

digital den



**TWEAKING
WINDOWS FOR
RICH-MEDIA
PERFORMANCE.**

Speed searching

By Brian Dipert, Technical Editor

IN THIS AGE of rich-media applications, even relatively recent PCs can come up short in performance. From audio to photographs to video, digital-consumer applications provide a stiff processing challenge. In addition, PCs simply tend to bog down over time as we install and uninstall programs and perform seemingly countless Microsoft updates.

I recently found myself in this predicament with my Fujitsu Lifebook P2040, which features an 800-MHz Transmeta Crusoe CPU and runs Windows XP Professional. Over time, bloated code and numerous background Windows processes had straight-jacketed what was once a nimble-running machine. The sluggish performance I experienced when viewing *EDN's* new digital version (available at www.edn.com) drove me to action.

Not yet ready to replace my PC, I instead experimented with various performance-

enhancing adjustments. The results of my testing should benefit anyone who'd like to help an aging PC last a little longer and keep up with today's digital-media applications. If you're not running Windows XP, some of what I discuss will still apply to you.

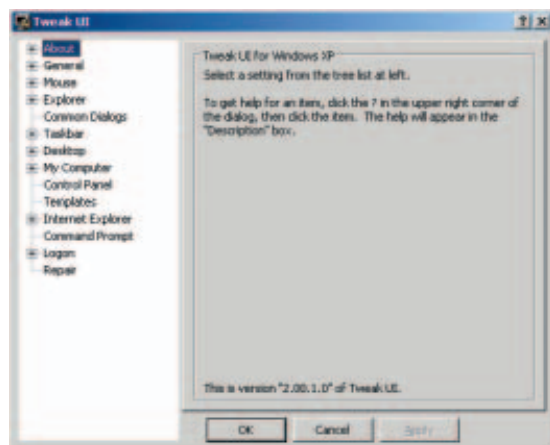
For many of the steps highlighted below, I'll provide detailed instructions and expanded explanations in "Roll up your sleeves," a sidebar available with this version of the article at www.edn.com. Finally, I make no guarantees, nor do I accept responsibility for any problems that may result from implementing these suggestions. They've worked for me and others, but your mileage may vary, and you should proceed at your own risk.

EXCISE EYE CANDY: Much ado has been made about Windows XP's GUI (graphical user interface). Some people like the new look, but others can't stand it. Personally, right after firing

my PC up for the first time, I switched Windows to its "Classic" GUI mode. Regardless of your GUI preference, Windows XP includes a number of animation, fading, translucence, and other visual effects that, if your PC has a trailing-edge graphics subsystem like mine, can hinder its snappiness. Luckily, you can turn them all off.

CUT COLOR DEPTH: I was somewhat reluctant to

NOT YET READY TO REPLACE MY PC, I INSTEAD EXPERIMENTED WITH VARIOUS PERFORMANCE-ENHANCING ADJUSTMENTS. THE RESULTS OF MY TESTING SHOULD BENEFIT ANYONE WHO'D LIKE TO HELP AN AGING PC KEEP UP WITH TODAY'S DIGITAL-MEDIA APPLICATIONS.



Microsoft's free TweakUI utility permits numerous performance-enhancing Windows adjustments.

perform this step, but throttling my graphic chip's color depth back to 16 bits/pixel (instead of 24 or 32) led to a significant boost in performance. More bits per pixel means more traffic running across PCI or AGP to the graphics subsystem, along with more per-pixel processing within the graphics subsystem. My Windows icons don't look quite as nice at 16 bits, but few applications actually benefit from increased color depth.

This move paid off particularly well when watching DVDs. In 24-bit mode, CyberLink PowerDVD dropped a significant number of video frames, leading to a jerky presentation. But playback was silky smooth in 16-bit mode, even with MIPS-gobbling audio features such as Dolby Headphone turned on. Adobe Acrobat and Acrobat-based programs, including the Zinio reader program used with the digital version of *EDN*, also saw a big performance boost from the color-depth downshift.

