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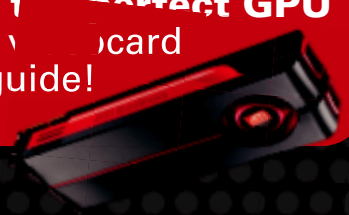

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Future plc is a public company quoted on the London Stock Exchange (symbol: FUTR).

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Maximum PC ISSN: 1522-4279

My Nerdy New Year's Resolutions: 2009 Edition

Sure, losing weight and spending more time with my family would both be great New Year's resolutions, but let's face reality: I'm not going to do either of those things. Instead, I've made four tech resolutions—I call them "techolutions"—that I earnestly pledge to follow in the coming year (or at least until the next time I have something more fun to do).

▶ BACK UP ALL OF MY DATA

Right now, with the Windows Home Server I'm rocking at home, I have a pretty reliable, idiot-proof way to back up all the PCs in my house. But these PCs don't hold all my data. I have gigabytes of stuff stored on computers that are beyond my home server's reach, in the cloud and on my work PC. This year, I resolve to back up everything at least once a month—this includes everything from my Outlook archive at work to the contents of my Dropbox folder. Just in case.

▶ TAKE BETTER CARE OF MY BATTERIES

Battery maintenance should be much easier, but sadly, it isn't. This year, I pledge to keep a partial charge on all my Lithium-ion-powered devices—never overcharging, never draining completely, and always unhooking my batteries when I'm not going to use a device for a while. I resolve to do everything reasonable and within my power to extend the life span of my batteries.

▶ WRANGLE CONTROL OF MY PHOTO LIBRARY

Right now, I have photos strewn everywhere. On my computer, on my server, on my wife's laptop, on my laptop, on my work computer—*everywhere*. Worse, they're stored using a wide variety of naming schemes, there are a fair number of corrupt or broken files in there, and many have the default date for my camera. I could be wrong, but I don't think I had a digital camera in 1999. By the end of 2010, I resolve to have all of my photos stored in one organized place, tagged and labeled based on the content of the shots.

▶ RE-RIP ALL MY OLD CDS

If I remember correctly, I ripped my first CD in 1998. It took all night, and I believe I ripped 128Kb/s constant bitrate MP3s. Sadly, I still have those files. Sure, the tags are good and they all have album art, but they sound crappy. AM-radio crappy. Rather than hit Amazon and rebuy all those tracks, I pledge to re-rip all the CDs I've bought over the years, replacing the old versions with EAC-ripped, bit-perfect MP3s of all my favorite tracks.

Of course, I'll probably just back up about half of my photos from Flickr while ripping *Abbey Road* and *Nevermind* before I accidentally delete my photo library when my laptop's battery explodes. That would be just my luck.

What are your nerdy New Year's resolutions?

Will Smith

READ THIS NOW

Videocard Roundup page 36
How Batteries Work page 58
Second-Gen WD TV page 86

LETTERS POLICY Please send comments, questions, and black-eyed peas (no Fergie, please) to willl@maximumpc.com. Include your full name, city of residence, and phone number with your correspondence. Unfortunately, Will is unable to respond personally to all queries.

THE NEWS

Google Android Grows Up

Sporting a slew of new features, Android 2.0 only needs a killer handset (and some 90,000 more apps) to knock the iPhone off its perch —PAUL LILLY

Here we are just over a year after Google first released its Android platform, and already the OS has taken the smartphone industry by storm. The latest revision—Android 2.0, or Éclair, as it's more deliciously known—bundles in even more awesome ingredients than before, keeping the open-source platform on track to leapfrog ahead of Apple's iPhone OS and grab the No. 2 spot by 2012, as market research firm Gartner is predicting.

Ranking high on the list of desired features, Android now comes with Exchange support baked right into the OS. The latest revision also brings to the table a unified inbox for multiple email accounts, and this alone might cause a few iPhone owners to suddenly develop a case of Android-envy, an affliction largely unfamiliar up to this point.

Apple owners won't be the only ones coveting Google's latest update. Existing Android owners dining on Donut (Android 1.6) have had to make do without multitouch support. The iPhone has had it all along, and Google is just now getting around to implementing multitouch into its framework.

There's a lot more to look forward to in Android 2.0, including a much more robust camera with built-in flash support, digital zoom, white balance, macro focus, and other photographic frosting. Google also garnished Éclair with an improved keyboard layout; a better browsing experience, which, among other things, brings HTML5 to the table; new platform technologies like Bluetooth 2.1 and a revamped graphics architecture; and improved messaging controls that will automatically purge the oldest messages when a predefined limit is reached.

Fast, sleek, and built around Android 2.0, Motorola's Droid is everything HTC's G1 isn't, including a potential iPhone killer.

WHILE ANDROID 2.0 LIFTS THE OPEN-SOURCE OS TO NEW HEIGHTS, SOME EXISTING OWNERS MAY BE LEFT GROUNDED

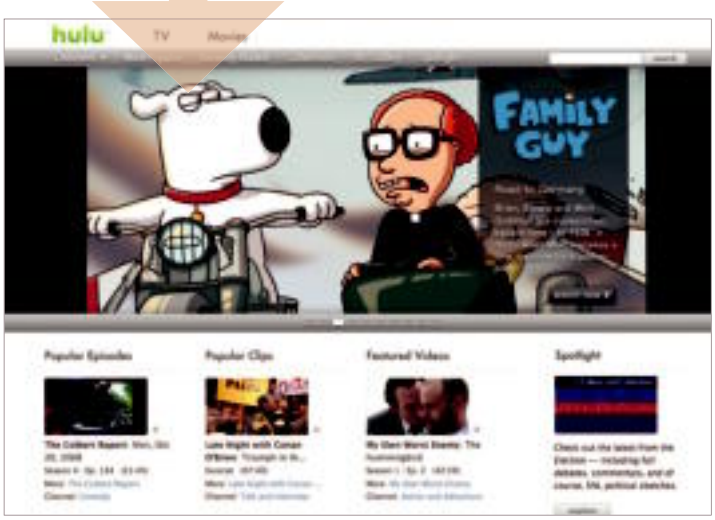
Now, here's where things get interesting. While Android 2.0 lifts the open-source OS to new heights, some existing Android owners may be left grounded, particularly owners of HTC's popular G1 handset. HTC might have botched things by not having the foresight to include enough internal memory to handle future Android updates. G1 users have already had to contend with insufficient storage to accommodate all the apps they want to install, and as frustrating as that's been, it will be an even bigger blunder if the only way to upgrade to 2.0 is by hacking the handset. Power users may not care, but the real money comes from the mainstream.

There's no doubt Android's got game, but unlike Apple, Google doesn't sell its own branded phone. Android's success will ultimately depend on what handset makers do with it, and so far, Motorola's Droid is the first to market to make use of Android 2.0. It's faster than any other Android-based smartphone, and thanks to the updated OS, it's far more robust. But is it an iPhone killer? Can there be such a thing? Expect these questions to be answered as the year progresses.

Hulu to End Free Ride

Now that we're all good and hooked on Hulu's free, on-demand, high-quality, minimally ad-driven TV and movie fare, the website's executives are seriously considering a subscription-based model. Talk of such a move first surfaced in mid-2009, but the News Corp faction of Hulu's leadership seems particularly intent to act, with the media company's Deputy Chairman Chase Casey saying, "It's time to start getting paid for broadcast content online."

Apparently, ads alone haven't been making Hulu enough money, hence the interest in new revenue streams. (News Corp has had success putting the *Wall Street Journal*'s digital edition behind a paywall.) Whether Hulu will cease to be free altogether or evolve into a tiered service with select premium content costing a fee, is yet to be seen. But word has it a change is coming in 2010. **–KS**



Win7 UAC Found Wanting

There's been a lot of positive buzz about the security of Windows 7, so security firm Sophos decided to put it to the test. It exposed the OS sans antivirus software to 10 unique viruses found in circulation in order to verify Microsoft's claims that User Account Control (UAC) is more secure in Win7.

The results? Eight out of 10 viruses ran without problem on a stock install of Windows 7 with User Account Control disabled. With UAC enabled, an additional threat was actually blocked, and the original two still failed to run. The conclusion? Overall, UAC didn't make much difference in virus protection. So, yes, you still need to run an antivirus on Windows 7. **–RW**

Intel Bricks SSDs, Seeks Fix

In October, several owners of Intel's X25-M G2 solid state drives cried foul when a firmware update promising a 40 percent performance boost ended up bricking their drives instead. Oops! That marked the latest in what's becoming a string of problems plaguing the 34nm SSDs, and once again, Intel says a fix is on the way.

"Intel has replicated the issue on 34nm SSDs (X25-M) and is working on a fix," wrote Alan Frost of Intel's NAND Solutions Group.

Frost added that there have been no reports of related issues by users who upgraded to the 02ha firmware using the firmware upgrade tool, which suggests that the problem isn't the firmware itself, but a bug in the loader software. **–PL**

The Boot Race

Every new version of Windows promises faster booting, but PCs still take too long to boot. Despite faster processors, hard drives, memory, graphics, etc., we still waste a few minutes watching the machine come to life.

Indeed, many PCs seem to *never stop* booting. Years ago, we measured boot times by clicking a stopwatch while pressing the power button and waiting until the disk activity light stopped flickering. Nowadays, background tasks (antivirus scanners, software updaters, incremental defraggers, application preloaders, and various other daemons) awaken at startup and can stay busy for hours.

We might say the system has finished booting when the Windows desktop appears and we can launch apps and start working. But performance can be sluggish as the machine struggles to finish its startup chores.

Windows PCs are handicapped by a system architecture dating back to the IBM PC of 1981. First, the BIOS must boot and initialize low-level system functions. Then, Windows must boot, figure out what the BIOS has done, load the operating system into memory, and load the drivers needed by hardware devices. Macs boot faster, partly because their proprietary system architecture integrates the BIOS more tightly with the OS.

Phoenix Technologies, a leading BIOS maker since the 1980s, is tackling the challenge (again) with new BIOS firmware. The Phoenix SecureCore Tiano BIOS can bring Windows 7 on screen a mere one second after powerup. (Windows still takes its usual time to boot, though.)

How does the new BIOS work? One trick is to run the firmware as parallel threads on multiple processor cores. That idea might seem obvious. But remember, before Windows boots, there's no OS to manage the multiprocessing. The BIOS must do it.

Another trick is to leave some devices uninitialized at boot. This shortcut is really a form of time shifting, because the BIOS postpones initialization until a program actually needs the device. Save now, pay later! Still, it's useful. In off-the-shelf PCs, manufacturers will decide which devices to bypass. Power users can tweak the settings.

Phoenix claims these efficiencies won't compromise BIOS security or reliability. Let's hope it's true.

Tom Halfhill was formerly a senior editor for *Byte* magazine and is now an analyst for *Microprocessor Report*.

AMD Lifts the Veil on Fusion

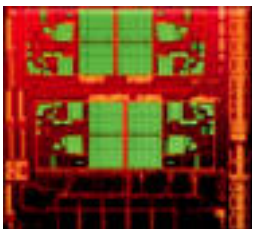
Company talks up CPU/GPU combo and hints at DX11 mobile GPUs

AMD disclosed more information on its next-generation CPU/GPU combination code-named Fusion, which won't be available until 2011. The company also discussed the imminent release of its upcoming quad-core mobile platform, Danube, in a meeting for analysts and press in Austin on November 3.

AMD is currently the only company that designs and builds both x86 CPUs and DirectX 11–class GPUs. The Fusion initiative intends to blend the best of both into what AMD Client Computing CTO Joe Macri calls an APU, short for Advanced Processing Unit. These APUs will be built on a 32nm manufacturing process, and are slated to ship in 2011. The quad-core APU is currently code-named Liano; the dual-core part is known as Ontario. Both integrate DirectX 11 onto the die with the CPU. Liano will offer 4MB of cache, while Ontario will have just 1MB.

The quad-core platform (CPU, I/O controller, and motherboard) is code-named Sabine, while Brazos is the current moniker for the dual-core version. Both Sabine and Brazos are designed for laptop systems, with Sabine aimed at desktop replacement and mainstream "thin and light" notebooks. Brazos is targeted at the ultrathin and mini-notebook segments.

Macri made the point that Fusion would not only perform well, but save considerable power—up to seven hours of resting battery life. Since the GPU will be integrated onto the same die as the CPU, significant power savings would be realized by reducing interconnects and shortening the distance between a separate graphics chip and the CPU.



AMD calls its CPU with built-in graphics an APU (Advanced Processing Unit).

AMD also discussed its roadmap for 2010, noting that the Danube mobile platform, consisting of the Champlain CPU with up to four cores, will be shipping sometime during the first half of 2010. A higher-performance version of its current integrated GPU chipset would be coupled with the CPU. The Nile platform, along with the dual-core Geneva CPU, would use a similar, but slightly lower-performing integrated graphics core logic.

Both laptop platforms would offer optional DirectX 11 mobile graphics chips. AMD didn't disclose details of the mobile DX11 GPUs, however. **–LC**

MODERN WARFARE 2 BOYCOTT FAILS

Lack of dedicated servers, 18-player maximum enrages gamers, but doesn't hurt sales

Developer Infinity Ward enraged fans of Call of Duty: Modern Warfare by announcing that the PC version of Modern Warfare 2 would lack support for dedicated servers. Dedicated servers allow gamers to develop and deploy mods and host custom game types. In place of the servers, Modern Warfare 2's multiplayer will be served through IW.net, with a 9v9 maximum per map, and a random user picked to host the game.

More than 200,000 gamers signed petitions protesting the lack of dedicated servers, and many threatened to boycott the game. However, Modern Warfare 2 sold 4.7 million copies across all platforms in its first day—the biggest game launch of all time. Does this mean multiplatform developers can afford to ignore hardcore PC gamers entirely? Will more developers drop dedicated-server support? Is this the end of the modding scene? Probably not, but it doesn't bode well for PC gamers. **–NE**

GAME THEORY

Leaver-Outers

The older I get, the more I appreciate elegance, simplicity, and concision in game design. Sure, there are still times I want a game that piles on the detail like a rococo basilica. It's possible to just fall into a giant hunk of gaming like Hearts of Iron III or Fallout 3 and roll around like a pig in... well, you know.

But a game that takes the most appealing bits and distills them to their essence has a powerful draw. This is what's so wonderful about Torchlight, which boils the Diablo experience down to its essentials and skims off all the fat. This is a brisk and entertaining bit of action RPG, with a light touch and a set of simple game mechanics that conceal hidden depths.

For a $20 title, the skill of the design is almost shocking, at least until you check the credits. Designer Travis Baldee gave us the strikingly similar Fate series, and codesigners Max and Erich Schaefer gave us... Diablo.

These are designers who have thought deeply about what gamers want and what they can live without. The overblown cinematics and expensive production of Diablo II are replaced with text descriptions and appealingly simple visuals that are so efficient they can run on a netbook.

Last year's Hinterland accomplished a similar bit of alchemy by creating a mashup of Diablo and Caesar, stripping down both experiences to their most appealing elements, then building them into a remarkable, easy-to-grasp, fast-playing game.

The things left out of Torchlight and Hinterland are hardly missed, partly because there is an art to simplicity that has its own charms. Thomas Wolfe, in defending his sprawling novels to F. Scott Fitzgerald, described great writers as "leaver-outers" or "putter-inners." Some artists suggest something larger by saying less, while others put in every detail they can. Both are legitimate approaches, and offer unique delights, but it's hard to deny F. Scott's basic point: It takes greater craft to create something small that suggests unstated depths.

Or, as Elmore Leonard said, "I like to leave out the parts people skip." It's something designers should keep in mind.

Thomas L. McDonald has been covering games for 17 years. He is an editor at large for *Games* magazine.

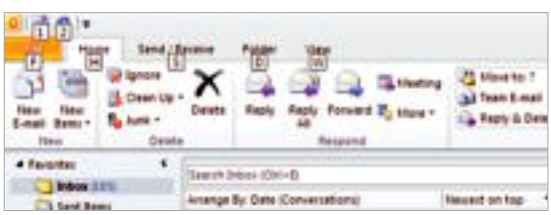
Office 2010 Previewed

MS to release free Starter Edition, remains committed to Ribbon

With Office 2010 just around the corner, we had a chance to take a peek at an early beta of the upcoming suite. While it's similar to Office 2007, the much-maligned Ribbon is staying, but it's been tweaked to be less jarring to menu-loving users.

Microsoft is also discontinuing the entry-level Works product in favor of an ad-supported, pared-down version of core Office apps Word and Excel. Users of the free Starter Edition will be limited to four tabs of the Ribbon, while paying customers will have access to the applications' full complement of seven tabs. Even though Starter users are blocked from using the more advanced functionality, a document created in the full version will still render exactly the same way for them as it does for paying customers.

The public beta for Office 2010 should be available by the time you read this, with the full version shipping in 2010. –WS



The Ribbon stays, but it's smarter and more customizable.

Intel Settles with AMD

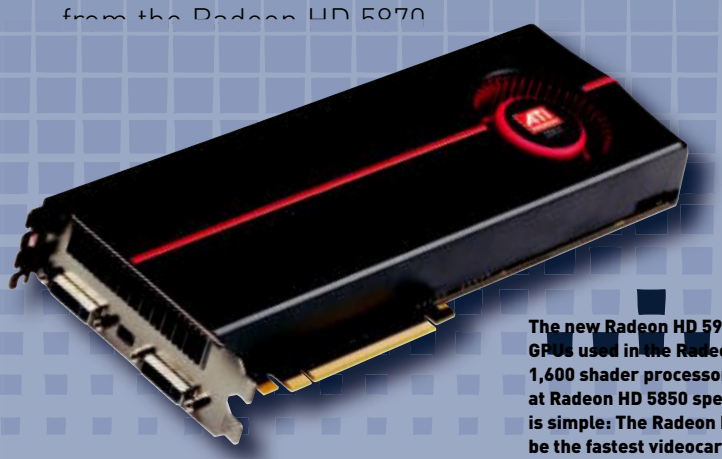
Intel will pay rival AMD $1.25 billion to settle a long-running antitrust suit between the two chip companies. As part of the settlement, AMD will drop its suit against Intel as well as withdraw its complaints with regulators.

The suit, filed in 2005, alleged that Intel used rebates, incentives, and its market power to essentially lock AMD out of PC OEMs. Intel denied any wrongdoing as part of the settlement but said the risks of going to a jury trial posed a far greater penalty than the payout it was making.

The payout follows a record $1.45 billion fine imposed on Intel by the European Union for violating European antitrust laws, and another antitrust action filed by New York state's Attorney General. It's not clear how the settlement will impact the New York suit. –GU

ATI Kicks Its Own Ass!

Introduces the Radeon HD 5970 to take speed crown... from the Radeon HD 5870



The new Radeon HD 5970 sports two of the GPUs used in the Radeon HD 5870 (that's 1,600 shader processors, people!) clocked at Radeon HD 5850 speeds. The upshot is simple: The Radeon HD 5970 should be the fastest videocard ever. (Check our full review at MaximumPC.com or in next month's issue!) –WS

BYTE RIGHTS

Ruining the Party

I'm going to say something I don't get to say enough: Copyright can be great. It can provide a living wage, spread knowledge, and even sometimes enhance art. It gives us Open Source, viral art, and countless creative works that would have died in the desk job. Many of the worst uses of copyright are actually misuses, deceptions, and hustles. They often trade on how confusing copyright is, giving too much power to legally worded nonsense meant to squeeze money or restrict use that's all bark and no legal standing.

There are so many bogus claims out there, high and low. Even the notice on the White House's Flickr stream says pictures are posted "only for publication by news organizations and/or for personal use printing by the subject(s).... The photograph may not be manipulated in any way...." It's nice they tell you why they posted it, but they're not telling you what you're allowed to do with it. The license link on the same page explains that all intellectual work of the U.S. government is "not subject to copyright in the United States and there are no U.S. copyright restrictions on reproduction, derivative works, distribution, performance, or display of the work." You're allowed to put horns on Obama's picture and march down the street with your derivative work claiming he turns into a lizard at night and eats janitorial staff. You'd only be violating the laws of common sense.

The most pernicious bogus claims aren't ever seen by the public; they're misused to damage individuals and businesses by knocking them offline. According to a report that Google provided to the New Zealand government, more than half the DMCA take-down notices that the search giant receives are from businesses targeting their competition, and then another 37 percent of those aren't valid copyright claims at all, much less ones that check out legally. These days, the DMCA take-down is largely a dirty-tricks tool. It's too bad that copyright, which can do so much good, is becoming such a hustler's tool that we might almost be better off without it.

Quinn Norton writes about copyright for Wired News and other publications. Her work has ranged from legal journalism to the inner life of pirate organizations.

THE LIST

8 Things Killed by the Internet

8 ENCYCLOPEDIA SALESMEN

7 NEWSPAPERS

You don't have to pull your ebook reader out of the bushes, and it doesn't get ink on your hands.

BULLETIN BOARDS

6 For sale: one cork bulletin board, gently used.

VIDEO RENTAL

5 Who's smirking about late fees now?

4 FAXING

It's dead, but you can simulate curled paper by holding printer paper over a steaming pot.

3 YELLOW PAGES

Let your fingers do the walking... to your keyboard.

2 CHECKS

Hardly a loss, since no one can write long-hand anyway.

1 STAMPS

Jelly Belly's stamp-glue flavor actually originated from the postal system.

This month the Doctor tackles...

My PC Is Overheating

This Side Up

Virtual XP on Win7

Overheated Pentium 4

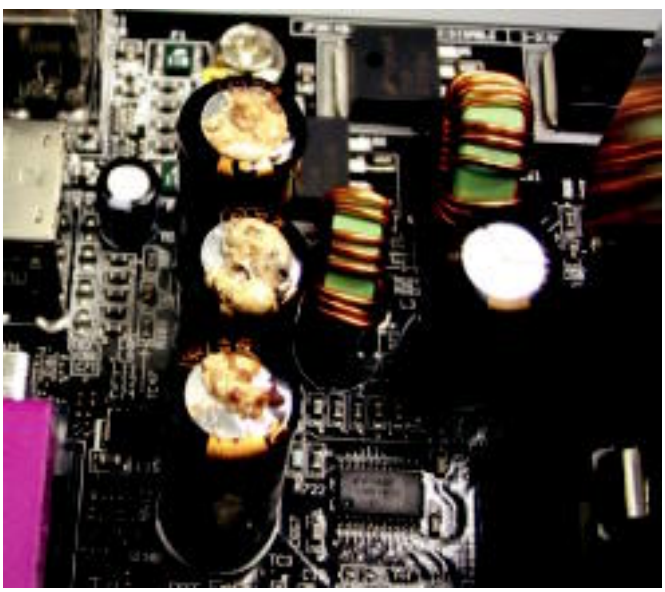
My 5-year-old computer—Windows XP, 2.4GHz Pentium 4, Antec server case, 430-watt PSU, Seagate HD, and two 256MB Corsair DIMMs in an Asus P4P 800 Deluxe motherboard—no longer boots. It was fine until the day my son used it without opening the door to the cabinet that it's stored in. Now when I try to start it, I get an error saying "CPU Test Failed" and the machine won't boot. I've switched the CPU out with a known good 2.8GHz Pentium 4 (tested in a second PC), to no effect. I have no way of checking the RAM as the second machine we have uses different RAM. Is there a way to check the motherboard? Or is there a way to check the power supply with a multimeter? I'm on a very tight budget so I'm going as cheap as possible.

