme in science fiction, but when we consider the important roles that computers play in modern society the theme feels more like reality than fiction.

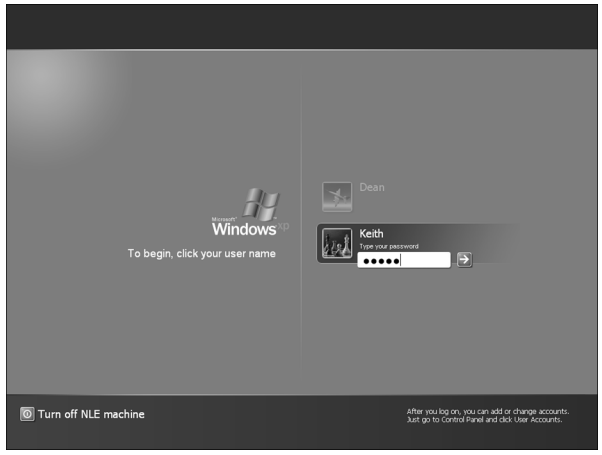
Fortunately, humans haven't entirely given up control to the machines just yet, not even those machines that run Windows XP. You can control virtually every aspect of the way Windows XP looks and behaves, whether you're running XP on your personal laptop or your company's network server.

This chapter shows you how to take command of Windows XP's behavior. You can take charge of the way Windows starts up, as well as control if and how others use your computer. You can specify which program is used to open files of a certain type. Techniques in this chapter also show you how to track errors and system events, and how to take charge of the way Windows XP handles system memory.

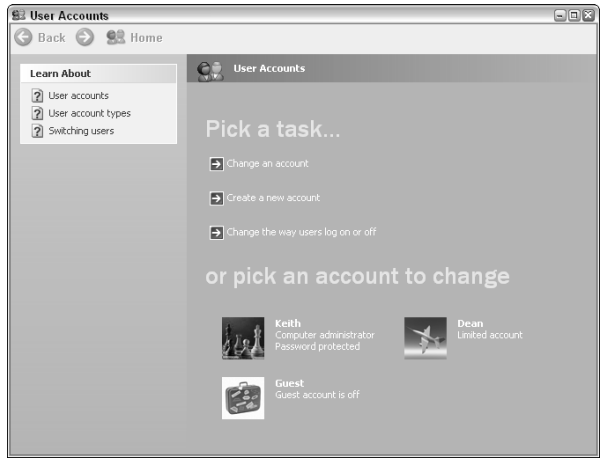


TECHNIQUE 1

MANAGING USER ACCOUNTS



1.1



1.2

ABOUT THE FEATURE

Whether your computer is in a home full of nosy teenagers or a fully-staffed office, it's not a good idea to let anyone and everyone have free access to your computer. Windows XP uses individual user accounts to control who can use a computer and what each user is allowed to do.

A little more than a decade ago home computers weren't very common. But today many households have two or more computers, and modern offices often have more computers on hand than people. But even with so many computers on hand, many computers are still used by more than one person. At home you may use your computer to shop online and file taxes, while your children use the same PC to do their homework.

If you share your computer with others, you may find it handy — or even necessary — to control who can use the computer and what features they can access. Windows XP helps you do this with user accounts. The computer shown in **Figure 1.1** has two user accounts, named **Keith** and **Dean**. Each authorized user can have his or her own account on the computer. As an *administrator*, you control who gets an account and what they are

allowed to do when they log on. Creating separate accounts for each user has several benefits:

- Your personal files, e-mail, and documents remain private.
- You can prevent others from modifying important system settings.
- Each user can use his own unique display and appearance settings for Windows.
- Restricted users may not install new programs.
- Favorite Web sites and other Internet files are unique to each user.

STEP 1: CREATE AN ACCOUNT

At a minimum, your computer already has an administrator account. As the name implies, the administrator account is for the person in charge of the computer, probably you. Before you can create a user account, you must log in to Windows as an administrator or with an account that has administrator rights. The steps below show you how to specify whether or not an account has administrator rights. To create a new user account:

- Open the Windows XP Control Panel by choosing **Start ➢ Control Panel**.
- Click the **User Accounts** icon. The User Accounts control panel appears as shown in **Figure 1.2**.
- Click **Create a new account**. Type a name for the account when prompted to do so, and then click **Next**.

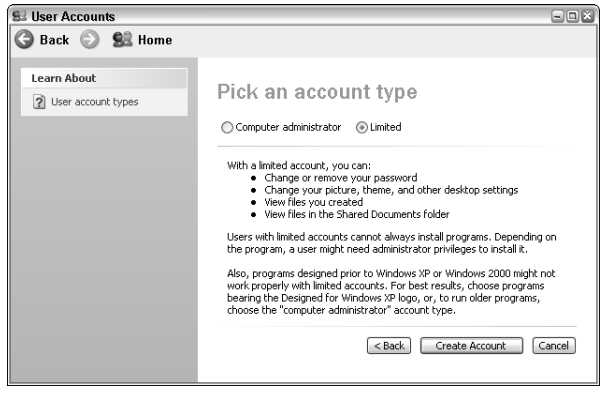
NOTE

Even if you don't share your computer with anyone, it's a good idea to set up a user account for yourself. This helps ensure that unauthorized persons can't use the computer.

- On the **Pick an account type** screen shown in **Figure 1.3**, choose an account type. If you choose **Computer administrator**, the user will have full access to the computer. An administrator can install software, create or delete user accounts, and access all files on the computer. If you want to limit access to the computer, choose the **Limited** account type. A limited user cannot create, modify, or delete accounts, nor can a limited user install new software. Limited users can only access files they create, as well as any files located in the **Shared Documents** folder.
- Click **Create Account** to complete the process.

TIP

Account types can be changed easily. Simply open the User Accounts control panel, click the name of an account that you want to change, and click Change the account type in the list of options that appears.



1.3

STEP 2: SET LOG ON/OFF OPTIONS

An important aspect of managing user accounts in Windows XP is controlling how users log on and off Windows.