DOWNLOAD DRIVERS: Next, I made sure that I was running the latest version of the driver suite for my graphics chip. This practice is also good for other PC subsystems. Checking regularly for updates to audio and core-logic software, for example, can reap big rewards. Intel's Application Accelerator and Via Technologies' 4-in-1 driver suite serve as good examples.

TWEAK WITH TOOLS: TweakUI, a tool you can download from Microsoft's Web site, provided a big return on investment—especially considering that it's free. With the program, you can drastically increase the speed with which menus appear and disappear, adjust mouse-button sensitivity, and make many other performance-related changes. Another utility, Xteq Systems' X-Setup, provides even more adjustment options, but also offers possibilities that can really mess up your system if you don't know what you're doing.

FINAGLE FORMAT: Some folks believe that converting your drive from FAT32 (32-bit file-allocation table) to NTFS (New Technology File System) format will generate a speed boost. Others maintain that the change will result in a slight performance decrease. Regardless,

NTFS is the newer, more robust and fuller featured option, so most people recommend the conversion—as long as you don't need to run a Windows ME- or 9x-based configuration, or another operating system, on that same partition.

DO DMA: If (and only if) your hard disk, optical drive, and other peripherals connected to the IDE bus support DMA (Direct Memory Access), ensure that Windows is running them in this mode instead of the much slower PIO (Parallel Input/Output) mode.

In addition, you should periodically check to make sure that the drives remain in DMA mode. If Windows en-

FERRET OUT FRAGMENTING.

counters drive errors, such as if you attempt to write to a defective optical disc, it'll permanently throttle back to PIO mode. Fixing this feature requires an operation not for the faint of heart. Uninstall the channel in Device Manager, reboot, and let Windows find it and reinstall its drivers. Don't forget, too, to fix the problem that caused the PIO conversion in the first place.

POLICE PAGING: Many people recommend overriding Windows' management of the virtual-memory paging file (also known as a swap file). I didn't see much of a speed boost from this action, but again, others have.

FERRET OUT FRAGMENTING: At this point, you're likely to have a fragmented paging file that's constructed out of available clusters scattered across your drive. For best performance, defragment the drive to collect the paging file into one contiguous string of clusters. Doing so will also speed up access to all of the files on your system. The defrag utility included with Windows is incomplete in that it doesn't work on system files that are in use, including the paging file. In this case, I'd recommend Executive Software's Diskeeper, which includes a mode in which it runs before Windows boot.

REVISE THE REGISTRY: Now that you've got your drivers and other startup programs organized, turn your attention to the order in which the Windows Registry loads them during sys-

tem boot. BootVis, another free utility available from Microsoft, monitors your system as Windows loads, then reorganizes the launch order of various pieces of software to remove dependencies and maximize boot speed.

As before with the paging file, I didn't perceive much improvement after running BootVis. In addition, because Hibernate works well and because Windows XP is so much more stable than previous operating systems, I find that I'm not rebooting very often anyway. However, other BootVis users have reported dramatic acceleration, so it's worth a try.

BOOT THE BLOAT: To boost the amount of available hard-drive space, you might want to scale back the default sizes of the Internet Explorer cache, the Recycle Bin, and System Restore. The default settings, based on percentages of the total partition size, have bloated to unnecessary proportions in this era of multigigabyte drives. You should also regularly run Disk Cleanup to clean out your browser cache and eliminate unnecessary, space-consuming files in your temp directories.

To compress the Windows Registry database, which doesn't automatically shrink when you uninstall programs, and to eliminate leftover program references, you might want to try running a registry-cleanup utility. Microsoft's RegClean supposedly doesn't support Windows XP, so I haven't tried it (operating under a "better safe than sorry" policy). However, some folks report success with it. Companies such as Symantec also offer registry-maintenance programs.

BITE THE BULLET: All of the above may prove helpful to you. But beyond a certain point, tweaking meets with diminishing returns. To gain more performance, you'll need to pull out the screwdrivers (and your credit card) and replace some of the PC's hardware. In the end, I upgraded my RAM and switched to a hard-disk drive with a higher RPM rating. The latter change in particular netted a dramatic improvement (see the online **sidebar**, "The hard(ware) way").

