TWEAKGUIDES

TWEAKING COMPANION

for Windows xp

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[Version 4.3 - April 2009]

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CREDITS

This guide is a reference compilation borne out of a great deal of research, reading and personal experience. I give full credit to any third party sites and authors linked in this guide. The same goes for all the software developers whose excellent tools I recommend in this guide, especially those who provide their software for free. It is amazing that they invest so much time and effort into developing and testing this software then provide it free to PC users. I encourage you to support their work with donations and purchases where relevant.

Thank you to my readers who, since TweakGuides began in April 2004, have provided incredible support. From those who support the site by linking to my guides on various websites and Internet forums, to those who take the time to write to me or contribute thoughtfully to the TweakGuides Forums, to those who donate to the site - I really do appreciate it. The only thing which motivates me to keep writing my guides is the fact that I know there are intelligent people out there who are patient enough to take the time to read them. I wish I could name everyone who has written to me and provided valuable feedback in the past, but again there are simply too many. A special thanks goes to Larry Kuhn for preparing several pages of very detailed and highly valuable feedback which was immensely helpful in an earlier revision of this guide.

INTRODUCTION

Hi,

Windows XP is a popular, well-established operating system and is still an excellent operating system to use on a home PC. I first started using Windows XP in late 2001, and in late 2002 I released my first Windows XP Tweak Guide: WinXP Tweaking: From Reformat to Relax. It became quite popular, so I wrote two follow up guides: WinXP Tweaking: From Relax to Righteous and The System Optimization Guide for Gamers.

Looking back at these guides now I can see that they are far too simplistic and totally outdated, but they started me down the road to writing the 'ultimate' Windows and System tweaking guide. I wanted to write a guide which covers all the major Windows tweaks and tips, yet takes them much further by providing information on understanding and optimizing your entire system all in one place: thus was born *The TweakGuides Tweaking Companion,* the Windows XP version of which you now see before you. It is by no means perfect, but I feel it brings me one step closer to my goal.

The first version of this guide came out in December 2004, and since then it has proven to be very popular. Over the years the guide has been continually refined, and has undergone several major revisions - the culmination of a great deal of user feedback, experimentation and new discoveries, and of course recent changes to PC hardware and software. At almost 200 pages in length, the guide will no doubt frustrate people who are looking for a handful of tweaks or quick fixes to 'make XP faster'. Clearly that is not the sole aim of this guide. The main purpose of the guide - indeed my entire site - is to try to explain how things work in simple but sufficient detail so that readers can customize and optimize their machines appropriately while learning more about them. As computers become integral to almost every aspect of our way of life, it is no longer possible to simply ignore them or pretend that it's not important to know how they work. Now more than ever it has become extremely important that you begin to *understand* how your PC and Windows are working. Thus the guide is long because wherever possible I try to ensure that you are given enough details to actually see what is going on, and understand the logic behind my recommendations, rather than being treated like a small child who is simply told to change settings without a second thought.

I promise you that if you patiently work your way through this guide over the course of a few days, that you will come out at the other end with not only a better performing, more stable and better customized PC, you will also be much more comfortable with using Windows on a daily basis; the mystery will disappear. More importantly, you will also be able to better diagnose, indeed *prevent*, any problems on your PC in the future.

In any case use the guide as you see fit. Aside from the descriptive text it does contain all the major performance and customization tweaks for XP, if that's what you're after. If you find the guide useful, please consider providing constructive feedback, making a donation, or purchasing the Deluxe Edition at www.TweakGuides.com. This will allow me to work on further refining and maintaining this guide over time, and also to continue to create a range of new guides in the future.

Cheers,
Koroush

Koroush Ghazi
Owner/Author
TweakGuides.com

In honor of 2,500 years of Persian Culture
Dedicated to the noble ideals of Cyrus the Great

BEFORE USING THIS GUIDE

Please read the following information before attempting to make any changes using this guide.

BASIC REQUIREMENTS

There are several important requirements you must meet before using this guide:

- You should have prepared backups of all your important information prior to undertaking any of the changes detailed in this guide. Follow the instructions in the Backup & Recovery chapter.
- You should have your original Windows XP installation CD readily available - do not undertake the tweaks in this guide if you don't have an original Windows XP installation CD.
- You will need Administrator level access to Windows XP to make the majority of the changes in this guide. See User Accounts under the Control Panel chapter for more details.

Unless you meet all of the requirements above, I do not recommend proceeding with the guide as you may be unable to successfully undertake the tweaks in this guide, or may run into problems.

DIFFERENT VERSIONS OF WINDOWS

This guide is designed equally to suit Windows XP Professional and Windows XP Home. There are no major content or performance differences between XP Pro and XP Home. The main differences between XP Pro and Home are covered in this article.

Furthermore, there are no content differences between the various versions of Windows XP such as the OEM Edition, Academic Edition, and Upgrade Edition. These are all identical in terms of performance and content to the Full Version of Windows XP. The only difference between these editions is that certain purchasing conditions are attached to them: the OEM (Original Equipment Manufacturer) Edition can only be provided with the purchase of a new computer; the Upgrade Edition requires that you own an earlier version of Windows to install it; and the Academic Edition requires that you be a student or qualified educator to purchase it. However the tweaks and tips in this guide apply to all these versions equally.

This guide does not apply to older versions of Windows such as Windows95/98/SE/ME - these are based on a different architecture to Windows XP, so many of the descriptions of Windows functionality in this guide are not correct for other versions of Windows. Windows 2000/NT/2003/x64 are based on the same underlying architecture as XP, so most of the general tips, descriptions and tools should work for those versions, however I cannot specify which do and do not work. I have only tested the tweaks and settings in this guide on Windows XP, and cannot provide recommendations for other Windows versions. Importantly, there is a separate *TweakGuides Tweaking Companion for Windows Vista* available from the main TweakGuides Tweaking Companion page - this is recommended for both existing Vista users and XP users who want to learn more about Vista.

WHY IS THE GUIDE SO LONG?

This guide is intended as a reference source. It is not intended for people seeking quick fixes. I provide detailed explanations for a wide range of features and procedures so that you *understand* what you're doing, rather than just taking my word for it. I firmly believe in the old saying "*Give a man a fish and he will eat for a day; Teach a man to fish and he will eat for a lifetime*". To find information on any topic in the guide at any time, use the Table of Contents, the Bookmarks tab to the left, or press CTRL+F to bring up the PDF search functionality. I will not be releasing a cut-down version of this guide; there will be no '10 best tweaks' or handful of changes which 'fix' or magically speed up XP, it is a complex interrelationship of hardware and software settings which determines how fast and how stable your PC runs. For those who find that the guide does not have enough detail about a particular aspect of Windows I encourage you to follow the link(s) provided and also undertake additional research to find out more.

RECOMMENDED SOFTWARE

Listed throughout this guide is a range of software which I recommend you download to enable you to carry out some of the procedures in the guide or to provide additional functionality. At no point do you have to purchase any software. I am not paid or sponsored by any software or hardware company, hence my recommendations are based on only two criteria: functionality and price. Specifically it must be the best free software available to do the job. In a few cases the software may require purchase, but usually the trial version of the software retains enough functionality to complete the job for which I have recommended it. Of course if you do find any of the software useful I encourage you to purchase it or donate to the software's author. Not everything on the Internet is free, nor should it be.

PICTURES AND DIAGRAMS

There is a distinct lack of pictures, diagrams and graphics in this version of the guide. This has been done to keep the guide as short as possible. The Deluxe Edition of this guide does contain screenshots and illustrative images, as well as higher quality image and text resolution, bookmarks, and the ability to copy text from the guide - all of which makes using the guide easier. If you want the guide with these features, and more importantly want to show your support, please consider purchasing a Deluxe Edition, the electronic version of which is only a few dollars.

PROBLEMS WITH THE GUIDE

While I have made every effort to ensure this guide is as accurate and detailed as it can be, I hope you appreciate that I cannot possibly test the information and recommendations in this guide on every potential type of PC hardware and software. I stress that I can't provide technical support to readers. Unfortunately I just don't have the time, so under no circumstances will I provide personalized tweaking advice, purchasing advice or tech support. The whole reason for writing this guide is to give each and every reader a thorough rundown on all the steps necessary to optimize your system. There are sufficient resources and links in this guide to help people understand and solve most any problem when combined with genuine research.

However if there is anything you believe is genuinely inaccurate, or which needs fixing in the guide such as broken links please don't hesitate to Email Me with specific details.

YOUR RESPONSIBILITIES

The basic theme throughout this guide is that as long as you read and consider the advice given carefully and use common sense when applying any changes you will remain problem-free. In all respects the guide is safe to use if followed correctly. However for legal reasons, I cannot take any responsibility for any damage or loss incurred through the use of this guide. **It is a condition of use for this guide that you agree to take full responsibility for your own actions**. If you do not wish to take full responsibility for using this guide and any resulting impacts, then do not proceed any further - close the guide immediately.

BASIC PC TERMINOLOGY

If you're not totally familiar with the various components of a modern PC, then this chapter will help you understand some of the common terminology used throughout the guide and what each hardware component does in layman's terms. Note that I use a human body analogy to describe the function of PC hardware components to hopefully clarify their functionality. Experienced PC users can skip this chapter.

BITS & BYTES

You will often see the terms Bits, Bytes, Kilobytes, Megabytes and Gigabytes (or their abbreviations) being thrown around in guides such as this one. A Bit is the lowest form of computer information and can take the value 0 or 1 (i.e. Off or On). All computer functionality is derived from the behavior of Bits. For our purposes, the main conversion factors you need to know are:

8 bits (b) = 1 Byte (B)
1,024 Bytes = 1 Kilobyte (KB)
1,024 Kilobytes (KB) = 1 Megabyte (MB)
1,024 Megabytes (MB) = 1 Gigabyte (GB)

Note in particular that the general convention is that bits are shown as a small 'b', and Bytes are shown as a capital B. E.g.: 512kbps is 512 kilo*bits* per second, which translates to 64KB/s (Kilo*Bytes* per second).

PC

A PC (Personal Computer), often referred to as a System, Machine, Rig or Box, is a collection of hardware (electronic components) which function as a unified system through the use of software (programmed instructions). This is similar to the way a human body has a range of organs, connective tissue and structures designed to work together to achieve an outcome.

CPU

The CPU (Central Processing Unit) is the single most important component of a PC. It is typically a thin square chip which is seated firmly on your Motherboard, usually covered by a large metal heatsink and fan to cool it. The CPU controls and co-ordinates the actions of the entire PC under instruction from software. It has the role of determining which hardware component does what, assigning tasks and undertaking complex calculations which are then fed through the various relevant components and back. In human body terms, the CPU is the brain.

MOTHERBOARD

The Motherboard, also called the Mainboard, or Mobo for short, is the large rectangular plastic Printed Circuit Board (PCB) into which a large range of electronic components are connected in a PC. The motherboard provides a network of pathways (or Buses) for the CPU to communicate to the various hardware components, and a range of ports for standard peripherals and devices to plug into the PC. The major pathway for information flow in the motherboard is the main Bus (Front Side Bus or HyperTransport). In human body terms, the motherboard is the nervous system and arterial system combined.

MEMORY

RAM (Random Access Memory), also called System RAM or just Memory, is the most common form of computer memory hardware used by a PC. RAM usually comes in long thin 'sticks' of set sizes that plug into the motherboard and through it provide a place for the CPU and other components to temporarily store information. RAM only holds information while the PC is on; if a PC is rebooted or switched off, any information in RAM is instantly cleared. Aside from System RAM, the graphics card usually has its own

RAM called Video RAM, and the CPU and other hardware often have small memory chips called Caches to hold information temporarily. In all cases, memory is used to speed up data transfers because information can be written to and read from memory much faster than any other form of storage (such as the Hard Drive or CD ROM). This is primarily because such memory chips have no moving parts.

ROM (Read Only Memory) is a permanent form of memory, and works similar to RAM, however unlike RAM it can only be read from and not written to under normal circumstances, and it will not clear when the system is rebooted or switched off. ROM is primarily used to hold small amounts of important information, such as the BIOS (Basic Input Output System) - the program which tells the computer how to function when it is first switched on - stored on the ROM chip in the motherboard. Certain ROMs can be written to by use of a process called Flashing, such as when the BIOS is flashed with a new version. In human body terms, Memory is like our own memory with RAM being short term memory and ROM being long term memory.

HARD DRIVE

The Hard Drive is a semi-permanent storage area that acts like Memory, except it is slower and far larger. The hard drive is a rectangular metallic box inside which is a stack of round platters and a read/write head. The hard drive plugs into the motherboard's IDE (Integrated Drive Electronics) Controller, SATA (Serial Advanced Technology Attachment) Controller or SCSI (Small Computer System Interface) Controller depending on the drive type and the motherboard type. Whenever the PC requires information, it must first be read from the hard drive, usually into RAM, from where it is then accessed by the CPU and other devices. Data such as installed software will remain on the hard drive regardless of whether the system is rebooted or switched off. Because the hard drive involves moving physical components, such as the read/write head and a spinning disk, it can never be as fast as RAM/ROM - which have no moving parts - in providing information. Often a system may slow down or stutter while waiting for more information to be loaded up or written to the hard drive. The amount of information on the hard drive itself usually has no significant impact on its performance. In human body terms, the hard drive and the information it holds is like a library of books, or a notepad that can be read from and written to.

CD/DVD DRIVE

Much like the Hard Drive, a CD, DVD, CDRW or DVD-R drive (broadly called an Optical Drive) is a storage device that reads from and sometimes writes information onto CDs or DVDs that permanently hold this information until overwritten or deleted. Such drives usually come in plastic rectangular boxes with a loading slot or extendable tray in the front. They usually plug into the motherboard's IDE Controller or SATA Controller depending on the drive and motherboard type. Specifically, CD and DVD ROM drives can read information from CDs or CDs & DVDs respectively, but cannot write anything onto them. CDRW and DVD-R drives can both read from and write information to writeable CDs and DVDs respectively. All these drives are slower than a hard drive in reading and writing information due to physical limitations once again and also the way in which they are connected to the main system Bus. In human body terms, these drives are again much like an external library and the CDs and DVDs themselves are like books or notepads.

FLOPPY DRIVE

Much like a Hard Drive or CD/DVD Drive, a Floppy Drive stores information on a recording medium, usually a thin plastic 3.5" Floppy Disk. The floppy drive comes in a rectangular plastic box with a loading slot at the front and a large ejection button, and plugs into the floppy controller on the motherboard. Floppy drives can read from and write information to floppy disks, but are incredibly slow compared to any other form of drive, and also hold very little information (1.44MB) and hence are not commonly used anymore. Most PCs retain a floppy drive for emergency use when Windows won't load up for example, or to flash the BIOS. Again, in human body terms a floppy drive is like a library, with the floppy disks a document or notepad for reading from and writing to.

GRAPHICS CARD

The Graphics Card, also called the Video Card, Graphics Adapter or VGA Adapter, is a miniature computer of its own dedicated solely to graphics-related functions on the PC. It is a thin rectangular plastic PCB with a GPU (Graphics Processing Unit, or 'Core') - similar to a CPU - and Video RAM (or VRAM) - similar to System RAM - as well as Pipelines for transferring information internally, similar to the Buses on a motherboard. It plugs into the motherboard through the AGP (Accelerated Graphics Port) Port, a PCI (Peripheral Component Interconnect) slot, or a PCI-E (Peripheral Component Interconnect Express) slot. Most graphics cards have one or more heatsinks on the GPU and the VRAM, and often have a fan on the GPU or covering the entire card. The graphics card undertakes the majority of 2D and 3D graphics calculations and also sends information directly to the Display Device, which is usually a monitor. Some motherboards have built-in graphics functionality that works in much the same way as a graphics card, but is referred to as Onboard Graphics or Integrated Graphics. PCs with such graphics functionality typically process graphics-related information far less quickly than those with plug-in graphics cards. In human body terms, the graphics card is like the portion of the Brain that relates to visual or artistic expression.

DISPLAY DEVICE

A Display Device, or more commonly referred to as the Monitor, is the device through which the PC's information is displayed graphically. This graphical information comes from the graphics card, and a display device must usually be plugged directly into the graphics card through the back of a PC to facilitate this. While many computers still have a CRT (Cathode Ray Tube) monitor as their primary display device, modern PCs can utilize LCD displays, Plasma Televisions and sometimes multiple types of displays at once to output the graphics information. Display devices have the ability to display graphics at various resolutions, typically expressed in number of Pixels wide by number of Pixels high (e.g. a resolution of 1024 x 768). A Pixel is the smallest component of graphics, and the higher the resolution, the more pixels are displayed on the display device and hence the clearer the image. At each resolution a display device can also redraw the image a number of times per second, referred to as the Refresh Rate. The higher the refresh rate the smoother your graphics will appear and the less flickering you will notice. In human body terms the display device is like a piece of paper or a canvas used by a person to convey thoughts as images and text.

SOUND CARD

The Sound Card, also called the Audio Card or Audio Device, is a thin plastic PCB or sometimes an external attachment that acts as a dedicated CPU for calculation of audio information. A sound card typically plugs into the motherboard through a PCI slot, or in some cases as an external peripheral, and usually has no heatsink or fan, as it does not require the same level of cooling as other major components. Some motherboards have built-in audio functionality that works in much the same way as a sound card, but is referred to as Onboard Audio or Integrated Sound. PCs with such audio functionality typically process audio-related information less quickly or less faithfully than those using proper sound cards. In human body terms, the sound card is much like the portion of the Brain that relates to audio interpretation.

SPEAKERS OR HEADPHONES

A PC speaker system (or headphones) is designed to output the audio signals of the PC, which usually come from the sound card, and hence it is typically plugged directly into the sound card. Even if a PC has no attached speakers/headphones, all PCs have a small built-in speaker that provides important system status information usually as beeps. In human body terms the speakers or headphones are like the voice of the PC.

POWER SUPPLY UNIT

The Power Supply Unit (PSU) is a square metal box, usually with a fan at the back, which is cabled to all the major components of a PC, particularly the motherboard, and provides the power for the PC to function. The power cord from the wall usually plugs straight into the back of the PSU directly, as it draws the appropriate power and regulates the precise voltages that certain devices need to function correctly. The PSU usually has a wattage rating which indicates the maximum power output of the PSU under load, with the more devices

connected to a PC the higher the wattage required to maintain ample smooth power to each and hence keep the system stable under stress. In human body terms, the PSU is like the heart which pumps blood through the arteries and organs.

HEATSINKS AND FANS

A Heatsink is a square or rectangular solid metal object typically with a perfectly flat surface on one side, and many long square 'spines' on the opposite surface. The role of a heatsink is to sit on top of a chip like the CPU or GPU, or even RAM - any component which gets quite hot - and draw out the heat these components are producing through conduction. This heat then travels along the length of the heatsink to the top of the individual metal spines where cooler air and a large surface area help in accelerating the dissipation of the heat. Typically a fan is bolted on top of the heatsink to aid in blowing more cool air over the heatsink's spines and hence dissipate the heat more quickly. In some cases where just a heatsink is sufficient for the job, no fan is used - such as the heatsinks on the motherboard or heatsinks placed onto VRAM.

Often Fans are placed inside and around a PC case by themselves to draw in cool air and blow out hot air from the enclosed space around the hardware components on the motherboard. Given the way heatsinks work, the air around components will heat up quickly as heatsink(s) radiate the heat drawn from hardware components. Fans of varying sizes and speeds aid in cooling the air in the entire case.

Other forms of PC Cooling such as refrigerator-like Peltiers, Heatpipes and Watercooling blocks can assist or replace heatsinks and fans in the role of cooling system components, but are less common due to their cost and complexity. In human body terms all these devices are like the respiratory and perspiration functions.

CASE

The PC case is a hardened structure, usually made of thin but strong metal and/or plastic, which encloses all the PC components and onto which the motherboard is firmly attached. The case usually provides the basic framework required for affixing additional components such as hard drives, floppy drives and the PSU. Often the case will also have a range of openings small and large to allow fans to draw and expel air for better circulation. In human body terms the case is like the skeleton combined with the skin.

PERIPHERAL

A Peripheral generally refers to any external device attached to a PC, such as a mouse, keyboard, printer or digital camera for example. The term 'peripheral' is used specifically to indicate that the device lies outside the periphery of the PC case. The only thing peripherals have in common with each other is that they provide additional input to the PC, and often capture some of the PC's output too. In human body terms peripherals are like the eyes, ears, nose, hands and feet of the PC.

OPERATING SYSTEM AND SOFTWARE

The Operating System (or OS) such as Windows XP, is a vital piece of software - a compilation of instructions that tell all the hardware components in a PC how to function to achieve particular outcomes. This information is interpreted and coordinated by the CPU, but is not confined to CPU functionality. An OS is a necessity on all modern PCs since without an overarching program to provide core functionality, all the computer components would not be able to function as a single machine. Additional installed software is like modular functionality which slots under the OS to perform specific functions or tasks, such as word processing or gaming. In human body terms the Operating System/software is like a combination of our basic education, instincts and emotions - the driving force behind our behavior that tells us how to act.

Hopefully this information has helped you understand the roles of the various hardware components a little better. Ultimately a PC is an incredibly complex machine and as such the simplifications in this chapter don't do justice to the intricate and multi-faceted ways in which hardware and software components interact.

SYSTEM SPECIFICATIONS

The first step in optimizing your PC is to find out precisely what hardware components you have, and what their various capabilities are. This is known as your System Specifications, and to find out the specific details of your hardware you require an appropriate set of tools. Information about your system specifications is vital both for using this guide, and for general PC usage and maintenance. For example you must know the model and chipset type of your motherboard before you can upgrade your BIOS or install the correct motherboard drivers; you must know the full capabilities of your graphics card if you want to know if it can run certain games or again to update its drivers; or you may have a complex problem which you wish to resolve yourself or provide details of to a Technical Support person. This chapter covers the tools you need and the methods you can use to obtain all the relevant system information.

< SYSTEM INFORMATION TOOLS

There are several good free system information utilities to choose from, including some comprehensive ones built into Windows XP. A combination of these programs will tell you everything you need to know about your system specifications and capabilities, and I recommend you download and install as many of these programs as possible:

WINDOWS SYSTEM INFORMATION TOOL

You can access the Windows System Information Tool by going to Start>Programs>Accessories>System Tools>System Information, or go to Start>Run and type "msinfo32.exe" (without quotes) and hit Enter. Note that for this utility to work, you will need to have the 'Help and Support' service enabled - see the Services chapter for more details.

The System Information Tool presents a range of basic information about your system. Unfortunately much of it can be a little difficult to comprehend or may not be quite what you're looking for. Some of the more useful pieces of information include the IRQ allocations under Hardware Resources>IRQs; the listing of your hardware components by type under the Components section; and a listing of all the system drivers loaded up and their status under Software Environment>System Drivers. In general the System Information Tool is best used by medium to advanced users who can comprehend the interface and the information much easier than a beginning user. Its major advantage is that it is a free and built-in utility that anyone can easily access.

DEVICE MANAGER

You can access the Windows Device Manager under the Control Panel>System>Hardware tab, or by going to Start>Run and typing "devmgmt.msc" (without quotes) and then pressing Enter. As a built-in Windows utility you can gain a great deal of useful information from this tool. Your major devices are displayed under various categories, and you can even choose to update individual device drivers or uninstall a device altogether should you wish. The device manager has several important roles and is covered in more detail under the Control Panel chapter.

DIRECTX DIAGNOSTICS

You can access the DirectX Diagnostic Utility (DXDiag) by going to Start>Run and typing "dxdiag" (without quotes) and pressing Enter. DXDiag is another built-in Windows Diagnostic/System Information tool that is part of the DirectX API. When DXDiag starts up you don't need to worry about WHQL (Windows Hardware Quality Labs) certificate checking - WHQL certification is not necessarily a solid indication of a driver's stability or functionality (See the Driver Installation chapter for more details).

The main tab of DXDiag, called System, shows basic information about your system such as CPU type and speed, amount of physical RAM and the total pagefile (Virtual Memory) usage among other things. Under

the Display, Sound and Input tabs you can find more information about the particular hardware you are running for each of these functions, and also conduct some basic tests to ensure they are working to their full extent under DirectX. In particular you should ensure that all the DirectX Features listed are Enabled and that any Acceleration options are at maximum (slider to the far right). If you are experiencing problems with your hardware you can try the DirectX troubleshooting procedures under the 'More Help' tab.

The most useful function of DXDiag for our purposes is its ability to create a text file with all your major system information, including your main hardware specifications, driver files, and environmental settings. To generate this text file click the 'Save All Information' button found at the bottom of the DXDiag screen. You will be prompted to save this report somewhere, and the default of the Windows Desktop is just fine. This *DXDiag.txt* file can now be attached to an email you can send to a Technical Support person, or its contents can be posted on an online forum to allow others to help you with any problems you may be experiencing. Don't worry - it doesn't contain any private information such as serial numbers or passwords.

SIW

SIW is the System Information for Windows tool which can be downloaded from the SIW Website. Once you've downloaded the standalone version of the program, you can simply run it from the file - there's no need to install anything. The interface is quite intuitive; click items in the left pane to see more details about them. For example, to find out more about your motherboard, click the Motherboard item under the Hardware section. After a short pause, the details will be shown in the right pane. Alternatively, you can access these items by going to the Software or Hardware menus at the top of the screen. Note that SIW also has some testing and tweaking tools built into it under the Network and Tools menus. These aren't covered here, but I don't recommending changing anything using them unless you feel confident that you know what they do - the best use for this utility is simply for gathering system information.

3DMARK

You can download the 3DMark from the Futuremark Website and you can read more about its main functionality under the Benchmarking & Stress Testing chapter. 3DMark is primarily designed as a graphics benchmarking utility, however it has a nice system information section that gives you plenty of important info. Start 3DMark and on the main screen, click the Details button under the System section. A browser screen will open with a vast array of information about your system. Everything from your CPU's clock speed and L1 & L2 Cache sizes, to your hard drive's capacity and interface type. Note that only 3DMark 06 or older will run on XP; the newer 3DMark Vantage is Vista-only.

SANDRA

You can download Sandra from the SiSoftware Website. Once installed, run Sandra and you will see a wide selection of information and benchmarking modules to choose from. Under the free Lite version of Sandra, many of these modules are inactive, however the main ones we need have sufficient functionality for our purposes. For example, if you want to know more about your system, go to the Hardware tab and double click on the Computer Overview module. It will display a range of basic but important information about your system, such as the CPU speed and type, and your graphics card model. If you want to know more about your motherboard in particular for example, open the Mainboard module, and it will display the motherboard chipset type, and information related to your motherboard and the types of devices on its various ports. Sandra has several very useful benchmarking and stress testing features that are covered in more detail in the Benchmarking & Stress Testing chapter. Note that Sandra installs a new service for itself called the 'SiSoftware Deployment Agent Service' which you must leave at its default.

CPU-Z

You can download CPU-Z from the CPU-Z Website. Run *CPU-Z.exe* and it will provide you with everything you need to know about your CPU, such as its precise speed, voltage, packaging type, cache sizes etc. It will also tell you about your system's current Bus speed and Multiplier under the CPU tab, your full motherboard details under the Mainboard tab, and your RAM's complete details under the Memory and SPD tabs. Note that for information to appear under the SPD tab you will have to first select the slot(s) on the motherboard that your RAM stick(s) occupy, otherwise the box will be empty.

GPU-Z

You can download GPU-Z from the GPU-Z Website. Note that GPU-Z is distinct from the CPU-Z utility covered above; it relates to your GPU (Graphics Processing Unit), which in other words is your graphics card. Run the *GPU-Z.exe* file, and much like CPU-Z, it will provide you with all the information you need to know about your graphics card. Under the main Graphics Card tab you will see all the specifications for your graphics hardware, including the amount and type of Video RAM, the level of Direct X support, and the BIOS version. Under the Sensors tab you will find your current clock speeds, temperatures, fan speed and so forth. Finally, note that the Validation tab is there only if you want to submit your specs to the GPU-Z Statistics Database, which is not essential.

There are many other system information tools which are available, some of which are not free. However a combination of the tools above should be more than enough to give you all the details you need for every aspect of the hardware that is in your PC. I strongly encourage you to make sure that you are fully aware of your hardware specifications and capabilities, as incorrect knowledge can cause major problems when you try to install drivers or make system or BIOS changes for example. Make a list of your relevant system specifications now using the above tools and keep them handy - see the format below for further help.

< PROVIDING SYSTEM SPECIFICATIONS

At some point while you are seeking help for a computer-related problem you will have to provide your system specifications. Whether a qualified Technical Support person or simply a computer enthusiast on an online forum asks, you should provide your specifications in an appropriate format. Simply copying the entire contents of a DXDiag dump for example is far too large for most people to have the patience to wade through, so I recommend that you use the format shown below.

Use the system information tools covered above to fill in the appropriate details. The more detail you can provide, the better - the bare minimum is the brand and model number of your major components. Add in details like whether any of the components are overclocked, whether there is any additional or modified cooling, and indeed whether any other modifications have been made to the system since purchased. I have filled in some sample information in italics to demonstrate how it should look:

CPU:	*AMD Athlon 64 X2 4400+ Dual-core CPU, stock speed, XP-90 cooling*
Motherboard:	*DFI NForce4 SLI-DR*
Graphics card:	*Nvidia GeForce 8800GTS 640MB at Stock speed*
Sound Card:	*Creative SoundBlaster Audigy 2ZS*
RAM:	*2 x 1GB OCZ PC3200 at 400MHz, 2-3-2-5 (CAS 2)*
Hard Drive(s):	*2 x 74GB Western Digital Raptor SATA RAID 0*
CD/DVD Drive(s):	*Pioneer DVR-109 DVD-R*
Power Supply:	*Silverstone 650W*
Operating System:	*Windows XP SP3 including all updates*
Driver Versions, Other Details:	*02.09.0016 Audigy 2 ZS drivers, 174.74 Forceware, 6.86 nForce drivers*

You can also provide details of your monitor, keyboard, mouse, speakers/headphones, however these are usually not critical to solving a PC problem, unless of course your problem is with mouse input, display output, or audio output for example.

If you are still at a total loss as to how to provide full details of your system, use DirectX Diagnostics (see above) to generate a report and attach it to an email or post its contents on a forum, but bear in mind that no-one can magically solve a problem simply by looking at your system specifications, no matter how detailed they are, so despite the length of a DXDiag text dump, it is not a substitute for you becoming familiar with your own system and therefore troubleshooting your own problems, or actively being able to contribute and assist someone else who is trying to do so. You should also become familiar with the Windows Errors and Benchmark & Stress Testing chapters of this guide, as they provide important details on how you can go about resolving many common problems on your own PC.

BACKUP & RECOVERY

Computers can store a great deal of information, and over time your PC may hold a lot of important, private, irreplaceable data such as digital photographs and home movies, financial documents, emails, passwords and login details. It is of critical importance that you establish an appropriate method for regularly backing up this information, so that if your PC is stolen, damaged, or its data is corrupted or accidentally overwritten, that you do not lose all this valuable data permanently. Hence backing up is a vital and unavoidable part of sensible computing. In fact once you are sure that your system is completely free of malicious software, you should make at least one backup copy of all your important and irreplaceable documents before proceeding any further with this guide.

This chapter not only covers various backup strategies and tools, it also covers a range of useful data recovery methods you can use to regain valuable information which has been lost through forgetting passwords, accidental deletion of files, data corruption or damage to your Windows installation.

< MANUAL BACKUP

The most basic and reliable method of backing up your system is to do things manually. There are methods that can be used to create automated backups of your system which are covered further below, however I personally use the manual method regularly to ensure I have a 'clean' backup copy of all my important files, especially if I am going to do a reinstallation of Windows. Any automated backup utility you use may inevitably backup the problematic or sub-optimal settings you were trying to escape in the first place, so a clean manual backup is strongly recommended, especially if you are experiencing problems.

How precisely you do a manual backup is up to you; below are my tips for preparing data and manually backing up your important files regularly:

Logical Directory Structure: Create a logical directory structure under your 'My Documents' folder, with appropriately-named sub-folders, e.g. Music, Movies, Pictures, Patches, Downloaded Programs, Drivers, Personal Documents, Tax - as many as necessary. Note that you can rename the default directories such as 'My Pictures' or 'My Music' to Pictures or Music - right click on each folder and rename it. Now sort all your relevant documents into these directories. You might want to keep copies of downloaded programs, a copy of all the latest drivers, Service Pack, and so forth, but these are optional. Alternatively, if you have a separate data partition or drive, store your files there in appropriately named folders. Having a logical file structure makes storing and finding files easier, but importantly it also makes regular manual backups much easier.

Internet Bookmarks: In Internet Explorer you can create a backup file of your Favorites by going to File menu>Import and Export>Export Favorites. Follow the prompts to export your Favorites to a suitable location under the default name *Bookmark.htm*. Back this file up, and to import your Favorites back into Internet Explorer at any time go back to the Import and Export function and choose 'Import Favorites'. If you use a browser like Mozilla Firefox, you can backup your bookmarks by going to the Bookmarks menu, selecting 'Manage Bookmarks', then selecting File>Export and choosing where to save the *Bookmarks.html* file.

Saved Games: If you want to backup any saved games or game configuration files, these are typically held under the game's main directory, in a *\Saves*, *\Savegames,* or *\[profilename]* directory, or held under *\Documents and Settings\[username]* in the *\My Documents, \My Games* or *\[gamename]* directory. If you are having problems with a game, backing up its saved games should still be fine, but I don't recommend backing up the game's configuration files as it may just pass the problem onto your new install of the game. Also, don't attempt to backup an entire game directory, as you cannot restore games or other programs in this manner - these will not run properly if they are copied back onto another installation of XP due to the

lack of appropriate registry entries and files spread throughout various other directories. You must use the original installation files/discs to reinstall a game or program correctly.

Usernames/Passwords: You can store all your usernames and passwords securely electronically - see the Backing Up & Restoring System Passwords section further below. If you have no faith in electronic storage systems then compile a written list/printout of the major usernames and passwords on your system. However you *must* then store this list safely in a physically secure place like a safe or lockable drawer.

Backup to Disk or Hard Drive: Once you have determined the files to backup, you should regularly backup your important files/programs to another medium, such as another hard drive, or ideally to CDs or DVDs. I certainly don't recommend backing up your files to another partition on your main drive. I recommend CDs or DVDs simply because it is easier to transfer information between PCs via CD/DVD rather than having to plug in a hard drive, but the choice is yours. When selecting which files to regularly back up, give top priority to files that are genuinely irreplaceable, such as digital photos and financial documents. Anything that has a high sentimental or monetary value should be backed up often, ideally to more than one location. Information which changes regularly should also be backed up more often.

< AUTOMATIC BACKUP

If you want a more comprehensive method of backing up your data that will take up more space but is automated, and hence may be more foolproof, then you can use an automated backup tool. Note that if you are having any sort of general system problems or quirky behavior, I recommend against using this method to backup your data and settings. Any automated tool may capture and transfer the same problems you experienced before onto your new install of Windows XP - defeating the entire purpose of doing a fresh install of Windows. Only use these methods if you genuinely aren't experiencing any problems and have generally trouble-free performance.

WINDOWS BACKUP UTILITY

You can access the Windows Backup Utility by going to Start>All Programs>Accessories>System Tools>Backup, or by going to Start>Run and typing "ntbackup" (without quotes) and pressing Enter. Windows XP Home users will not have access to the Backup utility by default, but it can be manually installed from the Windows XP Home CD by following the instructions in this Microsoft Article. Basically it involves inserting the Windows XP CD into your drive, opening Windows Explorer, going to the *\VALUEADD\MSFT\NTBACKUP* directory on the Windows CD and double-clicking on the *Ntbackup.msi* file to start installation of it.

The Backup Utility has several methods of usage, which are detailed in this Microsoft Article, but essentially it involves the following steps:

1. Run the Backup Utility and click the 'Advanced Mode' link to switch to a more customizable method of backing up.
2. Go to the Backup tab, and put a tick in the boxes next to the directories that you want to back up.
3. Select the 'System State' box if you want to ensure all the additional system settings relating to your setup are backed up as well (i.e. your Registry settings etc.). Alternatively, if you don't want to save these as well (i.e. you want to restore your backups onto a clean install of Windows), then don't tick the 'System State' box.
4. Click the Browse button at the bottom, and select the destination for the backup. This is usually another hard drive given the amount of data involved; the Backup utility cannot backup to CDs/DVDs.
5. Click the 'Start Backup' button to commence backing up. The process may take quite some time depending on how many directories you chose to back up, and the type of medium to which they are being transferred.
6. To restore this backup in the future, run the Backup utility again, but this time under 'Advanced Mode' click the 'Restore Wizard' button and follow the prompts.

The Windows Backup utility has many more options and methods for backing up, so go through the options for configuring the utility under the Tools>Options menu in Backup.

NORTON GHOST

A popular package for backing up quickly and easily is Norton Ghost, though unfortunately it isn't free. However if you genuinely can't be bothered with manual backups and/or you have some very important information and want to make sure it's backed up completely and properly and/or you often install risky software, play around with system settings and/or overclock heavily on a regular basis, then Norton Ghost can save you a lot of time and grief. Since Ghost isn't free, and is not essential, it won't be covered in detail here, but I refer you to this Norton Ghost Guide for full details.

You can also try Acronis TrueImage, which some users prefer over Norton Ghost. Once again this is not a free utility, so refer to the TrueImage User Guide for more details.

ONLINE BACKUP

Most ISPs provide their customers with a basic webspace, or if not, then free email services such as Yahoo and GMail provide large amounts of storage in the order of several Gigabytes. While I do not recommend uploading/emailing any sensitive data to these locations, or using them as a sole backup method, they do serve as good holding spots for additional backups of digital photos and other important but non-secretive documents. That way if you somehow lose all your local backup copies through fire or theft for example, there are still copies online which you can download and restore.

If you really want to be secure and not worry about losing your backups - especially if you have extremely valuable information - then consider an online backup service, like Backup.com. This ensures that your data is encrypted and stored safely, but these services are usually not free to use, so they're only recommended for people who genuinely need that level of protection against data loss or theft.

< SYSTEM RESTORE

Once the initial backing up of your data and programs is done, and if you are not going to reformat and reinstall Windows XP, you need to create a new System Restore point as an additional safeguard before doing any tweaking. Using System Restore means that even if you make a large number of system changes you can 'undo' these changes if you run into any problems. More details of the System Restore functionality can be found in this Microsoft Article. It is strongly recommended that you create a new Restore Point prior to implementing any major tweak or system change by following these steps:

1. Go to Start>Programs>Accessories>System Tools and launch System Restore, or open MSConfig (Start>Run>MSConfig), and click the 'Launch System Restore' button.
2. In the System Restore Wizard, click 'Create a Restore Point' and follow the prompts to save your system state in a new restore point.
3. At any time, if you wish to return your computer to the state it was in when you created a particular Restore Point, follow step 1 above to get to the System Restore Wizard. Then click 'Restore my computer to an earlier time', and select the date on which you created the restore point you wish to return to.

Note that if System Restore is enabled, Windows automatically makes restore points under certain circumstances, such as during the installation of new drivers, or prior to the installation of certain applications. This gives you additional protection against catastrophic changes on your system. However a restore point is not a guarantee that you can just go back to the way things were if something goes wrong. In some cases trying to undo a change by going back to a recent restore point won't work, so only use System Restore as an additional layer of protection - you should always make backups of your important information often, regardless of whether you use System Restore or not. System Restore does not backup

personal files or folders, it is only a tool to capture the current state of important system files and settings, so it is not a general backup utility.

If your system is currently stable and problem-free, and you have made a recent restore point, you can clean out all older restore points except for the latest one by using the Disk Cleanup utility (see the Cleaning Windows chapter) - freeing up a great deal of hard drive space. Finally, note that System Restore will not function if you've disabled the 'System Restore' service - see the Services chapter for details.

< BACKING UP THE WINDOWS REGISTRY

The Windows Registry is a critical component of Windows, and any problems you experience with it can make Windows unbootable, or result in a variety of errors or strange behavior - see the Windows Registry chapter. That is why it is important to have a backup of the Registry before undertaking any tweaking.

ERUNT

The most efficient and foolproof way of backing up the entire registry is *not* to use the Export function in Registry Editor - that method is only handy for saving individual branches of the Registry. Unfortunately full Registry backups made by Registry Editor will not restore correctly if your registry becomes corrupted. Instead, I strongly recommend you use a free utility called Erunt (Emergency Recovery Utility for NT). Download this small program and install it, but note that during the installation of Erunt you should answer 'No' when asked if you want Erunt to be placed in the startup folder, as this is unnecessary.

To make a backup of the Windows Registry using Erunt, launch the program. You will be prompted to backup your registry to a folder, which you should accept by clicking Ok until the backup has been made. If you want to restore this backup at any point, simply go to the directory where the backup was made, typically *\Windows\ERDNT\[Date of backup]*, and launch the *ERDNT.exe* file there to restore that backup.

< BACKING UP & RESTORING PASSWORDS

One of the biggest headaches when running Windows would be losing your main login password, particularly if you're the Administrator on your machine. With the NTFS file system it is quite difficult to access the data on your hard drive without the correct login password (there is a method to reset this password - see further below). Clearly the best thing to do is back up your password now before anything happens, so that if necessary you can restore it without any difficulties. The recommended way to back it up is as follows, though note you will require a floppy drive or a USB flash drive for this to work:

BACKING UP LOGIN PASSWORD

1. Go to Control Panel>User Accounts and click on your User Account.
2. Click on 'Create a Password Reset Disk' in the left pane. The Forgotten Password Wizard will open up. Click Next.
3. Insert a blank formatted 3.5" floppy disk into your *A:* drive or attach a USB stick and click Next. If you need to format a blank floppy first, insert the disk into your floppy drive, open Windows Explorer, right-click on *A:* and select Format. Click Next.
4. Type your current User Password in the box and click Next. Once the disk has been created, click Next and select Finish. Store this disk/stick somewhere safe, as anyone can use it to access your account.

Note that most people will use any old 3.5" floppy they find to backup their password and often these disks are quite old. A floppy disk has an error-free life of about 10 years on average, so I urge you to obtain fresh 3.5" floppies. If you don't have a floppy drive or fresh disks, consider buying a small USB flash drive just for this purpose.

RESTORING LOGIN PASSWORD

If you ever need to restore your password from the backup created above, follow these steps:

1. Boot your PC as normal, and on the Windows Login screen select your User Name.
2. Try entering your password (or just press Enter), and if it's incorrect you'll get a message saying the Username or Password is incorrect. Click OK and then select 'Reset Password', inserting the password reset disk or flash drive you created earlier.
3. Follow the Password Reset Wizard to set a new password and log back into your system.

Note that the password reset disk needs to be write-enabled so that Windows can update it with the new password automatically during this procedure. When done, you should once again put it away in a physically secure place.

RESETTING YOUR LOGIN PASSWORD

There is a method by which you can get to your data in case you've lost your main Admin login password. The utilities and methods are covered on this Offline NT Password & Registry Editor site. The site provides a bootdisk image (CD or Floppy) which when used to boot up your PC will provide an option to unlock user accounts that would otherwise be inaccessible. It is a method of last resort, since it can actually corrupt data if used incorrectly, or if your files have been EFS encrypted for example. Read the instructions on the site carefully, and use with caution.

STORING PASSWORDS

If you want to hold all your usernames and passwords in a central database which is protected by high level encryption, use the free KeePass Password Safe utility. To use it, run the program and select 'New Database' under the File menu, then enter a Master Password and/or select a 'Key Disk' - this is used to unlock the password list so make sure the password has a high bit-rate (e.g. 128 bit). Once created, you can populate the database with Group entries for home banking, Internet - any groups you require. Then in the right pane for each group you can right-click and select 'Add Entry' to create a new Username/Password entry to store. Make sure to read the help file under the '?' menu>Open Help File as there are many options in this utility. You can backup this password database to another location, and if needed access it using the master password or key disk as required. Because it is encrypted it is next to impossible to access the database without the right password/key disk.

RECOVERING PASSWORDS

If you haven't stored your passwords and you've managed to forget or lose a username/password, there are several utilities you can use to recover various passwords stored on your system. To recover passwords in Internet Explorer, MSN or for your Outlook Express accounts you can use the Protected Storage PassView Utility. If you have forgotten a password which is now only visible as a series of ****'s in a password dialog box or on a website, you can try using Revelation or Asterisk Key to show you the actual password being used. Finally, you can use RockXP to retrieve a series of passwords and keys on your Windows installation that are usually hidden.

Detailed usage instructions for these utilities are not provided as they are relatively straightforward to use. The presence of these tools also lets you see that nothing is completely safe on your machine, so it is important to always restrict physical access to your machine only to trusted individuals, and always follow the tips in the PC Security chapter.

< FILE DELETION AND RECOVERY

Accidental deletion of files is one of the most common ways in which files are lost. By default Windows XP has minimal protection against accidental deletion; as noted earlier in this chapter, System Restore does not protect personal files and folders. Aside from leaving the Recycle Bin enabled and making sure that files are moved there when deleted, there isn't a great deal of protection against unintended permanent deletion of files. Fortunately, when you delete a file from your system the file is removed from view and you regain the space on your hard drive, however it is not actually *permanently* deleted from your hard drive. In fact, nothing on your drive is permanently removed when you delete it. Whenever you delete a file Windows simply marks it for deletion by changing one character in the file table. The entire file is still sitting on your hard drive, but is not visible. Windows then allows other files to write over the space where it resides if required, but the file is not gone from your hard drive until it is completely overwritten at some point. This means that you can recover files that have been 'permanently' deleted, but you need to act quickly and will require special software to do so.

RECOVERING DELETED FILES

The best free utility I have found to restore deleted files is a small tool called Restoration. To use Restoration first download the file and run it to extract the contents to an empty directory on your hard drive, or preferably to a blank 3.5" floppy disk or USB drive. Then run the *Restoration.exe* file and either enter a filename in the search box, or a file extension (e.g. JPG, DOC, TXT), or leave the box blank (to find all recoverable deleted files) and click the 'Search Deleted Files' button. Restoration will scan your hard drive for files which can be restored and will list them. Once done, you can highlight a file and click 'Restore by Copying' to recover it - however note that the file may not be complete since portions of it may have already been overwritten, so there is no guarantee you can recover an entire file this way.

The more hard disk activity there is after you have deleted a file, the less chance you can fully recover it, since portions of it may have been overwritten by new data. If you have accidentally deleted an important file, try and minimize any further disk activity before running Restoration; if you can't run Restoration straight away it is best to shut down Vista immediately to prevent a background task from commencing as these will potentially overwrite the area where the file is sitting. Run an undelete program like Restoration immediately.

If you want to recover deleted or damaged files on a CD or DVD disk, you will have to use a utility like IsoBuster. This utility can be downloaded for free, however it requires paid registration for full functionality. You can use the free version to first check to see if there is any recoverable data on your particular disk. See the program's help file for detailed instructions. However just like hard drive data recovery, there is no guarantee that any usable data can be recovered from a damaged or deleted disk - particularly if it has been overwritten.

PERMANENTLY DELETING FILES

If you ever want to permanently delete a file so that others can't undelete it, you can also use the Restoration program to do this. First delete the file(s) you want to permanently delete the normal way - i.e. highlight them and press Delete, then empty the Recycle Bin. Then launch Restoration and enter the name of each file in the search box and click 'Search Deleted Files'. When Restoration finds the file and lists it, highlight the file and go to the 'Others' file menu in Restoration and select 'Delete Completely'. This will permanently delete the file so it is unrecoverable by virtually any program or method. Note that the file may still be recoverable by law enforcement agencies using specialized methods, although it is highly unlikely that anyone could recover the bulk of this data regardless of the methods used.

LOW LEVEL FORMAT AND ZERO FILL

People might suggest that you 'Low Level Format' your drive to permanently remove data or fix a drive problem. This is not recommended unless you are experiencing severe hard drive problems, and even then only as a last resort. Modern hard drives are low-level formatted at the factory to create tracks and sectors and do not need to have it done again. The correct course of action is to *Zero Fill* your drive, which people often confuse for a low-level format. This method overwrites the entire hard drive with blank data, ensuring that everything is deleted permanently for most intents and purposes, but it is not as intensive or potentially disk-damaging as a low-level format. A note for the extremely paranoid - nothing short of physically destroying the drive (by burning it for example) can guarantee that data cannot be recovered from a hard drive by law enforcement agencies. So essentially a zero fill is your best bet in getting back to a 'good as new' hard drive. To zero fill a drive, check your hard drive make and model, then consult your manufacturer's website for an appropriate installation/diagnostic utility such as: Seagate DiskWizard & SeaTools for both Seagate and Maxtor drives, Western Digital Data LifeGuard, or Hitachi Drive Fitness.

If you still believe you have to low level format your drive - for example if it seems heavily damaged with bad sectors and is unresponsive to a zero fill - then you will have to look for a specific utility available from your hard disk manufacturer's website to undertake this. I would only recommend this as a final step and even then it may not save your hard drive.

< SYSTEM RECOVERY

This section covers methods of recovering data and/or control of Windows after a major system error. Also refer to the Windows Errors chapter for more details of troubleshooting Windows errors which could be the source of such problems.

RECOVERING FROM A CORRUPTED REGISTRY

After any changes you make to Windows XP, if your system is crashing and you are having major problems booting into Windows, it is typically because the Windows Registry contains incorrect or corrupted settings. If you can't boot into Windows to use System Restore or Erunt to restore your system or registry, follow one of the steps below:

- During bootup, keep pressing the F8 key and you'll soon see a range of options, including 'Load last good configuration'. Select it and your computer should boot into Windows hopefully devoid of the recent changes you made which have caused problems.
- If you have a recent Restore Point, but can't boot to the Windows desktop for some reason, keep pressing F8 during bootup, but this time choose the option to 'Boot into Safe Mode' (See further below). In Safe Mode you can access System Restore by going to Start>Run, type "MSconfig" (without quotes) and press Enter, then clicking the 'Launch System Restore' button.
- Alternatively you can press F8 repeatedly at bootup once again, and this time select to boot into 'Safe Mode with Command Prompt', and at the command prompt which opens type "\Windows\System32\Restore\rstrui.exe" (without quotes) then press Enter to open System Restore.

For more details on how to recover from a corrupted Registry, see this Microsoft Article.

SAFE MODE

Safe Mode is an important Windows mode which only loads up the bare essentials required for Windows XP to function. Third party drivers, graphical enhancements, startup programs, unnecessary processes etc. are all skipped and only the minimum required to display and use Windows and access your drives is provided. Safe Mode is provided precisely for troubleshooting purposes and not for general usage. The idea is that by reducing the number of software variables involved it is easier to identify the cause of a problem. You can read the full details of Safe Mode options in this Microsoft Article. To access Safe Mode do the following:

1. Make sure there are no discs in your CD/DVD drive(s) and reboot your PC.
2. As your PC starts booting up keep pressing the F8 key and you will soon reach the Windows Advanced Options menu where you can see a range of options, each described in detail in the article linked above.
3. Select the safe mode option you prefer - for most purposes I recommend the default 'Safe Mode' option which loads the least number of device drivers.
4. You will reach the Windows Desktop which will be shown at lower resolution, low color bit-depth and with no graphical enhancements. The words 'Safe Mode' will appear around the edges of the screen to inform you that you are running a cut-down version of Windows XP. Note: if you cannot enter Safe Mode, this is the sign of a more serious problem, and you will need to see the Recovery Console section further below.

The main use for Safe Mode is to determine whether your device drivers or installed software are the source of a problem you are currently experiencing. Because Safe Mode does not load any of your installed third party device drivers - instead using the default versions built into Windows XP - and because Safe Mode does not load up any unnecessary startup programs or services, this gives you the opportunity to determine whether your applications or one (or more) of your startup programs is causing problems.

If you couldn't boot into Windows XP normally, but you can in Safe Mode for example, that is a clear sign that one of your recently installed driver(s) or application(s) is the likely cause of the problem. You can choose to remove recent software or drivers completely by going to Control Panel>Add/Remove Programs and uninstalling them from there. Alternatively you can experiment by using MSConfig or Autoruns (See the Startup Programs chapter) to temporarily disable suspected startup items, drivers and/or services (by unticking them) and try to reboot into normal Windows to see if this resolves your problem.

If you made a change to a system setting or the Windows Registry that would normally prevent you from booting into Windows, you can undo the setting in Safe Mode, or revert to an earlier Restore Point, or restore a Registry backup here.

If however you find that you cannot boot into Safe Mode, or are having similar problems in Safe Mode as you are in normal Windows - for example your graphics are garbled or show glitches - then the problem is most likely hardware-based such as overclocking, excess heat, permanent damage to a component/faulty component(s), related to a BIOS setting or incompatibility, or hard drive corruption which requires use of the Recovery Console to fix.

Finally, a major use for Safe Mode is the removal of malicious software such as viruses or spyware, or for any other type of file which Windows says is 'in use' during normal Windows. Many of these will load into memory areas that cannot be unloaded during normal Windows XP operation. However in Safe Mode there are no such protected memory areas, and no additional startup programs, drivers or services are loaded with Windows, so this is the best way of removing such troublesome software. Enter Safe Mode and either manually enter Windows Explorer and delete the troublesome file(s), edit your startup items or Services to remove unusual or harmful entries (See the Startup Programs and Services chapters); or run several malware scanners in Safe Mode to find and remove any malicious software (See the PC Security chapter).

RECOVERY CONSOLE

The Recovery Console is an important repair and recovery tool built into Windows XP that allows you to do such things as check for faults on your drive and repair the Master Boot Records. You can read the full description of the Recovery Console, as well as its available commands and options in this Microsoft Article. The main use for the Recovery Console is when other methods of data recovery or troubleshooting have failed, and you simply cannot boot into Windows, even in Safe Mode.

The quickest way to access the Recovery Console is to do the following:

1. Insert your Windows XP CD into your main CD/DVD drive.
2. Reboot and go into your BIOS. Set the 'First Boot Device' (or similar) option in the BIOS to CDROM and reboot.
3. As your PC starts booting up, keep pressing the F8 key until you see the message 'Booting from CDROM'. If this doesn't work, you should use a Windows XP Bootdisk instead (See the Installing Windows chapter).
4. The blue Windows Setup screen will eventually appear.
5. If you are running a SATA or RAID drive configuration, make sure to press F6 repeatedly when prompted during the loading of Windows Startup, and have your SATA/RAID driver disk handy; if these drivers are not loaded up the recovery console will not be able to identify your SATA/RAID hard drive(s) properly and/or will mistakenly identify them as corrupt volumes when they are not.
6. Once in Windows Setup, press R to access the Recovery Console.
7. If prompted, press a number that corresponds with your Windows installation - the default is 1. Enter your Admin password if required, or leave blank if you haven't set an Admin password for Windows XP, and press Enter. Note, if you cannot access your hard drive using the Recovery Console due to an incorrect Admin password, try the utility covered under the Resetting your Login Password section further above.
8. Once the Recovery Console opens, there are a range of commands you can use. Just type "Help" (without quotes) and press Enter, and a list of commands will be shown. To see the options for each command in more detail, type the command followed by a blank space and then "/?" (without quotes). A full list of command line commands can be found in this Microsoft Article.

The most common methods of attempting to repair a Windows installation in the Recovery Console are:

- Use the CHKDSK /R command to do a drive check and fix any errors if possible. If CHKDSK says the drive is unreadable or there are too many errors, make sure that if you have a SATA/RAID setup, you loaded the appropriate SATA/RAID drivers from a disk during Windows Setup loadup. If you're using the correct drivers and still see this error, it is likely your drive is actually corrupted or it may even be physically faulty.
- Use the LISTSVC command to list all current services and drivers and their startup status. Use the DISABLE or ENABLE commands to enable or disable particular services which you think are related to the problem. E.g. "Enable *RPCSS Service_Boot_Start*" (without quotes) tells windows to set the RPCSS service to start at Windows Bootup, in case you had accidentally disabled this vital service in Windows.
- Use the FIXBOOT command to repair the boot sector of the drive.
- Use the FIXMBR command to repair the Master Boot Record of the drive.

If you find the drive still doesn't boot up into Windows after all these steps, you may just have to return to the Recovery Console, and use the CD and Copy commands to go to various locations on the drive and either copy across data to the faulty drive to replace a missing or corrupted file for example, or from the faulty drive to another drive to back up data before a reformat.

Although the Recovery Console is a very useful tool, it still may not resolve some hard drive errors or problems. In such cases you can try using a Repair Install of Windows which if successful should fix your Windows without any data loss. Chances are that if the Recovery Console or a Repair Install don't work, either you have faulty hardware which is corrupting the data as it's being written (e.g. overclocked or faulty CPU or RAM), or your drive has simply experienced too much corruption and/or has too many bad sectors to recover your Windows; you will simply have to try reformatting your hard drive and reinstalling Windows.

SYSTEM FILE CHECKER

The System File Checker is another built-in function of Windows XP that allows the system to go through and check all the major protected Windows XP system files against the original versions stored on a valid Microsoft Windows XP CD. This is extremely handy if you suspect corrupted/tampered system files that are leading to unusual Windows behavior. Full usage instructions for the System File Checker can found in this Microsoft Article. To access the System File Checker follow this procedure:

1. Go to Start>Run and type "SFC /scannow" (without quotes) then press Enter to start an immediate scan of your system files.
2. The System File Checker will go through all your important system files and make sure they have not been altered in any way. Where major system files are corrupted or shown to be different from original, they will be replaced with the originals from your *\Windows\System32\Dllcache* directory and/or your Windows XP CD.
3. If prompted, reboot your PC as required.

Note that instead of */scannow* you can use the switches */scanonce* (to scan after the next reboot) or */scanboot* (to scan on every reboot). If you use */scanboot* and then want to stop a scan after every reboot, use the */revert* switch.

While the tweaks in this guide are safe for the most part, there are times when human error or another issue may result in problems and even data loss. Get in the habit of backing up regularly if you don't already as that is the only guarantee you have of retaining your valuable information. In general the methods covered above are the most common and practical ways of both backing up your important information, as well as recovering from data damage or loss.

BIOS OPTIMIZATION

The BIOS (Basic Input/Output System) is a program held on a small ROM chip on your motherboard. It provides the instructions for what your PC should do as soon as it turns on. Your BIOS is independent of your Operating System, which means it is not directly affected by the operating system you use, or which driver version you've installed, or what your settings are in Windows for example. The BIOS supersedes all of that, and your drivers and operating system will load *after* the BIOS has loaded up. The BIOS controls a range of hardware-related features and is the middle-man between your CPU and other devices.

If there is an incorrect setting in your BIOS - that is a setting which is not optimal or correct for your hardware configuration - then you will have problems regardless of what you change in Windows, or which driver versions you install. Importantly, the BIOS is best configured correctly *before* installing Windows, as this reduces the number of unnecessary services and drivers which Windows may install, and helps reduce the potential for IRQ conflicts which is discussed further below.

< THE BIOS

BIOS POST SCREEN

As your BIOS starts to load, the first thing it does is the Power-On Self Test (POST), a diagnostic program which quickly checks your components and makes sure everything is present and working OK. The POST sequence is usually extremely fast; you will only really notice it if it stops when encountering an error. POST error messages can be a bit obscure, but usually give you a lead as to where to look in your BIOS settings. A quick general guide to what the startup error beeps may mean is this POST Error Codes, but a more accurate description specific to your hardware is usually found in your motherboard's manual.

If you have no POST errors you will then see your PC's startup screen, which shows such information as your BIOS type (e.g. Award BIOS), the key to press to access your BIOS settings (e.g. DEL or ESC), the type of processor and its speed, RAM amount and RAM test results, drive information, etc. Note that if any of this information is incorrect, it may be that your hardware is extremely new and hence not recognized correctly by the current BIOS version; you've overclocked your PC too far; or you have bad hardware or incorrect BIOS settings.