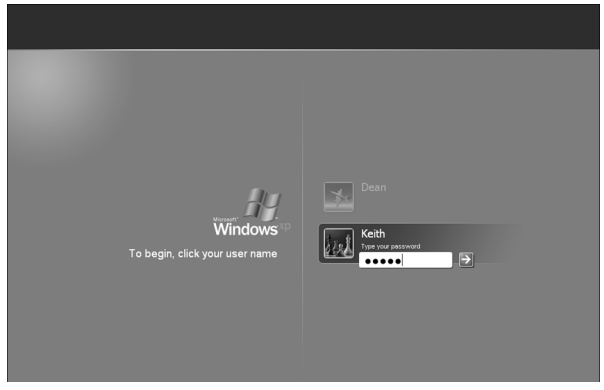
- Open the User Accounts control panel if it isn't already open, and then click **Change the way users log on or off** from the list of tasks.
- Choose whether or not you want to use the Windows XP Welcome screen like the one shown in **Figure 1.4**. The Welcome screen is faster and easier to use if some or all of your user accounts don't use passwords. If you choose not to use the Welcome screen, users instead use a classic login dialog box like that used by older versions of Windows.
- Choose whether you want to use Fast User Switching. Like the name implies, Fast User Switching lets you switch between users faster. To use Fast User Switching you must also use the Welcome screen. With Fast User Switching enabled, you can change user accounts without closing programs. To use Fast User Switching, click **Start** and then **Log Off**. As shown in **Figure 1.5**, the Log Off Windows dialog box has a button named **Switch User**. Click this button to open the Welcome screen and switch to a new user account.
- Click **Apply Options** when you are done adjusting log-on and log-off options.

TIP

If your screen saver activates and you use the Windows XP Welcome screen, you'll have to go through the Welcome screen every time you turn off the screen saver and try to get back to work. This can be annoying if your account happens to be password protected, because it means you must retype your password every time the screen saver starts. To avoid this, uncheck the Use the Welcome screen option in the User Accounts control panel.

NOTE

Passwords in Windows XP are case-sensitive. If your password includes a combination of upper- and lowercase letters, such as APRILfools, you must type your password exactly the same when you log in to Windows.



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STEP 3: CREATE PASSWORDS (OPTIONAL)

Passwords aren't absolutely mandatory for all user accounts in Windows XP, but it's usually a good idea to at least create a password for all administrator accounts. For more on advanced password management techniques, see "Managing Passwords" in Chapter 6.

- Open the User Accounts control panel if it isn't already open, and then click the name of an account for which you want to create a password.
- Follow the instructions on-screen to type and retype a password for your account. You should also type a word or phrase in the **password hint** field, but keep in mind that this hint is visible to anyone who uses your computer. For example, if your password is the name of your dog, and the hint is, "What is the dog's name?" other family members can probably figure out the password.
- Click the **Create Password** button to create the password.

STEP 4: DELETE ACCOUNTS (OPTIONAL)

It's always a good idea to get rid of old user accounts that are no longer needed. To delete an account, open the User Accounts control panel, click the name of the account you want to delete, and click **Delete the account**. Keep in mind that when you delete an account, you usually delete all of the files and documents associated with that account, including:

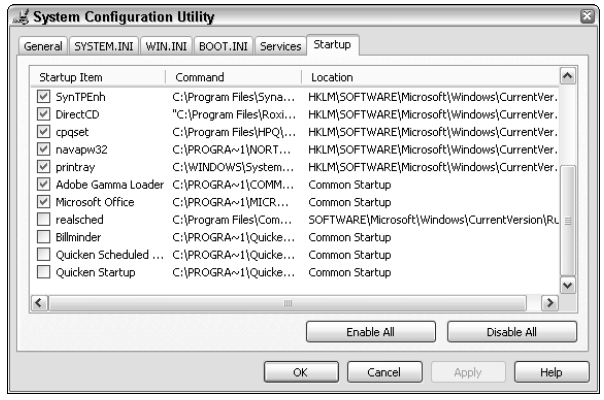
- E-mail messages
- Internet files and favorites
- Display settings
- Desktop items
- The **My Documents** folder and all of its contents

You can preserve items from the account's desktop and **My Documents** folder. To do so, click **Keep Files**. If you click **Delete Files**, all of the above listed items are deleted along with the account.

TECHNIQUE 2

CONTROLLING STARTUP ITEMS

2.1



2.2

ABOUT THE FEATURE

When you launch Windows, various other programs launch as well. Some of these programs — such as antivirus programs — are important, but others simply waste system resources. You can control which programs start up when you launch Windows XP.

Take a look at the Windows XP system tray, which is the area in the lower-right corner of the screen next to the clock. Your system tray probably shows a collection of icons similar to the system tray shown in **Figure 2.1**. Some of these icons provide a visual indication of system status. If you're using a laptop, for example, you should see a small power cord icon in the system tray if you are plugged in to AC wall power, and you should see a battery icon if you are currently running on battery power. Other system tray icons — like the speaker — provide links to basic Windows features.

Many system tray icons represent third-party programs that launched when Windows XP started up and are currently running in the background. These programs are often called *memory resident* programs, because they've taken up residence in your computer's memory and have no plans for moving out. Among the most annoying types of memory resident programs are spyware or adware, programs that I describe in Technique 40, "Finding and Destroying Spyware" in Chapter 6.

Some memory resident programs, such as antivirus programs and firewalls, are desirable. But others may be just wasting system resources. This technique helps you identify and disable startup items on your system

using tools such as the System Configuration Utility, shown in **Figure 2.2**. Disabling startup programs simply turns them off; it does not delete the program, so this is a change that can be safely undone if you don't like it or if it causes problems.

STEP 1: REVIEW STARTUP ITEMS IN THE SYSTEM CONFIGURATION UTILITY

One of Windows XP's most useful yet little-known tools is the System Configuration Utility. This utility is little known because you won't find it in the Windows Control Panel or the **Start** menu. To launch the System Configuration Utility, choose **Start ➢ Run**. In the Run dialog box, type **msconfig** as shown in **Figure 2.3**, and then click **OK**. The System Configuration Utility opens.

In the System Configuration Utility, click the **Startup** tab to bring it to the front. A list of items similar to **Figure 2.4** appears. Each item in the list represents an application that launches with Windows and runs in the background. To disable a startup item, simply remove the check mark next to it in the list. Consider each item carefully. Some items are easy to identify based on their name. In **Figure 2.4**, the last two items have "Quicken" in the name, which identifies them as part of a personal finance software installed on this computer. I can safely disable those items because they don't serve a function that is crucial to system function. The third-to-last item, "Billminder," has a less descriptive name, but the Command column shows that it resides in the same "Quicken" folder as the other two items. I can safely disable "Billminder" as well.