—Harry

In the Doc's experience, Asus's "CPU Test Failed" error message seems to be a catch-all for any CPU-related problems, including power, RAM, and cooling issues.

Since you know the second CPU is good, we'll look for the fault elsewhere. The Doc's guess is the PSU. A 5-year-old PSU when suddenly stressed-out with heat could very well fail. You could use your multimeter to look at each of the power rails (12 volt, 5 volt, and 3.3 volt) to see if anything is out of order. But it may be easier to swap the PSU from the second machine into the first one to see if it boots.

The other possibility is bad capacitors. The vintage of the board puts it right in the time period when the industry was using capacitors with a faulty electrolytic formula. That's a story in itself, but for now, open up the case, grab a good flashlight, and look closely at the capacitors on the board (check the picture to see what to look for). If any of the caps are bulging or leaking, you likely have a failed capacitor. Usually bad capacitors result in a failure to boot or POST. You can actually buy replacement caps but you need to be handy with a soldering iron if you're going to attempt a repair. It's probably more cost- and time-effective to replace the whole motherboard—though by this point, given the age of the machine you're working with, it might be time for a whole new computer.



If the capacitors on your motherboard are bulging or leaking, they're bad. You either need to replace the capacitors (difficult) or the board (expensive).

Backing Up Files for Upgrade

I need to back up my files in anticipation of upgrading my rig from 32-bit Windows XP to 64-bit Windows 7. I don't own an external hard drive and can't afford to buy one (being a poor college student). I do, however, have a rig with two hard drives. If I were to transfer my files onto one drive and reformat the other with Windows 7, would the new OS be able to recognize the old drive and give me access to my files?

—Rhys Pygall

Yes, you can transfer your files to the other hard drive. In fact, due to the way Windows sets permissions, you'll definitely want to do that: Transfer your files to a disk other than the one you're upgrading. If you try to access a My Documents folder from an old install with a new version of Windows, you'll probably lack security permissions. We've covered how to get your permissions back in this column before, but it's easier to just bypass the issue by using a separate drive, like you're doing.

SUBMIT YOUR QUESTION Are flames shooting out of the back of your rig? First, grab a fire extinguisher and douse the fire. Once the pyrotechnic display has fizzled, email the doctor at doctor@maximumpc.com for advice on how to solve your technological woes.

Get Right

Does the orientation of a hard drive correlate to its life expectancy? With a series of lovely grinding sounds, the 750GB Seagate hard drive in my Thecus NAS failed and all data was lost. The hard drive only lasted a little more than two years. The NAS (and thus the hard drive) stands upright, but in most desktops the hard drives lie flat. So, does the orientation effect the hard drive's life expectancy? Are they manufactured to operate lying flat, upright, or does it matter?

—Pete Gallagher

Pete, all the major hard drive manufacturers say that mechanical hard drives are built to work horizontally, vertically, or in whatever orientation you can dream of. After all, enterprise servers often have racks and racks of vertically mounted hard drives that work with no problems. That said, the only reason we've found that upright enclosures (like in a NAS or external hard drive) could fail more quickly is because they're more prone to falling over. We've ruined more than a few hard drives by knocking their enclosures over while they were running. But if you are less clumsy than we are, and manage not to knock yours over, it should last just as long whether it's upright or lying flat.

WE'VE RUINED A FEW HARD DRIVES BY KNOCKING THEM OVER WHILE THEY WERE RUNNING

Virtualization in Win7

I want to buy a new CPU, one that will support new features like hardware virtualization. Before I move to Windows 7 from Windows XP, I wish to find out if its Windows XP Mode will work for my 32-bit programs under the 64-bit version of Windows 7. Has anyone even tested this?

—Mitch Miller

Mitch, Windows XP Mode, the virtual XP install that you can use in Windows 7 Professional and Ultimate, is 32-bit. And you won't be able to use hardware 3D acceleration in Windows XP Mode. But you shouldn't need to resort to virtualization to run most of your 32-bit apps; they should run just fine on 64-bit Windows 7. Windows XP Mode is only for apps that won't run natively at all on Windows 7.

For apps that *will* run, but aren't optimized for Windows 7, use the Compatibility tab (right-click the application and select Properties, then the Compatibility tab) to use Windows XP settings.

Crap Removal

What program do you recommend to clean up registry errors? I tried the new Norton Utilities, and it won't fix all the errors it finds, even in safe mode.

—Vade Forrester

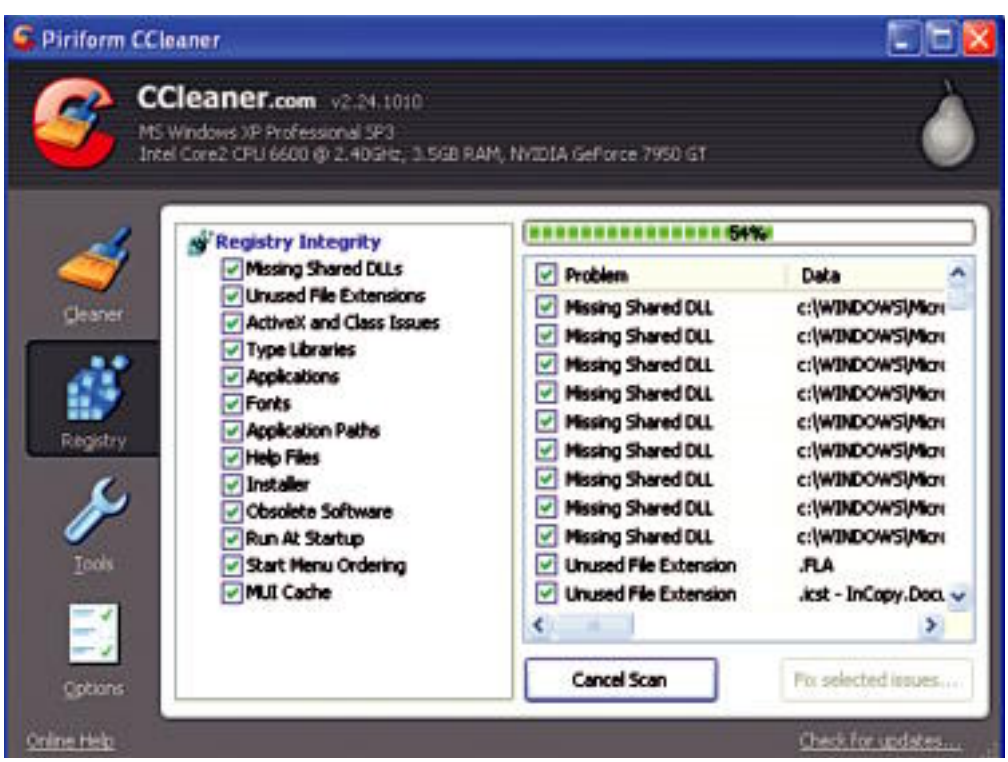
We like CCleaner (www.ccleaner.com), Piriform's freeware crap-removal tool. Its registry cleaner does a bang-up job. Many of our readers swear by Comodo Registry Cleaner (http://system-cleaner.comodo.com), as well. We should note, however, that cleaning your registry won't necessarily speed up your computer, but it can fix errors, compatibility issues, remove old Start Menu items, and tidy up your file associations.

Vexed by Really Slow Startup

I built a new Core 2 Quad Q9400 machine on an Asus P5Q Deluxe board with 4GB of Corsair DDR2, a 74GB Raptor, and a GeForce GTX 260. The problem is that it starts up really slowly. The rig will POST and go through hardware boot but right before the Windows XP logo comes up, I get a black screen for seven to eight minutes. On occasion it will start up right away, but about 80 percent of the time, it has the delay. It also takes five minutes to shut down even after using a registry hack to kill apps faster.

—Adam Sorich

Slow startups in Windows XP are difficult to diagnose without more information, but there are a few things you should look at: First, download the latest BIOS and chipset drivers for your motherboard from Asus's website and install them. If that doesn't fix the problem, remove all of your USB devices (except keyboard and mouse) and see if you can replicate the issue. Perform a chkdsk of the drive to see if drive corruption is causing the issue. Also, check your machine for malware, which could be slowing you down. Install and run Windows



CCleaner includes a powerful registry-cleaning utility that we've found works wonders.

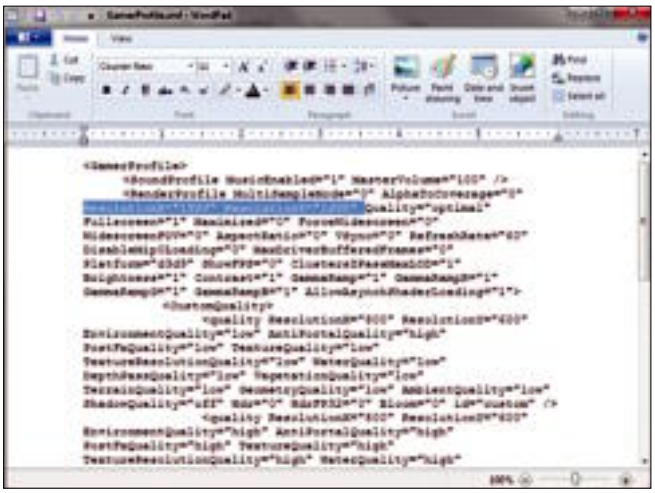
Defender. We also recommend Malwarebytes' Anti-Malware (http://malwarebytes.org), Super Antispyware (http://superantispyware.com), and A2 Free from (www.emsisoft.com). All of the above apps have freeware options. If all else fails, you're probably going to have to back up your data, and do a clean install of Windows.

Resolution: Cry Farther

I'm having a problem with my default resolution when running Far Cry 2 in DirectX 10 mode. When I run Far Cry 2 in DirectX 9 everything seems to be OK, when I select DirectX 10 mode, the display expands to what looks like 860x600. I'm running the Asus PT6 Deluxe Motherboard, Intel Core i7 920, 12GB of DDR3, and Windows Vista x64. I have two ATI Radeon 4870s in CrossFire, running a Dell 24-inch LCD at 1920x1200 resolution. I'm using the latest ATI Catalyst Control and driver in CrossFire mode. What could be causing the problem?

—Bob Guadagno

If updating your Catalyst drivers doesn't do the trick (and you should double-check to make sure you really have the latest ones installed), you can fix this manually. You can set your default resolution by editing an XML file. Assuming you used the default install options, go to C:\Users\[Username]\Documents\My Games\Far Cry 2, then look for a file called GamerProfile.xml. Open it with a text editor like Notepad. You'll see options labeled ResolutionX and ResolutionY; change those to reflect your desired resolution. In your case, you'll probably want ResolutionX to be 1920 and ResolutionY to be 1200. Save the file and exit, then try starting Far Cry 2 in DX10 mode.



If your preferred settings aren't sticking, sometimes the best thing to do is manually edit a config file. In this case, we're manually setting the resolution in Far Cry 2.

The Best of 2009

The hot gear, tech, people, and events that shaped an incredible year

A lot has happened in the last 12 months. At the start of the year, iTunes was still peddling DRM, Yahoo and Microsoft were at bitter odds over the latter's takeover attempts, Nvidia had the fastest consumer videocard, and the "cloud" was still a burgeoning concept. Oh, how times have changed. Follow along as we relive and reflect upon some of the most memorable moments to impact computer users over the last year.

BY THE MAXIMUM PC STAFF AND PAUL LILLY

100 Best All-in-One Liquid Cooler: Corsair Cooling Hydro Series H50

Air cooling not doing enough for you? Water cooling too complicated? All-in-one liquid-cooling solutions are popping up like daisies, and our favorite is the Corsair H50. Quieter and less complicated than the competitors, it delivers performance surpassing the best air coolers for just a little more moolah. Factor in an easy install and this is a no-brainer.

99 NEW JERSEY RESIDENT FIRST TO BE ARRESTED FOR DOMAIN NAME THEFT

On August 3, Daniel Goncalves, a 25-year-old computer technician, allegedly hacked an email account, stole login information, and falsified PayPal transaction records in an elaborate scheme to claim ownership of P2P.com, a domain valued at $160,000.

98 Samsung Demos Awesome 24-SSD RAID

You'd have to be crazy to build a 24-drive RAID array. Crazy like a fox, as Samsung showed us when the company strung together 24 SSDs to create 6TB of solid state storage, with a theoretical throughput of 2GB/s. The video of the escapade got more than 2.6 million views, and even though the drives weren't all technically on the same controller (two RAID controllers along with all of the motherboard's onboard ports were used), it proved that SSDs are serious business.

97 Vandals Sever Fiber Optic Cables in Silicon Valley—Disconnect Many

96 WALT MOSSPUPPET IS THE ONLY TECH JOURNALIST IN THE WORLD

ggworks Studios' plushy impersonation of the *Wall Street Journal*'s technology columnist is the best fake tech luminary since Fake Steve Jobs. In a series of web videos, the egomaniacal puppet slurs angry rants about Microsoft and ogle while unabashedly praising Apple—often while inebriated.

95 PIRATED WOLVERINE MOVIE A HUGE HIT A MONTH BEFORE ITS THEATRICAL RELEASE

MARVEL.COM

94 Woman Arrested under New Cyberbullying Law Missouri citizen Elizabeth Thrasher took her vendetta too far by posting a fake "Casual Encounters" Craigslist ad for a 17-year-old girl. Because a recent law made cyberbullying a criminal offense, Thrasher was arrested on felony charges.

93 Facebook and Twitter Worth $12 Billion Through several rounds of funding, two of the fastest-growing social networking hotspots on the web came to be worth almost $12 billion combined.

92 Google Shocks Android Mod Community with Cease and Desist Order Google threatened popular Android ROM developer Cyanogen with legal action because he included some proprietary Google apps—like Market, Gmail, and YouTube—in his ROMs.

91 Best GPU before the Radeon HD 5870: Nvidia GeForce GTX 295 With a pair of GT200 GPUs, each boasting 896MB of GDDR3 memory, and a sexy black plastic enclosure, the GTX 295 sat atop our high-end GPU recommendation, at least until ATI launched the Radeon HD 5870.

90 AT&T Charges Bears Fan $28K for Watching a Football Game While waiting for his cruise to depart from Miami, Wayne Burdick watched the Bears defeat the Lions on his laptop, but because he connected to an international roaming signal, Burdick was charged $28K for the pleasure. Ouch!

89 OPENID GETS ITS BIGGEST BACKER IN FACEBOOK

88 BellKor's Pragmatic Chaos Takes Netflix Prize After an intense battle to claim the $1 million dollar prize for improving Netflix's movie recommendation system, a multinational team of researchers known as "BellKor's Pragmatic Chaos" eked out the win in a photo finish worthy of the movies.

87 Sun Rejects IBM's Buyout Offer, Goes with Oracle Instead IBM nearly acquired Sun for about $7 billion, but Sun, fearing Big Blue would back down in the face of an antitrust review, gave IBM the cold shoulder. That allowed talks to heat up with Oracle, who swooped in and bought Sun for $7.4 billion.

86 Best Blu-ray Burner: Pioneer BDR-2203

85 Seagate First to Ship Super-Fast SATA 6Gb/s Hard Drive With an eye toward the future, Seagate released the world's first hard drive built around the emerging SATA 6Gb/s interface.

84 Judge Voids Uniloc's Record $388 Million Patent Ruling Against Microsoft Security firm Uniloc won a record-setting $388 million patent-infringement suit against Microsoft in 2007, but the activation-patent lawsuit was overturned in a U.S. federal court this year. According to the judge, the jury "lacked a grasp of the issues before it."

83 OnLive Ushers in Gaming on Demand Services The cloud isn't just used for storing data anymore; it could be your next game console. OnLive is an upcoming service that promises high-resolution, latency-free gaming streamed over a broadband connection. We're still waiting for these services to go live before we believe the hype.

82 GeoCities Expires, Hardly Anyone Notices

81 Microsoft and Yahoo Bury the Hatchet and Sign Search Deal Microsoft's rocky relationship with Yahoo took a turn for the friendly when the two sides hashed out a long-term search partnership.

80 Best Mid-Tower Case: Silverstone Fortress

79 U.S. Nuke Secrets Posted Online A "sensitive but unclassified" report listing all U.S. civilian nuclear sites and other related details was accidentally posted on a government website long enough for whistle-blower site Wikileaks to mirror the 18MB PDF. Oops.

78 RealDVD Case Drags On in Court As the RealDVD copying case moves closer to a jury trial, RealNetworks has been ordered to halt sales of the software. In retaliation, the company amended its lawsuit against several major movie studios to include complaints of antitrust violations.

77 Amazon Tax Stands Up in Court, but the Fight Continues A New York Supreme Court judge in January sided with the state of New York, declaring Amazon must collect sales tax from New York state residents. Amazon has been lobbying to have the law overturned.

76 Nigerian Police Put the Smackdown on Hundreds of Fraud Sites We're not sure which is more shocking, that people still fall for Nigerian scams, or that Nigeria has an anticorruption agency. Both are true, and in late October, Nigerian officials eradicated 800 scam sites from the web and arrested members of 18 high-profile crime syndicates.

75 Congress Characterizes P2P as Dangerous, Especially LimeWire Don't use P2P software, and steer clear of LimeWire, warned the U.S. House Committee on Oversight and Government Reform. To drive the point home, the agency said it unearthed thousands of sensitive documents from computers connected to the service.

74 Wall Street Journal Plots a Pay-as-You-Read Business Model As the newspaper industry struggles to retain subscribers and ad revenue, the Wall Street Journal announced a plan to charge per-article, which should be in effect by the time you read this.

73 Font Fanatics Freak Out over Ikea's Typeface Change Swedish furniture store Ikea invoked the wrath of font enthusiasts far and wide when it switched from a customized version of Futura to Verdana for its 2010 catalog. What's the big fonting deal?

72 Jammie Thomas Loses Battle against RIAA After a two-year ordeal that involved two separate federal trials, Jammie Thomas, the only accused music file-sharer taken to court by the RIAA, was found guilty by a jury and ordered to pay $1.92 million dollars for sharing 24 songs.

71

BEST TERABYTE DRIVE: SEAGATE BARRACUDA 7200.12 1TB

The Barracuda was the first two-platter terabyte drive to come to market, and its kick-ass performance won it instant acclaim. With sustained reads and writes near 100MB/s and a price below $150, it was the drive to get if you could only get *one*. We'll still take it.

70 BEST AIR COOLER: COOLERMASTER HYPER 212+

69 Microsoft Decides Not to Gimp Windows 7 for Netbooks Pairing Windows 7 with the hottest-selling PC segment had all the makings of a beautiful marriage, but only if one doesn't seek to change the other. Microsoft put those fears to rest by confirming it would not force vendors to install feature-stripped versions of Windows 7 for netbooks, like it did with Vista.

68 Red Hat Beseeches Court for Ban on Software Patents Claiming that "software patents form a minefield that slows and discourages software innovation," Red Hat petitioned the Supreme Court to ban the process entirely.

67 JULIUS GENACHOWSKI: THE PEOPLE'S FCC CHAIR Preaching open competition, network neutrality, transparency, and caution over media consolidation, FCC Chairman Julius Genachowski is seen as a breath of fresh air by public interest groups.

66 Google Books Settlement Sparks Outrage (and an Investigation) To scan or not to scan? Ultimately, Google decided 'twas nobler to scan and suffer the slings and arrows of Open Book Alliance members, but it still had to answer to the DoJ, which opened a formal investigation into the $125M Google Book settlement over antitrust concerns.

65 Circuit City Shuts Down, Reincarnated as an Online Entity

64 Facebook's Entourage Outnumbers MySpace in the U.S. Even though Facebook claimed more global visitors than MySpace in 2008, the latter remained more popular in the United States. That all changed in May 2009 when Facebook pulled ahead by about 1,000 visitors and never looked back.

63 Comcast Plays Internet Killjoy and Throttles U.S. Internet Users

62 Digsby Dupes Users into Donating Spare CPU Cycles People were pretty pissed when they found out their favorite instant-messaging client had betrayed their trust by tapping into spare CPU cycles for profit. The developers quickly responded with a new version that was more up-front and did away with most of the adware that plagued previous releases.

61 Nvidia Kills PhysX for ATI Users; Users Turn it Back On When a driver update disabled PhysX acceleration for folks rendering games with ATI cards, users were naturally upset. At least, until NGOHQ.com forum user GenL posted a patch that disables Nvidia's disabling patch. Way to go, GenL!

60 Microsoft Opens First Retail Store, Ashley Tisdale Performs Consumers lined up overnight to be the first to set foot in Microsoft's first retail store, which opened on October 22 in Scottsdale, Arizona. Or maybe they just couldn't wait to hear the musical stylings of Ashley Tisdale, who was hired as the evening's live entertainment.

58 Wikipedia Claims Another Victim (Encarta is Dead)

59 FACEBOOK AMENDS ToS TO OWN USER CONTENT, IMMEDIATELY REVERSES AMENDMENT

57 Augmented Reality Calls Out the Shortcomings of Regular Reality Today's augmented-reality apps overlay restaurant reviews on maps; tomorrow's will tell you everything you want to know about a person as soon as you meet them.

56 eBay Hangs Up on Skype, Sells 65 Percent Stake eBay's expensive Skype purchase never worked out the way the auction giant hoped, so it sold 65 percent to a group of investors.

55 AT&T's 3G Network Blows—J/K, It SUCKS! While riding a high wave of iPhone sales, AT&T's 3G network couldn't take the load, delaying core iPhone features—including MMS and tethering—in the U.S. market. Slow data transfers, spotty connections, and dropped or missed calls plagued many U.S. users.

54 Best Soundcard: Asus Xonar STX Soundcard If you think soundcards are dead, the Asus Xonar Essence STX is a PCB-mounted zombie ready to grab you by your wax-filled ears. That's just what this headphone-optimized soundcard will do to non-believers.

53 No One Cares About 3D Glasses With both ATI and Nvidia delivering 3D shutter-glass technology to gamers, it looked poised to take off. Unfortunately, the tech didn't resonate with gamers—either due to the lack of monitors that support a 120Hz refresh rate, or the fact that the glasses make you look like a tool.