BIOS SETTINGS

To access the detailed settings in your BIOS, you typically need to press a particular key (the Delete key for example) repeatedly as your system is booting up. If your BIOS has a password then you'll need to enter it first to access your BIOS settings; if you've forgotten the password, then try this BIOS Password Site. Once in your BIOS screen you will see a multitude of settings. The layout of the BIOS, and the names of the various settings vary greatly depending on the particular motherboard brand and model you own, so I cannot possibly cover them all here. The best reference source is this Definitive BIOS Optimization Guide - scroll down that page to find the 'Free Access' link to the guide. It covers all the common BIOS settings in detail, and combined with your motherboard's manual and Google, you can undertake the very important task of optimizing your BIOS settings before doing any Windows tweaking. I cannot stress the importance of making sure all the major settings in your BIOS are correct for your particular hardware setup and that you've disabled unnecessary devices and options. It may take some time and some research, but it ensures maximum performance and stability. No amount of software tweaking can overcome a badly set up BIOS or resolve BIOS-related problems.

BIOS UPDATES

The BIOS is written on a rewriteable ROM chip, which means that it can be updated (or 'flashed') with new information. Motherboard manufacturers often release new BIOS versions that can improve performance, stability and compatibility, add new features or modify existing features, and fix known bugs. These new BIOS versions are available for download on the manufacturer's website. I can't list all the manufacturer websites here, as there are far too many, however if you have a look through your motherboard manual you should see a relevant link to the appropriate website. Download the latest BIOS for your exact motherboard brand and model number and follow the instructions on the site to Flash (reprogram) the BIOS chip on your motherboard with this new BIOS version. A word of warning: flashing the BIOS is not to be taken lightly. If something does go wrong then your PC may not boot up and you may have to take your motherboard to a dealer to have the memory chip replaced. While this is rare, when updating your BIOS make sure you follow the instructions provided to the letter.

FIRMWARE UPDATES

Your motherboard is not the only device which has a BIOS. Many components, indeed most major electronic equipment like TVs and DVD players have their own inbuilt BIOS chips. The software on these chips is typically referred to as Firmware, and all firmware can be updated using the correct equipment and software. For consumer electronic equipment this is usually done by a qualified technician, but for PC components, it can be upgraded in much the same way as flashing your BIOS. You will need to check your manufacturer's website for more recent versions of the BIOS/firmware you require, and any specific instructions or software necessary. The most common firmware updates are for CD/DVD drives. If you want to find out more about these updates, see this Firmware Page. A firmware upgrade can help resolve problems like difficulties reading from a particular disk type, 'disk not detected' errors, and other issues. Just like BIOS flashing it involves an element of risk, so please read any instructions carefully before proceeding.

The motherboard BIOS is a critical component of the PC which is often overlooked, so I urge you to take the time to become more familiar with your own BIOS, and to configure it correctly. Of course if you are not sure what a setting in the BIOS does, do not change it from its default. If necessary, contact your hardware manufacturer for more details.

< INTERRUPT REQUESTS (IRQS)

An important aspect of the way the BIOS manages your hardware is through Interrupt Requests (IRQs) - these are the way in which all of your major system devices get the CPU's attention for instructions/interaction as often as necessary. There are usually 16 - 24 main hardware IRQs in a modern PC. To view your current IRQ allocation go to Control Panel>System>Hardware>Device Manager and under the View menu select 'View Resources by Type', then expand the 'Interrupt Request' item. You will see all the devices currently active on your PC arranged by IRQ number, starting at 0 [System Timer]. Each IRQ has a priority assigned to it as to which gets the CPU's attention first when several are competing at once. While Windows XP is designed to allow several devices to share an IRQ, you may have problems or reduced performance if two or more major devices (such as the sound card and graphics card) share the same IRQ. To minimize IRQ sharing, try the tips below.

DISABLE UNUSED DEVICES

Under Windows XP, as this Microsoft Article explains, ACPI (Advanced Configuration and Power Interface) compliant systems - which is all modern PCs - will have their IRQs automatically allocated by Windows upon installation. Even if you manually reassign them in the BIOS (if the option exists), Windows XP typically assigns them back to the default IRQs it has chosen. This default assignment of the IRQs is done when Windows XP is first installed, and eight IRQs (IRQs 0, 1, 2, 6, 8, 9, 13 and 14) are automatically reserved for critical system devices on all PCs and cannot be altered or reassigned.

The best way to ensure that you are less likely to end up with shared IRQs (and potential problems) is to disable any unused devices in the BIOS *before* installing Windows XP. Some examples of common devices that can be disabled are:

- Serial Port1 (COM1)
- Serial Port2 (COM2)
- Parallel Port (LPT1)
- Game Port
- Midi Port
- Unused IDE Channels
- Unused SATA Channel
- RAID options

Disabling unused devices not only frees up unreserved IRQs and reduces the chances of sharing, it can also speed up bootup time noticeably because Windows won't load up drivers for these devices. Clearly if you already have, or plan to have, a piece of hardware connected to any of these Ports, or need to use a particular device, then you should not disable them. For example if you have a printer which connects to the Parallel Port (LPT1) then disabling the Parallel Port in the BIOS is pointless as it will simply mean your printer will not function. If you have one or more IDE-based drives which connect to an IDE channel, then you cannot disable that IDE channel and expect the drives to work. You can always re-enable these devices in the BIOS at any time, so this is by no means a permanent disabling of particular devices. However you should only disable devices in the BIOS that you are certain will not be used during your normal Windows usage.

MOVE CONFLICTING DEVICES

If you are using an existing installation of Windows XP you can attempt to reduce IRQ sharing by physically moving a device. Note however that on certain motherboards particular IRQs are shared by default and cannot be changed. For example on many systems the USB Host Controller (for USB peripherals) is often on an IRQ shared by another fixed system device, such as your Serial ATA Controller - this is unavoidable and usually does not result in any problems. In such cases where you feel there may be a conflict or reduced performance, your only course of action is to physically move one of the items to another location on your system if possible. For example, if your sound card is sharing an IRQ with your graphics card, physically shift the sound card from one PCI slot to another free one; if the USB Host Controller is sharing with another device, avoid using the particular USB hub that controller relates to. If neither of the shared devices can be physically moved then you will have to accept the situation. Remember that Windows can share IRQs without major problems in most cases, so you shouldn't automatically assume that a shared IRQ is the source of any problems.

DISABLING ACPI

If the above methods do not work, there is one final method of reallocating IRQs short of reinstalling Windows. Since ACPI is one of the reasons why Windows XP automatically allocates IRQs, if you disable ACPI you can manually allocate and rearrange IRQs and hence remove any IRQ sharing. I strongly recommend that you *do not* disable ACPI, as the side effects are much worse than any potential problems IRQ sharing could cause. ACPI is there for a reason - disabling it can effectively destabilize your system and cause your components not to function correctly. The instructions provided below are for the sake of completeness, and for the truly desperate or the very curious:

1. Backup all your important data before attempting this procedure as it is highly risky.
2. Go into your Control Panel>System>Hardware>Device Manager and under the Computer component, double-click on the 'ACPI Uniprocessor PC' (or similar ACPI) device.
3. Click the 'Update Driver' button, then select 'Install from a list or specified location'.
4. Select 'Don't search. I will choose the hardware to install'

5. Untick the 'Show compatible hardware' box, and in the list below click on the 'Standard PC' option and select Next.
6. The non-ACPI drivers will be installed and you will need to reboot your machine, perhaps several times, to redetect all your hardware components. Make sure to disable any ACPI options in your BIOS.
7. You can now use any BIOS options available to manually assign IRQs to particular devices. Note that it depends on your particular BIOS as to how much flexibility you have in assigning IRQs to all the devices on your system; disabling ACPI doesn't suddenly add any new BIOS options.

I can only repeat that disabling ACPI will cause a lot of problems, and you may not be able to return to using ACPI unless you reformat and reinstall Windows XP completely.

If after all of the above procedures you still have major difficulties which you feel are attributable to IRQ sharing, you will have to simply reformat/reinstall Windows XP - making sure to first correctly configure your BIOS and disable all unused devices of course.

INSTALLING WINDOWS

If you are going to do a full reformat and reinstall of Windows XP on your hard drive, follow the procedures in this chapter to find out more about your options, ensure the correct setup of your hard drive and get an optimal installation of Windows.

< PRIOR TO INSTALLATION

Here are some important things you should remember to do before formatting your hard drive and installing Windows:

1. Scan for viruses and other malicious software - See the PC Security chapter.
2. Backup your important data and passwords - See the Backup & Recovery chapter.
3. Download any SATA/RAID drivers required during installation - See the Driver Installation chapter.
4. Create some Windows XP Bootdisks if necessary - See further below.
5. Read this Microsoft Article on partitioning and formatting hard drives.

Here's a checklist of things you should have handy for a smooth installation of Windows XP:

§ Your original Windows XP CD.
§ Your Windows XP Product ID Number.
§ An earlier 'Full Version' CD of Windows if you are using a Windows XP 'Upgrade Edition' CD.
§ Your Windows XP Bootdisks if necessary.
§ A disk containing a copy of the latest drivers and Service Pack 3 (SP3) - we want to minimize Internet usage immediately after installation, so it's best to have all the relevant core software ready to install on a separate disk. See the Driver Installation chapter for a list of all the major drivers and software needed.
§ Any drivers which have to be installed during the Windows installation process - e.g. some motherboards require a floppy disk with SATA and/or RAID drivers to be used during the XP installation process in order to detect your hard drive(s) or RAID array correctly. Check your motherboard package for such disks, or download the drivers from your motherboard manufacturer's website and copy them onto a floppy. Note that if you're having problems with your nForce SATA/RAID drivers during installation, you can fix this using nLite (see below) along with these instructions.
§ Your motherboard manual, a printout of relevant pages of this guide, and any other associated articles or guides below which you may need. Again since it's not recommended that you connect to the Internet immediately after installing XP for security reasons, ideally you should have offline copies.
§ All your backups as well as any applications and games on CD/DVD. Also make sure to have software serial numbers or registration details handy.
§ Pen and paper for recording passwords, registration numbers or other important information.

Once you've gathered as much of this material as possible around you, familiarize yourself with all the information below before beginning the actual formatting and installation process.

SLIPSTREAMING WINDOWS XP SP3

If you own an older Windows XP CD that does not contain the latest Service Pack 3 (See the Driver Installation chapter) already built into it, you can create a new Windows XP Installation CD that neatly incorporates all the files from SP3 using a process called 'Slipstreaming'. When a slipstreamed XP CD is used for installation it automatically installs SP3 along with the rest of Windows XP, and hence you won't need to run SP3 separately after installation, nor do you need to worry about any outdated drivers/files being installed on your system first, or any SP3 installation problems. It's a detailed process, but relatively straightforward if you use nLite (see below). However using a slipstreamed CD is for installing Windows XP

SP3 is not vital, so if you don't feel comfortable doing it you can skip this step. Note that you shouldn't slipstream XP SP3 from within Windows Vista as this will result in installation problems due to a bug.

NLITE

nLite is a free utility for customizing Windows XP prior to installation. It allows you to select the component(s) you wish to remove from Windows, as well as things you would like to add, such as SP3 or SATA/RAID drivers. Once you have integrated the relevant components and removed the components you don't need, nLite generates an ISO file which you can burn onto CD and use as your Windows installation disk.

Personally I'm a traditionalist and I still recommend installing Windows XP as normal, then manually installing or uninstalling the relevant components. This is the only way to guarantee that things work as intended - in particular I recommend against removing core Windows components like Internet Explorer or Windows Media Player, as you may need them in the future. Don't fall into the trap of thinking that it's cool to strip out virtually every component of Windows and replace it with a third-party alternative - often times the Windows version of an application is not only required, it is actually the best method of viewing particular content.

However nLite is a very handy utility and well worth downloading and investigating. It won't be covered in detail here as the user interface is quite intuitive to use, and if you need additional help check the nLite Forums. With some time and effort, and in conjunction with the information presented throughout this guide, you can create your own customized nLite Windows XP install disk which has everything the way you want it.

< PREPARING THE HARD DRIVE(S)

Before commencing the formatting of your hard drive to prepare it for Windows XP installation, read through the details below on the various options available to you when formatting a hard drive. Take the time to research this aspect of Windows installation carefully.

NTFS VS. FAT 32 FILE SYSTEMS

During the formatting of your hard drive, you will be asked whether you want to use the NTFS (NT File System) or FAT32 (File Allocation Table) File System for the drive. This is an important choice and the answer generally depends on your requirements:

Use FAT32 if

§ Your hard drive is smaller than 32GB.
§ You want to install more than one operating system on your computer (aside from Windows Vista).

Use NTFS if

§ Your hard drive is larger than 32GB and you are running only one operating system on your computer.
§ You want enhanced file security.
§ You need better disk compression.

For more details of the differences read this FAT & NTFS File Systems Article. Essentially NTFS is a newer, more stable and much more secure file system that has several benefits FAT32 doesn't. For example, if you format your hard drive in NTFS and password protect it, it is more difficult to access the information on the drive without the correct password (but still possible - see the Backup & Recovery chapter). As for the speed difference, for larger drives it is negligible. For more technical details on NTFS, see this NTFS Article. In short there is no real reason to format your drive in the older FAT32, unless you have a very small drive and/or want to install more than one Operating System on it - particularly an older version of Windows. For most everyone NTFS is the recommended file system.

CONVERTING EXISTING FAT32 DISK TO NTFS

If you already have a FAT32 drive and don't want to reformat just to use NTFS, you can still convert the drive to NTFS using the Windows Convert tool - however note that this may result in a sub-optimal cluster size, especially for drives formatted in FAT32 under older versions of Windows. To set an optimal cluster size you will have to read this Converting Fat32 to NTFS Guide.

The following is the simple (but not optimal) method of converting an existing Windows XP FAT32 installation to NTFS:

1. Go to Start>Run and type "cmd" (without quotes), then press Enter.
2. In the Command Prompt which opens, type "Convert C: /FS:NTFS" (without quotes) and press Enter. Substitute the correct drive letter in place of *C:* above if it is different.
3. Enter the name of your hard drive when prompted. If you don't know the name of the drive, type "Vol *driveletter*" (without quotes - e.g. *Vol C:*) to find it out.
4. Reply Y to each of the prompts. Reboot if prompted.

This will take some time to complete, so leave your system alone until the process is finished.

MULTIPLE PARTITIONS

During the formatting of your hard drive, you have the option of also Partitioning your hard drive. Partitions are simply fenced-off portions of a hard drive. By partitioning a drive you can effectively divide a single hard drive into several smaller logical drives of varying size, each with their own drive letter. For details on the potential advantages, disadvantages and optimal methods for partitioning, see this Partition Strategy Guide. If you're still not certain and you just want to install Windows on a single hard drive, I strongly recommend having a single partition (the default setup) as this keeps things simple and performance will be optimal.

On any hard drive the first Primary partition is always the fastest, and performance is still limited by how fast the single hard drive head can seek (move around to read or write) information. It can't be in two places at once, whereas with two physically separate hard drives, each hard drive's head can seek information independently, such as one drive reading game information while the other concurrently reads/writes virtual memory information in the pagefile. Therefore partitioning is not a true substitute for having two or more drives, it is most useful as an organizational tool. For example one of the major reasons you may wish to create multiple partitions is to allow you to dual boot with Windows XP and Windows Vista, as discussed further below. This allows you to run Vista along with XP on the same hard drive for example, but completely separated from each other.

Keep in mind that using multiple partitions on the same drive for backup purposes is not a good substitute for having backups of your important data on CD/DVD or another hard drive. Hard drives can and do become physically corrupted and this affects data on *all* partitions of a drive, so backing up from one partition to another on the same hard drive as your main backup strategy is not appropriate.

It is ideal to format and partition a hard drive prior to starting Windows installation, and you can do this either using a third party tool or you can use the built-in formatting and partitioning functionality of XP as detailed in this Microsoft Article. If you use multiple partitions across a range of hard drives and you are after a utility that will make partition management easier, the most reputable one is Norton Partition Magic. It is not free, and I will not be covering it in detail here, however if you wish to undertake complex partitioning of your hard drive(s) it is a worthwhile investment.

DUAL BOOT/MULTIBOOT SYSTEM

If you want to set up your system so that each time you bootup you get the choice of two or more Operating Systems to use - such as Windows XP and Windows Vista - read this Microsoft Article and see this Vista Multiboot Site for instructions. You will need to have at least two or more partitions on your current hard drive and/or have two or more hard drives to be able to multiboot. If dual booting with Vista, you should boot up into Windows XP first, insert the Windows Vista DVD and run Vista setup from there. This ensures that Vista will 'see' your existing Windows XP installation and configure the boot menu properly to give you the choice of booting into either OS. Importantly, if you run SATA or RAID hard drives, for Vista to correctly identify all of your hard drives prior to installation and correctly configure the dual boot, you must have appropriate SATA/RAID drivers on a floppy disk or CD/DVD and insert them during the hard drive identification stage of Windows Setup. For more details of dual booting with Vista, see the Windows Installation chapter of the TweakGuides Tweaking Companion for Vista.

Note that there are no performance benefits in dual or multibooting - it is normally done if you use software or a particular feature that only works under another operating system for example. Once again, unless you specifically require this functionality I do not recommend a multiboot system.

RAID CONFIGURATION

RAID (Redundant Array of Independent Disks) is a common method of configuring multiple hard drives to perform better and/or provide better protection against data loss than a single hard drive. The various RAID levels are best demonstrated in this RAID Article - click the numbers at the top right of the article to see the various RAID levels demonstrated graphically, including RAID 0, RAID 1, RAID 5 and RAID 0+1.

To set up a RAID array you need two or more hard drives, preferably of the same size and speed, and a motherboard with RAID support. You will then need to install the drives as normal and configure the appropriate RAID options in your motherboard's BIOS (include any 'RAID BIOS' options) - see your motherboard manual for instructions. If your motherboard supports RAID, there is no additional hardware required, it is all driven by Windows and the motherboard. Once configured correctly, the RAID configuration of multiple drives will be seen as a single large hard drive by Windows, and treated as such.

To determine which RAID configuration best suits your needs, you will need to read the articles linked above and consider your most common PC tasks. The most commonly used RAID array is a pair of similar drives in RAID 0 formation, which provides the best all-round performance at minimal cost. RAID 0 usually beats a single hard drive configuration in terms of speed, particularly for gaming or large file movements, due to there being two independent drive heads constantly seeking data in place of one. However RAID 0 also provides absolutely no fault tolerance at all, meaning if one of the drives suffers a serious error or is damaged, you lose all the data on *both* drives since the data is split evenly ('striped') across both drives. Therefore if you require stronger protection against data loss, you might want to consider a RAID 5 configuration which is more costly, but far safer and still provides good performance for desktop PC usage.

While setting up striped RAID arrays - that is, RAID arrays which split data evenly across two or more hard drives (such as RAID 0 or RAID 5), you will need to determine a Stripe Size to be used in your RAID BIOS. In general, if you are uncertain of the size to choose, use the Auto setting (if available) or a 64kb stripe. If you use the drives primarily for gaming I suggest a smaller stripe size of 16kb, as in my experience this can assist in reducing stuttering in games.

In any case once you have connected your drives and set up your RAID array using the options in the motherboard's BIOS, you will need to have a floppy disk, CD or DVD handy with the correct RAID drivers prior to starting the Windows XP installation procedure. Then during Windows Setup, press the F6 key repeatedly when prompted at the bottom of the screen, and enter your driver floppy when prompted again and load up the RAID drivers, along with any other drivers (such as SATA drivers) as necessary. If you miss this step, the RAID hard drives will not be correctly detected by Windows as one large hard drive, and you

will not be able to install Windows on them properly or you will break the RAID array and lose the benefits of RAID.

Once XP is installed on your RAID drives, from that point onwards there are no special considerations as such; the drives are treated as one large normal hard drive for all intents and purposes in Windows.

< INSTALLING WINDOWS

At this point you are ready to begin the actual format and installation process, which differs depending on whether you're using a brand new/freshly formatted hard drive as opposed to a hard drive with an existing installation of Windows. See the relevant section below:

NEW HARD DRIVE

If you have a new or blank formatted hard drive, the entire procedure for installing Windows XP is relatively straightforward. Follow these steps:

1. If it is not already in your system, connect the hard drive to your system by following the instructions that came with the drive. Typically this involves turning off your PC, plugging into the back of the drive both a power connector and either a wide IDE ribbon cable, or a thin SATA cable.
2. Start your system, go into your BIOS and make sure the hard drive is being detected, whether on one of the IDE Channels, or as a SATA device - whichever is relevant to the particular type of hard drive and channel it's connected to. If the hard drive is not detected at all in the BIOS, you cannot install Windows XP on it. Look around the BIOS and make sure you've enabled the channel on which the drive is connected. You may have to re-check your drive cabling (i.e. SATA/IDE cable and power cable), and also whether any small switches on the back of the hard drive are set correctly (e.g. the main hard drive is typically set as the Master on the Primary Channel). In some cases (mainly for SATA or SCSI drives and/or RAID configurations) you will have to insert a driver disk into the floppy drive to load up appropriate hard disk drivers during Windows installation, so have those handy if need be and proceed with the next step.
3. Insert your Windows XP CD into your CD/DVD drive, and reboot your system.
4. Upon rebooting your system, since the hard drive does not have an operating system installed, the computer will skip loading from it and instead will attempt to boot from the next boot device - which should be the Windows XP disk in the CD/DVD drive - and should lead to the blue Windows Setup screen. If that doesn't occur, check your BIOS settings to ensure that firstly the relevant CD/DVD ROM drive is being detected as present on your system and that any option for 'First Boot Device' or 'Second Boot Device' (or similar) is set to CDROM.
5. From this point onward, you should follow this step-by-step: Windows XP Pro Installation Guide or Windows XP Home Installation Guide as relevant. These guides cover the procedure in far more detail (including screenshots for every step of the way) than I can do here due to space considerations. You should ideally have a printout of them handy for use during the installation.

HARD DRIVE WITH EXISTING INSTALL OF WINDOWS

If you have a hard drive with a current installation of any version of Windows on it, follow the steps below to begin a reformat and subsequent installation of Windows XP. Note you shouldn't just install Windows XP over an existing installation of Windows - start afresh with a full reformat of your hard drive and a fresh installation of Windows XP otherwise you will get sub-optimal results and experience many problems:

1. Insert your Windows XP CD into your CD/DVD drive.
2. Reboot and go straight into your BIOS settings. Set the 'First Boot Device' (or similar) option in the BIOS to CDROM. Reboot your system.
3. As your PC starts booting up keep pressing the F8 key repeatedly until you see a message saying 'Booting from CDROM' (or similar).
4. The blue Windows Setup screen will eventually appear.

5. From this point onward, you should follow this step-by-step: Windows XP Pro Installation Guide or Windows XP Home Installation Guide as relevant.
6. Make sure that you choose to format the hard drive and do a clean installation of Windows XP. Again, do not install Windows XP over an older version of Windows as an 'upgrade' installation (not to be confused with the Windows XP Upgrade Edition which is fine) - start with a new installation of Windows XP.

WINDOWS XP BOOTDISKS

If you still can't get to the Windows Setup screen using the instructions above, you can download a Windows XP Bootdisk image from the Microsoft site for your particular version of Windows XP as covered in this Microsoft Article. If you still have problems booting into Windows setup, or you just want an older version of a bootdisk, go to this Bootdisk Site to download free copies of various bootdisk versions.

WINDOWS PRODUCT ACTIVATION & WINDOWS GENUINE ADVANTAGE

< WINDOWS PRODUCT ACTIVATION

One of the first things you will notice after installing Windows XP is the Windows Product Activation (WPA) notice. Even if you skip Activation at Windows startup and go to the Windows Desktop, a little popup balloon in the System Tray tells you that you have 30 days left to activate Windows XP, and when you click on it, it provides various options for activation. Windows Product Activation is a protection system Microsoft uses to ensure that Windows piracy is reduced. If you're interested in the facts about Windows Activation, how it works and what parameters it checks on your system I recommend you read this detailed Windows Product Activation Guide and download this Technical Details of Activation document.

Ideally if you've just installed Windows XP I recommend that you don't change any of your hardware - aside from attaching some peripherals. For performance and stability reasons major hardware changes (e.g. those involving your CPU, motherboard or graphics card) are best made *prior* to XP installation. If you are aware that your hardware setup may undergo some further changes shortly, it is recommended that you don't activate Windows XP right away. You have 30 days within which to bed down your final hardware configuration. Activating before your hardware setup is finalized could see you having to re-activate repeatedly, including having to call Microsoft to complete Activation.

If you are certain that the major hardware components of your system are not going to change soon and/or that you are not going to reinstall Windows XP again shortly, then go ahead and activate XP. Otherwise ignore the constant nagging Activation gives you and wait until your system configuration is finalized before going through with Activation. Microsoft views multiple activations in a very short period of time as suspicious - precise details of this are in the links above.

Something you can do after you have activated Windows XP is to backup your *wpa.dbl* file, found in the *\WINDOWS\system32* directory. This file is the Windows Product Activation system file, and should your installation of Windows XP become corrupted and you need to attempt a recovery (See the Backup & Recovery chapter), you can use this backed up file to help in restoring your system.

< WINDOWS GENUINE ADVANTAGE

Microsoft has implemented an additional anti-piracy feature into Windows called Windows Genuine Advantage (WGA). Any time Windows attempts to connect to Windows Update or download certain Microsoft updates, it may be asked to validate itself to make sure it is a legitimate copy. If validation fails, the user cannot download updates from Windows Update, and can only download critical security updates through the Microsoft Download Center or through the Automatic Update service (See the Control Panel chapter).

If you are having problems with WGA on a legitimate installation of Windows, visit the Windows Genuine Advantage Diagnostic Site to run through a set of diagnostic procedures which can help fix the issue. In particular, if you use Firefox as your main browser, Microsoft has released a Firefox plugin to allow WGA to work on this popular browser.

Please note I will not provide any information on how to view or change your Windows Product Key, or how to bypass Windows Product Activation or Windows Genuine Advantage. If you experience problems with these particular features on a legitimate installation of Windows XP, the only correct course of action is to contact Microsoft Technical Support for your particular country.

DRIVER INSTALLATION

Device drivers are the software which give instructions to your system on how to deal with particular hardware. Graphics drivers for example tell your graphics card what to do in various situations, such as during 3D applications and games, as well as translating information to and from your CPU. While Windows comes with built-in driver support for virtually any type of common computer hardware, and hence most of your hardware will operate in Windows even without installing additional drivers, the built-in drivers are neither optimal, nor do they guarantee stability or full compatibility under certain situations. Thus, you need to download and install the latest device drivers for your hardware to make sure your entire system performs optimally and with stability.

The instructions below cover both the initial installation order of drivers on a fresh install of Windows, as well as being a list of which drivers and core software to install on an existing installation of Windows XP. The chapter also contains some general tips to clarify which types of drivers should be installed and why.

< DRIVER INSTALLATION

The first thing you should do with a fresh installation of Windows XP is to install the core system software and drivers that are vital in helping to run XP optimally. Installing these prior to anything else, and in the correct order, is key to reducing the chance of any problems and also ensuring peak performance.

Note that during installation of these drivers, if you are prompted to reboot at any time, you must do so to allow proper driver installation. The reason for this is that some driver files are currently loaded into memory areas that are used by the system and protected from being overwritten by a different version. Thus they cannot be replaced without Windows first marking them for replacement, rebooting to remove them from memory, and subsequently replacing them with the newer version upon successful loadup of Windows. Therefore whenever Windows asks you to reboot after installing any driver or application, you should do so as soon as possible.

If starting with a fresh installation of Windows, I recommend you download the following software and drivers in advance of reformatting and reinstalling Windows XP as for security reasons you should try to minimize your Internet usage at this point. If you have a permanent connection to the Internet and it is already enabled straight after installing XP, first follow the procedure in Step 8 further below to turn on the built-in Windows XP Firewall before following the rest of these steps. If you are using nLite (See the Installing Windows chapter), make sure to read this chapter and download the latest versions of all the relevant drivers below, however obviously once you've installed XP using your nLite install disk with integrated drivers, you don't need to follow these steps again.

The initial core software installation process is provided below in order of first to last, starting immediately after you've installed Windows XP. If you're using an existing installation of XP, you should still follow these steps, installing/updating the relevant drivers which you may have missed previously.

STEP 1 - SERVICE PACKS

Install the full version of Windows XP Service Pack 3 (SP3). A Service Pack is a compilation of important security, stability and performance updates for Windows, and SP3 is the latest Service Pack for Windows XP 32-bit, containing every major Windows update released up to April 2008. You can read about the updates and types of changes it contains here. SP3 also contains all the fixes contained in SP1 and SP2, though note that you can install SP3 on a system which already has SP1 or SP2 installed on it. However SP3 can't be installed directly on an original pre-SP1 copy of Windows XP - you need to either install SP1 first; use an original Windows XP SP1 or SP2 CD to install XP; or use a Slipstreamed XP + SP3 install CD.

You can download and install SP3 via Windows Update, or download and use the full standalone SP3 package from here: Windows XP SP3. The standalone version is recommended as it should be the least problematic method of applying the Service Pack. Obviously if you used a Windows XP CD which already has SP3 incorporated into it to install Windows, such as a Slipstreamed XP + SP3 CD you've created with nLite (See the Windows Installation chapter), then you don't need to undertake this step as all the relevant SP3 files were automatically installed along with Windows XP.

STEP 2 - DIRECTX

Install the latest version of DirectX from here: Microsoft DirectX. DirectX is already built into Windows XP, but you will need to install the very latest version of it to ensure maximum performance, security and compatibility with the latest programs and games. In fact many recent games come with the latest build of DirectX 9.0 on their disk, so check to see if that is the case and save yourself the extra download.

Note that DirectX 10 is a version of DirectX designed solely for Windows Vista and Windows 7 and is not compatible with Windows XP, so any program or game which requires DX 10 can only be run on Windows Vista or Windows 7.

STEP 3 - DRIVER SIGNING & WINDOWS UPDATE

Driver Signing is meant to ensure that the drivers being installed are verified as being authentic and are certified to work with Windows XP. However in practice, almost all unsigned drivers are perfectly fine to use, as long as you have downloaded them from your hardware manufacturer's website, or from another trusted source. Prior to installing any other drivers go to Start>Control Panel>System>Hardware and click on the 'Driver Signing' button. In the Driver Signing Options screen make sure 'Warn - Prompt me each time to choose an action' is selected so that unsigned drivers are not automatically blocked, and you will be asked to choose whether to install them. Then tick the 'Make this action the system default' box and click OK.

If you click the 'Windows Update' button under Start>Control Panel>System>Hardware you will see several options which determine Windows behavior whenever you connect a new device, or a new device is initially detected. To start with I recommend selecting 'Never search Windows Update for drivers' and click OK. This is because to start with, you don't want any potentially out-of-date drivers on Windows Update installing on your system until you've had the chance to manually install the latest drivers for each major device as per the steps below. Once you've followed all the steps up to Step 8, you can then come back and set this option to 'Ask me to search Windows Update every time I connect a new device' if desired, or leave it to never search if this behavior bothers you. Again, the drivers on Windows Update are generally a bit older than the latest available, so manual updating of drivers is necessary, and then only if newer drivers are found on Windows Update should you install them.

STEP 4 - MOTHERBOARD DRIVERS

Install your motherboard drivers. The motherboard is the hardware foundation of your entire system, so using the latest drivers for it is important in achieving optimal, trouble-free performance for your entire system, as well as providing additional motherboard-specific functionality such as onboard audio, onboard Network adapter, RAID, and so forth.

When dealing with motherboard drivers it's important to understand that the motherboard chipset type is not the same as the motherboard brand or model number. The chipset type is based on the company that manufactures the actual chipset architecture used in the motherboard. The motherboard's brand is based on the company that buys this chipset, packages it with certain features and sells it under its own brand name with a specific model number. For example, a *Gigabyte GA-965P-DS3* motherboard is manufactured by a company called Gigabyte, it uses an Intel P965 chipset and it has the specific model number GA-965P-DS2. A combination of the utilities covered in the System Specifications chapter, along with your motherboard manual and Google will give you all the details you need about your motherboard.

Your motherboard usually comes with a driver disk which contains the relevant drivers, however these are usually out of date. The first place you should look for the latest version of these drivers is on your motherboard manufacturer's website - there are too many to list here, so check your motherboard manual for links. Once at the site, you will need to look for chipset drivers for your motherboard model, as these are the core drivers which control your motherboard's key functionality - download and install the latest version of these. If you also wish to utilize other functions on your motherboard, such as onboard audio or video (if you're not using standalone sound and/or graphics cards), a RAID drive configuration, or onboard LAN, then also download and install the latest version of the relevant drivers as well. Note that if you're not using any of these functions on your motherboard, I strongly recommend disabling them in your BIOS as discussed in the BIOS Optimization chapter.

If the drivers on your motherboard manufacturer's site appear to be fairly old, then you can download the latest chipset drivers directly from the chipset manufacturer:

§ For **Intel** motherboards, download and install the latest Intel Chipset Software. If you have a RAID drive or AHCI setup also install the Intel Matrix Storage Manager.
§ For **Nvidia** motherboards, download and install the latest nForce Drivers.
§ For **VIA** motherboards, download and install the latest VIA Hyperion Drivers.
§ For **SiS** motherboards, download and install the latest SiS Chipset Software.

Finally, remember that motherboard chipset drivers are not the same as a motherboard BIOS. The motherboard drivers are Windows drivers that control the way the motherboard communicates through its various components under Windows, the same as graphics drivers or sound card drivers for example. The BIOS on the other hand is not dependent on Windows at all and operates at the machine level to control the motherboard's behavior the second your PC starts booting up. See the BIOS Optimization chapter for more details.

STEP 5 - GRAPHICS DRIVERS

Install your graphics card video drivers. Just as with motherboards, graphics chipsets are usually sold to different manufacturers who then package them together with certain features and capabilities and market them under their own brand name. The important thing to know is the manufacturer of the chipset on which your graphics card is based - for most graphics cards this will be either Nvidia or ATI. For example, an *EVGA 8800GTX* graphics card uses an Nvidia GeForce 8800 series chipset packaged and sold by the company EVGA under its own brand. The chipset is the determinant of which driver to use, not the company selling the card. Determine your chipset using the utilities in the System Specifications chapter, then download and install the relevant package:

§ For **Nvidia** graphics cards, download and install the latest Forceware Graphics Drivers. For details on how to install and set these up correctly read my Nvidia Forceware Tweak Guide.
§ For **ATI** graphics cards, download and install the latest ATI Catalyst Drivers. For details on how best to install and set these up correctly read my ATI Catalyst Tweak Guide.
§ For **SiS** graphics cards, download and install the latest SiS GPU Graphics Drivers.
§ For **S3** graphics cards, download and install the latest S3 Graphics Drivers.
§ For **Matrox** graphics cards, download and install the latest Matrox Graphics Drivers.
§ For **XGI** graphics cards, download and install the XGI Graphics Drivers.
§ For motherboards with onboard graphics, the latest drivers for these are usually found on your motherboard manufacturer's website - see Step 4 above.

Note that unlike motherboards, you do not need to download your graphics drivers from your hardware manufacturer's website. Installing the latest 'reference' chipset drivers shown above is the best method, and will not cause any problems.

STEP 6 - SOUND DRIVERS

Install your Sound card audio drivers. These vary depending on the brand of the sound card you are running. Only the major brands are covered below:

- For **Creative** sound cards, download and install the latest Creative Audio Drivers.
- For **ASUS** sound cards, download and install the latest ASUS Audio Drivers.
- For **Auzentech** sound cards, download and install the latest Auzentech Drivers.
- For **Turtle Beach** sound cards, download and install the latest Turtle Beach Audio Drivers.
- For **Hercules** sound cards, download and install the latest Hercules Audio Drivers.
- For **AOpen** sound cards, download and install the latest AOpen Audio Drivers.
- For motherboards with onboard audio (e.g. AC '97 or HD Audio) the drivers for these are usually found on your motherboard manufacturer's website - see Step 4 above; or for newer drivers see your onboard audio chipset manufacturer's website (e.g. Realtek).

STEP 7 - PERIPHERAL DRIVERS

Before installing any peripheral drivers, connect these devices (e.g. Mouse, Printer, Digital Camera) to your system and test their functionality. If they appear to work fine and all the major functions which you would use are intact, then do not install a new driver for them. For example, if you connect an optical mouse and it appears to have sufficient functionality, do not then install the drivers that come on the CD with the mouse, or download and install new drivers from the manufacturer's website. The reason for this is that such drivers typically need to load into the background at Windows startup and usually add to overall resource usage, increase boot times, and quite often don't add anything of real value to the device's function. XP already supports the important basic functionality of most major peripherals without the need for additional drivers.

However obviously should your device not function correctly, or a feature that you need to use appears disabled, you will then need to install the latest driver for that device. In that case I recommend you go to the device manufacturer's website and download the latest available drivers rather than using the older drivers that come on the disk with the device. There are far too many device manufacturers to list here, but the website address is usually prominently listed on the device's box and/or in the manual. Where possible follow the device installation instructions in the device's manual (or on its website) for the best method of installation. Typically this involves connecting the devices to your machine one by one, and when Windows detects them and prompts for drivers, insert the appropriate driver disk or point Windows to the directory where you have downloaded the latest driver files for the device and continue from there.

If you have an older device which is not compatible with Plug and Play, or your device isn't being detected correctly, see the Add Hardware section under the Control Panel chapter for more details of how to manually install such a device.

STEP 8 - FIREWALL, WINDOWS UPDATE & .NET

You will need a connection to the Internet for this step. That means your network adapter or modem must be installed and set up correctly - refer to your modem/network adapter's documentation as each has unique setup procedures and requirements. You must also have your ISP (Internet Service Provider) details handy (e.g. username, password, configuration scripts, access number, proxy settings, port numbers, etc.). Once you have installed the modem or network adapter, and prior to connecting to the internet, you must enable a Firewall. A firewall prevents malicious access to your machine via the Internet, and your network device may already have a built-in firewall. However to start with, enable the Windows XP Firewall if you're not sure.

To enable the default Windows XP Firewall, which is recommended for most purposes, go to the Windows Control Panel, open the Windows Firewall component and on the main screen of the Firewall settings, make sure it is set to On. Now you can safely connect to the Internet, but do not visit any other website, nor check your email, or download any programs. Go directly to the Windows Update website, either by clicking the

Windows Update icon in your Start menu, or by going to Internet Explorer>Tools>Windows Update, or by clicking this Windows Update link. Once on the Windows Update site, click the 'Custom' link and wait for the scan to finish. Note that Windows Update will only work on Internet Explorer by default - it will not have full functionality on other browsers. See the Internet Explorer chapter for more details of Windows Update.

You will notice that after selecting a Custom scan, all the 'High Priority Updates' items have automatically been added to your 'Review and install updates' list. It is important that you install all of these critical updates for security, stability and compatibility purposes. Under the 'Optional Software' section, you should also add any fixes or updates you see which are relevant to the programs or features you use or wish to use. Note in particular that certain programs and drivers have a user interface which has been developed using Microsoft's .NET Framework. This means that for these drivers to function correctly, you will need to install .NET on your machine. You can download and install the latest .NET Framework through Windows Update, or download it separately here: .NET Framework Version 3.5. ATI graphics card users in particular will find that the latest ATI Catalyst graphics drivers require .NET 2.0 or higher for the Catalyst Control Center to work.

Finally, add in all 'Optional Hardware' updates shown, as these are important updates of drivers for the hardware on your system. They are all safe to use and should only be available for installation if they are newer than the drivers you are currently using for your device(s). You can (and should) install newer versions of hardware drivers over these versions if and when they become available in the future.

Once you've added all the relevant updates, click the 'Install Updates' button. It may take quite some time for the various updates to download and install depending on your internet connection. Reboot as often as prompted. Don't install any other applications or games, and don't browse any other websites yet - go straight to the PC Security chapter.

< GENERAL DRIVER INSTALLATION

THE LATEST DRIVERS

The drivers installed on your system need to be kept up to date, so regularly check all the sites linked to above and make sure you have the latest versions. To check the current driver version on a particular component, go to Control Panel>System>Hardware>Device Manager and expand the various categories. For each device, right-click on it and select Properties, then under the Driver tab look at the *Driver Provider* and *Driver Version* details. Alternatively, check the System Specifications chapter for automated system tools which can give you this information.

I usually announce major driver releases on the front page of TweakGuides so check there regularly for download links and details of the changes in the latest drivers.

UNINSTALLING DRIVERS

Before installing any new drivers, always make sure to go to 'Add or Remove Programs' under the Control Panel and uninstall any previous drivers for the relevant device, then reboot Windows. Furthermore, you can use the Driver Sweeper utility to attempt to remove any remaining traces of particular drivers. Launch the utility, tick the driver(s) you wish to remove, click the Analyze button first to see what will be removed. Then if you wish to continue, click the Clean button and reboot your PC to make sure all driver files and related registry entries are removed. If you really want to remove all possible traces of previous drivers, use the Autoruns utility to identify and remove individual driver files which may be resident on your drive after uninstallation - see the Startup Programs chapter for more details.

This 'clean install' method ensures that your system is free of any 'driver residue' - leftover components of previous driver versions which may cause conflicts with newer drivers.

INSTALLING NON-EXECUTABLE DRIVERS

Device drivers in *.EXE* format only need to be executed to automatically install the drivers. However drivers which come as a collection of files in archived format (i.e. *.ZIP*, *.ACE*, *.TAR*, *.RAR*) must have their contents extracted (using WinZip, WinRAR, WinACE or 7-Zip), and then follow the steps below to install them on your system:

1. Go to Control Panel>System>Hardware>Device Manager, and double click on the device to update.
2. Go to the Driver tab and click the 'Update Driver' button.
3. Select 'Install from a list or specific location' then click Next.
4. Select 'Don't search, I will choose the driver to install'
5. Click the 'Have Disk' button.
6. Click on the Browse button and go to the directory where you placed the latest drivers.
7. Highlight the relevant driver file (usually an *.INF* file) and click Next to install.
8. Reboot your system if prompted and upon reboot the device should be using the latest drivers. You can check this by checking the driver tab in device manager again (Steps 1 & 2 above).

You can use the above procedure to manually update (or downgrade) any of your device drivers whenever you download an archived driver package for any device.

GENERAL DRIVER TIPS

The following are my recommendations with regard to device drivers:

§ It is usually fine to install non-WHQL unsigned drivers (See Step 3 above for details), as long as they are from a fully trusted source such as your device manufacturer (e.g. Nvidia, Intel, Creative), or from a reputable third party modder.
§ Only install beta drivers if they are from your device manufacturer, and only if the release notes (or user feedback) states that they resolve a specific issue you are currently experiencing, or you are running a recently released game or application. Beta drivers carry the risk of causing additional system problems and are usually unsupported by hardware manufacturers.
§ Do not install alpha (pre-beta) drivers, as these can be much more risky. This includes 'leaked' drivers and/or heavily modded drivers. Don't be fooled by promises of large performance gains from the manufacturer, modder or other users - be patient and wait for a solid beta or final release version before installing such drivers.
§ If you play recent games or use recent applications, you *must* keep your system up to date with the latest drivers. While the latest drivers don't necessarily contain performance improvements, they do contain bug fixes, resolutions to compatibility issues, and improvements to the driver interface among other things. More often than not, problems with recent games are fixed by installing the very latest drivers - whether graphics, sound, and/or motherboard drivers.
§ If on the other hand your hardware is quite old and/or you don't use the very latest games or applications, you should examine the latest drivers and if no fixes or improvements are listed for your particular hardware or software, then you can stick with an older driver set.

In general, even if you don't install the latest drivers regularly, you should try to keep an eye on what is on offer, and how it may affect you, because chances are that any problems you experience could be due to your drivers. They play a critical role on your system, so make sure you stay as up-to-date as possible.

PC SECURITY

Whether starting with a clean install of Windows XP or tweaking an existing installation, one of the first steps in tweaking actually involves scanning all your current data for viruses and other kinds of malicious software (malware) such as trojans and spyware, and securing your PC. Ideally this must be done before you do any reformatting/reinstallation, backup any data, or any tweaking. That way you can be sure that what you do from this point onward will not all be wasted due to malware messing up your system and making you go through the whole process again.

It is no longer true to say that only the very careless or novice user will succumb to a security-related problem or malware infestation. Even if you consider yourself an advanced user, you need to bear in mind that malware threats these days are becoming increasingly dangerous. In the past a malware infestation would usually result in little to no real harm; you'd have to delete a few files or at worst reformat and reinstall Windows. Now however, malware is increasingly being coordinated by organized crime groups for financial gain, and if you use your home PC for any type of financial transactions such as online banking or shopping, being exposed to malware may see you lose money or your online identity. Even if you're not concerned about your own security, it needs to be understood that much of the unsolicited junk email (or Spam) that is sent actually originates from home PCs which have been infected with malware and used as part of a Botnet. So having a somewhat carefree attitude towards PC security is a thing of the past.

There is a wide range of malware which can infect your system and cause problems. The major categories of these are covered in this chapter, along with detection and removal methods, and important security tips.

< VIRUSES & WORMS

Viruses are small programs that load onto your computer without your permission and without your knowledge of their real function. They are called viruses because just like a human virus they are designed to replicate themselves and cause damage, attaching themselves to normal programs and files and spreading to other host computers. Viruses range from the mischievous to the truly harmful, and while none of them can cause physical damage to your computer, they can destroy valuable information, cause a range of system problems, and waste resources.

Worms are a variation of viruses, with the primary difference being that they generally do not attach to other programs, they can spread independently.

Virus scanners serve a valuable role in finding these hidden viruses and worms - as well as some other common malware - and removing them from your system. A virus scanner is an essential part of any system, and you run a major risk if you don't have one installed on your system: it is your first line of defense against serious infection. To start with, by regularly running Windows Update and installing all available Critical Updates, your system will have a good level of protection. The Windows Malicious Software Removal Tool in particular is a regularly updated free anti-malware tool provided through Windows Update. Once it is downloaded and installed it does an automatic scan of your entire system for the most common pieces of malicious software and removes them if detected. You can also manually download and run the latest version of the tool at any time from the link above.

However a dedicated third party virus scanner is necessary, and I personally use the AVG Antivirus Free Edition. AVG strikes a reasonably good balance between effectiveness, ease of use and system intrusiveness, especially for a free product. However AVG is not the only good virus scanner around - there are several good scanners which you can try, though most of them are only free for a trial period:

Avast
AntiVir
NOD32
Trend Micro AV

There are many arguments about which virus scanner is 'the best', but any of the ones listed above should do a suitable job as long as it is kept up to date. I have yet to see security experts agree on which single scanner is the most efficient one at detecting and removing every virus and worm. Note however that I do not recommend Norton Antivirus as it is highly system intrusive, virtually impossible to remove, and does *not* strike a good balance between security and convenience.

The following is information on how to set up the recommended AVG Antivirus Free Edition software for optimal performance and minimal intrusiveness:

AVG ANTIVIRUS

While AVG Free Edition is a good virus scanner, it requires a fair bit of effort to remove its intrusive and performance-sapping functionality. None of the steps below is critical for AVG to work properly, however it is strongly recommended that you follow all of the steps below to remove/disable features which will slow down your PC and may also introduce instability, particularly when gaming.

1. During the installation of AVG, make absolutely certain that you select the Custom option, and I strongly recommend unticking the 'Email Scanner' , 'Plugin for Microsoft Office' and 'Linkscanner' components. These are unnecessary components which will result in performance issues. If you've already installed AVG before following this step then you can still uninstall the Linkscanner by using the method listed in this AVG FAQ.
2. Once AVG has installed, start it and go to the Tools menu, then select 'Advanced Settings'. I recommend the following settings:

    - Under the Appearance menu untick the 'Display system tray notifications' box to remove the unnecessary AVG icon in the System Tray/Notification Area.
    - Under the Ignore Faulty Conditions menu, tick the 'Resident Shield' and 'Update Manager' boxes to prevent constant unnecessary nagging by AVG.
    - Under the Linkscanner menu untick all available boxes. Note that this menu shouldn't exist if you followed Step 1 above.
    - Under the Scans menu, for each type of scan you should tick all available boxes except 'Automatically heal/remove infections' in each case - this ensures that should AVG detect a false positive, it won't automatically delete it from your system.
    - Under the Schedules menu untick every available option - instead I recommend updating manually prior to doing a manual scan at a time of your choosing.
    - Under the Resident Shield menu untick the 'Enable Resident Shield' box (if available) to disable this background functionality, as it can and will interfere with other programs and may reduce overall performance and stability.

3. While the changes above will reign in most of AVG's intrusive and problematic behavior, in addition to these changes, it is also recommended that you take some additional steps to disable unnecessary/intrusive components. To start with, AVG installs an active Windows Service called 'AVG Free8 Watchdog'. While this service needs to be left at Automatic for AVG to work, it actually runs two separate files in the background: *avgwdsvc.exe* (for the Watchdog Service) and *avgrsx.exe* (for the Resident Shield service). If you've disabled the Resident Shield feature of AVG, then it is also recommended that you to go to your *\Program Files\AVG\AVG8* directory and rename the *avgrsx.exe* file (also called *avgrsa.exe* on some systems) to something else; this will prevent it from starting up in the background without affecting AVG scanning capabilities.

4. Now run Autoruns (see the Startup Programs chapter) and under the Everything tab, untick the following AVG startup components which are unnecessary if AVG is configured as above:

   § *AVG8_Tray* - this item just relates to a tray icon which has no real benefit.
   § *Linkscanner* - this item shouldn't be shown if AVG is installed as above, but if it exists, untick it.
   § *AVG Safe Search* - this item shouldn't be shown if AVG is installed as above, but if it exists, untick it.
   § *AvgMfx86.sys* - this item is related to the Resident Shield functionality. Note on 64-bit systems this file is called *AvgMfx64.sys*.
   § *Avgrsstx.dll* - this item is related to the Resident Shield functionality. Note on some systems this file is called *Avgrssta.dll*.
   § All incidences of *AVG8 Shell Extension* - this removes the 'Scan with AVG Free' context menu entries.

Once all the steps above are completed, reboot your system and start AVG. You may see one or more red or orange warning prompts from AVG - you can safely ignore these. Click the 'Update Now' tab to run the web updater to ensure that AVG is up to date. If there are any problems, recheck the procedures above, and if nothing else works, uninstall AVG and reinstall it, then only follow steps 1-2 above this time. Note that for advanced users, if you want to further remove the resource usage and potential conflicts caused by AVG, you can set the 'AVG Free8 Watchdog' service to Manual so that it doesn't run in the background each time you start Windows. However if you do this then you must remember to manually start the service again before launching AVG for full functionality.

To start a manual scan of your system with AVG click the 'Computer Scanner' tab and then select 'Scan whole computer' to scan everything, or 'Scan specific files and folders' and then specify the particular folder(s) you wish to scan. Note that the 'Scan process priority' slider at the bottom of the scanning page effectively controls the speed of scanning - set it to the far right if you want the fastest scanning, though this will use more system resources.

I strongly recommend running the AVG Updater by clicking the 'Update Now' tab before doing any scan, to make sure the virus definitions are always up to date. Manually scanning your entire system once a week, and always scanning potentially harmful files which you have downloaded before you open or launch them is strongly recommended and more than adequate when combined with some common sense if you want to ensure your system remains clear of major malware.

Again, the background functionality of virus and malware scanners is notorious for causing conflicts and slowdowns, and most people don't realize that their scanner may be the cause of increased startup times, as well as stuttering or crashes in games for example. Unfortunately however, security software is gradually becoming more and more system intrusive due to the ever-growing threat of malware. AVG Antivirus Free Edition is the most popular free virus scanner, and is quite effective. The advice provided above is intended to ensure that you can continue to use this free scanner with minimal intrusion and resource usage, while still retaining its key functionality as a virus scanner. You can trial the other virus scanners linked to further above if you prefer another scanner, however sadly they are all heading towards greater intrusiveness, so all will require some level of customization and tweaking to strip back unnecessary resource usage.

< TROJAN HORSES

A Trojan, short for trojan horse, is a malicious program that is often installed on your system under the guise of being another program. Trojans differ from viruses in that they typically attempt to steal information from your system such as passwords, or control certain aspects of your PC without your knowledge, all for the benefit of the distributor of the trojan.

Trojans are increasingly becoming more of a threat than viruses. Many trojans are not detected by virus scanners, so you also need a dedicated trojan scanner. I personally use and recommend A-Squared Free to scan for trojans. It is one of the best free trojan scanners while also being the least intrusive. However you can also try one of the following scanners, though some are only free for a limited period:

The Cleaner
Trojan Hunter

The following is information on how to set up the recommended A-Squared Free trojan scanner.

A-SQUARED

To start with, make absolutely sure you are downloading A-Squared *Free Edition* as the other A-Squared versions are only free for the first 30 days. After installation of A-Squared, as long as you're running it under an Administrator account with full access privileges, you can set the new 'A-Squared Free Service' to Disabled as it is not needed. If you then have any problems, you can set it to Manual if necessary.

Each time you run A-Squared, click the 'Update Now' button on the main Security Status screen. The program will download all the latest updates. Fortunately the more intrusive aspects of A-Squared, such as 'Background Guard' background scanning, are not available in the free edition, so we do not need to configure/disable them. To set the depth of scanning used, click the 'Scan PC' option on the left of the main screen, and for normal usage select either Smart Scan or Deep Scan - I recommend Deep Scan which is longer but much more thorough. For more advanced users who want more control over the scan options, select Custom Scan and click the Scan button - you will be taken to a screen which allows you to configure individual scanning options. Once you've set your chosen scanning method, whenever you want to run a scan using A-Squared, you need only click the 'Scan Now' button on the program's main screen.

Note that A-Squared may find software which it classifies as Riskware, but is not actually malware. Such software is not necessarily malicious, it just carries greater risk in usage if your system is compromised by malicious software. To disable detection of such entries, go to the Scan PC screen, select 'Custom Scan' and you can untick the 'Alert Riskware that is often used by Malware' option.

< SPYWARE & ADWARE

Spyware is similar to a Trojan, in that it is software that is usually installed on your system purporting to have different functionality, or as a component of a useful program. Just like a trojan it transmits information about you, such as your passwords, Internet usage behavior etc. to the distributor of the spyware. Adware is a form of spyware that is less malicious as it is mainly used to target online advertising, however again it is installed without your permission. In either case this software breaches privacy and security and uses system resources and bandwidth for no useful purpose whatsoever.

A dedicated spyware/adware scanner will find and remove them from your system. I personally use Ad-Aware. It is available as a completely free download. However Ad-Aware can be more complex and system intrusive for some, so you may wish to try one of these other free spyware/adware scanners:

Spybot
Windows Defender

The bulk of spyware/adware found by these scanners is not always malicious, and typically consists of tracking Cookies - small files that keep information on your user preferences for a particular site. These have no real impact on performance or security, contrary to popular hysteria. However some spyware, such as keyloggers, *are* malicious and will seriously compromise your security for things like online banking, so in general you should find and remove all spyware and adware from your system just to be safe.

Importantly you should be aware that there are a wide range of spyware/adware and malware scanners which purport to remove malicious software, but ironically contain malware themselves, or are bad knock-offs of good scanners. Consult the lists below if you plan on installing any malware scanners other than the ones recommended in this guide:

Spyware Warrior Suspect List
2-Spyware Corrupt List

The following is information on how to set up the recommended Ad-Aware scanner.

AD-AWARE

After installing Ad-Aware, it should automatically update to the latest resource file. If not click the 'Web Update' button on the front page. Note that the program also installs a new service called 'Lavasoft Ad-Aware Service', and you can set it to Manual if you wish, though if you have any problems return it to Automatic. To set up Ad-Aware for the most effective and least intrusive scanning performance follow these steps. First click the Settings button on the top right of the main screen, then:

- Under the Updates tab, select the 'Do not automatically check for Updates' option under both categories.
- Under the Scanning tab, I suggest unticking the 'Add Ad-Aware to the Windows right-click menu' option at the bottom. The other available options can all remain ticked.
- Under the Ad-Watch Live tab untick the 'Process Protection' option to turn off Ad-Aware's background resource usage.

Once done, click OK. These settings should reign in most of the unnecessary functionality and intrusive aspects of Ad-Aware, without affecting its ability to pick up adware or spyware when conducting manual scans. Be aware however that even after all these changes, launching Ad-Aware will result in it opening up the Tray utility and leaving it active, requiring manual closure. There are two more changes you can make to reduce Ad-Aware's intrusiveness: using something like Autoruns, disable the 'Ad-Watch' and the 'Ad-Aware Update' items; you might also like to right-click and select Delete for the Ad-Aware icon added to your QuickLaunch bar, as it serves no real purpose.

To start a scan, click the 'Scan System' button on the main page, and I generally recommend a 'Smart Scan' for most occasions. If you suspect an infection, or want to be extra careful, select 'Full Scan' which takes longer but is more thorough. Make sure you regularly update Ad-Aware's reference file and routinely do a manual scan after any heavy Internet browsing, especially after visiting unfamiliar or risky sites, or when you suspect infection.

< ROOTKITS

A Rootkit is similar to a virus or trojan horse, but is specifically designed to mask its presence on your PC to make it easier for an intruder to secretly access your machine and conduct malicious activity. The problem with a rootkit is that it is specifically designed not to be detected, and actively works to remove telltale signs of itself so that most scanners cannot see it. There are however specific tools being designed to find and remove rootkits, with varying success, and the best free ones at the moment are:

Rootkit Revealer
Sophos Anti-Rootkit

Since one of the most common rootkits which has circulated in the recent past is actually installed on legitimate Sony music CDs (as part of their fight against piracy), you should also download and use the free Aries Rootkit Remover. Run the program, click 'Perform Scan' and you will see whether you have this rootkit installed. Note that to circumvent the installation of such rootkits on your PC from older Sony music CDs, make sure to disable the Autoplay functionality for CD/DVD drives (See the TweakUI chapter).

There is no need for specific usage advice, as these scanners are relatively straightforward to use - run them, start the scan and if anything suspicious is found you will be informed. However they do require some advanced skills in identifying whether an actual rootkit has been found, as opposed to a normal system file.

If you are not clear on whether the identified potential threat is genuinely a rootkit, you will need to do a fair bit of additional research on Google to confirm whether something is a genuine rootkit or not.

< PHISHING

While not a form of malicious software, Phishing is fast becoming a common and significant security threat. Typically it involves fooling unsuspecting users into revealing important information such as credit card numbers or passwords. For example a phishing attempt may involve tricking a user to click a fake 'confirmation link' in an email which takes them to a fraudulent copy of the user's bank login page, whereupon they enter their login details, giving the phisher the details they need to then login to the user's real bank account and rob them. Phishing is not malware as such, since it does not involve software infection, it uses social engineering techniques instead to defraud its targets. There are no 'scanners' as such to detect phishing. It requires knowledge, vigilance and some basic verification techniques by a user to detect and prevent. Fortunately there is some assistance now, as the latest versions of the three most popular Internet browsers - Internet Explorer, Mozilla Firefox and Opera - all have some form of phishing protection built into them.

In Internet Explorer 7, the Phishing Filter is enabled by default and will warn you if it suspects that a site you are about to visit is fraudulent. This checking process may add a slight delay to page loads as it checks a site. You can change this setting in IE7 by going to Tools>Phishing Filter and selecting 'Turn off automatic website checking'. You can still manually check any web page at any time by going to Tools>Phishing Filter>Check This Website, or click the small exclamation prompt in the Status bar. If you want to completely disable the Phishing Filter, go to Tools>Internet Options>Advanced and scroll down to the Phishing Filter section and select 'Disable Phishing Filter'. However unless you are an advanced user I strongly recommend against turning this feature off altogether; just turning the automatic website checking off is the best course. See the Internet Explorer chapter for more details.

The Phishing Protection feature in Mozilla Firefox is covered in more detail in my Firefox Tweak Guide, and once again it is strongly recommended that you do not disable this functionality altogether unless you are an advanced user. More details of Opera's Fraud Protection features are in this Opera FAQ and it too is best kept enabled unless you feel you can detect phishing without its help.

For the techniques required to prevent falling victim to phishing as well malware infestation, see the Important Security Tips section further below.