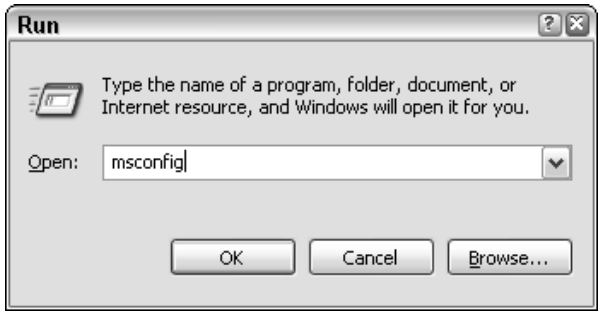
Click **OK** to close the System Configuration Utility. Windows prompts you to restart your computer to put your changes into effect.

TIP

It's a good idea to create a system restore point before you make any system changes such as the ones described here. See Chapter 4 for more on using system restore points.

CAUTION

When in doubt, keep it. Some startup items may serve important system functions such as antivirus protection or laptop touch pad controls. Only disable items that you can clearly identify as noncrucial.



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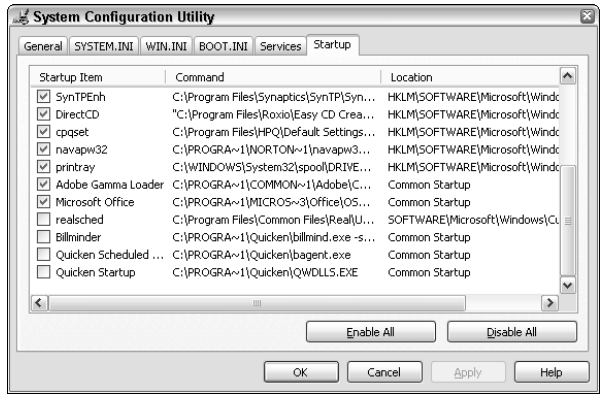


2.4

STEP 2: CLEAN OUT THE STARTUP FOLDER

Some startup items are stored in a Windows Start menu folder aptly titled **Startup**. To view the contents of this folder choose **Start ➢ All Programs ➢ Startup**. You can easily remove an item from the **Startup** folder. Just right-click the item and choose **Delete** from the menu that appears. Deleting items from the **Startup** folder is usually safe because the programs themselves are not deleted. The only thing you delete here is a shortcut to the program.

Although this technique is about removing startup items, you can add items to the **Startup** folder as easily as you remove them. Simply click and drag items to the **Startup** folder. For example, if you want your e-mail program to open when you start Windows, click and drag the shortcut for the e-mail program to the **Startup** folder.

STEP 3: EDIT THE REGISTRY

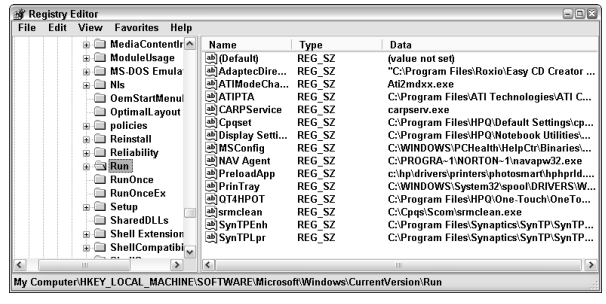
The Windows registry controls some Windows startup items. The registry is a fundamental component of the Windows XP operating system, and it should be modified with great care. If you accidentally delete the wrong thing in the registry your computer may stop working, and your only solution may be to reinstall Windows. Still, sometimes the only way to completely disable a startup item is to edit the registry.

To review and disable startup items in the registry:

- Choose **Start ➢ Run** to open the Run dialog box.
- Type **regedit** in the Run dialog box and click **OK**. The Registry Editor opens as shown in **Figure 2.5**. Registry keys are listed on the left side of the screen in a folder-tree manner. Click a plus sign next to a key to expand the list.
- Open the key **HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Run**. A list of values appears on the right. Your list may look similar to **Figure 2.5**. To remove an item, select it in the list on the right and choose **Edit ➢ Delete**. Remember, deletions are permanent; the Registry Editor does not have an undo feature. Don't delete any value unless you can positively identify it as a noncritical item. For example, if you see a key that is obviously related to a program that you uninstalled, you can safely delete it.
- Open the key **HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Run**. As before, review and delete values as needed.

CAUTION

The Windows Registry Editor does not have an undo feature, and changes take effect immediately. Because of this, trial and error is not a good methodology to use when editing the registry. Be very careful and absolutely certain before making any registry changes. Also, set a system restore point before editing the registry. See Chapter 4 for more about using system restore points. It's also a good idea to back up the registry. Chapter 4 also shows you how to back up the registry and other system components.

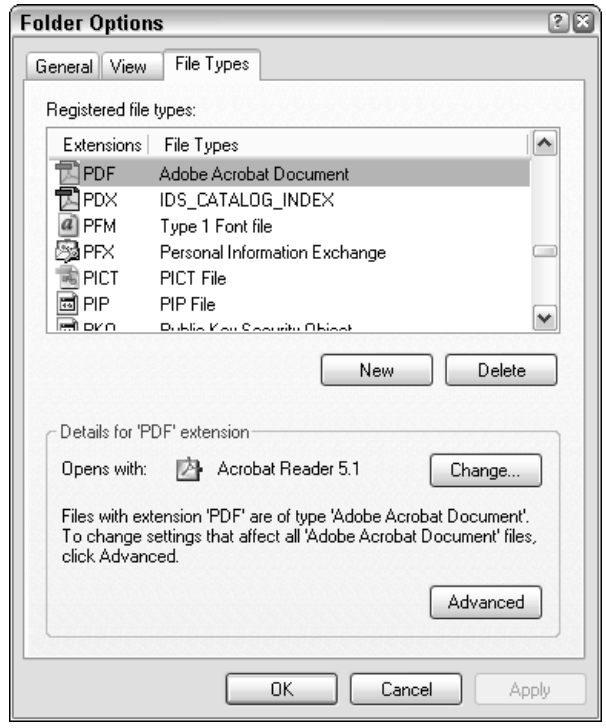


2.5

TECHNIQUE 3

CHANGING THE WAY FILES OPEN

3.1



3.2

ABOUT THE FEATURE

When you double-click a file, Windows automatically chooses which program should be used to open it. You can control which programs are associated with various file types.

If you've been using PCs since the days of DOS, you're probably familiar with filename extensions. Extensions are typically two-, three-, or four-character suffixes appended to a file's name, and they identify the file's format. For example, a Microsoft Word document has the extension **.doc**, and a JPEG image usually has the extension **.jpg** or **.jpeg**. Extensions are still used by Windows XP, although the extensions are usually hidden when you view a list of files in Windows Explorer or My Computer. By default, Windows XP hides extensions that are understood, so that only unknown file extensions are displayed.