52 Google Captains Failboat, Leaks Users' Docs, Labels Internet Malware We're all prone to occasional moments of mental ineptitude, and in 2009, Google had two of them. First, the company inadvertently shared some users' private documents, and then it mistakenly tagged every search result with a malware warning.

51 Texas Judge Bans Microsoft from Selling MS Word The software maker allegedly messed with a Canadian company's XML patents, which explains why a Texas judge ordered MS to stop selling its popular productivity app. Microsoft was given 60 days to comply with the surprise order, but a month later received a temporary stay from an appeals court.

50 Oops! Microsoft Breaks the Web with IE8 Microsoft made a concerted effort to improve web standards compliance in Internet Explorer 8, but it didn't take into account all the web pages that had been designed with workarounds for previous versions of IE.

49 BEST NETBOOK: ASUS EEE 1000HE

The Asus Eee 1000HE was the first netbook of 2009 that did everything right. An Atom N280 chipset, great keyboard, excellent battery life, and easy access to the RAM and hard drive made this the netbook to beat.

48 GEEK OF THE YEAR: J.J. ABRAMS Believe it or not, *Star Trek* is cool again. And we can thank J.J. Abrams, the creator of the geek-adored *Lost*, for that. Abrams's incredibly successful reboot of our most beloved science fiction franchise (complete with the original's spirit of adventure and faux-science roots) earns him the title of 2009's Top Geek. Mr. Abrams, you are officially forgiven for your screenwriting credit on Michael Bay's *Armageddon*.

44 Barnes & Noble Announces Potential Kindle Killer Laugh at the name, but Barnes & Noble's dual-screen nook is the first ebook reader to present a legitimate challenge to Amazon's Kindle. It's the first Android-powered ebook to emerge, and the only one to allow users to lend out purchased books.

43 Best Hard Drive: Western Digital Caviar Black 2TB Whoomp, there it is: The 7,200rpm Western Digital Caviar Black 2TB was the first performance-oriented two-terabyte drive. With reads and writes topping 112MB/s, the Caviar Black beats all magnetic hard drives that came before—even the VelociRaptor.

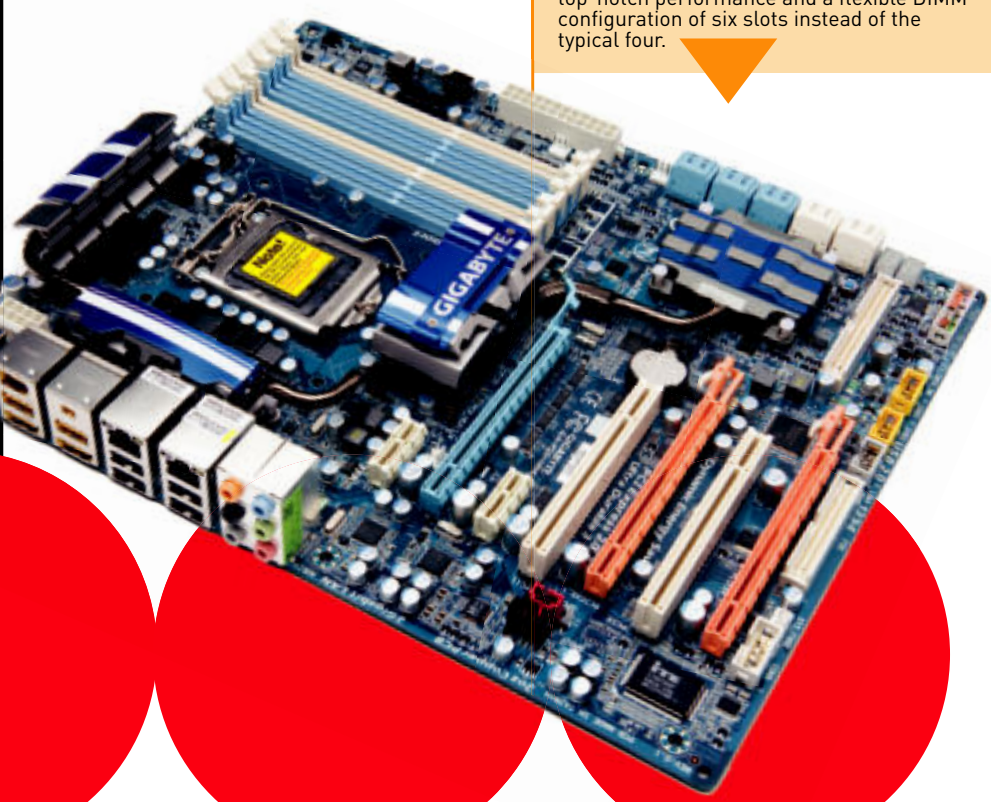
47 PRICE GAP BETWEEN DDR2 AND DDR3 DISINTEGRATES

46 Larrabee Demoed, Then Delayed Was 2009 the year of Larrabee? Not so much. While we expected 2009 to bring the first tidings of Intel's massively parallel x86-based GPU, there was nary a peep on the new architecture. Aside from a brief demo at the fall Intel Developer Forum, we await word on the future of Intel's upcoming GPU.

45 HD Video Gets Cheap (and Small) The only thing better than creating a viral video of your roommate getting Tasered by the campus police is capturing it in high-def for the world to see. Thanks to pocket cams such as Flip's MinoHD, Kodak Zi6, and Creative's Vado HD, shooting 720p video is cheap and easy.

42 Nvidia Brings Kick-Ass 3D to Embedded Nvidia's new ARM-based system-on-a-chip Tegra delivers the type of performance you expect on a PC to the small, power-sipping devices that fit in your pocket. First appearing in the Zune HD, Tegra should power lots more devices next year.

41 BEST P55 MOTHERBOARD: GIGABYTE GA-P55-UD6 Gigabyte's GA-P55-UD6 has survived multiple LGA1155 challengers—even arch enemy Asus—to prevail as our favorite budget-badass board. Besides lickity-split boots, the board offers top-notch performance and a flexible DIMM configuration of six slots instead of the typical four.



40 Awesome Dropbox App Changes the World You want to know why Dropbox is better than crack? Because sharing has never been simpler. Just drag and drop a file into a special folder on your computer and Dropbox will encrypt it and whisk the file to the cloud for easy access from any PC you install the client on. How'd we ever live without this?

39 Google Announces Chrome OS (It's for netbooks!)

38 Conficker Worm Scares the Crap out of Everyone In March, panic swept across the Internet as the highly sophisticated Conficker worm spread to millions of PCs. The question on everyone's mind was, "What the flip is Conficker up to?" Even to this day, nobody really knows for sure. Well, nobody except for its devious authors.

37 BEST GAMING MOUSE: LOGITECH G9x Take a super-smooth 5,700dpi laser sensor, set it to sample 1,000 times every second, and then put that sensor into a mouse that lets you swap profiles on the fly, without installing any software. That's exactly what Logitech did with the G9x, and that's exactly why we love it.

36 Microsoft Finally Admits Linux Is Competition

35 Most Interesting Case: Thermaltake Level 10 We were stunned in October, when the Level 10 concept case arrived, in full retail packaging. Eschewing the standard box design, the Level 10 sports a central support pillar with many component boxes hanging from it. At $700, it's a status symbol, but we gotta give Thermaltake credit for thinking... (wait for it)... outside the box.

34 Steve Jobs Takes Leave of Absence, Returns with New Liver

33 Mozilla Releases Its Fastest Firefox Browser Ever It took several delays, beta releases, and even a version-number change, but Mozilla finally cut the ribbon on Firefox 3.5. The latest release ushered in a huge performance boost and a bunch of new features, like Private Browsing and augmented video.

32 Best Sub-$100 Quad-Core: Athlon II X4 620 The $99 Athlon II X4 620 quad-core gives every American the right to encode video in a quarter of the time it took on a Pentium 4. This CPU is such a performance triumph for the masses that you should fire up an MP3 of "Battle Hymn of the Republic" while you build your new machine.

31 Data Disaster Strikes T-Mobile Sidekick Microsoft took the heat when a massive computing outage at the company's Danger subsidiary left Sidekick owners with no way to access their contacts and other data. Thankfully, most of the missing data would later be restored.

30 First SuperSpeed USB 3.0 Controller Chips Ship

29 BEST EBOOK READER: KINDLE Sporting the perfect combination of long battery life, a stupid-easy purchase and download process, an eyeball-friendly E Ink screen, and a svelte 10.2-ounce package, Amazon's second-generation Kindle captured our hearts. Sure, there may be sexier ebook readers on the horizon, but the rousing success of the Kindle paved the way for all others.

28 BEST SSD: PATRIOT TORQX 128GB One of the first SSDs to come equipped with the powerful Indilinx Barefoot controller, the Patriot Torqx offers 200MB/s-plus sustained reads and 175MB/s sustained writes, and supports the TRIM command. After a rash of stuttering, slow first-gen SSDs, the Torqx was the first SSD we tested that actually competed with Intel's previously dominant X-25M series.

27 AT&T Tests Metered Broadband, Public Freaks Out

26 Microsoft Gives It to Apple in Laptop Hunter Ads By handing normal folks a wad of cash and a strict budget for buying a laptop, Microsoft both struck a chord with Windows fans and hit a nerve with Apple, which cried foul over the high prices for Macs portrayed in the ads.

25 Microsoft Organizes Massive Windows 7 Beta/RC Campaign Following the poor reception of Vista, Microsoft launched the first public beta for a Microsoft operating system we can recall. And demand for the nascent OS was frenetic, resulting in more than 2.5 million downloads of the beta and even more of the release candidate.

21 Seagate Borks Barracuda Drive, Then Botches Firmware Fix Seagate screwed the pooch with a relatively small number of its 7200.11 Barracuda drives, which were prone to lockups and other quirks. Even worse, the first firmware "fix" bricked the drives it was intended to cure. Seagate eventually fixed the problem, but by then the damage was done.

20 Nvidia Whiffs in 2009 Besides offering no new consumer graphics cards to compete with ATI's Radeon HD 5870, Nvidia also found itself in full retreat on the chipset front. Legal battles with Intel prevented development of both LGA1366 and LGA1155 chipsets, and the GPU giant is unlikely to offer newer chipsets for AMD's platform either.

24 HARD DRIVES REACH 2TB MAXIMUM CAPACITY

23 Nvidia Launches Ion Conventional wisdom says that gaming and high-definition video simply won't work on three-pound notebooks. Not true, says Nvidia, with the launch of the Ion chipset for netbooks and other mobile devices. Ion puts a decent DirectX 9–era GPU on systems that would otherwise suffer the wrath of woefully underpowered integrated graphics.

22 Palm Pre Hype Sizzles, Then Fizzles Hardly the iPhone killer we hoped it would be, the Palm Pre struggled to find relevance in an increasingly crowded smartphone market. With just a handful of applications available at launch and Sprint exclusivity, we wonder how long Palm can last.

19 Microsoft Flips a Four Letter Word at Google Launched two days ahead of schedule, Bing blasted onto the search-engine scene as the world's first "decision engine." Rebuilt and rebranded, Bing reinvigorated Microsoft's presence as a search player and surprised many skeptics, but barely made a dent in Google's market share, instead poaching searchers from Yahoo.

18 Android Anointed as Main iPhone Competitor Just when Apple's iPhone looked like it would forever crush the competition, Google's Android platform emerged as the new kid everyone wanted to meet, thanks to a combination of open APIs and Google's strong brand recognition. The only thing missing is a killer handset to steal the hearts of iPhone users.

17 BEST PORTABLE MEDIA PLAYER: MICROSOFT ZUNE HD

After essentially ceding the portable-media-player space, Microsoft made a triumphant comeback with the Zune HD—a product capable of going toe-to-toe with the inveterate iPod. The Zune HD's combination of a spiffy OLED screen, listener-friendly interface, and amazing battery life proved Microsoft has what it takes to produce a damned fine media player, and even teach Apple a thing or two in the process.

16 PIRATE BAY FOUNDERS SAIL INTO COURT, LEAVE WITH $3.6M GUILTY VERDICT

15 Multitouch Mania Takes Over the Nation Credit the iPhone for popularizing multitouch, but remember 2009 as the year multitouch extended its reach into all kinds of devices, from trackpads to monitors to mice. With official multitouch support in Windows 7, it's easier than ever for manufacturers to join in the fun.

14 Intel Pays Out Over Antitrust Allegations AMD has long complained that Intel's exclusivity rebates were freezing it out of many markets, but the company finally found a willing ear in the European Union, which fined Intel a record-setting $1.45 billion for anticompetitive business practices. That outcome no doubt influenced Intel's decision to settle a similar suit in the U.S. and give AMD $125 billion.

13 Net Neutrality Debate Turns White-Hot Debate over net neutrality heated up in 2009, but was further fueled when all five FCC members voted to begin writing new regulations that would prohibit broadband providers from acting as gatekeepers over Internet traffic. The proposed rules won't be voted on until mid-2010, but they're available for comment at FCC.gov until then.

12 Tablet Hype: All Talk, No Substance Apple, Microsoft, and many others were supposed to turn the tech world upside down in 2009 with hand-held touch-screen tablet PCs. Despite all the rumors, sexy 3D mock-ups, and leaked launch dates, not one of the products saw the light of day. Will 2010 be any different?

11 Nvidia's Fermi Isn't for You—Yet Want to know what Nvidia has cooking to compete with the Radeon 5870? So do we. While the company publicly unveiled its next GPU at its own GPU Technology Conference—a multi-day affair for folks into massively parallel computing—it said nary a peep about the next consumer offering, other than, "It's coming." We do know that Fermi is a massive GPU—2 billion transistors—and that it will support DirectCompute, OpenCL, and CUDA.

10 OPENCL AND DIRECTCOMPUTE PROMISE TO TAKE GPU COMPUTING MAINSTREAM

9 There's an App (Store) for That The hottest platform for software developers isn't the PC, Mac, or even a gaming console—it's the cell phone. In the past year, mobile app development has ballooned at an astounding rate: The iPhone's app store boasts more than 100,000 apps and Android's includes another 10,000. The app marketplace has become such a critical component of a mobile OS that it can make or break a phone (see Palm Pre and Windows Mobile).

7 The Cloud Looms Large Consumers are realizing what corporate offices have known for years—remote storage and computing is safe, easy to use, and convenient. This year, new web applications and cloud storage services became not only practical supplements to desktop programs, but reliable alternatives as well. Dropbox, Zoho documents, and Gmail aren't novelties anymore—they're essential components of our daily computing experience.

8 STEVE BALLMER STEWARDS MICROSOFT INTO A NEW ERA In the first year since Bill Gates's departure from day-to-day operations at Microsoft, Steve Ballmer has stepped up to the plate to deliver several wins for the software giant. From a commanding CES keynote (in which he announced the Windows 7 public beta) to the critical success of the new operating system and the Zune HD, Ballmer's Microsoft seems poised to bounce back from foibles like Vista and IE 7. Ballmer also didn't disappoint with bold quotes in 2009, dismissing Chrome and Safari as mere "rounding errors" and declaring Linux more dangerous than Apple.

6 IPHONE SETS THE BAR FOR SMARTPHONE EXCELLENCE

Despite a seemingly boring hardware refresh (in the form of the iPhone 3GS), the iPhone as a platform dominated the minds of the tech elite in 2009. Facing off against classic competitors—Blackberry and Windows Mobile—as well as new contenders in the form of Google's Android and Palm's WebOS, Apple continued to build market- and mind-share by adding support for corporate users, adopting push apps, and fostering the growth of the App Store.

5 DRM is Dead (at Least for Music)!

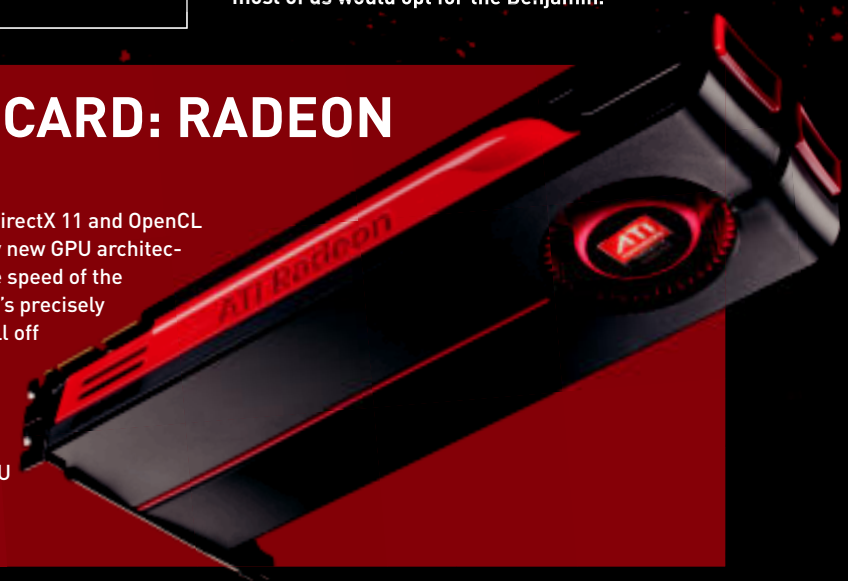
It certainly wasn't news to consumers, or even to the major record labels, that music DRM has been nothing but a big bowl full of wrong, but this year even the RIAA was forced to retreat from its stance on embedded copy protection. Once Apple removed the shackles from music sold on its iTunes store, joining every other major digital-music retailer, the recording industry trade group finally fell in line, no longer insisting that "DRM serves all sorts of pro-consumer purposes."

4 Best Mid-Priced CPU: Intel Core i7-860

Think of Intel's LGA1156 "Lynnfield" Core i7 as getting a shiny new—and fast—CPU with a crisply folded $100 bill in the box. Complete with enhanced Turbo modes, on-die PCI-E, and a full eight threads exposed to the OS, the CPU supports more affordable mobo and RAM choices than its pricier LGA1366 cousin. These days, most of us would opt for the Benjamin.

3 BEST VIDEOCARD: RADEON HD 5870

Fancy new technologies—like DirectX 11 and OpenCL support—are de rigueur for any new GPU architecture, but clocking in at twice the speed of the previous generation is not. That's precisely the feat that ATI managed to pull off with the Radeon 5870, doubling the performance of the company's last-gen parts in every benchmark that matters, and even dominating some dual-GPU boards—all with an incredibly low idle power of 27W.



2 Twitter Hits Big

In the past year, Twitter went from being a nifty micro-blogging tool used primarily by the digitally hip to occupying a place deep within the soft, white underbelly of mainstream culture, thanks in large part to Hollywood himbo Ashton Kutcher. When the Kutch threw down against CNN in a race to 1 million Twitter followers, it was just the sort of serious news every major media outlet feels compelled to follow—ad nauseum. Now everyone from our plumber to our periodontist is tweeting.

1 WINDOWS 7 LAUNCHES—EVERYONE CHEERS

After the long, cold winter that was Windows Vista, PC users around the world rejoiced when Microsoft released Windows 7, and it was good. After a 10-month-long prerelease beta program, Windows 7 mixed the security and new technologies of Vista with the speed of XP and added a newly revamped user interface—to make Windows 7 the best version of Windows yet. The PC faithful once again have an operating system to rally behind.


ASUS
ASUS

ATI Mangles the Competition

We burn up kilowatts testing eight hot new videocards to see why the Radeon reigns supreme

BY LOYD CASE

AMD's recent release of its RV870 GPU line makes the company the undisputed graphics performance leader. The Radeon HD 5870 is the fastest single-GPU graphics card on the market currently. But at roughly $380, it's not inexpensive, so AMD has also rolled out the Radeon HD 5850, 5770, and 5750 cards. All are DirectX 11–capable, at lower price points than the flagship HD 5870.

The HD 5850 uses the same RV870 GPU as the 5870, but with a couple of functional units disabled. Priced at around $260, the 5850 occupies the lower tier of the high-end cards. The recently released 5770/5750 cards use a different chip. Based on the same DirectX 11 architecture as their big brothers, the 5770/5750 are built with 1.04 billion transistors—just slightly more than the 956 million used in the previous-generation Radeon HD 4870/4890 products. Contrast these numbers with the 2.15 billion transistors in the Radeon HD 5870.

Current prices for 5770s are roughly the same as older 4870s, around $150–$160. So the 5770 is firmly positioned as a midrange graphics card.

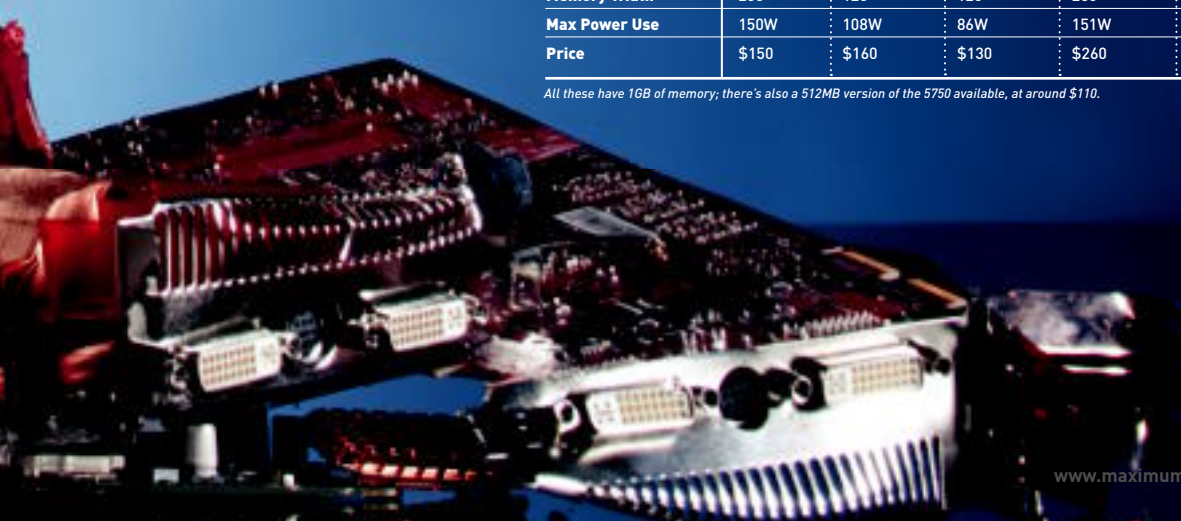
We put eight cards to the test, from six companies: three Radeon HD 5870s, three HD 5850s, one HD 5770, and a factory-overclocked Nvidia GTX 260 from Gigabyte, our token Nvidia card in the mix. We compared each card against the fastest previous single-GPU champ, the EVGA 285 GTX SSC. Our test bed consisted of a 3.3GHz Intel Core i7-975 on an Asus Rampage Extreme II X58 motherboard, 6GB Corsair DDR3/1600 at 1,333MHz, a Seagate 7200.12 1TB hard drive, a Lite-On DVD+/-RW optical drive, a Corsair 850W PSU, and the 64-bit version of Windows 7.