< BROWSER HIJACKERS

A certain category of malicious scripts attempt to alter certain aspects of your Internet browser's behavior, such as the default home page, the title bar of the window, additional toolbar icons - all without your permission. These scripts are typically called Browser Hijackers.

Aside from the usual malicious software scanners which may find the source of the hijacking, there is a specific tool designed to detect and remove hijack attempts called HijackThis. This tool is slightly more advanced than the average virus scanner, and trickier to use, however it may be your last hope if your browser is exhibiting undesirable behavior.

HIJACKTHIS

To use HijackThis, download the program and run it, then click the 'Do a System Scan and Save a Logfile' button to begin a scan of your system. When the scan is complete you will see a list of entries - don't panic, these are not all browser hijack attempts or malware. Almost all of these entries are related to legitimate startup items and modifications you may have made to your browser, such as installing a messaging program. To understand what each entry relates to, read this HijackThis Tutorial as well as the Startup Programs chapter of this guide to determine what should be kept and what should be removed. If you don't have the time or patience to manually determine what should or shouldn't be removed, you can either click the 'Analyze This' button on the results page, or post the contents of the *Hijackthis.log* file to this automated HijackThis Logfile Analyzer to get an indication of what is safe and what is not.

If you find that certain items are not necessary, or are malicious, then place a tick mark against every such item on the main HijackThis list after a scan (left-click on the small box next to each item), then click the 'Fix Checked' button. HijackThis will remove these items from your startup, but note that it keeps a backup of your changes under the Config>Backups section of the program, so if you need to undo anything you can highlight a backup and click the Restore button to return to the state you were in before.

To keep HijackThis updated, make sure you are online then click the Config button, click the 'Misc Tools' button and use the scroll bar on the right to scroll down to the bottom of the options list. Click the 'Check for update online' button to check for a newer version of HijackThis and be sure to download and install any available updates.

< IMPORTANT SECURITY TIPS

All the malware scanners and phishing protection in the world are no substitute for learning how to *prevent* malware infestation and how to detect and avoid phishing and other forms of online fraud. Once your system is infected with malware, or once you've compromised your credit card details for example, then it is often too late to prevent serious damage or loss, especially if the infection has already spread to your backups as well. Despite advances in technology there is no fully automated way of protecting you against every threat, so I strongly encourage you to read and understand the tips below.

BACKGROUND SCANNING VS. MANUAL SCANNING

There is no definitive answer as to whether you should enable or disable the background scanning functionalities of the various scanners covered above (where applicable). Background scanning provides greater protection from malicious software by both blocking their installation and/or providing the earliest detection of their activities. However by the same token, background scanning is most definitely not foolproof, and more importantly, the methods used by these scanners to detect malicious software in the background can and will conflict with various games and applications, and generally slow down your entire system by scanning all reads/writes to your hard drive. It all depends on whether you're willing to (or need to) sacrifice performance and stability for greater security.

For the average PC used in a home environment, I strongly recommend disabling all background scanning options in all your scanning software, both to maintain high performance and importantly to minimize any conflicts or issues with your applications and games. Most games and application developers now explicitly provide the same recommendation themselves in the installation and usage instructions for their software, so it is not just a personal belief of mine. Instead, I recommend doing regular manual scans using the various scanners above. The frequency should vary based on how often you visit risky or new sites, and install various software, but on average I recommend a full manual scan with each of these scanners at least once a week. Furthermore, follow the tips in this chapter to reduce your chances of picking up any malicious software in the first place - prevention is always better than cure.

FIREWALLS

I feel the built-in Windows Firewall is sufficient - when combined with the information in the rest of this guide - in protecting against system intrusion (See the Control Panel chapter for Windows Firewall setup details). It prevents external intruders from accessing your system, as long as you do not open lots of Ports and/or have lots of Exceptions. It also allows what it feels is necessary outgoing traffic, and asks you to choose whether to block particular connection attempts (such as those initiated by games or programs). This is one of the reasons why I recommend the built-in Windows Firewall, since it is the least troublesome to use, particularly for online gamers and the average home user.

However you do have other options if you want greater security. There are several commercial Firewall packages you can purchase and install. In particular the ZoneAlarm free firewall is recommended for those who want to use a third party firewall.

Finally, note that your Network Device may come with a hardware firewall which you can configure - see your manufacturer's site or the device's documentation for more details. For the average home user who is using a Network Router, you can access your device's settings by going to http://192.168.1.1 - again check your device's manual for specific details. It is important that you change the default username/password combination for this device, which is usually just *admin* for both. Log into the device's settings and change the password to anything else, as the default is a security risk.

EMAIL USAGE

- Avoid opening any emails from unfamiliar senders, especially if the subject of the email seems suspicious or inappropriate. Simply opening an email which contains a malware attachment will not infect your system, however it is still not advised. Most definitely do not click anywhere inside the email, as some emails use tricks such as text which is actually an image, and clicking anywhere on these will launch an undesirable link or launch a program download.
- Never save or open an attachment from a suspicious email, regardless of the format it appears to be in. It doesn't have to be an *.EXE, .BAT* or *.ZIP* file to be dangerous; seemingly innocuous formats such as *.SCR, .GIF* or *.JPG* files can be faked and may also contain malware. Remember that the most common method of infection for malicious software is accidental installation by users, so don't let your curiosity get the better of you - if you don't know the source of the email, then do not trust it or any attachments. If you believe an attachment is legitimate and save it, then manually scan it with multiple scanners first before opening it.
- If you receive an email purporting to be from your bank, financial institution or online store for example, never click on any links they provide, however genuine they may appear. Real institutions never use email to ask you to verify important details. These phishing emails usually refer you to a fake mirror image of the site you expect to see, and there they trick you into revealing your credit card number or personal details on a phony login screen. Links in emails can be 'masked' - that is they can seem real but the actual link is different to the underlined hyperlink text shown. Or the link may appear legitimate but have additional characters or other subtle alterations which actually point to another site. If you aren't sure if you actually do need to verify or alter details with an institution, close the email, open a new browser window and manually type in the known web address of your institution into your browser address window, and check for any notifications there.
- Never click on or use any links that contain just an IP address at the start (e.g. http://68.203.11.34). These links don't provide a site name because the name would tell you the site is a scam site, or not what it purports to be. Legitimate sites never use just an IP address.
- Never install any 'security patches' or 'important updates' that have supposedly been emailed to you from Microsoft, a software company or financial institution for example. Microsoft and other companies never send out updates or patches this way. Also never follow any provided links to an 'update site' or use a download link provided in such emails.
- Don't click on any links which supposedly remove you from a mailing list - these are used by spammers to verify that the email address is 'live' (i.e. a real person is receiving and opening their spam) and hence

you will receive even more spam, or worse still the links could download malware. For the same reason, never send any kind of reply to spam emails however tempting it might seem.

§ If an offer seems too good to be true, ignore it. This includes unfamiliar people offering you millions of dollars via email or chain letters purporting to give you good health or reward you with a free product after certain conditions. All of these are scams designed to either harvest active email addresses, perpetuate malware, or at best a prank.

See the Outlook Express chapter later in this guide for details of how to set it up to filter spam and also prevent harmful files from being easily accessible in emails.

INTERNET BROWSING

§ I strongly suggest that you always run the very latest version of your Internet browser to ensure maximum security. Both the Firefox and Opera browsers will check for updates and notify you if any are available, so always install them when prompted. Also regularly run Windows Update and install all the critical updates available, as many of these apply to Internet Explorer. Make sure to also enable the phishing protection features on these browsers.

§ If you are going to conduct a sensitive online transaction on a supposedly secure site, such as an online banking or online shopping site, make sure that once connected you look in your browser's address bar and see *https://* in front of the address (note the difference between *http://* and *https://*), and to further verify the credentials of a secure site before entering any sensitive details, double-click on the padlock icon which appears and make sure the certificate is verified as being issued to the web address or name of the company you believe it to be. If there is no *https://* and/or no padlock then the site is not fully secure and hence you should not enter sensitive information there. Contact the company by phone or email for more details.

§ If you have any doubts about a particular site you are visiting, note the site's name, then exit the site and do a Google search both on the site's name and its web address. You should be able to see if there is any positive or negative user feedback on the site. To see who actually owns and operates the site, go to Whois and enter the site address in the top box to see more details. If the details are unclear or suspicious, do not trust the site.

§ Avoid visiting sites that purport to provide free software, music, movies etc. - basically anything that seems too good to be true or is illegal. These sites are usually designed to both earn money from advertising clicks or referrals to other websites, and more often than not attempt to install malicious software on your system or use scripts to compromise your browser through any known exploits.

§ Never install any certificate, software or plugin for your browser that does not come from a trusted site. Even if a website insists that you must install certain software in order to view their content or perform a function, ignore or cancel all such attempts unless the site is reputable and completely familiar to you. The most common software you require for Internet multimedia functionality are the Flash and ShockWave players, as well as Java, which you can install safely by downloading the latest versions directly from here: ShockWave Player, Flash Player, and Java.

See the Internet Explorer chapter later in this guide for more details of how to configure Internet Explorer properly, or see my Firefox Tweak Guide if you use the Firefox browser.

PEER-TO-PEER, MESSAGING AND IRC PROGRAMS

§ Peer-to-peer (P2P) programs (e.g. Bittorrent and its variants), instant messaging (e.g. ICQ, MSN or AIM) or Internet Relay Chat (IRC) programs (e.g. mIRC) can be used to send and receive files directly to and from other peoples' machines so you must be extremely careful when using them. Go through their configuration options and ensure that you are not sharing files or directories which contain potentially sensitive information such as passwords or licenses. Make sure to disable any automatic downloading features, so that you at least see a prompt before a file can be downloaded onto your machine. If you must swap files using such programs, I strongly recommend that you create a new empty folder and only allow download and upload access to this folder. Then place copies (not originals) of all the files

you wish to share into that folder, and disallow access to any other directory or drive on your system. Scan any files downloaded through these programs with multiple scanners before opening them.

- § Do not download or install any software which purports to allow you to steal other peoples' passwords or serial numbers, lets you 'store' your passwords/serial number, or lets you 'hack email accounts' for example. Ironically these are usually trojans designed to steal *your* passwords and serial numbers.
- § Before downloading a file from a peer-to-peer program you can usually tell if a file is real or fake by the number of people who are sharing it: the less people sharing a particular file, the more likely it is that it is either a fake, a renamed file, or worse still it contains malware. However there is never any guarantee that any file is legitimate or indeed free of infection, even if it is popular.

Downloading files over P2P is one of the more risky things you can do because there is absolutely no indication or guarantee that the actual contents of the file(s) you are downloading are legitimate or safe until you download and attempt to open them. It is strongly recommended that you minimize your exposure to such programs. If you insist on engaging in a lot of file sharing then I strongly recommend that you manually scan all your downloaded files with at least one each of a virus, trojan and spyware scanner before opening them, and that you increase the frequency of your regular manual system-wide scans.

ENCRYPTING FILES

If after reading all the tips in this chapter you suddenly feel the urge to protect certain files on your system even more carefully, you can do so by using Windows XP's built-in File Encryption technology on systems formatted with NTFS. To encrypt a file, open Windows Explorer, go to the file you want to encrypt and right-click on it, then select Properties. Click the Advanced button at the bottom of the General tab, and select 'Encrypt contents to secure data' and click OK then Apply. You may be shown the option to encrypt the entire folder, in which case select to do so for maximum security but note that all the folder's contents will also be encrypted. Now only a user with your account password and login can access the file. For all other users the file will remain encrypted and inaccessible. You can give access to other users manually by going back into the file's Properties>Advanced and clicking on the Details button and adding in a user.

For more detailed Windows XP security information, read the Microsoft Windows XP Security Guide.

BALANCING SECURITY VS. PERFORMANCE

In the past the balancing act between adequate security and convenience tended more towards convenience, since security threats were not as prominent, and even if you caught a virus, it was often just a harmless prank or at worst it ruined a few of your files. I recall as far back as 1987 I would regularly get viruses on my Amiga 500 computer, and they were little more than a nuisance, sometimes even entertaining in their own way. However unfortunately in the past few years there has been a significant rise in genuinely *malicious* software; namely software designed solely to do harm to your system and/or compromise your personal financial information. This coincides with the rise in the number of people who are using the Internet to pay bills, do their banking and go online shopping.

The stakes are much higher now, so it is far more important to pay attention to the security of your PC, and it will continue to become even more important in years to come as the malware creators and online fraudsters find increasingly more complex and intrusive ways of getting into your system. They make millions of dollars from undertaking this sort of activity, so they have every incentive to innovate. This is why it's important to learn more about PC security. You will need to do more than just a couple of manual scans of your system every week or two, or enable a malware scanner or two in the background to keep it secure. The balancing act between security and convenience has now swung more towards security than purely convenience, so you must make some effort to keep your system secure, even if this can be a bit of a pain at times; it's simply unavoidable now.

I've tried in the chapter above to give what I believe is still an acceptable balance between security and convenience, and importantly keeping in mind the impact on performance for people like gamers. Rather

than just suggest the use of background malware scanners which can hurt performance, I have recommended a combination of Windows own built-in features, third party tools used in manual scanning, as well as preventative behavior to create a good layer of defence with no real performance impact.

MEMORY OPTIMIZATION

This chapter looks at the configuration and optimization of memory-related functionality on your system. It is very important to understand how your computer uses the various forms of memory on your hardware, as well as how the Windows Memory Management system works in conjunction with this hardware. Memory-related hardware and software settings have a major influence on your system's responsiveness, performance and stability, not to mention your data integrity. A system with mis-configured memory-related settings risks slowing down, stuttering, becoming unstable, crashing to desktop, experiencing errors and sudden reboots, and ultimately causes data corruption which can eventually make your system unbootable.

Each component of the memory subset is dealt with separately below, I urge you to read and understand how all of these components work.

< MEMORY HARDWARE

The following are the common forms of memory hardware used on most modern PCs:

CPU CACHE

The CPU Caches are memory chips that cache (buffer) information for faster usage by the CPU, since the CPU is the central component of your system. They assist in temporarily storing the information in anticipation of reading/writing by the CPU, preventing any bottlenecks or slowdowns. The cache chips themselves vary in storage capacity depending on your CPU, but essentially they are physical chips that you should not have to worry about. Windows and your associated hardware are designed to automatically detect the size of these caches and use them optimally as long as you have them enabled in your BIOS. That is, if options relating to the use of CPU L1 and CPU L2 Cache are present in your BIOS, never disable them unless troubleshooting. Aside from BIOS settings, there is a `SecondLevelDataCache` Registry setting for manually adjusting your CPU's L2 Cache setting. However altering this setting is not necessary, as the default value of 0 already allows Windows XP to automatically identify and use the correct L2 Cache size.

In general since the user has no control over the CPU's L1 and L2 caches (aside from ensuring that they are enabled in the BIOS), this is one area of the memory subset you should not worry about unless you are troubleshooting a memory-related problem. For example, a CPU with a faulty cache may exhibit strange behavior such as constantly returning data errors and CRC errors. In these cases you can try temporarily disabling the caches in the BIOS to see if this reduces or resolves errors. Also see the Benchmarking & Stress Testing chapter to find out how to run a CPU-specific stress test to isolate whether the CPU is the source of such problems.

PHYSICAL RAM

This is probably the most well-known form of memory. RAM (Random Access Memory) usually comes in sticks composed of multiple memory chips adding up to a certain size (such as 256MB or 512MB). Physical RAM, also referred to as System RAM, Physical Memory or just RAM, holds information in storage that can be read from and written to by your system components. It is a temporary holding area for data, and is constantly being accessed when your machine is on. The advantage of RAM over other forms of storage such as your hard drive is that it is much, much faster to access, so optimal RAM usage means faster and smoother performance for your system. There are three main factors affecting RAM performance: RAM size, RAM speed and RAM timings, each covered below.

RAM Size: This is the actual storage capacity of the RAM in MegaBytes (MB) or GigaBytes (GB). The main impact of having more RAM is that - when combined with appropriate Windows Memory Management settings - your system will perform more smoothly. This is because data has to be loaded less often from

your hard drive, as more of it is stored in RAM, making it easier to access rapidly by your CPU and the rest of your system. Windows XP requires a minimum of 64MB of RAM to operate, with 128MB or more recommended for normal functionality. Furthermore many recent games require 2GB or more of RAM to perform optimally without stuttering or displaying frequent loading pauses. There are no RAM size tweaks; essentially if you have a low amount of RAM (e.g. 512MB) then it is strongly recommended that you consider getting more RAM, especially if you constantly experience stuttering and long pauses in games or the Desktop for example. Bear in mind however that Windows XP 32-bit cannot practically use more than 4GB of RAM; only the 64-bit version can do that.

RAM Speed: This is the frequency at which RAM operates (in MHz), much like the speed at which a CPU operates. The higher the RAM's speed, the faster it can undertake the operations it needs to perform. Each stick of RAM has a speed rating, which is the speed *up to which* a stick of RAM is certified to safely operate. However the *actual* speed a RAM module is currently running at on a particular system varies depending on how fast it is set to operate in the BIOS and your Front Side Bus/HyperTransport speed. For example, a DDR PC3200 RAM module can operate at up to 400MHz (2x200MHz) while staying within specifications. However it is possible to adjust your BIOS such that the RAM can operate at a higher or lower speed in practice. The bottom line is, the faster the RAM's actual speed in MHz, the faster it reads and writes information and the better your performance. Remember though that the speed rating is not the same thing as the actual RAM speed - it is only an indicator of how fast it can *potentially* perform and has no direct bearing on performance. The more the RAM's actual speed surpasses its rated speed, the greater the chance for instability, so ideally you should keep the RAM at or below its rated speed for maximum stability and data integrity. See the Overclocking chapter for more details of how to adjust RAM speed and the impacts this has.

RAM Timings: These are composed of several variables, set in your BIOS, which determine not the frequency of the RAM module (RAM speed), but the Latency of the RAM - that is, the amount of time it waits between updating various signals. For example the RAS (Row Access Strobe) and CAS (Column Access Strobe) latency settings measure in nanoseconds the delay in sending signals which specify firstly the row in which a particular memory cell is located, and then the column. The lower the RAM timings in nanoseconds, the less time the RAM rests between these operations, and hence the faster it performs, but the greater the chance for errors and instability. Just like speed ratings, RAM modules come with recommended timings already encoded in their Serial Presence Detect (SPD) on a special chip. These SPD settings are used by default by your system unless manually changed in the BIOS, and when used with the recommended speed rating (see above) ensure maximum stability.

If you want to improve the performance of your RAM and your entire system, you can lower its timings and/or increase its speed - see the Overclocking chapter. However any time your RAM is running faster than its rated speed or timings, this can decrease your system's stability and increases the potential for errors particularly when the system is under stress. Importantly, if you want to test your RAM for stability, see the Benchmarking and Stress Testing chapter for more details.

VIDEO RAM

Video RAM (VRAM) is the memory built into your graphics card and the size of this is usually quoted in MB as part of the graphics card's specifications (e.g. 768MB 8800GTX). This RAM acts as a temporary storage location to hold graphics information for faster access by your graphics card, much the same as system RAM does for general information. For this reason the VRAM is also called the Frame Buffer, in that it holds (buffers) individual graphics 'frames' ready to send to your monitor one by one. Just like physical RAM, VRAM has a speed in MHz, and a latency in nanoseconds, with the higher the speed and the lower the latency the better the graphics performance. Unlike physical RAM, altering the latency of your VRAM is tricky and not recommended, though still possible. The speed in MHz can also be altered up or down using an overclocking utility, with the faster the speed the higher the performance, but once again the greater the chance of graphical glitches and freezes. See the Overclocking chapter for more details.

If you want to see the actual amount of Video RAM being used at any time, for example during gaming, you can use the free Video Memory Watcher utility to dynamically monitor the amount of VRAM in use. Run it in the background during a brief gaming session, then exit and look at the graph it generates to see how much VRAM has been used.

If you're interested in a plain English step-by-step overview of how the hardware memory features above are utilized for a task like gaming, check the Graphics Process section of my Gamer's Graphics & Display Settings Guide for details.

< WINDOWS MEMORY MANAGEMENT

Another important part of your memory subset is the Windows Memory Management settings. These are software settings which include the System Cache and related Windows Registry entries. This is an area with the most tweaking potential, and all the major memory management settings are covered below:

DISK CACHE

The Windows Disk Cache size can be set through the System component of the Control Panel, in the Windows Registry, or by using a utility like Cacheman. This setting controls how much RAM is set aside to assist in buffering information written to and read from your hard drive(s) to achieve faster information transfer. The optimal setting for most systems is the default 'Programs' option under Memory Usage in Control Panel>System, or the 'Balance' option in Cacheman. Selecting the 'System Cache' option ('Maximize throughput...' in Cacheman) may result in drive errors for some people, and is really only designed for server applications - that is, machines which are constantly writing/reading from the hard drive - and hence it is strongly recommended that it not be used for home PC users.

ICON CACHE

Windows keeps a copy of all your most commonly used icons in its icon cache, speeding up the display of these icons (on the Windows Desktop or in Explorer for example), rather than fetching them directly from each executable or file every time you view them. You can assign the number of icons to hold in the cache by editing the Registry entry below:

```
[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Explorer]
Max Cached Icons=2000
```

Edit this STRING value to set the maximum number of icons which can be cached. A value of 2000 should be optimal for most systems.

GENERAL MEMORY SETTINGS

There are several registry settings that are presented as controlling various memory usage behaviors in Windows. Unfortunately, over time these have proven to be useless. Specifically these are the `DisablePagingExecutive`, `IOPageLockLimit` and `AlwaysUnloadDLL` entries. If you have already applied these tweaks, don't worry as they are totally harmless, but they appear to be unnecessary and completely non-functional, so I removed them from this guide quite a while ago. If you still want to apply these tweaks because you feel they have some impact on your system, you can use Cacheman (See below).

WINDOWS PREFETCHER

The Windows Prefetcher creates prefetch files for the most commonly used programs, and attempts to use these to more efficiently seek and load up data. You can configure it through the following Registry entry:

```
[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Session Manager\Memory Management\PrefetchParameters]

EnablePrefetcher=3
```

The allowable values for `EnablePrefetcher` are:

0 - Disable Prefetcher
1 - Application launch prefetching
2 - Boot prefetching
3 - Both application and boot prefetching

The default is 3, which should be fine for most systems. Note that if the Task Scheduler service is Disabled (See the Services chapter), much of the Prefetcher functionality becomes disabled. If you wish to use full prefetcher functionality, do not disable the Task Scheduler service.

I personally leave the Prefetcher registry setting above at its default of 3, and set the Task Scheduler service to Disabled. This means the prefetcher won't create application prefetch files under the Window\Prefetch directory. I also clear all out existing prefetch (*.PF*) files in that directory. I have found that this provides for the fastest Windows bootup time, and yet does not noticeably increase my game or application loading times. Experiment to see if this is the case on your system, or try a value of 2 in the prefetcher registry entry above. If you don't see any benefits, then simply re-enable the Task Scheduler service and/or reset the prefetcher value to the default. The relevant prefetch files will be automatically recreated and optimal within a few days of using your system.

CACHEMAN

Cacheman is a free utility that provides a user-friendly interface for making most of the memory and cache-related changes covered above, and in the Windows Registry chapter. To access Cacheman, download Cacheman 5.50, install it and then launch the program. Cacheman is in no way an essential tool, as most of the important tweaks can be performed using the Registry Editor and TweakUI. However Cacheman does provide a simple interface for making these changes for those not willing to edit the Registry - just make sure to follow the recommended advice for each major setting as shown further above in this section, and also do not enable any 'memory recovery' features of Cacheman, nor do you need to have it run at Windows startup for the settings to work.

VIRTUAL MEMORY

Virtual Memory refers to a memory management technique used in several generations of Windows. During normal operation, system RAM is the best place to store information for fast access by your CPU and other components, since it has no moving parts and information in it can be accessed at many times the speed of any hard drive or CD/DVD. When RAM starts to run low, or if XP determines a particular application is no longer a high enough priority, it breaks up some of the portions of memory (called 'pages') and temporarily swaps them out from your RAM to your hard drive. This 'swap file' where the memory pages are held on your hard drive is called *pagefile.sys*, and resides in the base directory on your hard drive (e.g. *C:\pagefile.sys*). That's why you will often see the terms Virtual Memory, Pagefile and Swapfile being used interchangeably to refer to the same thing. Note you will only see the actual *pagefile.sys* file if you have unticked the 'Hide Protected Operating System Files' option under Folder Options - see Folder Options under the Control Panel chapter.

The information provided here is based on this Virtual Memory in Windows XP Guide and Virtual Memory Optimization Guide. These guides give you a good insight into how Virtual Memory works in Windows XP. I recommend that you read them both if you want to gain a clearer understanding of what virtual memory is, and why most of what you may believe concerning virtual memory and 'freeing up RAM' are not quite true. What follows below are my personal recommendations for Virtual Memory configuration based on a combination of the above guides and my own experience.

To access your Virtual Memory settings, go to the Control Panel>System>Advanced>Performance>Settings>Advanced>Virtual Memory section and click the Change button.

Clearing the Pagefile: Before setting a new pagefile size or location, you need to first clear your existing pagefile. To do this select each relevant hard drive, choose the 'No paging file' option and click the Set button, then you need to reboot your system. This step does two things: first it clears the pagefile, fixing any potential pagefile corruption which can occur after a bad shutdown; and secondly it ensures that any new pagefile you create will start off as a single unfragmented contiguous block on your hard drive for optimal performance, which will remain unfragmented in the future. Note that if you have any problems booting back up into Windows due to a lack of a pagefile during this step, enter Windows in Safe Mode and continue the setup procedures for Virtual Memory from there - see the Backup & Recovery chapter.

Location of the Pagefile: Once you've cleared the pagefile, you can now set its physical location. Highlight the logical drive where you want the pagefile to be placed under the Drive window. Which drive or partition the pagefile should be located on is based loosely on the following scenarios:

- 1 Hard Drive with 1 Partition - The pagefile can only be located on the first primary partition of your hard drive, which provides optimal performance.
- 1 Hard Drive with 2 or more Partitions - Make sure the pagefile is placed on the first primary partition as this is the fastest partition. Placing the pagefile on another partition of the same drive does not simulate the benefits of having two hard drives since the read head of a single drive can still only seek information from one place at a time.
- 2 Hard Drives or more (similar speeds) - If all your hard drives are similar in terms of their rated speed, you should put the main pagefile on the drive that *doesn't* contain your Windows installation and applications/games. If you've already separated your Windows installation from your applications/games, then place the pagefile on the drive which doesn't contain your applications/games, even if this is the Windows drive. This is primarily to reduce hard drive head movement on the main disk when an application or game is running, and speed up access to the pagefile on the other disk when needed.
- 2 Hard Drives or more (different speeds) - If one drive is faster than the others, you should put the pagefile on that drive, particularly if you have low system RAM (i.e. the pagefile is accessed more often).
- RAID Configuration - For striped RAID configurations such as RAID 0 or RAID 5, Windows sees these as a single large hard drive, hence you cannot actually choose which drive to place the pagefile on; it will be split evenly across the drives which is optimal. If you have a separate faster drive outside the RAID configuration, you can shift the pagefile there.

After selecting the location of the pagefile, you can then determine its size in MB. In the Virtual Memory settings screen select the 'Custom size' option. Although there are many differing opinions as to how big the pagefile should be, it is important not to 'disable' your pagefile regardless of how much RAM you have. Windows and certain programs *need* a pagefile in order to operate correctly. Setting the pagefile to zero does not force Windows to use your physical RAM. Windows Memory Management does not work that way.

To determine the optimal pagefile size you should ideally see how much memory your most memory-intensive programs use and then set the pagefile to comfortably accommodate this. A rough and ready way of doing this is to configure your Task Manager as specified under the Task Manager chapter, then run what you believe is your most memory-intensive application or game and use it for a period of time. Then without

quitting the game or application, bring up the Task Manager and check the peak memory usage figure for the largest process under the Processes tab - this should indicate how much memory the program usually needs. Also after a period of time using various applications and games on your system, open up Task Manager and go to the Performance tab, then check the Peak figure under the 'Commit Charge (K)' section - this is approximately the maximum amount of memory in KB required so far by your system. These will give you an indication of how much total memory you need when going through the next step.

For most people however accurately working out which is the most memory intensive application or game, and more importantly predicting the amount of memory future software will require is tedious if not impossible. Therefore I provide a simple general recommendation which is both safe to use on all systems, regardless of how much RAM you have, and provides good performance:

Set the Initial and Maximum pagefile sizes to 2048MB each - i.e. allocate 2GB for the pagefile.

This may seem like quite a lot, but the reason for this is that recent games now require a lot more real and virtual memory to function correctly, even if you have 2GB of RAM or more. Having a larger pagefile size does not hurt performance as such; it only takes up a bit of additional disk space. So on balance my recommendation is to play it safe.

Once you've adjusted your Virtual Memory size settings click the Set button and reboot if required. Your pagefile will now be in a single fixed unfragmented file, created closer to the start of the hard drive for faster performance. There will be plenty of headroom for memory-intensive applications and games and you should notice smoother performance. It will also not become fragmented in the future.

Note that the common advice about the pagefile being 1.5 x RAM or some other multiple is not intuitively correct. Consider the situation where you only have 128MB of RAM: setting the maximum pagefile size to 1.5 x 128MB = a 192MB pagefile, which when combined with your 128MB of system RAM gives Windows only 320MB of total available memory for Windows XP which is obviously not anywhere near enough memory for modern games and applications. In effect it is about how much *total memory* (RAM + Pagefile) that should be made available for Windows to operate efficiently.

If at the end of all this you still have doubts about what to do, or you run into any problems, you can either further increase the fixed pagefile size (make sure to reset to 0 first, then reboot); set a 'semi-permanent' pagefile which has an Initial size equal to your current system RAM, and a Maximum size which is high, e.g. 3072MB; or failing all of the above, simply revert back to the 'System Managed Size' setting to let Windows manage the pagefile size. Whatever you do, don't set a zero pagefile.

Finally, if after all the tweaking you find that you're still experiencing slow loading times and stuttering, you will simply have to increase the amount of physical RAM in your system and/or consider purchasing a faster hard drive. For example, 512MB or even 1GB of RAM is now generally insufficient for current games to run smoothly in Windows XP regardless of any virtual memory tweaking you undertake.

DRIVE OPTIMIZATION

Windows Memory Management is tied closely to the way the hard drive is used in Windows. The reason for this is mentioned under the Memory Optimization chapter: your hard drive can be used as a temporary storage area, but is one of the relatively slower components of your system. Even the fastest hard drives cannot read or write data as quickly as RAM. So when one of your components such as the CPU or graphics card needs information, to prevent pauses, stuttering or slowdowns, as much of the information as possible should be held in RAM for fast access. However regardless of how much RAM you have, or how efficient Windows is with memory management, at the end of the day RAM is only a temporary form of storage which is cleared each time your PC shuts down. Therefore it is the hard drive where all your information is permanently held, and your system must regularly access the hard drive for data, from the moment the PC starts up to the time you run a program.

This chapter covers the primary means by which you can improve and maintain the performance of your hard drive(s) in Windows. Many aspects of drive performance are already covered in other chapters - you should have already:

§ Formatted and partitioned the drive correctly (See the Installing Windows chapter).
§ Made sure to have the correct BIOS settings (See the BIOS Optimization chapter).
§ Installed the latest motherboard drivers (See the Driver Installation chapter).
§ Have correct relevant Windows settings (See the Control Panel and Memory Optimization chapters).

Follow the rest of the instructions in this chapter to make sure your drive(s) remain fast and responsive.

< WINDOWS DISK INDEXING

This is a performance tip that I strongly recommend you implement. The Windows Disk Indexer constantly indexes all files on your machine to allow for faster searching using the Windows Search function for example. Since most people don't search their machine very often, having Disk Indexing enabled provides a performance hit for no good reason, and also increases fragmentation. Follow these steps to turn off the Windows Disk Indexer to improve general hard drive performance and responsiveness:

1. Go to Windows Explorer, right-click on your hard drive name (e.g. *C:*) and select Properties.
2. Untick the 'Allow Indexing Service to index this disk for fast file searching'.
3. Select 'Apply changes to [*Drive letter*]\, subfolders and files' in the subsequent prompt.
4. Your system will now go through and remove all indexing on existing files, and not index any new or moved files in the future - this will speed up drive read/writes and general responsiveness. Ignore any 'errors' which are shown, this occurs simply because some files are in use or protected and can't have their properties changed to remove indexing - this is normal.

Make sure you also disable the 'Indexing Service' service as it is no longer necessary when disk indexing is removed from your hard drive (See the Services chapter).

< DRIVE CONTROLLERS

To optimize the performance of your hard drive(s), first make sure you have installed the correct motherboard drives for your particular motherboard, as the drive controllers on your motherboard require these for optimal operation, as well as special functions like RAID - see the Driver Installation chapter.

Next, open Device Manager, found under Control Panel>System>Hardware, and go to the Disk Drives section in Device Manager and expand it. Right-click on each hard drive available, select Properties, and under the Policies tab make sure 'Optimize for Performance' is selected. If available, also tick the 'Enable

Write Caching on the disk' option. The aim is to allow the hard drive to use a Cache – a small area of memory set aside specifically for the hard drive – to speed up reading and writing to the drive. Note that these options may not be available to be changed here for certain SCSI, Serial ATA (SATA) and/or RAID configured hard drives. If you are using such a configuration, select the 'SCSI Properties' tab and make sure that both 'Disable tagged queuing' and 'Disable synchronous transfers' are unticked for maximum performance.

To optimize all system drives, in Device Manager go to the 'IDE ATA/ATAPI Controllers' section and expand it. Right-click on each sub-controller listed and select Properties and see the relevant section below:

Parallel ATA Controller: This controller affects all PATA drives which use the IDE interface - typically this is older IDE hard drives and CD/DVD (optical) drives. Go to the 'Primary Channel' and 'Secondary Channel' tabs and check the transfer speeds as relevant - the maximum possible speeds are Ultra DMA Mode 4 for optical drives, and Ultra DMA Mode 6 for IDE drives. If you untick the 'Let BIOS select transfer mode' box you may be able to alter the speed here, but if it is below the maximum then it may be due to one or more of the following factors:

- Your motherboard does not support Ultra DMA 6 or Ultra DMA 5 modes for hard drives - these are also called ATA 133 and ATA 100 respectively. Check your motherboard manual and make sure you have installed the correct IDE drivers for this motherboard.
- Your BIOS is not configured correctly to enable the highest speed - see the BIOS Optimization chapter.
- You are sharing a hard drive and a CD/DVD drive on the same channel - move them to separate channels.
- Your hard drive(s) or CD/DVD drives don't physically support the highest transfer mode available on your motherboard. This should only be the case if they are quite old.
- No drive should be running in PIO or Multi-word DMA mode as these provide poor performance. Check your BIOS and any switches on the back of the drive(s).

Serial ATA Controller: This controller affects all SATA drives connected to your motherboard. Right-click on this controller, select Properties, then go to the 'Primary Channel' and 'Secondary Channel' tabs. If a drive is connected to these channels, the 'Transfer Mode' should show the correct maximum speed for the drive - 1.5GB/s for SATA I, or 3.0GB/s for SATA II. Alternatively click the 'Speed Test' button to do an actual quick benchmark of the drive's speed and see the speed rating. The 'Let BIOS select transfer mode' box should be ticked unless you are troubleshooting, or you see 'PIO Mode' for your hard drive, which is sub-optimal; in that case untick the box and manually attempt to switch to a better mode. The other boxes should all be ticked for maximum performance.

AHCI Mode: If you run a SATA drive, you can try enabling Advanced Host Controller Interface (AHCI) Mode on your SATA controller in your BIOS. This mode has a range of benefits, especially on SATA II drives with NCQ support - this includes quieter operation and better multi-tasking capabilities. However it will not necessarily result in a speed boost depending on how you use your system. Furthermore it requires appropriate drivers from your motherboard manufacturer (e.g. the Intel Matrix Storage drivers for Intel motherboards) to function properly. Most importantly, if you do not enable this mode in your BIOS *prior* to installing Windows, you will experience an error and may not be able to boot back into your system if you switch to AHCI on an existing install of Windows. It is recommended that if you wish to switch on AHCI mode, you make the appropriate changes in your BIOS and then reinstall Windows XP.

If your hard drive is not set to the highest mode possible for its type, or some of the options are unavailable here then you have not set up your BIOS correctly or you have not installed the correct SATA motherboard drivers. To confirm your drive's actual speed, and whether there really is a problem, you can benchmark your drive using a utility like Sandra - see the Benchmarking & Stress Testing chapter.

Most recent hard drives come with a technology called SMART - if available and enabled in the BIOS. This technology prevents drive errors and provides diagnostic information. To further diagnose any hard drive problems for non-RAID configuration hard drives using SMART, use a utility like PassMark Disk Checkup.

< MASTER FILE TABLE

The Master File Table is a system area of Windows which contains an entry for every file and directory on your drive with information on its size, attributes, permissions, timestamps and so forth. In a way, it is like a table of contents for your drive, and as such serves a very important function. By default Windows reserves around 12.5% of your total drive space to allow the MFT to grow without becoming fragmented. This space cannot be reduced, but over time it may need to be increased - especially after creating lots of new files or installing numerous applications and games. Fortunately Windows will automatically manage the MFT, increasing its size as necessary.

However if your drive has a relatively large number of files, over time the MFT may become fragmented as it grows beyond the initial space allocated to it by Windows, and this can affect performance. You can use a third party defragmentation utility to defragment the MFT and thus keep it optimal - see further below for details of these.

If for some reason you want to manually increase the amount of space Windows reserves for the MFT - and this is generally not recommended - you can do so via the Registry Editor by going to:

[HKEY_LOCAL_MACHINE\System\CurrentControlSet\Control\FileSystem]

NtfsMftZoneReservation=1

The DWORD above is set to 1 by default, which means it is automatically managed. However you can give it a value of 1 - 4, with higher values reserving larger portions of the drive for the MFT. The specific percentages for each value are purposely not documented by Microsoft, as they may change in the future.

< WINDOWS DISK DEFRAGMENTER

As information is written to or deleted from your hard drive, portions of individual files will become fragmented and physically spread out all over the drive. This happens because as Windows starts writing the data for a file onto the drive, when it reaches an occupied portion of the drive it jumps to the next available empty spot and continues writing from there. So a single large file may actually be in several separate chunks in various locations on your drive. The more the files on your system are fragmented, the more time your hard drive takes to find all these fragments and access the information it needs at any time. It's like trying to read a book with the pages out of order. This can clearly reduce drive performance and increase the potential for stuttering and loading pauses.

Windows Disk Defragmenter (Defrag) is a built-in utility that performs a very important function: it puts all these file fragments back together with each other in the same location on the disk and also attempts to pack them closer to the start of the drive to speed up reading and writing to these files. This reduces loading times and greatly reduces annoying loading pauses and stuttering. To access the Windows Defrag utility, go to Start>Run and type "Dfrg.msc" (without quotes) and press Enter, or look for the Disk Defragmenter in your Start>Programs>Accessories>System Tools menu. Make sure there are no open applications or games running in the background and then in the Defrag window simply click the Defragment button to begin defragmentation. Do not do anything else while this process is being completed. It may take quite a while to complete so be patient. The longer it takes, the more good it is doing your drive. If tweaking a new install of Windows, make sure to run Defrag immediately after installing the system drivers and core software as this will move all the important system files to the start of your hard drive where drive access is fastest.

Note that for any defragmentation program to work, whether Defrag or a commercial package, you must have 15% or more free drive space to give the program room to temporarily relocate files as it defragments.

BACKGROUND DEFRAGMENTATION

By default, Windows also defragments your hard drive in the background whenever your system is idle. It does this to maintain optimal layout of your important files, such as your boot files. That is why you may see hard drive activity even when there are no programs or games running in Windows. This is fine, since it does not interfere with your programs or games - it only occurs when the system is truly idle. You can disable this behavior if you really wish by using Cacheman for example, but this is not recommended. The other source of background drive usage is the Disk Indexer, which you should disable (See further above).

< ADVANCED DEFRAGMENTATION

If you want to do a more thorough defragmentation of your hard drive and get better results you will have to look beyond the built-in Disk Defragmenter in Windows XP - even Microsoft admit this in this Microsoft Article. There are several applications which can defragment a disk in more efficient ways, and also defragment files which the Windows Defragmenter cannot move, such as system files (the green blocks in Defrag). The benefits are spelt out more clearly in this White Paper. Note that the Windows pagefile will not become fragmented if configured correctly as detailed in this guide (See the Memory Optimization chapter), so pagefile fragmentation is not an issue.

PAGEDEFRAG

To defragment your system files for free, you can use the PageDefrag utility. It is fairly simple to use, and upon launching it you can see at a glance how many fragments your major systems files are in - to be optimal they should all be in 1 fragment each. To run a defragment using PageDefrag, launch the program and click the 'Defragment at next boot' option, then reboot. This will defragment your major system files, which can only be done at boot time - something which the regular Windows defragmenter cannot do. However even the author of PageDefrag suggests you use it in combination with other defragmentation software such as a commercial package, or his own Contig utility.

DIRMS & BUZZSAW

If you are an advanced user, you can try the Dirms and Buzzsaw defragmentation utilities. These utilities are free but require re-registration every 30 days. They also require a bit more work in figuring out and using, so they are not covered here in detail, and are not recommended for the average user.

For ease of use and maximum safety, I recommend a third party defragmentation package for most users, since these usually come with detailed instructions, are fully automated and fairly foolproof. Defragmenting involves lots of file movements, sometimes sensitive system files, so it is important that the software you use to defragment be rock-solid. There are several advanced defragmentation utilities you can use in XP which are not free, but the free trial versions have full functionality with sufficient time for you to judge their usefulness before considering whether to purchase them or not:

Diskeeper
PerfectDisk
O&O Defrag

I personally prefer Diskeeper since the default Windows Disk Defragmenter is simply a cut-down version of Diskeeper anyway. Below is my advice for configuring and using the latest version of Diskeeper.

DISKEEPER

While Diskeeper isn't free, you can download and try its full functionality for 30 days for free. I recommend that you trial the Pro Premier Edition as that is the edition that has all the functionality listed below, including the I-FAAST and Invisi-Tasking features. Once Diskeeper is installed, it takes the place of the Windows Disk Defragmenter, so if you click the regular Defrag icon it will also launch Diskeeper instead. Note that Diskeeper also installs an additional service called simply called 'Diskeeper', which is necessary for the day-to-day usage of Diskeeper, so it needs to be kept at its default of Automatic.

Below is detailed advice on how to set up and use the recommended Diskeeper defragmenter optimally.

Automatic Defragmentation: To start with, Diskeeper is now designed to automatically defragment files 'on the fly' using only available background resources via the Invisi-Tasking feature. This should ensure that your system is always defragmented even if you don't manually defragment. I recommend that you try this feature to see if you prefer it, and to gauge the performance impact it has on your system. To enable or disable this option right-click on the relevant drive and select 'Automatic Defragmentation'. I personally choose to disable it and prefer to manually defragment after specific events (as listed further above), as this minimizes the likelihood of any additional stuttering caused by this feature running in the background.

Manual Defragmentation: To perform a manual defrag at any time start up Diskeeper and follow these steps:

1. Click on the logical drive you want to defragment, and click the Analyze button.
2. Once the drive analysis is over - the progress is shown in the bottom right corner - click on the 'Volume Map View' drop box and look at the results in both File Performance and File Structure views, paying attention to the color legend shown at the bottom. While not a perfect representation of fragmentation, in general, the more red and pink areas you see, the more benefits defragmentation will give.
3. Click again on the logical drive you wish to defrag and click the Defragment button. As defragmentation begins you will see a graphical representation of the blocks of files which are being moved, and a progress meter at the bottom.
4. Once the defragmentation is over, you will see that the layout shown under the 'Volume Map View' File Performance section has changed, showing a defragmented (blue) drive. If you can still see pink areas, see the boot time defragmentation instructions below. Note that any areas of cross-hatched green and white are normal reserved system areas, typically for the Master File Table (MFT).

Note that the latest version of Diskeeper monitors the MFT using what it calls the 'Frag Shield', and automatically configures it for optimal performance as long as automatic defragmentation is enabled. There is no longer any need for manual adjustment of the MFT, nor any warnings regarding its size.

Boot-Time Defragmentation: To defragment certain system files you must periodically do a 'Boot-Time Defragmentation'. This is because some files are protected system files and can't be moved while they're loaded up in Windows. To do a boot time defrag using Diskeeper, follow these instructions:

1. Open Diskeeper and highlight the logical drive where your pagefile resides.
2. Right-click on that drive and select 'Boot-Time Defragmentation'
3. In the box that opens, tick the 'Enable boot time defragmentation to run on the selected volumes' box and select 'Run boot time defragmentation the next time this computer is manually rebooted'. Then tick all available options except 'Produce the summary log file'.
4. Click the Apply button, and then OK and a boot-time defragmentation is now scheduled. Note if you change your mind and want to cancel this, simply follow steps 1-3 above but this time simply untick the 'Enable boot time defragmentation...' box and click Apply.
5. Reboot your system and upon rebooting Diskeeper will commence defragmenting system files for optimal performance.

Do not disturb this process and at the end of it press ESC to boot back into Windows. Upon booting back into Windows I recommend doing a manual defragmentation of your drive again with Diskeeper.

The Diskeeper Professional Premier version contains a technology called I-FAAST which is not available in other versions of Diskeeper. It is basically an advanced analytical method. I-FAAST can result in an improvement in drive performance, but whether you want to invest in the Pro Premier version of Diskeeper to be able to use it is up to you. Again I recommend trialing it first to see whether I-FAAST makes any practical difference on your drive. If you run into any problems when using Diskeeper, you should check the Diskeeper FAQ.

A third party defragmentation utility is not essential, as the normal Windows Disk Defragmenter utility is sufficient for most tasks. I do however recommend at least trialing a utility like Diskeeper for a few weeks to see if it makes a real difference on your system - it can have a noticeable impact particularly in reducing stuttering in games. Regardless of whether you use the built-in defragmenter or a third party utility, make sure to defragment regularly as it is essential to optimal drive performance.

FREQUENCY OF DEFRAGMENTATION

Whether using the Windows Defragmenter, or a commercial package, I strongly recommend also doing a manual defrag immediately after any of the following events:

- Installation of any game or application.
- Patching any game, application or Windows.
- Installation of any drivers.
- Adding or deleting very large file(s).

This is particularly necessary for gamers, since games are already quite prone to stuttering and longer loading times due to their data-intensive nature, so by defragmenting your drive after a game installation or patch, you help reduce stuttering in the game.

Neglecting to defragment your hard drive after a major drive operation such as those listed above may see your applications or games take longer to load, exhibit frequent stuttering and pausing, and generally reduce your hard drive's performance. There is no need to defragment daily or hourly, and indeed you shouldn't just defragment on a set time schedule. Manually defragmenting regularly also reduces the time it takes to defragment your drive, so that each time you do it, it should only take a few minutes at the most, even for a large drive, since only small portions of files need to be rearranged.

< BOOT ANALYSIS & OPTIMIZATION

By default Windows already detects and optimizes your Windows bootup time by placing the relevant files in optimal positions on the disk. This is done frequently, however you can speed up the process by doing it manually after you install major system drivers. Furthermore by analyzing your boot procedure you can troubleshoot any problems which may be slowing down your Windows startup. This is best done using a tool called Bootvis.

BOOTVIS

Bootvis is the Boot Visualizer tool from Microsoft, which shows information about the specific programs, drivers and services that are loaded up during your Windows startup procedure, and how long each one of them takes. This information can be very useful in identifying precisely what is taking the most amount of time at bootup, and if necessary lead to uninstalling or altering hardware and software which is causing any long delays. Bootvis does more than just analyze the startup procedure - it can also optimize it by laying out the required files in an optimal pattern for faster bootup times. This usually results in dramatically faster

loading of Windows, and that is the primary purpose to which we will put Bootvis. To access Bootvis download it from this Bootvis Download Site and install it.

Before you use Bootvis however you should note that although it is a Microsoft-produced utility, it was removed from the Microsoft Bootvis Page a while ago for an unspecified reason. The likely reason is that it can cause problems on certain systems, although it is unclear which particular types of systems. The bottom line is that you should backup your data before using Bootvis, just in case.

Note that for Bootvis to operate correctly, the Task Scheduler service needs to be set to Automatic (see the Services chapter). This is very important, otherwise Bootvis will not complete its Boot Trace or Optimization tasks after rebooting.

ANALYZING SYSTEM STARTUP

To analyze your system with Bootvis, run the program and go to the Trace menu, then select 'Next Boot + Driver Delays'. Let Bootvis reboot the system, and on rebooting wait patiently for Bootvis to pop back up when it's finished analyzing. It will display several graphs that show the various startup components laid out sequentially in time shares. Make sure to use the scroll bars to look at the various graphs in their entirety. If you want to identify which programs are associated with particular applications or drivers, consult the Startup Programs and Services chapters for more details.

OPTIMIZING SYSTEM STARTUP

To optimize your bootup procedure using Bootvis, first go to your *\Windows\Prefetch* folder and delete the entire contents. Then start Bootvis, go to the Trace menu and select 'Optimize System'. Once again let Bootvis reboot and wait for it to restart after the reboot. It will say 'Optimizing System' for a while. Once this is done you can reboot your system and observe that your bootup times will now be much faster. Ideally any time you install new drivers or add new pieces of hardware to your system you should redo the entire Bootvis procedure to maintain an optimal startup time.

In the end though, this is not absolutely necessary because by default Windows will automatically optimize your startup after several days, so if you don't feel confident using Bootvis for this purpose or don't have the time, it is not an important step. However using Bootvis to analyze your startup can be very handy in helping you identify potential slowdowns in the startup process, so if only for that purpose, Bootvis is worth having on your system.

THE CONTROL PANEL

This chapter covers all the general options available under the default Windows XP Control Panel, which is an important central location for accessing many Windows settings. I cannot go into each section of the Control Panel in great detail due to space considerations however all the important settings which are relevant to the average home PC user are covered here and where necessary you will be referred to other relevant chapters of this guide for more information. Take the time to go through this chapter carefully as although it is long, it is very important for Windows performance and functionality.

Note that you may have additional items showing in your Control Panel, as some third-party programs will automatically insert shortcuts into the Control Panel, however only the default Windows XP items are covered below. If you wish to remove a third party shortcut from the Control Panel, in most cases you can right-click on it and select Delete to remove the icon (not the program itself). For some Control Panel icons you will have to find the relevant file under the *\Windows\System32* directory - all Control Panel icons have the extension *.CPL* - so for example to remove the 'Nvidia Control Panel' icon rename or delete the *nvcpl.cpl* file in the directory above, then close and reopen the Control Panel, and it should be removed. Alternatively, you can go to the Control Panel section of the TweakUI utility and remove unnecessary components - see the TweakUI chapter.

< ACCESSIBILITY OPTIONS

There are a range of features here that can be used to accommodate different keyboard usage styles, make Windows easier to see on screen, or provide audible notification of events for example. Quite obviously which settings you choose will depend on your individual requirements. If you want to find out more about these options go to the Windows Accessibility Page. For the majority of users who do not need to use any accessibility functions, make sure that every option under each of the tabs is unticked for maximum performance and minimal interference with the functionality of games and applications. For example, if the 'Sticky Keys' option is left enabled, it is known to cause unintended interruptions in some games (when the SHIFT key is pressed multiple times in a row it will activate it).

< ADD HARDWARE

This utility allows you to go through a set of procedures for adding a new piece of hardware to your system. In most cases though, since Windows XP is a plug-and-play operating system, and as long as you have 'Plug and Play' enabled in your BIOS (See the BIOS Optimization chapter) and the 'Plug and Play' service set to Automatic (See the Services chapter), all you need to do to add any new hardware is to connect it to your system and XP will detect it, and either automatically install basic drivers for it, or if it can't determine the type of hardware, request that you insert a driver disk - see the Driver Installation chapter. I strongly recommend that before adding any new piece of hardware, you spend some time and read through the installation instructions which come with the hardware, as some have unique requirements for optimal installation which may be different to what you might expect, and in some cases the default Windows XP driver will not function as well as the latest specific drivers for the device.

< ADD OR REMOVE PROGRAMS

The main use for this utility is not so much for the addition of new software - that typically only requires that you insert the installation CD/DVD into your drive and follow the procedures from there, or the execution of the software's setup executable file. Rather this tool is most useful for looking at existing software and drivers currently installed on your system and quickly being able to remove ones that are no longer needed. It is always a good idea to go through this list periodically and remove software that hasn't been used for a long time. You can sort this list in various ways by going to the top right corner and for 'Sort by', selecting either Name, Size, Frequency of Use or Date Last Used.

On the left side of the screen, you will see the major functions available under this utility. We've covered the addition and removal of software so far. You can also 'Add/Remove Windows Components', which is covered in the Cleaning Windows chapter. The final option is the ability to 'Set Program Access and Defaults' that is covered below.

SET PROGRAM ACCESS AND DEFAULTS

Click the 'Set Program Access and Defaults' button, and on the next screen you can choose from two presets (Microsoft Windows or Non-Microsoft), or as I recommend, click on the third Custom option. Next, click the double down arrows to the right of Custom. Here you can set the default Web Browser, email program, media player, instant messaging program and Java virtual machine.

For example, if you want to make Mozilla Firefox the default Internet browser instead of Internet Explorer, as long as you already have it installed on your system the option to select it as the default should appear here. Select it, and make sure a tick appears in 'Enable access to this program' next to it. You can disable access to Internet Explorer by removing the tick in the 'Enable access to this program' box next to it as well. This won't uninstall Internet Explorer, it simply removes access to it, which is not recommended. I recommend you select 'Use my current Web browser' instead which should be fine for most purposes and ensure a tick appears next to all browsers below it so that you still can access them all as need be.

Although Microsoft has incorporated this feature as a result of charges relating to monopolistic behavior, bear in mind that quite often you must use a Microsoft product for optimal trouble-free usage. For example, only Internet Explorer can access the Windows Update site properly by default, and only Windows Media Player can provide optimal playback of *.WMA* files. Other methods to access these sites and files do exist, and they are covered in the Internet Explorer and Windows Media Player chapters of this guide, but they are not necessarily as secure or as optimal, so don't disable access to these default applications for that reason. Instead configure them correctly as detailed later in this guide. In all cases I recommend selecting 'Use my current...' and allowing access to all the components beneath. There is one exception - if you want to disable access to Windows Messenger as part of removing it from Windows, untick the 'Enable access to this program' box next to it, as it has no other use.

< ADMINISTRATIVE TOOLS

There are seven main administrative tools under this category. Some of them may not be available if you run Windows XP Home. In particular if you are running Windows XP Professional, you will also have access to the Group Editor, but that is covered separately in the Group Policy chapter. If you have installed the .NET Framework on your machine, you may also have access to the .NET Config and .NET Wizard tools. I cannot go into detail about all the functions of these administrative tools because they are capable of a great many things, however I provide brief details of the primary Administrative Tools and point out their most useful aspects for the average home PC user below.

COMPONENT SERVICES

This tool allows system administrators the ability to deploy and administer component services applications or automate administrative tasks. For our purposes, the only real usage is the Event Viewer and the Services components, both of which also have separate tools to allow direct access to them - see each of these below.

COMPUTER MANAGEMENT

The main unique use for the Computer Management tool is the Disk Management sub-component, which you can access by expanding the Storage item in the left pane and then clicking on the Disk Management item that appears underneath it. You will then see your hard drive(s) listed in the top right pane, with all your available drives (including CD/DVD drives) listed in the bottom right pane.

If you want to change any of the drive letters on your system - for example if you want to swap your CDROM drive from *D:* to *E:* or just change it to a new letter like *Z:*, you can do so here by right-clicking on the drive letter in the bottom right pane and selecting 'Change Drive Letter and Paths', then highlighting the drive letter which appears, and selecting the Change button, and assigning a new drive letter.

If you want to convert a hard disk from a Basic to a Dynamic volume, you can do so here by right-clicking on the Disk 0 (or Disk 1, etc) box in the bottom right pane, and selecting 'Convert to Dynamic Disk'. Dynamic disks can emulate a RAID array - that is they can span multiple drives as though they are one large drive. The features of Dynamic Disks are discussed in this Microsoft Article. Note that dynamic disks are a storage type not supported on Windows XP Home Edition or earlier versions of Windows. It is not recommended that you convert your disk from basic to dynamic, because even though you can covert back to a basic disk you will lose all your data. If however you have a specific reason to use this function, the option is here.

DATA SOURCES (ODBC)

This tool lets you add and configure drivers for managing access to data on various database management systems. Unless you use databases extensively on your machine, you can ignore this tool. There are no general functions for this tool that can be discussed here. Note that this is the same tool as the Data Sources (ODBC) item in the main section of the Control Panel.

EVENT VIEWER

The Event Viewer tool shows a list of events under the Application, Security and System categories. These events are recorded by Windows over time, and reflect information alerts, warnings and errors that have occurred to date. You can view the (limited) details of an event by double-clicking on it. Event Viewer can be used to troubleshoot an event if you haven't had the chance to see an error message - for example because your system rebooted before you could read it. More details on using this tool are provided in the Windows Errors chapter.

LOCAL SECURITY POLICY

This tool allows you to establish and alter security-related settings. This is best left at default and I recommend that you do not change any of these settings unless directed to by a Network Administrator or a Technical Support expert. All the important security settings relevant to home users can also be adjusted elsewhere as detailed in this guide.

PERFORMANCE

This tool allows users to examine the various performance variables on their system, such as CPU usage or page file usage in graphical and numerical form. You can add components to the display by clicking the large '+' button above the graph. A more user-friendly interface can be added to the Performance Monitor by downloading the Microsoft Performance Monitor Wizard.

SERVICES

This tool is extremely useful in configuring service usage under Windows XP. Changes to settings made under this tool can affect performance, stability and XP functionality quite noticeably, so see the Services chapter dedicated to explaining these features in more detail and showing you how to optimize them.

That covers the initial look at all the administrative tools in Windows XP. As mentioned, certain tools are covered in more detail later in this guide due to the need to use them often. Generally though, aside from the Services utility and Event Viewer, and possibly Computer Management, you should not need to access the administrative tools very often and great caution should be used when changing any settings with them.

< AUTOMATIC UPDATES

The Automatic Updates function in Windows allows your machine (when connected to the Internet) to periodically check for updates on the Windows Update website and depending on the options you set here, download and install them as necessary. When set to Automatic here, Windows will check for updates as often as you specify, and if an important update for your system is found it will download and install it for you at the same time. If you specify 'Download updates for me, but let me choose when to install them', Windows will download the updates but only install them when you choose. Neither of these two options is recommended, as updates may be downloaded and/or installed at inconvenient times and without your explicit consent. Although no Microsoft updates are harmful, I still recommend you keep tight control over the downloading and installation of Windows Updates.

Instead, if you feel as though you will forget to check the Windows Update site regularly, and want to be told whenever important updates are available, select the 'Notify me but don't automatically download or install them' option. That way you will be told when an important update is available, but you can still choose if/when to download and install it.

My personal preference (and the most optimal for performance and privacy) is the final option: 'Turn off Automatic Updates'. This means the Windows Update service will not constantly run in the background, taking up resources, and at the same time you can simply check the Windows Update website manually every few days to see if you should download any important updates. Not only does this give you full control over updates, you will also be able to access updates much sooner this way, as they are often available via Automatic Update much later than on Windows Update or the Microsoft Download site.

Note that the 'Automatic Updates' service must be set to Automatic to allow you to access the Windows Update website, even if you set Automatic Updates to Off here, so don't disable it.

< DATA SOURCES (ODBC)

This tool is discussed under the Administrative Tools entry above, and has exactly the same function.

< DATE AND TIME

DATE AND TIME

Set the current date and time under this tab.