When you double-click a file, Windows XP looks at the filename extension to determine the file's format. This information is used to determine which program should be used to open the file. Of course, some files can be

opened by more than one program. A text file (**.txt**) can be opened by Notepad, WordPad, or any word processor. A JPEG image can be opened by Internet Explorer, Windows Picture and Fax Viewer, Microsoft Paint, or any graphics program.

You may or may not be happy with the default programs used to open certain types of files. Fortunately, Windows lets you change program file associations. You may need to do this after installing a new media player program. When you install a new program like RealOne or QuickTime, the new program probably takes over file associations for common media formats such as MPEG video and MP3 audio. But if you want to continue using your old media player — such as Windows Media Player — for those file types, you need to manually adjust file association settings. In **Figure 3.1** you can see that some of the video file formats are associated with Windows Media Player, while others are associated with RealOne Player. Other programs in the list — non-video files — are associated with programs such as Adobe Acrobat and Microsoft Word. Windows XP lets you easily control which programs are used to open certain types of programs. In **Figure 3.2** I'm checking the file association for Adobe Acrobat documents.

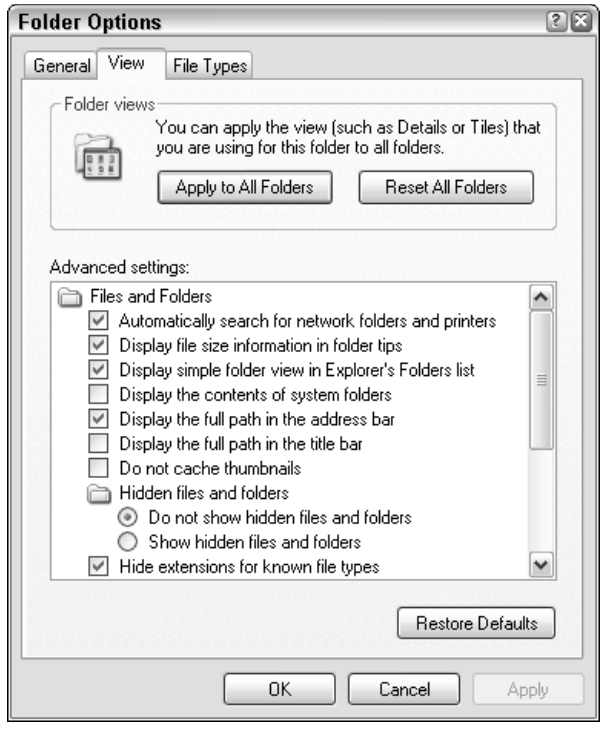
TIP

If you get an error message stating that Windows cannot find a program to open a given file, the file association setting for that program may simply be broken. If you know that a program is installed that can handle the file type, follow the steps here to fix the file association setting.

STEP 1: LAUNCH FOLDER OPTIONS

You can change file associations using the Folder Options dialog box. To open the Folder Options dialog box, open Windows Explorer or My Computer and then choose **Tools ➢ Folder Options**. The Folder Options dialog box appears. Click the **View** tab to bring it to the front as shown in **Figure 3.3**.

As mentioned earlier, Windows XP normally hides filename extensions. If you want to view extensions all the time, scroll down the list of Advanced Settings, and remove the check mark next to **Hide extensions for known file types**. When you're done reviewing options on the **View** tab, click the **File Types** tab.



3.3

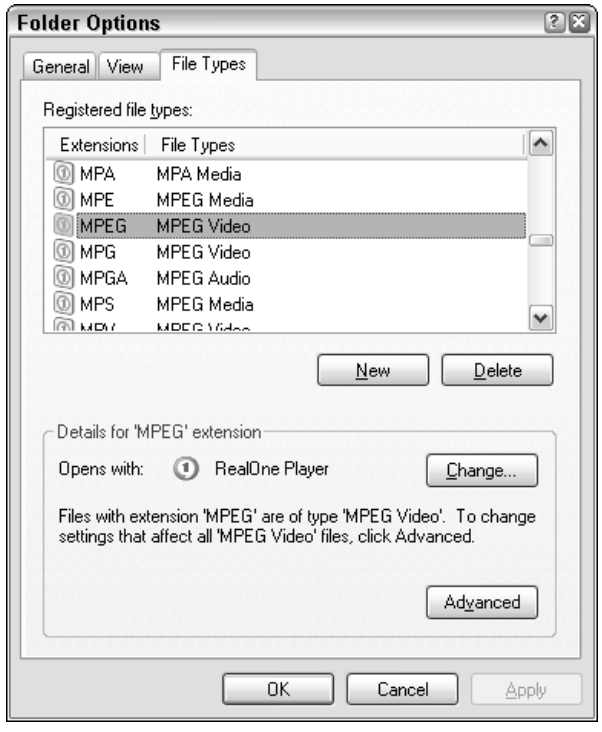
STEP 2: CHANGE A FILE ASSOCIATION

The **File Types** tab of the Folder Options dialog box provides a list of all file types known to the computer. The list on your computer is probably long. Formats are listed in alphabetical order by extension, and you may need to scroll down before you find the extension that you want to change. To change a file association:

- Locate the file extension that you want to change. Click it once to view details about the extension in the bottom half of the **File Types** tab as shown in **Figure 3.4**.
- Click **Change**. The Open With dialog box appears as shown in **Figure 3.5**. Choose a program from the list, preferably one from the Recommended Programs list. If the program you want to use isn't listed at all, click **Browse** and browse to the executable program file for the program you want to use.
- Click **OK** to close the Open With dialog box.

NOTE

Some file formats are identified by several different filename extensions. For example, an MPEG movie file can have the extension .MPG, .MPEG, .MPE, or one of several other alternate extensions. Carefully review the list of file extensions in the Folder Options dialog box; you may need to change the file association for several different filename extensions.