With all the modifications I've made, I think I can live with this computer for a long while. But, alas, I'm probably only a Microsoft patch away from further frustration. □

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THE HARD(WARE) WAY

Desktop PCs afford lots of customization potential, but my Lifebook P2040 notebook offered only limited hardware-upgrade options.

My PC's original owner had upgraded to 256 Mbytes of RAM, half on the system board and half in a user-replaceable MicroDIMM located under the keyboard. The Crusoe's Code Morphing x86 emulation software takes up 16 Mbytes, leaving 240 Mbytes available to the OS and applications. If you've run Windows XP, you know that 240 Mbytes is insufficient to handle anything more than a sparse configuration. Try to do anything substantial on the computer, and it'll perpetually swap virtual memory into and out of the paging file on the hard drive.

I first purchased a 256-Mbyte MicroDIMM from Global Computers, custom-designed for them and for the Lifebook P-2000 series by Unigen. Subsequently, and also successfully, I tested a compatible MicroDIMM from Buffalo Technology.

Unfortunately, I can confirm from later testing that the attractively priced 256-Mbyte MicroDIMM from Kingston Technology will not work in this machine.

After upgrading to 368 Mbytes of total system DRAM, my computer now seems somewhat snappier when launching, operating, and switching between programs. However, I'm not sure the results justify the \$119 price tag. Those of you with computers like mine will want to reference the excellent resources available at www.leog.net. The site proclaims that it offers the "best independent information on Fujitsu Lifebook P Series Computers," and I agree with the claim.

Still searching for more speed, I decided to drop a larger, higher-RPM hard drive into the system. The computer came to me with a 20-Gbyte, 4200-RPM Toshiba drive, and under normal conditions it's only about 25% full. I do like to use the computer as my recording station

at concerts, however, so I figured I'd find at least occasional use for the extra capacity that a 40-Gbyte, 5400-RPM Seagate Momentus series drive affords. I was also curious to see whether the higher rotational speed would produce a noticeable performance boost under normal operating conditions. I expected not, because the DRAM I'd already added would reduce the amount of paging. But because the drive consumed the same amount of power as 4200-RPM alternatives, I figured I had nothing to lose.

Along with the drive, Seagate bundled an Apricorn USB external drive enclosure, along with a copy of Apricorn's EZ Gig II drive cloning and imaging software. With these features, I was able to easily mirror my existing drive to the new one, even adjusting the new drive's partition size to account for its larger density compared with the source drive. The mirroring process was somewhat tedious because my computer includes only USB 1.1 ports;

an external FireWire-based enclosure would have made for much faster transfers. Nonetheless, when the cloning operation completed, I powered off the system and removed the battery, then popped the underside panel, swapped drives, and fired up the computer again.

What a difference! The only minor hitch I encountered was that I had to go through Windows Activation again, reflective of the hardware change I'd made. After that five-minute exercise, I was up and running. The drive swap was as dramatic as the move to 16-bit color depth in boosting perceived performance. The system boots somewhat faster, though as I previously mentioned, this feature isn't so important to me. However, everything is faster than before, including launching programs (such as Outlook with its 70-Mbyte database of appointments, contacts, e-mails, and tasks), running applications, printing, and switching between open programs.

ROLL UP YOUR SLEEVES

Below you'll find detailed instructions and, in some cases, potential pitfalls for many of the suggestions highlighted in the main text. (For convenience, I've used the same headings as the corresponding sections in the main text.)

I'd also suggest that you supplement your reading of this article with a perusal of publications such as *Maximum PC*, *PC Magazine*, and *PC World*. They regularly publish Windows fine-tuning guides, and many of the ideas here originally came from them. Other good sources include reference manuals such as the recently published *Windows XP Hacks* (ISBN 0-596-00511-3).