TIME ZONE

Select the time zone that applies to you, and also tick the 'Automatically adjust clock for daylight savings' option. This means that whenever daylight savings changes in your area, the clock will be automatically set forward or back as appropriate - handy if you rarely remember when daylight savings actually occurs.

INTERNET TIME

In general you can leave the 'Automatically synchronize with an internet time server' option ticked so that the system time is always correct. Alternatively you can untick the box and periodically update manually whenever you are connected to the Internet by clicking the 'Update Now' button instead. See the Services chapter for details on how to disable the Windows Time service as well if you decide to disable this functionality here.

< DISPLAY

THEMES

You can switch between the Windows Classic theme, which makes XP look like previous versions of Windows, or select the Windows XP theme. You can also save any changes you make to Windows XP's look by creating a custom theme and saving it. Selecting the Classic theme will provide some memory savings due its less graphically intense nature, however if you prefer the Windows XP theme I recommend you use it regardless. There's no reason why you should tweak away the aesthetics of Windows XP for no major performance gain. You spend a great deal of time looking at the XP interface, so on balance a few MB of memory sacrificed to make the interface easier on the eyes is not that bad - uglier does not really equal faster in this case. See the Visual & Convenience Tweaks chapter for details of how to customize the interface and add more themes.

DESKTOP

Select a Wallpaper you would like to display in the background of the Windows Desktop. If the default ones listed in the preview pane are not to your liking, you can choose one from an existing picture anywhere on your hard drive or from an inserted CD/DVD by clicking the Browse button. Note that if you want to minimize memory usage and speed up bootup time, you should either not use a wallpaper at all, or preferably select a wallpaper that is the same size as your desktop and less intricate - that is, a picture with a smaller file size.

Click the 'Customize Desktop' button. Here you can also select whether to display or remove the My Documents, My Computer or My Network Places icons on your Desktop. Removing these icons (unticking them) here will not disable their functionality, it will simply remove their icons from the Windows Desktop. Note that if for some reason you wish to remove the Recycle Bin from the Desktop see the Group Policy chapter or the Windows Registry chapter for the relevant tweak. You may also wish to change the appearance of any of the main system icons that appear on the Desktop. You can choose to alter their appearance by highlighting them in the scroll list below, selecting 'Change Icon' and assigning a new icon in their place.

SCREEN SAVER

You can select a particular screen saver here, to be displayed after a set period of idleness. Modern CRT and LCD monitors don't actually require screen savers to protect them from 'burn-in' (permanent image imprinting), so a screen saver is not an absolute unnecessary. However you may want to enable the screensaver to prevent static images becoming temporarily imprinted on some LCD screens, and of course Plasma screens are more susceptible to permanent burn-in and should definitely be protected by using a fully animated screensaver, or the Blank screensaver. Note that the settings under the Power button are covered under Power Options further below.

APPEARANCE

I personally prefer the Windows XP Style for Windows and buttons. This uses a small amount of extra memory over the Windows Classic Style, but looks much nicer in my opinion and has no significant impact on performance. If you are genuinely struggling (e.g. running 256MB of RAM), then you may notice an improvement in responsiveness by switching to the Windows Classic Style. You can adjust the individual elements of the desktop theme by clicking on the Advanced button, selecting the element you want to change from the drop-down list, and adjusting its properties accordingly.

Under the Appearance tab, click the Effects button, and I recommend unticking the 'transition effects', 'show shadows under menus' and 'show window contents when dragging' options here for maximum responsiveness on the desktop. However once again if you particularly like these effects you can leave them enabled without any major impact on most modern systems. LCD users in particular should enable the

ClearType option here under the 'smooth edges of screen fonts' setting - see ClearType further below for details.

SETTINGS

You may find two monitors listed under the Display list. This is normal for some graphics cards, even when only one physical display is currently attached. Select the Screen Resolution you want for the Desktop, and the Color Quality to go with it. Note that some recent programs and games may experience problems if the Desktop is anything less than 32 bit Color quality, so 32 bit (if available) is recommended for maximum stability and compatibility - the performance degradation is insignificant on your Desktop, and there is no reason to select any lower bit depth on modern PCs.

If you click the Advanced button under the Settings tab, you will be taken to the control panel for your graphics card. While many sections of this screen differ based on your particular graphics card, all graphics cards share the following common elements, which are described below:

General: The DPI (Dots Per Inch) setting determines the relative size of everything on your screen. If you run at extremely high or extremely low resolutions for example, you can change the DPI to scale the elements of your screen to a more suitable size without having to change your resolution. The default of 96 DPI is recommended for most people. I also recommend selecting the 'Apply the new display settings without restarting' option, as you do not need to restart your machine each time you change a display setting.

Adapter: Here you will find the details of your current graphics adapter (i.e. your graphics card). If the details are incorrect, this could indicate a poorly installed or incorrect graphics and/or motherboard driver, or modified hardware. Check your details against those provided by the tools in the System Specifications chapter.

Monitor: Here you can set the Refresh rate used by your monitor for the current screen resolution. I strongly recommend that you first tick 'Hide modes that this monitor cannot display', then select the highest refresh rate listed. The refresh rate determines how many times per second the image onscreen is redrawn. The higher the setting, the more times the screen is 'refreshed', and the less strain there is on your eyes. It is strongly recommended that you use a utility called Refresh Force to force the highest possible refresh rates at each resolution on your system. This utility is easy to use, and is supported by all graphics cards. Note that many LCD displays generally refresh at 60Hz maximum, which is fine since LCD-based displays work on a different principle and don't need a high refresh rate - see this page of my Gamer's Graphics & Display Settings Guide for an explanation of what Refresh Rate is and how it works in Windows and in games.

Under the Troubleshoot tab, move the slider under 'Hardware acceleration' to the far right, and tick 'Enable write combining'. This ensures maximum performance, and you should only change these if troubleshooting a specific graphics-related problem.

Under the Color Management tab, select the color profile that matches your monitor model and click the 'Set As Default' button. If there is no profile listed for your monitor, click the Add button and select one which matches your monitor model, or if none seem appropriate, insert your monitor's driver disk, browse to your CD/DVD drive and find the correct .ICM file, then click Add. Alternatively go to your monitor manufacturer's website and download the latest driver for the monitor, then install it and recheck the list here when you click the Add button. The color profile ensures your monitor displays colors as they are intended to appear, which can be particularly important if you are doing things like web design.

CLEARTYPE

For users of LCD panels and other fixed-pixel display devices that may require some enhancement to make text appear sharper and clearer on screen, particularly when using non-native resolutions, Microsoft has an option called ClearType you can enable by going to your Display properties (See above), selecting the Appearance tab, clicking the Effects button, and changing the 'Use the following method to smooth edges of screen fonts' to ClearType. However, to fully customize ClearType you need to use this Microsoft Online ClearType Tuner, or download and use the ClearType PowerToy Utility. In either case, ClearType greatly improves font display quality by reducing jaggedness, so it is recommended you use it if you run an LCD or other fixed-pixel digital display.

GRAPHICS CARD CONTROL PANEL

For full details on how best to configure the remaining graphic card-specific elements of Display Properties, for ATI graphics cards you should refer to my ATI Catalyst Tweak Guide, and for Nvidia cards you should refer to my Nvidia Forceware Tweak Guide. Also check my Gamer's Graphics & Display Settings Guide for clear explanations of how major graphics-related settings and features work.

When you're done altering the settings in Display Properties click the Apply button. Then go back to the Themes tab, click the 'Save As' button and select a new name and location to save your customized theme.

< FOLDER OPTIONS

GENERAL

Under the General tab, select 'Use Windows classic folders' to get rid of the lumped-together 'common task' icons. The choice is yours of course, but this guide assumes you are using the classic folders view when giving directions on accessing features. If necessary you can use classic folders only while following this guide, and then switch back to the default XP folder view once you're finished.

Select 'Open each folder in the same window' to reduce open windows and hence unnecessary memory usage.

Select 'Double-click to open an item (single-click to select)' as this is the default method most Windows users are familiar with, and the one which is assumed when providing descriptions in this, and most other guides. Again, you can always switch to the other method once you have completed using this guide.

VIEW

I recommend you *tick* the following options:

- Display file size information in folder tips
- Display simple folder view in Explorer's folder list
- Display the contents of system folders
- Show hidden files and folders
- Show and manage the pair as a single file
- Remember each folder's view settings
- Show encrypted or compressed NTFS files in color
- Use simple file Sharing

It is recommended that the following are *unticked* for best performance and functionality:

§ Automatically search for network folders and printers (don't untick if you are on a Network)
§ Hide extensions for known file types
§ Hide protected operating system files
§ Launch folder windows in a separate process
§ Show popup description for folder and desktop items

Any remaining options can be ticked or unticked according to your tastes and needs.

FILE TYPES

You can view and change which tools will open particular file extensions by default. For example, scroll down to the TXT extension (text documents) and highlight it. In the details below you can see that the default tool for opening *.TXT* files is Notepad, and if you click on the Change button you can choose another application as the default. Sometimes certain installed applications will quietly change these default programs to suit their own needs without asking you, so check back here if you find your files opening with something other than the application you want to use, and make changes as appropriate.

OFFLINE FILES

I recommend you untick 'Enable Offline Files'. You'll still be able to view saved/cached web pages offline. If the option is unavailable, it is because you have Fast User Switching enabled (See User Accounts below), in which case you can ignore this section.

< FONTS

This item displays the contents of your *\Windows\Fonts* folder, which contains all your currently installed system fonts. Fonts are the various types of text styles used by a variety of programs such as word processors, paint programs and the Windows Wordpad for example. You can install a new font simply by copying its *.FON* or *.TTF* files into this folder, or by going to the File menu and selecting 'Install New Font...' and pointing to the directory where the new font files reside. Note that TrueType is a font technology that ensures good scaling and that what is displayed on your screen should come out exactly the same on your printer - other types of fonts may look slightly different in different applications and/or when printed and/or when using different font sizes. To find out more about fonts, go to the Microsoft Typography Website. A good site that contains additional fonts you can download and install for free is Simply The Best Fonts.

< GAME CONTROLLERS

This tool allows you to add or remove gaming controllers on your system. This typically includes gamepads, joysticks and game simulation hardware. Note that although often used in PC games, the mouse and keyboard are not classed as 'game controllers' here - they have their own separate setup tools in the Control Panel (see Keyboard and Mouse below).

Note that most joysticks require something called Calibration - a process under the device's Properties which tells Windows when the joystick is at absolute dead center, when it is at far right, far left, etc. If this is not done then often you will find the joystick may be unresponsive in certain directions, or it will constantly be read by Windows as moving in one direction when it is actually dead center, and so on.

The majority of game controllers have their own software for installing and setting up the device, however firstly I recommend clicking the Add button in the Game Controllers section and using the closest device description which matches your device. If then during gameplay you find your device is not functioning at all, or missing certain functionality, you should then install and use the device-specific software. This will minimize the background resource usage that specialized device drivers often bring with them.

Finally, if you play certain games only using the keyboard and mouse combination, and you find your character is displaying strange movement behavior (e.g. constantly moving in one direction with or without user input), then physically disconnect all game controllers from your system (excluding keyboard and mouse) and reboot, then relaunch the game.

< INTERNET OPTIONS

This setting in the Control Panel simply brings up the Internet Explorer 'Internet Properties' box. There is no difference between accessing it here and accessing from within Internet Explorer, so see the Internet Explorer chapter for full details of how to configure these options. Note if you are using another browser as the system default browser then clicking this item will still bring up the Internet Explorer 'Internet Properties' box - this is normal and cannot be changed.

< KEYBOARD

Under the Speed tab, I recommend you set the 'Repeat Delay' slider to the far right and also set the 'Repeat Rate' slider to the far right. This will increase the responsiveness of the keyboard in Windows XP. You can also adjust the 'Cursor Blink Rate' to your taste, and then click OK to apply. You can test these settings in the box provided to see if they suit you. Note you can further customize the cursor's blink rate and width under the Display tab of the Accessibility Options item in Control Panel.

< MOUSE

I only cover the basic mouse settings here, and most of the settings in this section can be adjusted to taste. If you have installed a special mouse driver for your mouse, you may see different settings under this screen, however the settings below should still be available on most systems with a mouse.

POINTERS

I recommend you untick 'Enable Pointer Shadow' at the bottom.

POINTER OPTIONS

I recommend ticking the 'Enhance pointer precision' option before you adjust your pointer speed. This option enhances the acceleration/deceleration of your mouse to provide for larger movements when you move the mouse fast, and finer movements when you move the mouse more slowly, allowing a balance between speed and precision. I recommend unticking the 'Display pointer trails' option to reduce mouse 'lagginess' unless you have an older or less clear screen and/or have difficulty keeping track of mouse movements.

WHEEL

If your mouse has a mousewheel, you can increase the wheel's responsiveness by increasing the number of lines it will scroll on each turn of the wheel. Even an increase from the default of 3 to 4 for example will make a subtle, but noticeable difference if you previously found the mousewheel relatively unresponsive.

INCREASING USB SAMPLE RATE

If you have a USB mouse and want to increase the rate at which it takes samples of its current position - thereby increasing accuracy and responsiveness - check this USB MouseRate Switcher. Please note there is a fair bit of risk involved in using this utility as it affects all USB devices, so follow the instructions closely before implementing, and only use it if you are an advanced user.

< NETWORK CONNECTIONS

Because of the sheer variety of network connection hardware, and the potential for doing more harm than good, altering your Network Connections settings is not a simple procedure and I will not be covering it in detail in this guide. If you have a Dialup connection - that is 56K or lower connection speed - then read this Dialup Modem Tweak Guide for more details. If you have DSL or Cable, use the information from this DSL/Cable Tweak Guide for guidance. If you are on a Network of computers, consult your Network Administrator before attempting to alter any of the Network Connection settings, and be very careful about which other settings you implement from this guide, especially those under the Services chapter, as the advice is not designed for Networked users.

In general, I recommend that you do not alter your network-related settings, as more often than not, your connection will end up being slower rather than faster, and in many cases you may lose Internet functionality. Most network connections require specific procedures to set up optimally, and these are usually documented in the device's instructions which is the best place to look for tips and advice.

QOS PACKET SCHEDULER

The following is recommended for home dialup and Cable/DSL users (but not for Network or Shared users). Right-click on the device you use to connect to the Internet, and select Properties. Go to the General tab, and under the 'This connection uses the following items' list, make sure the 'Internet Protocol (TCP/IP)' option is available and ticked. Now select every other item listed, including the 'QoS Packet Scheduler' and click the Uninstall button to remove them. None of these are required for regular Internet usage by a single non-networked machine, and removing them will reduce unnecessary resource usage. Should they be needed again you can always simply reinstall them from here at any time. Note if you disable the QoS Packet Scheduler you should also disable the 'QoS RSVP' service (see the Services chapter). Neither are required for the average home Internet user.

WINDOWS FIREWALL

Under the Advanced tab click the Settings button and turn the Windows Firewall On as advised previously, unless you have third party firewall software already installed, in which case activate that instead, and disable the Windows Firewall. To find out more about Firewalls see the PC Security chapter.

< NETWORK SETUP WIZARD

This wizard will take you through the steps required to connect a network device, including any device that connects your machine to the Internet. You can follow the steps in the wizard to connect your device, however I generally recommend you follow the instructions that come with your device instead, along with instructions from your particular Internet Service Provider (ISP).

< PHONE AND MODEM

As mentioned under Network Connections above, because of the variety of modems that can be used to connect to the Internet, or to other electronic devices, I cannot provide specific setting recommendations here for each device. Check the links under Network Connections above for more details.

As with installing any other type of peripheral device under Windows XP, typically the best installation procedure is to simply connect the device to your system, and wait for Windows XP to identify the device and install the default drivers. However in the case of modems I recommend installing the latest available drivers or at the very least the drivers which come on the device's driver CD. If you have any doubts about what settings to use once the device is installed, I strongly recommend leaving them at their defaults. Changing these settings can see your modem or device not function correctly, and hence you may not be able to connect to the Internet. Note that devices listed under Phone and Modem may include devices loosely identified as 'modems' such as mobile phone/PDA data hookups.

< PORTABLE MEDIA DEVICES

If you have a portable media device connected to your system, such as an MP3 player, you can manage the device here. It is recommended that you refer to your device's instructions as to how best to configure it for connection and usage with Windows.

< POWER OPTIONS

POWER SCHEMES

You can set the periods of time after which your monitor, your hard drive and/or your entire PC go into a power-saving standby state to conserve energy. You can select an appropriate preset scheme such as 'Portable/Laptop' or 'Always On', or you can customize the settings yourself.

Unless you have a power-limited device, such as a laptop running on batteries, I recommend selecting 'Always On' to start with. Next, for the 'Turn Off Monitor' option, I recommend selecting a period which is not too short, so that the monitor isn't constantly switching off - e.g. select 30 minutes. Combined with a shorter period for a screensaver to kick in (See further above), such as 5 or 10 minutes, the two settings ensure that your monitor saves power without becoming a nuisance. I recommend against enabling the 'Turn Off Hard Disks' option on a desktop PC - set it to Never. Even if you're not at your system, there may be scheduled drive-related tasks such as background defragmentation, and so switching the drive off will only hurt performance for minimal power savings. Similarly, I don't recommend using the System Standby option for desktop PCs, as putting your entire system into standby mode once again prevents background tasks from executing.

ADVANCED

I recommend unticking the 'Always show icon in the taskbar' option to remove the unnecessary power icon in the system tray. If you don't use system standby, or if physical security is not a concern then I also recommend unticking 'Prompt for password when computer resumes from standby'. In the Power Buttons section, select the action you want for 'When I press the power button on my computer' - I recommend selecting Shut Down from the list for the most obvious and trouble-free result.

HIBERNATE

I recommend not using Hibernation for desktop PCs and hence I suggest you untick the 'Enable Hibernation' option here. Hibernation uses a great deal of disk space to store the state of your machine at the time of hibernation - equivalent to your physical RAM size in hard disk space - and for optimal stability I recommend that you start each computer session with a clean bootup. This will reduce the possibility of memory-related problems and crashes.

UPS

If you have a power supply that is specifically classified as an Uninterruptible Power Supply (UPS), you can configure it here. Most people do not have UPS power supplies, and if you're not sure whether you have one then it's almost certain that you don't, hence you can ignore this section. See the Services chapter for more details about how to disable the UPS Service if you don't have a UPS power supply.

< PRINTERS AND FAXES

This section allows you to view all connected printers and faxes, and add or remove such devices. It is recommended that you refer to the particular device's instructions for optimal setup information under Windows XP as each can differ.

Importantly, note that if you have disabled the 'Print Spooler' service then any printer on your system will not function - this also includes 'printer-like' utilities such as PDF makers. Make sure the 'Print Spooler' service is set to Automatic if you want to use a printer. Furthermore if you have disabled the port to which

the printer is connected in the BIOS or in Device Manager (e.g. LPT1 or a specific USB Host Controller), perhaps to free up an IRQ, then once again your printer will not function - you will have to re-enable it. Finally, if you are connected to a network printer and you have followed my service configuration recommendations under the Services Utility chapter - which as noted are not intended for networked computers - then your network printer may not be detected by Windows. Go through this guide again and make sure all network-related functions are enabled so you can access your network printer.

< REGIONAL AND LANGUAGE OPTIONS

REGIONAL OPTIONS

Select the language format that suits your particular region of the world. You can also set your country at the bottom, and it is recommended that you do so to allow all your software to be able to customize options and text displays to suit you, not just in Windows XP itself, but also in all the games and applications you use. If you wish to customize any specific settings, such as data/time display formats, currency formats etc. click the Customize button and do so accordingly. If you've selected the appropriate country though, the defaults shown here should already be correct.

LANGUAGES

Click the Details button and select your default input language.

If you only ever use one particular text service on your machine for each language, such as Keyboard (the default, and a necessary service), then remove any other text services displayed under each language (such as Speech Recognition) as they take up additional memory. Do this by highlighting the displayed text service in the Installed Services box, and click on Remove.

Alternatively, if you want to Add a text service, or configure these advanced text services for various functionality, see this Microsoft Article for more details. Remember, the use of advanced text services takes up memory and can reduce system performance, so only enable these functions if you really use them often, and not just as a novelty.

In the Preferences section below it, if you have more than one text service installed you can click the 'Language Bar' button (otherwise it is unavailable). I recommend selecting 'Close the language bar' to remove it from your desktop unless you specifically need it there. If you do use more than one language often, I still recommend closing the Language Bar, and instead assign keyboard shortcuts for switching between these languages, by clicking on the 'Key Settings' button here. This is a much more efficient and quicker method of switching languages.

Under the Advanced tab, unless you use any advanced text services such as speech or handwriting recognition, tick the 'Turn off advanced text services' option. If you do wish to use advanced text services, and also want them to be available to all your programs and applications, then tick the 'Extend support of advanced text services to all programs'. Click Apply and OK to go back to the Regional and Language Options box.

Back under the Languages tab of the main Regional and Language Options box, unless you use a right-to-left language (such as Arabic or Thai), or an East Asian language, then make sure both boxes under the Supplemental language support area are unticked, and click Apply. This removes unnecessary files from your hard drive.

ADVANCED

Select the language you want for non-unicode programs. Since Unicode basically allows most modern programs to automatically adapt their menus and dialogs to your system's default language, this setting only applies to older non-unicode programs. These older (non-unicode) programs will use the Code page

conversion tables listed to convert from other languages to your preferred language. While you can choose to remove or add (untick or tick) various conversion tables in this section, I recommend against doing so as this can affect the correct language display of any older programs you use. Some of the conversion tables are greyed out as these are installed by default for Windows XP and cannot be removed.

If you want to make the settings you have modified in the Regional and Language Options box the default for every user account created on this system as well as the current account, tick the 'Apply all settings to the current user account and to the default user profile' box.

< SCANNERS AND CAMERAS

This section will allow you to manage any digital image devices such as scanners or digital cameras connected to your machine. Refer to your device's manual for specific setup recommendations. Typically you will simply need to attach your device, turn it on and Windows XP should detect it and install basic (but adequately functional) drivers. I recommend that only if you are having problems accessing the device, or any of its important functionality, that you install device-specific drivers or software. Otherwise the default Windows XP drivers are the most efficient and minimize background resource usage.

< SCHEDULED TASKS

The Scheduled Tasks utility allows you to set up particular tasks that your machine will then run at a predetermined time and in a predetermined sequence. To create a new task, click the 'Add Scheduled Task' item, and the Scheduled Task Wizard will commence, allowing you to detail the task to be run. You can also view and edit existing scheduled tasks in this panel. I recommend you go to the Advanced menu and select the 'View Hidden Tasks' option to ensure all scheduled tasks are shown. I generally do not recommend having scheduled tasks; regular system maintenance for example is best carried out manually, at intervals determined by frequency and type of use and not set periods of time (See the Regular Maintenance chapter). Note that the 'Task Scheduler' service must be set to Automatic for scheduled tasks to function.

< SECURITY CENTER

The Windows Security Center unifies access to, and monitoring of, major security-related Windows settings on your system. Primarily these are the Windows Firewall for protecting against externally-initiated intrusions into your system; Automatic Updates which ensures notification and/or installation of important Windows XP updates as they are released by Microsoft; and Virus Protection which works in conjunction with your virus scanner to make sure your system is free of infected files which can compromise your system's security, stability and privacy.

Each of these areas and appropriate recommendations is covered in the relevant section of this guide: the Windows Firewall is covered in the Windows Firewall section below; Automatic Updates is detailed in the Automatic Updates section above; and Virus Protection is covered under the PC Security chapter above. The Security Center is simply a means of gaining access to all of these and changing some of their settings in a central location. As such, it's not actually a dramatic improvement in security - simply one that makes users more aware of the types of things they have to monitor and change to maintain system security.

The one setting which I do find very annoying and I recommend you change is the Virus Protection setting. In the 'Virus Protection' box in the Security Center click the Recommendations button. In the Recommendation box which opens, I suggest you tick the box at the bottom. This will prevent Windows from constantly reminding you that your virus scanner's reference file is out of date, or that your virus scanner is not found, or that it is not currently active. For starters many popular antivirus programs are not supported by this feature. Secondly, it should be part of your regular maintenance procedure to manually update your virus scanner and run manual scans as often as possible. Finally, as I recommend throughout this guide, having a virus scanner running in the background can and will reduce your system performance for marginal gains in security. For all intents and purposes as long as you follow the other recommendations in this guide your system should be quite secure and clear of malicious software. If however you are

genuinely forgetful *and* your virus scanner appears to be supported by this feature, you may wish to keep the monitoring function of Virus Protection enabled.

Note the Windows Security Center won't function fully if the 'Security Center' service has been Disabled (See the Services chapter). I recommend that the 'Security Center' service be set to Automatic to begin with, adjust your settings as recommended above, then disable the 'Security Center' service again as it is not necessary to continually access the Security Center to maintain security on your system. That is, disabling the 'Security Center' service will not disable the Windows Firewall, Automatic Updates or Virus scanner functionality at all. Also see the PC Security chapter of this guide for more tips on how to secure your PC.

< SOUNDS AND AUDIO DEVICES

VOLUME

Adjust the volume to suit your taste, and make sure the Mute option is unticked. I recommend ticking the 'Place volume icon in the taskbar' option as adjusting the volume is something you may do often in Windows, so this provides quick access by placing a speaker icon in the System Tray. I will cover the settings under the Advanced button a bit later below, as part of my instructions for optimal sound output.

Under the Speaker settings section, you can independently adjust each speaker's volume level by clicking the Speaker volume button. In general this volume can be adjusted under the Volume tab as described above, so you only need use this section of the Sound options to check and make sure all speakers are outputting at the same volume, or adjust the individual speakers to have different volume levels each if that is what you want.

Click the Advanced button here, and under the Speakers tab select the type of speaker setup you are using, such as Headphones or Desktop Stereo Speakers. Choose the setting closest to your particular setup. Under the Performance tab, move the 'Hardware acceleration' slider to the far right. This ensures full use of your sound hardware's features. Only reduce the slider by one or two notches if you are troubleshooting sound problems in a game for example. Move the 'Sample rate conversion quality' slider to the far right. This ensures optimal sound quality, and there is no real performance difference between the various settings on this slider as such.

SOUNDS

You can assign different sounds to particular system events in this section. Click on the relevant Program events (e.g. 'Start Windows') and either scroll through the list of default system sounds in the Sounds list below and select one, or click the Browse button to find a sound file elsewhere on your system which you can use. Press the Play button to hear a preview of the sound.

I strongly recommend that you disable as many system sounds as you can, as they take up system memory by being loaded into RAM at startup. In particular I recommend disabling sounds for 'Start Windows' and 'Exit Windows' to both reduce memory usage and speed up booting up and shutting down Windows. Also note that various programs add sub-entries to this section and include their own specific sounds, even if you uninstall them later on. Go through the entire list carefully and disable all unnecessary sounds.

You can quickly disable all system sounds by selecting the 'No Sounds' item under the Sound scheme area - this doesn't turn off sound on your system, it simply removes sounds effects from all the various system events thereby reducing memory usage by these sounds. If you want to keep sounds for certain important events, such as Default Beep or System Notification, I recommend you apply the same sound to several similar events. For example, on my system I use the *Exclamation.wav* sound for all warning and alert events (i.e. Asterisk, Critical Stop, Default Beep, Exclamation, New Mail Notification and System Notification). That way if Windows runs into a problem or provides a warning/notification I can still hear an audible indicator of it, but by using the same sound for each event, my memory usage is greatly reduced.

Once done, save these new settings by clicking 'Save As...' and entering a new name.

AUDIO, VOICE

Make sure the default device in each of these categories is your primary sound hardware then tick 'Use only default devices' to minimize problems and conflicts with any other sound devices which may also be present on your system.

OPTIMAL SOUND CONFIGURATION

My suggested method for configuring your Sound settings for optimal sound output is provided below:

1. Click the first Advanced button under the Volume tab of the Sounds and Audio Devices box. Alternatively, simply double-click on the Volume icon in the system tray.
2. In the Volume Control dialog box that appears, go to the Options menu and make sure the 'Advanced Controls' option is ticked.
3. Select the Properties item under the Options menu, and in the box that appears select your main sound output device in the Mixer Device list. Select Playback in the next section. Place a tick against every item in the list shown, and click OK. Back in the Volume Control window, you will notice it has expanded to show Volume, Balance and Mute options for every audio output method on your system.
4. Go to the master Play Control (far left) and adjust the master Balance setting. Unless you specifically need an offset balance, the neutral (absolute middle) position is recommended.
5. Make sure the 'Mute All' option is unticked
6. Set the master Volume level to around the center position on the slider, then play a high quality music or audio file on your system (e.g. an MP3 file, not CD Audio as that uses independent sound) and adjust your speaker hardware's physical volume controls until the sound level is correct.
7. Click the Advanced button, and if available to you (depending on your sound hardware) adjust the Bass and Treble settings to taste. If you don't have Digital Output capable sound hardware, make sure the 'Digital Output Only' box is unticked, otherwise you will not hear any sound. Click Close when done.
8. Now go to the Wave output method in the Volume Control box and make sure the Mute option is unticked. Again, while playing some music on your system adjust the Wave volume and your speaker hardware volume control together until the combination suits your taste and has the least amount of background noise/hiss. The Wave output method is the output method used by most games, applications and audio playback software so it's important to set it up correctly and at a tolerable level.
9. Go through and adjust all the other sound output methods' Volume and Balance settings to taste. To further reduce background noise and hissing, I recommend muting (tick the Mute option) for every sound output method you do not regularly use. Input devices, such as Line-In, TAD-In and Microphone in particular can significantly contribute to background hissing, so mute them unless needed.
10. Once done, go to the Options menu and select Properties, then untick all the sound output methods except those that you will be adjusting the properties for quite often. This will not disable these methods, only remove them from displaying in the Volume Control box, making it more manageable the next time you open it. At a minimum I recommend you leave the Play Control and Wave items ticked, as these are used most often on all machines.

If you have a complex speaker setup or third party audio software you may wish to use that to adjust equalizer settings for example. In which case after you've followed the advice above go into that software and conduct more setting tweaks as necessary.

Importantly, if your sound hardware has any Environmental Audio or Special Effects settings in your sound card-specific software (such as the EAX Control Panel for Creative sound cards), open these settings and disable all effects. These additional effects typically cause problems in games and can distort music and other audio played back on your machine.

< SPEECH

This utility allows you to configure the speech recognition and text-to-speech capabilities of Windows XP. To use speech recognition, you will require an input device (i.e. microphone) connected to your system. To use text-to-speech functionality, you don't require anything other than audio playback hardware such as a sound card and speakers/headphones. You can select the voice style used to convert text to speech, and adjust its speed here. Note that this functionality must be supported by the program or game you are using if you want it to work. Also note that in most games or applications where you can enable a synthesized voice, you should be able to adjust the characteristics for this voice in this section of the Windows Control Panel since it is likely using the default Windows voice engine. If you want to download additional synthesized voices to use see this Text-to-Speech Voice site.

< SYSTEM

This is an important section of Windows XP, and each of the tabs under System Properties is covered below:

GENERAL

If any of the details displayed are incorrect then it is a sign of a bad install, new/unsupported hardware, IRQ conflicts, poorly installed/incorrect drivers or overclocking problems. In general if your system is functioning correctly then the information in this section should be correct. You may notice your CPU's speed rating is shown slightly higher or lower than its actual rating - this is normal. Importantly, you should make sure that after your Windows version, it says 'Service Pack 3' - if it doesn't, make sure to follow the instructions under the Driver Installation chapter to install the latest Service Pack, as it is an essential update.

COMPUTER NAME

Leave the Computer Description field blank, or use a generic description. To change your computer name, click the Change button. In both cases I strongly recommend against placing anything uniquely identifiable - such as your real name or address - in these fields. Unless you are part of a network of computers (the Internet doesn't count as a network), there is no need to alter your Network ID, nor the Workgroup you belong to. If you are part of a network, consult your System Administrator before attempting to change any of the settings above as it may result in problems and confusion, or completely dropping out from the Network.

HARDWARE

The 'Driver Signing' and 'Windows Update' options are covered in more detail in the Driver Installation chapter.

DEVICE MANAGER

Click the Device Manager button, go to the View menu and select 'View Devices by Type' and also tick the 'Show Hidden Devices' option. You will see all the devices connected to your system at the moment, most of which are physical devices, some of which are virtual devices. Devices with a yellow question mark or exclamation mark next to them will need further troubleshooting to correctly identify and install. Typically this involves ensuring the device is correctly attached to your system, then double-clicking on the device in Device Manager, selecting Update Driver under the Driver tab, and following the prompts to install or reinstall the correct driver for the device. You may also need to install any software that came with the device to correctly use it. See the Driver Installation chapter for more details of drivers, and the Windows Errors chapter for more details of Device Manager error codes.

You should disable devices that you don't regularly use to speed up windows and free up resources. Ideally this should be done first in the BIOS - See the BIOS Optimization chapter. However, to disable a device in Device Manager, double-click on the device and select 'Do not use this device' under the Device usage area at the bottom of the box. A red cross will appear next to the device, indicating it has been disabled. Make

sure to only disable devices you knowingly do not use. If in doubt leave them enabled, or re-enable them if you experience any unusual behavior.

Go to the View menu and choose 'View Resources by type', then expand the 'Interrupt Request (IRQ)' item. Make sure each major device in your system (graphics card, sound card etc.) is on a separate IRQ from other major system devices. See the BIOS Optimization chapter for more details of IRQ sharing.

REMOVE UNUSED DEVICES

For each device that has ever been connected to your system, Device Manager will retain a range of entries in the Windows Registry relating to the device type, and the drivers and settings it used. That way if it is ever reconnected it can be quickly recognized again and ready for use. However there are times when you have permanently discontinued the use of a device and you want to clean out the Device Manager of these unused devices. To first view unused devices in Device Manager, do the following:

1. Open a Command Prompt by going to Start>Run and type "cmd" (without quotes) then press Enter.
2. Once the MS DOS prompt is open, type the following lines exactly as shown, pressing Enter after each:

```
Set devmgr_show_nonpresent_devices=1
```

```
Devmgmt.msc
```

3. You can now type "exit" (without quotes) and press Enter in the command prompt window to close it.
4. In the Device Manager window that opens go to the View menu and select 'Show Hidden Devices'. Now expand the categories and start looking through all the devices. Devices in gray are usually old/unused and safe to remove by right clicking on each one and selecting 'Uninstall'.
5. In particular, you might find several entries under the Monitors section from previous graphics driver installations. You can typically delete all the greyed out entries but at least one un-greyed entry should remain. You may also find old entries for previous graphics cards under the Display Adapters section that again can be removed. Remember that even with only one monitor connected there may be two entries for some graphics cards, one of which is the Secondary - this is normal.
6. You should not remove any Microsoft devices such as those under the Sound section, or devices that you are unclear about, or know that you will be reconnecting to your system regularly.
7. Once done, you can close Device Manager the usual way and the next time you open it up it will not shown unused devices until you again use this method to do so.

Use this method with great caution. In particular I recommend you create a new System Restore point beforehand. At the same time however if you do accidentally uninstall a hardware device which is currently connected to your system, in many cases you can simply disconnect and reconnect the device, or reboot Windows, and it will be redetected by Windows and the appropriate drivers installed again - so this method doesn't permanently remove any device nor prevent it from future usage.

Back under the Hardware tab of System Properties, click the 'Hardware Profiles' button and for optimal bootup speed have only one hardware profile and choose 'Select the first profile listed if I don't select a profile in' and set the time to 0 seconds.

ADVANCED

The Advanced tab of System Properties has three major areas of settings - Performance Settings, User Profiles Settings and Startup and Recovery Settings - these are covered separately below:

Performance Settings:

Visual Effects: For fastest performance, I recommend unticking everything except 'Use visual styles on windows and buttons' and 'Use drop shadows for icon labels on the desktop'. That will reduce usage of system resources for graphical effects, while still retaining the majority of Windows XP's trademark appearance. Obviously you can tick other effects if you specifically want to keep them.

Advanced: In the Processor scheduling section select the Programs option for optimal performance on most systems. The 'Background Services' option will only improve performance on systems where multiple programs are often run together.

Under the Memory usage section, once again select the Programs option. The 'System Cache' option is designed for servers, where more memory is used to speed up disk access at the expense of available memory for programs. Importantly, data corruption may occur under certain conditions if the 'System Cache' option is enabled, so it is strongly recommended you do not select it.

For optimal settings under 'Virtual Memory', see the Memory Optimization chapter for full configuration details.

Data Execution Prevention (DEP): This is a technology introduced with Windows XP SP2, and uses software and (where supported) hardware detection of programs that try to access and run code from designated 'non-executable' memory areas. Full details of it are in this Microsoft Article. In practice DEP protects against malware that has become resident on the system and which then tries running malicious code from such memory areas. When DEP detects an attempt to launch an executable from a non-executable memory area it will shut the program down and provide a notification that it has done so. Hence if you are experiencing crashes or problems in games for example, unless you see Windows give you a specific DEP-related warning, it is highly unlikely that DEP is the cause of the problem.

By default when 'Turn on DEP for essential Windows programs and services only' is selected, DEP protection is only enabled for programs that choose to work with DEP, along with Windows system files. This is the minimum form of DEP protection. You can choose to extend this protection to all programs by selecting 'Turn on DEP for all programs and services except those I select' - and then choose which programs to manually exclude from DEP by using the Add and Remove buttons. I recommend leaving DEP at its default setting ('Turn on DEP for essential Windows programs and services only') as it is not problematic and helps reduce any potential damage from malware activity on your computer. However if you want to change your DEP settings in more depth, including the total disabling of DEP, you can do so by editing your *Boot.ini* file (To access and edit Boot.ini see further below). The entry to change in *Boot.ini* is the */NoExecute=* option. By default it is set to */NoExecute=OptIn* however you can change the *OptIn* value to one of the ones below to change DEP's implementation:

OptOut - Applies DEP to all processes and you must then set which programs are excluded manually. This is the same as the 'Turn on DEP for all programs and services except those I select' option above.

AlwaysOn - Provides full DEP coverage for your entire system. If you are concerned about potential malware activity on your system and want maximum protection you can use this setting, although older software may have problems with it.

AlwaysOff - This option turns off DEP completely. It is not recommended unless you are having a lot of problems with program crashes directly related to DEP even after thoroughly cleaning your system by following the advice under the PC Security chapter of this guide.

Once again, it is recommended that you leave DEP at its default setting unless you are specifically having DEP-related errors and problems, which is usually quite rare.

User Profiles Settings:

Back under the Advanced tab of the main System Properties box, click the Settings button under User Profiles, and examine the profiles stored on your computer. There will always be at least two profiles - the Administrator, and the default User profile here. If you are absolutely certain any other profiles are no longer in use, you can select them and press Delete to remove them from the system, which will free up disk space.

Startup and Recovery Settings:

Under the Startup and Recovery section, click the Settings button. For a system with a single operating system, select '"Microsoft Windows XP [*Home*/*Professional*]" /FASTDETECT...' in the list presented. For a multiboot system with two or more operating systems, select the one that you want to boot up by default each time you start your machine. If you only have one operating system, or you don't want to select a different operating system each time you boot up, untick the 'Time to display list of Operating Systems' option. Note that if you have an XP/Vista dual boot, you can still untick this option, because the Vista boot files which control dual booting are not affected by these settings. You will have to adjust your bootup options directly in Vista - see the Boot Configuration chapter of the TweakGuides Tweaking Companion for Vista.

Tick the 'Time to display recovery options when needed' option and select at least 10 seconds if not more. This is the amount of time you'll get to choose the type of bootup from the recovery menu after a bad system crash.

Click the Edit button to edit your *Boot.ini* file. Change the *timeout*= value in the second line to =0. You can also change the /*NoExecute*= setting here as covered under the DEP information above. When done, save and exit the text editor and the changes will be made to your *Boot.ini* file in your base directory. Note again that under an XP/Vista dual boot, the *Boot.ini* file is not used and hence editing it is irrelevant.

Under the 'System failure' section untick all three options for optimal performance, and the 'Write Debugging Information' option should be set to None. That way if you run into problems you'll see the error displayed (usually a Windows Blue Screen of Death (BSOD) message) and your system won't automatically reboot, giving you time to read and record the error details at your leisure. At the same time you won't get lots of logfiles and dumpfiles of the event cluttering up your hard drive. Re-enable these options if troubleshooting a vague problem, or if relevant Technical Support personnel ask you to provide these files. See the Windows Errors chapter for more troubleshooting tips.

Environment Variables:

Under the Environment Variables screen I suggest you leave all the listed variables at their default settings, as most are needed by Windows and various programs to operate correctly. These should only be changed if instructed by a particular program or by Technical Support, and even then you should record the original settings in case something goes wrong.

Error Reporting:

Click the Error Reporting button and select 'Disable Error Reporting' and tick 'But notify me when critical errors occur'. This will prevent your system continually informing Microsoft of errors occurring on your system, but at the same time will still show you important system messages and errors for notification and troubleshooting purposes.

SYSTEM RESTORE

Only tick the 'Turn off System Restore' box if you feel extremely confident about your Windows expertise. System Restore can take up a great deal of disk space, however I recommend that you leave it enabled since it can also save you a great deal of heartache if things go wrong. See the Backup & Recovery chapter for more details of how to use System Restore to backup your system state. Also see the Cleaning Windows chapter for details of how to delete older restore points to reduce the amount of disk space used up by System Restore. If you choose not use System Restore, see the Services chapter for details on how to disable the 'System Restore' service to save on system resources.

AUTOMATIC UPDATES

See the Automatic Updates section earlier in this chapter for more information on this functionality.

REMOTE

I strongly recommend that you disable (untick) the available options in this section for security and performance reasons. Only re-enable these options if specifically asked to do so by a trusted Technical Support person who requires remote access to your machine. Allowing remote access pretty much lets someone else access your machine and all its various files and settings as though they were sitting in front of your PC, so clearly it can compromise your security if left enabled.

< TASKBAR AND START MENU

TASKBAR

The Taskbar is the long bar which sits at the bottom of your screen and contains your Start button, buttons for any open programs, and the System Tray. Most settings in this section can be set to suit your taste.

The 'Lock the taskbar' option prevents accidentally moving or resizing the taskbar when ticked. When unticked, you can resize the Taskbar by dragging the top edge of it upwards, or you can move the entire Taskbar to sit at the left, right or top of the screen by dragging the bar itself - if you wish to do this, unlock the Taskbar, reconfigure it as desired, then lock it again to prevent unintended changes.

I recommend you initially untick 'Hide Inactive Icons' so that you can see all the programs which are loading in the background in your System Tray area. I then recommend disabling as many of these as possible - see the Startup Programs chapter for more information on how to identify and disable unnecessary startup/background programs. If you want to eventually enable 'Hide Inactive Icons', perhaps to hide an annoying but necessary icon in the system tray (such as the 'Safely Remove Hardware' icon), tick the option and click the Customize button to select precisely which applications to always hide in the system tray, which to always show, and which should be hidden when inactive. Again, I recommend no applications be hidden when inactive, or hidden at all, unless you are absolutely certain they are essential and thus can be left running in the background at all times. Many application or game incompatibilities and crashes occur due to background programs, so hiding them will only make it harder to troubleshoot problems in the future.

START MENU

I recommend you select the 'Start Menu' option here to use the Windows XP default menu system. It has many advantages over the Windows Classic menu system. Click on the Customize button next to it and under the General tab, choose settings to taste. If you want to remove the Frequently Used Programs listing normally available on the Start Menu under the pinned items, set the 'Number of Programs on Start Menu' option to 0 and click the 'Clear List' button.

Under the Advanced tab, I recommend you tick 'Open submenus when I pause on them with my mouse' to speed up menu access, and untick 'Highlight newly installed programs' as it is generally unnecessary.

Under the 'Start Menu Items' section, I recommend you *tick* the following:

§ Enable Drag and Dropping
§ Run command
§ System Administrative Tools - Display on the All Programs menu

These features should be enabled when using this guide, and I recommend keeping them enabled afterwards also. The other settings in this section can be ticked or unticked according to what you wish to have displayed on your Start Menu.

When finished, click the Apply button and your changes will immediately be made to the Start Menu.

< USER ACCOUNTS

Windows XP allows multiple users to have varying levels of access to the same machine. By creating a separate User Account, each user can store their own settings, keep their own documents private, and have limited access to the system-wide settings on the same computer.

My recommendation is that unless you have several people using the computer and each need separate accounts, you should only use one Administrator-level user account for fastest performance. That way you don't need to worry about logging into and out of two or more separate accounts (the Administrator and a lower level User account) just to make system changes and install/uninstall system software. Some recent software, as well as many games, require administrator-level access to use properly.

Technically this is a security risk, as using an Administrator level account by default allows greater access to your system if you are infected by malware. However if you follow the instructions in the PC Security chapter, as well as the rest of this guide, the risks should be minimal when compared with the performance and convenience benefits. At the end of the day however, if security is your primary concern, you should create a separate account for day-to-day usage with more limited access so that if your regular account is compromised by a malicious program, it cannot be used to make changes to system files and settings. Remember though that you have to be logged in as the Administrator to make the majority of changes in this guide, as well as being able to use certain programs and games properly.

FAST STARTUP - SKIPPING LOGIN SCREEN

If you have only one user on your machine, to have the fastest startup in Windows XP you can bypass the Login screen altogether by doing the following:

1. Click 'Change the way users log on or off' and tick 'Use the Welcome screen', and untick 'Fast User Switching'.
2. Go back to the main User Accounts screen and click the Guest account, and then click the 'Turn Off the Guest Account' button.
3. Delete any unused accounts other than your primary one on the main User Accounts screen by clicking each one and selecting 'Delete the Account'.
4. Click on your main account, and if your account has a password select 'Remove my Password'.

Click 'Apply Options' to finish.

< USER ACCOUNTS - ADVANCED

Aside from the User Accounts tool in the Control Panel, you can access a further set of user account features by going to Start>Run> and typing "Control Userpasswords2" (without quotes) then pressing Enter. The following are details of the settings in this advanced user accounts tool:

USERS

If you have only one User account and you left your password field blank during Windows installation you shouldn't be prompted for a username and password each time you bootup XP. This is the method I recommend for the fastest (though less secure) way to bootup. However, if you have several user accounts with associated passwords, but want one of those accounts to automatically log on to XP at bootup without being prompted for a password, go to the Users tab and untick 'Users must enter a username and password to use this computer', and click Apply. In the new dialog box that appears, enter the username and password for this 'autologon' user. Now each time you bootup Windows this user will automatically login to Windows - but this is not as fast as not have a password in the first place. It all depends on your particular security needs.

In general you should remove all user accounts from the list of 'Users for this computer' except for the Administrator and the individual accounts for known users of your PC. Accounts such as ASPNET (the .NET Framework account) can safely be removed by highlighting them and clicking the Remove button. The less accounts you have on your machine, the safer and more optimal your machine will be. Furthermore, as soon as you have two or more user accounts (aside from the Administrator), your system will prompt you to select an account on the welcome screen when booting up Windows, so if you find this has suddenly happened to you, you will need to remove any additional accounts recently created if they are not needed.

You can also change the access level of individual accounts here by highlighting them and selecting the Properties button. Go to the 'Group Membership' tab and you can select the level of access they have. Aside from the Administrator and your own user account, you should ensure all other accounts have 'Standard User' or 'Restricted User' level access, not Administrator level access.

ADVANCED

Under the Advanced tab click the Advanced button under the 'Advanced user management' section. Select the Users folder in the left pane, right-click on the 'Help Assistant' account if it exists, select properties and make sure the 'User cannot change password', 'Password never expires' and 'Account is disabled' boxes are ticked for security purposes. You should do the same for the Support and Guest accounts. The only time you should enable these accounts is if someone you trust such as Microsoft Technical Support, asks you to do so.

Under the 'Secure logon' section, if you want to increase your security you can tick the 'Require users to press CTRL+ALT+Delete' option. This will mean that users have to press the CTRL, ALT and DEL keys together to bring up a logon prompt which then allows them to enter their username and password for logging into Windows. This adds an extra layer of security however it can also be an inconvenience so I don't recommend it unless you need extra security.

< WINDOWS FIREWALL

The Windows Firewall is an important security feature of Windows. A firewall is a barrier between your machine and anything that attempts to connect to your system from outside, usually via the Internet. Unless you are using a separate software or hardware-based firewall, it is strongly recommended that you enable the Windows Firewall.

In the General tab under the Window Firewall settings, I recommend you select On, and untick 'Don't allow exceptions' for maximum compatibility. Exceptions are temporary instances of connections to your machine that you have consciously authorized, such as connections for online games or messaging programs. To

completely disallow exceptions would mean that many of your online games and programs will not function correctly.

Whenever you launch an application or game which requires external access to your machine, you will be prompted by the Windows Firewall whether you want to 'Keep Blocking' the attempt, to Unblock it, or to 'Ask Me Later'. The simple rule is that you should only allow exceptions for (i.e. only Unblock) applications or games which you use often, and which you know should definitely require Internet communication with your machine, and which you trust. If a program that should have no need for Internet connectivity suddenly raises the firewall's alert without providing a sound reason, I recommend you 'Keep Blocking' it - at least until you can find out more about it through some research, such as reading its documentation.

Under the Exceptions tab of the Windows Firewall settings you can see all the applications and games which you are currently allowing to have Internet access to your machine. Remove any which you are no longer using, or which you do not know or do not trust. You can do this by unticking them and/or highlighting them and selecting Delete. For more details on exceptions, see this Microsoft Article.

Some specific applications or games might require that you open a particular Port. A 'port' in this context is like a small doorway into your machine, so opening a port also lessens your machine's security. However some programs must have access through a specific port to be able to communicate with your machine. If the application or game which requires the open port is on your Exceptions list then highlight it, otherwise select 'Add Program' and add it to the list, then highlight it. Then select the 'Add Port' button and enter the port number and protocol exactly as specified by the application or game's manual, help documentation or technical support personnel. Remember that certain trusted programs simply cannot function without appropriate access through the correct port, so this must be done from time to time. Technically speaking though, the more ports you have open, the less secure your machine is - so remove all open ports for programs you have not used in a while.

Finally, the Advanced tab of the Windows Firewall settings contains a range of options that you can alter to allow or disallow greater access to your machine. I strongly recommend you leave these at the default settings, and only alter them if required by an often-used and trusted application or game. Almost all games and applications should function correctly without the need to alter any of the Advanced settings. If you want to know more about them refer to the articles linked above.

See the PC Security chapter for more details of both preventing and detecting infection by malicious software, and other security tips which can help you secure your PC. See the Windows Errors chapter for potential solutions to Windows Firewall problems.

< WIRELESS NETWORK SETUP WIZARD

This feature launches a Wizard that takes you through the steps of connecting a security-enabled wireless device, such as a Bluetooth device. In many cases a wireless device shouldn't require additional drivers, however if necessary you may have to install them from your device's driver disk or its website. It won't be covered in detail here.

STARTUP PROGRAMS

Windows loads up a range of programs into memory during its startup procedure, including drivers and programs needed to provide the main functionality in XP, just prior to showing the Windows Desktop or the logon screen. However many of the startup programs can be removed as they are not necessary for the specific functionality you require. Importantly, removing unnecessary startup programs will help reduce Windows startup time, and also reduce background resource usage, which in turn can improve overall responsiveness, reduce stuttering, and even prevent program conflicts and errors.

The process of identifying and removing unnecessary startup items requires some patience and troubleshooting using the tools and methods covered in this chapter.

< FINDING STARTUP PROGRAMS

The first step in the process is to find the names of all the programs and files which are running at startup on your system. To do this you will need to use one or more of the several tools covered below:

MICROSOFT SYSTEM CONFIGURATION UTILITY

Windows XP comes with a built-in utility which allows for additional tweaking and troubleshooting of your system. This tool is usually hidden, in that no icon is provided for it by default. To access it, go to Start>Run and type "MSConfig" (without quotes) and press Enter. The main use for the Microsoft System Configuration Utility (MSConfig) is to provide a brief snapshot of key system variables, and perform some diagnosis and troubleshooting of your Windows startup, as detailed in this Microsoft Article. Details of each section of the utility are provided below.

General: This section shows the current status of system startup procedures. The default is Normal, which loads up all your device drivers, services and startup items. If you disable any startup items or alter system variables using MSConfig, the Selective Startup option becomes highlighted, showing which processes and items have been changed. You should only use Selective Startup mode for temporary troubleshooting purposes.

If at any point you want to quickly troubleshoot your system, and only want the essential services and drivers to load up with Windows, select the Diagnostic Startup item. This can help you determine if a problem is hardware or software based. This is similar to starting up using Safe Mode - see the Backup & Recovery chapter for more details.

There is an option here to start System Restore (if the System Restore service is enabled) by clicking the 'Launch System Restore' button. See the Backup & Recovery chapter for details of System Restore functionality.

The 'Expand File' button provides a utility for extracting archived files from cabinet files (*.CAB*) such as those on the Windows XP CD. By selecting the location of the cabinet archive, and the specific file required, you can extract and restore individual files from the Windows XP CD in case the installed ones are corrupted or deleted. This is much more handy than having to reinstall Windows completely. There are other methods of repairing a Windows installation such as using the System File Checker - again, see the Backup & Recovery chapter.

System.ini & Win.ini: These sections allow you to see and change the entries stored in the *System.ini* and *Win.ini* files, which typically reside in your *\Windows* directory. However unlike previous versions of Windows, Windows XP does not use these files at startup. The contents of these files are usually only required by very old 16-bit applications. As such, you should leave all the entries under these tabs at their

default settings, unless specifically instructed to change them for a particular application. There are no performance gains to be had by editing them.

Boot.ini: This section allows you to see and change the entries stored in the *Boot.ini* file, which sits in the base directory of the hard drive you have installed Windows XP on (typically directly under the *C:* directory). This file determines what XP should do at startup time, such as which options to display prior to loading up Windows. In general you should not change this file otherwise you may have problems booting into Windows. Details of what the most important boot.ini options do are covered under the Device Manager section of the Control Panel chapter. Note that if you're using an XP/Vista dual boot arrangement, the Boot.ini file is not used.

I recommend that you make sure all options under the 'Boot Options' area at the bottom of this section as well as those found under the 'Advanced Options' button are unticked for the fastest full-functionality startup. These options are only provided to remove certain features from Windows at startup primarily for troubleshooting purposes:

/SAFEBOOT - Ticking this option will force Windows to boot into Safe Mode the next time you restart - see Safe Mode under the Backup & Recovery chapter.

/NOGUIBOOT - This option prevents the Windows XP startup screen (the scrolling bar) from appearing prior to the Windows Desktop loading up. This won't make any real speed difference, but if you find that screen annoying this is how to remove it.

/BOOTLOG - Generates a log of the bootup files in your hard drive's base directory, handy if you are troubleshooting an error which occurs during Windows bootup.

/BASEVIDEO - This option will force Windows to load up in standard VGA mode - that is no graphics drivers will be loaded up. This can be useful for troubleshooting purposes if you feel your graphics drivers are the source of a particular problem.

/SOS - Ticking this option will remove the Windows Startup screen, allowing you to see what goes on behind the scenes as Windows starts up, such as which drivers are being loaded up.

One setting you can safely edit in *Boot.ini* is the *timeout=* line - which is the same as the Timeout setting shown on the right side of this box. It should be set to 0 seconds for fastest bootup, however it can't be set below 3 seconds in MSConfig, so you must manually go to the *Boot.ini* file, open it with a text editor such as Windows Notepad, and edit the *timeout=* line to *timeout=0*, then save and exit the file.

Services: This section shows all the services currently installed on your system, and their present status - that is whether they are running or stopped. If you want to temporarily determine whether a service is necessary or not for troubleshooting purposes, you can untick a service here and it will not load up the next time Windows is booted. However this is not the recommended method for permanently disabling services. The most useful feature here is the ability to tick the 'Hide All Microsoft Services' box, and hence quickly see all the third party services which are currently installed (and active) on your system by software other than Windows. Many of these services can be disabled to reduce memory usage and speed up bootup time. See the Services chapter for full details on how to correctly configure your Windows Services.

Startup: This section shows all the additional programs which load into system memory upon booting up your system (aside from Services). Many of these startup items are unnecessary and you will gain performance and most importantly stability from removing them from your Windows startup. The hard part is determining which startup items are absolutely necessary, and which aren't. Unfortunately there are no set rules for doing this; each individual startup item has to be assessed on each system to see whether it is truly necessary in providing certain functionality for a specific program, or whether it is a useless entry which can

be safely removed without any negative impact. Follow the instructions below to correctly identify and remove unnecessary startup items on your system.

Tools: As of SP3, a new Tools tab has been added which simply provides quick links to handy XP utilities.

REGISTRY EDITOR

The Registry Editor is detailed under the Windows Registry chapter, however here we look at its functionality related to startup programs. To launch the Registry Editor go to Start>Run and type "regedit" (without quotes) and press Enter. Below is a brief run-down of where startup items are held in the Registry and how to remove them. The Windows Registry holds a record of the specific programs to launch at startup, contained in four separate areas:

```
[HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Run]
[HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\RunOnce]
[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Run]
[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\RunOnce]
```

If you find any items listed under any of these keys, it means they are set to run at Windows startup, with those under the `Run` keys being permanent items, and those under `RunOnce` being temporary items which only run for the next bootup. You cannot temporarily disable a startup item here, however to permanently delete any of these items, right-click on it and select Delete. Note that there is no backup functionality, so you should consider doing a backup of the Registry in part or in full, as detailed under the Backup & Recovery chapter, before deleting any items you're not completely certain about.

AUTORUNS

Autoruns is an advanced and highly useful startup identification and removal utility with unique features not available in the utilities covered above. Download the program, extract its contents to an empty folder and run the *Autoruns.exe* file. Under the 'Everything' tab you will see a large number of items which are loaded up with Windows - far more than most other utilities will ever show; this is what makes Autoruns so valuable for a range of purposes. Most of the entries shown are required for various programs to run, and a large proportion of them are Microsoft items which Windows XP absolutely needs to function correctly.

Correctly identifying and removing the truly unnecessary items using Autoruns is more complex precisely because it shows so much detail, however to first narrow down the list to startup items you may want to remove, click the Logon tab in Autoruns. Note the particular filenames shown under the 'Image Path' column, or right-click on an item and select Properties to clearly see the filename. If you want to filter out Microsoft entries from this list, go to the Options menu and tick the 'Hide Microsoft Entries' item, then click the Refresh icon on the taskbar (or press F5). The list of items shown will be reduced, leaving only third-party programs showing, making it easier to spot unnecessary programs.

If you are an advanced user, or you're feeling more confident, click the Everything tab, and follow the steps above again to list only the non-Microsoft entries. What remains will be a range of startup programs, scripts, services and driver files. Some of these can be safely disabled, however you will need to research carefully before doing so. To do some basic research on an item, right-click on it and select 'Search Online' and Autoruns will launch a search in Google for that item's name.

You can disable any item temporarily by unticking its entry, and Autoruns will prevent that item from loading up the next time Windows starts up. This is a good way of testing to see if the item is essential, and what impact its removal may have, without actually removing it. If you then wish to permanently remove an item in Autoruns, right-click on it and select Delete, though clearly this must be done with caution.

WINDOWS STARTUP INSPECTOR

Windows Startup Inspector is a basic startup identification utility you can use to make the task easier. Download and install the program, then launch it. You will see all your startup items listed on the main screen. Now make sure you have an active Internet connection, and click the Consult button in the top menu. The program will connect to its Online Database and try to provide information for each of your startup items - click on each startup item to see the details. While details may not be available for every startup item, there is a handy 'Find More on Google' link at the bottom of the information panel, which when clicked automatically initiates a Google search using the startup item's exact name - very useful.

If you want to disable a startup item using Windows Startup Inspector, simply click the green tick mark next to the startup item's name, and when the tick mark has been removed click the Apply button at the top of the screen. Close Startup Inspector and reboot for the item to be removed from your startup.