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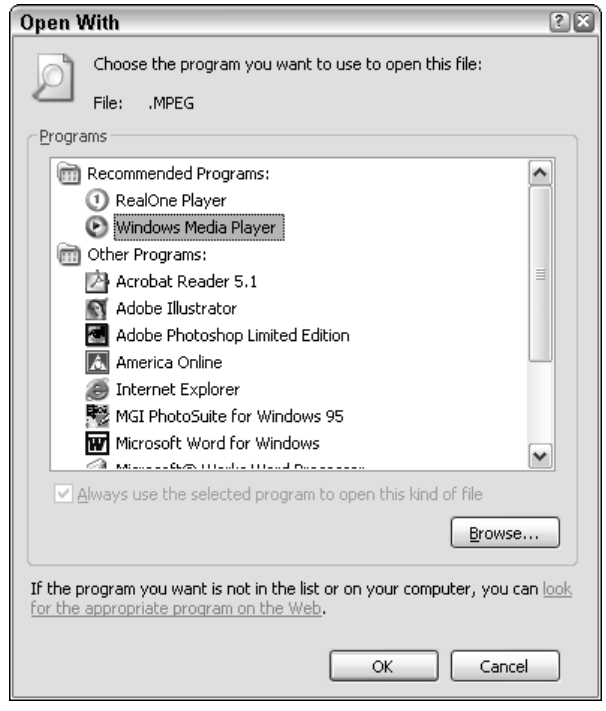

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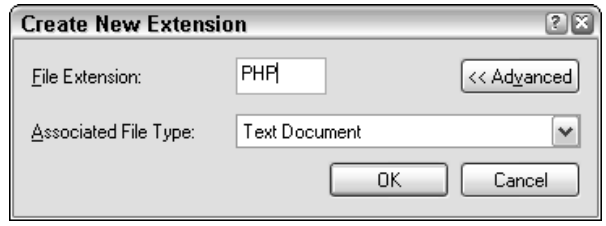
STEP 3: CREATE A NEW FILE TYPE (OPTIONAL)

It is possible — though unlikely — that a file extension you need to use isn't associated with any program. In that case, you can create a file extension from scratch and associate it with a program.

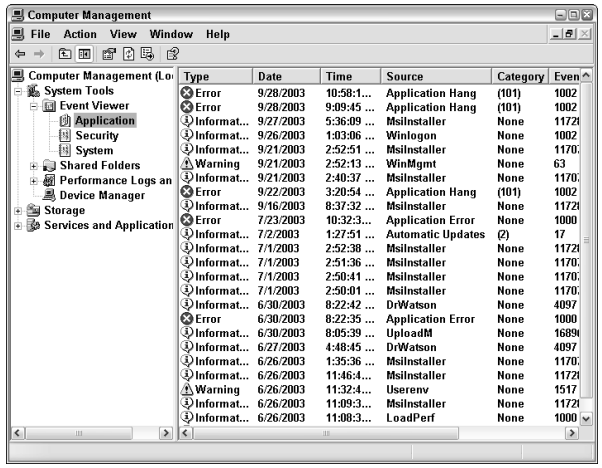
- On the **File Types** tab of the Folder Options dialog box, click **New**. The Create New Extension dialog box appears.
- Click the **Advanced** button to expand the dialog box as shown in **Figure 3.6**.
- Type an extension in the **File Extension** field.
- Choose an **Associated File Type** from the menu. In **Figure 3.6** I am associating the extension **PHP** with the **Text Document** file type so that I can easily edit PHP files in a text editor. This step is optional; if you don't choose an Associated File Type or if nothing in the list seems to match, you can specify a program to open the file later. Follow the instructions under step 2 to associate the extension with a program.
- Click **OK** when you're done.



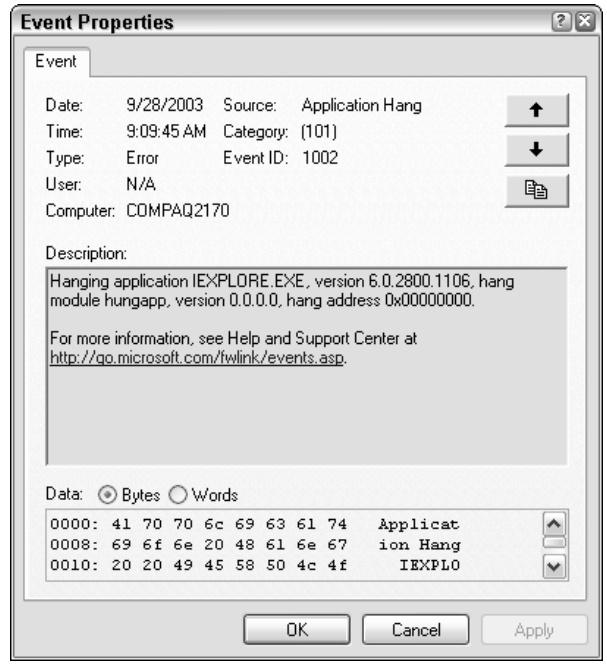
3.6

TECHNIQUE 4

TRACKING ERRORS AND EVENTS



4.1



4.2

ABOUT THE FEATURE

Windows XP keeps track of all errors, security events, network events, software installations, and other important actions. Logs of these events and errors can prove invaluable as you troubleshoot problems.

Have you ever experienced an error with a program, but when you tried to explain the problem later — say, to technical support staff — you couldn't remember some important details? Helpfully, Windows XP logs all system errors, as well as security and network events. A tool called the Event Viewer, shown in **Figure 4.1**, allows you to review these logs, providing information that will prove useful whether you troubleshoot the problem yourself or consult outside help. The Event Viewer gives you more control over your computer by keeping you informed about things that are happening.

STEP 1: OPEN THE EVENT VIEWER

The Event Viewer is part of the Computer Management control panel. To open it:

- Choose **Start ➢ Control Panel** to open the Windows XP Control Panel. If your Control Panel is set up in Category view, click the **Performance and Maintenance** category.
- Double-click the **Administrative Tools** icon in the Control Panel. A list of administrative tools appears.
- Double-click the **Computer Management** icon. The Computer Management window opens. Click the plus sign next to **Event Viewer** under **System Tools** on the left side of the window, and click one of the event categories to view it.

In **Figure 4.1** I am viewing Application events, which usually consist of application errors and crashes, installations, and other program events. Security events include security-related events, including policy changes. Every time a user logs in to Windows a security event is logged, so the list of Security events can get quite long. System events are operating system events, such as hardware drivers and Windows components. As with Security events, the list of System events can get lengthy because drivers and components are loaded every time you start Windows.