At the start of any new GPU's cycle, board vendors adhere to the reference design, making performance virtually identical among competing cards. This changes as OEMs tweak their designs. Still, as you'll see from our reviews, differences exist in terms of warranty, software bundle, availability, and price.

AT A GLANCE: ATI's NEW LINE OF GPUS

	HD 4870	HD 5770	HD 5750	HD 5850	HD 5870
Stream Processors	800	800	720	1440	1600
Core Clock	750MHz	850MHz	700MHz	725MHz	850MHz
Memory Clock	900MHz	1.2GHz	1.15GHz	1GHz	1.2GHz
Memory Width	256	128	128	256	256
Max Power Use	150W	108W	86W	151W	188W
Price	$150	$160	$130	$260	$380

All these have 1GB of memory; there's also a 512MB version of the 5750 available, at around $110.



XFX Radeon HD 5870

The fastest GPU on the planet combined with a terrific warranty

All of the Radeon HD 5870s reviewed here are essentially identical—they're the fastest single-GPU graphics cards you can buy currently. Out of the box, you get a typical one-year limited warranty. But if you register XFX's product online (www.xfxforce.com) within 30 days of purchase, the warranty lasts for "the duration of your life." Not a bad deal, assuming the company is around that long.

It's nice having a great warranty, but you want great performance for your $390. You'll get that in spades. The XFX card burned through our performance tests, posting the highest scores in the 3DMark Vantage Extreme and Crysis benchmarks. The differences were minimal, though, and other 5870s won in other benchmarks.

Note that our benchmarks were exclusively run with 4x AA enabled, at 1920x1200—and we still got 32fps in Crysis and more than 60fps in both Far Cry 2 scenes. By the same token, idle power draw was minimal, a scant 140W.

The bottom line with the XFX Radeon HD 5870 is simple: You get world-leading 3D gaming performance, minimal power usage when you're not gaming, and a warranty that offers you peace of mind if the card dies. What's not to like (other than the price tag)? www.xfxforce.com

BENCHMARKS

	XFX 5870	EVGA 285 GTX SSC
3DMark Vantage Performance	**17,089**	13,941
3DMark Vantage Extreme	**8,312**	6,276
HAWX (fps)	**68**	62
Far Cry 2 / Action (fps)	**62**	47
Far Cry 2 / Ranch Long (fps)	**74**	56
Battle Forge / DX10 (fps)	**47**	46
Crysis / DX10 (fps)	**32**	22
Resident Evil 5 (fps)	**100**	87
X3: Terran Conflict (fps)	**101**	93
STALKER: Clear Skies (fps)	**36**	27

Best scores are bolded. All games were run at 1920x1200 with all detail levels maxed out and 4x AA enabled. Anisotropic filtering was also enabled in game, where available.

HIS Radeon HD 5870

It even comes with the tools to install it

HIS is based in Hong Kong, but its cards are readily available in U.S. outlets. They often cost slightly less than the competition, but that's not the case with the company's Radeon HD 5870, which is priced the same as its competitors. When we first unpacked the card, we thought it was the lesser HD 5850 model, due to its relatively compact packaging.

In our benchmarks, the HIS HD 5870 turned out excellent scores across the board, easily beating the fastest previous single-GPU champ, the EVGA 285 GTX SSC. It also pumped out the highest score in the 3DMark Vantage Performance test, although, again, margins were small.

If you buy the card from online retailer Newegg, it ships with a compact toolkit, which has bits and accessories useful for working on PCs. That, and the somewhat greener packaging, separate HIS from the competition. On the other hand, the two-year warranty looks a little anemic next to the XFX limited lifetime warranty.

Overall, the HIS Radeon HD 5870 is a stock Radeon HD 5870 with that GPU's impressive performance, a relatively wimpy warranty, and a moderately useful toolkit. If you're the kind of user who upgrades to the latest graphics cards every year, then this card is worth considering, particularly if the price comes down a bit. www.hisdigital.com/us/

BENCHMARKS

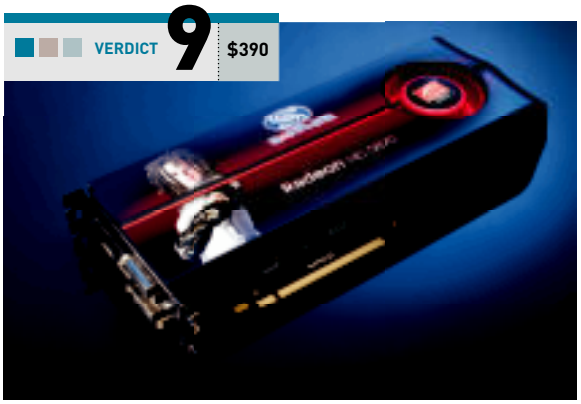
	HIS 5870	EVGA 285 GTX SSC
3DMark Vantage Performance	**17,131**	13,941
3DMark Vantage Extreme	**8,205**	6,276
HAWX (fps)	**68**	62
Far Cry 2 / Action (fps)	**62**	47
Far Cry 2 / Ranch Long (fps)	**74**	56
Battle Forge / DX10 (fps)	**48**	46
Crysis / DX10 (fps)	**31**	22
Resident Evil 5 (fps)	**100**	87
X3: Terran Conflict (fps)	**101**	93
STALKER: Clear Skies (fps)	**36**	27

Best scores are bolded. All games were run at 1920x1200 with all detail levels maxed out and 4x AA enabled. Anisotropic filtering was also enabled in game, where available.

Sapphire Radeon HD 5870

Sapphire's take on the Radeon HD 5870 is pretty much middle-of-the-road

VERDICT 9 $390



As with all Radeon HD 5870s, Sapphire's version offers superlative performance, making it one of the fastest single-GPU cards available today. At its core is AMD's 2.15 billion transistor Cypress chip, coupled with 1GB of 1,200MHz GDDR5 memory. Two DVI, one HDMI, and one DisplayPort connection allow for flexible monitor attachment.

Sapphire is bundling two games with this card: Dirt 2 and Battlestations: Pacific. Dirt 2 is one of the first titles to support Microsoft's DirectX 11 graphics API, so it should show off the visual chops of the new GPU. As with all HD 5870 cards, the Sapphire HD 5870 is just over 10.5 inches long, so be sure the card will fit in your case before buying.

Sapphire's two-year warranty is a little different than most others'; rather than returning the card to Sapphire, the company prefers you return it to the original retailer.

In the end, Sapphire's take on AMD's hot new GPU is pretty much like all the others—the fastest card you can get for the money, modest power use when it's not running a game, and a cost below $400. Overall, it's a combination that's hard to beat.
www.sapphiretech.com

BENCHMARKS

	SAPPHIRE 5870	EVGA 285 GTX SSC
3DMark Vantage Performance	**17,097**	13,941
3DMark Vantage Extreme	**8,212**	6,276
HAWX (fps)	**69**	62
Far Cry 2 / Action (fps)	**62**	47
Far Cry 2 / Ranch Long (fps)	**74**	56
Battle Forge / DX10 (fps)	**48**	46
Crysis / DX10 (fps)	**31**	22
Resident Evil 5 (fps)	**100**	87
X3: Terran Conflict (fps)	**101**	93
STALKER: Clear Skies (fps)	**36**	27

Best scores are bolded. All games were run at 1920x1200 with all detail levels maxed out and 4x AA enabled. Anisotropic filtering was also enabled in game, where available.

OVERCLOCK YOUR CARD!

Tools to Boost Your Graphics Card Performance

The Asus EAH5850 might be the only card here to ship with the Smart Doctor software tool for overclocking, but the fact is, you can overclock any of the graphics cards in this roundup.

AMD's own Catalyst software suite that's installed with the Radeon drivers has a built-in overclocking control panel known as Overdrive.

While you can't tweak the voltage—something that's fairly dangerous, anyway—you can set GPU and memory clocks, manually control your fans, and use Overdrive's auto-tune feature to try to automatically set higher clock speeds. Our experience with auto-tune is that it's fairly conservative; we were able to boost core clocks from 850MHz to 890MHz, and memory clocks from 1,200MHz to a scant 1,230MHz. When you click auto-tune, expect to wait about 15–20 minutes for the process to complete.

Nvidia also lets you overclock cards based on its GPUs, but you have to work at it a little. First, you need to download the Nvidia System Tools software from http://bit.ly/18BKXa. Look for the link "Nvidia System Tools with ESA support."

Download and install System Tools. You can do this even if you don't have an Nvidia-based motherboard. An additional panel is installed in the Nvidia graphics control panel, allowing you to manage clock speeds.

As with AMD's Overdrive, Nvidia's tool has an auto-tune feature.

Third-party apps also exist for overclocking graphics cards. Probably the most popular graphics overclocking tool is RivaTuner, which works with both ATI- and Nvidia-based cards. You can find RivaTuner at Guru3D (www.guru3d.com). Currently, RivaTuner hasn't been updated to work with the 5800 series. Also, you may have issues with 64-bit Vista and Windows 7, due to its use of an unsigned driver.

Asus EAH5850

Asus beefs up its stock Radeon HD 5850 for better overclocking

All of the Radeon cards tested here are based on AMD's reference design, including this Asus card. However, Asus includes Smart Doctor software, which allows you to easily overclock its card.

You can use the app to auto-tune the clock speeds, though this typically gives you a conservative up-clock that results in a relatively modest performance gain. When we used the auto-overclock feature, we saw gains of 8 percent in 3DMark Vantage, and a couple of frames per second in STALKER and Far Cry 2. If you have the patience, you can tweak voltage settings, core clocks, and memory clocks manually, which could boost performance more substantially.

The Asus EAH5850 is a double-wide card, and is 9.5 inches long. It will fit comfortably in most PC cases, although it requires a second slot. This is a more power-efficient card than the higher-end Radeon HD 5870s; our system idled at 138W, and maxed out under load at 260W—that's about 55W less than the Radeon HD 5870 cards. If you use Smart Doctor to push up the voltage on the card, you'll consume more power, so make sure you have a robust power supply in your system.

At stock clock speeds, performance was on par with the other Radeon HD 5850 cards in the roundup, but the addition of Smart Doctor is a definite distinguishing characteristic. The $260 Asus card was even with or better than the fastest last-generation card, EVGA's 285 GTX SSC.

Asus offers a three-year warranty, better than all other manufacturers except XFX. www.asus.com

MAXIMUM PC KICK ASS!

VERDICT 9 $260

BENCHMARKS

	ASUS 5850	EVGA 285 GTX SSC
3DMark Vantage Performance	**14,383**	13,941
3DMark Vantage Extreme	**6,561**	6,276
HAWX (fps)	57	**62**
Far Cry 2 / Action (fps)	**53**	47
Far Cry 2 / Ranch Long (fps)	**61**	56
Battle Forge / DX10 (fps)	42	**46**
Crysis / DX10 (fps)	**26**	22
Resident Evil 5 (fps)	86	**87**
X3: Terran Conflict (fps)	92	**93**
STALKER: Clear Skies (fps)	**30**	27

Best scores are bolded. All games were run at 1920x1200 with all detail levels maxed out and 4x AA enabled. Anisotropic filtering was also enabled in game, where available.

Diamond Radeon HD 5850

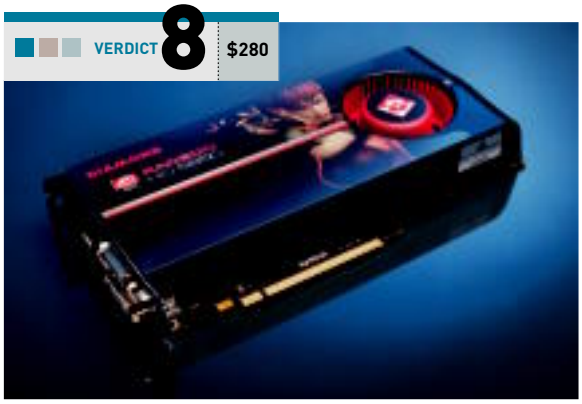
Performs well, but is pricier than the competition

We admit to mixed feelings about Diamond's Radeon HD 5850. On one hand, it offers the same strong performance as other Radeon HD 5850 cards—second only to their big-brother HD 5870 cards. But unlike other manufacturers, you don't get a coupon for Dirt 2 in the box. Instead, you need to register the card at Diamond's website to get the perk. You also won't get the two-year warranty unless you register the card.

The other puzzling bit is the price. The card seems to be priced higher than other HD 5850s in our survey of online sites, though only by a few dollars.

Built on the cut-down Cypress chip, with 1,440 shader units and 1GB of 1,000MHz GDDR5 memory, Diamond's card certainly offers terrific performance at a sub-$300 price point that's sure to please, hitting 30fps in the demanding STALKER: Clear Skies test and pushing past 60fps in the Far Cry 2 ranch scene. But Diamond's warranty, pricing, and bundle policy seem a little consumer unfriendly, so you might want to consider other HD 5850 cards if you're in the market. www.diamondmm.com

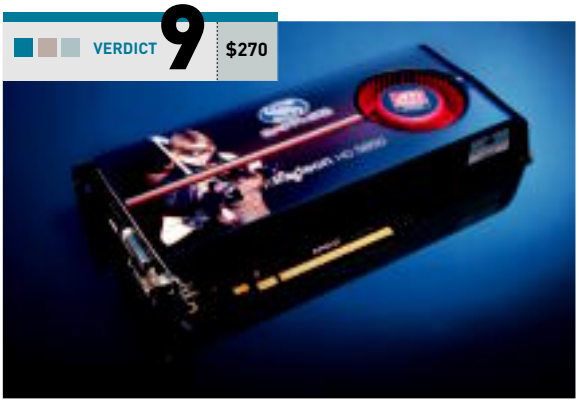
VERDICT 8 $280



BENCHMARKS

	DIAMOND 5850	EVGA 285 GTX SSC
3DMark Vantage Performance	**14,359**	13,941
3DMark Vantage Extreme	**6,583**	6,276
HAWX (fps)	57	**62**
Far Cry 2 / Action (fps)	**53**	47
Far Cry 2 / Ranch Long (fps)	**63**	56
Battle Forge / DX10 (fps)	41	**46**
Crysis / DX10 (fps)	**26**	22
Resident Evil 5 (fps)	85	**87**
X3: Terran Conflict (fps)	93	93
STALKER: Clear Skies (fps)	**30**	27

Best scores are bolded. All games were run at 1920x1200 with all detail levels maxed out and 4x AA enabled. Anisotropic filtering was also enabled in game, where available.



Sapphire Radeon HD 5850

Great performance at a midrange price

As with Sapphire's Radeon HD 5870, the company's HD 5850 card ships with coupons for two games: Dirt 2 and Battlestations: Pacific. Sapphire's HD 5850 delivers a stock Radeon HD 5850, with its 1,440 stream processors, 72 texture units, and DirectX 11 support.

In our power-usage testing, Sapphire's power draw was about average for an HD 5850. Our system power averaged 140W at idle, while pushing 260W at full throttle. Fan noise was fairly loud at full bore, but that was generally true of all the cards. At idle, overall noise levels were low enough to blend into the background of CPU, power supply, and case cooling.

We put the card through its paces in our gaming benchmark suite and found it to be an able performer, easily besting Nvidia's last-generation best single-GPU card. There were no benchmark standouts, but given that we were running with 4x AA throughout, overall performance was robust. The Sapphire card kept pace with other HD 5850s in our roundup, but lacks the overclocking software tools Asus includes with its card.

The Sapphire Radeon HD 5850 seems readily available, and the best prices we found hovered around $270. The company offers a two-year warranty, but you need to return it to the retailer for replacement cards. There's no provision for transferring the warranty if you resell the card.
www.sapphiretech.com

BENCHMARKS

	SAPPHIRE 5850	EVGA 285 GTX SSC
3DMark Vantage Performance	**14,510**	13,941
3DMark Vantage Extreme	**6,610**	6,276
HAWX (fps)	57	**62**
Far Cry 2 / Action (fps)	**54**	47
Far Cry 2 / Ranch Long (fps)	**64**	56
Battle Forge / DX10 (fps)	41	**46**
Crysis / DX10 (fps)	**26**	22
Resident Evil 5 (fps)	**87**	87
X3: Terran Conflict (fps)	93	**93**
STALKER: Clear Skies (fps)	**30**	27

Best scores are bolded. All games were run at 1920x1200 with all detail levels maxed out and 4x AA enabled. Anisotropic filtering was also enabled in game, where available.

Gigabyte 260 GTX Super OC

The 260 GTX chip pushed to its limit

It's easy to be seduced by the latest and greatest graphics cards, but you can sometimes find excellent deals in older-generation cards that can still keep up with today's shader-heavy PC games. Gigabyte's 260 GTX SuperOC is a good example.

To make the cards, Gigabyte starts with cherry-picked 260 GTX chips from the factory. Then it clocks the GPUs at 680MHz, more than 100MHz faster than the standard 576MHz. Similarly, the SuperOC pushes the shader clock to 1,466MHz, instead of the stock 1,350MHz. Rounding off the performance push is 896MB of GDDR3 running at 1.25GHz instead of 1GHz. Gigabyte delivers these rarefied clock rates at slightly less than $200.

It's true that the SuperOC won't deliver Radeon HD 5850 levels of performance—but it also costs $60–$80 less. You should get good performance from the card if you're willing to run without antialiasing in current games. Note, however, that pushing the card this hard takes power; our system idle power was 160W (compared to 141–142W for the Radeon HD 5000 series cards), and power at full bore was 316W—the same as the much more powerful Radeon HD 5870.

The Gigabyte 260 SuperOC supports Nvidia's PhysX hardware physics acceleration in games that can take advantage of it, as well as 3DVision, Nvidia's take on 3D stereoscopic gaming (a 120Hz display is required). The card is currently bundled with Far Cry 2. www.giga-byte.com

BENCHMARKS

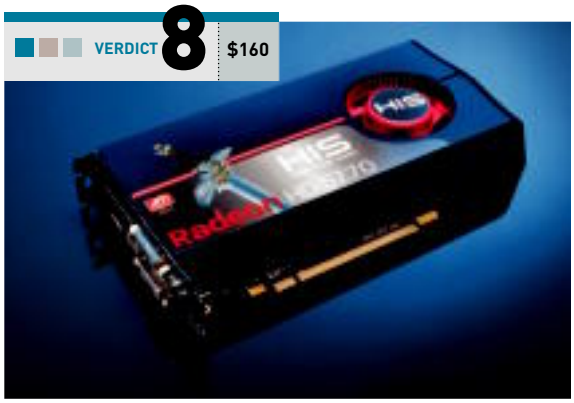
	GIGABYTE 260 SUPEROC	EVGA 285 GTX SSC
3DMark Vantage Performance	12,819	**13,941**
3DMark Vantage Extreme	5,709	**6,276**
HAWX (fps)	56	**62**
Far Cry 2 / Action (fps)	45	**47**
Far Cry 2 / Ranch Long (fps)	52	**56**
Battle Forge / DX10 (fps)	28	**46**
Crysis / DX10 (fps)	20	**22**
Resident Evil 5 (fps)	79	**87**
X3: Terran Conflict (fps)	89	**93**
STALKER: Clear Skies (fps)	**34**	27

Best scores are bolded. All games were run at 1920x1200 with all detail levels maxed out and 4x AA enabled. Anisotropic filtering was also enabled in game, where available.

HIS HD 5770

Near–HD 4870 performance on a budget

VERDICT **8** $160



AMD has wasted no time bringing its DirectX 11 GPU architecture to a more affordable, mainstream-class GPU in the HD 5770. HIS is one of the first manufacturers to bring the HD 5770 to market.

At around $160, the card is priced similarly to existing Radeon HD 4870 cards. It's the lowest-cost card in the roundup, and given the 180mm² die size (that's incredibly tiny for a GPU), prices are likely to eventually come down even further.

While the HIS HD 5770's benchmark scores were the lowest in the roundup, this needs to be put into context. The card is practically miserly with power. Our system's idle power of 142W was on a par with other HD 5000 series cards, but power at full bore was a scant 251W—about 10W lower than the HD 5850. The card requires just a single PCI Express power connector.

For the low price, you have to give up some graphical amenities, like antialiasing. It's worth noting, however, that the HD 5770 still delivers 38fps in the Far Cry 2 action scene and 51fps in Ubisoft's HAWX flight sim with AA and AF enabled. And like all the HD 5000 series, you can connect up to three displays to a single card.

So if you're on a tight budget, and are still looking for a solid gaming experience and efficient power usage, check out the HIS HD 5770. www.hisdigital.com/us/

BENCHMARKS

	HIS 5770	EVGA 285 GTX SSC
3DMark Vantage Performance	10,194	**13,941**
3DMark Vantage Extreme	4,290	**6,276**
HAWX (fps)	41	**62**
Far Cry 2 / Action (fps)	38	**47**
Far Cry 2 / Ranch Long (fps)	43	**56**
Battle Forge / DX10 (fps)	24	**46**
Crysis / DX10 (fps)	17	**22**
Resident Evil 5 (fps)	64	**87**
X3: Terran Conflict (fps)	74	**93**
STALKER: Clear Skies (fps)	19	**27**

Best scores are bolded. All games were run at 1920x1200 with all detail levels maxed out and 4x AA enabled. Anisotropic filtering was also enabled in game, where available.

EYEFINITY

Making the Most of Multiple Monitors

Eyefinity is AMD's moniker for the Radeon HD 5000 series' ability to connect to multiple displays. Even the lowest-cost Radeon HD 5750 offers four display connections; you can use any three of them simultaneously. Note that if you use more than two displays, one must be DisplayPort capable—but you can use an active DisplayPort-to-DVI adapter to connect a third display via that monitor's DVI port.

Of course, the HD 5000 cards support standard Windows multiple-display capability, so you can clone or extend a display if you have more than one attached. But Eyefinity takes this a step further, by enabling you to create monitor groups. If all the displays in a monitor group are the same resolution, then you can configure the driver to see all of them as one large surface.

Three 1680x1050-pixel panels can therefore be configured as a single 5040x1050 panel in a three-wide configuration. Or, you could configure them as a single 1680x3150 stacked display. When you do this, games and apps see the group as a single display. Not all games will necessarily look correct—you'll probably need to manually tweak the field of view, for example. Note that the panels don't have to be the same physical size, but they do need to have identical resolutions.

If you don't have three monitors of the same resolution, you can still use Eyefinity groups—you just can't configure the group to be a single surface. We used three displays—a 2560x1600 monitor with DisplayPort and two DVI-equipped 1920x1200 24-inch panels. The two 24-inchers were set up in portrait (tall) mode, so they were seen as 1200x1920 displays. The 30-inch Dell 3008WFP was set up in landscape (wide).