HIJACKFREE

HijackFree is an advanced free utility which provides details of all running processes, startup programs, services, even the open Ports and ActiveX controls currently in use by your system, all in one neat interface. It is intended for advanced users who have some knowledge of what they're looking for. You can choose to do an automated online analysis of your data by clicking the 'Online Analysis' button at the top right of HijackFree, however note that the results can be confusing as it often lists both the good and bad *potential* uses for particular services/processes/files, but it can make it look like you're actually infected with a particular piece of malware when you're not. If you've followed the instructions in the PC Security chapter you can generally ignore these malware warnings - unless an item is listed as solely being bad.

< IDENTIFYING STARTUP PROGRAMS

Follow the steps below to try to correctly identify your startup programs:

1. Some filenames will tell you quite clearly what the startup program relates to. If in doubt, also check the directory path of the file and see if there are any other indications as to which program it relates to. It's important to know the actual program the file is for, firstly so you can tell what functionality may be affected for testing purposes, and secondly as covered in the step below. Importantly, some files may relate to Windows services, so see the Services chapter and check against the list of filenames provided there.
2. Launch the program which the file relates to and look through its options for settings like 'Load with Windows', 'Load at startup', 'Enable System Tray', 'Enable Shell Integration', and so on. In most cases you should be given the option to disable any such settings, and you may also find text which explains whether doing so will affect the program's functionality in any major way. Typically disabling a program from loading at startup means it won't be available after Windows loads; you will have to manually open it yourself. For some programs this is not an issue, for others it can prevent them from working automatically in the background or even from being able to be launched.
3. If the filename still isn't clear, and you can't determine from its directory path which program it relates to (e.g. it resides in the *\Windows\System32* directory) then you will have to do some online research to find out more details. Start by searching one or more of the following databases using the exact filename (e.g. *wpcumi.exe*):

   Google
   SysInfo Definitive Startup List
   WindowsStartup Online Search
   ProcessLibrary
   Security Task Manager List

   Some of the more obscure system files and services, as well as files for lesser-used programs may not be listed in the sources above, so Google will likely be the best place to search for obscure filenames.

4. Run several malware scanners to ensure that none of the startup files relate to malicious software. If any such files are flagged as malware by your scanner, you can usually click on their names or a provided link to find out more details from the scanner's own database.
5. Use MSConfig or Autoruns to temporarily disable the startup item(s) in question - that is, untick it but don't delete it. Restart Windows and see if over time any of your program functionality is impaired. You should be able to see after a few days of normal usage whether the startup item(s) was necessary or not, and which particular program(s) it relates to.

< REMOVING STARTUP PROGRAMS

Once you've followed all the steps above, and you're confident that you've found a truly unnecessary startup item, the final step involves permanent removal. You can do this in several ways (in order of preference):

§ Go to the program in question and make sure there are no options to disable it from running at Windows startup. As noted further above, if any options such as 'Load with Windows', 'Load at startup' or similar exist, disable them otherwise if you just manually delete the item it may be recreated each time you boot into Windows or start that program.
§ Go to Autoruns, right-click on the relevant entry and select Delete.
§ Go to the Registry Editor, find the item under the relevant key, highlight it and select Delete. Remember that Registry Editor does not have any 'undo' capabilities, so it is best used as a last resort.

Once the item is removed from your startup, you should reboot Windows and see if it is indeed gone. If at any point any of your programs start to behave strangely or do not function at all, then uninstall and reinstall that particular program and its relevant startup items will be recreated. In general it's wise not to permanently remove any Microsoft startup programs unless you're certain you will never use such functionality. Having removed unnecessary startup programs make sure to run through the Services chapter and disable unnecessary services as well.

Note that some startup items require special additional steps to completely remove from your startup. For example the CTFMON startup item, which relates to an unnecessary 'alternative user input text input processor' function for the Microsoft Office suite, requires following the procedures detailed in this Microsoft Article to completely remove. Simply removing its startup item from the registry will not remove it as it is recreated every time you run an MS Office application.

Once again, it is important not to ignore your startup programs, and actually spend time both identifying what they do, and removing the unnecessary ones. Importantly, in the future as you install new programs you should continue to regularly examine and identify new startup items which are being added. I generally recommend that after each installation of a new program you open MSConfig and quickly look under the Startup tab to see whether new item(s) have been added, and determine whether the program really needs these or not.

SERVICES

Services are programs that run in the background and support specific functionality in Windows XP. They can be initiated by Windows itself, or they can be installed and initiated by third party programs. They may start automatically at bootup (Automatic), they may be triggered to start by the launching of certain programs or functionality (Manual), or they can be blocked from running altogether (Disabled). There is scope to improve system resource usage and startup time by disabling unnecessary services. As with startup programs in the previous chapter, it is wise to learn more about what a particular service does before considering altering its default status.

In this chapter we look at customizing services, and I provide safe recommendations for service configuration for the average home PC user.

< SERVICES UTILITY

The Services Utility gives you the ability to edit your Service configuration. To access the Services Utility, you can either go to Control Panel>Administrative Tools>Services, or you can go to Start>Run and type "Services.msc" (without quotes) and press Enter. This opens the Services Utility which lists all installed services, tells you whether they are currently running or not under the Status column, and whether they're set for Automatic, Manual or Disabled startup under the 'Startup Type' column. A brief description of each service is also provided.

You can see the details of each service by left-clicking on it and the default Extended view will show the description to the left of the service. To see more details and configure a service, either double-click on the service, or right-click on it and select Properties. Here you can where the actual program file resides for the service, and you can also manually Start, Stop or Pause/Resume a service as applicable. Importantly, you can change its startup type here - the startup type of a service is defined as follows:

Automatic: This service is automatically started during the Windows boot process.

Manual: This service must be started manually by the user, or typically, as requested by a program when needed. It does not reside in memory nor load at startup otherwise.

Disabled: This service is blocked from running and does not load into memory at any point, even if a program requires it. It can only be started by manually setting it one of the above startup types then clicking the Start button, or rebooting.

DEFAULT SERVICES

Before we move on to service customization, it is important to backup your default service configuration in case you have any problems and need to return any of your services to their default state. Services may be configured differently on various machines based on the particular features and programs you are using, as well as your specific hardware configuration, so the best thing to do is save your current service configuration. To do this, open the Services utility, then right-click on the 'Services (Local)' item in the left pane and select 'Export List'. In the box which opens, enter a name for the list and save it as the default 'Text (tab delimited) (*.txt)' option. This file will then save with all the details of your services as they currently stand, and can then be viewed with correct formatting in a program like Microsoft Excel.

For convenience sake, I have also listed my default Windows XP Professional SP3 service configuration in the table further below under the column labeled 'Startup Type (Default)'; but again, remember that this will vary from system to system, and also doesn't include non-Microsoft services, so as a precaution take the steps above before altering your own services.

CUSTOMIZING SERVICES

While we can customize services, it is important to note that by setting a service to Disabled you may cause a particular function or feature(s) of Windows or your programs to stop working without warning. If you change several services at once in particular, it can sometimes be extremely difficult to track back your problems to a particular service - not all services are obvious in what they affect.

The main aim of customizing services is to:

§ Help speed up Windows startup time especially on systems with slower hard drives.
§ Reduce unnecessary RAM usage by removing unwanted services.
§ Speed up shutdown time since Windows has to close some running services before shutdown.

Keep in mind that altering the service configuration will not increase your framerate in games (though it may reduce stuttering due to reduced RAM usage), and it can impair your functionality if not done carefully. It is not something to be taken lightly - it does have benefits, but they won't necessarily be dramatic.

With all of the above in mind, on the next few pages are a list of the services in Windows XP, the defaults for XP Professional SP3 and my recommendations for any services that can be changed on an average standalone home PC not connected to a network of other PCs, but retaining full Internet functionality. This configuration should be safe on most any PC, however if your system is unique in some way, or is on a network of PCs, make sure to read the descriptions for any service in the Services utility before altering it.

Important: There are some unnecessary services which are already set to Manual, and hence don't need to be altered. Many services don't need to be set to Disabled as that has no benefit whatsoever - a service set to Manual is not taking up any resources nor will it load up unless it is needed, yet provides a safeguard because if it is truly needed it can be restarted by Windows or a program. Only disable a service if it keeps restarting and/or you are 100% certain that it is not needed on your system. Some services can be very tricky in the impact they have, so I urge you not to consider the disabling of services as some sort of major performance tweak and go crazy turning everything off.

If you want to research services in more detail refer to the BlackViper Service Configuration Guide and The Elder Geek Services Guide. These guides contain additional details on precisely what each service does, and a range of service configurations for differing needs.

On the next few pages I provide my recommended Windows XP service configuration.

Service Name	Startup Type (Default)	Recommended Change	Notes
Application Layer Gateway Service	Manual		
Application Management	Manual		
Automatic Updates	Automatic		
Background Intelligent Transfer Service	Manual		
ClipBook	Disabled		
COM+ Event Service	Manual		
COM+ System Application	Manual		
Cryptographic Services	Automatic		
DCOM Service Process Launcher	Automatic		
DHCP Client	Automatic		
Distributed Link Tracking Client	Automatic		
Distributed Transaction Coordinator	Manual		
DNS Client	Automatic		
Error Reporting Service	Automatic		
Event Log	Automatic		
Extensible Authentication Protocol Service	Manual		Added in SP3
Fast User Switching Compatibility	Manual	Disabled	If not using multiple accounts on one PC
Health Key and Certificate Management Service	Manual		Added in SP3
Help and Support	Automatic		
HID Input Service	Automatic	Manual	Set back to Automatic if peripherals don't function properly
HTTP SSL	Manual		
IMAPI CD-Burning COM Service	Manual	Disabled	Not required if using third party burning software
Indexing Service	Manual	Disabled	If you've also disabled disk indexing
IPSEC Services	Automatic		
Logical Disk Manager	Automatic		
Logical Disk Manager Administrative Service	Manual		
Messenger	Disabled		
MS Software Shadow Copy Provider	Manual		
Net Logon	Manual		
NetMeeting Remote Desktop Sharing	Manual	Disabled	Network related
Network Access Protection Agent	Manual		Added in SP3
Network Connections	Manual		
Network DDE	Disabled		
Network DDE DSDM	Disabled		
Network Location Awareness (NLA)	Manual	Disabled	Network related
Network Provisioning Service	Manual	Disabled	Network related
Performance Logs and Alerts	Manual		
Plug and Play	Automatic		
Portable Media Player Serial Number Service	Manual	Disabled	Set back to Manual if any DRM-protected media doesn't play
Print Spooler	Automatic	Disabled	If not using a printer or printer-like device
Protected Storage	Automatic		
QoS RSVP	Manual	Disabled	Provides no benefit
Remote Access Auto Connection Manager	Manual		
Remote Access Connection Manager	Manual		
Remote Desktop Help Session Manager	Manual	Disabled	If not using remote assistance
Remote Procedure Call (RPC)	Automatic		
Remote Registry	Automatic	Disabled	Security risk
Removable Storage	Manual		
Routing and Remote Access	Disabled		

Service Name	Startup Type (Default)	Recommended Change	Notes
Continued...			
Secondary Logon	Automatic	Disabled	If main user is Administrator
Security Accounts Manager	Automatic		
Security Center	Automatic	Disabled	If you follow advice in PC Security chapter
Shell Hardware Detection	Automatic		
Smart Card	Manual	Disabled	If not using a Smart Card
SSDP Discovery Service	Manual	Disabled	Network related
System Event Notification	Automatic		
System Restore Service	Automatic	Disabled	If not using System Restore
Task Scheduler	Automatic		
TCP/IP NetBIOS Helper	Automatic	Disabled	Network related
Telephony	Manual		
Telnet	Manual	Disabled	Security risk
Terminal Services	Manual		
Themes	Automatic		
Uninterruptible Power Supply	Manual	Disabled	If not using a UPS
Universal Plug and Play Device Host	Manual		
Volume Shadow Copy	Manual		
WebClient	Automatic	Manual	
Windows Audio	Automatic		
Windows Firewall/Internet Connection Sharing (ICS)	Automatic		
Windows Image Acquisition (WIA)	Manual		
Windows Installer	Manual		
Windows Management Instrumentation	Automatic		
Windows Management Instrumentation Driver Extensions	Manual		
Windows Time	Automatic		
Wired AutoConfig	Manual		Added in SP3
Wireless Zero Configuration	Automatic	Disabled	If not using wireless network devices
WMI Performance Adapter	Manual		

RESTARTING A SERVICE

If for some reason you find that a Disabled or Manual service is actually required for certain functionality you want to use, but is not starting up, then you can simply go to the General tab for that service, change the Startup Type back to Automatic or Manual, and then click the Start button. If the Start button is greyed out or the service fails to restart, it is because it is dependent on another service which is currently disabled or stopped. Go to the Dependencies tab for the service and under the first box you will see the other services it relies on - go to those services and set them to Manual or Automatic as required and start them. The bottom box displays the services which depend on this service to function, so also keep that in mind when disabling a service, as other dependent services will also stop working.

NON-MICROSOFT SERVICES

You may notice that your services list has several additional services that are not on the list provided on the previous pages. This is because particular programs and drivers, such as graphics drivers, antivirus programs and system utilities, can install their own unique services. These services power some of their specialized functionality, but as with many of the Microsoft services some of these can be set to Manual or even Disabled to reduce background resource usage and prevent conflicts without affecting the program's functionality.

The best way to quickly find all non-Microsoft services is to run MSConfig (See the Startup Programs chapter), go to the Services tab and tick the 'Hide All Microsoft Services' box at the bottom. The only services which will then be shown are those that have been installed by third party software. To determine which of these are truly unnecessary, you will have to work out which software package has installed the service - in most cases it is fairly obvious. For example the 'Diskeeper' service clearly relates to the Diskeeper defragmentation program. However some services are either not clear, or may even be part of malware and hence difficult to identify.

IDENTIFYING NON-MICROSOFT SERVICES

To correctly identify which program a service relates to, and in particular which file is launching it, follow these steps:

1. In MSConfig, under the Services tab having ticked the 'Hide All Microsoft Services' box, write down the exact name of each non-Microsoft service (e.g. *PnkBstrA*).
2. Go to Control Panel>Administrative Tools>Services and find the same service name in the listing.
3. Double-click on the name of each non-Microsoft service and under the General tab for that service, look at the 'Path to executable' item and note both the filename and its directory path. For example the service 'PnkBstrA' service has the path *C:\Windows\system32\PnkBstrA.exe*. Write down the filename (i.e. *PnkBstrA.exe*).
4. Search Google or one of the databases shown under the Startup Programs chapter for this particular filename. This should give you an indication of what its functionality is related to. If necessary you can temporarily set the service (one at a time) to Manual or even Disabled to see what functionality it impacts on.

As with Microsoft Services, you should be able to Disable a range of these third-party services as they are not necessary. In some cases, Manual is the correct choice, and in other cases Automatic must be chosen otherwise the relevant program will not launch or will have problematic functionality. I cannot provide guidance in this respect as it depends on the program and the functionality you wish to use. If in doubt, leave a non-Microsoft service on its default setting.

CHANGE SERVICE STATUS VIA COMMAND LINE

If you wish to change the status of a service without opening the Services Utility, you can do so by using an MS-DOS Command Prompt - go to Start>Run and type "cmd" (without quotes) and press Enter. To change a service status here you will first need to know the name of the service, either its short name or full name. For example the full name for the Application Layer Gateway Service is 'Application Layer Gateway Service', while its short name is simply ALG. You can find these details in the Services utility by double-clicking on a service, or under the following key in the Windows Registry:

```
[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services]
```

To start or stop a service via command line, go to the Command Prompt and use the form:

Net [Start/Stop] "*servicename*"

Note, if using the short name for a service, quotes are not necessary, but if using the service's full name, quotes must be used around the name. For example to start the Application Layer Gateway Service, you can use either command below to achieve the same result:

Net start alg
Net start "application layer gateway service"

You will receive a confirmation that the service has been started or stopped if successful. This method is really mainly useful if you want to compile a batch file to start or stop particular services, or if you can't access the Services utility for some reason.

Service editing is an area of ongoing debate. Some people suggest that altering services from their default is completely pointless and unnecessary and should not be done due to the potential problems it can cause; others will argue that many services should be disabled to 'increase performance'. I tend to be in the middle - there is certainly a case for disabling genuinely unnecessary services for functions you will never use, but this must be done with a bit of thought and research: only disable services if you are absolutely certain of their functionality and that you don't need them, and if in doubt, leave the services set at their defaults. This is particularly true of most Manual services which do not need to be set to Disabled as this has no impact on resource usage.

Editing services wisely is one more way of reducing resource usage and improving startup times, but it is not a major performance-boosting exercise. I've tried to provide the best of both worlds in this chapter by giving you a thorough list of 'safe' changes you can make, and also showing what the default settings are in case things go wrong. However if you are not confident in what you are doing, or don't have the time or patience to do the research and sort out your own service needs properly, then leave your services on their default Windows configuration for the moment. This will prevent a lot of problems in the long run.

CLEANING WINDOWS

As you use your system in day-to-day activities, a vast range of temporary, backup and unnecessary files can build up on your hard drive. Most temporary files are automatically deleted whenever you close an application, or whenever you shut down Windows. Unfortunately some of them aren't, and over time they can build up, taking up a lot of disk space and generally making a mess in your directories. The main reason to clean Windows is to free up additional drive space, reduce clutter and possibly prevent file version conflicts.

< DISK CLEANUP

The Disk Cleanup utility provides the ability to automatically find and remove unnecessary Windows files, old System Restore points, and unwanted Windows components. To access the Disk Cleanup utility go to Start>Run and type "Cleanmgr.exe" (without quotes) and press Enter, or look for it under your Start>Programs>Accessories>System Tools menu.

The Disk Cleanup utility has several functions, which are covered below:

REMOVE UNNECESSARY WINDOWS FILES

To remove unnecessary Windows files at any time, open the Disk Cleanup utility and under the main Disk Cleanup tab you can safely tick the following:

- Recycle Bin
- Setup Log Files
- Temporary Files
- Catalog files for the Content Indexer

Also tick the 'Temporary Internet Files' option if you want to clean out your Internet Explorer cache. If you are short on disk space you can also tick the 'Compress Files' option, however I strongly recommend against this as disk compression can be time consuming and will reduce your overall performance in Windows XP, increasing the frequency of fragmentation. Click OK when done, and OK again. This will remove a lot of unnecessary files on your system and may take a while.

ADD OR REMOVE WINDOWS COMPONENTS

To add or remove Windows XP components under the 'More Options' tab click the 'Clean Up' button under the 'Windows Components' section. In the 'Windows Components' box that opens, items with ticks next to them are currently installed. You can install additional items by ticking them, and untick any existing components that you want to remove. Note that some items, such as Windows Messenger or Internet Explorer, cannot be fully uninstalled this way - unticking them only removes the shortcut to the program which is not much use.

When you highlight certain components, you may see a Details button appear on the bottom right. Click it to see which particular sub-components you can select to install/keep/uninstall. For example, if you highlight the 'Accessories and Utilities' component, click Details and you will see two types of sub-components - Games and Accessories. Highlight the Accessories sub-component and click Details again, and you'll see the full list of Windows accessories installed on your system. Untick the ones that you know you do not need or use, and tick those which you want to install or keep. If in doubt, do not install or uninstall any items. Items that are already ticked are currently installed, and leaving the tick mark against them won't see them installed again - it just means you wish to keep them.

Once you're finished, click OK until you are back at the main Disk Cleanup utility screen and click Next. Any changes will see the relevant components installed/uninstalled as specified. Note that you may be prompted to insert your original Windows XP CD if you've chosen to install a new Windows component.

To access a more detailed list of the components you can install or uninstall on your Windows, do the following:

1. Go to your *\Windows\Inf* directory and open the *Sysoc.inf* file with Windows Notepad.
2. Do a search for all occurrences of the word *,hide,* and replace them with *,,* (i.e. delete the word *hide*)- make sure there are no spaces around, or in between, the commas.
3. Save the file and close it.

Now when reopen the Windows Components section under Options in Disk Cleanup, you will see many more items listed. Note that some of them - such as those shown with grey box icons - are important system files which may result in problems if removed. Be very careful here as to what you add or remove. If you really want to strip out a large number of Windows components, I recommend using nLite instead (See the Installing Windows chapter), that way these components will never be installed in the first place.

REMOVE OLD SYSTEM RESTORE POINTS

If you have System Restore enabled, and want to remove all System Restore points other than the most recent one, thereby freeing up a great deal of disk space, under the 'More Options' tab click the 'Clean Up' button under the 'System Restore' section. Click Yes on the subsequent prompt, then click the OK button.

ADVANCED DISK CLEANUP USAGE

You can access more disk cleanup options by going to Start>Run, typing "cleanmgr /sageset:1" (without quotes) and pressing Enter. In the dialog box which opens, tick the items you wish to clean - I suggest ticking all boxes except the 'Compress old files' option - and then click OK. Now to execute this extended cleanup at any time, go to Start>Run and type "cleanmgr /sagerun:1" (without quotes) and press Enter, and cleaning will commence immediately. Note that this method will clean all your drives - you cannot choose a specific drive to apply it to, so keep this in mind before using this method in case you don't want any other drives affected by Disk Cleanup in this way.

< RECYCLE BIN

The Recycle Bin provides a storage area for deleted files and acts as an additional layer of protection against permanently deleting files on your system. This section covers the optimal configuration of this essential Windows tool.

CONFIGURATION ADVICE

If you don't want deleted files to automatically move to the Recycle Bin and instead want them permanently deleted every time, right-click on the Recycle Bin icon on your Desktop, select Properties and under the Global tab tick the 'Do not move files to the Recycle Bin. Remove files immediately when deleted' option. I don't recommend that you do this, since the Recycle Bin is useful insurance to have against accidentally deleting important files.

I recommend you untick the 'Display delete confirmation dialog' option under the Global tab of the Recycle Bin Properties. This will stop Windows from asking you each and every time you want to delete a file whether you really want to do it - instead the file will go immediately into the Recycle Bin when deleted.

If you have enabled the Recycle Bin, but at any time want to delete a file and not have it moved to the Recycle Bin first, highlight the file(s) and press SHIFT + DELETE. You will be asked to confirm this action each time, but this will delete them immediately without placing them in the Recycle Bin.

You can specify the maximum amount of disk space the Recycle Bin can take up at any time by adjusting the slider under the Global tab of the Recycle Bin Properties. I recommend allowing enough disk space so that should you delete several large files on your system you can still recover them if necessary. Typically around 4GB is sufficient for most people. Work out what percentage of your drive that would be, and apply it here (e.g. 4GB of an 80GB drive = around 5%). To see the exact amount of maximum space allocated, click the tab that has your hard drive's name.

For more details of how to recover files which you have permanently deleted from the Recycle Bin, see the Backup & Recovery chapter.

RENAMING OR DELETING THE RECYCLE BIN

You can rename the Recycle Bin or even delete it from your Desktop by using this tweak. Open the Registry Editor and go to:

```
[HKEY_CLASSES_ROOT\CLSID\{645FF040-5081-101B-9F08-00AA002F954E}\ShellFolder]
CallForAttributes=0x00000000(0)
Attributes=50 01 00 20
```

First double-click on the `CallForAttributes` DWORD and change its value to 0. Then double-click on the `Attributes` DWORD and change its value to `50 01 00 20` to add a Rename option to the Recycle Bin icon's context menu (when you right-click on Recycle Bin, the Rename option now appears). To add a Delete option as well, change the value to `70 01 00 20`. You will have to reboot your machine for this tweak to be implemented. Note, it is strongly recommend that you do not delete the Recycle Bin.

< CCLEANER

CCleaner is a free utility which can automatically find and remove a wide variety of essentially useless files from your system. CCleaner automates a task that you can perform manually to some extent (see further below), but which takes longer to do by hand; CCleaner finds and removes a range of files with common extensions identifying them as unnecessary (e.g. *.TMP*, *.BAK*, *.OLD*) and also files which reside in known temporary or rubbish folders. It excludes important backup/temporary files that should not be deleted, and if used with caution it is usually quite safe in removing only unnecessary files.

Run the program and click the Options button, and first adjust the following settings:

1. Under the Settings section, untick all available boxes as none are vital to running CCleaner correctly. Selecting the 'Normal file deletion' option is fine as well.
2. Under the Cookies section, in the left pane are a list of cookies CCleaner will automatically delete if the Cookies option is ticked under Internet Explorer and/or Firefox on the main CCleaner screen. Select which cookies you would like to keep by highlighting it in the list and moving it using the '->' arrow to the 'Cookies to keep' list.
3. Under the Include and Exclude sections you can manually add particular files or folders which you would specifically like CCleaner to scan for deletion or exclude from deletion.
4. Under the Advanced section I suggest unticking everything except 'Only delete files in Windows Temp folders older than 48 hours' which should be ticked for maximum safety, along with the 'Show prompt to backup registry issues'.
5. If you're not sure if you're running the latest version of CCleaner at any time, click the 'Check for updates' link at the bottom right corner to see if a newer version of CCleaner is available.

To start the cleaning process, first make sure you close all open applications to prevent conflicts if CCleaner tries to delete actively used files. Then open CCleaner and under the Cleaner>Windows tab make sure to untick anything which you don't want deleted. For example, if you use Internet Explorer you should check

to make sure you untick any components which you wish to keep (e.g. untick 'Temporary Internet Files' if you don't want your IE browser cache cleaned out). Note that you should only tick the options under the Advanced list at the bottom if you know what you are doing, otherwise they are all best left unticked.

Next, under the Cleaner>Applications tab CCleaner lists all relevant installed applications which it can help clean up. Once again, make sure you untick anything you wish to keep. For example, if you have a browser like Firefox installed, make sure you untick any portions of it which you don't want 'cleaned' (e.g. untick the 'Internet Cache' option). If in doubt, untick everything.

Once you have all the relevant options ticked, click the Analyze button and after a while CCleaner will come up with a list of files it wants to delete. At this stage nothing has been deleted yet, so scroll through the list and make sure no files which you wish to keep are listed. Most of what CCleaner removes is not needed by the average user, but each person differs in what they want, so review the list carefully. The files typically found unnecessary by CCleaner include Most Recently Used (MRU) lists (i.e. the path to the last few documents you opened in a particular application), log files, temporary setup files for drivers and applications, and browser cache files.

If you have any doubts, or want some of these files kept, go back to the Windows and/or Application tabs and untick any areas you don't want CCleaner to clean and click Analyze again. Once you're happy to continue click the 'Run Cleaner' button to permanently remove the listed files.

Finally, the Registry function in CCleaner attempts to find redundant Registry entries. To start with, tick all the options available and then click the 'Scan for Issues' button. A whole range of "issues" may be found, all of which are generally harmless. Click the 'Fix selected issues' button, and make sure to save a backup when prompted, then when prompted again click 'Fix All Selected Issues'. If in doubt, do not use this functionality, and see the Windows Registry chapter for more details of what Registry cleaning entails.

< MANUAL DRIVE CLEANING

Below is the basic manual method for cleaning out the more obvious redundant files in your system. If you don't trust an automated cleaner or just want to be certain you delete all unnecessary files, follow these steps:

1. Close all open applications and games as some of these may have created temporary files that cannot be deleted because they are in use. Restart your system just to be certain.
2. Make sure you empty your Recycle Bin. Also ensure that the option to move files to the Recycle Bin is enabled. This will provide protection against accidentally deleting a necessary file in the next few steps.
3. Open Windows Explorer and navigate to the following directories on the hard drive where you have installed Windows. Delete any files or subdirectories beneath them, but not the directories themselves:
   \Documents and Settings\[Username]\Local Settings\Temp
   \Windows\Temp
4. Go to *\Windows* and delete any *$NTUninstall* directories. These are directories which allow you to uninstall Microsoft updates typically installed through Windows Updates. Unless you've installed a beta Microsoft product, it is highly unlikely you will ever need to uninstall a Microsoft patch. Note that you should not delete the *hf_mig* directory.
5. Find files with extensions that identify them as redundant. Go to Start>Search and select 'All files and folders' to bring up the Search box. Enter the following text, and in each case you can usually delete all incidences of these files without a problem:
   **.BAK*
   **.TMP*
   ~.**
   **.OLD*
6. Delete any files you are sure are not needed anymore, such as older versions of downloaded driver packages, setup files from downloaded programs, log files and so on.

7. Note, if any files cannot be deleted because they are in use by Windows, reboot your system and go into Safe Mode (See the Backup & Recovery chapter) and from there you should be able to delete any file. Alternatively you can use the method further below. Usually however if a file is in use it is a good indication the file is needed and best not deleted unless you are certain it's unnecessary.

Once you've deleted these files, keep them in your Recycle Bin and don't empty it for a few days until you've had a chance to see if any of your applications or games are not functioning properly without these files. If in doubt, I recommend only using an automated cleaning utility such as CCleaner.

CLEANING UP AFTER SERVICE PACK 3

During the installation of Windows XP Service Pack 3 (SP3), it will create a range of backup files which allow you to uninstall SP3 if necessary. However for all intents and purposes, once you've installed SP3 there should never be any need to uninstall it again. To delete these unnecessary files, you should go to your *\Windows* directory and delete the *$NTServicePackUninstall$* directory and all its contents. Once this directory is deleted, you will no longer be able to uninstall SP3, but once again, this should never be required as Service Pack 3 is a necessary update. Generally speaking, if you are having issues with SP3 on your system, it is wiser to reinstall XP and then install SP3, or better yet, use an installation image of XP with SP3 incorporated into it.

DELETING 'IN USE' FILES

If during manual file cleaning you find that you cannot delete an unnecessary file because Windows claims that it is 'in use' by another person or program, or simply denies you access to the file or folder, then reboot your system and try again. If that doesn't work, then it is usually either a driver or some other system-level file which is loading up during bootup, or a file required for an active program. Go through and close all active programs, particularly ones which load at startup and try again. If necessary, temporarily disable the suspected startup program(s) using MSConfig, reboot and try again. Alternatively use AutoRuns and see if the file is shown there, and untick it to prevent it being loaded up at startup, then reboot and try again. See the Startup Programs chapter for more details of how to use both these programs.

Ultimately however some files will refuse to be deleted no matter what you try, in which case you should try the free Unlocker utility. To use the program, right-click on the relevant file or folder and select Unlocker, then click the 'Unlock All' button to unlock the file. Alternatively choose from the list of actions at the bottom left of the box shown, and reboot if necessary for the action to complete.

Be warned however that in general Windows locks files or prevents deletion for a reason, so only use Unlocker if you're absolutely certain that that file in question is genuinely no longer required.

That covers the bulk of unnecessary files on your system. Importantly do not empty your Recycle Bin just yet - reboot your system and use it normally for a few days just to be sure the files you have deleted are genuinely no longer needed. In general I recommend using the automated methods further above for regular Windows cleaning, but you can supplement them with manual cleaning every once in a while.

TASK MANAGER

The Windows Task Manager is a utility that allows you to view important real-time information about which applications and processes are running on your system. You can also see how much memory, CPU usage and network bandwidth is being consumed at present by these various processes. As an information and troubleshooting tool it is invaluable. To access the Task Manager at any time, press the CTRL, ALT and DELETE keys together, or go to Start>Run and type "Taskmgr" (without quotes) and press Enter.

The Task Manager's primary use is to allow you to attempt recovery from system lockups and crashes. Whenever a program stops responding you can attempt to launch the Task Manager (CTRL+ALT+DEL) and under the Applications or Processes tab you can select the offending task or process and select 'End Task' or 'End Process', usually regaining control of your PC without the need to reboot. If the Task Manager does not appear after pressing CTRL+ALT+DEL several times then your system has 'hard locked', meaning a reboot is required to regain use of your computer. However Task Manager also allows you to undertake several other useful tasks, which are also covered in this chapter.

< CONFIGURATION ADVICE

To customize the Task Manager so that it displays the specific system information you want to see, go to the View menu and under it click the 'Select Columns' option. You will be presented with a dialog box that allows you to select a range of items that can be displayed as separate columns under the Processes tab of the Task Manager. I recommend that at the very least the 'CPU Usage' and 'Memory Usage' items be ticked. These will show you for each process the proportion of the CPU's resources the process is currently using, and how much system memory (RAM + Virtual Memory) it is using. I recommend also ticking the 'Peak Memory Usage' item as well, as this will show you just how large a particular process has been at some point - we discuss one use for this information in the Memory Optimization chapter when ascertaining Virtual Memory requirements.

Next, go to the Options menu and make sure the 'Show 16-bit tasks' setting is ticked, then under the Processes tab make sure the 'Show processes from all users' option is also ticked. This ensures that all running programs and processes will be shown. Note that at any time if you cannot see any menu items or tabs in the Task Manager window, simply double-click anywhere on the borders of Task Manager and it will revert to its normal view. Also note that you don't usually require the 'User Name' column, however if you are on a PC with multiple users you can enable this functionality by making sure the 'Fast User Switching Compatibility' service is set to Automatic - see the Services chapter.

< RESOURCE USAGE MONITORING

One use for Task Manager which can be of great benefit to system performance and even security is that of monitoring your startup state. That is, the programs and processes which are running in the background after a fresh bootup, and the amount of memory being used. After a fresh bootup immediately open Task Manager, and click on the Processes tab, then examine the following areas of Task Manager:

PROCESSES

Check the list of running processes - there should be as few as possible. Note that certain processes can appear multiple times - this is fine for *svchost.exe* for example, since it is the Service Host process and as such runs groups of several Windows services. However some processes may be initiated by a virus or completely unnecessary program, so see the Services and Startup Programs chapters for details of precisely how to identify the programs behind these processes and how to disable or remove unnecessary ones.

COMMIT CHARGE

Look at the total Commit Charge at the bottom of the Task Manager window. This shows the amount of system memory (RAM + Virtual Memory) that has been used out of the maximum available. Although this may grow dramatically after you have run several programs - and this is quite normal - the main point to consider is that the first figure in the Commit Charge section should be quite low at Windows startup. Once again, see the Services and Startup Programs chapters for details on how to reduce such resource usage. Minimizing memory usage at startup is not about 'freeing up' as much RAM as possible. Rather, the aim is primarily to speed up startup times and reduce the likelihood of program conflicts. The less information is in memory prior to launching a program or game, the less chance there is for memory conflicts, and the less pagefile usage you will experience. Games manufacturers specifically recommend that background programs and processes be minimized precisely to prevent game conflicts and stuttering.

CPU USAGE

Pay attention to the CPU usage for your system when it is idle - that is, when you have no open games or applications. It should be at or close to 0%, and the 'System Idle Process' process should have around 99% CPU usage, indicating that the CPU has as minimal a load as possible. A CPU that idles correctly stays cooler and uses less power. More importantly though, if your system is using CPU resources even when supposedly idle, this indicates that you have a background program(s) or process(es) which may be unnecessarily drawing resources and hence there is scope for you to improve performance by disabling it/them.

You can also open the Task Manager during the running of an intensive game or application and check the CPU % being used by its process - for a single-core CPU it should be consistently at, or close to, 100% CPU usage. If for some reason it is quite low, again check to see if any other processes are drawing CPU resources, and once again refer to the Startup Programs and Services chapters of this guide to remove/disable unnecessary background programs. Note that on systems with dual core or multi core CPUs, the CPU usage figure shown here may be lower, since each core may share a proportion of the total load, hence overall CPU usage for a particular process may only be around 50% for example. For more details see further below.

I do not recommend manually changing the process priority. For example you can right-click on a process and select Set Priority>High. Such tweaks are more likely to increase system instability, and should have no impact on an optimized machine since by default your current program should have maximum potential usage of the CPU (which isn't always 100% by the way - it depends on the program), thus the highest priority.

MEMORY USAGE

Examining the memory usage for each process can provide valuable information. If you have selected the 'Peak Memory Usage' item to add to the list of columns under the Processes tab (as recommended above), you can combine that information with current Memory Usage to learn some interesting facts about the performance of the processes over time. For example, you can open the Task Manager while running a particularly intensive application or game and check to see how much memory its process is currently using, and how much it has used at its peak so far. Compare these figures to the number on the right of the Commit Charge figure at the bottom of the Task Manager window – which is the total amount of memory (RAM + Virtual Memory) available to the system. If the game or application is using close to the total amount of memory available on your system, you may have to increase the maximum size of your pagefile (See the Memory Optimization chapter) otherwise you may experience crashes, increased stuttering, or 'Out of Virtual Memory' errors.

Note that whenever a program is minimized, i.e. shrunk down to the Taskbar, it will use less memory and resources than normal. Therefore check the resource usage of a program when it is taking up the full screen or running in a large window to get an indication of how intensive it is during normal usage.

< PROCESSOR AFFINITY

Many desktop PCs now contain a CPU with two or more cores - that is, a single CPU which is actually made up of two (or more) separate CPU chips. Furthermore some Intel CPUs have a technology called HyperThreading which in effect emulates two physical cores on each single core of a CPU. For a program to truly take advantage of both cores on a CPU, it needs to be multi-threaded. That means several program 'threads' will run in parallel, with each thread assigned to a particular core to handle. Alternatively, multiple separate programs can be run together much more smoothly on a multi-core system, as each program can be run on a separate core. However some older programs and games are not multi-threaded, and hence show no real benefits when run individually on a dual core system. In fact some programs exhibit problems, such as stuttering, skipping or incorrect speeds when run on a multi-core CPU.

Where programs show problems launching or running on a dual core system - and some older games and applications do indeed have such problems - then dual core users have two options. For AMD Dual Core CPU users, install the AMD Dual Core Optimizer which resolves these issues. For both AMD and non-AMD users, you can install the Microsoft Dual Core Hotfix. These steps will ensure that any problems in older games or applications due specifically to multi-core CPUs are removed or minimized.

However if you feel you are still having multi-core CPU related problems, or want to troubleshoot a potential hardware issue with any specific core of your CPU, you can manually force the main process for a program to temporarily run on only one specified CPU core. Do this as follows:

1. Launch the program in question, and as soon as it appears to be loading, or immediately after it has loaded up, open the Task Manager.
2. Under the Processes tab, find the game/program's main process; if necessary go to the Applications tab, right-click on the program and select 'Go to Process'.
3. Right-click on the relevant process and select 'Set Affinity'.
4. In the box which appears, untick 'CPU 1' (and any other available CPUs), so that only 'CPU 0' is ticked. If you're troubleshooting problems you suspect on one particular core, you can do the opposite - disable all cores except CPU 1 (or CPU 2 or CPU 3 etc.). The aim is to restrict the program to run on only one core.

The program is now forced to run on only one CPU core, which should resolve any problems if they were genuinely related to the multi-core setup. If this works, or if you have problems attempting to change affinity this way, or you find it inconvenient, there is a way of permanently forcing the affinity change on a program each time it loads. Before undertaking it, be aware that it modifies the executable file to which it is applied, so backup that file first before using this method:

1. Download the file *imagecfg.exe* from this page and put it into your *\Windows\System32* directory. The file is safe to use, as it is a Windows NT system file.
2. Identify the problematic program's main executable. To do this go to the program's launch icon, right-click on it, select Properties and highlight and copy the text in the Target box.
3. Make a backup copy of this executable first and put it somewhere safe.
4. Go to Start>Run and type "cmd" and press Enter. This will open up a new command prompt.
5. In the command prompt window type: *imagecfg -a 0x1* followed by the text you copied from step 1 above (right-click in the command prompt box and select Paste) then press Enter. Make sure to put quote marks around the path if it's not already there. E.g.:

   imagecfg -a 0x1 "c:/program files/RegCleaner/RegCleanr.exe"

6. Windows will now only allow that program to see and use the specified CPU core each and every time it is launched by using that particular executable.

Alternatively if you're having problems with imagecfg, you can use this small SetAffinity program instead. Download and extract the contents to an empty folder, and run the *setaffinity.exe* file. This will bring up the

interface where you can select to run a particular process or executable with only one CPU core, either temporarily or permanently.

For all other intents and purposes a multi-core CPU-based system will behave the same way as a single core system. You should only use the steps above if you run into a problems with a particular program which you genuinely believe is associated solely with multi-core CPU usage - usually the program will be an older one; recent programs are designed to take into account the existence of multi-core CPUs, so even if they don't take full advantage of your CPU they won't cause problems because of it.

< PROCESS EXPLORER

If you want an advanced form of Task Manager which provides even more details about processes and has multiple options for performance analysis and troubleshooting, you can download Process Explorer. When launched, Process Explorer looks similar to Task Manager, however aside from the same sort of functionality as Task Manager covered above, you can also see much more information about a process by double-clicking on it. In the box which opens, there are various tabs which provide valuable information specific to the process. For example under the Performance Graph tab you can see resource usage graphs for the process; under the Performance tab is a range of data which is neatly summarized to give a good overview of resource usage, and under the Image tab you can details about the file itself, including the ability to verify if a file is a Microsoft system file. Process Explorer is a valuable tool to add to your system and is safe to use.

As you can see, the Task Manager has multiple functions as detailed above. Familiarizing yourself with its various uses will help give you a good idea of what is happening on your system at any time. For example, regularly checking active processes and memory usage will give you early warning of things such as malware infections, since they often cannot be hidden from the Task Manager's Processes list or memory usage statistics. If you see a sudden increase in memory usage at startup, or a new and unknown process appears, or CPU usage increases at idle, you can be sure it is the result of a new program or service running in the background. Most often this is the result of recently installed legitimate software adding a program or service to your startup, and you should use the procedures in this guide to determine whether it is necessary or not. If left unmonitored, your background resource usage can and will blow out, slowing down your boot time and causing stuttering and potential program conflicts, so stay vigilant.

WINDOWS REGISTRY

The Windows Registry is a central database for a range of system and program-related settings. Whenever you change your Windows settings, add or remove components or install new programs and/or change their settings, or even move or resize open windows, the registry will be updated with key pieces of information marking these changes. This chapter covers the optimization and editing of the Windows Registry.

< REGISTRY EDITOR

To access the Windows Registry Editor, go to Start>Run and type "regedit" (without quotes) then press Enter. You can also access the Registry Editor by typing "regedt32" instead of Regedit, but Regedt32 is a just a small program that runs Regedit anyway, so there is no difference between either method. For our purposes, the main reason for editing the registry is to alter settings that cannot otherwise be changed using the normal Windows interface. Learning to use the Registry Editor is important because it is a powerful tool, and unlike any third-party utility designed to edit the registry, using Registry Editor provides the most direct access to the entire Windows Registry and ensures that you are aware of precisely what has been changed each time, and where it originally resides should you need to change it back. I recommend you take the time to learn more about using this important tool.

To use the Registry Editor correctly, open it and you will see what looks like a directory listing under Computer, with five folders starting with 'HKEY_', e.g. `[HKEY_CURRENT_USER]`. Under these Root Keys are a series of sub-folders called Keys. Within each key there is at least one Value called `(Default)`, visible in the right pane of the Registry Editor window when you click on the key name. Typically there are several other values underneath the Default entry. These values can be of several types, including STRING, DWORD and BINARY values.

The most common form of registry editing involves changing the contents of values, or adding new values under certain keys. Note that in this guide the key name and location is provided in square brackets [ ], and the name of the value to be edited is shown underneath. The data to be entered into the value is given after the '=' (equals) sign. An example is provided below.

EDITING REGISTRY ENTRIES

To edit an existing Registry entry follow the example below to see the correct procedure:

```
[HKEY_CURRENT_USER\Control Panel\Desktop]

CursorBlinkRate=600
```

The text above indicates that to make this registry change, you should open Registry Editor and then:

1. Double-click on the `HKEY_CURRENT_USER` root key (or click the '+' sign next to it) in the left pane of the registry editor window. This will show every key sitting directly under it.
2. Next, you must double-click on the `Control Panel` key.
3. Highlight the `Desktop` key by left clicking on it once, and in the right pane of the Registry Editor window, look for a value called `CursorBlinkRate`.
4. Double-click on this item and in the box that opens, click in the Value box, delete the current number there, and enter '600' instead.
5. As soon as you click OK the change has been saved - you can now close Registry Editor if you wish.

Note that the impact of changes made to the Registry can either come into effect straight away, or may require a reboot - it depends on the change. If in doubt reboot and test for new or altered functionality.

CREATING NEW REGISTRY ENTRIES

You may need to create a new key or value if it does not exist by default in your registry. To create a new entry from scratch correctly, follow this procedure:

1. Go to the particular area under which you have been instructed to create the key.
2. Make sure you highlight the key name of the particular key under which the new entry is to be created. If the new entry is a key, then right-click on the name of the key under which it must be created in the left pane, and select New. If the new entry is a value, skip to step 4 below.
3. Enter the name for the new key and press Enter. It should now sit as a folder in the tree listing one level below the key it was intended for.
4. If the new entry is a value, left-click on the name of the key in which it must be created in the left pane, then in an empty area in the right pane, right-click and select New, then choose the type of value it will be - the main types we use are String, DWORD and Boolean. Enter the name for the new value and press Enter. Double-click on the new value, and enter the data for the new value as recommended.

Note that you will not see any confirmation or sign that you've entered a valid key or value.

A more detailed guide to editing the Registry is in this Microsoft Article. Just remember that the Windows Registry is very important, and editing it is not to be taken lightly, so if in doubt, don't edit the registry unless you absolutely have to.

BACKING UP AND RESTORING PORTIONS OF THE REGISTRY

The registry is an important component of Windows and it is crucial for you to understand that the Registry Editor does not have an 'undo' function. Hence the best course of action prior to using the Registry Editor to alter any part of the registry is to back up your important data and settings, as well as your entire registry (See the Backup & Recovery chapter for details). A more practical precaution is to make a backup of the particular registry key(s) you are about to edit, especially if you don't feel confident about making the change, or aren't sure how the change will impact on your system. That way if anything goes wrong you don't have to go through a lengthy process - you can restore the individual key(s) that you have changed quickly and easily. The steps to backing up a specific registry key are as follows:

1. In the left pane of the Registry Editor window, right-click on the name of the key that holds the settings you wish to edit.
2. Select the Export option, and choose a suitably descriptive name and appropriate location for the file. Make sure that the 'Selected Branch' option is ticked at the very bottom of the box, so that only the particular key and all its sub-components are saved, not the entire registry. Click the Save button and the file will be saved with a *.REG* extension.
3. Once the relevant section of the registry has been saved, you can go ahead and edit the registry entries underneath the key you've just saved.

If you experience any undesirable behavior after your registry changes - and remember that some registry changes require a reboot before their effects can be seen - then you can restore the backup of your registry keys by going to the place where you saved them, and double-clicking on the relevant *.REG* file. This will overwrite the existing sections of the registry with the backed up versions, effectively undoing your changes quickly and easily.

If you don't feel comfortable with the above method, or if you want to backup the entire Registry, see the Backup & Recovery chapter for more details on how to make proper full Registry backups, as well as forms of protection against unintended Registry changes.

< MAINTAINING THE REGISTRY

The Windows Registry has thousands of entries, and can grow to be quite large in size on a common PC. Over time some of its entries can become obsolete due to changes in hardware and software, and some entries can even become corrupted due to bad shutdowns, overclocking or faulty software or hardware. Therefore it can be beneficial to periodically undertake some basic Registry maintenance using the tools below.

REGISTRY CLEANING

A registry cleaner trawls through the registry to find any invalid or unnecessary entries, such as entries that point to non-existent files or programs or corrupted entries. Since the registry loads into memory and controls a great deal of system behavior, the leaner and cleaner the registry is, the less space it takes up, and the less the likelihood for errors or strange behavior. This is a risky process and if in doubt, do not clean your Registry as it is not absolutely necessary. If you do wish to use a registry cleaner, I suggest trying JV16 PowerTools as covered below, or use the registry cleaning function in CCleaner covered in the Cleaning Windows chapter.

JV16 POWERTOOLS

JV16 PowerTools is a package of various tools relating to system cleaning and modification. The registry cleaning functionality is the main reason why this software is being covered here, and note that the latest version of JV16 PowerTools supersedes the RegSupreme and RegCleaner software previously released by the same company.

To access the registry-related functionality we require, download the software from the JV16 PowerTools Site and install it, but note that it is only free for a limited trial period. However this should be sufficient to undertake the bulk of the registry cleaning we require. Once JV16 PowerTools is installed, click on the Registry Cleaning module on the main page. The default options are fine for most users, however I recommend that you can make the following adjustments:

- Under Engine Settings move the slider down a notch (i.e. one notch from the bottom). This will increase the effectiveness of the registry cleaning without introducing too much more risk. Also untick the 'List MRU and other history data', as these items shouldn't be regularly cleaned out.
- Under Advanced Options, tick the 'Don't show items that would automatically be recreated' and 'Don't show the scan report after finishing'; both options are redundant features.

Once configured, click the tiny disk icon in the bottom left corner of the box to save your settings, then click the Start button to begin scanning. When completed you will see a full list of all the 'invalid' entries the registry cleaner has found, though note that nothing has been deleted or altered yet. Sometimes thousands of supposedly invalid entries may be found (especially when using the default options), but don't be distressed: this doesn't mean your registry was a total mess. Most of these are just MRU (Most Recently Used) entries for example, and are harmless and perfectly normal.

Now go to the Select menu and choose All to tick all the entries. Advanced users can scroll through the list to see if there's anything you want to individually exclude or delete. Otherwise once everything is selected, click the Fix button, and make sure to create a backup before proceeding. JV16 PowerTools will then attempt to fix, or delete if necessary, the invalid entries. This may take a while so be patient. Again, if you have doubts, don't use this form of registry cleaning as there is an element of risk involved when altering the Registry this way.

JV16 PowerTools has a range of other potentially useful registry-related functionality, particularly via the Registry Manager component. This component allows you to view various types of registry entries sorted under different categories in a user-friendly manner. You can then delete entries related to unwanted

functionality or left over from an incomplete uninstall of software for example. There's also a Registry Compactor component which performs the same sort of task as NTRegOpt (See below).

There are a range of other system cleaning and maintenance modules, however in general I recommend against using these. I only recommend using JV16 PowerTools primarily for its registry cleaning functionality as covered above - the other functionality is best done manually and with the full benefit of understanding through research and using the other tools and techniques covered in this guide as appropriate. It is quite easy to make an absolute mess of your system and subsequently have no idea what caused the problem - or how you can fix it - if you become reliant on an 'all-in-one' tweaking utility like JV16 PowerTools. Each task requires different tools, and every aspect of Windows tweaking requires knowledge to perform correctly, for which there is no automated replacement.

NTREGOPT

After cleaning the registry, and before we enter into any registry editing, there is a utility called NTRegOpt you can use to optimize the size and layout of the Windows Registry. If you have installed Erunt as covered earlier in the guide then you will have already installed NTRegOpt. If not, or you're not sure, download it from the link above and install it. Then run the *NTRegOpt.exe* file to start the program and click OK to begin the optimization procedure. It may take some time, so be patient. You will have to reboot for the optimization procedure to complete. This process compacts your registry, which can help improve Windows startup times and memory usage. NTRegOpt is best used infrequently, perhaps once every month, to ensure optimal registry size is maintained. Note however the program does not physically defragment your registry; only one of the defragmentation utilities under the Drive Optimization chapter can do that.

< MISCELLANEOUS REGISTRY TWEAKS

Once you've learned how to edit the registry, you can use a range of tweaks to customize your system using the Registry Editor. This section only covers the miscellaneous tweaks; most registry tweaks are actually covered under the chapter relevant to the specific area of Windows they relate to. For example, registry tweaks relevant to Internet Explorer are covered in the Internet Explorer chapter. Remember that some registry changes require a reboot before they come into effect. Importantly, don't forget to backup your Registry properly before changing anything in it.

Below are a range of miscellaneous performance and convenience tweaks - implement the ones you want to use. My recommended values are provided for the performance-related tweaks:

IMPROVE MENU RESPONSIVENESS AND SHUTDOWN SPEEDS

The following tweaks improve the responsiveness of Windows. The values shown for each are the recommended values for your system. If you don't feel comfortable making these changes using Registry Editor, use Cacheman instead (See the Memory Optimization chapter).

```
[HKEY_CURRENT_USER\Control Panel\Desktop]
```

```
HungAppTimeout=4000
```

This STRING controls the delay before a hung application is allowed to terminate (each 1000 = 1 sec).

```
WaitToKillAppTimeout=4000
```

This STRING controls the delay before windows finally starts to shutdown (each 1000 = 1 sec)

```
MenuShowDelay=20
```

This STRING controls the delay before a menu or sub-menu pops open (each 1000 = 1 sec)

```
AutoEndTasks=1
```

If enabled this STRING automatically closes all running applications when Windows shuts down.

INCREASE NTFS SYSTEM PERFORMANCE

These tweaks improve the performance of Windows systems that use the NTFS File System. See the Installing Windows chapter for more details of NTFS. If the following entries don't exist, create them and assign the recommended values shown:

```
[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\FileSystem]
NTFSDisableLastAccessUpdate=1
```

This DWORD disables the constant updating of dates a file/folder was last accessed if set to 1, improving disk performance.

```
NTFSDisable8Dot3NameCreation=1
```

This DWORD disables support for old MSDOS 8-character filenames if set to 1, which can improve performance.

CHANGE FOREGROUND APPLICATION PRIORITY

For users who usually run one major application or game at a time on their machine, you can set Windows XP to give even higher priority in allocating resources to such 'foreground applications'. Follow the tweak below to implement the change:

```
[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\PriorityControl]
Win32PriorityControl=38
```

Create a new DWORD called `Win32PriorityControl` and allocate a value of 38 to it in Decimal view.

PREVENT MSN MESSENGER FROM RUNNING

If you don't use the Windows MSN Messenger utility and want to prevent it from running - e.g. when it is launched automatically by certain applications - then implement these changes to your Registry.

```
[HKEY_LOCAL_MACHINE\SOFTWARE\Policies\Microsoft\Messenger\Client]
PreventRun=1
```

This DWORD will prevent MSN Messenger from running if set to 1.

```
PreventAutoRun=1
```

This DWORD will prevent MSN Messenger from popping up automatically if set to 1.

TURN OFF CD AUTOPLAY

By default Windows XP will automatically detect the presence of any CDs or DVDs inserted into CD/DVD drives on your system. As soon as such disks are detected, any applications, audio or movies files on these disks will automatically be launched. This Autoplay functionality can be annoying to some, and can also lead to unwanted software being automatically installed (such as Rootkits - see the PC Security chapter). To disable Autoplay functionality, make the following change:

```
[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\CDRom]
```

```
Autorun=0
```

Setting this DWORD to 0 disables Autoplay, setting it to 1 enables Autoplay. Note that instead of this tweak, you can temporarily disable Autoplay behavior at any time simply by holding down the SHIFT key while inserting a CD or DVD.

TURN OFF WINDOWS XP BUILT-IN CD BURNING

Windows XP has a basic form of CD burning which although adequate is not good enough to replace the functions of a dedicated burning package like the recommended Nero Burning ROM. If you are using a third-party burning package you can disable the built-in XP burning functionality by doing the following:

```
[HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Policies\Explorer]
NoCDBurning=1
```

This DWORD disables the built-in Windows burning functionality if set to 1, but still allows other burning software to work.

TURN OFF SYSTEM BEEPS

By default Windows XP makes beeping noises under certain situations, regardless of your Windows sound settings. To alter this behavior, go to the following Registry entry:

```
[HKEY_CURRENT_USER\Control Panel\Sound]
Beep=Yes
```

Set this STRING to No to disable any system beeps that occur during Windows usage. Note that to disable other Windows event-based sounds you will still need to go into Control Panel>Sounds and Audio Devices - see Sounds & Audio Devices under the Control Panel chapter.

CHANGE THUMBNAIL QUALITY & SIZE

Whenever you view a folder with pictures in it, by default Windows will show the contents in Thumbnails view. To change the size and quality of these thumbnails use this tweak:

```
[HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Explorer]
ThumbnailQuality=50
```

To alter the quality of thumbnailed pictures displayed in Windows XP folders, enter a DWORD value in Decimal view between 50 and 100. The larger the value, the better the thumbnail image but the slower the thumbnailed images will load up.

```
ThumbnailSize=32
```

To alter the size of thumbnailed pictures displayed in Windows XP folders, enter a DWORD value in Decimal view between 32 and 256. The larger the value, the larger the thumbnail but the slower the thumbnailed images will load up.

DISABLE THUMBNAIL CACHE

When displaying folder contents in Thumbnails view, Windows creates caches of thumbnailed images, usually saved in files called *Thumbs.db* in each folder that has been viewed in Thumbnails view at any point. Thumbnail caching helps speed up repeated viewing of these folders in Thumbnails view, but you can disable thumbnail caching by doing the following:

```
[HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Explorer\Advanced]
DisableThumbnailCache=0
```

Set this DWORD to 1 to disable thumbnail caching, or set it to 0 to enable thumbnail caching. If you disable thumbnail caching you should also go to Windows Search and find and delete every instance of the file *Thumbs.db* on your system as they are no longer necessary.

TURN OFF 'LOW DISK SPACE' NOTIFICATION

Once the free space on your hard drive falls below a certain percentage Windows XP will give you a 'Low Disk Space' notification. To disable this, implement this tweak:

```
[HKEY_CURRENT_USER\SOFTWARE\Microsoft\Windows\CurrentVersion\Policies\Explorer]
NoLowDiskSpaceChecks=1
```

Set this DWORD to 1 to turn off the notification altogether.

DISABLE BALLOON TIPS

Balloon Tips are the small yellow pop-ups that appear throughout Windows informing you of various facts or functions. To disable these, implement this tweak:

```
[HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Explorer\Advanced]
EnableBalloonTips=0
```

Setting this DWORD to a value of 0 turns off the balloon tips.

DISABLE WINDOWS KEY

If you want to disable the Windows Keys on your keyboard, perhaps because they are interfering in a game you are playing, use this tweak:

```
[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Keyboard Layout]
Scancode Map=
```

Under the `Keyboard Layout` key (not *Keyboard Layouts*) create a new BINARY value called `Scancode Map` and then double-click on it and click once in the top right hand side of the value data box and manually type in the following values in the exact order as shown (note all the 0's are zeros, and no spaces are necessary):

```
00 00 00 00 00 00 00 00 03 00 00 00 00 00 5B E0 00 00 5C E0 00 00 00 00
```

You will need to reboot for this change to come into effect. If you want to reverse this tweak, delete the above key and reboot. Since the Windows keys are useful for many keyboard shortcuts, I generally don't recommend implementing this tweak.

That's just a small number of what I believe are the more useful miscellaneous registry tweaks. If you're in the mood for more registry tweaking, a large range of Windows Registry tweaks can be found on this Registry Tweaks for XP Page. Note that some of them may not work correctly on Windows XP SP3, so please backup before using any of them. I don't recommend implementing a large number of Registry tweaks at once, as this makes troubleshooting difficult in the future. Select the ones that you feel are the most necessary for performance and convenience sake, implement them and reboot. If your system remains stable and trouble-free, implement a few new ones at a time, and repeat the process. Remember, there is no 'undo' for the Registry Editor, so take the appropriate backup precautions as spelt out earlier.

GROUP POLICY

The Group Policy editor is an Administrative Tool designed primarily for network administrators to alter the way in which Windows XP behaves for groups of users on their network - see Administrative Tools under the Control Panel chapter. It is only available in Windows XP Professional, but fortunately for Windows XP Home users the majority of the tweaks covered in this chapter can be performed using other utilities, such as TweakUI. To access the Group Policy settings, go to Start>Run and type "gpedit.msc" (without quotes) and press Enter. This will open the Group Policy editor, which shows two main branches: 'Computer Configuration' and 'User Configuration'. Changes made under the 'User Configuration' sections only affect the current user, while changes made under the 'Computer Configuration' section apply to the entire machine and affect all users on that machine.

< GROUP EDITOR TWEAKS

Below are a range of tweaks that you can apply through the Group Policy editor. To change a setting, go to the sub-folder shown and double-click on the setting in the right pane and then choose Enabled, Disabled or 'Not Configured' as required then click Apply. My recommended settings for each are provided in brackets, however you should first click once on the setting you wish to change and in the Extended view you can see a brief description of the setting to the left of it. If in doubt, do not change a setting - leave it at its default.