STEP 2: REVIEW EVENTS

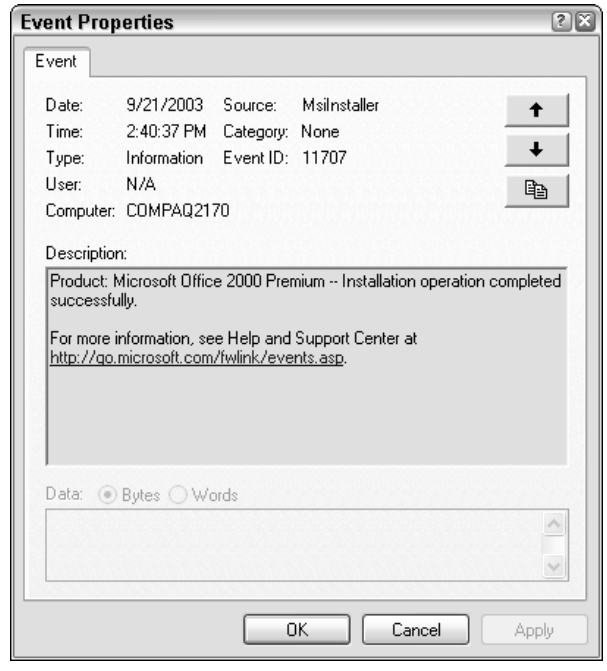
To review details of an event, simply double-click it in the Event Viewer. An Event Properties dialog box appears, the contents of which vary depending on the type of event. **Figure 4.2** shows an error event that was logged when the application IEXPLORER.EXE hung, which is how Windows XP describes a program that freezes or crashes. Additional information may prove useful when contacting technical support or researching solutions.

Figure 4.3 shows another type of event. This event is a little more mundane; Microsoft Office 2000 was installed on this computer.

STEP 3: FILTER RESULTS

The Event Viewer logs can grow pretty long, with many of the entries pertaining to mundane events such as logging on to Windows. You can filter events in the Event Viewer so that only events of a certain type — errors or warnings, for example — are displayed. To filter events:

- In the Computer Management window, choose **View ➢ Filter**. The **Filter** tab of the properties dialog box appears as shown in **Figure 4.4**.
- Remove check marks next to event types that you don't want to view.



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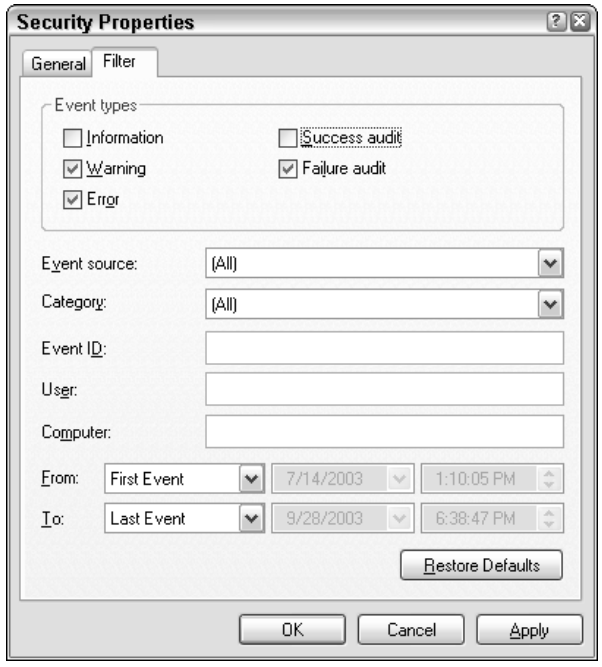
■ If you know that you want to view events only from one specific source, choose an option in the **Event source** menu. If you choose a specific **Event source**, you can further filter the results by choosing a **Category**.
■ Enter information in the **Event ID**, **User**, and **Computer** fields if you want to filter results by those criteria.
■ Use the drop-down menus at the bottom of the **Filter** tab to view results from a specific date range.
■ Click **OK** when you have set up all of your filter rules.



4.4

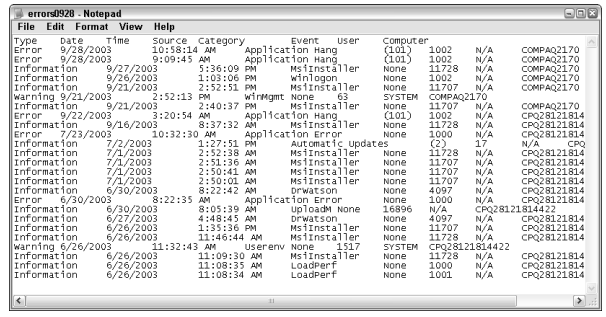
STEP 4: EXPORT A LOG

Event logs can be exported to a text file. This allows the log to be easily shared with others. To export a log:

■ Choose **Action ➢ Export List** in the Computer Management window. An Export List dialog box appears.
■ Choose a location in which to save the file, provide a filename, and click **Save**. The file is saved as a tab delimited text file. You can open the file in any text editor, as shown in **Figure 4.5**. Tab delimited files can also be easily imported into a spreadsheet program.

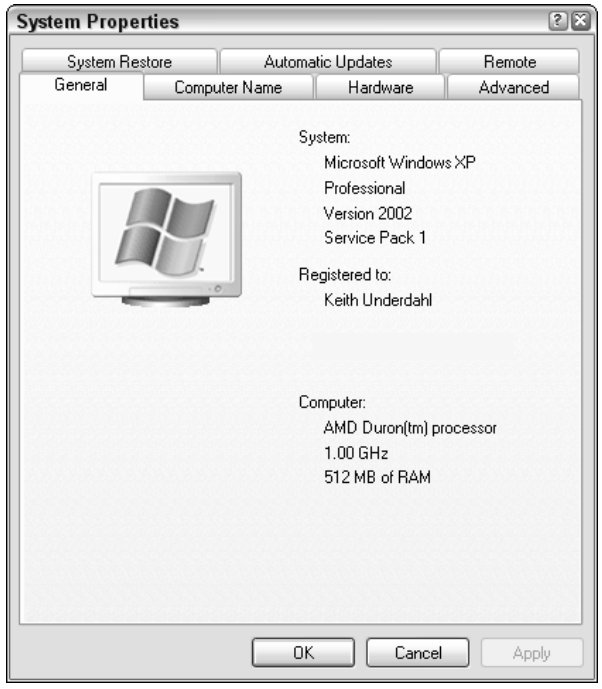
STEP 5: CLEAR EVENTS (OPTIONAL)

Your Event Viewer will start to get full after a while. If you have resolved all outstanding issues, you can clean up the logs by clearing out old events. To do so, simply choose **Action ➢ Clear All Events**. Before doing so, I recommend you first export your logs as described in the previous step. If a problem occurs in the near future, you can use information in the exported log files for troubleshooting.