While you can use Eyefinity with two displays, it's a far better gaming experience with three, particularly in games with a targeting reticule or similar feature. With two displays, the reticule is split over the center bezels. That makes aiming a little chancy in fast-paced shooters.

Store Everything!

Don't want to pay for Windows Home Server? We show you how FreeNAS lets you create a server for storing, sharing, and streaming all your digital content—for free!

Back in the day, the average nerd household had one or two computers, a printer, and a game console. If you were lucky, you had an Internet connection on one of those computers—forget about the printer; forget about the console. And forget about home networking. But now, the average geek household has a multitude of machines: desktop computers, laptops, netbooks, Wi-Fi-enabled smartphones, and networked game consoles—not to mention terabytes of ripped movies, music, and photos. Wouldn't it be nice to have a central location where all of those files lived that was accessible to all your computing devices? A place where you could back up all of your computers, host your media files for streaming to your console or other computers, and use as a file share for your whole network? Yes. Yes, it would.

In the November issue, we showed you how to set up a Windows Home Server to enable such a scenario. But a Windows Home Server license costs 100 bucks, and doesn't necessarily play well with non-Windows machines. FreeNAS, on the other hand, is a free, open-source FreeBSD derivative, and though it can be a little more complex under the hood, it's as powerful as Windows Home Server and runs well on salvaged hardware. And FreeNAS plays well with Windows, Apple, and *nix systems.

We'll show you what hardware you'll need for a FreeNAS server, how to install and configure your server, and then help you choose between FreeNAS and WHS.

BY NATHAN EDWARDS


Backup
TV Shows
Music
Photos
Documents
Grue
Movies

Free to Be FreeNAS

Five ways the no-cost server software can benefit your home network

STORAGE

Let's face it: A family's worth of home movies, music collections, photos, school assignments, and ripped DVDs takes up a lot of room. Rather than keeping all that content scattered among four computers and six external hard drives, centralize! Use FreeNAS as a central repository for your family's media, so everyone can access it.

MEDIA SERVER

A FreeNAS server isn't just a place to store your media—it's also a fully featured media streaming machine in its own right. The built-in Firefly media streamer creates a library in iTunes that anyone on the network can access. And with FUPPES, the open-source UPnP server, you can transcode and stream movies to your networked computers, HTPC, Xbox 360, PlayStation 3, or any other UPnP or DLNA-enabled media player. It also streams photos and music!

BITTORRENT DOWNLOADING MACHINE

Rather than wasting your personal machine's processor cycles and bandwidth, use your FreeNAS server to automatically download and seed .torrent files. We'll show you how to set a watch folder so that your NAS will immediately download any torrent it finds there.

WEB SERVER

FreeNAS is configured through a web GUI, which means FreeNAS has a built-in web server. You can use FreeNAS to host your own websites—and even access them from outside your home network!

BACKUP SERVER

Back up all your computers to your NAS box—whether you're an advanced Unix user and back up using FreeNAS's built-in rsync support, or you merely point your backup software toward your FreeNAS user folder, a FreeNAS server is a great centralized location for data archives.

HARDWARE REQUIREMENTS

Building Your FreeNAS Box

One of the biggest advantages of FreeNAS is that it will run on virtually any hardware, so you have the potential to build a new file server without laying out any cash. At the bare minimum, FreeNAS requires just 128MB of RAM, an x86- or AMD64-compatible CPU, a bootable CD-ROM drive, and at least one bootable hard drive. So if you have a computer built within the past 10 years, it probably qualifies, though you might want to add a SATA controller.

If you're buying new hardware, aim for a low-voltage processor (less than 50W), and the more RAM the better. Integrated graphics are fine, and you'll only need a mouse, keyboard, and monitor for the initial setup.

We used the same hardware as for our Windows Home Server build, which you can find in the November 2009 issue of *Maximum PC*. Briefly, that's an Asus M4A78 Pro motherboard, AMD Athlon X2 240 CPU, 2GB Corsair DDR2 RAM, two 2TB Western Digital Caviar Green drives, and a Rosewill 550W PSU. We installed the OS with a USB CD-ROM drive we had lying around, since we're not going to need an optical drive on the server once it's built. To ensure compatibility with FreeNAS, you should check your hardware against the FreeBSD hardware compatibility list http://bit.ly/1rqwfQ.

We used the same hardware for our FreeNAS box as our Windows Home Server story, but nearly any old PC parts will do.

Installing FreeNAS

Don't let the ancient UI fool you; it's not as scary as it looks

For the purposes of this article, we're going to assume your machine is already built; for the build process, see Steps 1-6 of our Windows Home Server article from November 2009 (http://bit.ly/1tbEX6). Once your hardware is ready, it's time to install FreeNAS.

1

DOWNLOAD AND BURN THE LIVECD

You'll need the latest LiveCD for your processor—either 64-bit (AMD64) or 32-bit (i386). Download the LiveCD ISO from FreeNAS.org or SourceForge (http://bit.ly/14bAhI) and burn it to a CD using image-burning software such as ImgBurn (www.imgburn.com). There's also a method for flashing a FreeNAS image directly to a bootable CompactFlash card—instructions can be found at http://bit.ly/1Li7TN.

2

BOOT FROM LIVECD

Go into the BIOS (usually by hitting Del or F10 during startup) and give boot priority to the CD drive. FreeNAS will load from the disc and present a numbered menu labeled Console Setup.

3

SELECT INSTALL TYPE

Select option 9) Install/Upgrade to hard drive/flash device, etc. In the next screen, pick option 3) Install 'full' OS on HDD + DATA + SWAP. You'll be prompted to select the CD drive containing the LiveCD, which should be cd0, then the destination media—ad4, in our case. (FreeNAS, as a FreeBSD distro, uses device codes, not drive letters, for its drives.)

Next, you'll be prompted to set a size for the OS partition. We chose the minimum size: 128MB, which is plenty—all your data will be stored on a separate partition. Now you'll set your swap partition size. We went with the default again here, which gave us a swap size of 1,684MB.

4

WRITE IT DOWN!

After you've chosen your OS and swap-partition sizes, FreeNAS will install on your system. Once it's finished, the screen will display some important information. Specifically, make note of the instructions for mounting the data and swap partitions. And make note: The data partition has been formatted in UFS, so don't reformat it unless you want to use ZFS (see sidebar). After you've written down the information on the screen (which we'll cover again later, don't worry), you can remove the CD and restart the computer.

5

REBOOT

Once you've restarted the machine, go back into the BIOS. Go to the Boot menu and change the boot priority back to your hard drive. Save your changes and exit the BIOS. FreeNAS should boot from the disk and return to the original Console Setup menu. Before we head over to FreeNAS's WebGUI, where we'll do most of the configuration, we have a few more things to do here.

6

SET WEB INTERFACE

Select option 1) Assign interfaces, just to make sure your Ethernet connection is detected and working. Your Ethernet interface name will probably be the first two or three letters of your chipset, followed by a number. Ours is ale0. After you've assigned the first port, you can assign others (if you have more than one Ethernet port on your motherboard), or finish and exit the configuration.

7

SET LAN IP ADDRESS

You'll want to give your FreeNAS server a static IP address, to prevent your DHCP server from assigning it a different IP every time the server reboots. First, go to a computer on your local network and run cmd.exe. Enter the command line `ipconfig /all` and make note of that computer's IP address, subnet mask, DNS server, and default gateway.

Now go back to the NAS. Select option 2) Set LAN IP address. FreeNAS will ask if you want to use DHCP for this interface. Select No. The next screen will prompt you for a new LAN IPv4 address. Use something in the same subnet as your other computers—often, this will be some variant on 192.168.1.* or 192.168.0.*. (You'll need to go into your router's config and reserve the IP you chose.)

In the next screen, use the subnet mask bit count that corresponds to your other computers' subnet mask (most users will use 24). And in the next screen, when it asks for your default gateway, enter your router's IP address. Finally, you'll set your DNS IPv4 address, which is the DNS Server address you got from ipconfig on your Windows machine.

Once all this is completed, make note of the new IP address. You'll use that to access the WebGUI. And now it's configuration time!

ZFS

Using FreeNAS's Multi-Drive File System

By default, FreeNAS formats its data storage with UFS (Unix File System). FreeNAS actually warns against formatting in NTFS, the default Windows file system, and you won't want to format your NAS in FAT32—not if you have any files larger than 4GB, that is. So UFS is the best option for most people. But FreeNAS recently implemented support for ZFS, the Zettabyte File System. Instead of being a single-drive file system, ZFS manages a pool of virtual devices, which can be partitions or whole drives. Advantages include one file system for all your storage, seamless addition of devices, and the ability to set up RAID-Z redundancy easily. Unfortunately, ZFS is still experimental on FreeNAS, and it does have limitations—the biggest of which is that it is a local file system and doesn't handle multiple access requests well. There's also no provision for defragmentation.

If you do choose to try ZFS on your FreeNAS server, you should configure it from the beginning. You can do so under Disks › ZFS in the WebGUI.

Configuring FreeNAS

A not-always-intuitive WebGUI is the key to FreeNAS's powerful features

Once you've finished your initial FreeNAS setup, you shouldn't need a connected mouse, keyboard, or monitor anymore (unless your mobo won't boot without a keyboard). The rest of the configuration process, as well as any maintenance you'll perform from now on, will be done through the WebGUI using any computer on your home network. To access the WebGUI, type your server's internal IP address into a browser window. In our previous example, that means http://192.168.1.250:80. Log in with username "admin" and password "freenas." We'll change this in the next step.

CHANGE ADMIN PASSWORD

The first thing you'll want to do is change the password. Go to the System drop-down menu and pick General, then click the Password tab. Type in the default admin password ("freenas") at the prompt, then pick a new password. (If you forget it, you can reset the password to a default later, but you'll need physical access to your server.) While you're here, don't forget to go back to the General tab and enable HTTPS login.

ADD A DATA DISK

Remember those instructions we told you to write down in Step 4 of the installation process? Well, now you're gonna use them. In the WebGUI, go to Disks > Management. Click the plus button to add a disk, then pick your primary disk from the drop-down menu. Ours was ad4, which is FreeBSD jargon for ATA Disk 4—it's attached to SATA controller 4. Give it a description so you'll remember which drive is which, then click the radio button to activate S.M.A.R.T. disk management. That's useful. Hit Save, and don't forget to Apply Changes back at the Disk Management screen.

SET UP A MOUNT POINT

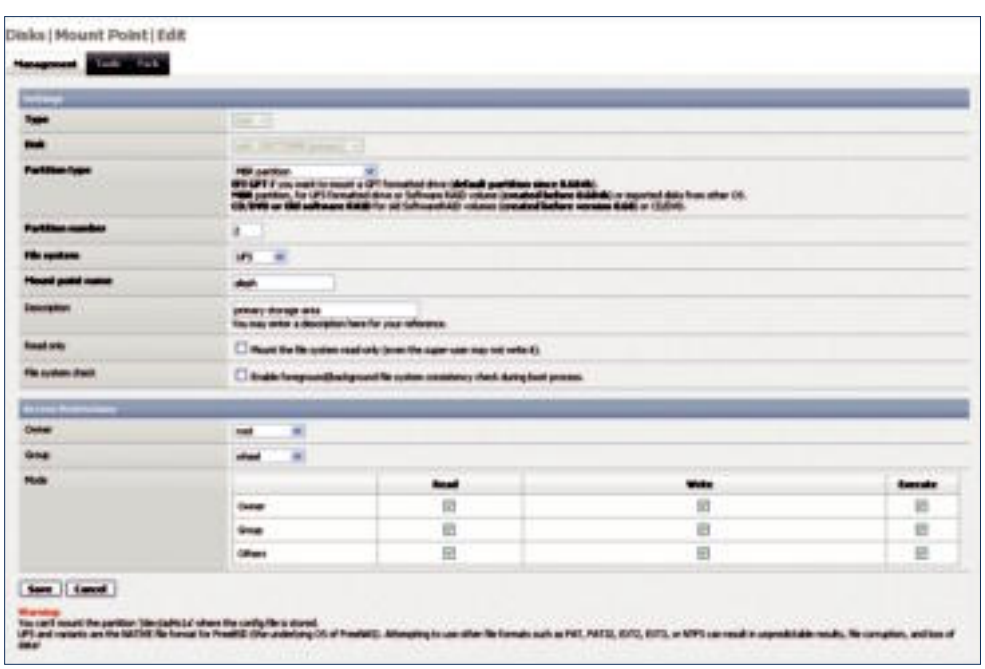
Next, we'll set up a mount point. You won't be storing anything on your FreeNAS partition; there's only 128MB of space there and most of it is full already. Instead, all your disks will be mounted as subdirectories of your /mnt/ folder. Go to Disks > Mount Point, and click the plus button, just like you did to mount the disk itself. For Type, select Disk. From the drop-down menu, choose the disk you mounted in the previous step (ad4, in our case).

Provided you're adding the data partition you set up in the installation process, you'll choose MBR partition as the Partition Type. For Partition Number, choose 2 (1 is the OS partition you created earlier—you can't configure that). Name your mount point something memorable. Last, you can set up access restrictions by group or by user. It's always better to assign group permissions and then make users part of specific groups, rather than assign specific permissions to each user.

SET UP WINDOWS SHARING

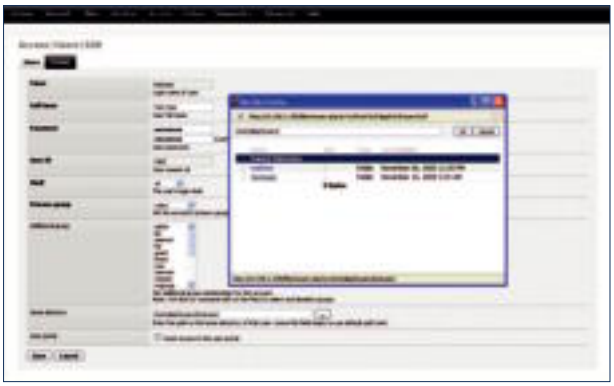
Now that you have a mounted drive, it's time to configure it. Navigate to the Services menu and go to CIFS/SMB. Click the Enable button under Settings. Choose your authentication method; we're going with Anonymous for now, since all the computers we're using are on the same network and we're not worried about other people accessing the server. Set your NetBIOS name and workgroup name (if you have a home workgroup). We used freenas and WORKGROUP, respectively. In Advanced Settings, check "Enable large read/writes" and "Enable use sendfile."

Now go to the Shares tab. Create a new share by clicking the plus icon. We've called ours Aleph, the same as our data partition, because that's what we'll be mounting. At the Path menu, enter your mount point from earlier—in our case, that's /mnt/aleph. We'll check the boxes for "Set browseable," and "Create recycle bin." Click Save and then Apply Changes. For Apple sharing, enable AFP; for Linux/unix, enable NFS.



MAP NETWORK DRIVES

Next, we'll map drives in Windows Explorer. Go to the address bar and type \\[servername]. In our case, that's \\freenas. You should see the share folder you named (Aleph, in our case). Right-click it and select Mount Network Drive. Now you can access your FreeNAS server's storage area directly from My Computer. If you want, you can create separate network shares for your media folders: We created Music, Movies, TV Shows, Photos, and others. Create subdirectories of your



main share, then repeat the steps we just described to set them up as shares and map them.

CREATE USERS

FreeNAS is still a work in progress, and the version we are using (0.7RC2) doesn't have an easy way to set per-user and per-group permissions for individual files and folders. However, you can control how much access users get to the web panel. Go to Access > Users and Groups. There's not much to do here yet, but you can still create a group called Users, and then add individual users to that group. You can assign each user a home directory, as well as additional user groups.

SET UP ITUNES STREAMING

A NAS is a perfect place to store a unified music library, and FreeNAS ships with Firefly, an open-source media server for iTunes.

Go to Services > iTunes / Daap. Click the box for Enable, then name your server (we called ours freebird, and that's what shows up in iTunes). Choose a directory to store the music database, and directory or directories to watch. In our case, that's /mnt/aleph/music. Set a scan frequency (in seconds), then save and restart. You should see the name of your music server in the Shared section of iTunes. Make sure you have Zeroconf/Bonjour set up in (System > Advanced), so FreeNAS will broadcast its services. You can access the Firefly media server via the web by connecting to port 3689 at your server's IP address.

SET UP UPNP/DLNA FOR STREAMING

Turning your FreeNAS server into a UPnP streaming media library is just as easy as setting up iTunes streaming, thanks to the included FUPPES UPnP media server software. Go to Services > UPnP, and click the Enable box. Name your server, keep the default interface and port unless you have a reason not to. Choose a directory for the UPnP database, just like you did for iTunes streaming, and set directories to watch. We created separate directories for movies, television, and photos. The Profile setting is device-specific, though we found the Xbox 360 profile worked fine for the WD TV Live we tested it with, as well as with our test computers. Click the checkbox to enable the WebGUI, then hit Save and Restart to activate the service.

SET UP THE BITTORRENT CLIENT

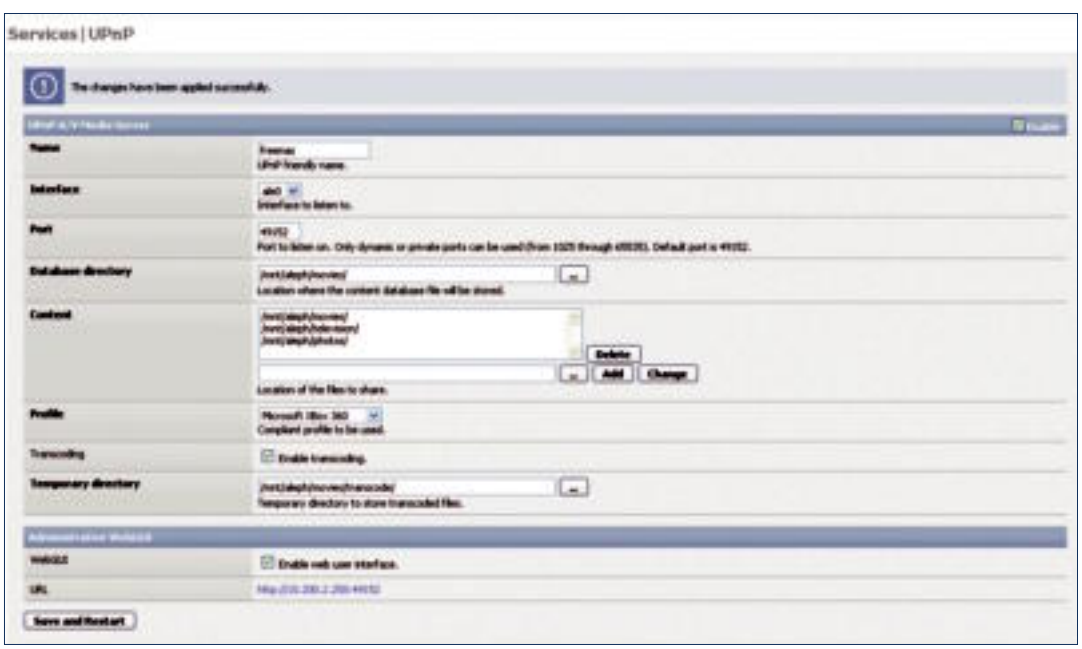
Another perk of a dedicated media server is that you can also use it as a torrenting box. FreeNAS ships with the Transmission client, which you can configure to automatically download .torrents it sees in its watch folder. Create two subdirectories in your share; one for Transmission to watch for .torrent files, and the other for finished torrents. Go to our old friend the Services menu and select Transmission. Click the Enable checkbox. Point the Download Directory to the folder for finished torrents (ours is called Finished Torrents) and the Watch directory to your watch directory. Set minimum and maximum upload and download speeds, then click Save and Restart. Any .torrent file you save in the watched folder will automatically be downloaded by Transmission; alternately, you can log into the Transmission WebGUI (http://serverIP:9091) and upload torrents from your local machine or from the web.

CONFIGURE WEB SERVICES

The FreeNAS server can also be configured as a web server. In the Services menu, go to Webserver, click Enable, set a TCP port for the web server and a parent directory for the web server, and hit Save and Restart. Drag your website files to that subdirectory and you're ready to go.

For FTP access, go to Services > FTP, and click Enable. Leave the default settings unless you have reason to change them. We checked "Only allow authenticated users" and left the rest at their default settings.

To access your FreeNAS server from outside your home network, you must forward certain ports from your router to your NAS—the defaults are 80 for the web



and 21 for FTP. For step-by-step instructions for your router, go to portforward.com.

ADD ANOTHER DISK

To add another disk to your FreeNAS installation, shut down the server and install the disk, then restart. Essentially, you'll repeat the steps you took to create the first data disk: Go to Disks > Management and click the plus sign to add a disk. Select the one that isn't already mounted (ad6, in our case), give it a description, set its power management levels, and enable S.M.A.R.T. Unlike the first disk, you'll have to format this one, so under Preformatted File System, leave it unformatted. Next, go to Disks > Format, select the disk you're adding, and UFS (GPT and Soft Updates) as the file system. Give it a label, and hit Format disk. It may take a few minutes.

Once the disk is formatted, go to Disks > Mount Point and add it. Follow the previous instructions for mounting a disk, except the Partition Type will be GPT partition, and the partition number will be 1. Add it, apply the changes, and make it into a share. Voilà!

ADVANCED STEPS

Because FreeNAS is based on FreeBSD, a Unix variant, it has an array of advanced features that aren't necessarily easy for the *nix newbs among us. If you want to SSH into your FreeNAS server remotely, use rsync or Unison, set up a RAID array, or use the command-line interface to set permissions for files and folders individually, you'll find plenty of help and documentation at the FreeNAS knowledgebase (www.freenaskb.info/kb/), forums (http://bit.ly/3uhoQj), and tutorial websites like LearnFreeNAS.com. It might not always be simple, but FreeNAS is powerful, flexible, and free, and that's a winning combination in our book.

FreeNAS vs. Windows Home Server

Editors Norman Chan and Nathan Edwards debate the merits of two home server solutions

NORMAN

Windows Home Server trumps FreeNAS with its ease of use. You can schedule hassle-free automated backups for up to 10 Windows PCs without learning complicated scripts or using BSD.

WHS's library of Add-ins lets you add functionality like automatic Flickr uploads and advanced power management. Plus, since WHS runs on top of a Windows kernel, you can use remote desktop to install additional server software for features like real-time video transcoding.

A WHS machine has huge upgrading potential. Microsoft's software makes it easy to add or swap out hard drives to expand server capacity without messing up your existing backups.

FreeNAS might not be as easy to set up as Windows Home Server, but it's more powerful: Does WHS have a built-in BitTorrent client and iTunes library? Plus, it plays better with Macs and Linux/Unix machines.