DISABLE AUTOMATIC SYSTEM RESTORE CHECKPOINTS

Folder: Computer Configuration\Administrative Templates\Windows Components\Windows Installer
Setting: Turn off Creation of System Restore Checkpoints (Leave at default)

TURN OFF BUILT-IN XP CD BURNING

Folder: User Configuration\Administrative Templates\Windows Components\Windows Explorer
Setting: Remove CD Burning Features (Enabled)

Note: Still allows third party burning software such as Nero Burning ROM to work without problems.

PREVENT WINDOWS MEDIA DIGITAL RIGHTS MANAGEMENT FROM INTERNET ACCESS

Folder: Computer Configuration\Administrative Templates\Windows Components\Windows Media Digital Rights Management
Setting: Prevent Windows Media DRM Internet Access (Enabled)

REMOVE 'SHARED DOCUMENTS' FOLDER

Folder: User Configuration\Administrative Templates\Windows Components\Windows Explorer
Setting: Remove Shared Documents from My Computer (Enabled)

REMOVE SHUTDOWN/LOGOFF/RESTART MESSAGES

Folder: Computer Configuration\Administrative Templates\System
Setting: Remove boot /Shutdown /Logon / Logoff messages (Leave at default)

TURN OFF USER TRACKING (WILL ALSO DISABLE PERSONALIZED MENUS)

Folder: User Configuration\Administrative Templates\Start Menu and Taskbar
Setting: Turn off user tracking (Enabled)

PREVENT ACCESS TO WINDOWS COMPONENTS

Folder: User Configuration \ Administrative Templates \ System
Setting: Don't run specified Windows applications

Note: You can also prevent users from accessing the Registry Editor and Command Prompt in this folder.

TURN OFF CD/DVD AUTOPLAY

Folder: Computer Configuration \ Administrative Templates \ System
Setting: Turn off Autoplay (Enabled)

DISABLE WINDOWS MESSENGER

Folder: Computer Configuration \ Administrative Templates \ Windows Components \ Windows Messenger
Setting: (Set both to Enabled)

CUSTOMIZE INTERNET EXPLORER TITLE

Folder: User Configuration \ Windows settings \ Internet Explorer Maintenance \ Browser User Interface
Setting: Browser Title (Personalize as desired)

REMOVE RECYCLE BIN ICON FROM DESKTOP

Folder: User configuration \ Administrative Templates \ Desktop
Setting: Remove Recycle Bin icon from Desktop (Leave at default)

REMOVE MY DOCUMENTS ICON FROM DESKTOP

Folder: User configuration \ Administrative Templates \ Desktop
Setting: Remove My Documents icon from Desktop (Enabled)

REMOVE MY COMPUTER ICON FROM DESKTOP

Folder: User configuration \ Administrative Templates \ Desktop
Setting: Remove My Computer icon from Desktop (Leave at default)

Note: Use this tweak with caution as enabling it can cause a great many problems.

There are a range of other Group Policy tweaks you can undertake, so have a look through the other areas of the Group Policy editor and see if there is anything you would like to change. However be very careful to remember precisely what you have changed, because when troubleshooting problems people tend to forget the changes they implemented in Group Policy and spend a great deal of time checking elsewhere, especially since you can perform many of these same tweaks in a variety of other places.

TWEAKUI

TweakUI is a free Microsoft utility that provides a convenient tweaking User Interface (UI) for safely customizing many of Windows XP's hidden settings. It is easy to use and includes helpful instructions on what the various settings do. If you don't feel confident in using the Registry Editor or Group Policy editor to make certain changes for example, TweakUI allows you to change many of the same settings in a relatively foolproof way. To access TweakUI, first download it from the Microsoft PowerToys site, then install it and launch it. To navigate to the various areas of TweakUI, click once on the name of the section (e.g. General), and in the right pane tick or untick the appropriate settings and then make sure to click the Apply button for every section or sub-section you change. The effects of most changes will be visible immediately.

< CONFIGURATION ADVICE

TweakUI covers a large number of settings, and as such I can't possibly cover them all here. Below are a selection of the more significant settings which I recommend people change in order to improve general performance and functionality. Descriptions for each can be seen in TweakUI whenever you highlight the relevant setting. These changes should be safe for almost every system, but obviously you can undo them by reversing the changes in TweakUI should they not suit you.

GENERAL

Tick 'Optimize hard disk when idle'

GENERAL>FOCUS

Tick 'Prevent applications from stealing focus'

EXPLORER

Tick 'Detect accidental double-clicks'
Untick 'Maintain network history'
Untick 'Show Links on Favorites menu'
Tick 'Use intuitive filename sorting'

EXPLORER>SHORTCUT

Select None to remove the shortcut arrows from shortcuts

EXPLORER>THUMBNAILS

Move the slider to the far left for Image Quality

EXPLORER>CUSTOMIZATIONS

To conserve memory use a relatively low setting like 400 folders

TASKBAR AND START MENU

Untick 'Enable balloon tips'
Untick 'Warn when low on disk space'

MY COMPUTER>AUTOPLAY>TYPES

To disable the Autoplay functionality of your drive(s), untick 'Enable Autoplay for CD and DVD Drives'. Some malicious software such as Rootkits can be prevented from installing by turning off Autoplay (See PC Security chapter).

CONTROL PANEL

Untick all the Control Panel components you never use, or which are installed by third party programs and are unnecessary. Note that this only removes their icons from the Control Panel and not the programs themselves, and doesn't affect that program's functionality in any way. I recommend you do this tweak *after* you have adjusted all the settings in the Control Panel (See the Control Panel chapter).

You should customize the remaining settings as you see fit, then click OK when done.

Although TweakUI is very safe to use, don't change settings that you are unclear about. If anything goes wrong, it may be difficult for you to figure out which change in TweakUI is causing the problem, or has removed the functionality you want. Take it slow and change a few things at a time. Also have a look at the other XP PowerToy utilities on the PowerToys site, as some of them are very useful.

WINDOWS EXPLORER

Windows Explorer is the primary means for manipulating files and folders in Windows XP. This interface appears in the Windows Explorer application itself, as well as in many applications which prompt you to open or save files, and of course in most standard Desktop windows. Windows Explorer can be accessed in several ways, including by going to Start>All Programs>Accessories, or by going to Start>Run and typing "explorer" (without quotes) and pressing Enter, or by pressing WINDOWS+E at any time to name just a few methods. The interface is familiar to any Windows user and the basics have remained the same. Importantly, there are many settings you can alter in Folder Options that have a direct impact on what you can see when in Windows Explorer. These are covered under Folder Options in the Control Panel chapter, so make sure you use the recommended settings there for maximum performance and functionality. For example, by making sure that file extensions and system files aren't hidden in Folder Options, you will be able to see these files in Explorer and perform some of the tweaks in this guide, as well as making general troubleshooting easier.

Below are a range of tweaks and tips for Windows Explorer:

SET EXPLORER'S DEFAULT STARTUP FOLDER

If you usually open Explorer from a shortcut, this tweak allows you to set which directory it will start in by default when launched from that shortcut:

1. Right-click on the shortcut icon you use to launch Explorer and select Properties. If no such shortcut exists, you can first create one by right-clicking on a blank spot on your desktop or in a directory and then selecting New>Shortcut.
2. In the Target box replace any existing text with the following:

   %SystemRoot%\Explorer.exe /e, *path*

3. In place of *path* above you should enter the actual path to the directory you want open by default. The path doesn't require quote marks around it. For example:

   %SystemRoot%\Explorer.exe /e, C:\Windows

4. Click OK, and now using this shortcut will open a Windows Explorer window in the directory specified.

Note that there are several other switches and options you can use in the Properties box to further customize Explorer's default view as detailed in this Microsoft Article.

SPEED UP EXPLORER

The following tweak can improve the response time of Windows Explorer (and also Internet Explorer). Go to the following key in the Windows Registry:

```
[HKEY_LOCAL_MACHINE\Software\Microsoft\Windows\CurrentVersion\Explorer\RemoteComputer\NameSpace]
```

To prevent Windows Explorer from searching for remote scheduled tasks, under the Namespace key in the left pane find the `{D6277990-4C6A-11CF-8D87-00AA0060F5BF}` key if it exists, right-click on it and select Delete to remove it. To also prevent Explorer from searching for remote shared printers, delete the `{2227A280-3AEA-1069-A2DE-08002B30309D}` key as well. This will speed up the time it takes for Explorer to open and navigate. If you are connected to a network of computers do not undertake this tweak.

REMOVE 'SHARED DOCUMENTS' FROM MY COMPUTER

If you want to remove the 'Shared Documents' folders under My Computer use this tweak:

```
[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Explorer\MyCompute
r\NameSpace\DelegateFolders]

{59031a47-3f72-44a7-89c5-5595fe6b30ee}
```

Delete the key above by right-clicking on it in the left pane and selecting Delete. This will remove all the superfluous 'Shared Documents' folders permanently.

FORCE ALL COLUMNS IN EXPLORER TO BE VISIBLE

Sometimes when you open Windows Explorer or Explorer-based interfaces (and there are many, such as the Registry Editor) there may be columns that are much too wide or narrow to show everything they contain. To quickly force Windows to resize these columns appropriately press the CTRL key and the + (plus) key together. This will instantly resize all columns so that even the largest value in each column is visible. This may require you to expand the surrounding window or use the bottom scroll bar to see them all, but at least there won't be any hidden or overly wide or thin columns. See the Visual and Convenience chapter for other handy keyboard shortcuts.

RENAME MULTIPLE FILES

If you have a large number of files you want to rename, you can do it rapidly by doing the following:

1. Highlight the group of files you want to rename in Windows Explorer. You can do this two ways:
   - § Hold down the SHIFT key and click on the first file in the group, then while still holding down shift, click on the last file in the group and everything in between will also be highlighted; or
   - § Hold down the CTRL key and click on any individual files you want to select until all the files you want to select are highlighted.

   You can also combine the two methods, i.e. SHIFT select a range of files, then use CTRL to remove or add individual files to the highlighted ones.
2. Without clicking anywhere else, right-click on the first file you want to rename, and select Rename.
3. Enter a name for the file and press Enter.

Now all the remaining highlighted files will be renamed with the same name you gave the first file, however they will also have a number in brackets after them. For example, if I rename the first in a series of files *Screen.jpg* using this method, the remaining highlighted files will be renamed *Screen (1).jpg*, *Screen (2).jpg,* etc.

EDIT CONTEXT MENUS

Many programs insist on becoming a part of your context menus. A context menu is the small menu which pops up when you right-click on a file, folder or icon for example, whether in Explorer-based views or on your Desktop. Many of the entries in the context menu have been unnecessarily put there by programs you have installed. The first step in getting rid of any unwanted entries involves opening the programs in question and looking through their options to see if you can unselect any 'shell integration' or 'context menu' options they have. If that fails, you can manually remove these entries by opening Registry Editor and following these steps:

1. Create a System Restore Point, then back up the registry keys which you plan on changing - see the Backup & Recovery and Windows Registry chapters for details of how to do this.
2. The specific keys you should look under in Registry Editor are:

```
[HKEY_CLASSES_ROOT\*\shellex\ContextMenuHandlers]
[HKEY_CLASSES_ROOT\Directory\shellex\ContextMenuHandlers]
[HKEY_CLASSES_ROOT\Drive\shell]
[HKEY_CLASSES_ROOT\Drive\shellex\ContextMenuHandlers]
[HKEY_CLASSES_ROOT\Folder\shell]
[HKEY_CLASSES_ROOT\Folder\shellex\ContextMenuHandlers]
```

3. Under each, aside from standard Windows items such as `Sharing` or `Offline Files`, you may find keys which relate to particular third party programs. Right-clicking on the relevant program key in the left pane and selecting Delete will remove its context menu entries.
4. As you remove unwanted program entries, you can test the effects immediately by checking to see if the relevant entry was removed from the context menu.
5. If you make a mistake and remove an important entry, restore the relevant branch of the Registry you backed up in Step 1 - do not proceed without backups of each branch.

If you're not comfortable manually editing the Registry and want to delete (or add) the main context menu entries, you can use the Context Menu Editor utility instead, or try the CMenu context menu management utility.

Note: if any of the programs whose context menu entries you've edited or removed start displaying strange behavior, or you accidentally deleted the wrong entry, restore the registry entries you backed up previously, or just reinstall that particular program. As long as you only delete clearly marked program entries and none of the default Windows entries, all the normal context menu items will still remain.

ADD 'COPY TO' AND 'MOVE TO' CONTEXT MENU ITEMS

If you want to add two useful commands to your context menus - namely 'Copy To' and 'Move To', follow the steps below:

```
[HKEY_CLASSES_ROOT\AllFileSystemObjects\shellex\ContextMenuHandlers]

Copy To= {C2FBB630-2971-11d1-A18C-00C04FD75D13}
Move To= {C2FBB631-2971-11d1-A18C-00C04FD75D13}
```

Create two new keys under the `ContextMenuHandlers` folder - that is, right-click on `ContextMenuHandlers` and select New>Key twice and name them 'Copy To' and 'Move To' (without quotes) respectively. Then left-click once on each folder, go to the right pane in Registry Editor and double-click on the `(Default)` entry and assign the appropriate values shown above, including the parentheses around the numbers. This will create two new entries that allow you to select either 'Copy To Folder...' or 'Move To Folder...' in the context menu for a particular file or folder and then specify the location to copy or move them to. Obviously if you wish to add just one of the above entries to the context menu then only create the relevant key.

FOLDER VIEWS NOT BEING SAVED

Sometimes when you change the way a folder's contents look, or its position on your Desktop, or the size of the window it opens in, after a reboot the changes don't seem to have been saved. The first thing to do is go to Control Panel>Folder Options and under the View tab make sure that 'Remember each folder's view settings' is ticked. However even with this setting ticked you may inevitably end up with unsaved settings. This can be due to corrupted registry entries brought on by a bad shutdown for example. The easiest way to fix this problem is to open the Registry Editor and go to the following keys:

```
[HKEY_CURRENT_USER\Software\Microsoft\Windows\ShellNoRoam\BagMRU]
[HKEY_CURRENT_USER\Software\Microsoft\Windows\ShellNoRoam\Bags]
```

Right-click on each key (i.e. `BagMRU` and `Bags`) and select Delete to get rid of both of them. Reboot your PC and open up each folder or window you want to customize. They will be back at their default appearance, and you will need to adjust again them to suit your tastes. However this time after you reboot your PC the

view settings should be exactly as you set them prior to the reboot. By deleting the registry entries above Windows is forced to recreate them and in doing so get rid of corrupted entries. If you find you have to do this very often, then see the tips throughout this guide for stabilizing your system. This is a clear sign that your system is not completely stable, and contrary to popular belief, it is not normal behavior for Windows to constantly forget folder views. Also see the Explorer Customizations section of the TweakUI chapter for details of how to set the maximum number of folders for which Windows retains the saved customization settings - if this is set too low it may be the reason why your folder views are being lost.

REPAIR INCORRECTLY DISPLAYED ICONS

By default Windows stores a range of commonly used icons, such as Desktop and folder icons, in a cache to speed up their display. If you are experiencing problems with your icons displaying incorrectly, go to your *\Documents and Settings\[Username]\Local Settings\Application Data* directory and delete the file *IconCache.db*. Reboot Windows and this file will be recreated afresh, resolving any icon incorrectly displayed. Also see the Memory Optimization chapter for details of how to set the size of the Icon Cache.

MOVE THE MY DOCUMENTS FOLDER

By default the 'My Documents' folder is in a specified location, and moving it manually will not work. To move the My Documents folder to another location, you must do the following:

1. Click on Start, go to My Documents and right-click on it, then select Properties. Alternatively in Windows Explorer find the My Documents folder under your *\Documents and Settings\[Username]* directory, right-click on it and select Properties.
2. Click the Move button and select a new location, then click OK.
3. Choose whether you wish to move your existing documents across to this location.

Alternatively you can just type the new path in the Target box. When you're done, Windows will now recognize the new location as the home of My Documents. Note that you can also change the name of My Documents to something else if you wish, such as simply 'Documents'.

MAKE THE MY DOCUMENTS FOLDER PRIVATE

If you want to password protect your My Documents folder, or in fact any folder which is unique to your user account (such as My Photos, Favorites, Desktop, Start Menu), and you're using the NTFS file system, you can do the following: Right-click on the folder in Explorer, select the Sharing tab and tick the 'Make this folder private' box. Now the folder and all its subdirectories will be password protected with your user password. If you're logged in as the Administrator, or you have not set a user password (for quicker logon to Windows), this tweak won't do anything - if you try it, you'll be prompted to set a password, and unless you're worried about others accessing your private folders, I do not recommend setting a password. Also see the PC Security chapter for more details on how to protect files and folders using Windows Encryption.

DISABLE WINDOWS FILE PROTECTION

By default Windows XP protects a range of important system files from accidental deletion. This tweak allows you to remove that protection - I strongly recommend against using it though:

```
[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Winlogon]
SFCDisable=0
```

Setting this DWORD to 1 will allow you to view, alter and delete protected system files. This is not recommended as these system files are protected for a reason - to specifically prevent harmful changes or deletions to core system files that can destabilize your system. Note you need to untick the 'Hide protected operating system files' option under Control Panel>Folder Options>View to be able to see protected files in

Windows Explorer. Use this tweak only if troubleshooting a problem, such as malware infection, and only as a last resort.

CHANGE DEFAULT LOCATION FOR PROGRAMS AND COMMON FILES

To change the default location for the Program Files and/or Common Files folders, open Registry Editor and go to the following key:

```
[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion]
```

```
ProgramFilesDir=C:\Program Files
```

Change this STRING entry to another path if you want to change where Windows points to by default when installing new programs.

```
CommonFilesDir=C:\Program Files\Common Files
```

Change this STRING entry to another path if you want to change where Windows points to by default when installing common files for programs.

Reboot Windows to bring the changes into effect. Keep in mind that using this tweak may result in problems with existing installed programs and file associations, as well as running Windows Update. You may have to manually move some of the existing program folders to the new location for them to work correctly.

INTERNET EXPLORER

Internet Explorer (IE) is the most popular Internet browser in the world today. Most Windows users are extremely comfortable and familiar with Internet Explorer, and also know that it is the one browser upon which pretty much all Internet content will display as intended. Even if you use an alternate browser as your main browser, you may need to use Internet Explorer from time to time because certain websites will not display or function properly on other browsers. The best example of this is Microsoft's own Windows Update website which is only fully functional and secure when viewed with Internet Explorer. While I recommend that you begin trialing alternatives to Internet Explorer, it is a fast, efficient browser, and you should not feel you have to use another browser if you are happy with it.

Internet Explorer 6 is the version built into Windows XP, even with SP3 installed. However Internet Explorer 8 is now the latest official version of IE and the one I would strongly recommend all IE users to upgrade to for security, performance, stability and compatibility reasons. Accordingly, the advice in this chapter now relates solely to IE8. You can download Internet Explorer 8 from here.

< CONFIGURATION ADVICE

To configure Internet Explorer, open the browser, go to the Tools menu and select 'Internet Options' - note this is the same as if you go to the Windows Control Panel and choose 'Internet Options'. Below are the descriptions and my recommendations for the important settings under each tab of Internet Options in IE:

GENERAL

Home Page: Here you can set the page that opens by default whenever you start Internet Explorer. If you don't want any homepage to start when IE is opened, click the 'Use blank' button; if you want to set the website you are currently viewing as your homepage, click the 'Use current' button; clicking 'Use default' will restore IE's default homepage which is a Microsoft site such as MSN (depending on your location). If you are using tabbed browsing (see further below), then you can enter multiple website addresses in the box, one on each line. Then whenever you open IE, all of these pages will open at the same time, as separate tabs.

Note, if the home page will not change regardless of what you do here see the Programs section further below as well as the PC Security chapter - this may be caused by malware such as a browser hijacker.

Browsing History: As you browse the Internet, certain files and settings are stored on your hard drive (cached) by IE to make your browsing faster in the future. Click the Settings button and you can select how IE uses this cache to speed up your browsing. Under the 'Check for newer versions of stored pages' you can tell IE how often to check to see if a web page has been updated; any parts of a site which don't appear to be updated will be loaded from your cache rather than site, and this can increase page load times especially for sites which have a lot of items to load up. I recommend selecting 'Automatically' as this allows IE to detect updated content and reload from the site only when it believes it is necessary. However this does not guarantee that you will always see the very latest content on the sites you visit, so if you want to see the absolute latest version of every page you visit select 'Every time I visit a webpage', though note this may increase page loading times. If you only want to view the latest version of certain pages at any time, press CTRL + F5 when on that page and this forces IE to reload the entire page from the site rather than from its own cache. Importantly, do not select the Never option here as that will mean IE will not update web pages you commonly view; it will always rely on the cached version which always results in out-of-date web pages.

If for privacy purposes you wish at any point to delete any components of your browsing history from the cache, click the Delete button back under the General tab - see further below for details. If you just wish to

browse privately from time to time, see the InPrivate Browsing feature covered in the section of the same name further below.

Disk space to use: You specify the maximum amount of space IE uses for its cache (in MegaBytes) in the box provided. If the cache is too small, it will generally result in longer page loading times; if the cache is too large then depending on your Internet connection speed and your hard drive speed, you may get longer page loading times as IE has to search its cache to find the components of a web page to load, when it may actually be faster just to reload them from the original site. Therefore I recommend 100MB of disk space for the cache as a balance of size and speed. If you have a faster hard drive and view more complex sites with lots of large images or scripts you may wish to double or even triple the size of this cache.

Current Location: Internet Explorer lists the current location of its cache - this is where all of IE's stored content is held on your hard drive. You can view the files already there by clicking the 'View files' button, and you can view any downloaded programs necessary for certain sites to run by clicking the 'View objects' button. If you wish to move the cache, for example to a faster drive, click the 'Move folder' button. To delete cache contents, it is recommended that you follow the instructions further below rather than manually deleting any files here.

History: Internet Explorer can keep a record of the addresses of all the websites you have viewed for a certain number of days. Here you can select how many days worth of recently viewed websites IE keeps. If you don't want a history of visited sites to be kept at all enter 0 in the box. Alternatively, see the InPrivate Browsing section if you just want to browse periodically without keeping a record of your history.

Delete Browsing History: By clicking the Delete button under Browsing History, you will open a new box which contains a range of options. These options list the individual components of your browsing history, giving you greater control over the specific elements you can delete. If you don't wish to leave any trace of your browsing history for each and every session, you can use the InPrivate Browsing feature of IE, which is covered later in this chapter. In general it is completely safe to tick all of these boxes and click the Delete button to remove all traces of browsing, however doing so too often will also decrease the efficiency of your browsing. For this reason, there is an option entitled 'Preserve Favorites website data' which if ticked (recommended) will keep your preferences and cached files for any sites you have in your Favorites. This increases convenience and speed when accessing your favorite sites, without retaining date for non-favorite sites. However if you want to remove all stored content then untick this box as well. In any case once you've selected which components you want to remove, click the Delete button at the bottom and they'll be removed immediately.

Search: The Instant Search box at the top right of Internet Explorer allows you to quickly initiate a web search using the search engine of your choice, the results of which are displayed on the main IE screen. By default it is set to use Windows Live, however if you wish to set it to another engine such as Google, click the Settings button and select a new engine, then click the 'Set as Default' button. If you want to use a search engine not listed here, click the 'Find more providers' link at the bottom of the box. If you don't want sites or programs to suggest changes to your default search provider, then tick the relevant box at the bottom as well. If you just want to use a particular provider for particular searches, then in the main IE window click on the small arrow to the right of the Search box, select a provider from the list, enter your search query and press Enter - that search provider will be used only for that search, it will not change your default provider.

Tabs: Tabbed browsing means that new web pages launched from links or popups can be opened as tabbed pages within the current browser window, rather than opening a new browser window. This helps reduce resource usage and it is also much easier to manage multiple open pages this way. To configure tabbed browser, click the Settings button. In the box which opens you can select whether to enable or disable tabbed browsing altogether, and set the behavior of it if enabled. Briefly, I recommend ticking the following settings:

- Enable Tabbed Browsing - As mentioned above, tabbed browsing reduces resource usage by only keeping one IE window open; each new tab takes up far less memory than new IE windows.
- Enable Quick Tabs - Quick Tabs places a small box at the far left of your tabs when you have multiple open tabs. Clicking it opens a page which contains previews of the content of every open tab.
- Enable Tab Groups - Tab Groups allows IE to group together tabs which are related. Tabs originating from the same source page are grouped next to each other and use the same color.
- Always open popups in a new tab - This prevents popups from using extra resources by forcing them to open in a new tab instead of a new window.
- A new tab in the current window - When a program launches a web page, this option forces it to open a tab in any existing IE window rather than open a new IE window, again conserving resources.

You can select the other options as you wish, but the main aim of tabbed browsing is to make viewing multiple web pages more manageable and prevent having lots of separate open IE windows which can use resources and space for no good reason. Some tips you can use to make tabbed browsing easier in IE include:

- Clicking on any hyperlink with the middle mouse button opens that link in a new tab.
- Clicking on any tab with the middle mouse button closes that tab.
- Holding down SHIFT and left-clicking on any link forces it to open in a new IE window.
- Holding down CTRL and left-clicking on any link forces it to open in a new tab.
- Use CTRL+TAB to quickly switch from tab to tab.
- You can reopen a recently closed tab by pressing CTRL+SHIFT+T.
- Left-click and hold on any tab and you can then drag and drop it to rearrange tab order.
- Right-click on any tab to bring up a tab-specific context menu.
- If you want to save a set of tabs as a single bookmark folder, click the Add to Favorites icon (the star with a plus sign), select 'Add to Favorites' and select 'Add Current Tabs to Favorites'.
- To open the contents of an entire Favorites folder in a series of tabs, right-click on the folder under Favorites and select 'Open in Tab Group'.
- To manage Tab Groups, right-click on a tab within the group and you can close the entire group for example by selecting 'Close This Group'.

Appearance: These options allow you to change the appearance of web pages, customizing colors, fonts and even forcing particular style sheets. In general you shouldn't alter these options unless you have specific needs.

SECURITY

Security level for this zone: You can set the level of security Internet Explorer uses on the slider here, from Medium to Medium-High, to High. I recommend the default Medium-high level of security as it designed to allow most normal Internet functionality without being overly restrictive nor too relaxed. However if you constantly browse unsafe or untrusted websites, you may wish instead to set the High security level, though this will impact on Internet functionality. If you want to be even more selective, click the 'Custom level' button and manually select each security function; clearly though this is for more advanced users.

Note that the Windows XP version of Internet Explorer differs from the Windows Vista version of IE, as it does not include Protected Mode.

PRIVACY

Settings: The slider here controls the level of privacy in IE, which for the most part pertains to Cookies - small files stored on your machine designed to hold your preferences for particular websites. Cookies are not usually malicious or dangerous, and can be very useful. For this reason, the 'Medium-High' level is recommended as it provides the best security/functionality compromise and should not prevent legitimate cookies from being placed on your machine while still protecting your privacy. However to be even more selective, you can click the Advanced button and tick 'Override automatic cookie handling'. Third-party

Cookies can usually be Blocked without any major issues, as these are mainly from advertisers. First-party Cookies on the other hand are often useful (e.g. for holding your login details for forums, or recording visual settings for particular sites), and blocking them can impair a site's functionality. If you do decide to block all first party cookies, and/or if you select a higher Privacy setting on the slider, click the Sites button and here you can manually allow or block specific website's cookies. I recommend adding your trusted favorite sites to this list and allowing them, to prevent any problems with functionality. For example, if you set a High or Very High privacy setting this will block almost all cookies, but you can still allow specific sites' cookies by making sure they're in the list of allowed sites. For broader blocking of third party content see the InPrivate Filtering section further below.

Pop-up Blocker: A 'popup' is a new window which opens when you visit particular sites and/or click on particular links or areas of a site. They are most commonly used for advertising, and hence the option here to block them. I recommend ticking the 'Turn on Pop-up Blocker' box, but you should also click the Settings button and manually add the names of websites you trust which have legitimate popups that would otherwise be blocked. For example you may wish to add your Internet banking site to the list, or Microsoft.com. By default when a popup is blocked by IE, a small yellow warning bar will appear at the top of the page to inform you of this, and you may also hear a sound. If you want to disable either or both of these visual warnings, untick the relevant boxes here. Bear in mind that this may mean you will not be aware that a legitimate site is trying to open a necessary popup box, and thus you may run into problems on some sites - again make sure to add trusted sites manually to the list if you want them to function properly.

InPrivate: InPrivate Browsing is a new feature of IE8 which allows you to surf the web without leaving any trace of your activities on the PC. This is covered in more detail in the InPrivate Browsing section further below. The options here relate to the way in which the InPrivate Browsing and InPrivate Filtering features operate when enabled. By default IE keeps a record of the sites you visit for the purposes of determining what data to automatically block from third party providers. If you tick the 'Do not collect data for use by InPrivate Filtering' box, IE will not record any such data. This will impact on how effective InPrivate Filtering is at automatically blocking third party content, but start off by ticking this box and if you find problems on particular sites, make manual adjustments in the InPrivate Filtering settings box - see the InPrivate Filtering section further below.

When using InPrivate Browsing, ticking the 'Disable toolbars and extensions when InPrivate Browsing starts' box will disable all such toolbars and extensions to prevent them from saving any private data during an InPrivate session. This is recommended for maximum privacy, but if you absolutely require their functionality during InPrivate Browsing, then untick this box but make sure to research your installed toolbars and extensions to ensure they do not breach your privacy, as otherwise it will defeat much of the purpose of InPrivate Browsing in the first place. Note that in general I strongly recommend against installing many (if any) toolbars and extensions wherever possible, for both security, stability and performance reasons.

CONTENT

Content Advisor: If enabled, the Content Advisor allows you to attempt to filter out and control access to websites that contain offensive or inappropriate material. Go through each category of content and use the slider below the box to set the restrictions on that category. Once done, click OK and you will be prompted to set a Password, as well as a Hint in case you forget that password. IE will now attempt to restrict content based on content advice from the ICRA (Internet Content Rating Association), so this is not fool-proof.

Certificates: Certificates are a form of electronic authentication method to verify that a particular website or individual is what/who it claims to be. They are described in more detail in this Microsoft Article, and are too complex to discuss here. I don't recommend altering any of the settings in this section unless you are acting under advice from a qualified tech support person. If a particular site displays a certificate error or warning, I recommend pursuing this further with the site owner or researching via Google before conducting any financial transactions with the site, as advised in this Microsoft Article.

AutoComplete: AutoComplete can save any website address you have typed into the address bar (or already stored in your History), any text you've entered into online forms, and any usernames and/or passwords you've entered on a web page. The aim is that next time you visit that site it will automatically restore your typed text, speeding up logging in or filling out details, or typing URLs into the address bar. Click the Settings button to configure which particular aspects of a web page AutoComplete will function for, but in general for security purposes I don't recommend enabling any of these options unless you have strong protection on your User Account and/or the PC is physically isolated from anyone else.

Note that ticking the 'Use Windows Search for better results' box will mean that an item called 'Internet Explorer History' will be added to the Indexing Options used by Windows Search. This item cannot be removed from within the Indexing Options; to remove it, untick the box here and click OK.

Feeds and Web Slices: If a website you're viewing has RSS or Web Slice capability, you will see the orange RSS or green Web Slice icon. You can then click the relevant icon to view the feed or to preview relevant slice information. Clicking the Settings button here allows you to configure how often such feeds and slices are updated, how they're read, and how IE warns you about capable websites. If you don't use these features, untick all the boxes on the Settings page.

CONNECTIONS

You should set up and customize the details of your Internet connection as provided to you by your Internet Service Provider (ISP), and make sure the settings here match your connection type and details.

PROGRAMS

Default web browser: If you have installed any other browsers, you can choose to set or reset IE as your default browser by clicking the 'Make default' button. Unless you are worried about another browser taking over this default association, you needn't tick the 'Tell me if Internet Explorer is not the default web browser' box for optimal startup speed. If you wish to make another web browser your default, see 'Set Program Access and Defaults' under the Add or Remove Programs section of the Control Panel chapter for details.

Manage Add-ons: Clicking this button allows you to configure Add-ons in IE. Any small program installed for use within Internet Explorer is an add-on, and generally you will be aware that a site is installing an IE add-on through prompts. However you can view all the main add-ons here by selecting the relevant category and making sure that the Show drop down box under the Toolbars and Extensions category says 'All add-ons'. For example Adobe Flash Player is a common add-on which allows flash-based content to play on web pages, such as YouTube videos. When you first visit a web page with a flash animation, IE will prompt you with a yellow warning bar that 'This website wants to install the following add-on:' and mentions the name of the add-on, in this case 'Adobe Flash Player from Adobe Systems Incorporated'. If you wish to continue you then click the warning bar and follow the prompts.

For the most part some add-ons are legitimate, such as allowing you to view PDF files from within Internet Explorer, or run free browser games. You can also download a Range of Add-Ons which provide useful additional functionality for Internet Explorer, such as spell checking. Many of these add-ons are free and operate similar to Extensions for Firefox, making Internet Explorer more customizable.

The problem is that some sites try to install add-ons which contain malicious scripts designed to alter its settings to suit their purposes. Furthermore some sites and programs will insist on installing useless toolbars in IE which take up space, collect data on your browsing behavior, and add to resource usage. For this reason it's extremely important that you don't just automatically accept the installation of any add-on; only install add-ons from trusted websites and only if absolutely necessary. In general the less add-ons the better both for security and performance purposes. Even legitimate add-ons can potentially slow down the launch

and browsing speeds of Internet Explorer. Regularly check the list of add-ons in this section and disable those you don't trust; do a Google search if the name does not seem familiar.

The Search Providers category in the Manage Add-ons box is covered under the General section further above; the Accelerators category is covered under the Accelerators section later on in this chapter, as is InPrivate Filtering.

HTML Editing: Here you can set the program IE uses for editing the HTML code of web pages when you select the 'Edit with...' option under the Page menu.

Internet Programs: Clicking the 'Set Programs' button here simply opens the Default Programs component of Control Panel, covered in full detail under the Default Programs section of the Control Panel chapter.

ADVANCED

This section contains important settings for Internet Explorer's functionality, security and general behavior. There are too many settings to be able to describe each one of them in full here, however I want to discuss a few important options in more detail before going into the recommended settings:

Phishing Filter/SmartScreen Filter: As discussed under the PC Security chapter, Phishing is a form of deception designed to illegally secure your personal details, such as logon, password and credit card numbers. It is usually done for financial gain, and is becoming an increasingly significant threat. Internet Explorer 7 introduced the built-in Phishing Filter which warns you if a particular site seems to be deceptive or a known phishing perpetrator. Internet Explorer 8 has changed the name of this option to the SmartScreen Filter. More than just a name change, the way in which the filter works has also changed. The filter now works much more efficiently, has new features to detect and block potential malware downloads, and in general it is strongly recommended that you leave the 'Enable SmartScreen Filter' box ticked under the Advanced tab. If you visit a potentially unsafe site, the prompts you will receive are quite intuitive. If you still wish to continue visiting the reported site, click the 'More Information' link at the bottom of the warning, or click 'Disregard and download unsafe file' to continue downloading an allegedly unsafe file download. Obviously in both cases this is not recommended.

To manually check a particular site using the SmartScreen Filter, go to the Safety menu in IE, highlight the 'SmartScreen Filter' menu and select 'Check this Website'. To report a website as being unsafe, go to the same menu and this time select 'Report Unsafe Website' - however bear in mind this doesn't automatically add the site to the list of unsafe websites, it only reports it for further examination by Microsoft. Finally, you can disable SmartScreen Filter by selecting the 'Turn Off SmartScreen Filter' option, but this is not recommended.

Zoom: Different web pages have different sized text and pictures. Internet Explorer allows you to zoom in/out of any page at any time simply by selecting the zoom level using the Zoom box at the bottom right of the screen - click on it and select the desired zoom level. However a quicker method is to hold down the CTRL button and scroll up or down on your mousewheel. Alternatively you can use CTRL + (plus key) or CTRL - (minus key) to zoom in and out respectively, and to reset the page to its default size, use CTRL 0 (zero). Under the Advanced options you can alter how this behavior works, particularly for new tabs and windows. For example if you tick the 'Reset zoom level for new windows and tabs', regardless of how zoomed in or out you are on your current tab, opening a new tab will mean the page will open at the default zoom level; if unticked, the new tab will open at the same zoom level as your current page. Experiment with these settings as well as the zoom feature to determine what suits your tastes.

Compatibility View: Internet Explorer 8 introduces Compatibility View which helps correctly render web pages that use code designed for older browsers. You can switch to Compatibility View at any time by selecting the option under the Page menu, or by clicking the small 'broken page' icon to the right of the Address Bar. This essentially changes IE8 into IE7 for the purposes of rendering the page. You should only use this option if you believe a web page is being shown incorrectly, typically when elements on the page are

out of alignment, obscured by other elements, glitchy or missing objects/text is visible, and so forth. Most sites will render correctly in IE8, so this is not a common problem. To manually force any page to permanently show itself in Compatibility View, select the 'Compatibility View Settings' option under the Page menu and add it to the list. You can also tick the 'Include updated websites lists from Microsoft' to use a pre-compiled list held by Microsoft which determines which sites require Compatibility View to automatically be enabled - more details can be found in this Microsoft Article. Of relevance to this section, under the Advanced tab in the main IE Internet Options, there is an option entitled 'Automatically recover from page layout errors with Compatibility View' - if ticked, as the option implies, page layout rendering errors will result in the page being shown in Compatibility View. You can leave this option ticked, however if you notice a site you regularly visit triggering this option, it is better to add it to the list under Compatibility View Settings for faster rendering.

The rest of my recommendations for the more important Advanced settings in IE are provided below.

I recommend that the following options be ticked for maximum performance, stability and convenience:

§ Disable script debugging (Internet Explorer)
§ Disable script debugging (Other)
§ Enable automatic crash recovery
§ Enable third-party browser extensions
§ Enable visual styles on buttons and controls in webpages
§ Show friendly HTTP error messages
§ Use Passive FTP
§ Use smooth scrolling
§ Use HTTP 1.1
§ Use HTTP 1.1 through proxy connections
§ Always use ClearType for HTML
§ Enable automatic image resizing
§ Show pictures
§ Check for publisher's certificate revocation
§ Check for server certificate revocation
§ Check for signatures on downloaded programs
§ Do not save encrypted pages to disk
§ Enable DOM storage
§ Enable Integrated Windows Authentication
§ Enable native XMLHTTP support
§ Enable SmartScreen Filter
§ Use SSL 2.0
§ Use SSL 3.0
§ Use TLS 1.0
§ Warn about certificate address mismatch
§ Warn if POST submittal is redirected to a zone that does not permit posts

I recommend the following be unticked, again for maximum performance, stability and convenience:

§ Display a notification about every script error
§ Enable Suggested Sites
§ Allow active content to run in files on My Computer
§ Allow software to run or install even if the signature is invalid

Settings for which I have no specific recommendation, but which are noteworthy:

Display Accelerator Button on selection: Accelerators are covered in more detail in the section of the same name further below. If ticked, this option brings up the blue Accelerators button whenever you highlight a selection on a page for example. This may be annoying for some people, especially if they keep accidentally clicking the button. Unticking this option removes the button.

Do not submit unknown addresses to your auto-search provider: If selected, this option prevents the search functionality of the Address Bar. Given IE already provides an Instant Search box at the top right of the screen, this functionality appears superfluous. If you wish to retain it, select 'Just display the results in the main window', then whenever you enter some plain text in the Address Bar it will initiate a search using the default search engine used for the Instant Search box.

Empty Temporary Internet Files folder when browser is closed: As discussed under the General section above, the use of the browser cache speeds up browsing in IE. However if for privacy and/or security purposes you want the cache cleared every time you close IE, tick this option. This may result in slower browsing each time you start a new session of IE. A better alternative might be to browse with InPrivate Browsing automatically enabled - see the relevant sections later in this chapter.

The remaining settings not covered above can be set to suit your taste, or simply left at their default.

INPRIVATE BROWSING

InPrivate Browsing is a new feature in Internet Explorer 8, the primary purpose of which is to allow you to surf the Internet without leaving any trace on the PC you are using. To access this feature, select the 'InPrivate Browsing' option under the Safety menu, or press CTRL+SHIFT+P - a new browser window will open, clearly marked as 'InPrivate'. Any browsing done using this InPrivate session will not store data on your drive. This is ideal for people who browse the Internet using publicly shared machines, but it is also useful if you simply want to ensure that there is no potential for potentially embarrassing Internet-related material to be stored on your PC via normal browsing.

While using an InPrivate session, IE will generate and store several temporary pieces of information, mainly to ensure that website functionality is maintained. Cookies and cached internet files will be stored temporarily for example, but as soon as you close the InPrivate browser window, these are all automatically removed. Importantly however, there are a range of caveats to keep in mind when using InPrivate Browsing:

- If you add any Favorites, RSS Feeds or Web Slices while using InPrivate, or you install any software, or add a new home page, then such changes *will* be saved and kept permanently even after you close it.
- If you don't close the InPrivate window before terminating your session, then others may be able to view your browsing history and temporary files on the same PC.
- InPrivate functionality does not extend to protecting your anonymity when surfing - your IP address for example will still be visible and stored on various sites as you browse the Internet.
- An InPrivate session does not offer any greater security than using the standard IE mode. Do not mistake InPrivate as a form of protection against malware or phishing for example.

Note also that if you have installed any third party toolbars or extensions in IE, then unless you tick the 'Disable toolbars and extensions when InPrivate Browsing starts' box as covered under the Privacy section further above, these toolbars and extensions may be saving and transmitting private data regardless. For that reason, I recommend ticking this box, but more importantly, resisting the urge to install additional software for IE as much as possible unless absolutely necessary.

While InPrivate Browsing is a useful feature, especially for those using shared machines, it is not a substitute for correctly configuring all of IE's options (see the rest of this chapter), and also exercising common sense as to general browsing. InPrivate does not guarantee that others will not find out about your browsing habits through other techniques, so minimize the extent to which you undertake potentially embarrassing or secure browsing on shared PCs for example.

INPRIVATE FILTERING

InPrivate Filtering is an additional feature which goes hand-in-hand with InPrivate Browsing. As noted above, InPrivate Browsing is designed to remove traces of your activity from the PC, but it does not protect your privacy when online. InPrivate Filtering attempts to do just that, to a reasonable extent, by preventing your private data from being broadcast unnecessarily to third party sites which are displaying content on the page you are viewing. For example, when you visit a trusted site, it may have content such as an interactive map or advertising which is drawn from another provider. You may wish to block data regarding your current actions on the trusted site from being transmitted to these third party providers.

To turn on InPrivate Filtering, go to the Safety menu in IE and select the 'InPrivate Filtering' option to enable it; this must be done each time you start IE, although there is a advanced tweak to overcome this covered later in this chapter. Once enabled, you can then refine the way in which it works by selecting the 'InPrivate Filtering Settings' option under the Safety menu. Alternatively, you can access these options by clicking the small lock icon in the Status Bar at the bottom of the screen.

You have three main options for InPrivate Filtering: Automatically Block; Choose Content to Block or Allow; or Off. When 'Automatically Block' is chosen, if the same third party content appears frequently across a range of sites it will be tracked and eventually blocked by IE to protect your privacy. However you can manually choose to block or allow content yourself if you're not satisfied with the automated results. At the bottom of the Settings box there is a small box which allows you to change how many websites need to be visited with the same third party content before it appears on the list of Content Providers in the Settings screen at the bottom of the screen. The default is 10, but you can lower it to 3 or raise it to 30; the lower the number the more third content will be blocked and hence also appear for you to choose to block or allow in the list.

Alternatively, click the 'Advanced Settings' link at the bottom of the Settings box and you will be taken to the Manage Add-Ons box which then allows you to import pre-made filters for InPrivate Filtering. One example is this list which a user has compiled, mimicking the filter list from Adblock plus, a popular ad-blocking extension for Firefox. Save the list and use the Import feature in the InPrivate Filtering category of Manage Add-Ons to apply it to IE.

Remember however that InPrivate Filtering is not specifically designed to block advertising as such, it is a general tool to limit the amount of data you send to third party providers. Enabling InPrivate Filtering can result in some sites not displaying correctly, or missing importantly functionality. However more importantly, constantly using InPrivate Filtering and thus blocking advertising can and will affect the viability of many sites on the Internet which rely on third party advertising income to remain free to view. If you block the ads on sites you enjoy, consider donating to them directly if you wish to see them remain open and free.

ACCELERATORS

Accelerators are browser-based tools which provide additional functionality for a site. You can access an Accelerator by highlighting a portion of a site and clicking the blue Accelerators button which appears. To access a list of Accelerators currently installed on your IE, right-click the blue button and select 'All Accelerators', or go to the Tools menu in IE, select 'Manage Add-Ons' and then select the Accelerators category. There are a range of additional free Accelerators you can download, you can view the full list by right-clicking on the Accelerators button and selecting 'All Accelerators'>'Find More Accelerators', or by clicking the 'Find More Accelerators' link in the 'Manage Add-Ons' screen. While they provide useful functionality, I recommend exercising constraint in how many you add to IE and keep active at any time to reduce resource usage.

If you find the Accelerators functionality unnecessary, then disable all the available Accelerators in the 'Manage Add-Ons' box, and also disable the blue Accelerators button - see the Advanced settings section further above.

< ADVANCED SETTINGS

The following are some more advanced customizations to make IE easier to use:

CUSTOMIZE INTERNET EXPLORER 8'S APPEARANCE

Unlike Internet Explorer 7 which had virtually no options for altering its default appearance, IE8 does allow some room for customization in that regard. To streamline IE8's appearance, I recommend trying the following changes:

1. Right-click on an empty area of the main IE toolbar (e.g. in the blank area to the right of any open tabs) to access the customization options.
2. Untick any components you do not wish to view. For example the Menu Bar and the Compatibility View button are two prime candidates for removal, as they are not frequently used by most people and their functionality is duplicated in a range of places.
3. Select the 'Lock All Toolbars' option to turn it off, and you can now move the Command Bar - the icon bar on the right side of the screen holding your main IE options. Grab the dotted line to the left of the Command Bar and you can move it up slightly to sit on a new line above your Favorites button and tabs for example; this might make access to it quicker for some people. Once done, be sure to select the 'Lock All Toolbars' option again to prevent accidental movement of any toolbars.
4. Select the Customize option and tick or untick the 'Use Large Icons' option to toggle the size of the icons to suit your taste, and also tick or untick the 'Show Stop and Refresh Buttons Before Address Bar' option if you wish to move the location of the Stop and Refresh buttons accordingly.
5. Select the Customize option and then select whether you wish to display any text next to icons or not - selecting 'Show Only Icons' will reduce the space they take up and is recommended.
6. Select the Customize option and then select 'Add or Remove Commands'.
7. Highlight the commands you wish to add or remove to/from the Command Bar and use the Add and Remove arrows to make the appropriate changes in the box on the right. For example you may wish to remove the Read Mail and Help buttons, and instead add a 'Delete Browsing History' button to the Command Bar. Once done, click Close to see the changes.

Unfortunately there doesn't appear to be much more scope to truly customize IE8's appearance, but it is an improvement over IE7, and in general the browser does look quite streamlined as it is.

CHANGE OR DISABLE INTERNET EXPLORER CLICK SOUND

Every time you navigate anywhere using Internet Explorer, or for that matter in Windows Explorer, you will hear a 'click' sound. To disable this clicking sound, or to change it to another sound follow these steps:

1. Go to Control Panel>Sounds and Audio Devices>Sounds.
2. Under the Program Events list, scroll down to 'Start Navigation' under the 'Windows Explorer' section.
3. Left-click on 'Start Navigation' to highlight it.
4. To disable the sound completely go to the sounds list below and select [None] at the very top of the list, then click Apply.
5. To change the sound, pick another more suitable sound from the list, or click the Browse button to find another sound file on your hard drive to use - remember, the larger the sound file the more memory is used (See Sounds & Audio Devices under the Control Panel chapter). Click Apply when done.

Note that changing or disabling this sound will affect both Internet Explorer and Windows Explorer equally. Further note that the default click sound is called *Windows XP Start.wav*.

CHANGE INTERNET EXPLORER DEFAULT DOWNLOAD DIRECTORY

By default Internet Explorer uses the same directory path to save files whenever you download a file from the Internet. You can change this default path at any time by opening the Registry Editor and going to:

```
[HKEY_CURRENT_USER\Software\Microsoft\Internet Explorer]
Download Directory=C:\Documents and Settings\User\Downloads
```

This STRING specifies the default directory where IE will save downloaded files. Enter the path to wherever you want the new default to be.

START WITH INPRIVATE BROWSING MODE ENABLED

By default the InPrivate Browsing mode in IE8 requires that you start up IE normally, then select the 'InPrivate Browsing' option under the Safety menu (or press CTRL+SHIFT+P) to open a new browser window which specifically uses InPrivate. To avoid all this, you can create a shortcut which opens IE already in InPrivate Browsing mode, ready to go at the start of every session. To do this, follow these instructions:

1. Right-click on the icon you normally use to launch Internet Explorer 8.
2. Select 'Send to>Desktop' if you wish to create a duplicate of it.
3. Right-click on the icon to be modified and select Properties.
4. In the Target box, go to the very end of the existing text, insert one blank space and then add the *-private* switch, and click Apply then OK to close the box.

Now whenever IE is launched from this modified icon, it will automatically open already in InPrivate Browsing mode every time.

START WITH INPRIVATE FILTERING MODE ENABLED

By default InPrivate Filtering needs to be enabled each and every time you start a new session of IE if you wish to use it. If you want InPrivate Filtering to be on by default all the time, then open the Registry Editor and go to:

```
[HKEY_CURRENT_USER\Software\Microsoft\Internet Explorer\Safety\PrivacIE]
StartMode=1
```

This DWORD needs to be created. When set =1 it forces IE8 to automatically begin with InPrivate Filtering mode enabled with each session. Delete it if you wish to undo this option.

CUSTOMIZE INTERNET EXPLORER TITLE BAR

If you want to customize what is displayed at the top of each Internet Explorer window - typically the name of the site followed by *Windows Internet Explorer* - go to:

```
[HKEY_CURRENT_USER\Software\Microsoft\Internet Explorer\Main]
Window Title=
```

Create a new STRING called `Window Title` (there is one space between the two words), and assign whatever text you wish to use. The next time you launch a new Internet Explorer window this text will be displayed at the top of IE.

BUILT-IN FLASH BLOCKING

If you want to block Flash-based content on any web page, you can use the new functionality in the 'Manage Add-Ons' screen in IE8 which allows greater control of ActiveX content, as described in this Microsoft Article. Follow these steps to customize how Flash content is allowed/blocked on a per-site basis:

1. Go to the Tools menu in IE, select 'Manage Add-Ons'.
2. Highlight the 'Toolbars and Extensions' category and make sure the 'All add-ons' option is selected under the Show drop-down box.
3. Left-click on the Flash-related entry (e.g. Shockwave Flash Object), and at the bottom of the screen select the 'More Information' link, or simply double-click on the entry.
4. In the box which opens, at the very bottom you will see a section where you can manually enter the names of sites which are allowed to use Flash-based content. By default it says * which means all sites. Remove the *, or click the 'Remove All Sites' button and click Close to disallow all Flash-based content on all sites. Alternatively, remove the * and manually enter the names of specific sites for which you wish to *allow* Flash functionality.
5. With Flash functionality disabled for sites, you will see a yellow information bar when a site requires flash for full functionality. You can either ignore this bar, or if you wish to add the site to your allow list, click on the bar and select the 'Run Add-On' option and follow the prompts.

Once again, be aware that blocking flash-based content not only affects the functionality on certain sites, but it may also affect their viability.

SPEED UP / FIX INTERNET EXPLORER 8

Many users report that this tweak has improved IE8's speed and/or stability, and in general it should be quite harmless either way, so it is included here. If you believe IE8 is running slowly on your machine, or you are experiencing problems with the browser, open a Command Prompt and type "regsvr32 actxprxy.dll" (without quotes) and press Enter. Reboot your system and open IE8 to see if there is any difference.

GENERAL INTERNET EXPLORER ISSUES

If you are having problems with Internet Explorer, you can browse through this Microsoft Article for a list of official solutions to common problems, including instructions on how to correctly uninstall IE8 for example.

INCREASE MAXIMUM SIMULTANEOUS CONNECTIONS

By default Internet Explorer only allows two items to be downloaded at a time from a server, which can be slow for sites which have multiple items that need to be downloaded before the page can be displayed. This limit is the Internet Standard for maximum number of simultaneous connections to a server, however you can increase the value beyond 2 by going to:

[HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Internet Settings]

MaxConnectionsPer1_0Server=0x0000000a(10)

MaxConnectionsPerServer=0x0000000a(10)

Create two new DWORD keys with the names shown above. Double-click on each one and in Decimal view enter the maximum number of simultaneous connections you want in the 'Value data' box (e.g. 10), then click OK. Reboot your system and see if Internet Explorer is faster as a result. You can experiment with even higher values if you wish, but note that increasing the maximum number of simultaneous connections to a server is technically a breach of Internet Standards, so if you experience any problems reset these values to 2 or simply delete these keys altogether.

DNS CACHE ISSUES

Whenever your browser tries to load up a page on the Internet, it has to access a Domain Name System (DNS) server to resolve or translate the text address you use (e.g. www.Google.com) into the actual IP address for the website (e.g.: 216.239.57.99). As you can see, the concept of having text for an address rather than a bunch of numbers makes remembering addresses a lot easier for users.

However since your browser needs to check DNS addresses each time it loads any web pages, the browser speeds up this process by caching (locally storing) the addresses you use for a period of time so that next time you try to go to the same address it uses the IP address it has cached rather than looking it up again on a DNS Server. Unfortunately if a site is down temporarily, or has recently moved, then your DNS cache may store the site as being inaccessible for a while even if it comes back online shortly afterwards, and therefore every time you try to connect to it for several hours you will get an error message.

To resolve any DNS problems with web pages not loading up at all or loading up with outdated information, go to Start>Run and type "CMD" (without quotes) and press Enter to open a new Command Prompt window, then in the Command Prompt type "ipconfig /flushdns" (without quotes) and press Enter. This will clear your DNS cache.

Furthermore, to make sure that your browser never stores a 'negative' DNS cache entry – i.e. one which says a site is inaccessible - then go to the Registry and do the following:

```
[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Dnscache\Parameters]
MaxNegativeCacheTtl=0
```

If the value above doesn't exist, create it as a new DWORD and assign it a value of 0 so that no negative DNS entries can be kept in the DNS cache.

You can also set the length of time in 'Time To Live' (TTL) for a 'positive' (or working) DNS cache entry to remain active before being updated. To do this, in the Registry go to:

```
[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Dnscache\Parameters]
MaxCacheTtl=10800
```

If this entry doesn't exist, create it as a new DWORD and assign it a value which measures (in seconds) the total Time To Live for the positive cache entry. Make sure to enter the amount of seconds in Decimal - not Hexadecimal - view. Also do not set this value too low as your DNS cache will effectively become useless and browsing will take longer. A value of between 3 and 6 hours (10800 - 21600 seconds) should be fine.

< WINDOWS UPDATE

Windows Update is an essential website which you should access regularly to download and install important updates for Windows. To access Windows Update at any time, open Internet Explorer, go to the Tools menu and select Windows Update. Alternatively, if you want to create a shortcut or bookmark to it, the address is Windows Update. If you are having problems accessing the site through the common methods above, you can try accessing it using a secure server through this link: Windows Update Secure. Note that the secure link differs by having *https://* instead of *http://* in the address. Note also that Windows Genuine Advantage does not allow pirated copies of Windows to fully access updates on Windows Update - see the Windows Product Activation & Windows Genuine Advantage chapter for details.

WINDOWS UPDATE USAGE

Whenever you access Windows Update I strongly recommend that you click on the Custom button instead of the Express method. This is because Custom allows you to see what updates are available, and you can select which you want to install. Once you've clicked on Custom you will see Windows Update scanning your machine and after a while it provides a list of updates. If the scanning doesn't seem to stop, or you have problems getting Windows Update to work, see further below.

Now click on the 'Review and Install Updates' option and make sure all the High Priority security-related updates are selected - these should be installed on any Windows XP installation. However you should then check the 'Optional Software' and 'Optional Hardware' links on the left and go through the list of optional updates. These updates include important application updates, newer versions of drivers for the hardware on your system, etc. and I recommend that you first follow the procedures in the rest of this guide to update your drivers, and then if these driver updates still appear you should install them as well. They won't cause any harm to your system and you can always manually install newer versions over them.

If you feel adventurous and want to see any pre-release software in Windows Update, click on the 'Change Settings' link under Options in the left pane and place a tick against the 'Show beta products and related updates' box at the bottom of the screen and click the 'Apply Changes Now' button. Do a rescan with Windows Update and a new 'Beta Software' category will be visible in the left pane.

SECURITY PATCH LINKS AND RELEASE DATES

Microsoft usually releases new drives and software updates as necessary, but they have a set release schedule for security patches - typically they are released together on the first Tuesday of every month. To find out when the next update is due, check the Microsoft Security Bulletin Site. You can find the direct download links to major security updates at any time on the Windows Security & Updates Download Site.

WINDOWS UPDATE ON OTHER BROWSERS

Browsers other than Internet Explorer cannot access Windows Update correctly by default. If you use Firefox or Opera for example, you can use an updating service like WindizUpdate. This site should be safe enough to download updates from, however I strongly recommend using Internet Explorer and the proper Windows Update site to ensure maximum security and minimum delay in obtaining critical updates for Windows. Also see the Windows Product Activation & Windows Genuine Advantage chapter of this guide for an official Microsoft Firefox plugin to validate the browser for use with downloads that require WGA verification.

REPAIRING WINDOWS UPDATE

Windows Update can exhibit strange behavior such as endlessly scanning your machine but never providing any list of updates, or gives strange error codes. The following are some things you can try to repair Windows Update:

1. Try the secure Windows Update address instead: Windows Update Secure.
2. If Windows Update seems to scan forever, or no updates appear, see this Microsoft Article.
3. If you are experiencing specific Windows Update errors such as error code 0x800A138F, see this Windows Update Fails page. There is no single fix for all error codes and each one has several methods you can try to resolve the issue.

As always, remember to run Windows Update at least once a week and install all important updates to maintain the security of your PC. Alternatively keep an eye on the front page of TweakGuides.com as I provide details of the latest patches and miscellaneous Windows updates of importance, and when to check

Windows Update for Microsoft patch release days. If you're paranoid or forgetful and want to ensure you always have the latest patches and updates, see Automatic Updates under the Control Panel chapter.

< OTHER INTERNET BROWSERS

You may be wondering if there are other browsers you can try if you are not happy with Internet Explorer. Fortunately there are at least three other major free browsers which are a viable and secure alternative to IE: Mozilla Firefox, Google Chrome and Opera Browser.

My personal preference is for Firefox. It is an excellent browser which is free and well-supported and runs without any problems alongside Internet Explorer, giving you the opportunity to try it out to see if you prefer it. The main advantage of Firefox over Internet Explorer is that Firefox is much more customizable. If you want to find out more about Firefox I recommend you read the Firefox Tweak Guide which covers all aspects of Firefox from the basic to the advanced.

You have nothing to lose by trying other browsers out, since none of them conflict with each other whatsoever. I strongly recommend installing at least Firefox and Chrome alongside Internet Explorer, and getting into the habit of switching between them if a major unpatched vulnerability or security breach is reported in one browser. All three major browsers function quite well, have similar functionality, and similar levels of performance.

OUTLOOK EXPRESS

Outlook Express - not to be confused with the full version simply called Outlook - is a useful email and newsgroup program which is built into Windows XP. It should meet all your basic email needs, but it also has some features people rarely get around to configuring or using. This chapter covers advice for how to configure Outlook Express, as well as some tips and tweaks. Note, if you don't have the latest version of Outlook Express use Windows Update to update it to the latest version for security and functionality reasons.