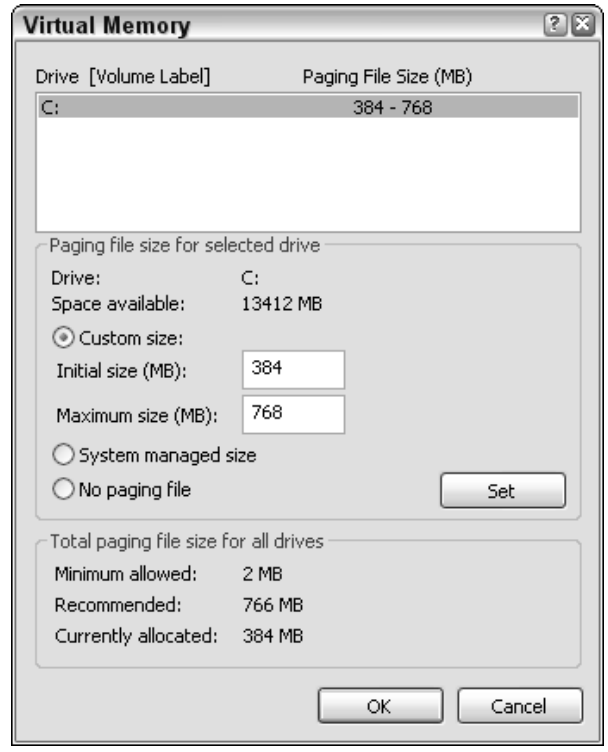


4.5

MANAGING MEMORY



5.1



5.2

ABOUT THE FEATURE

Windows XP manages memory resources on your computer, but the default memory management settings may not be ideal for your computer and needs. Windows allows you to adjust the way memory is managed.

One of the most important hardware components of your computer is the *random access memory*, or *RAM*. If your hard drive can be thought of as a filing cabinet, RAM is the top of the desk where the computer actually does its work. If you have a bigger desk, your work is more efficient and you're less likely to lose something important. Likewise, if your computer has more RAM it performs faster, more efficiently, and more reliably.

Because RAM is so important, it's usually one of the first things listed on the spec sheet for a new computer. But no matter how much RAM is installed, some programs need more. To accommodate this, the operating system uses some hard drive space to supplement system RAM. Windows

XP calls this space *virtual memory*, and it is similar to the swap space used by other operating systems such as Linux.

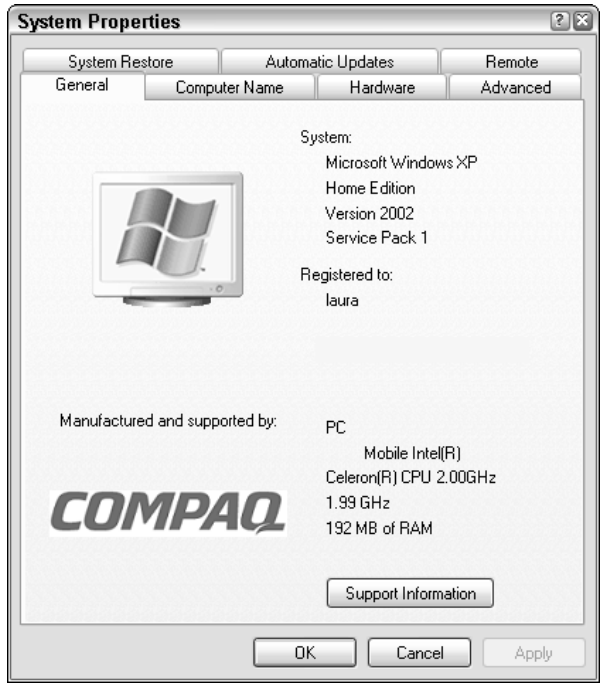
Windows XP manages the size and location of virtual memory behind the scenes so effectively that most computer users are never even aware of it. But even though virtual memory seems to be working fine in the background, it may not be set up for greatest efficiency on your computer. This technique shows you how to review the way Windows XP manages memory usage on your system, as shown in **Figure 5.2**, and adjust virtual memory settings for best efficiency.

STEP 1: DETERMINE HOW MUCH RAM IS INSTALLED

Before you start changing memory settings, you need to know how much RAM is installed on your system. Although you may remember the computer's specs from when you bought it or upgraded RAM, a more reliable way to measure available RAM is to check the Windows XP System Properties control panel:

- Choose **Start ➢ Control Panel** to open the Windows XP Control Panel. If you see the **Performance and Maintenance** category, click that category to open it.
- Double-click the **System** icon to open the System Properties control panel as shown in **Figure 5.3**.
- On the **General** tab, note how much RAM is listed under the processor information. The system shown in **Figure 5.1** has 512 MB of RAM installed, while the system in **Figure 5.3** has only 192 MB of RAM.

Checking the amount of RAM shown in the System Properties control panel is important, because in some cases the amount of RAM listed here isn't what you expect. For example, the computer in **Figure 5.3** shows only 192 MB of RAM, even though the specs for this computer listed 256 MB of RAM when I bought it. The reason for this discrepancy is that the computer's built-in display adapter uses 64 MB of the computer's RAM. Such sharing of system RAM is common, and any memory that is used by the computer's display adapter isn't available for running Windows XP or other programs. As far as Windows is concerned those 64 MB of RAM don't exist.

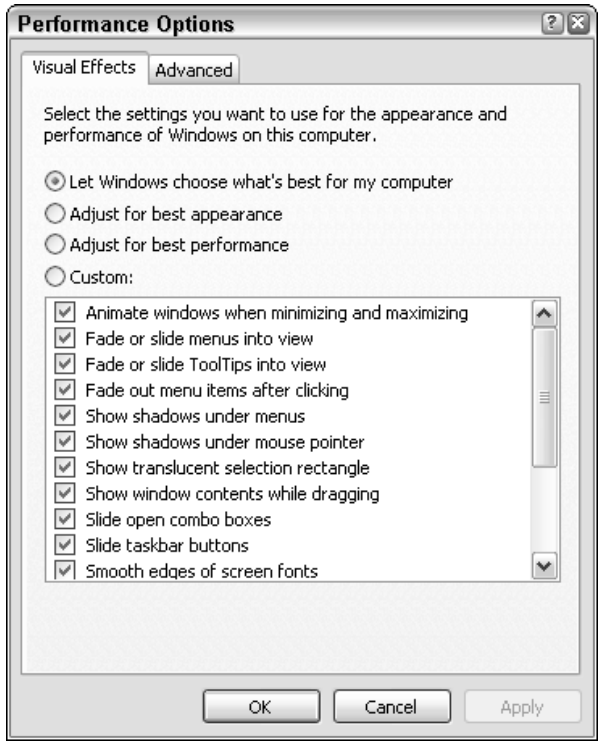


5.3

STEP 2: ADJUST VISUAL EFFECTS SETTINGS

When you know how much RAM is available on your computer, you're ready to start taking control of memory management.