FreeNAS has lower system requirements than WHS, which needs at least a 1GHz PIII and 512MB of RAM, as well as an 80GB primary hard drive. FreeNAS can be run from a CD, CompactFlash card, or USB stick, and requires just 128MB of space for its OS partition and 128MB of RAM.

FreeNAS is free. WHS costs around $100.

NATHAN

WHITE PAPER

Rechargeable Batteries

Li-ions, NiCads, and NiMHs, oh my! What does this alphabet soup mean and how do you get the most from your rechargeable devices? –JASON CROSS

Batteries are everywhere. They're in our phones, mice, cars, laptops, game machines, controllers, remotes, cameras—you name it. Battery technology influences the design, capabilities, and feature set of nearly everything portable, from laptops and cell phones to hybrid and electric vehicles.

Most of the batteries in our lives are rechargeable, and our more eco-aware world is quickly replacing standard alkaline AA and AAA batteries with rechargeable equivalents. Still, few people know how all these batteries work or how to best take care of them.

BATTERY BASICS

We're going to focus on common rechargeable battery types, but before we get into that we should cover a few basics about how batteries work and go over common terms. Every battery has two electrodes: the anode and the cathode. In a standard nonrechargeable chemical battery, a chemical reaction oxidizes the anode (typically zinc metal powder), causing free electrons to flow through the electrolyte (ionizing solution) and out the negative terminal. The process is sustained by closing the circuit to the positive terminal, creating a continuous positive charge to the cathode (typically magnesium dioxide powder). A rechargeable battery is one that can store energy if the electron flow is reversed, because the oxidizing chemical reaction can be reversed by the application of electricity. This is, of course, an oversimplification—a detailed description of the chemistry involved in batteries, especially rechargeables, would vary depending on the type of battery and is well beyond the scope of this article.

There are lots of rechargeable battery types—standard Lead Acid car batteries were some of the first commercialized—but most of what you see in today's electronic devices are either Nickel-Cadmium (NiCad), Nicked-Metal Hydride (NiMH), or Lithium-ion (Li-ion). If you understand these three battery types, you'll understand 99 percent of the rechargeable batteries you're likely to use from day to day.

All rechargeables can be measured by their energy density, the ratio of how much energy they can hold per unit of weight. Different battery types have different energy densities, but density can also be affected by improvements in manufacturing and design.

NICKEL-CADMIUM

Nickel-Cadmium, or NiCad, batteries were some of the first commercially produced rechargeables, outside of car batteries. Fifteen years ago, they were everywhere. The anode is a nickel hydroxide and the cathode is the metal cadmium. By today's standards, NiCads have a fairly low energy density, perhaps 50 watt-hours per kilogram. However, NiCads can discharge a large amount of current very rapidly without sustaining any damage, and they can take on charge very quickly, so they're popular in some motor-driven applications like power tools.

Unfortunately, cadmium is poisonous heavy metal and this makes old NiCad batteries hard to dispose of safely. If you have a NiCad battery, you shouldn't store it for long periods of time fully charged. NiCads have a nasty "memory effect," where they don't like to be recharged without being fully drained, nor stored for long periods in a fully charged state. Large crystals can form on the cell plates and prevent the battery from taking on a full charge. Every five charges or so, you should let the battery drain completely and charge it fully.

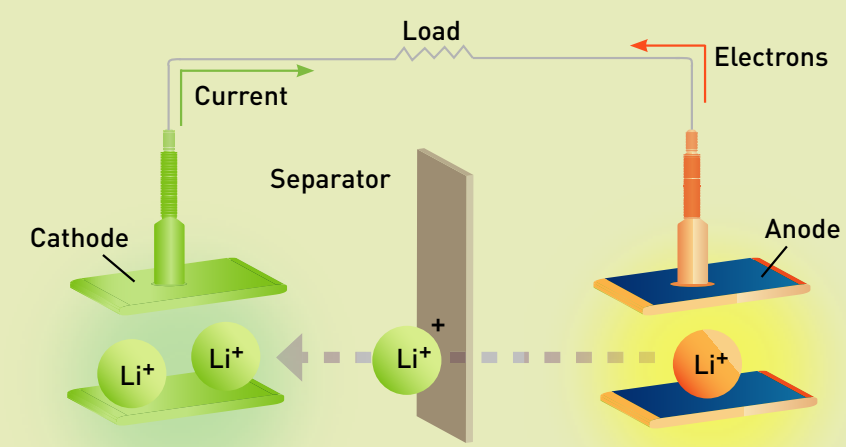
NICKEL-METAL HYDRIDE

Most similar to Nickel-Cadmium are Nickel-Metal Hydride, or NiMH, batteries. Most of the rechargeable AA and AAA batteries you see on store shelves these days are NiMH, and they're used in a lot of electric vehicles and hybrids, too. They have 30–40 percent higher energy densities than NiCad, and the replacement of cadmium with a hydrogen-absorbing alloy in the cathode makes them more environmentally sound. They don't take well to being charged/discharged very rapidly, so a quality "smart charger" or "trickle charger" may extend the life of your battery and allow it to hold more charge longer.

NiMH batteries used to be limited to around

HOW IT WORKS

A Li-ion Battery in Action



In a li-ion battery, positively charged lithium ions flow in a conducting electrolyte, through a separator, to the cathode. This leaves a negative charge of electrons on the anode. When charging, this flow is reversed.

200 or 300 recharges before ceasing to hold a charge well, but recent advances in manufacturing methods have improved this. You can now get NiMH batteries that recharge up to 1,000 times. Similar improvements have been made in their ability to hold charge when sitting unused. NiMHs suffer from the same "memory effect" as NiCads, although to a much lesser degree, so you'll want to fully discharge/recharge them every now and then.

LITHIUM-ION

In most consumer devices with permanent (or proprietary) batteries like laptops or cell phones, you'll find a Lithium-ion battery. In this battery type, the positive electrode is usually lithium cobalt oxide and the negative is carbon. However, the exact composition of the electrodes has varied in recent years in an attempt to improve performance and safety.

Li-ion batteries are light, giving them energy density much greater than NiMH (more than 100 watt-hours per kg). They also don't suffer from the "memory effect" of NiCads or NiMHs, and don't really lose charge just sitting on a shelf. They do lose their capacity to hold charge over time, whether used or not, so don't buy a "new" Li-ion battery that was manufactured more than a year ago.

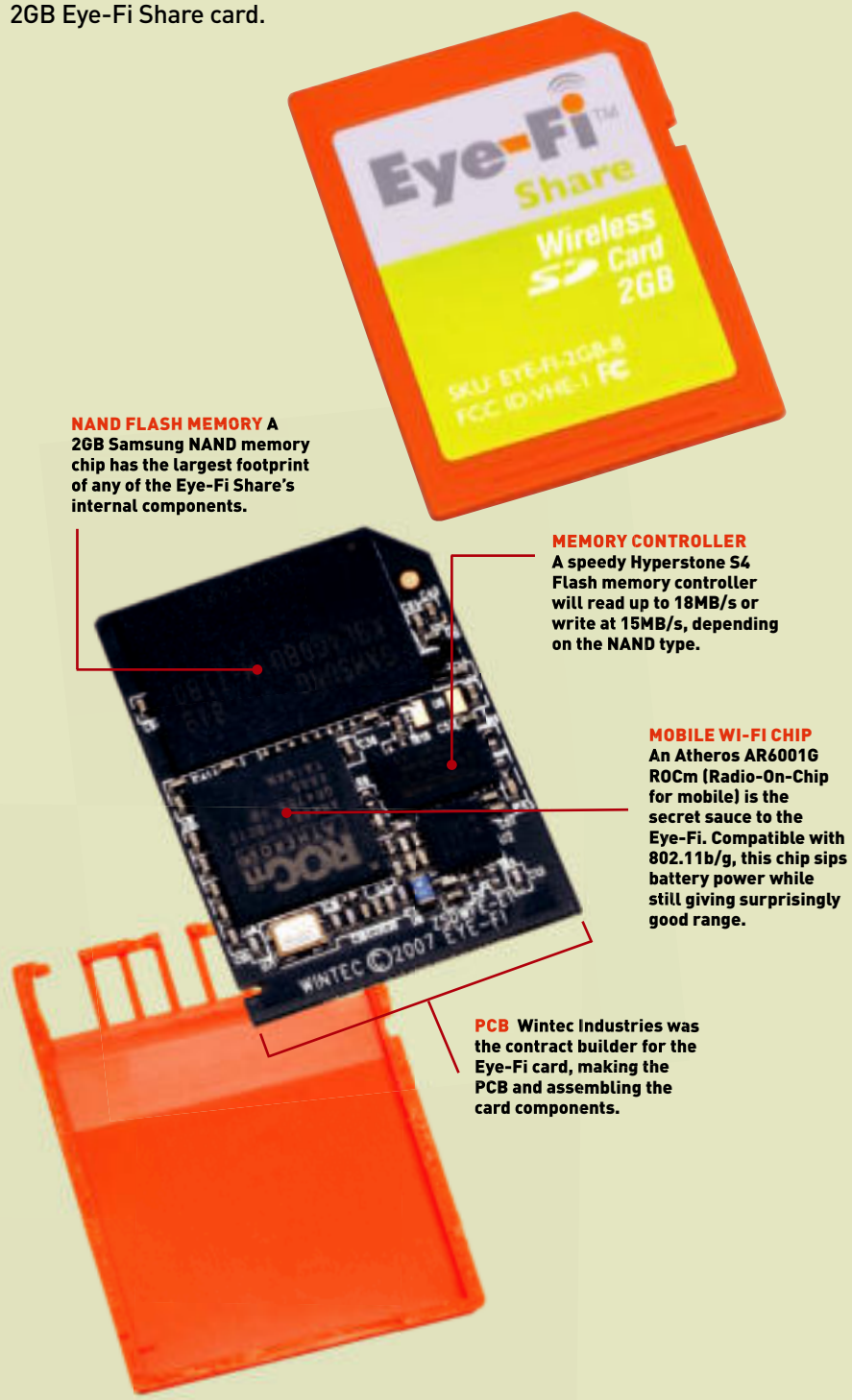
With every charge, deposits form inside the electrolyte that inhibit the ability of the lithium ions to move between the anode and cathode, and the total charge capacity goes down. This gets worse if the battery is stored fully charged or in high temperatures. The best practice is to leave your laptop only half-charged if you're not going to use it for a long time.

You may have heard of Lithium Polymer batteries. Technically a type of Lithium-ion battery, Li-Poly holds the electrolyte in a solid or gel polymer composite (polyethylene glycol or polyacrylonitrile). This makes them safer and more stable, and because they are, they don't need to be manufactured in dense, heavy, pressure-tight cylinders. Li-Poly batteries can take almost any shape, and are often lighter because they don't require a dense metal casing. On the other hand, they're also more expensive and carry slightly lower energy densities than standard Li-ion cells.

Though they may be the best of the bunch, Li-ion batteries still have their issues. You've no doubt heard about laptop or cell phone battery fires in recent years. Li-ion batteries can get very hot, and if there's a failure in the separator inside the battery and the venting organic electrolyte ignites from a spark or heat, it can quickly catch the cells on fire.

Eye-Fi Share Wi-Fi SD Card

SD cards aren't exactly hulking objects, so just how does Eye-Fi manage to jam both NAND and a Wi-Fi chip into its cards? To find out, we dissected a 2GB Eye-Fi Share card.



NAND FLASH MEMORY A 2GB Samsung NAND memory chip has the largest footprint of any of the Eye-Fi Share's internal components.

MEMORY CONTROLLER A speedy Hyperstone S4 Flash memory controller will read up to 18MB/s or write at 15MB/s, depending on the NAND type.

MOBILE WI-FI CHIP An Atheros AR6001G ROCm (Radio-On-Chip for mobile) is the secret sauce to the Eye-Fi. Compatible with 802.11b/g, this chip sips battery power while still giving surprisingly good range.

PCB Wintec Industries was the contract builder for the Eye-Fi card, making the PCB and assembling the card components.

SUBMIT YOUR IDEA Ever wonder what the inside of a power supply looks like? Don't take a chance on destroying your own rig; instead, let us do the dirty work. Tell us what we should crack open for a future autopsy by writing to comments@maximumpc.com.

HOW TO

Step-by-Step Guides to Improving Your PC

THIS MONTH

KEEPING IT SIMPLE

NORMAN CHAN
ONLINE EDITOR

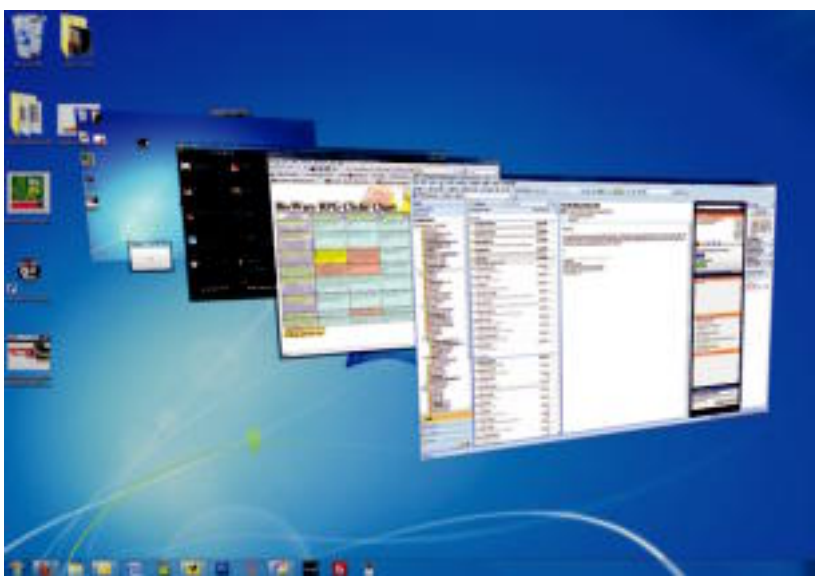
Twitter is slowly becoming the social network of choice for keeping tabs on friends. Its phenomenal success is partly due to its adherence to the age-old adage: Keep it simple. For today's Internet users, who live their lives 140 characters at a time, minimalism is a virtue, especially when it comes to user interfaces. Banners, sidebars, and toolbars all get in the way of accessibility; people just have no tolerance for clutter. That's why Twitter and Google keep their homepages as utilitarian as possible.

But what about other popular services? If you think Gmail's design could shed some waste, use Minimalist Gmail (http://bit.ly/2EhHXo), a Firefox extension that strips the mail service down to the basics. You should also try Printliminator (http://bit.ly/2vuRpQ), a coded bookmarklet that lets you selectively delete parts of individual websites for clutter-free viewing and printing.

Have any tweaks that keep your favorite sites neat and simple? Send tips my way at norman@maximumpc.com!

SUBMIT YOUR IDEA
Have a great idea for a How To project? Tell us about it by writing to comments@maximumpc.com.

WINDOWS TIP OF THE MONTH



Manually Reboot Aero

Windows 7's graphically enhanced Aero interface looks great, but some OpenGL applications inadvertently disable it. To manually get Aero back up without rebooting your system, launch the command prompt as an Administrator and type `net stop uxsms`, followed by `net start uxsms`. This jump-starts the Desktop Windows Manager, giving you back your translucent windows.

Essential Outlook Tweaks

Are you stuck using Outlook at work? We feel your pain. Compared to the alternatives, like Mozilla's lightweight and customizable Thunderbird client, Outlook is slow, bloated, and downright unwieldy. Add to that the fact that it isn't free, and Outlook doesn't appear to have much going for it. But whether you use Outlook because you have to or because you've grown accustomed to its interface and are reluctant to switch, we have some tricks to help you manage your email and contacts like a pro. –PAUL LILLY

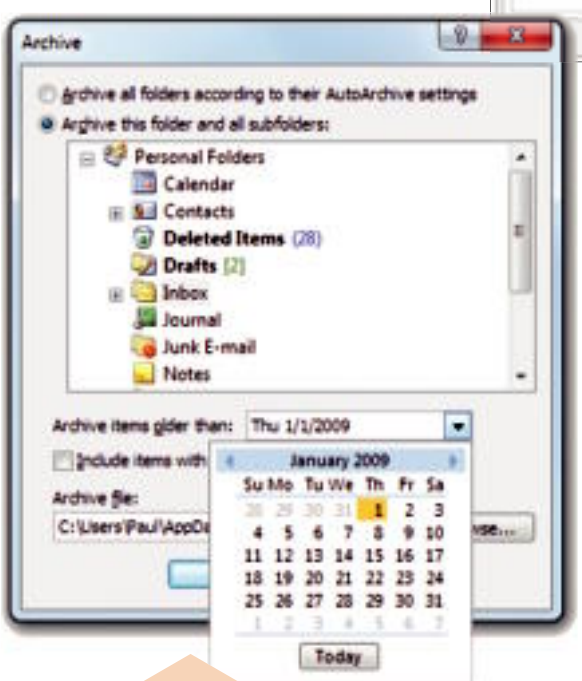
1 ARCHIVE OLD MAIL ON YOUR TERMS

Every once in awhile, Outlook will offer to auto-archive your old email items, but if you take the time to do this yourself, you can keep those old files infinitely more organized than Outlook is able to do on its own.

But why even archive email in the first place? If you don't, Outlook's Personal Folders (PST) file will continue to expand, kind of like Jabba the Hutt left unattended at an all-you-can-eat buffet. As the PST file grows in size, Outlook may start to feel sluggish. The rate at which this happens depends on your emailing habits, but whether you're a light or heavy email user, at some point, Outlook will lose its initial pep.

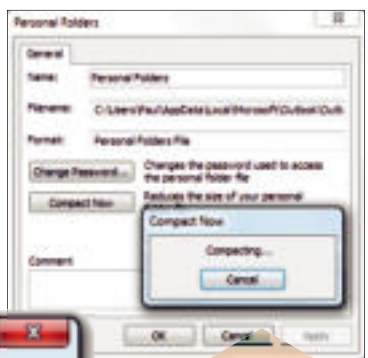
Your best course of action is to set up an annual or biannual archive. Or if you're a regular chatty Cathy, a monthly archive might better suit you. No matter what the interval, the basic steps will be the same. To get started, click File on the toolbar and select Data File Management. Next, click the Add button and choose the desired format (stick with the default if using Outlook 2007). Click OK and give your archive a name, such as "2008" or "Jan-June_2008." For that warm, fuzzy feeling, go ahead and password protect your new archive when prompted.

You should now see two entries in the Data File Management window. Go ahead and close the window because we're now ready to start archiving items to our newly created PST file. One way to do this is by dragging and dropping individual mail items to the newly created entry under Mail Folders. Depending on how much email you need to move, this can take a long time.



A better way to move old files is by navigating to File>Archive. Make sure the "Archive this folder and all subfolders" radio button is checked. Next, highlight the folder you want to archive (or your entire Inbox), specify the appropriate date in the "Archive items older than:" pull-down menu, click the Browse button to select your newly created archive file, and then punch OK.

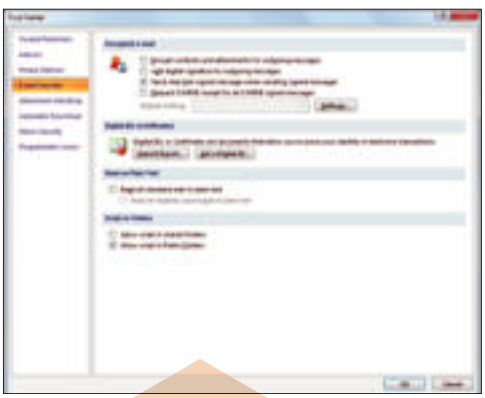
Houston, we have a problem! You followed the above steps, but your original PST file (which you can find by navigating to C:\Users\[username]\AppData\Local\Microsoft\Outlook) is just as large now as it was before you archived all your email.



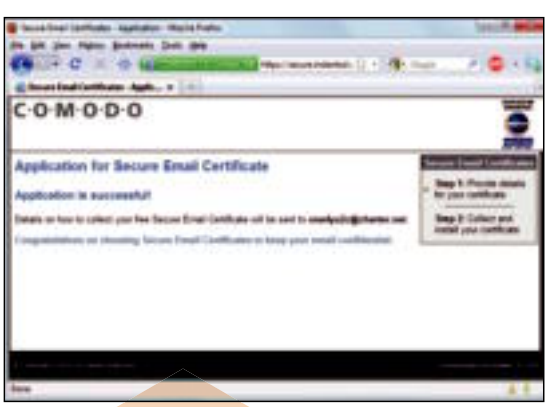
This isn't cause for concern; it just means Outlook's automatic background compaction hasn't kicked in yet. Part of what this does is reclaim the empty space in your PST file and give it back to your hard drive. But if you don't feel like waiting, or if you have waited and there's still no change, you can tell Outlook to get to work. Just go back to the Data File Management window, double-click the PST file, and select Compact Now. Once again, be patient, because, depending on the initial file size, this could take a while.

2 SIGN YOUR EMAILS WITH A DIGITAL ID

It's not at all difficult for hackers to impersonate you by spoofing your email address and sending out emails that appear to come from you. Luckily, there's something you can do to give your recipients some peace of mind that, hey, this email is the real deal. You need a digital ID.



You can think of a Digital ID as sort of an electronic driver's license. The digital certificate, which is verified by a trusted third party, tells the recipient that you are who you claim to be. Anyone can get one, and to get yours, navigate to Tools > Trust Center. Highlight Email Security in the left-hand column and then click the "Get a Digital ID" button.

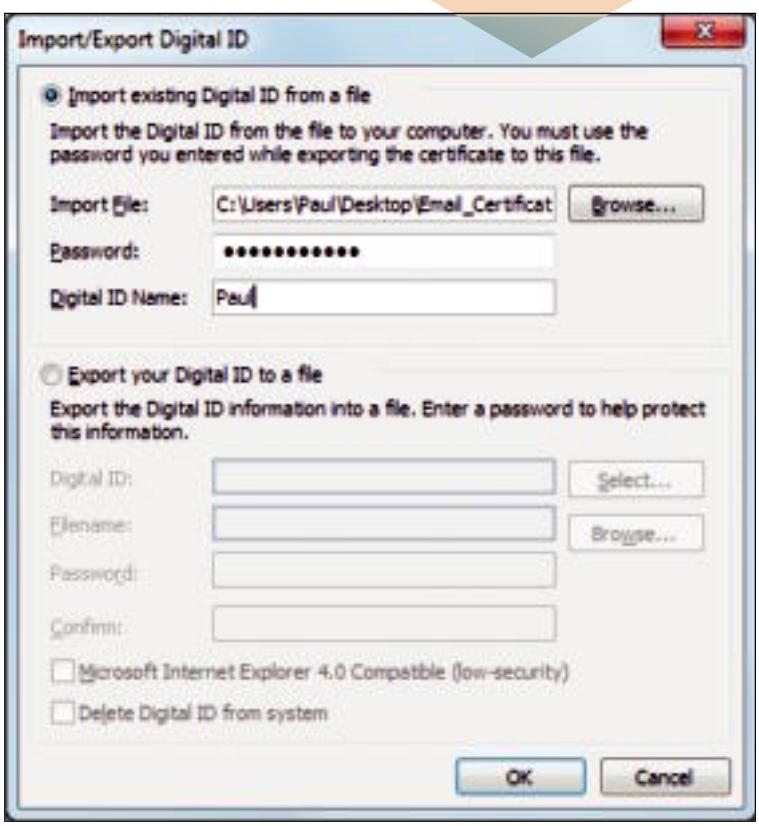


This brings up the Digital ID page on Microsoft's Office Marketplace website, which can be a little overwhelming. You can research the available options on your own, or follow our lead and head straight to InstantSSL by Comodo (http://bit.ly/3w0Dtk). It's free, while most of the alternatives are not.