< CONFIGURATION ADVICE

The first thing to do is optimize Outlook Express' basic settings for efficient, trouble-free operation. Open Outlook Express, go to the Tools menu and select Options. Below are my recommendations for the more important settings under each tab of Options:

GENERAL

Tick 'When starting go directly to my Inbox folder'
Untick 'Automatically Log on to Windows Messenger' if the option exists

Note if you have removed Windows Messenger from your system, you may also have to apply the Outlook Express slowdown fix (See below) otherwise Outlook Express may take a long time to load each time it starts.

READ

Untick 'Automatically download message when viewing in the preview pane'

This is recommended for security reasons, so that unsolicited/spam email is not automatically downloaded in the preview pane when it is highlighted.

RECEIPTS

Read receipts tell the sender of a message whether a message has been opened by the recipient. I personally don't like sending or receiving read receipts. They can be quite annoying, and whether you want to use them is up to you, but for the 'Returning Read Receipts' section I recommend selecting 'Notify me for each read receipt request'. That way you know when someone has sent an email to you with a receipt request, and you can choose whether to accept the request when you open the email.

Secure receipts are similar, but might be more useful if you're sending a very important message and you want to make sure that the recipient has opened the message, and that the message arrived at the other end unaltered. Otherwise the same settings apply.

SEND

Tick 'Send messages immediately'
Untick 'Automatically put people I reply to in my Address Book'

Making sure that you don't add everyone to your Address Book is one way of preventing any viruses on your system from emailing everyone in your Address Book with the virus. I recommend instead either writing down email addresses or keeping at least one existing email from various people so you can reply to them that way.

COMPOSE, SIGNATURES, SPELLING

There are no specific recommendations for these tabs. Configure them to suit your taste. If you want to know what any of these features do, right click on them and click 'What's this' or press F1 for Windows Help.

SECURITY

The security features in Outlook Express are reasonable in protecting against most viruses and malicious code sent in emails. However you need to know how they work and configure them correctly.

There is an option to select either the 'Internet Zone' or 'Restricted Sites Zone' for your default email behavior. When in Internet Zone mode, HTML-based emails with active content will display their content just like a web page in Internet Explorer. In fact the security settings you choose under the Security tab in Internet Explorer Options also apply to Internet Zone email content. When in Restricted Sites Zone mode, Outlook Express will disable active content from HTML-based emails, which is much more secure, but reduces email functionality. I recommend running in Restricted Sites Zone mode, as most HTML-based emails nowadays are spam or malicious in intent.

Tick 'Warn me when other applications try to send email as me' so that no other application can automatically send out an email under your name without you knowing about it.

Tick 'Do not allow attachments to be saved or opened that could potentially be a virus'. This important feature will protect you against email attachments, the vast bulk of which are dangerous, unsolicited malware. See the PC Security chapter for tips on how to prevent infection through emails. If you receive an attachment from an address you know, it may still be malware which was auto-mailed from that user's account, so double-check with the sender if you're genuinely unsure of whether to save or open the attachment. If you believe it's a legitimate attachment, then save the attachment and scan it with several malware scanners. If you're not allowed to save the attachment, first close the email, open Options and untick this setting, go back and open up the email and save the attachment, then make sure to retick this option afterwards. Once again, make sure to thoroughly scan all suspicious attachments, and remember that executable attachments in particular (e.g. those with *.EXE, .BAT, .COM* extensions) are almost always bound to be malware unless you are 100% certain of the source of the email.

As noted, certain file types (e.g.: *.EXE* files) are automatically blocked with this setting enabled. To configure which other types of files are affected when this setting is ticked, go to Control Panel>Folder Options>File Types, highlight a file extension and click the Advanced button. Select 'Confirm open after download' to add the file type to the unsafe file list which Outlook Express uses to block attachments when this setting is enabled. Some file types are permanently on the unsafe list and cannot be taken off.

Tick 'Block images and other external content in HTML email' - once again for security reasons. In practice very few people send legitimate HTML-based emails with images.

You shouldn't have to change the remaining settings in this section.

CONNECTION

Uses the same settings as Internet Explorer, so see the Internet Explorer chapter.

MAINTENANCE

I recommend the following settings to reduce wasted disk space:

Tick 'Empty message from the Deleted Items folder on exit' - this means any messages you have in your Deleted Items folder will be permanently deleted each time you quit Outlook Express.

Tick 'Purge deleted items when leaving IMAP folders' - only affects email accounts which use IMAP protocol, which is not necessarily common.
Click the 'Clean Up Now' button and select Compact to reduce existing wasted space immediately.

If you are wondering where your emails are physically being saved, then the following option will show you email store directory:

'Store Folder' – This is the location of your emails and Outlook Express folder settings. Typically it is the *\Documents and Settings\[username]\Local Settings\Application Data\Identities\{ID String}\Microsoft\Outlook Express* directory.

Once you've changed all the settings you wish to change in Outlook Express, click the Apply button and exit the settings screen. You will need to close and relaunch Outlook Express for some of the settings to come into effect.

< TIPS & TWEAKS

BACKING UP EMAILS

If you want to manually back up the emails you've saved in Outlook Express, follow these procedures:

1. Open Outlook Express, go to Tools>Options and open the Maintenance tab.
2. Click the 'Store Folder' button and highlight the directory path shown with your mouse (right-click on the text and choose Select All).
3. Right-click again on the highlighted text and select Copy.
4. Go to Start>Run and right-click in the box. Select Paste, then click OK. This opens an Explorer window in the folder where Outlook Express holds your emails and email folders as *.dbx* files.
5. The folder names should be self-explanatory. Select individual *.dbx* files where you stored emails and copy them to another location for backup purposes.

RESTORING EMAILS

To restore these emails back into Outlook Express at any point, say after a reformat of Windows, follow these procedures:

1. Open Outlook Express, go to File>Import>Messages.
2. Select 'Microsoft Outlook Express 6' from the list (or whichever version of OE you saved the messages under).
3. Select 'Import mail from an OE6 store directory' and click OK.
4. Browse to the directory where you backed up your Outlook Express messages as *.dbx* files. Click OK, then click Next.
5. Click All Folders, select Next, then select Finish. Your messages should be restored as you saved them.

You can also use these Import and Export functions in Outlook Express to save and restore your Address Book, Email account and Newsgroup account data. These aren't detailed here, but the procedure is similar to that outlined above.

FILTERING SPAM

Spam is unsolicited email with useless and often offensive content. Outlook Express has some built-in features which can be used to sort mail automatically and prevent spam. Note that these features won't work for IMAP and HTTP (i.e. Web-based) email accounts such as Hotmail. Use these tools for your POP3 accounts such as the ones your ISP provides. To access and configure these tools:

1. Open Outlook Express and go to Tools>Message Rules and select Mail.
2. Click the New button to create a new rule. The New Mail Rule window will open.
3. Select a condition for your rule. For example, we will choose 'Where the message is more than size'. We can set the size parameter for this rule in Step 5.
4. Select the action for the rule. For example, 'Move it to the specified folder'.
5. Set any parameters required for the rule by clicking on the blue underline text in the Rule Description box. For example, we will click on the Size text and choose 40KB as our size limit for the rule set up in step 3. We will click on the Folder text and choose Deleted Items.
6. Give the rule an appropriate name, such as 'Large email filter' and click OK.
7. In the Mail Rules window, put a tick next to this new rule and click the Apply Now button. If you want to add more parameters or change the rule, click the Modify button, and go back through steps 3 - 6 above until you're happy.
8. Create as many rules as you like, and arrange them in order of priority/application to new messages by using the Move Up and Move Down buttons.

Now when you check for new emails, the above rule will automatically check each email's size and if it is over 40KB, will redirect it to your Deleted Items folder automatically. You can have a quick look in there after checking your mail and see if it's anything you want to keep, otherwise just empty the deleted items and you've cleared some hefty spam straight away. Create more rules once you identify patterns in your email. For example I was getting a lot of spam emails with phony virus screensavers attached. So I set up a new rule which automatically deletes from my mail server any emails with 'Screensaver' in the message body (i.e. I chose the 'Delete it from server' action for the rule) - that way I don't even download them, saving time and bandwidth.

Of course you can do a lot more with Message Rules, such as block certain individuals, block any email accounts from particular domains (such as MSN, Yahoo or AOL), etc. Experiment with the tool as it is more useful than most people would believe. To begin with I strongly recommend setting the action for any rule to redirect flagged mail to a separate folder you set up and see if any legitimate mail is getting caught up by the rule. Also, you can create multiple layers of rules to finely sift through the mail and get rid of the genuine rubbish. That way if the email gets through one rule, it is subjected to the next one and so forth, and if it makes it through several rule checks it should be fine to view.

REMOVE SPLASH SCREEN

The following is a simple tweak which skips the blue Outlook Express splash screen when Outlook Express is loading up. To perform this tweak, open Registry Editor and go to:

```
[HKEY_CURRENT_USER\Identities\{numbers}\Software\Microsoft\Outlook Express\5.0]

NoSplash=1
```

Create this new DWORD value and set to =1. Delete the entry if you want to regain the splash screen.

SLOWDOWN ISSUES

If you have disabled MSN Messenger then you may experience slowdowns when launching Outlook Express. To resolve this problem, implement the following change to your Registry:

```
[HKEY_LOCAL_MACHINE\SOFTWARE\Classes\CLSID\{FB7199AB-79BF-11d2-8D94-
0000F875C541}]
```

Find this key in the left pane and under it left-click once on the `IniProcServer32` key. In the right pane of the Registry Editor double-click on the `(Default)` entry at the top and completely delete the data it contains. Now do the same for the `LocalServer32` key as well. This prevents the slowdown which some users experience with Outlook Express when MSN Messenger has been disabled.

< OTHER EMAIL CLIENTS

I personally find Outlook Express to be just fine for my everyday email needs, even though I receive a lot of emails. However, it is important to understand that if you are not happy with Outlook Express, you do have other options. To start with, the standard free webmail sites Yahoo, Hotmail and GMail are not only useful in providing you with free email addresses, they also provide good built-in protection against viruses and spam and plenty of storage space. However in general I don't recommend relying on an online provider only, it's best to still use a local mail client to store emails.

If you want an actual free email program to replace Windows Mail, you can download Windows Live Mail which is a more advanced version of the Windows Mail client built into Vista. It's quite advanced and has more sophisticated capabilities including automated spam filtering, so it's worth trying out. Another alternative is to check out Mozilla Thunderbird, an email client which is both very customizable and also offers more methods of blocking spam.

Finally, I strongly suggest once more that you examine the tips provided in the PC Security chapter of this guide for ways you can protect yourself from Email-related security risks while also preventing the spread of spam and malicious software.

WINDOWS MEDIA PLAYER

Windows Media Player is Window's built-in utility for playing music and movies. It has many useful features and is actually a very efficient, feature-packed media player, but is often dismissed as being 'bloated' or 'spyware'. In actuality it is smaller and more efficient than some popular media players, and if configured correctly should provide good privacy. This chapter contains configuration advice and details on WMP's features. If you don't like Windows Media Player, some alternative free players are covered at the end of this chapter, as well as a discussion of media-related issues including various Codecs.

This chapter assumes that you are using the latest version of WMP which is Windows Media Player 11. This is not the version that originally comes with Windows XP, nor does it install as part of SP3, so you should download it from the link above. All Windows users are encouraged for both security and functionality reasons to upgrade to the latest version. Note, if you're not going to use WMP 11's online music store functionality and/or to control any portable media devices connected to your PC via WMP, you can disable the 'Windows Media Player Network Sharing Service' - see the Services chapter for details of how to do this.

< CONFIGURATION ADVICE

To access Windows Media Player, go to Start Menu>All Programs>Accessories. To access Windows Media Player's menus, in Full View mode right-click on an empty spot on the black command bar, or just press the ALT key. To configure Windows Media Player as covered below, first select Tools>Options then see the details for each tab as follows:

PLAYER

Automatic Updates: WMP can automatically check for updates at set intervals. Since it is not updated all that often, the 'Once a month' option should be fine. If you tick 'Download codecs automatically', whenever you attempt to play a media file for which you don't have the correct codec (and you are online), Windows Media Player will automatically try to find and download the required codec and install it so you can play the file. This is recommended, and see the Audio and Video Codecs section below for more information.

Player settings: You can set these to suit your taste, however I recommend unticking 'Connect to the Internet' if you want to maintain your privacy.

Start the mini player for file names that contain this text: This option allows you to tell WMP to automatically launch into Mini Player mode (see further below) for files containing the specified text in their filename.

RIP MUSIC

Rip music to this location: Ripping music is the process of copying it from an audio CD to a media file on your computer. Click the Change button and select the directory where any ripped music or media is placed; by default it will be placed under the *\Music* directory. Click the 'File Name' button to specify the particular attributes of the CD/track which will be used to compose the ripped music track's filename. Check the preview at the bottom of the box to see how this will look.

Rip Settings: I strongly recommend you untick the 'Copy protect music' option as otherwise each track you rip will become DRM protected and this cannot be changed. On the slider below, choose the audio quality you prefer for ripped music - 160Kbps or above is recommended for good quality audio, 128Kbps is the minimum recommended. The higher the quality the larger the file size of the ripped file however.

To use WMP to convert any audio tracks you want from a non-protected Audio CD to *.WMA* or *.MP3* format do the following:

1. Insert the Audio CD in your drive.
2. Close and restart Windows Media Player to make sure it detects the CD.
3. Maximize WMP so you can see the track listing.
4. Click the Rip button at the top of the screen.
5. Put a tick against the track(s) you wish to rip
6. Click the arrow under the Rip button and you can select the specific Format you wish to use - *.MP3* is recommended as a good balance between quality, size and compatibility with a wide range of media players, Windows Media Audio (*.WMA*) is good but less compatible, and *.WAV* provides the best quality but is usually too large because it doesn't compress the audio information.

There are better third party ripping tools available, however Windows Media Player is free, quick and easy to use, and the audio tracks it produces will not contain any copy protection (as long as you use the options further above) so it is well worth using.

DEVICES

The devices listed under this tab are capable of media playback, whether video or audio or both. Select each playback device and click the Properties button. Adjust settings as appropriate, and if in doubt leave at their defaults which are fine for most purposes. Note that for your Display properties, you can alter the aspect ratio for video/DVD playback if it appears to be too wide or too narrow; the circle shown should be perfectly round on your screen.

I recommend that you untick the 'When deleting playlists from devices, also remove their contents' option to prevent undesired file deletion.

Click the Advanced button to alter the settings for audio and video file conversions when being transferred to/from multimedia devices and set to suit your tastes.

BURN

Windows Media Player allows you to also burn music or media files to a CD or DVD. Music can be burnt as an audio CD, but other media can only be burnt to CD or DVD as data files. Note that for general burning purposes a full-featured burning program called Nero is recommended, but it is not free. A useful free burning program is Deep Burner.

Burn Speed: Select the burning speed, keeping in mind that if you are continually having errors with burnt disks, you should reduce the speed to Medium or even Low to ensure accurate burning. If you want the disc automatically ejected after the burn is complete, tick the box.

Apply volume leveling across tracks on the CD: If burning an audio CD, you can tick this option to have WMP attempt to set a common volume level for all audio tracks. This can help prevent some tracks from being overly loud or soft relative to others.

Use media information to arrange files in folders on the disk: If you are burning a data disk and this option is ticked, WMP will sort your media into separate folders using *\Music\Artist\Album*, *\TV*, *\Video* and *\Picture* folders. If unticked, WMP will burn all tracks to the base directory of the disk without sorting.

Conversion: If you select the 'Convert to' option here, you will be able to use a slider which determines how the various music files will be resampled for burning to audio CD. I strongly recommended against allowing conversion, as most music files will lose quality if converted, especially if it's to 128Kbps or below, and more

importantly WMP automatically converts all files to *.WMA* format during conversion which is not necessarily desirable.

To burn a disk, open WMP in full view, click the Burn button at the top of the screen, and an interface for arranging files for burning appears. Click the small arrow under the Burn button to select whether to burn an audio CD or a data CD/DVD. You can then drag and drop files into the right-hand pane to add them to the list of media to be burnt to disk, and when finished clicked the 'Start Burn' button at the bottom.

PERFORMANCE

Connection Speed: I recommend the first option, however if WMP consistently has problems detecting your connection speed, then set it manually here.

Network Buffering: The 'Use default buffering' option is usually fine to use, but if you find streaming videos are constantly disjointed, then experiment with increasing the buffer size.

Video Acceleration: Under this section click the Advanced button. These options affect all DVD and video playback, and can be used to help resolve issues with particular videos or DVDs. If your video goes out of sync - sometimes due to lack of sufficient bandwidth - tick the 'Drop frames to keep AV In sync' for example. Tick the 'Use video smoothing' option if playing back video with low framerate, as WMP will try to interpolate frames (fill in the blanks) to provide the appearance of smoother video playback.

In particular, when playing fullscreen video, if the 'Display full screen controls' option is ticked, a set of controls will be shown at the bottom of the screen. If you want these removed, untick this box for true fullscreen video playback. You can then control playback at any time using your mouse and the following keyboard/mouse commands:

- Play or Pause - Left-click.
- Change Volume - Use the mouse wheel to increase or decrease volume.
- Mute Volume - Press the middle mouse button.
- Fast Forward/Rewind - Press and hold the front and back thumb buttons (if any) for Fast Forward/Rewind.
- Skip Forward/Back - Click the front or back thumb buttons to Skip Forward/Skip Back.
- Command Menu - Right-click.
- Return to Full Mode - Press ESC.

If you have a standalone graphics card, tick the 'Turn on DirectX Video Acceleration for WMV Files' option to allow your graphics hardware to provide better video playback performance for *.WMV* video. Finally, for videos which don't fill the entire screen due to their aspect ratio being different to your monitor shape, you can set the color used to display the surrounding area. For example for playback on a Plasma TV to prevent burn-in or uneven phosphor aging, you can set a white background by clicking the Change button.

Finally, if you get black and white video playback for color videos, untick the 'use high quality mode' option here.

LIBRARY

Sharing: If you wish to share the media on your current PC with other machines or devices on the same network, click the 'Configure Sharing' button. For instructions on how to configure this, click the 'Learn about sharing Online'. It won't be covered here as it's not a feature for the average home PC user.

Update Library: By default when Windows Media Player is first run it checks your personal folders to find any media files it can use, and adds them to your Library - a listing of all the media files on your PC. Windows Media Player will keep monitoring your personal folders to add or delete listings from the library

as you add or delete your media files. You can access the Library listings by category at any time by going to WMP and clicking the Library tab. Here you can view the media files in various ways, sorted by categories such as Album, Genre, even Rating. You can also create specific Playlists from the listings.

While this is handy, the Library function is not absolutely necessary, it is simply an organisational tool, so if you want to stop it or alter it, click the 'Monitor Folders' button, then on the next screen click the 'Advanced Options' button. You can now add further folders to monitor if you wish, but you cannot remove the default folders WMP monitors; you can only choose to Ignore certain folders. If you want to prevent WMP from adding any more files to the Library, enter the maximum values of 9999 for the 'Skip files smaller than' boxes at the right side, so that any file smaller than 10MB is not automatically added to the Library. When done click OK and WMP will scan for any changes it needs to make to the Library. Finally, back under the main Library tab I strongly recommend unticking the 'Delete files from computer when deleted from library' box to prevent accidental deletion of files. This allows you to edit or delete items in your Library listing without deleting the corresponding media files.

Automatic Media Information: If you want WMP to retrieve information about the particular media you are playing from the Internet - such as the name of the Album or Artist for a track - then tick the 'Retrieve additional information from the Internet box'; you can then choose to have it fill in the gaps or overwrite all existing information for the media. This information can be useful in making searches much easier. You can also manually force Windows Media Player to fill in missing information for particular files by clicking the Library button in WMP, then right-clicking on a particular track which isn't fully identified and select the 'Find Album Info' option - a new box will open which loads up the possible matches for this track and you can select the appropriate one, or enter the media information manually.

The remaining options here determine how WMP behaves when a track is ripped - see the Rip Music section further above.

PLUG-INS

Plug-ins are various modules which add functionality to Windows Media Player such as Visualizations or Digital Signal Processing (DSP) effects. These can be added, removed or configured here. To find more plugins to add, click the 'Look for plug-ins on the web' link, and for more visualizations, click the 'look for visualizations on the web' link - you will be taken to relevant Microsoft sites where you can download useful plugins or visualizations which should be safe to use with WMP. You can remove any added plugin by highlighting it and selecting the Remove button, and you can configure any settings they may have by selecting the Properties button. Bear in mind that the more plugins you use in WMP, the more resources the player may take up, and also the greater the chance for potential problems, so only install plugins you feel are genuinely necessary.

PRIVACY

This is an important area of Windows Media Player which causes users a lot of concern. There is a common fear that by using Windows Media Player, Microsoft is spying on your media usage behaviors. This is not true, however to ensure that none of the media on your hard drive is altered, or any information about it reported back to Microsoft, follow the recommended settings in this section. To begin with untick every option on this page. None of them are necessary for normal media playback. If you use DRM-protected media, you may want to tick the 'Download usage rights automatically when I play or sync a file' and 'Automatically check if protected files need to be refreshed' options to prevent problems, but best to do so only if you run into a problem playing back such files.

If you don't want your media files altered in any way without your permission, I suggest that you make all of your media files (e.g. *.MP3*, *.MPG, .WMB* and *.AVI* files) write protected. To do this, in Windows Explorer go to the folders where your media files are stored and highlight all of them, right-click on them, select

Properties and place a tick in the 'Read Only' box. By write-protecting all your media, Windows Media Player can't alter them or add any additional identifying information without your permission.

Finally, see the Windows Media Digital Rights Management (DRM) option under the Group Policy chapter of this guide and enable it if you want to prevent Windows DRM from accessing the Internet when you use Windows Media Player. In the end though, at no point does Microsoft truly 'spy' on you, there are no real privacy risks to using Windows Media Player.

SECURITY

Your Internet Explorer security settings will be used when Windows Media Player is browsing any web content, so see the Internet Explorer chapter for details. For the remaining boxes here, I recommend you set them to suit your taste. You can start off by having them all unticked for maximum security, then if you encounter a legitimate website with multimedia content that doesn't function correctly, you can tick these options to allow it to do so. None of these options should be necessary to view most online media.

FILE TYPES

Here you can select the media file types for which Windows Media Player is the default player. Change to suit your tastes, and note that if another player keeps becoming the default for a particular media type against your wishes, you will have to either open that player and check its settings to ensure it is not forcefully changing these options each time it's opened, or go to Control Panel>Folder Options and under the File Types tab change the default program association for the relevant file type.

DVD

If you have a DVD drive on your system and use Windows Media Player to play DVD movies, you can adjust the settings in this section to suit your particular tastes and needs.

NETWORK

Configure this section according to your needs - the defaults should be fine.

GRAPHIC EQUALIZER

Windows Media Player comes with a fairly decent graphic equalizer which can noticeably enhance audio quality if set up correctly. To alter it, go to Full View mode and under the View menu select Enhancements>Graphic Equalizer. While you can use a range of presets, I recommend selecting the individual slider movement option - the top option on the far left - and then customizing the settings to suit your tastes. For reference, my personal settings from left to right for each slider are: 3 6 4 0 0 2 2 5 6 9. Your settings will vary both based on your playback device, as well as your any adjustments you may have made to the Tone settings for your playback device - see the Sounds and Audio Devices section of the Control Panel chapter.

Other options found under the Enhancements section include enabling SRS WOW effects, as well as Video Settings to alter the Brightness, Contrast, Hue and Saturation of video, and Crossfading and Auto Volume Leveling. You can close the Enhancements box at any time by clicking the small red 'x' at the far right of the Enhancements area.

SKINS

You can customize the way Windows Media Player looks through the use of skins. These skins can change the appearance and visible functionality of Windows Media Player. There are some skins which already come with the player, and you can view them by opening Windows Media Player, and under the View menu select 'Skin Chooser'. In the Skin Chooser box you can click on a skin to see a preview of it in the right pane. If you want to try a skin out, click the 'Apply Skin' button. If you want to get new skins online click the

'More Skins' button, or go to a site such as The Skins Factory to download more free skins. Some skins will install automatically when you download them, but if you download a skin file in *.WMZ* format you can manually install it so that it appears in the Skin Chooser by putting the *.WMZ* file into your *\Program Files\Windows Media Player\Skins* directory. Note that using more complex and elaborate skins can take up slightly more memory and possible extra CPU power when you run Windows Media Player, so if you want to ensure the fastest performance and least resource usage simply use the default WMP appearance - that is, under the View Menu select 'Full Mode'.

In fact my preferred look for WMP is to switch to Full Mode and then simply use the resizing button at the bottom right of the player to shrink it down to the Compact Mode. In 'Mini Player' mode WMP uses even less resources - see below.

MINI PLAYER MODE

One of the neat features of Windows Media Player which sets it apart from many other media players is the ability to shrink it down into a 'Mini Player' interface which sits in the Windows Taskbar. To activate this, right-click on an empty area of your Windows Taskbar and under the Toolbars menu select the 'Windows Media Player' option so a tick appears next to it. Now open Windows Media Player and click the Minimize button on the top right of the player window. The player will minimize and sit in your Taskbar with a handy interface that allows access to all the major functions of the player, and whenever you want to maximize it again click the Maximize button on the bottom right of the mini player. Not only is this a neat feature, but while sitting in the Taskbar the player also uses less resources. You can also access WMP's seek functionality by hovering your mouse over the mini player, and using the slider bar which appears.

< AUDIO & VIDEO CODECS

A Codec (*Co*mpressor *Dec*ompressor) is a program which allows audio or video to be compressed and decompressed to or from the original format for which it is designed. Compressed files use special algorithms, and it is the codec which can encode/decode these algorithms. If you can play or record audio/video in a particular format, you have a codec for that format already installed on your system.

To view and adjust the codecs already installed on your system, do the following:

1. Go to Control Panel>Sounds and Audio Devices>Hardware
2. Double-click Audio Codecs or Video Codecs to see the relevant codec lists.
3. Click on the Properties tab and you will see all the currently installed codecs on your system. To see more details about each one, double-click on it.
4. To disable an audio codec for troubleshooting purposes, double-click on it and select 'Do not use this audio codec' and click Apply; to remove it from your system, highlight the codec and click the Remove button in the main list.
5. Video codecs cannot be temporarily disabled, but they can be removed by highlighting them and clicking the Remove button in the main list.

If you want to uninstall a non-standard codec, the best way to remove them is to go to Control Panel>Add or Remove Programs and look for the codec name in the list shown. More details of common codecs can be found in this Codecs for Windows Media Player article. I don't recommend completely removing a codec as several programs may be dependent on it. In particular do not remove any unfamiliar or default Microsoft codecs. If you do, you can re-download the default codecs for Windows Media Player as a package from Microsoft Codecs.

If you want to determine what codec(s) a particular file uses, install the free GSpot utility. If you then want to manually find the required codec, try checking WMPlugins first. If the codec you want isn't there, the most common third party codec required to play back video found on the web is DivX, however you can

also download FFDShow which is a filter which decodes most common video and audio formats, including DivX, XviD, AC3 and OGG.

There are also certain types of media which won't normally play back on Windows Media Player or other common media players due to proprietary issues. The QuickTime *.MOV* and the RealPlayer *.RM* formats are two types of files which require special codecs and are usually viewable using their respective players: QuickTime Player and RealPlayer. If you don't want to install these players and instead want to view these audio/video files on Windows Media Player, or other players, you should install the Real Alternative and QuickTime Alternative codecs. Usually a Google search for any codec you require should find you a place to download it, but very old or proprietary codecs may be difficult to find or may cost money to obtain.

Note that I do not recommend installing any 'Codec Packs', as these often cause all sorts of issues, from impeding proper video or audio playback in games, to strange system crashes. Stick with the codecs provided above as they cover all the major formats, and download and install/test individual codecs one at a time.

< OTHER MEDIA PLAYERS

If you don't wish to use Windows Media Player to view media, there are several alternatives including the following popular free media players:

WinAmp
QuickTime Player
DivX Player
iTunes
VLC

I can't go into detail about each of these players here, however they are each good players, and it depends on your personal preference and specific needs as to whether you choose them over Windows Media Player. A specific media player worth noting is below:

MEDIA PLAYER CLASSIC

There is a free generic media player which can play back most formats, including proprietary formats, and is also both easy to use and utilizes very little system resources: Media Player Classic. It requires no installation - it is in one *.EXE* file which launches the player. It also requires no tweaking as such, it is ready to be used immediately without any issues. Give it a try as it is a great alternative to the other players, and you may even end up preferring it over Windows Media Player or any other media player.

VISUAL & CONVENIENCE TWEAKS

This chapter covers a range of tips and tweaks designed to allow you to further customize the appearance of Windows XP, as well as improving XP functionality. None of the tweaks in this chapter is necessary for ensuring that you have a fast, stable system, however many of them will save you time or make using Windows XP more enjoyable, so they are still worth considering. Please note that some of these tweaks can also be performed by a range of tweaking and customization utilities covered elsewhere in this guide, such as in the TweakUI chapter, so you don't have to use the Registry Editor for example if you don't want to.

< TIPS & TWEAKS

REMOVE TEXT FROM DESKTOP ICONS

To remove the text beneath any icon on your Desktop, follow these steps:

1. Right-click on the icon whose title you want to remove and select Rename
2. Instead of entering any characters in the text box, hold down the ALT key and type 255 (ALT + 2 + 5 + 5). Note that you need to use the NUMPAD numeric keys for this to work, that is the numbers to the right of your arrow keys, not the ones at the top of the keyboard.
3. When you release the ALT key the title will be blank, and you can press Enter to accept this. Blank titles are usually denied under Windows, but not when done this way as it inserts a special blank character.
4. For every icon whose title you wish to remove, do the same as above. However since no two icons can have the same name, for each subsequent icon you'll have to add an additional ALT 255 to the end of the string you enter. E.g. to blank a second icon name you'll need to hold down ALT and type 255, release, then hold ALT and type 255 again, then release and press Enter. For a third, you'll have to type ALT 255, ALT 255, ALT 255, Enter and so on.

If you want to regain the icon names you will have to manually edit each icon's name to whatever you want.

REMOVE THE BOX AROUND DESKTOP ICON TITLES

If you have applied the 'Remove text from desktop icons' tweak above and you still see a faint box where the text was, you can also remove that box by doing the following:

1. Go to Control Panel>System>Advanced and click the Settings button under Performance.
2. Tick 'Use drop shadows for icon labels on the desktop' under the Visual Effects tab and click OK.
3. Check your desktop. The boxes should be gone, regardless of whether you removed the text or not. If they're still there, right click on the desktop, look under 'Arrange Icons By' and make sure there's no tick against 'Lock Web Items on Desktop'.

CREATE DESKTOP ICONS FOR SHUTDOWN OR RESTART

Instead of using 'Turn Off Computer' or Restart options on the Start Menu, you can create desktop icons which automatically shutdown or restart your PC with just a double-click. This tweak makes use of the *Shutdown.exe* command line to create a new shortcut as follows:

Shutdown Icon:

1. Right click on an empty area on your desktop.
2. Select New>Shortcut.
3. In the first box of the Create Shortcut Wizard, type "shutdown /s /t 00" (without quotes) and click Next.
4. Call the shortcut something descriptive like 'Shutdown' and click Finish.
5. To add the finishing touch, right click on this new icon, select Properties, click the Change Icon button and select an appropriate icon.

Reboot Icon:

To create a Reboot icon, follow the same steps as above, but substitute the following steps in place of the corresponding ones above:

3. In the first box of the Create Shortcut Wizard, type "shutdown /r /t 00" (without quotes). Click Next.
4. Call the shortcut something descriptive like 'Restart' and click Finish.

Note that double-clicking on these icons will commence shutdown or restart of the PC straight away without any warning. If you want a countdown before a shutdown or restart, substitute a time in seconds in place of the '00' entries in the shortcut properties above (e.g. s*hutdown /s /t 10* gives 10 seconds warning before shutting down). Also note that once the shutdown or restart process begins it can't be aborted. If you want more command line switches which can be used with the shutdown command, open a command prompt and type "shutdown" (without quotes) and press Enter. For example you can use the */h* switch instead of */r* or */s* above to create a Hibernate icon instead.

CREATE DESKTOP ICON TO LOCK THE COMPUTER

Just as you can create Shutdown and Restart icons, you can also create an icon which locks your computer immediately and requires that a user login again before gaining access. To do this, follow these steps:

1. Right click on an empty area on your Desktop.
2. Select New>Shortcut.
3. In the first box of the Create Shortcut Wizard, type "Rundll32.exe User32.dll,LockWorkStation" (without quotes). Note there is no space between the comma and LockWorkStation. Click Next.
4. Call the shortcut something like 'Lock PC' and click Finish.
5. To add the finishing touch, right click on the new icon, select Properties, click the Change Icon button and select an appropriate icon.

Now whenever you click this icon your PC will instantly be locked, and can only be accessed by the user entering a correct password in the Login box. Note you can also lock the computer at any time by pressing WINDOWS + L. Also note that if you have an account with no password, locking the desktop is pointless as anyone can login by just leaving the password field blank and clicking OK to log back in.

SAVE DESKTOP ICON POSITIONS

This tweak allows you to save the current positions of your desktop icons so that if the icons are rearranged or moved you can quickly restore them back to their saved positions at any time. To give you this added functionality do the following:

1. Download the file Layout.zip (mirror: here) and extract the contents to an empty directory.
2. Copy the *Layout.dll* file to your *\Windows\System32* directory.
3. Double-click on the *Layout.reg* file to automatically make the appropriate changes to your Registry.
4. Go to your Desktop and arrange all your icons as you would like them to be saved.
5. Once done, right-click on the Recycle Bin and select the new 'Save Desktop Icon Layout' option. The positions of all the icons are now saved.
6. You can move the icons around freely and whenever you want them restored to their original saved positions, right-click on Recycle Bin again and select 'Restore Desktop Icon Layout'.

This tweak is particularly handy if you're installing new graphics card drivers for example and your Desktop icons get messed up, or you change resolutions and they get scrambled around.

CHANGE DESKTOP ICON SIZE

You can alter the size of Desktop icons by using this tweak as follows:

```
[HKEY_CURRENT_USER\Control Panel\Desktop\WindowMetrics]
Shell Icon Size=32
```

The value of this STRING entry determines the size in pixels both for the height and width of desktop icons. The smaller the value, the smaller the desktop icon. The default value is 32, which is a 32 x 32 pixel icon. Create the entry if it doesn't exist and assign the desired value, then reboot Windows to implement it.

SET SPACING BETWEEN DESKTOP ICONS

To adjust the spaces between your desktop icons, you can manually move them. However if you've chosen automatic spacing (Right-click on the Desktop and select Arrange Icons by>Auto Arrange) then you can adjust the automatic vertical and horizontal spaces placed between each icon by doing the following:

1. Right-click on the Desktop and choose Properties to bring up the Display Properties box.
2. Select the Appearance tab, then the Advanced button.
3. Under Items select 'Icon Spacing (Horizontal)' and 'Icon Spacing (Vertical)' and edit their values to determine how many pixels are placed between the icons. The defaults are 43 pixels between icons. Smaller values squeeze them closer together, higher values spread them further apart.
4. If your Desktop icons are aligned to the Desktop grid, you may have to right-click on your Desktop, go to Arrange Icons By>Align to Grid and untick it, then go back and retick it for the icons to reposition to the new spacings.

REMOVE 'SHORTCUT TO...' FROM NEW SHORTCUTS

Whenever you create a new shortcut, the words 'Shortcut to...' appear in front of the shortcut's name. To remove this default prefix for new shortcuts, open Registry Editor and change the following:

```
[HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Explorer]
Link=00 00 00 00
```

Create this BINARY value if it doesn't exist and set it equal to 00 00 00 00 to remove the 'Shortcut to...' prefix in front of new shortcuts. Reboot Windows to implement the change.

CREATE A CUSTOM POPUP MENU ON THE TASKBAR

To put your favorite shortcuts all under one easy-to-access pop-up menu on the taskbar, do the following:

1. Open Windows Explorer and create a new folder wherever you prefer.
2. Put shortcuts to all your favorite programs, pictures, documents, songs etc. in this folder.
3. Right-click on an empty area of your Taskbar, and choose Toolbars>New Toolbar.
4. In the New Toolbar dialog box, browse to where you created your new folder with all the shortcuts, highlight the folder and click OK.

You will now have a new item on your Taskbar with the name of the folder you created earlier. Click on the double arrows just above its name and you'll get a popup menu of all the programs you can now quickly access. If you want to remove this folder from the Taskbar, right click on an empty area of the Taskbar and select Toolbars, and untick the folder's name from the list.

< CUSTOM WINDOWS THEMES

Windows XP allows you to customize Window's Graphical User Interface (GUI) or 'skin'. By default XP comes with two main Visual Styles - 'Windows Classic Style' and 'Windows XP Style'. You can choose either of these by going to Control Panel>Display Properties>Appearance and selecting one under the 'Windows and Buttons' section. Note that you must have Themes enabled to do this; you can enable Themes by going to Control Panel>System>Advanced, click the Settings button under Performance and on the Visual Effects tab make sure there's a tick next to 'Use visual styles on windows and buttons'.

Aside from the built-in themes you can also download new official ones like the Zune or Royal Noir themes. Royal Noir in particular has many similarities with the Vista theme. These themes provide an attractive alternative to the regular Windows themes, and will work without requiring any third party utilities or system customization.

Unfortunately Microsoft has not made it easy to modify or install any unofficial styles beyond those which it provides. Only Microsoft digitally signed themes - such as those linked to above - can be installed without a problem. To install custom themes, you will need specialized tools and some detailed information. Full details can be found in this comprehensive Windows Customization Guide, but the main methods are covered below.

WINDOWBLINDS

To install a custom theme quickly and easily, you can use an automated utility called WindowBlinds. The basic version of this program is free and implements most aspects of a theme. Once you have installed WindowBlinds you can download a wide range of free custom themes from WinCustomize, GetSkinned or DeviantArt for example. Note however that WindowBlinds needs to run in the background in Windows for the theme to work, and can therefore increase resource usage. For this reason, I generally recommend the method below which is trickier but less resource-intensive.

UXTHEME.DLL PATCHING

If you want to use a manual method which does not involve a program running in the background like WindowBlinds, you will have to directly patch the *uxtheme.dll* file to allow custom themes. This file is held under your *\Windows\System32* directory, and is a system protected file, so it cannot be altered or deleted/replaced without using a special utility. As of Windows XP SP3, many of the older methods to patch this file, such as using the free UXTheme MultiPatcher, may not work properly, so follow the instructions below to patch it:

1. To start with, you will need a theme file which is in MSStyles format, such the ones listed here at GetSkinned. This means the downloaded theme package has to have at least one *.MSSTYLES* file for Windows to see it and use it. Typically you should extract the contents of your custom theme package to sit under the *\WINDOWS\Resources\Themes* directory.
2. Make sure to create a new System Restore point. Also create a backup copy of your original *uxtheme.dll* file found in your *\WINDOWS\system32* directory, preferably to another drive or disk. This is an important step - see Step 5 below for more details.
3. Download a replacement *uxtheme.dll* file which has been modified to allow you to run custom themes. You can download a relevant one from here, here or here - check to make sure it matches the build version of Windows XP you are using. Also make sure to scan the file for malware just in case.
4. Download the Replacer utility and run it. Drag your original *uxtheme.dll* file into the Replacer window and press Enter, then drag the modified *uxtheme.dll* file into the Replacer window and press Enter, then press Y to confirm, and reboot as required.
5. If something goes wrong and you find you cannot reboot your system to get back into Windows, go to the Windows Recovery Console and copy your backed up *uxtheme.dll* to the *\Windows\System32* directory and reboot. If this doesn't work, see the Backup & Recovery chapter for other recovery methods.
6. Go to Control Panel>Display and select the Appearance tab. Under the 'Windows and Buttons' scroll box, select the new theme and click Apply - it should immediately come into effect.

Once again, because this procedure involves modifying a core system file, it can cause problems if things go wrong. However for the most part it should be safe if you follow these instructions and in particular you make sure to create appropriate backups as explained in step 2. Implementing a custom theme using this method is the least resource-intensive way of having a custom theme, and best of all it's completely free.

GLASS2K

If you also want to make any of your themes appear transparent and glasslike, you can download and use the free Glass2K program. It allows you to add any level of transparency to any window as well as the Taskbar. Give it a try as it is simple to use, however note that it needs to run in the background to work.

As a final note, if you have low amounts of system RAM I recommend you steer clear of installing overly complex themes as they may make your system less responsive and increase loading times and stuttering in applications and games. For most modern systems however, a custom theme, particularly if implemented via the Uxtheme.dll method, should provide no discernable drop in performance.

< KEYBOARD & PROGRAM SHORTCUTS

Most people know that you can use the keyboard to speed up access to common commands and functions in Windows XP. Some people use these keyboard shortcuts a great deal, others rely mainly on their mouse for everything. On the following pages are some of the most useful Windows XP keyboard shortcuts, and even some shortcuts you can type in the Start>Run box to gain quick access to useful utilities and Control Panel items in Windows. I recommend you get used to using some of these regularly as they quickly become second nature.

COMMON KEYBOARD SHORTCUTS

Keyboard Combination	Function
CTRL + A	Select all
CTRL + C	Copy selected item(s)
CTRL + X	Cut selected item(s)
CTRL + V	Paste copied/cut item(s)
CTRL + Z	Undo last action
CTRL + Y	Redo last action
SHIFT + DEL	Deletes item, bypasses Recycle Bin
CTRL + ESC	Open Start Menu
ALT + TAB	Switches between active programs
CTRL + ALT + DEL	Opens Task Manager
ALT + F4	Closes program or opens 'Shut down computer'
SHIFT + LEFT CLICK	Select multiple items at once within a range
CTRL + LEFT CLICK	Select multiple items at once individually
TAB	Steps forward through screen elements
SHIFT + TAB	Steps backward through screen elements
F1	Open Help function
F2	Rename/Enter text for item
F3	Search key
F5	Update/Refresh active window
F11	Toggle Fullscreen mode
SHIFT + F10	Open Context Menu for item
ALT + SPACEBAR	Open Windows Properties menu
SHIFT + CD/DVD INSERT	Hold Shift while inserting a CD/DVD to prevent Autoplay
WINDOWS	Show Start Menu
WINDOWS + D	Minimize/Restore all Windows
WINDOWS + E	Open Windows Explorer
WINDOWS + F	Open Windows Search
WINDOWS + L	Lock Workstation
WINDOWS + R	Open Start>Run box
WINDOWS + U	Open Accessibility Utility
WINDOWS + BREAK	Open System Properties
WINDOWS + F1	Open Help & Support

PROGRAM & CONTROL PANEL SHORTCUTS

The following are file names for common Windows utilities and Control Panel items which you can insert into shortcuts or in the Windows Run box (Start>Run).

Services.msc	Services Utility
Gpedit.msc	Group Policy Editor
Comexp.msc	Component Services
Eventvwr.msc	Event Viewer
Secpol.msc	Local Security Policy
Perfmon.msc	Performance Monitor
Compmgmt.msc	Computer Management
Cmd	Command Prompt
Calc	Calculator
Cleanmgr.exe	Disk Cleanup Utility
Dfrg.msc	Disk Defragmenter
Notepad	Notepad
Pbrush	Paint
Wmplayer	Windows Media Player
Wordpad	Wordpad
Wupdmgr	Windows Update
Control	Control Panel
Sysdm.cpl	System Properties
Devmgmt.msc	Device Manager
Desk.cpl	Display Properties
Main.cpl	Mouse Properties
Timedate.cpl	Clock Properties
Inetcpl.cpl	Internet Properties
Mmsys.cpl	Sounds & Audio Devices

DIRECTORY SHORTCUT

If you want to get to a particular directory folder, go to Start>Run and type the name and path of the folder in the Run box, then press Enter. Windows Explorer will open up in that directory instantly. If you don't specify the full path, Windows Explorer will open up at the first incidence of that directory. You can also assign this path to a shortcut and use it to open Windows Explorer there by default whenever the shortcut is used - see the Windows Explorer chapter for details.

MICROSOFT ON-SCREEN KEYBOARD

If you are having problems using your keyboard you can bring up the Microsoft Onscreen Keyboard utility by going to Start>Run and typing "osk" (without quotes) then press Enter. The virtual keyboard will be displayed, allowing you to use your mouse to click on virtual keys as though you were using a keyboard. To make things easier, position the Onscreen Keyboard somewhere convenient and then select 'Always on Top' under its Settings menu so you don't constantly have to switch back and forward between tasks to use it.

Note if you can't click the left mouse button to select keys, under the Settings menu select 'Typing Mode' and then select the 'Hover to Select' option. Now you can just place your mouse cursor over a key on the Onscreen Keyboard and it will register as an entry. Set the length of time needed to hover over a key before it registers as an entry (values in seconds between 0.00 and 1.00 second).

MOUSEKEYS

If instead of your keyboard you are having problems using your mouse, you can enable the Windows MouseKeys functionality by going to Control Panel>Accessibility Options>Mouse and ticking the 'Use MouseKeys' box. Alternatively you can press CTRL + Left SHIFT + NUMLOCK to activate this functionality. MouseKeys allows you to use the Numpad keys - the numerical keys on the far right of your keyboard - to move the mouse cursor around on screen.

OVERCLOCKING

When people want additional performance from their machines, they may undertake a procedure called Overclocking. Overclocking is the process of increasing the clock speed of a component in your PC. The 'clock' referred to is a specialized oscillator pulsing with a frequency that determines the rate at which a data processor can perform instructions. A 3 Gigahertz (GHz) CPU for example has a frequency of oscillation of around 3 billion pulses per second by default. The theory of overclocking is simple: increase this clock speed and you'll increase the rate at which instructions are performed, leading to a faster PC. Overclocking is possible on a range of hardware components including CPUs, Graphics cards, Motherboards and RAM.

There is also another way of overclocking which doesn't really involve increasing the clock rate: altering timings. Memory-based components such as system RAM and Video RAM have latency timings - rest periods between operations measured in nanoseconds. By decreasing the latency time, a memory component can be made to wait less between completing specific operations and hence function faster.

So why is overclocking possible or even necessary? Why aren't the hardware components you buy not already performing to their absolute maximum potential? Well ironically the reason for that is just the same as the reason why Windows has so much scope for optimization and customization: the many different circumstances under which the hardware will potentially be used. Because components are expected to work in diverse environmental conditions and be put to vastly different tasks, hardware manufacturers ensure a safe headroom is provided so that in adverse conditions the component can still operate safely and with stability. Overclocking takes up this slack by pushing the component beyond manufacturers' specifications.

Of course when you push a component beyond its recommended specifications the component requires ideal conditions to continue operating with stability. That usually means more cooling on/around the component, since any cooling device it already uses is only really designed to deal with stock operation. The component also requires stable voltage from the Power Supply either directly or through the motherboard. Often to achieve a stable overclock the component may also require additional voltage, which in turn can add to heat and hence raise the cooling requirements even further. Furthermore, the additional heat being dissipated from one component may cause other nearby components to overheat. As you can see overclocking is not as simple as it first sounds, and there are often complex interactions involved both at the hardware and software level which must be taken into account to achieve proper stability.

< BENEFITS AND DRAWBACKS

Before going into any more detail about overclocking it is important to discuss the advantages and disadvantages of overclocking objectively, so you don't undertake it without knowing what you're getting yourself into:

BENEFITS

§ Increased performance - this is of course the primary reason why people overclock. The degree to which performance improves depends on the component(s) being overclocked, how far they are overclocked, and whether they are the hardware most relied upon by particular games and applications. The performance difference can be anywhere from negligible up to 25% or even more.

§ Bragging rights or 'coolness factor' attached to overclocking - some people gain a great deal of satisfaction and prestige in having the fastest machine, or the highest overclocked component, or the highest benchmark score. Or they may simply feel they are extracting the most out of their hardware by overclocking it. Some people also enjoy the tinkering and hobbyist aspect of overclocking and hardware modification. In that way it's a lot like tweaking.

DRAWBACKS

- There will be costs in providing improved cooling - in almost all cases you will have to purchase more effective and/or additional cooling for your system in the form of more efficient heatsinks and/or more fans, a case with more space or better airflow, or even specialized equipment like water cooling or phase-change cooling units. Of course if you start out by planning your system carefully, you can minimize the additional costs by beginning with the right components.
- The overclocked component, and therefore your entire system, may become unstable and crash randomly - without a doubt the number one cause of problems in games and applications is overclocking. People often refuse to acknowledge that their overclocking is the cause of the problem, and mistakenly blame Windows, their drivers or the game or application instead. Different programs react differently to overclocking. Some can tolerate much higher levels of overclocking on particular components, some cannot tolerate any overclocking at all; it all depends on how stressful the game or program is, and how stable or unstable the overclock actually is.
- Potential data corruption if certain components are pushed beyond their limits - pushing components like the CPU or RAM beyond their limits on your system can result in instability leading to data corruption, up to and including the loss of all your hard drive data. Often this data corruption can occur subtly over time without any indication or warning.
- Excessive heat can damage or permanently kill a component - since computer hardware is based on sensitive electronic equipment, if a hardware component is not kept adequately cool (and even in some cases if it is) it can be permanently damaged or destroyed through overclocking. It happens quite often, especially with graphics cards, so it is not as rare as you might think.
- Overclocking automatically voids the warranty on the component - most hardware manufacturers make it clear that overclocking beyond recommended clock speeds or timings will instantly void your warranty. This also goes for any physical modifications to the hardware such as changing its cooling. Unless explicitly stated otherwise, a warranty is only designed to cover unmodified hardware operating within specifications.
- Overclocking reduces the life span of the component - since the component is working beyond specification and working hotter and faster than it was designed to handle, most components will have reduced life spans. This can vary from a reduction of a few months to a few years, depending on the extremity of the overclock, the quality of the components and how well the components are kept cool. A mild overclock typically has little or no practical impact on the life expectancy of a component; an extreme overclock can drastically reduce the error-free life of a component.

So far the disadvantages appear to far outweigh the advantages of overclocking. This is not strictly true, it all depends on how far you overclock a component and how much performance you can gain in return, as well as the quality of the hardware itself. Don't get me wrong; I'm not suggesting you categorically shouldn't overclock. But I do feel that it's important to point out that it is not a simple or even beneficial procedure at all times. Despite everyone urging you to overclock your system you should weigh up the options rationally and either choose to avoid overclocking due to potentially modest performance gains and/or the strong likelihood of instability/damage; or alternatively research the topic thoroughly and invest appropriately to achieve a good balance of performance, stability and safety.

The bottom line is if you can't afford to replace a vital system component should it get damaged, do not overclock it. If your CPU or graphics card dies for example and you can't replace it your entire computer becomes unusable, so it is not something to be taken lightly just because people egg you on to do it.

< METHODOLOGY

Below I discuss the theory on how to overclock key system components. The precise details will vary depending on your particular hardware configuration and BIOS options. The information below is only indicative and should broadly give you an idea of the types of steps involved in overclocking; for more detailed information see the guides linked to at the end of this section. Importantly, before commencing *any*

overclocking you must make sure you are totally familiar with the exact brand, model and specifications of your major hardware components. If necessary refer to any packaging or manuals which came with your system, and more importantly see the System Specifications chapter for links to tools which can help you identify your components and their precise capabilities in detail.

Also make sure that before changing any BIOS settings for the purposes of overclocking that you record your existing BIOS settings. This is because in some cases when overclocking beyond the point of stability, you will have to reset your BIOS (or it may reset automatically) back to its factory default settings, losing any customized settings you've put in. So make sure you document what the major BIOS settings are which you've altered through any general BIOS customization.

CPU OVERCLOCKING

Overclocking a CPU on most systems involves entering the BIOS and increasing the speed of the Front Side Bus (FSB) or QuickPath Interconnect (QPI) for Intel CPUs, or HyperTransport (HTT) for AMD CPUs. The FSB/QPI/HTT is the main pathway (Bus) between your major system components, and as its speed increases, information is transferred back and forth more rapidly between all your major components working off this bus speed. However there are certain problems with increasing the FSB/QPI/HTT. To start with, some of your components may be running off this bus, such as your PCI devices (e.g. a Sound card). These operate at a much lower bus speed by default, so your motherboard has special dividers/multipliers or even a Lock to maintain the bus speeds at or close to their default. Importantly, your system RAM may rely on the main Bus speed to determine its speed in conjunction with some form of divider/multiplier.

Your CPU also has a Multiplier, which as the name suggests sets the CPU speed in MHz as a *multiple* of the main Bus speed. For example on a system with an effective Bus of 200MHz and a CPU that has a multiplier of 20 gives you a CPU speed of 20x200 = 4000MHz = 4GHz. Note that some CPUs have their multiplier locked at the hardware level, which means you can't actually change it. The Multiplier and the Bus speed can be used together to achieve a performance result in conjunction with the RAM speed.

RAM OVERCLOCKING

Increasing the speed of your RAM is dependent on a number of factors. Overclocking refers to the process of increasing the clock speed of a component; in the case of system RAM this involves raising the system Bus speed and/or changing the memory divider/multiplier and/or simply raising the RAM's Frequency directly to alter the RAM's speed in MHz - depending on your available BIOS options. However you can also alter the Timings (or Latency) of a memory chip such that it refreshes faster between operations, meaning less waiting time between each operation and hence faster performance. Changing timings is not overclocking strictly speaking, since you are not actually increasing any clock speeds, but in general terms it has similar performance-boosting potential.

People often ask whether increasing RAM speed or lowering latency is the better option. There is no set answer - it all depends on your particular system and the applications and games you most commonly run as to the precise combination of RAM speed and RAM latency which will perform best and with greatest stability, so you will have to experiment. Generally speaking, applications or games which have large amounts of non-graphics information to transfer to the CPU and back will benefit more from greater RAM speed, which provides more bandwidth. On the other hand applications and particularly games which primarily require very complex calculations with repeated access to information in memory will benefit more from lower RAM latency. Obviously some games require both, so there is no clear-cut answer.

RAM overclocking also depends a great deal on how many sticks of RAM you have, their quality, and how 'matched' they are. Because your RAM sticks work together, if you have two or more sticks of RAM in your system, you must try and ensure that firstly they are all equally matched in terms of rated speed and timings, and secondly that they should ideally be from the same brand and model of RAM. RAM sticks can

vary in quality and performance, so having mixed brands or types of RAM can lead to a variety of problems - even when running at default speeds.

GRAPHICS CARD OVERCLOCKING

The following is a modified summary from the overclocking section of my ATI Catalyst Tweak Guide and Nvidia Forceware Tweak Guide. It applies to all graphics cards regardless of brand, however if you are an ATI or Nvidia graphics card user please read through the relevant guide above for full details.

The modern graphics card is a lot like a small computer by itself. It has a Graphics Processing Unit (GPU) which is the graphics equivalent of the CPU, it sits on a motherboard-like Printed Circuit Board (PCB), and has its own Video RAM (VRAM). And just like a computer system, the components on a video card can be overclocked to increase performance. Overclocking a graphics card involves increasing the frequency of the GPU (also called the Engine or Core) and/or the Video RAM (also called VRAM or Graphics Memory). You can overclock one or both of these components, with varying results based on a number of factors, but generally resulting in an increase in performance the higher you overclock each component. To overclock your video card, ideally you'll need a tool which allows you to change the clock speeds of the Core and the VRAM - refer to the guides above for links and instructions.

Overclocking your video card is similar to CPU overclocking and RAM overclocking combined - simply increase the clock speed of the Core/Engine, and/or the clock speed of the Graphics Memory, both of which are measured in MHz. The Core generates graphics data, and depending on your CPU and the rest of your system specifications, increasing the core speed can result in a small or large performance improvement. The Video Memory transfers information to/from the Core, and increasing its speed can once again improve performance either slightly or significantly, in conjunction with your Core speed and the speed of the rest of your system.

As a general rule, if you have a fast graphics card and a slow CPU, then overclocking your graphics card yields less performance improvements. If you have a fast CPU and a slower graphics card, then overclocking the graphics card can show greater improvement. The reason for this is that if the graphics card is the weak link (or 'bottleneck') in the equation, and a particular game requires more graphical power and speed, then quite clearly overclocking the graphics card can show more of an improvement than in situations where the CPU or the rest of your system is the weak point.

Furthermore, all other things being equal, the higher the resolution being used for a game and the higher the graphics settings, and the more recent the game, the greater the potential for graphics card overclocking to yield bigger improvements in performance. This is because newer and more graphically intensive games being run at higher resolutions rely even more heavily on the GPU for their performance.

Remember however that if you have an old or low-end graphics card then overclocking is unlikely to improve performance dramatically. The reason for this is that lower end graphics cards simply do not have hardware support for the advanced functionality demanded by recent games, such as the latest Pixel Shaders and Vertex Shaders. If your card does not have hardware support for a required advanced function, overclocking cannot surmount this handicap.

VOLTAGE ADJUSTMENT

As components are pushed outside specifications with overclocking, they will do more work. Often they can accommodate this extra work within their current voltage, however sometimes to gain stability and/or to push a component further, you will have to increase the voltage to these components. The three main components that can benefit from voltage tweaking are the CPU, the graphics card and RAM. The two main voltage adjustments you will find in almost any BIOS are CPU Voltage and RAM Voltage, and these are explained below.

CPU Voltage (vCore): This is the amount of voltage applied to the CPU. The base voltage will vary depending on the CPU architecture, however make sure to note what your CPU's default voltage is before raising it. The only reason to alter the vCore from its default is that when overclocking your CPU you may notice that you cannot overclock it beyond a certain point, or that you experience a lot of instability. Raising the vCore slightly in your BIOS may allow the CPU to regain stability and/or allow you to push the CPU further. The theory behind raising the vCore is more complex than just supplying more juice to the CPU, and you can read about it in this CPU Overvolting Article as well as this Wikipedia Article. The most important thing to understand is that upping the VCore beyond a certain point can result in permanent damage to your CPU, and generally speaking any increase in the VCore can further shorten the life span of a CPU. However for the most part a small bump in voltage (e.g. 0.1 or 0.2 volts) can help stabilize an overclocked CPU that is acting slightly unstable. Just remember that more voltage equals more heat, which requires greater cooling to maintain safe temperatures.

RAM Voltage (vDIMM): Also sometimes called DDR Voltage, this is the amount of voltage for the RAM DIMMS (Dual Inline Memory Modules). Just like vCore, increasing vDIMM can improve stability, and RAM in particularly can benefit from higher voltages when your system is suffering from stability issues under overclocked conditions. This is particularly true if you're experiencing random reboots or sudden crashes to desktop as these are almost always RAM related in some way. Once again, increasing the voltage to your RAM can result in permanent damage so do not overvolt by a substantial amount without first consulting with other owners of the same RAM and motherboard combination to see what a recommended 'safe' voltage level would be. As always make sure your RAM has plenty of fresh cool air circulating around it to prevent any heat buildup.

There may however be additional voltage settings in your BIOS, and unless you have full knowledge of what they do, and what a safe adjustment is, do not alter them as you can permanently damage or kill your components this way.

POWER SUPPLY UNIT

Your Power Supply Unit (PSU) is an essential part of your system, and one that is often ignored, especially when overclocking. For basic details regarding PSUs see this PSU FAQ which talks about the common output specifications for PSUs and what they mean. A good PSU is essential to the stable operation of any PC.

You should consider three key factors when determining whether a PSU is a good choice for your system: Wattage, PSU efficiency, and total amps delivered on the +12V rail. These figures should be readily available from the PSU's specifications.

In terms of wattage, to work out a rough estimate of the PSU Wattage which is sufficient for a particular system, use this Interactive PSU Calculator. It is fairly straightforward to use, however note that there are some traps you can easily fall into which will result in overestimating your power usage. For example under the 'System Type' box, you should always select 'Single Socket' unless you actually have multiple CPU sockets on your motherboard. A Core i7 CPU for example has four cores, but it is still a *single socket* CPU; virtually no desktop system has more than one CPU socket on the motherboard, so pay careful attention to the descriptions while going through the calculator.