- In the System Properties control panel, click the **Advanced** tab to bring it to the front.
- Click the **Settings** button under **Performance**. The Performance Options dialog box appears as shown in **Figure 5.4**.



5.4

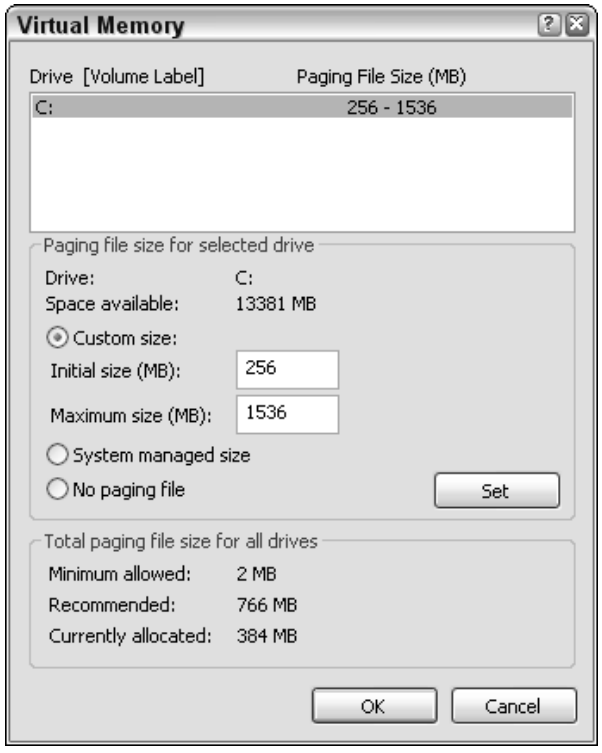
- Windows XP includes some new visual effects that make the interface more attractive. These effects include menus that fade gradually in and out, drop shadows behind desktop icons, sliding taskbar buttons, and more. These visual effects are cool, but they can negatively affect performance. This is especially true if your computer has a processor that is slower than 1.0 GHz or less than 256MB of RAM. You can control whether or not these visual effects are enabled on the **Visual Effects** tab of the Performance Options dialog box. It's usually safe to just let Windows decide what's best for your computer, but if you feel that the visual effects are just a pointless waste of system RAM and processor power, choose **Adjust for best performance**.
- If you want to activate some visual effects but not others, choose **Custom** and remove the check marks next to effects that you don't want to use.

STEP 3: REVIEW PROCESSOR AND MEMORY USAGE

Click the **Advanced** tab in the Performance Options dialog box. This **Advanced** tab contains three categories of options:

- **Processor scheduling:** This setting determines whether priority for processor power is given to whatever program you are currently using or things that are running in the background. If you have a compiler, printing service, or other memory-intensive tool running in the background, you may want to choose **Background services** to give those background items priority with the processor. Otherwise, keep the default **Programs** setting.

■ **Memory usage:** If your computer is used primarily as a server, choose **System cache**. This gives priority for memory usage to server operations. Otherwise, if your computer is a workstation or a stand-alone unit, choose **Programs**.
■ **Virtual Memory:** Here is where you manage virtual memory settings. Click **Change** to open the Virtual Memory dialog box as shown in **Figure 5.5**.



5.5

STEP 4: CHOOSE A LOCATION FOR VIRTUAL MEMORY

Because virtual memory resides on a hard drive, it works better if the hard drive is faster. Chances are your computer only has one hard drive, but if you have more than one hard drive and you know one of them is faster — say, one is a 5,400 rpm drive and the other is a 7,200 rpm drive — you should choose the faster drive. Check the documentation for your computer or hard drive if you're not sure how fast it is. Virtual memory also works best on a drive with lots of free space.

If your computer has more than one hard drive, each is listed under **Drive** in the Virtual Memory dialog box. Click the drive you want to use to select it.

STEP 5: SET VIRTUAL MEMORY SIZE

When Windows XP is installed it analyzes the amount of RAM installed on the computer and sets the size of virtual memory based on what it finds. By default, the initial size of virtual memory is 1.5 times the size of RAM, and the maximum size is three times the size of RAM. For example, if your computer has 192 MB of RAM, the default initial size is:

```
192 MB × 1.5 = 288 MB
```

The default maximum size is:

```
192 MB × 3 = 576 MB
```

This means that no matter what, 288 MB of hard drive space is always used for virtual memory, and the most that will ever be used by virtual memory is

576 MB. On a computer with only 192 MB of RAM, these are good settings to stick with. However, the more RAM that is installed on your computer, the less virtual memory is needed. Consider the default initial and maximum virtual memory sizes on a computer with 512 MB of RAM:

```
512 MB × 1.5 = 768 MB
512 MB × 3 = 1536 MB
```

On a computer with 512 MB of RAM, 768 MB is excessive. If your computer has 512 MB or more RAM installed, you can safely reduce the minimum virtual memory size to one-half the size of installed RAM. So on a computer with 512 MB of RAM, 256 MB is an acceptable minimum virtual memory size. No matter how much RAM is installed, it's safe to keep the maximum virtual memory size at three times the size of RAM. It is unlikely that virtual memory will ever actually consume that much space anyway.

When you're done making changes, click **Set** to set your changes. You must restart the computer to put your changes into effect.

TIP

If you upgrade the RAM in your computer, review the virtual memory settings and adjust using the guidelines described here. Virtual memory settings do not automatically update when RAM is removed from or added to the computer.

STEP 6: DIVIDE VIRTUAL MEMORY UP OVER MULTIPLE DRIVES (OPTIONAL)

If you have two or more hard drives, you may specify space on each drive for virtual memory if you want. If both drives are equally fast, using both of them for virtual memory provides the maximum possible performance.

To add virtual memory to a second hard drive, choose the drive in the list of drives in the Virtual Memory dialog box, and specify virtual memory settings as described in step 5. Divide virtual memory up evenly over each drive. If you have 512 MB of RAM and you want to divide virtual memory up over two drives, specify minimum sizes of 128 MB on each drive and maximums of 768 MB on each drive.