Excise eye candy: Under System Properties (get here by right-clicking on the My Computer icon and then selecting Properties, or by simultaneously pressing the Windows and Pause/Break keys), choose the Advanced tab. Click on the Settings button under Performance, and under the Visual Effects tab you'll see a long list of features. Options include adjusting for best performance (which turns off all of the GUI options) and best appearance (which turns on everything), letting Windows choose what's best for your computer, or setting a custom configuration. Personally, I turn off everything aside from the option to use drop shadows for icon labels on the desktop.

Download drivers: If you use a notebook, I highly recommend that you download drivers only from the PC manufacturer and not the chip vendor. The soft-

ware has likely been customized for your unique platform. With a desktop PC, you're generally safer downloading and installing the drivers from ATI or Nvidia's Web sites, for example, although as a result you may still lose some of your card's enhanced functions, such as video input and output.

Finagle format: Before making the change to NTFS format, ensure that all of your applications are NTFS-compliant. Third-party hibernation utilities are particularly suspect. Windows documentation explains the command-line program you need to run for NTFS conversion, which executes upon your next system boot and which you should precede with a full system backup.

Do DMA: In Device Manager (accessible through the Hardware tab of System Properties), select each IDE channel, and, under its Advanced Settings properties, set each device's transfer mode to "DMA if available." You might also need to enable the IDE channel and device in your PC's BIOS. Until I did that step, I was unable to get a Pioneer DVR-104 optical drive I'd added to my desktop PC to go into DMA mode.

Police paging: If you want to experiment with overriding Windows' management of the virtual-memory paging file, return to the Advanced tab of System Properties. This time, after you click on the Settings button under Performance, select the Advanced tab. Now click on the Change button under Virtual Memory, select a

custom size, and make the initial and maximum sizes the same. What number should you put in the boxes? I've read recommendations of anywhere from 1.5× to 2.5× the amount of system memory. I chose 2×. You'll be prompted to reboot to activate the new settings.

Ferret out fragmentation: Although I do recommend it, you don't necessarily have to buy Executive Software's Diskeeper. Instead, you can use the following process to allow the Windows defragmentation utility to get at your paging file. First, disable virtual memory in System Properties. Then reboot. Then, while not running any other programs (remember that right now you have no virtual-memory resources), run the Windows defragmentation utility. Immediately thereafter, reactivate virtual memory to custom sizes, and reboot again.

I still think Diskeeper is worth the added cost, though. It runs much faster than the Windows defragmentation software, even though, ironically, Executive Software developed that utility's processing engine for Microsoft. Moreover, after the initial defragmentation, Diskeeper periodically does background maintenance, keeping everything neat and tidy. Yes, this scenario means another always-running process, but it's one that I've found fairly unobtrusive (also see "Squash some services" below).

Crimp the caches: Internet Explorer: In the Tools menu, select Internet Options. On the General tab, under "Temporary Internet files," click Settings and

adjust the cache size. Recycle Bin: Right-click on the bin itself and choose Properties, then adjust the slider. System Restore: Select the System Restore tab under System Properties, then adjust the slider.

Squash some services: As mentioned in the main article, I wasn't courageous (or, depending on your perspective, foolhardy) enough to attempt automated registry maintenance. Similarly, I chose not to pursue another set of optimization procedures commonly found in Windows tweaking guides. These processes show you how to disable some of the services that normally run in the background or to change them from automatic to manual mode. If you'd like to take a stab at this potentially fruitful, but also potentially crippling, project, www.blackviper.com is a good place to start. Disabling Fast User Switching reportedly makes a big difference, but I don't have multiple users sharing any of my PCs, so this tweak wasn't necessary for me.

To clobber processes that load on system boot (such as the infamous Windows Messenger program), one option is to eliminate them using the MSCONFIG utility. (Click Start, then Run, then type MSCONFIG.) Every time you subsequently boot, though, you'll be greeted by a warning message. Instead, I use REGEDIT to find the start-up entries of such processes in the registry and insert a leading semicolon in the command line, thus disabling them.