Once you've determined the correct wattage, the next issue is PSU efficiency. This doesn't represent how much of a PSU's power is usable - all good PSUs should provide up to their maximum rated wattage with stability if required. Furthermore, contrary to popular myth, whether a high or low wattage PSU, the PSU only provides the amount of power the system needs, so buying a larger PSU than you require won't result in extra power usage all by itself. PSU efficiency is the proportion of the power the PSU draws from your power socket that is relayed to your system. For example a PSU with 80% efficiency providing 400W of power to your system will actually draw 500W from the power socket on your wall while doing so. In

practice efficiency will differ at different levels of load on different PSUs, and it's an important figure to look out for. Ideally you want 80% efficiency or higher at your expected load level on the PSU.

The final factor is amperage on the +12V rail, a key factor in system stability. For example if you look at the specifications of some graphics cards, they will say that they require a current of a certain number of amps on the +12V rail (e.g. 40A on +12V for an Nvidia GeForce GTX 285). You should refer to the specifications of the PSU to see if the +12V rail(s) provide that much amperage in total. Note that some PSUs may have multiple 12V rails - this is technically a safety requirement to prevent potential overload on a single 12V rail, but is not a necessity, and some even consider it undesirable. In practice as long as the amps and total wattage supplied along the 12V rail(s) are solid and sufficient for the job required, it shouldn't make a huge difference whether you have single or multiple 12V rails.

The problem is that beyond trying to take note of the more obvious factors above, an accurate review is required to tell you whether a PSU is genuinely good quality or not. As this article points out, specialized measurement instruments are necessary to determine this, not just measuring voltages with a multimeter. Hence most PSU reviews are actually inaccurate and effectively useless. Accurate PSU reviews can be found at sites like SilentPCReview and JonnyGuru, so start there if you want to know more about a particular PSU.

Do not underestimate the importance of a good quality PSU with sufficient wattage and stable voltages. Your entire system can suffer from constant instability unless you have a decent suitable PSU, and note that this applies equally to both overclocked and non-overclocked systems.

COOLING

One of the most common reasons for problems in Windows is actually the hardware-related phenomenon of overheating. Overheating hardware can cause all sorts of strange errors and problems, and is often misdiagnosed as being a software problem. Most computer hardware generates heat due to the power they consume, and this heat needs to be dissipated somewhere. A typical computer case is designed such that it traps heat, and hence as heat builds up in a PC, it will cause components to malfunction and even become permanently damaged over time. Overheating can occur in both stock systems and overclocked systems; it all depends on a range of factors we look at below.

Your CPU and motherboard both have built-in diodes that measure the temperature for these components. The CPU temperature monitor is a reasonably accurate measure of the temperature at or near the core of the CPU, while the motherboard temperature monitor is a good measure of the general system (or case) temperature - the ambient temperature of the air in the immediate vicinity of the motherboard. Most recent graphics cards also come with built-in temperature diodes as well, allowing measurement of the temperature near the core of the graphics card. Many other components do not come with temperature measurement devices, and so you can only tell their heat by touching them, or by using specialized equipment such as an electronic thermometer.

To actually see the temperature readings from your components, you can check them in your BIOS typically under a 'Hardware Monitor' section or similar. This gives you the CPU and motherboard temperatures, perhaps also the PSU temperatures as well. Clearly you need an additional method of checking temperatures under Windows, especially when running system intensive applications or games. Most motherboards already come with such a software utility, so you should check your motherboard manual and driver CD, or the motherboard manufacturer's website for an appropriate monitoring utility. However for the most accurate temperature readings I recommend one of the following free utilities which work on any system:

RealTemp
Core Temp
SpeedFan

Monitoring your graphics card's temperature is possible through your graphics card control panel, generally accessed via Control Panel>Display>Settings>Advanced Settings. For more details of the graphics card control panel functionality see my ATI Catalyst Tweak Guide or my Nvidia Forceware Tweak Guide. You can also use a range of third party utilities such as GPU-Z, or one of the system temperature monitoring utilities covered further above. Remember though that the GPU temperature shown is not the same as the Video RAM temperature which may be much higher.

Once you have the appropriate utility, monitor your component temperatures at both idle and when your system is under load. If particular components reach high or excessive temperatures when under load, then it is likely that those components will malfunction while undertaking more strenuous activities on your PC, such as playing games. However even when idle, your PC may begin to malfunction if heat steadily builds up in your PC case and is not cleared fast enough. Most people will want to know what the 'safe' temperature is for particular components on their system. The answer is different based on different hardware architectures, as some are designed to run hotter than others, but you can ascertain what a safe temperature under full load is by searching on Google using the specific brand and model of the component to see if any user feedback or reviews of your hardware states what temperature ranges are normal.

If you are experiencing problems with heat in your system, or if you just want to ensure that you remain problem-free, the following basic cooling tips should be observed. This applies equally to overclocked and non-overclocked systems:

- Remove any obstructions from around your case. For example don't obscure any of your case grills/air holes, such as having them pressed against a wall, blocked by dust etc. Insufficient flow of air into and out of the case is the number one cause of heat buildup and heat-related problems. No matter how much cooling you have inside a case, if air can't easily get into and out of the case then your system will overheat.
- If you have few or no major case fans drawing in cool air and expelling hot air, remove the sides of your case so that the fans on the CPU, graphics card and Power Supply can get a fresh supply of cooler air, and can expel hot air outside the case.
- If you do have several case fans, arrange them so that some are to the front and low in the case, sucking air into the case (as the air near the floor is cooler) and some are to the rear and/or the top of the case, blowing hot air out of the case (where the hot air expelled will rise away from the case). In this situation make sure to keep the sides of your case closed so that the fans have more pressure to suck/blow air through the case's contents like a wind tunnel.
- Don't position a sucking and a blowing fan(s) too close together as they will 'short circuit' each other - that is they will pass air through the shortest line between the two, bypassing your components and hence not cooling them as efficiently. As mentioned above, fans sucking air into your case should be low and on the furthest side of the case from the blowing fans that expel heat from the case.
- If one component is shedding a lot of heat, pay attention to perhaps providing greater cooling to the components immediately around it. Often the excess heat from one component can cause another nearby component to overheat.
- Tidy the internal components of your case. This means all ribbon cables, power cables, etc. should be clipped or twisty-tied to be as neatly arranged as possible, primarily to avoid blocking the flow of free air around components, especially the CPU and graphics card which are the two hottest components in most cases. Secured cabling and snug plug connections also means you can be sure nothing becomes accidentally unplugged or short-circuited over time and hence cause mysterious hardware-based errors that will confuse you in the future.
- If using additional internal cooling like larger heatsinks or fans, make sure they are not too heavy for the surface they are mounted on. For example, using extremely large heatsinks on a graphics card can result in the card actually bending under the weight and hence becoming permanently damaged. Even a large heatsink mounted on a motherboard can cause it to warp or crack, once again damaging the motherboard PCB beyond repair. If you feel you require such hefty cooling you should consider instead buying a larger case that has better airflow properties.

- Make sure your hard drive(s) are not smothered by cabling or crammed into a stuffy area of the case with no nearby cooling or fresh air. Higher speed hard drives in particular (i.e. 10,000 RPM or faster) can heat up quite a bit - one touch of their metal casing will tell you just how hot they get. Hard drives are often overlooked in cooling, and yet they are a vital system component, and as such you should make sure they receive plenty of fresh cool air around them.
- Make sure that any heatsinks or heatpipes on the motherboard itself are not covered or blocked by other components or cables, or covered in dust. There is a reason why these heatsinks are there: because motherboard memory controller chips for example require cooling otherwise they can malfunction due to excessive heat just like any other major component. Don't assume a heatsink or heatpipe without a fan implies the component requires minimal cooling, as sometimes manufacturers skimp on putting a fan on these components, which simply means the heatsinks have to do more work, so keep them well exposed to cool air. You may even consider installing a small fan on them if you wish, and this can aid in system stability.

The most simple of all of these tips which anyone can undertake is to provide greater access to fresh cool air for the case's contents and regularly clean the case to remove dust buildup. Dust in particular can reduce airflow significantly, so keep your case dust-free using a barely damp cloth or compressed air. The next time you go to upgrade your PC, consider buying a larger case with plenty of ventilation as the single best investment in cooling and hence general system stability.

COMPARING OVERCLOCKS

One of the most common statements I hear when people compare overclocks or are told that their overclock is unstable is: "But someone else who has the exact same system can overclock it much higher than me and their games don't crash! It must be a game bug!". A comment like that demonstrates a complete lack of understanding of some fundamental principles of overclocking:

- No two components are exactly the same. Even if the two components being compared are an identical brand, model and speed, they may have very different tolerances to overclocking depending on which factory they were produced in and which revision they are (how early/late into the production run they were produced - e.g. for CPUs this is called Stepping).
- No two people have the *exact same* conditions for their overclocking. Your computer room may be hotter or cooler than your friend's, your case may provide better or worse cooling, your combination of components may include a different PSU or different brand or speed of RAM, etc.
- Your Windows settings and software environment will *not* be identical to anyone else's. You may have sub-optimal software settings, background programs that are the source of conflicts, or even malware causing problems, or you may even have data corruption.
- No two games are identical in the way they stress components on your machine, and hence if all of your other games work absolutely fine at a certain level of overclock, it may well be that the latest game you are playing has a completely different tolerance to your overclock and will crash 3 times out of 4.

OVERCLOCKING AND STABILITY

I have a golden rule about troubleshooting any problem on an overclocked system:

> *Always start by assuming your overclock is the primary source of any problems*

Begin the investigation of *any* problem on your PC by suspecting your overclock as the source of a problem. Reset your entire system to its default speeds and see if the problem persists or is as severe. If the problem goes away, or doesn't happen as often you can be certain your overclocking is contributing in some way to, or is the sole cause of, your problems. You will have to lower or remove your overclock and/or increase your cooling.

Details on how to correctly test your system for stability are covered in the Performance Measurement & Diagnostics chapter, but bear in mind that even if your system passes every artificial test there is, the real test is having complete stability day-in, day-out even when running stressful games and programs. If your system starts behaving strangely, or you are having crashes and problems, don't persist in maintaining your overclock.

I know from experience that it is psychologically difficult to lower or remove an overclock because you may feel you are losing extra performance that you deserve, but this is something you will have to deal with. Virtually every day I receive emails or see forum posts from people who are wondering about some 'mysterious' problem on their machine, only to eventually find that it was in some way related to their overclocking. Subtle data corruption can occur over time on overclocked systems, even seemingly stable ones, and this is one of the main reasons why so many people often find they have to reinstall Windows every few months. This is not exaggeration or scaremongering - electronic hardware components are highly accurate devices, forcing them to run outside their normal operating speeds can increase the potential for small errors to creep into their operation. Manufacturers often push a particular component close to its limits by default from the factory, so even a small amount of overclocking is enough to cause problems.

If it appears that I'm being overly harsh or biased against overclocking, it is because I've been doing it myself since 1999 and I know full well how easy it can be to become lulled into accepting an unstable system as somehow being the norm. It is totally false to claim that it is normal to constantly reinstall Windows, or that it is normal for your system to crash every few hours. My (non-overclocked) systems have all been rock solid every single day for years, even after hours of very stressful gaming. My games do not crash randomly nor do my programs or system behave strangely. The point is if you're going to overclock, don't do it at the cost of system stability; do it properly. At the first sign of strange behavior, don't be quick to blame everything else - suspect your overclock first and foremost.

RESEARCHING OVERCLOCKING

Having stressed the importance of researching overclocking before you dive into it, I recommend that you start by referring to the following guides for more details. This is obviously not a definitive list of places to research, nor have I personally tested out all the procedures in these guides - they are simply a good starting point:

General Overclocking Guide 1
General Overclocking Guide 2
Core2Duo Overclocking Guide
Core i7 Overclocking Guide
AMD CPU Overclocking Guide

Take the time to search Google and various tech forums for peoples' experiences with overclocking hardware similar to your own. More often than not you will find someone who has a similar setup and who has overclocked it with reasonable success, so look out for such information. Be aware however that people often have different definitions of 'stable' when it comes to overclocking, and of course as noted further above, no two systems are identical so don't just automatically assume you can reach the same results using similar hardware. Take the time to research, read and think about overclocking and make sure you have the right tools and knowledge to undertake it properly.

BENCHMARKING & STRESS TESTING

If you change settings in Windows XP or your BIOS, or if you've applied a new tweak, or perhaps if you've overclocked a system component, it is often difficult to tell whether your overall performance or system stability has improved or decreased, and by how much. The best way to gauge performance changes and system stability is to Benchmark your system and Stress Test it. There are a range of utilities that are reasonably valid, objective benchmarking tools, and we will look at them in this chapter. We will also look at some reputable stress testing tools.

It is important to understand that some benchmarking tools double as stress testing programs since they put your system through a series of relatively rigorous tests to produce their performance figures. These tests should assist in highlighting any latent instability in your system, so the simple act of benchmarking can also result in stress testing your system. Stress testing plays a critical part in troubleshooting and diagnosing the source of system problems.

< BENCHMARKING

To set the actual benchmark - or base level of performance - you should ideally run the benchmarking program(s) prior to the majority of performance tweaks or changes you make, and note the initial results they provide. That way once you've started tweaking you can run the benchmarks again to confirm that the tweaks are having the desired effect, i.e. improving performance. However, many benchmarking tools already provide some information on the comparative level of performance of your system; that is, whether or not your system is above or below an average level of performance given the type of hardware you are using. You can also compare results online with other users with similar systems for example.

You may choose instead to take your base level of performance as being a freshly installed and tweaked Windows XP with no overclock for example, then perform additional alterations and perhaps even overclock certain components, then retest against the base level to see what impact your changes have had. The main point is that for benchmarking to be successful you need a reference point; something to compare with down the track to determine whether your performance is going up or down with the changes you have made.

Some important notes to keep in mind about benchmarking:

- Benchmarking programs usually focus on testing the performance of particular components of your machine. Graphics benchmarks for example usually test the graphics card and to some extent the CPU's performance. That means that if you want to test any tweaks you've made to your hard drive's speed for example, a graphics benchmark is not necessarily the best tool to use.
- All benchmarking (and stress testing) programs can result in sudden crashes and reboots, and on rare occasions data corruption, if used on unstable systems, so as a precaution always make sure any valuable data has been recently backed up before doing comprehensive benchmarking.
- For optimal results make sure that you do not have any other programs or games running in the background when benchmarking, since these can lower your results and introduce significant variability. They can also cause a benchmark to crash prematurely, misleading you into believing your system is overly unstable.
- For the purposes of using a benchmark as a stress test you may want to run other stress testing and/or benchmarking programs in conjunction with the benchmark, or other applications/games, to really put the pressure on your machine. Of course this can still result in prematurely crashing a system, but it would be an extreme test of system stability.

Below are the more popular benchmarking programs available for free, and how to use them correctly - including details on the component(s) they primarily focus on testing:

3DMARK

3DMark is a popular and reasonably accurate Direct3D graphics benchmarking utility that has been around for several years. 3DMark 06 primarily utilizes your graphics card and to a lesser extent the CPU, with the memory subset a player as well. 3DMark results will give you a good indication of advanced 3D gaming performance on your machine, and broadly speaking the higher your results, the faster the performance of recent and upcoming games on your system. In very general terms if one system scores higher in the same version of 3DMark than another, then it should be better for gaming. Note that only 3DMark 06 or older will run on XP; the newer 3DMark Vantage is Vista-only.

To use 3DMark start the program and click the 'Run 3DMark' button. You will see a series of tests running. These use various graphical techniques, some of which may not be supported by your graphics card, and some of which are only available in the purchased version of the benchmark. At the end of the run the benchmark will present a final score. You can then use this score to compare with other people who have run the benchmark and this will tell you whether your system is relatively faster or slower, and if compared with others who have virtually the same system specifications, it will tell you whether you have room to improve on your particular system. Note however that some systems with the same specifications may be heavily overclocked just to get a high 3DMark score and are not particularly stable for day-to-day use.

One method of comparing results with others is to simply find an appropriate forum and post your results for comparison and discussion. A more reliable method is to use 3DMark's Online Result Browser (ORB) to compare results with others who have posted their 3DMarks. Using the ORB means you have a better chance of finding a precise match for your system specs since the ORB has many thousands of users. To enter the ORB at any time, click the 'Options' button under the Results section of the main 3DMark screen and then click the 'Online ResultBrowser' button. Keep in mind that the scores from previous versions of 3DMark are definitely non-comparable to the current version.

UNIGINE

Unigine is a more recent tech demo/benchmark which can be run in either Direct3D or OpenGL mode. Extract the contents of the program archive to an empty directory and rain the *main.exe* file to start the benchmark and configure your options. If run in Benchmark mode, when completed the benchmark will provide an average FPS and a score - compare it with others running at identical settings.

FURMARK

FurMark is a recent intensive OpenGL-based benchmark. As with most benchmarks, installing and running the program results in a run through a series of tests, with results provided at the end. You can upload and compare these results online with other FurMark users.

In terms of general non-graphics benchmarks, the following are the more popular ones:

GAME BENCHMARKS

The most useful form of benchmarking is through the use of the benchmarking features in many 3D games. This is considered 'real world' benchmarking, since for most intents and purposes modern PC games are the most system intensive - and system-wide - benchmarks you can use. Many of the more recent games such as F.E.A.R, Call of Juarez and Crysis contain built-in benchmarking utilities. For more details of these benchmarking functions, as well as how to configure these games for optimal performance, see this list of Game Tweak Guides. If you want an automated utility to run the benchmarks for you, then you can download a range of free game benchmarking utilities at HardwareOC Benchmarks. Note that they have been given explicit permission to use some TweakGuides.com game guide text and descriptions in their utilities by me.

Even if you can't find an automated or built-in benchmarking feature for a game, simply select the most strenuous game you have - i.e. the one with the most graphical detail, best artificial intelligence and physics, and preferably the most recent - and use the FRAPS utility to measure performance over a set period of time. You can assign a key which starts and stops the benchmarking process in FRAPS, or you can tell FRAPS to stop benchmarking automatically after a period of time. You can specify the benchmarking stats to save, such as minimum, maximum and average frames per second.

To use any strenuous game as a stress tester, play it continuously for a sustained period of time at very high settings, such as one or two hours. If the game crashes at any point then this is usually a very good indication that your system is not completely stable.

PCMARK

PCMark is a general benchmarking utility from the makers of 3DMark that has been around for several years, and although not as reputable or as widely used as 3DMark, provides a reasonably good benchmark of your computer's general performance, not just in 3D gaming. It runs a series of tests based on such things as file encoding, disk reads/writes and basic graphics display. To use PCMark run the program and click the 'Run PCMark' button on the main screen. After several tests it arrives at a score you can compare with others online, or again on the ORB. Note that PCMark results are recorded separately from 3DMark results and are not comparable. Note further that only PCMark 05 can be used on XP; PCMark Vantage is Vista-only.

SANDRA

Sandra is discussed in detail under the System Specifications chapter, however it also contains a range of modules designed to test certain components of your system, such as the CPU, RAM, or various drives. The free version of Sandra is limited in the particular modules you can access and hence the tests you can run, however there are sufficient benchmarks in the free version for you to use it as a decent system benchmarking tool.

To see the modules of Sandra which have benchmarking functionality, click the Benchmarks tab and you will see modules such as the 'Processor Arithmetic', 'Physical Disks' and 'Cache and Memory'. To run a benchmark, open the appropriate module and press F5 or click the blue 'opposing arrows' (Refresh) icon at the bottom of the module. This will begin a benchmarking run, after which you will eventually see the results displayed at the top of the module. You might want to record the score(s) somewhere. You can put the benchmarking results in context by looking at the reference figures provided beneath it. You can also change the reference data to reflect a variety of hardware to compare against. Note that for the 'File Systems' benchmark, by default it does not use the Windows File Cache, and this can give quite low results. To enable the file cache, and hence see the real-world results of Windows memory management tweaking on your Windows system, click on the Options button at the bottom left of the File Systems benchmark module, untick the 'Bypass Windows File Cache' option, click OK then run the benchmark.

Sandra also has a role as a stress tester - that functionality is covered in the Stress Testing section further below.

HDTACH

HDTach is a free hard drive benchmarking utility that allows you to test your hard drive's speed. Launch the program, make sure all background programs and applications are closed, select 'Quick Test' then click the 'Run Test' button and wait for the testing cycle to complete. You will be presented with a graph showing the drive speed over the course of the drive. In the right hand pane you can see the various speed statistics and CPU usage information for the tested drive. If you want to compare your results to users online, click the 'Long Bench' option and then 'Run Test', and this time when the benchmarking run is completed you can click on the 'Upload Results' button to lodge your results to the database.

DISCSPEED

DiscSpeed is a free utility which provides the means to benchmark your CD or DVD drive with a range of tests which you can select by going to the 'Run Test' menu, and selecting the relevant test under it. If you don't want to select any specific tests, simply launch the program, leave it at default settings, insert a disk into the drive to be tested, and click on the Start button. You can save your results in various file formats, and you can share these results with others for comparative purposes for example.

< STRESS TESTING

Stress testing has one primary purpose on a PC: to exaggerate and bring out any instabilities or sub-optimal settings as quickly as possible. The reason for this is that instability usually manifests itself at various times on your system and in various ways and thus its causes may not be clear. A stress tester accelerates the process by placing extreme stress on certain components of your system to quickly and accurately determine whether they are the likely cause of system instability. For example, running a program which almost solely stress-tests your CPU can give you a good indication of whether it is your CPU which is causing crashes, freezes, or Windows errors; or whether another component may be to blame.

However specialized a stress tester may be, it will still not provide you with rock-solid evidence that a specific component is to blame. In the case of the CPU tester for example, it must be recognized that if the program indicates CPU instability, the causes can still vary. A CPU can appear to be unstable due to one or more of the following reasons:

§ A lack of sufficient CPU cooling
§ A lack of voltage to the CPU
§ A physical fault with the CPU chip
§ A specific incorrect software or BIOS setting
§ A fault with the motherboard
§ A fault with your Power Supply Unit

The best the stress tester can do is point you in a certain direction - it usually can't provide a precise solution for your problem. However often this is enough for you to rule out many other causes and hence save you a lot of time and trouble, and even prevent you from wasting money on repairing or replacing another component which is not the cause. This is typically the case when you are experiencing game-related problems, since it may not be clear which of the many components involved in running a game are the actual culprit. Often the graphics card, the drivers, or the game software itself is blamed when the cause may be anything from your power supply, to the RAM in your system, to general settings in Windows to dust buildup in your case.

Below are the more popular stress testing programs available for free, and how to use them correctly, including details on the component(s) they primarily focus on stress testing:

PRIME95

Prime95 is a small mathematics program which will effectively stress test your CPU and memory. Once you've installed the application, to run the actual stress test run *Prime95.exe* and choose the 'Just Stress Testing' button. Next, under the Options menu select 'Torture Test' to start stress testing. Select the test type based on the particular components you want to focus on testing:

§ Small FFTs - Select if you want to primarily test your CPU.
§ In-place Large FFTs - Select if you want to test your CPU for stability under high heat and voltage usage.
§ Blend - Select if you want a more general 'real word' test which tests both the CPU and plenty of RAM .

Once you click OK the testing will begin. If the program aborts with an error, you will be notified. If at any point you want to stop the test, go to the Test menu and select Stop. Make sure you read the document *Stress.txt* that comes with the program as it will explain more about CPU stress testing and how Prime95 helps uncover instability. The program recommends running the torture test for between 6 - 24 hours, however a PC that is unstable will usually crash much sooner than that, often within a few minutes of running the test. In general if your PC lasts for over 2 continuous hours under the Prime95 torture test it proves that the CPU and memory subset are quite stable.

SUPER PI

Super PI is a small utility similar to Prime95, in that it stress tests your CPU and memory subset by calculating the mathematical number PI to a certain number of places. Download the program and run the *super_pi_mod.exe* file. Click the Calculate menu item at the top, and select the number of places to calculate PI to, ranking from 16 thousand (16k) to 32 million (32M) places - the larger the number of places, the longer it will take. In general for a speed test of your CPU, select the 1M option and once the calculation is done, note the time in seconds taken for the final loop (e.g. 38.562s). You can then compare this figure to other people to see how fast your CPU is. If you want to stress test your CPU, run the full 32M calculation which will take longer, and hence is a better stress test of your CPU. Once again you can also compare the time taken to complete this with other users.

Note: Both Prime95 and Super PI only run on one core of a multi-core CPU by default. To stress test both cores of a dual core CPU for example, you should open up one instance each of Prime95 and SuperPI together, then run them both and both CPU cores will be stressed.

SANDRA

Aside from its other roles covered elsewhere in this guide, Sandra also can be used as a diagnostic tool. To use it as a stress tester of specific components on your system, use the relevant modules mentioned under the Benchmarking tab. However instead of simply running them once, if you want to stress test the relevant component simply refresh the benchmark repeatedly (by pressing F5) whenever it completes each run. Alternatively, if you want to stress all your components in turn automatically, Sandra has a 'Burn-in Computer' module under the Tools tab which will undertake more thorough stress testing of your machine. Start the wizard, tick the components you want to continually stress test, set the number of times for them to loop, make sure the 'Monitor your computer's health' and 'Terminate on overheat/failure' boxes are ticked to be safe, and then commence the stress testing.

MEMTEST

MemTest is a Windows-based memory test for all systems and will help in stress testing your RAM to detect any errors. Memory-related errors are one of the primary causes of system instability and data corruption/errors, so a RAM tester is a necessity. To use MemTest simply launch the program, and I recommend manually entering the amount of RAM you wish to test - e.g. enter 512 to test 512MB of RAM, 1024 for 1GB of RAM and 2048 to test 2GB of RAM. Click the 'Start Testing' button to begin RAM testing and allow the test to run until it has reached 100%. Ideally you should run the test for at least an hour or more, or even overnight if you want to test for total system stability. If any errors whatsoever are found then you have unstable memory which can lead to many types of system problems.

MEMTEST86

Memtest86 is another good memory test and is better than MemTest in that it tests your memory before Windows loads into memory. This is a much more accurate way to test your RAM and memory subset free of any memory spaces taken up by the operating system. To use MemTest86 download the latest zip file and extract the contents. Run the *Install.bat* file from the archive and enter a blank 1.44MB floppy as prompted. To run Memtest86, leave the floppy in the drive and reboot your system - it will run from the floppy and test

your RAM. Note that some motherboard BIOSes come with MemTest86 built-in, so check your BIOS for this option and run it from there, especially if you don't have a floppy drive to use for this procedure.

There is an updated and modified version of Memtest86 called Memtest86+ which you may prefer to use since it contains a range of enhancements over the original, including more information and better support for newer chipsets.

GOLDMEMORY

GoldMemory is another memory tester that runs before your operating system and other programs are loaded into memory, which is the most optimal condition for memory testing. Usage of GoldMemory is similar to MemTest86, and involves running the *install.bat* file of the package to create a bootable floppy disk that can be used for running GoldMemory upon rebooting.

RTHDRIBL

RTHDribl (Real Time High Dynamic Range Image-Based Lighting) is actually a DirectX9 tech demo and not specifically designed as a benchmark or stress tester as such. You must have a graphics card with Pixel Shader 2.0 support or higher to run it, such as Radeon 9600 or GeForce FX or higher card. It does not have a series of tests to run, so simply start up the program and observe your framerates (top left corner). You can turn off the text shown on the screen at any time by pressing F1 and F3. You can also cycle through a range of object shown (Press O), the materials used on their surfaces (Press M), and the backgrounds used (Press L). You can change the display resolution or increase the size of the program's window, either of which will increase the load on your graphics card.

To use it as a stress tester, go to the File menu and select 'Config Display'. In the Direct3D Settings screen which opens, click the 'Fullscreen' option, then select a higher resolution such as 1280x1024 or above. If you really want to stress your graphics card, select the highest resolution available. You don't need to alter any of the other options on this screen unless you know what you're doing. Click Ok and the changes will be implemented. Now start the Auto Demo mode by pressing F5 (or Demo>'Enter Planet Demo') and let the program run for a while and any graphics instabilities will soon become apparent through crashes, artifacts or glitches. You can also manually rotate the objects, change them, their materials and background environments often to put further stress on the graphics card.

Remember, you can use any of the benchmarks listed earlier in this chapter as stress testers simply by running them at their highest settings in a continual loop for example.

WINDOWS ERRORS

The information throughout this guide is already aimed at helping you configure your system for optimal performance and stability. As such the whole guide must be read to allow you to correctly troubleshoot any problems you may have. However this chapter contains some specific details on common Windows errors, and what they may mean. It is by no means a comprehensive listing of procedures to follow in troubleshooting problems, and again, it must be used in conjunction with the information in the rest of this guide.

< IDENTIFYING WINDOWS ERRORS

It is import to understand that most Windows and program errors are not easy to diagnose, and often what the error message says is the source of a problem, is not the actual source of the problem. For example, a DRIVER_IRQL_NOT_LESS_OR_EQUAL error is supposed to occur due to faulty drivers, however most commonly it actually occurs due to excess heat and/or overclocking on the graphics card, which then generates driver errors due to instability, which Windows then logically reports as a driver error. As you can see, if heat is the source of your problems for example, uninstalling and reinstalling new graphics drivers will do nothing to resolve this issue. So you need to make sure you follow the steps under the Diagnosing Problems area further below to correctly diagnose a problem.

SUDDEN REBOOTS ON ERRORS

If you find that your system suddenly reboots when you experience an error, and hence you can't see the full details of an error, then you will need to disable the automatic reboot on error function in Windows. To do this, follow these steps:

1. Go to Control Panel>System>Advanced>Startup & Recovery Settings.
2. Under the 'System Failure' section untick the 'Automatically Restart' option, as well as the 'Send an Administrative Alert'.
3. When next you receive an error, your system will freeze at the error screen and show the error message. Write down the error type and number exactly as shown for future reference.
4. Manually reboot your system using the restart button on your PC, or by pressing CTRL+ALT+DELETE, or by holding down the Shutdown button on your PC for 5 seconds.

If your system still suddenly reboots, then this is a sign of memory-related issues - see the Memory Optimization and Overclocking chapters, as this is related to your RAM, virtual memory or CPU Caches, especially when overclocked. Important system information held in memory is suddenly corrupted and must be dumped, and the system either aborts the program responsible for the corruption - causing an instant Crash To Desktop (CTD) with no error - or reboots your system instantly to reset memory and clear the error.

EVENT VIEWER

Another place to view error codes and error listings is in the Event Viewer, accessible under Control Panel>Administrative Tools, or by going to Start>Run and typing "Eventvwr.msc" (without quotes) and pressing Enter. There are three categories of event logs to view - Application, Security and System. Click on each of these in the left pane, and a list of events and errors (shown as red X's) will display in the right pane. The first thing to do is not panic if you see Red X's; this is normal on all systems. What is important is the details of the error - for example, under System there are commonly lots of DCOM errors if you've disabled any services. This is because an application will call for a service to start; if the service has been manually disabled, the application reports an error and continues loading. This is not a genuine error or something to worry about, unless of course it is the application with which you are having a problem in the first place - in which case re-enable the relevant service.

To correctly diagnose an Event Viewer error, read the error log text and enter its details into this Microsoft Events & Errors Message Center form, and it should provide you with more details and links to help resolve your problem. Alternatively you can try this Event ID Site for further research.

< SOLUTIONS TO WINDOWS ERRORS

I cannot cover all the error numbers and error types in this section, therefore it is necessary that you take the initiative and research the particular error code using one of the following trustworthy sources:

Microsoft Knowledgebase
Microsoft TechNet
Windows XP Solution Center
Microsoft Events & Errors Message Center
Troubleshooting Windows Stop Errors
Troubleshooting Miscellaneous Windows Errors

Use the search functionality in the sites above and enter your exact error code as shown on screen. To make things easier, below are some common Windows error codes, an excerpt from the relevant Microsoft document describing the error and a potential fix for the error. Remember, none of these errors has a definite cause or specific fix, sometimes a range of unrelated issues can cause Windows to generate a certain error. The description and solution provided is the most generic one for each error:

IRQL_NOT_LESS_OR_EQUAL

"A Stop 0xA message might occur after installing a faulty device driver, system service, or firmware. If a Stop message lists a driver by name, disable, remove, or roll back the driver to correct the problem. If disabling or removing drivers resolves the issues, contact the manufacturer about a possible update. Using updated software is especially important for multimedia applications, antivirus scanners, and CD mastering tools.

A Stop 0xA message might also be due to failing or defective hardware. If a Stop message points to a category of devices (video or disk adapters, for example), try removing or replacing the hardware to determine if it is causing the problem.

If you encounter a Stop 0xA message while upgrading to Windows XP Professional, the problem might be due to an incompatible driver, system service, virus scanner, or backup. To avoid problems while upgrading, simplify your hardware configuration and remove all third-party device drivers and system services (including virus scanners) prior to running setup. After you have successfully installed Windows XP Professional, contact the hardware manufacturer to obtain compatible updates."

Suggested Solution: Install the latest drivers, or if already using the latest drivers, do a full driver uninstall in Safe Mode and go back one version. If this doesn't work, run through a range of benchmarks and stress tests to determine whether a hardware component is faulty.

DRIVER_IRQL_NOT_LESS_OR_EQUAL

"Stop 0xD1 messages can occur after installing faulty drivers or system services. If a driver is listed by name, disable, remove, or roll back that driver to confirm that this resolves the error. If so, contact the manufacturer about a possible update. Using updated software is especially important for backup programs, multimedia applications, antivirus scanners, DVD playback, and CD mastering tools."

Suggested Solution: Install the latest drivers, or if already using the latest drivers, do a full driver uninstall in Safe Mode and go back one version. In particular if this occurs in relation to your graphics driver, make absolutely certain your system is not overclocked and is being cooled properly.

PAGE_FAULT_IN_NONPAGED_AREA

"If you added new hardware recently, remove and replace the hardware to determine if it is causing or contributing to the problem. Run diagnostics software supplied by the hardware manufacturer to determine if the component has failed.

Stop 0x50 messages can also occur after installing faulty drivers or system services. If the file name is listed, you need to disable, remove, or roll back that driver. If not, disable the recently installed service or application to determine if this resolves the error. If this does not resolve the problem, contact the hardware manufacturer for updates. Using updated drivers and software is especially important for network interface cards, video adapters, backup programs, multimedia applications, antivirus scanners, and CD mastering tools. If an updated driver is not available, attempt to use a driver from a similar device in the same family. For example, if printing to a Model 1100C printer causes Stop 0x50 errors, using a printer driver meant for a Model 1100A or Model 1000 might temporarily resolve the problem."

Suggested Solution: Aside from trying driver updates, test your CPU and RAM in particular, though it may even be an issue with your motherboard.

UNMOUNTABLE_BOOT_VOLUME

"This behavior can occur if either of the following conditions is true:

- Your computer uses an Ultra Direct Memory Access (UDMA) hard disk controller, and the following conditions are true:
  - You use a standard 40-wire connector cable to connect the UDMA drive to the controller instead of the required 80-wire, 40-pin cable.
  - The basic input/output system (BIOS) settings are configured to force the faster UDMA modes.
- The file system is damaged and cannot be mounted."

Suggested Solution: See the Backup & Recovery chapter for use of the CHKDSK /R and possibly also the FIXBOOT commands in the Windows Recovery Console to repair this issue. If these fail, do a full reformat and reinstall, and if that fails, your drive may be faulty.

BLACK SCREEN ON BOOTUP

"The master boot record (MBR), partition tables, boot sector, or NTLDR file is corrupted."

Solution: See the Backup & Recovery chapter for use of the FIXMBR command in the Windows Recovery Console to repair this issue.

DEVICE MANAGER ERROR CODES

For an explanation of the various error codes you might see for certain devices in Device Manager, read this Microsoft Article.

WINDOWS FIREWALL ISSUES

If you're having problems with the Windows XP Firewall, see this Microsoft Article.

WINDOWS STARTUP PROBLEMS

For a range of solutions to general Windows XP startup issues, see the following:

Microsoft Article 1
Microsoft Article 2
Microsoft Article 3
Startup Issues & Solutions

WINDOWS SHUTDOWN PROBLEMS

For solutions to general Windows XP shutdown issues, see the following:

Windows Support Center Article
User Profile Hive Cleanup Service

That is just a brief list of the more common errors and possible solutions. As always your specific problems may be much more difficult to resolve or not found in the list above, therefore I urge you to see the reference sources listed further above in this section to research and find the solution to your problem, as well as trying the methods covered below to diagnose your problem.

< DIAGNOSING PROBLEMS

I've noticed that whenever a problem occurs on a PC, new users tend to think everything that's going wrong is due to faulty hardware, and that they've just damaged their machine or screwed up thousands of dollars worth of equipment by editing their registry or changing a setting in a game. More experienced users go to the opposite extreme: they are always convinced that every fault they see on their PC lies with the software, despite their overclocking for example, or the fact that they've physically modified their graphics card or flashed it with a modified BIOS. The truth lies somewhere in between, and requires that you have some patience and try some common steps to diagnose your particular problem.

TROUBLESHOOTING CHECKLIST

I suggest you follow these general steps, preferably in the order shown:

Remove any overclocking: I cannot stress this point enough - almost all of the problems which I see reported on Internet forums and in emails to me are based at least in some part on some form of overclocking. Crashes, memory errors, freezing, sudden reboots, garbled graphics or unusual colors or dots on the screen - these are all the classic signs of a system which is operating outside its specifications and being over-stressed by a particular game or application. Before blaming any software of being at fault, you must first change *all* your hardware back to their default speeds, including such things as RAM timings. Even if every single other game or program on your system runs fine at a particular level of overclock, but one game or program doesn't, that does not mean the program is at fault; you should still make sure your overclock is not the issue by running at stock speeds for a while. If the problem is reduced or completely eradicated by running at stock speed then the issue is without a doubt related to your overclock. Note that if you have heavily overclocked and/or modified your components in the past you may have already caused them permanent damage, so keep this in mind as you try to find the source of the problem. For example, if you have heavily overclocked your graphics card for some time it is quite likely that you have permanently damaged the Video RAM and this is the cause of any video artifacts you may see in games, even at stock speeds.

Check for Heat Issues: A major cause of most system problems is heat buildup. Even if none of your components are overclocked, under certain conditions components such as your CPU and graphics card in particular will generate a large amount of heat. This can build up in your case, but even with good case cooling the heat may buildup locally near the particular component and cause it to malfunction. The most obvious signs of this are random errors, graphical glitches in games, and crashes to desktop. Check the Cooling tips in the Overclocking chapter, and as a temporary solution open up your case and clean the dust out, then leave the sides of your case open and if possible also place a desk fan pointing into the case, or some other method of additional cooling for the internal components. If this helps reduce the frequency of errors or problems, then heat is a major cause.

Optimize your System: In order to rule out a software-based problem you must make sure your general system settings are correctly configured. Clearly that is what this guide is designed to do, so follow it in full and also make sure to check for application or game-specific tweak guides to make sure the software's settings are configured correctly. Sub-optimal Windows and/or software settings and/or out-of-date drivers are a major cause of problems on many systems, and even if they are not the primary cause they can certainly exacerbate any existing issues.

Optimize your BIOS: Along with any software optimization you must make sure your BIOS settings are correct otherwise no amount of software optimization or reduction in overclocking will help. This is another important area that is almost always overlooked because it is not easy to do. See the BIOS Optimization chapter for details. For example, some game problems can be resolved by disabling Thermal Management, or by adjusting your RAM timings to be less aggressive - so make sure your BIOS is optimal.

Read the Manual & ReadMe Files: There are times when particular games have a known issue with a particular hardware component or hardware combination. Usually these issues are addressed in patches for the program, or by new driver releases for the relevant hardware. However you need to be aware of these problems, and the best way to do that is to read the *Readme.txt* or similar help files which come with the program. These are usually located somewhere in the program's directories and a link is typically found for them under the program's install folder. You may even find mention of known issues in the program's manual or on their website, so make absolutely certain you read these.

The Problem Occurs During Bootup or in the BIOS: If the problem you are experiencing occurs during your PC's initial bootup and/or in the BIOS screen then this clearly indicates that it is completely unrelated to your Windows settings, drivers or programs, since none of these have even loaded while the BIOS is loading. Problems which occur during initial bootup or when you are in the BIOS are always and unequivocally either hardware-related faults (including heat and/or overclocking) and/or a BIOS setting which is incorrect.

Benchmark and Stress Test: It is imperative that if you don't know which component(s) are causing a problem, that you use several benchmarking and stress testing tools (covered in the Benchmarking & Stress Testing chapter) to narrow down the cause. For example if your system is freezing during the playing of games, it could be the graphics card, CPU, RAM or even the sound card which are at fault. Using several benchmarking or stress testing programs that are specialized in stressing particular components more than others will tell you which component is the likely candidate for further investigation. There is no easy way for anyone to know what the cause is on your system unless you specifically test for it yourself.

Check your Cabling and Components: If you feel comfortable in doing so, turn off your system at the power switch (but don't unplug it) and open up your case. Check the Hardware Handling Tips section below first, then:

- Check to ensure that your component fans are not covered with dust or debris.
- Check to ensure all the cables to and from your components are firmly plugged in and not damaged along their length.
- Check your motherboard manual to make sure all the switches on the motherboard are set correctly, and that all plugs are going into the right source.
- Check for signs of extreme heat such as scorch marks or a burnt smell: these indicate heat damage to particular components.
- Check to make sure metallic surfaces are not in contact with each other as this can short-circuit components.

HARDWARE HANDLING TIPS

If you have to physically handle the hardware components in your system at any time, such as removing or installing a component, checking component connections, or cleaning components, you should make sure to follow these tips to prevent any permanent damage to the components through mishandling:

- Before opening your case and/or handling any of your components, always shut down your PC and turn off the power directly at the wall socket - the electricity in your PC can kill or injure you, especially the dangerous voltages contained in your Power Supply. Even when switched off at the wall, the PSU can retain a lethal charge for quite some time, so on no account should you ever open your PSU or insert any metal objects into its casing.
- Once you've turned off your system at the wall, press and hold the PC power button for several seconds to discharge any residual energy in the motherboard's capacitors.
- While handling computer components, make sure you regularly discharge any static electricity in your body by touching any 'earthed' object - that is any object that can harmlessly dissipate static electricity. Typically if you leave your Power Supply Unit plugged into the wall socket (but switched off) then periodically touching the side of the metal PSU case will harmlessly discharge any static electricity. You can also purchase an anti-static wrist strap if you handle components regularly. If you are going to handle components try to minimize how much artificial fabrics and materials you are wearing as these can help to build up a significant electrostatic charge in your body. An electrostatic discharge from your body can damage or kill an electronic component, so do not take this lightly as it can actually happen.
- Do not use a vacuum cleaner to clean the inside of your computer and its components, precisely because vacuum cleaner nozzles can discharge static electricity and zap your components. Use a clean barely damp lint-free cloth to wipe dust from most surfaces, making sure you don't rub or scrape the Printed Circuit Board (PCB). Don't use any detergents on the cloth and most certainly don't spray any onto the components. Ideally if it is available to you, use a can of compressed air (or an air compressor) to blow dust from hard-to-reach or sensitive surfaces as this is much safer and far more effective.
- Do not force any plugs, cables or components into sockets that do not appear to be accepting them. Even if the two ends appear to be matched, the pin arrangements may be slightly different or out of alignment and hence forcing a fit may actually bend or break some of the pins and make the connection useless or permanently damaged. Computer hardware interfaces are designed to fit together with firm but not excessive force. This includes components like the CPU chip which fits into the appropriate socket on the motherboard - align all the pins perfectly and press evenly but not too hard and they will mate safely. Force the fit and you may just end up permanently ruining your CPU.
- Most devices in your PC require a source of power, however the voltage they require is very specific. If you connect the wrong plug to the component (which is hard to do), or forget to attach a power connector then the component will appear to be dead or may malfunction. You will have to check your component documentation and especially the motherboard manual to ensure that all components are plugged in correctly and firmly to receive sufficient power.
- Most hardware components are sensitive to physical impact and strong vibrations. Avoid situations which result in the bumping or banging of these components, or for example mounting heavy fans onto them insecurely which can pass vibrations to these components or warp them under the weight.
- Do not handle liquids around electronic components. Any spillage can result in disastrous short-circuiting. This also includes any thermal or adhesive compounds which can conduct electricity and hence cause a short-circuit - apply them cautiously and don't just assume that any excess will dry up and disappear; remove all excess thermal compounds thoroughly with a cloth.
- Do not place excessive weights on PCBs as this can crack or warp them such that they will be permanently damaged. Don't even rest a large object temporarily on the motherboard or a component for example, put them on another surface until you need to use them.

Most importantly, make sure you invest in a good quality Surge Protector for your PC and all your other sensitive electronic devices. Aside from letting you plug in multiple devices into one outlet, surge protectors serve an important function: they prevent spikes in voltage which can occur for a range of reasons from harming your components. Voltage surges needn't be sudden or catastrophic; even minor increases in

voltage can reduce your component's lifespan over a period of time. Note that most surge protectors will not protect your equipment from the surge generated by a direct lightning strike on or near your house, so during heavy thunderstorms it is strongly recommended that you turn off your PC and any other expensive electronic products and disconnect their power plugs from the wall socket. This also includes any phone lines used for DSL for example.

Electronic components these days are quite hardy, and can withstand some abuse, but given how valuable they are I suggest that you don't take any risks when handling them and in their general usage, so the tips above are best observed if you want to maintain your PC and your electronic components in good condition.

In the end, if you really can't find a solution to your problem, try contacting Microsoft Technical Support, or the tech support for the particular game, application or hardware you are having issues with. Their contact details are listed on the product box, in the manual or on their website. Make sure to provide them with your correct system specifications - as covered in the System Specifications chapter of this guide - as well as full details of the error. You can also post your specifications and error code(s) along with the things you have already tried on an Internet forum. Usually however, the person best suited to solving a problem is you - all you need is some patience and some knowledge, and in the long run you will save yourself a great deal of time, and indeed come to be able to prevent a great many problems, if you make the effort to become proficient in identifying and diagnosing PC problems yourself instead of relying on others.

REGULAR MAINTENANCE

Keeping Windows XP and your PC in optimal working order requires regular system maintenance. Any operating system will degrade over time if not properly maintained, so you must arrive at some regular method of undertaking such maintenance using the tools and methods in this guide. It also cannot be done on a rigid schedule; it depends on your usage patterns, how often you install patches and updates, install new software and move files around, etc.

Below is a list of the actual things I regularly do to maintain my PC, the rough order they are done in, and the frequency with which I do them. You may consider some steps or their frequency as overkill, but I've found that by doing these procedures at least once a week I not only keep Windows as fresh as the day it was installed, I also weed out any undetected malware or unnecessary programs, keep my drive space optimal and quickly get wind of any potential problems before they ruin my data or unstabilize the system.

This is only an example, and you will need to customize it to suit your particular circumstances, but it is a good starting point for the average PC user:

STEP 1 - SCAN FOR MALICIOUS SOFTWARE

Action: Update malware scanners then run a full manual scan on each one.
Frequency: Once a week at least. Scan individual suspicious files such as new downloads or saved attachments as often as required.

See the PC Security chapter for details.

STEP 2 - CHECK FOR NEW STARTUP PROGRAMS & SERVICES

Action: Use MSConfig to quickly check under the Startup and Services tabs for any newly installed startup programs or non-Microsoft services. Identify any new ones and disable unnecessary ones as required.
Frequency: Once a week at least. Usually after each new program or game install.

See the Startup Programs and Services chapters for details.

STEP 3 - CLEAN WINDOWS

Action: Run the Disk Cleanup utility, then CCleaner. Do a manual clean out of remaining unnecessary files. Only empty the Recycle Bin if certain no important files will be removed, otherwise leave it for the moment.
Frequency: Once a week at least. Also after any major program or game installs.

See the Cleaning Windows chapter for details.

STEP 4 - CLEAN & COMPACT THE REGISTRY

Action: Use the registry cleaner in CCleaner or JV16 PowerTools to run a thorough clean of the Registry, then use NTRegOpt to compact it.
Frequency: Once a week.

See the Windows Registry chapter for details.

STEP 5 - RUN A DISK CHECK

Action: Use the Disk Check utility to do a full disk scan/repair of the hard drive - right click on your drive letter in Windows Explorer, select Properties>Tools>Check Now, tick 'Automatically fix file system errors', then click Start and reboot to implement.
Frequency: Once a week, or done automatically when using a third-party defragmenter (see Step 6 below).

See the Drive Optimization chapter for details.

STEP 6 - DEFRAGMENT THE DRIVE(S)

Action: Use a disk defragmenter - either the default Windows Disk Defragmenter or a commercial package like Diskeeper - to run a full defragmentation of the hard drive.
Frequency: Once a week at least. Usually after every major program or game install/uninstall, or any manual game or Windows patching.

See the Hard Drive Optimization chapter for details.

STEP 7 - BACKUP IMPORTANT FILES

Action: Create a System Restore point. Backup the Registry using Erunt. Do a full manual backup of important files and folders to DVD. Also backup extremely important files again to ISP webspace via FTP as an added precaution.
Frequency: Once a week at least. If working on something extremely important, backup every couple of days both to ensure it's not lost, and also to have several versions in case current version is corrupted or accidentally deleted.

See the Backup & Recovery chapter for details.

If done correctly, all of the above shouldn't take longer than an hour - with most of that time taken up by Step 1 due to manual scanning times. Please note that unfortunately there are no automated maintenance programs which can do proper PC maintenance for you. Though many tools many claim they can do this, there are several important steps which require active decision making and irregular frequency of application. There is no magic wand which will clean and optimize your machine for you. At best most will simply remove a few unnecessary files or registry entries; nothing genuinely thorough or useful.

Just as a human mechanic is required to actually inspect, tune and maintain a motor vehicle, rather than any totally automated process, so too a PC requires that you be aware of how things work and to actually think and act based on particular circumstances to keep both the hardware and the software running optimally.

CONCLUSION

That brings *The TweakGuides Tweaking Companion* to a close. I hope you've found the information in this guide valuable as a reference source. As I say at the end of all my guides: Until next time, take care!

Cheers,
Koroush Ghazi

< VERSION HISTORY

The table below shows all the major revisions made to this guide since first released.

Version	Release Date	Pages Revised
1.00	22 December 2004	Nil – First Release.
1.01	23 December 2004	pp.55, 98 - RegCleaner links fixed. pp.101 - Reference to */Windows/Prefetch* fixed.
1.02	10 January 2005	All pages - Formatting altered (e.g. inserted section name on side of each page). All pages - Numerous typographical /grammatical errors fixed. pp.13 - XPTC problem reporting link changed. pp.40 - Internet connection advice clarified in Driver Installation Order. pp.42 - Added XGI graphics card driver download link. pp.49 - Added 2GB+ RAM example for Virtual Memory. pp.54 - Prefetcher tweak clarified. pp.56, 99 - Correct RegCleaner version clarified. pp.86 - Mention how to re-enable User Names column in Task Manager. pp.104 - Recycle Bin rename/delete tweak fixed. pp.121 - Windows Update repair tweak fixed. pp.145 - AMD CPU Thermal Limiting mentioned.
1.03	15 February 2005	All pages - Numerous typographical/grammatical errors fixed. pp.41, 62, 140 - Added Nvidia Forceware Tweak Guide link.
1.04	10 March 2005	pp.34 - Corrected IRQ Priority tweak. pp.41 - Changed ATI Catalyst download link. pp.50 - Clarified Position of Pagefile using Diskeeper tweak. pp.53 - Clarified/corrected LargeSystemCache and IOPageLockLimit tweaks. pp.54 - Clarified the Windows Prefetcher advice. pp.102 - Instructions for Prefetch files in */Windows/Prefetch* folder clarified. pp.121 - Changed the Firefox Tweak Guide link.
1.05	10 April 2005	All pages - Several typographical/grammatical errors fixed. pp.23 - Ad-Aware TweakSE plugin linked. pp.29,87 - Erunt & NTRegOpt links fixed. pp.56,100-101,157 - All WinOptimizer advice and links replaced by CCleaner. pp.145 - Throttlewatch link fixed. pp.148 - PSU Guide link fixed. pp.160 - Electrostatic Discharge Article link fixed.
1.06	18 April 2005	pp.38 - Provided alternate links for XP Home and Pro Installation Guides. pp.82-83 - Provide alternate links for XP Services Guide.
1.07	22 April 2005	pp.41 - Fixed Intel software download links.
2.0	18 August 2005	Guide renamed from *The Windows XP Tweaking Companion* to *The TweakGuides Tweaking Companion* as requested by Microsoft. Guide edited throughout to fix some grammatical/spelling errors and fix dead links. Otherwise contents remain the same as the previous version(s).

Version	Release Date	Pages Revised
3.0	4 January 2006	**Major revision and rewriting of the guide** - too many changes to list individually: - Revision/clarification/addition of a wide range of advice. - Shifting/merging/renaming of a large number of chapters and creation of new ones. - Fixing/removing a range of dead links, and provision of many new links. - Format and grammatical corrections and adjustments. All previous *TweakGuides Tweaking Companion/Windows XP Tweaking Companion* users should update to this latest version as soon as possible.
3.1	8 June 2006	All pages - Several typographical/grammatical errors fixed. All pages - Fixed all dead or inaccurate hyperlinks. pp.19,164,167 - Updated Sandra instructions for new version. pp.29 - Repair install instructions link added. pp.43 - Removed reference to .NET 1.1 pp.89,93 - ProcessLibrary site link added. pp.90 - Added Autoruns instructions. pp.92 - HID Service removed from Disabled list. pp.97 - hf_mig details added pp.100 - Imagecfg instructions fixed. pp.119 - Updated Internet Explorer section for IE7 Beta. pp.130 - Switched order of Registry compacting & cleaning. pp.108 - Low Disk Space instructions fixed. pp.116 - Context Menu Editor link added, CMenu details fixed. pp.136 - Updated Windows Media Player section for WMP11 Beta. pp.139 - Quicktime and Real Alternative Codecs added. pp.144 - Shortcut To instructions fixed. pp.167 - Added SuperPI instructions.
3.2	22 August 2006	All pages - Several typographical/grammatical errors fixed. All pages - Fixed all dead or inaccurate hyperlinks. All pages - Updated the TweakGuides Logo. pp.25 - Corrected KeyPass reference to KeePass. pp.47 - A-Squared instructions updated. pp.55-56 - Prefetch instructions further clarified. pp.62 - I-FAAST & NTFSDisableLastAccessUpdate Registry key conflict. pp.69 - Added link to Gamer's Graphics & Display Settings Guide. pp.95 - Added Advanced Disk Cleanup options. pp.100 - Added AMD Dual Core Optimizer Utility link. pp.106 - Updated NTFSDisableLastAccessUpdate details. pp.145 - Corrected Windows Blinds references to WindowBlinds.
3.3	20 November 2006	All pages - Several typographical/grammatical errors fixed. All pages - Fixed all dead or inaccurate hyperlinks. pp.19 - Sandra Service names updated. pp.40 - Intel Matrix Storage Manager link added. pp.43 - .NET reference updated to 3.0. pp.46 - AVG Free instructions updated. pp.47 - A-Squared Free instructions updated. pp.47 - Microsoft Antispyware renamed to Windows Defender. pp.49 - Sophos Anti-Rootkit link & instructions added. pp.61-63 - Diskeeper advice updated. pp.73 - USB Mouserate tweak clarified. pp.91 - HijackFree link & instructions added. pp.120-123 - Internet Explorer chapter revised to suit both IE6 & IE7 final. pp.137-141 - Windows Media Player chapter revised to suit both WMP10 & WMP11 final. pp.146 - Zune & Royale Noir theme links added. pp.172 - User Profile Hive Cleanup Service link added.
3.4	1 March 2007	Cover - TGTC Logo changed. All pages - Fixed any dead or inaccurate hyperlinks. pp.102 - Added SetAffinity utility. pp.149-157 - Overclocking chapter heavily edited.

Version	Release Date	Pages Revised
3.5	1 July 2007	All pages - Fixed any dead or inaccurate hyperlinks. All pages - Minor layout changes. pp.47 - Updated A-Squared Free advice. pp.47-48 - Ad-Aware 2007 instructions added. pp.49 - HijackThis advice updated. pp.157 - Added new link for AMD overclocking. pp.136 - Added Windows Live Mail link.
3.6	22 September 2007	All pages - Fixed any dead or inaccurate hyperlinks. pp.97-98 - Updated CCleaner advice. pp.102 - Updated SetAffinity link and advice. pp.103 - Updated RegSupreme advice. pp.138 - Added fix for black & white video playback.
4.0	1 May 2008	This is a major revision of the guide. It has been thoroughly revised throughout, not just for SP3. There are a large number of changes, but only the more significant ones are listed below: All pages - Fixed any dead or inaccurate hyperlinks. All pages - Fixed any typographical/grammatical errors. pp.19 - Updated advice for Sandra 2008. pp.20 - Added GPU-Z utility. pp.36-37 - Updated slipstreaming & nLite advice for SP3. pp.39 - Updated multi boot advice for XP/Vista dual boot. pp.39 - Expanded RAID advice. pp.43-44 - Updated Service Pack details and installation advice for SP3. pp.43-49 - Expanded/clarified Driver Installation chapter. pp.51-52 - Updated advice for AVG 8.0. pp.54-55 - Added Phishing section. pp.56-59 - Updated general security tips. pp.62 - Added Video Memory Watcher utility. pp.63-65 - Updated Virtual Memory advice. pp.66-67 - Added Drive Controllers section. pp.67-68 - Added Master File Table section. pp.69-70 - Updated advice for Diskeeper 2008. pp.96-100 - Expanded/revised Startup Programs chapter. pp.98 - Updated MSConfig details for new Tools tab added by SP3. pp.101-106 - Expanded/revised Services chapter. pp.103-104 - Added full table of XP Services, including noting four new SP3 services. pp.111 - Added Cleanup Up After Service Pack 3 section. pp.111 - Added Delete 'In Use' Files section. pp.114 - Added Windows Dual Core Hotfix. pp.115 - Added Process Explorer section. pp.124 - Added Disable Automatic System Restore Checkpoints tip. pp.139-142 - Expanded/revised Internet Explorer chapter solely for IE 7. pp.148-153 - Expanded/revised Windows Media Player chapter solely for WMP 11. pp.158-159 - Revised custom themes advice for SP3. pp160-161 - Consolidated and improved formatting for Keyboard & Programs shortcuts tables. pp.163-171 - Expanded/revised Overclocking chapter. pp.173 - Added Unigine graphics benchmark. pp.174 - Updated advice for Sandra 2008. pp.177 - Added Memtest86+ utility. pp.178-184 - Expanded/revised Windows Errors chapter.
4.1	1 July 2008	All pages - Fixed any dead or inaccurate hyperlinks. All pages - Fixed any typographical/grammatical errors. pp.47 - Updated Driver Sweeper instructions. pp.50-51 - Updated AVG Free Edition 8.0 advice. pp.53 - Updated Ad-aware 2008 advice.
4.2	2 October 2008	All pages - Fixed any dead or inaccurate hyperlinks. All pages - Fixed any typographical/grammatical errors. pp.19,174,176 - Update advice for Sandra 2009. pp.46 - Added ASUS Audio Drivers link. pp.50-51 - Updated AVG Free Edition 8.0 advice. pp.142 - Added Google Chrome link. pp.154 - Added VLC link.

4.3	6 April 2009	All pages - Fixed any dead or inaccurate hyperlinks. All pages - Fixed any typographical/grammatical errors. pp.45 - Added AHCI reference. pp.46 - Added Auzentech audio driver link. pp.50-51 - Updated AVG Free Edition 8.5 advice. pp.52-32 - Updated Ad-Aware advice. pp.67 - Added AHCI Mode details. pp.118-119 - Added JV16 PowerTools section, replacing RegSupreme & RegCleaner. pp.133-147 - Revised Internet Explorer chapter for IE8. pp.168-176 - Revised Overclocking chapter with updated information. pp.178 - Added FurMark benchmark, removed outdated Codecreatures, Aquamark and GLExcess.

[End of Guide]