After filling out the online form, you'll receive a verification email (ours showed up almost instantly) alerting you that your digital signature is ready for collection. Click the included hyperlink to download and install the certificate.

Now we need to import the certificate into Outlook, but the steps will be slightly different depending on which browser you used to retrieve it. Firefox users will navigate to Tools > Options > Advanced and bring up the Encryption tab. Click the View Certificates button, highlight your certificate, and click the Backup button to save it to your hard drive. If you're an IE user, go to Tools > Internet Options and bring up the Content tab. Click the Certificates button, then press Export, and follow the prompts.

To import your certificate into Outlook, fire up your email client and navigate back to Tools > Trust Center > Email Security. Click the Import/Export button, then punch the Browse button to locate the certificate on your hard drive. Fill in the appropriate fields and you've got your very own digital ID certificate.



If you want Outlook to use your digital ID every time you send an email, navigate once again to Tools > Trust Center > Email Security and click the "Add digital signature to outgoing messages" checkbox. This can slow things down, so you may opt to only digitally sign emails when the need arises, such as when firing off an important email to your boss or co-conspirator for world domination. To manually add a digital ID on an as-needed basis, click Options in the email you're composing. Expand the More Options section on the right-hand side, mash the Security Settings button, and then check "Add digital signature to this message." When you fire off the email, the recipient can check the digital ID and verify that it really came from you!

3 BACKUP, TRANSFER, AND MANAGE YOUR AUTOCOMPLETE LIST

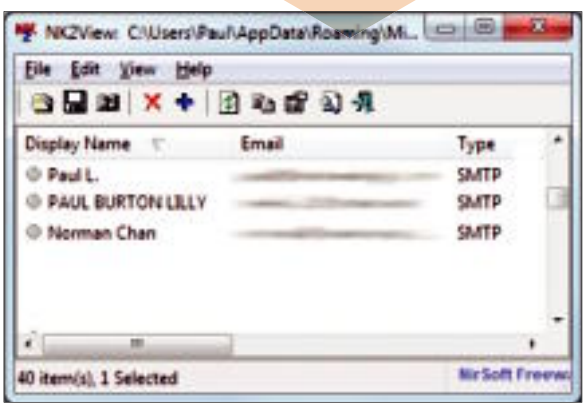
Over time, Outlook becomes pretty adept at predicting who it is you're trying to email and can usually accurately guess the recipient based on a single keystroke. This saves a ton of time, particularly if one of your frequent contacts has a long and convoluted email address and you'd rather not poke around in your address book. But there's a problem. As power users, we frequently find ourselves upgrading hardware and reinstalling Windows, which means the entire learning process starts anew. Or does it?

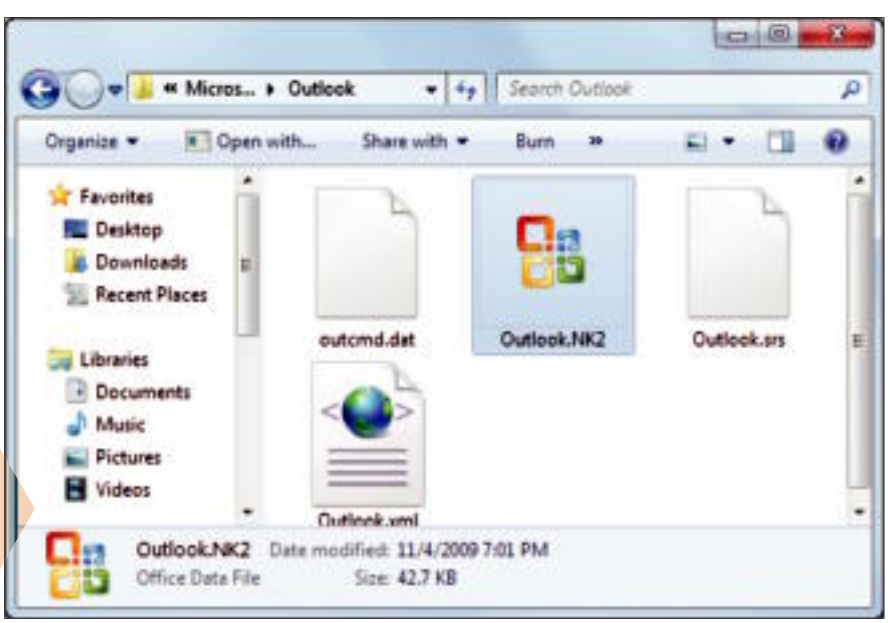
Whether dealing with a fresh Windows install or transferring your Outlook DNA to another machine, you can bring your auto-complete info along for the ride, but you won't find it in your PST file. Instead, this info lays hidden in a separate NK2 file.

To find it, you first need to close Outlook. Once you do that, navigate to C:\Users\[username]\AppData\Roaming\Outlook. If you're having trouble locating the directory, check to see that you've allowed Windows to show hidden files and folders (Control Panel > Appearance and Personalization, then click "Show hidden files and folders" under Folder Options). Alternately, bring up the Start menu (or Start > Run if you're using XP) and type `%APPDATA%\Microsoft\Outlook`.

Once you've located the NK2 file, simply copy it to a USB key and then transfer it to the same directory on the destination PC, or when you reinstall Windows.

Of course, Outlook doesn't always correctly guess who you're trying to email, and that can be frustrating when you're in a hurry. Not only that, but should one of your contacts switch email addresses or drop off the face of the earth, you'll want to delete their AutoComplete info. Unfortunately, the only way to do that is to begin typing their name and when it appears, press the down arrow to highlight the entry and the DEL key to nuke it. This can be time consuming if you have a lot of contacts to update, and Outlook doesn't allow you to edit the NK2 file. Luckily, there's an app for that. Nir Sofer's lightweight N2KView executable (http://bit.ly/JiWhb) displays the email records stored in Outlook's AutoComplete file. Just fire up the app, then proceed to delete any AutoComplete entries that are outdated. You can also use this handy utility to add items from your Address Book, and as an alternative way to back up and restore Outlook's AutoComplete file. You'll find all these options in the File menu.





Meta-Tag Your Music

The number one reason to practice proper CD-ripping technique is to ensure that you get proper ID3 tags embedded in each of your MP3s. Unfortunately, sometimes the damage is already done, and you have to deal with a folder of badly tagged, or untagged, songs.

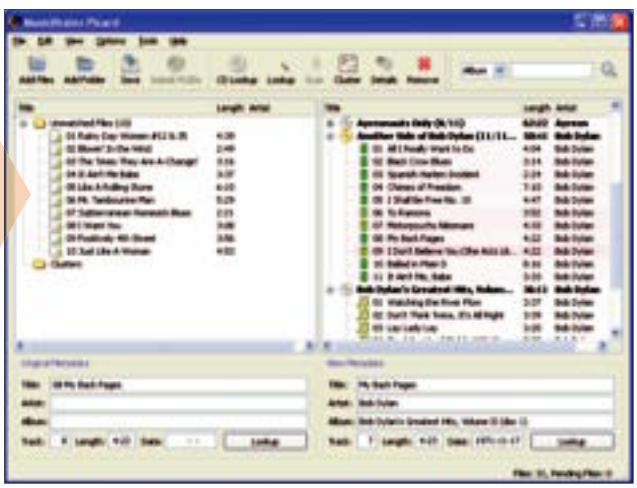
But there's good news: It's actually fairly easy to restore a chaotic MP3 folder to order. Several excellent freeware programs exist to do just that, but we've found the best results from MusicBrainz Picard (http://bit.ly/4u5kxt), an ID3 lookup database that automatically fills out missing tag data for your MP3s. By following these steps, you can spot-clean problem folders in no time. –ALEX CASTLE

1 LOAD FILES INTO PICARD

Simply start Picard, and drag a folder containing badly tagged music files from Windows Explorer to the Picard window. Processing a single album at a time works best, although you can also process a few at once, if you're attentive.

2 LOOK UP ID3 TAGS

Press the magic-wand Lookup icon at the top of the window. Picard will attempt to sort your files into their proper albums. If it gets any wrong (either by not sorting a file, or putting it into the wrong album), simply drag the file onto the album in which it belongs.



3 SAVE TAGS

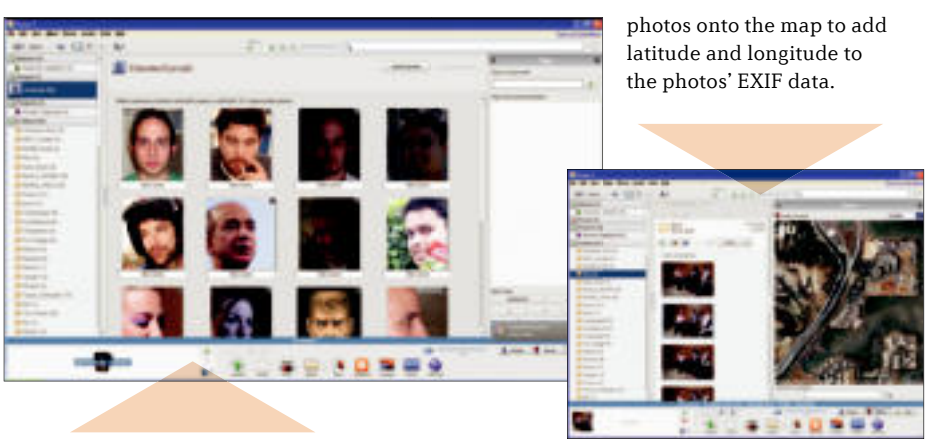
When you're satisfied with how Picard has organized the files, simply select the files (you can press Ctrl + A to select all files) and click the Save button. Picard will edit the ID3 tag information in your MP3 files.

Meta-Tag Your Photos

Even though automatic image-recognition technology is getting more advanced by the day, there's still no way to automatically add tags to all your images. Fortunately, there are programs that make the process of manually adding tags much easier and faster. Chief among these is Picasa, the photo management application from Google. Here are three steps to get started tagging your photos in Picasa. –ALEX CASTLE

1 LET PICASA TAG PEOPLE

Once Picasa has had a chance to scan all your photos (which can take a while), it will automatically group similar faces together, and place them in the Unnamed category in the left-side People menu. You can then add a name for each unnamed person, and Picasa will apply that name to every face it identifies as the same person. For privacy reasons, Picasa doesn't add these names as IPTC tags, but it does sync with your Google contact list, letting you associate faces with email addresses and other contact info.



2 GEOTAG YOUR PHOTOS

Picasa lets you add location data to your photos with a built-in Google Maps window. To access it, just click the Places button in the lower left-hand corner of the Picasa client. Then, simply drag photos onto the map to add latitude and longitude to the photos' EXIF data.

3 ADD SUBJECT TAGS

Finally, Picasa makes it easy to add IPTC tags to your photos. Click the Tags button in the bottom left, and select a photo, multiple photos, or a whole album. Then either enter a tag into the field, or click a "quick tag," and it will be applied to all photos.

Turn Your Laptop into a Wi-Fi Access Point

If you've ever been in a situation when you absolutely, positively need to share a network connection wirelessly (to a mobile device, for example), and you have a PC or laptop with a wireless adapter that's running Windows 7, you're in luck! Connectify (http://connectify.me/) turns almost any Windows 7 PC with a working wireless network adapter into a fast and secure wireless access point. –MARK SOPER

What you need:

- **A PC running Windows 7 or Windows 7 RC**
- **A working wireless adapter (some Intel adapters won't work)**
- **Connectify Me software**
- **About 15 minutes**

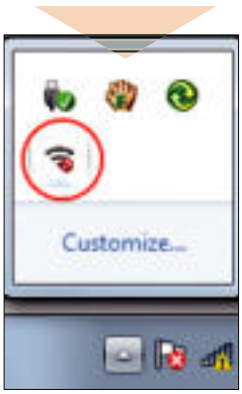
1 GET STARTED

Navigate to the Connectify Me website and click either the Download Beta button or Beta Test Now shield. When prompted, enter the required registration information and click Submit. Next, click the Click Here to Download Connectify link to download it immediately (instead of waiting for the promised email link, which you may or may not receive in a timely manner).

Run the 1.41MB installer and provide UAC information if prompted. After you sign off on the license agreement, let the installer get to work. When the software is installed, click Next to finish. By default, Connectify will immediately start up after the install, and a readme will open in your browser.

2 SET UP CONNECTIFY

If you don't see the Connectify icon in the taskbar, it may be hidden in the notification area. Click the up arrow pointer on the taskbar to display additional icons. Then click the Connectify icon.



The first time you start Connectify, you will see an error message. That's because Connectify needs you to provide a passphrase. Click the passphrase field and enter the text you want to use. You must enter at least eight characters (up to 32) for your passphrase text (you can display or hide the text as desired). Connectify uses WPA2 AES encryption for maximum security.

By default, Connectify uses "Connectify" as its SSID. To change the SSID, enter the name you prefer in the Wi-Fi Name field.

If you have more than one connection you can share, select the connection to share from the Internet pull-down menu. You can use Connectify to share a wired connection or a wireless connection. You need only one wireless adapter to make sharing work, even if you're sharing a wireless connection wirelessly.

Click the Hotspot Off button to turn on the Connectify access point.

3 CONNECT TO A CONNECTIFY ACCESS POINT

Whether you use Windows XP, Windows Vista, Windows 7, MacOS, or Linux, you'll connect to the Connectify access point the same as you would with any secure wireless access point that broadcasts its SSID:

- Select the SSID used by the network
- Enter the passphrase when prompted
- Make the connection
- Make any firewall or other configuration changes requested by your wireless network client

Once other PCs have connected to the Connectify access point, Connectify lists the computer(s) connected to it by their network names and IP addresses.

When you shut down the connection, Connectify "remembers" who was connected to the network, listing them as "disconnected clients."

Connectify works—and works well—because it relies on new networking features built into Windows 7. Right now, Connectify costs nothing to try—and it provides a solid, secure, and fast connection. Whether you're looking for a quick way to share a wired connection in a hotel room or conference center, add wireless capability with Internet access to a home or office wired network, or set up a quick, easy LAN party without fiddling around with your normal network configuration settings, Connectify looks like a winner. It's one of the coolest reasons to move up to Windows 7.

REVIEWS

Tested. Reviewed. Verdictized

INSIDE

ONLINE

- EVEN MORE REVIEWS!
- BEST OF THE BEST
- EDITORS' BLOGS
- NO BS PODCAST

Falcon Northwest Talon

QuadFire, quad-core, and quiet, too

When Falcon Northwest submitted its Talon PC to us instead of its top-gun Mach V, we didn't think the machine stood a chance of taking down the spate of ripping-fast 4GHz Core i7 rigs we've seen in the last few months.

And we were right. But the point Falcon was trying to make with its Talon was that its machine could deliver 90 percent of the performance of those big LGA1366-based Core i7 rigs at half the cost, half the noise, and half the energy consumption. Impossible? We thought so.

But that was before we'd ever heard of ATI's new Radeon HD 5970 card. Code-named Hemlock, this new card features not one, but two of the GPUs that power the Kick Ass Radeon HD 5870.

Falcon uses two of these cards in the Talon, for quad-GPU action, and pairs them with an LGA1156 Core i7-870 overclocked from its stock 2.93GHz to very stable 3.83GHz. We stress-tested the Falcon for more than 48 hours without a single crash.

For storage, Falcon tapped a pair of Intel's 34nm X25-M 80GB SSDs. Bulk storage is left to a 1TB Samsung Spinpoint drive.

The 64-bit Windows 7 Pro–based Talon's benchmark scores didn't disappoint—but they didn't send us swooning, either. The Talon beat our zero point, a Core i7-920 overclocked to 3.66GHz. We saw predictable results, with the Falcon faster in Premiere Pro CS3 and Photoshop CS3. Photoshop CS3 actually saw a performance delta of 19 percent, thanks to the SSDs in the Talon and the higher Turbo mode clocks. However, in ProShow and MainConcept, the Talon's scores were closer to the zero point's, but still faster. In gaming, pitting two dual-GPU Radeon HD 5970 cards against a single Radeon HD 4870 X2 turned out as expected: with almost an 80 percent difference in frame rates. Even better, the CrossFire (or should we say QuadFire?) Radeon HD 5970s let you tick on 16x AA in Crysis with nary a drop in performance. Frankly, for folks with a single, 24-inch panel, these two cards are overkill (but feel free to experiment with three or more panels in the cards' Eyefinity mode).

The Talon features two ATI Radeon HD 5970 dual-GPU cards.

Now, what about those claims of taking on those 4GHz-plus Core i7 boxes? Falcon hit its target. It couldn't beat the $9,000 Velocity Micro Raptor SE that we reviewed in December, but it was just 10 percent slower. The Raptor SE's tri-SLI also held a 5 percent edge in Crysis, but we suspect that with this class of machine, Crysis is quickly being limited by the CPU. Amazingly, the Talon managed to surpass the Windows Vista–based AVADirect machine we reviewed in our Holiday issue, even though the latter's Core i7 was clocked up to 4.4GHz.

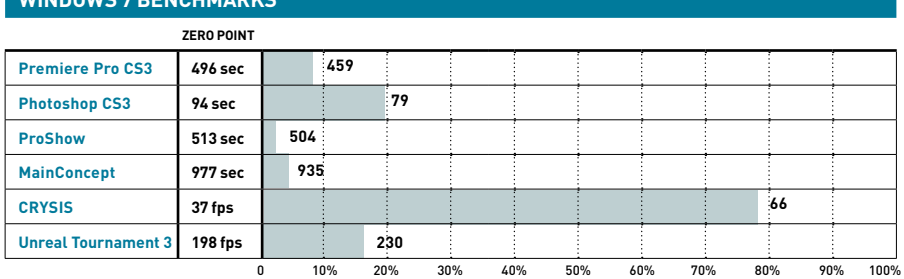
Even more amazing, the Talon could hold its own against machines that are almost twice as pricey, while being incredibly quiet. Not HTPC quiet, but you'd be unlikely to identify this machine as an all-out gaming rig judging by the sound output. In power consumption, the Falcon peaked at about 500 watts—half as much as the AVADirect machine.

The Talon is not the most powerful machine we've ever tested, but it still gets our approval for being fast, freakishly quiet, and even energy efficient. Heck, it'll even save you a few thousand bucks, to boot. —GORDON MAH UNG

SPECIFICATIONS

Processor	IIntel 2.93GHz Core i7-870 @3.83GHz
Mobo	MSI P55-GD65
RAM	8GB Crucial DDR3/1600
Videocard	Two MSI Radeon HD 5970 in CrossFire mode
Soundcard	Onboard
Storage	Two Intel X25-M 80GB in RAID 0; 1TB Samsung Spinpoint 7,200rpm hard drive
Optical	Lite-On 22x DVD burner
Case/PSU	Silverstone case with Exotix paint job and 1,000W Silverstone PSU

WINDOWS 7 BENCHMARKS



Our current desktop test bed consists of a quad-core 2.66GHz Intel Core i7-920 overclocked to 3.66GHz, 6GB of Patriot DDR3/1333, a Radeon HD 4870 X2, and a 1.5TB 7,200rpm Seagate 7200.11 hard drive. The motherboard is a Gigabyte GA-EX58-UDR3 motherboard and a Corsair TX850 PSU. OS is Windows 7 in 64-bit mode.

MAXIMUM PC KICK ASS!

VERDICT 9

FALCON NORTHWEST TALON

+ VIPER MK II	− FD STARFIGHTER
Dual Radeon HD 5970s; super quiet; relatively energy efficient.	Where's the Blu-ray drive? Will never get a hexa-core upgrade.

$4,800, www.falcon-nw.com

Intel DP55KG

Intel finally gets the SATA ports right!

It's no secret that we haven't exactly had great love for Intel's motherboards of late. Heck, we once openly wondered why the hell Intel even bothered to make enthusiast boards anymore.

Intel's LGA1156 DP55KG, aka Kingsberg, board doesn't erase all of our misgivings, but it does make us think that Intel is at least trying rather than phoning it in.

Take the SATA-port placement. Most enthusiast boards use forward-facing SATA ports to get around today's honking-big graphics cards. But Intel's X48 and X58 boards had all SATA ports pointing straight up. It was as though Intel was in denial over the size and importance of today's GPUs. The DP55KG finally remedies that flaw by aiming all eight SATA ports forward. Want more proof that Intel is learning? The DP55KG even includes an Intel-branded SLI bridge—something we thought we'd never see.

Other nice enthusiast touches include a surface-mounted power-on switch and a decorative skull backlit by blue LEDs. Even cooler, the skull's eyes are lit by red LEDs that indicate drive access. We also like the PCI-E slots Intel selected. The slot size corresponds to the signaling, so you can easily figure out that the x4 slot is x4, and the x8 is x8. Those same slots, however, also accept a full-length physical x16 card. Most boards use full-length x16 physical slots with x4 or x8 electrical plumbing, which leaves you guessing about which is which.

On the other hand, Intel could have borrowed a trick from Asus on its RAM slots. The P7P55D Deluxe board that we reviewed last issue featured one-sided DIMM slots to let you remove memory without having to pull the GPU. The DP55KG RAM slots are so close that you'll have to yank the GPU if you want to mess with the RAM. A couple of the fan headers are also poorly placed, but the physical layout of the board is fairly clean and well thought out. Intel even includes an embedded Bluetooth module and external antenna. We're not sure why, but free is free, right?

One area where we found the DP55KG wanting is in auto-overclocking. While the Asus P755D Deluxe would auto-overclock our Core i7-860 to a very stable 3.87GHz, and the Gigabyte GA-P55-UD6 (reviewed December 2009) would auto-overclock to the 3.5GHz range, the Intel board took us to an unstable 3.67GHz when we set the Desktop Control Center to "beyond manufacturers limits." We did manage to get a stable 3.3GHz overclock on a second run, but the "extreme" setting led us to an overnight session that just failed in the end. Mind you, the same CPU and cooler was used in the Asus board that went to 3.87GHz. Overall, we were unimpressed. Manual overclocking will yield far better results.

In performance, the DP55KG was mostly comparable to the Gigabyte and Asus boards, although slightly slower. However, we continued to see inexplicably wacky results among all three boards in our gaming benchmarks. With the exact same videocard, GPU drivers, and game versions, the boards' frame rates were all over the map. As we've said before, we think the discrepancies are the result of the Turbo Boost in Core i7 processors, which jacks clocks up or down based on load, thermals, and power consumption. In loads that hit all cores, the results were predictable, but in lightly threaded loads, such as gaming, the results can be baffling.

In the end, Intel's DP55KG is still a lot like its predecessors: a stable and conservative mobo for those who trust the Intel name. There's a lot to be said for that, as Intel's qualification and engineering is the envy of the industry. But if you're looking for a true enthusiast board, there are better ones out there. —GORDON MAH UNG

BENCHMARKS

	Intel DP55KG	Gigabyte GA-P55-UD6
PCMark Vantage 64-bit Overall	7,130	**7,536**
Everest Ultimate MEM Read (MB/s)	**15,691**	12,997
Everest Ultimate MEM Write (MB/s)	10,839	10,811
Everest Ultimate MEM Copy (MB/s)	14,925	**15,414**
Everest Ultimate MEM Latency (ns)	**50**	53
Sisoft Sandra RAM Bandwidth (GB/s)	17	17
3DMark Vantage Overall	14,918	15,002
3DMark Vantage GPU	12,172	12,231
3DMark Vantage CPU	46,138	46,815
Valve Particle test (fps)	152	**159**
Crysis CPU (fps)	130	**156**
Resident Evil 5 fixed DX9 (fps)	**148**	115
World in Conflict (fps)	189	**282**

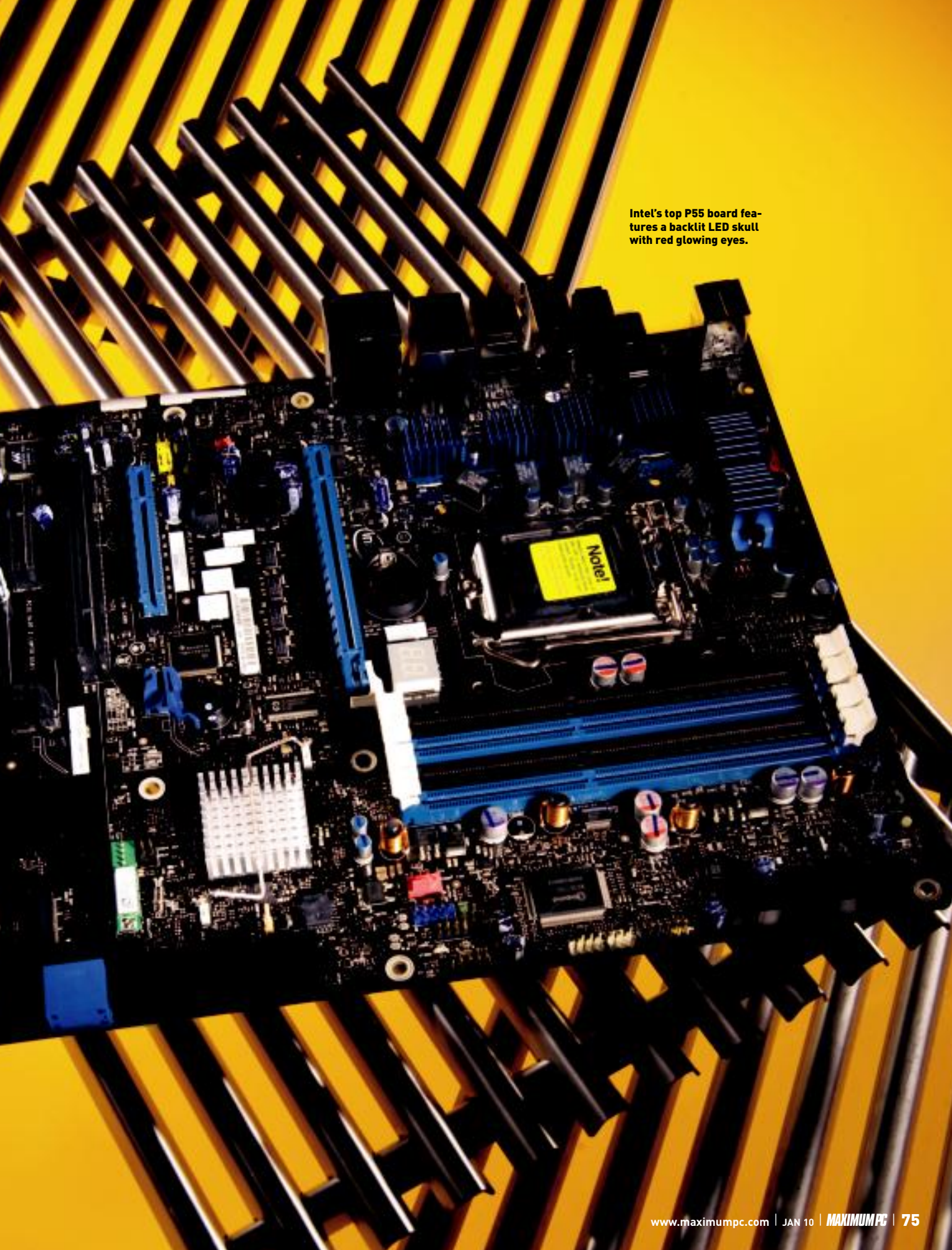
Best scores are bold. We tested both motherboards using a Core i7-870, 4GB of DDR3/1333 Corsair DRAM, an EVGA GeForce GTX 280, a Western Digital Raptor 150GB, and 64-bit Windows Vista Home Premium.

VERDICT **8**

INTEL DP55KG

+ LOST ARK	− CRYSTAL SKULLS
Easy-to-understand PCI-E slots and that cool-ass skull.	RAM slots too close to GPU; auto-overclocking underwhelms.

$200, www.intel.com



Intel's top P55 board features a backlit LED skull with red glowing eyes.

GammaTech Durabook D14RM

Takes a lickin'...

The D14RM can withstand substantial abuse, yet its brawn doesn't make it too heavy or cumbersome.

GammaTech's Durabook D14RM is the antidote for folks who are really rough on their hardware. The notebook's gray and black magnesium-alloy case, complete with black rubberized corners, not only makes the rig look burly, but also serves to protect it from aggressive manhandling.

GammaTech says the notebook complies with MIL-STD-810F guidelines for ruggedness, so we put those claims to the test. We "accidentally" knocked the D14RM off a desk when the machine was open and running a program, dropped it from a standing position onto a concrete floor (a few times, because it gave us such a thrill), and spilled a full 16-ounce cup of liquid across its keyboard. The D14RM withstood all that abuse without any apparent damage to its structure or functionality. And mind you, the D14RM uses a mechanical hard drive. Yes, an SSD seems like a more obvious choice for a notebook that's meant to be tossed about, but then it wouldn't be nearly so affordable.

The D14RM is a business-class notebook, with components that are suitable to that role—a 3.06GHz Core 2 Duo, 4GB of DDR2/800, a 320GB 5,400rpm hard drive, integrated graphics, and Windows Vista Business 64-bit (Windows 7 Home Premium, Pro, and Ultimate are also options). But in our initial benchmark runs, we were surprised to see scores that trailed our 2.53GHz zero-point machine by more than 30 percent in some cases. Further investigation revealed a serious power-management flaw. Even with the power plan set to High Performance, the D14RM's two cores dropped to half-speed when the notebook was plugged into an outlet; when the notebook was unplugged and running on battery, the CPU performed at full speed. Weird, huh?

It seemed like a BIOS issue to us, and, indeed, GammaTech delivered us a BIOS fix within a few days of our discovery, which resolved the matter. But it does make us question how the company could miss a flaw this massive.

With the updated BIOS, the D14RM performed as expected. It bested our zero-point business notebook by very healthy margins in almost every benchmark. The only exception was in Photoshop, where our zero-point held a minor 2.3 percent lead, likely the result of that notebook's SSD. We also compared the D14RM's scores to the iBuypower M865TU that we reviewed in November, since both notebooks use the exact same 3.06GHz T9900 processor. Each notebook won two of our four content creation benchmarks, neither by more than seven percent, so we'll call it a draw.

In terms of amenities, the D14RM offers a good selection of ports, including HDMI—all of which are protected with attached rubber caps to prevent dirt and dust from mucking with the works. But it's strange that GammaTech makes these allowances for outdoor use yet outfits the D14RM with a glossy 1280x800 screen. Such a highly reflective surface is totally unsuitable for use in bright natural light. Back in the plus column, our model came equipped with the Bluetooth, built-in 3G GSM modem, and webcam options, to make the sturdy D14RM an accommodating overall package—and for about half the price of a comparably sized Panasonic Toughbook. **—KATHERINE STEVENSON**

SPECIFICATIONS

CPU	3.06GHz Core 2 Duo Mobile T9900
RAM	4GB of DDR2/800
Chipset	Intel PM45
Hard Drive	320GB Fujitsu MHZ2320BH-G2 (5,400rpm)
Optical	HL-DT-ST DVDRAM GSA-T50N
GPU	Integrated
Ports	VGA in and out, HDMI, Ethernet, modem, four USB, headphone, mic, Smart Card reader
Lap/ Carry	6 lb, 5 oz / 7 lb, 1.9 oz

BENCHMARKS

	ZERO POINT	
Premiere Pro CS3	2,400 sec	1,260
Photoshop CS3	154.3 sec	158 (-2.3%)
Proshow Producer	1,775 sec	1,619
MainConcept	3,285 sec	2,676
FEAR 1.07	7 fps	9.0
Quake 4	15.9 fps	18.8
Battery Life	180	122 (-32.2%)

0 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our test bed is a Lenovo T400s with a 2.53GHz Intel Core 2 Duo, 2GB of DDR3/1067, a 128B Toshiba SSD, and Windows Vista 32-bit.

VERDICT 8

GAMMATECH DURABOOK D14RM

+ G.I. JOE	− G.I. DISORDER
Solid performance, solid build; competitive price.	Initial BIOS flaws; glossy screen sucks outdoors.

$1,700, www.gammatechusa.com

Scythe Kabuto

Big and bad, but not in a good way

When we reviewed the Scythe Mugen 2 in the December issue, we praised its performance and ease of installation but bemoaned its enormous size. But now that we've tested its cousin, the Scythe Kabuto cooler, we've learned to be careful what we wish for. The good news is that the Kabuto mostly forgoes the Mugen 2's ample proportions. The bad news is that it also forgoes the easy installation and excellent cooling.

The Kabuto's heat-dissipation system looks like someone took a standard skyscraper-style air-cooler's fin stack and bent it 90 degrees, so the heat pipes run parallel to the motherboard instead of up into the air. A 12cm 1,300rpm Scythe PWM fan sits atop the fin stack and blows air downward. At the base, the six heat pipes are sandwiched between the CPU heat exchanger and a solid heatsink, but aren't integrated into either, thus reducing the Kabuto's cooling power.

Though the Kabuto is shorter than the Mugen 2 and most of the other coolers we've tested recently, it's not small. It rises 4.9 inches above the motherboard, and is 5.25 inches to a side—just big enough to make its choice of mounting system for Socket 775 and 1136 a terrible one. The Kabuto uses the same plastic pin mounts as a stock Intel cooler. These work fine on a stock cooler, eliminating the need to mess around behind the motherboard. But the Kabuto's fin array is large enough that it completely overhangs the pins, making mounting an incredibly frustrating procedure, especially on a Socket 775 board.

When we finally got the Kabuto installed in our test rig, we hoped its cooling power would compensate for its terrible install. It did not. The Kabuto's performance at idle was no better than the stock cooler: 35.25 C, compared to 31.75 C from our champion Cooler Master Hyper 212+. At full burn, the Kabuto did better, cooling our rig's CPU to 55 C, 10 degrees cooler than stock. But the Hyper 212+ managed 44 C under the same conditions.

BENCHMARKS

	Scythe Kabuto	Cooler Master Hyper 212+	Stock Cooler
Idle (C)	35.25	**31.75**	35.25
100% Burn (C)	55	**44**	65

Best scores are bolded. Idle temperatures were measured after an hour of inactivity; load temperatures were measured after an hour's worth of CPU Burn-In (four instances). Test system consists of a stock-clock Q6700 processor on an EVGA 680i motherboard inside a Corsair 800D case with stock fans.

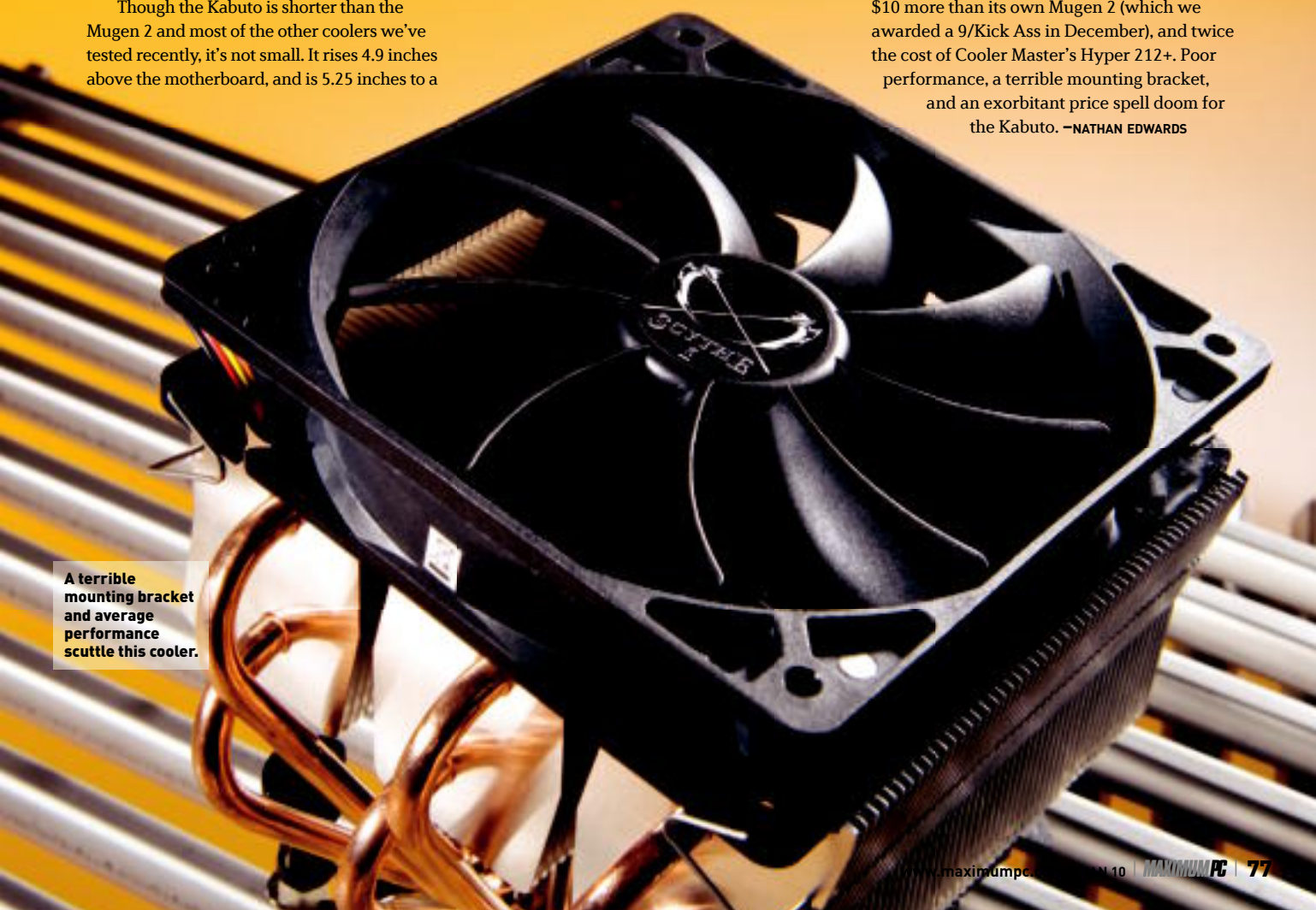
SCYTHE KABUTO

VERDICT 4

+ KABLOOEY	− CALAMITY
Better-than-stock performance; PWM fan is nice to see.	Poor performance; bad mounting bracket; high price. Scythe's own Mugen 2 does it much better.

$60, www.scythe-usa.com

Scythe is selling the Kabuto for $60, $10 more than its own Mugen 2 (which we awarded a 9/Kick Ass in December), and twice the cost of Cooler Master's Hyper 212+. Poor performance, a terrible mounting bracket, and an exorbitant price spell doom for the Kabuto. **–NATHAN EDWARDS**



A terrible mounting bracket and average performance scuttle this cooler.

Seagate Barracuda XT 2TB

Finally, Seagate's 7,200rpm 2TB drive

When Seagate told us it would be shipping the first 6Gb/s SATA hard drive, we were a little surprised. And when we found out it wasn't going to be a solid state drive, but a 7,200rpm Barracuda drive, our skepticism increased. Sure, we'd been waiting a long time for Seagate's 2TB 7,200rpm drive, and it's nice to see the SATA 6Gb/s spec ship on a real-world product, but putting a 6Gb/s controller on a mechanical hard drive is like putting a Formula 1 airfoil on a golf cart. The vehicle just ain't ever going to go fast enough to warrant the accessory.

In order to test the Barracuda XT on a level playing field, we built a new rig: a 2.66GHz Core i5-750 and 4GB of DDR3 RAM on an Asus P7P55D-Premium motherboard, which has an onboard Marvell SATA 6Gb/s controller as well as an Intel 3Gb/s SATA controller. The rig runs Windows XP SP3 and 64-bit Vista Home Premium from a 300GB WD Raptor. We tested both the Barracuda and its closest competitor, the 2TB WD Caviar Black, on both the Marvell and Intel controllers.

On the Marvell controller, the Barracuda reached average sustained read speeds of 108.3MB/s and average sustained writes of 102.3MB/s—only slightly faster than on the Intel controller. Random access times were within a few fractions of a millisecond on both controllers, averaging 14ms for random reads and 7ms for random writes, though reads were faster on the Intel controller and writes were faster on the Marvell. Strangely, burst transfer rates on the Marvell controller were nearly 30MB/s slower than on the Intel—186MB/s versus 214MB/s.

We saw the same pattern when we tested the WD Caviar Black 2TB on the Marvell and Intel controllers—random reads were faster on the Marvell, and random writes on the Intel, and burst speeds were significantly higher on the 3Gb/s controller. But this time the drive's average sustained write speeds took a huge hit—from 112MB/s on the 3Gb/s Intel controller to 99MB/s on the 6Gb/s Marvell controller.

Though we give Seagate props for being the first hard drive manufacturer to include a 6Gb/s SATA interface, it's of questionable utility—the technology just isn't mature enough to warrant inclusion on a mechanical hard drive. The Barracuda XT's performance on a 3Gb/s SATA controller rivals the Kick Ass 1TB Barracuda 7200.12, though it's much more expensive. So don't sweat it if you don't have a board with 6Gb/s SATA yet (and who does?). However, the WD Caviar Black has higher average sustained transfer rates, lower random access times, and a higher burst transfer rate, so it remains our champion high-capacity drive. **–NATHAN EDWARDS**

VERDICT 8

SEAGATE BARRACUDA XT 2TB

+ PAINTING THE LINE	– PAINTING THE LILY
100MB/s-plus reads and writes; props for early adoption of 6GB/s SATA.	Performs better on 3Gb/s SATA; can't match WD Caviar Black; 6Gb/s SATA completely unnecessary.

$350, www.seagate.com

BENCHMARKS

	Seagate Barracuda XT (6Gb/s)	WD Caviar Black 2TB (6Gb/s)	Seagate Barracuda XT (3Gb/s)	WD Caviar Black 2TB (3Gb/s)
h2benchw Average Sustained Transfer Rate Read (MB/s)	108.3	**112.1**	108.2	**112.1**
h2benchw Average Sustained Transfer Rate Write (MB/s)	102.4	99.6	101.8	**112.1**
h2benchw Random Access Read (ms)	14.62	10.25	14.41	**9.99**
h2benchw Random Access Write (ms)	7.08	**5.38**	7.34	5.55
HDTach Burst Read (MB/s)	186.5	197.4	214.0	**217.1**
PCMark Vantage HDD subscore	5,094	**5,786**	5,102	5,698

Best scores are bolded. All drives tested on our new hard drive test rig: 2.66GHz Core i5-750 on an Asus P7P55D-Premium motherboard. 6Gb/s scores obtained using onboard Marvell 6Gb/s SATA controller; 3Gb/s scores from Intel SATA controller. HDTach 3.0.1.0, h2benchw, and Premiere Pro CS3 were obtained in Windows XP; PCMark Vantage scores were obtained in Windows Vista Home Premium 64-bit.

The SATA 6Gb/s!
It does (almost) nothing!

Lian Li Tyr PC-X1000

Tall and striking, but not as tall and striking as its price tag

Lian Li has long had a reputation for crafting excellent cases at exorbitant prices, and the Tyr PC-X1000 upholds both standards. Like the PC-X2000 (rebadged as the ABS Canyon 695 and reviewed in December 2008), the PC-X1000 swaps depth for height, measuring more than 26 inches tall but less than 18 inches wide and 9 inches deep. The Tyr PC-X1000 offers a lot of compelling features, from five 14cm fans to thermally isolated compartments to 2.5-inch hard drive mounts. It's visually striking, packed with amenities, and (of course) expensive. Is it worth it?

Thanks to its height, the Lian Li Tyr PC-X1000 looks much thinner than it actually is. The black brushed-aluminum design is minimalist but attractive, eschewing LED fans and internal lighting altogether—fine by us, especially as the side panels lack windows. The X1000 has plenty of front connectors: four USB 2.0 ports, FireWire, eSATA, and audio.

What it lacks in flash, the PC-X1000 makes up for in features: Like its predecessor, the X1000 is divided into three thermal zones. The bottom zone holds the PSU, a three-slot removable hard drive bay, and a 14cm intake fan. The main compartment has two dust-filtered 14cm intake fans and one 14cm exhaust fan, a removable motherboard tray, two toolless 2.5-inch hard drive brackets, a toolless PCI retention bracket, and the same useless retention bar that we removed from the X2000. The top compartment holds two stealthed 5.25-inch optical drive slots, one 5.25-inch/3.5-inch combo slot, and another three-slot removable hard drive cage, as well as an additional 14cm exhaust fan.

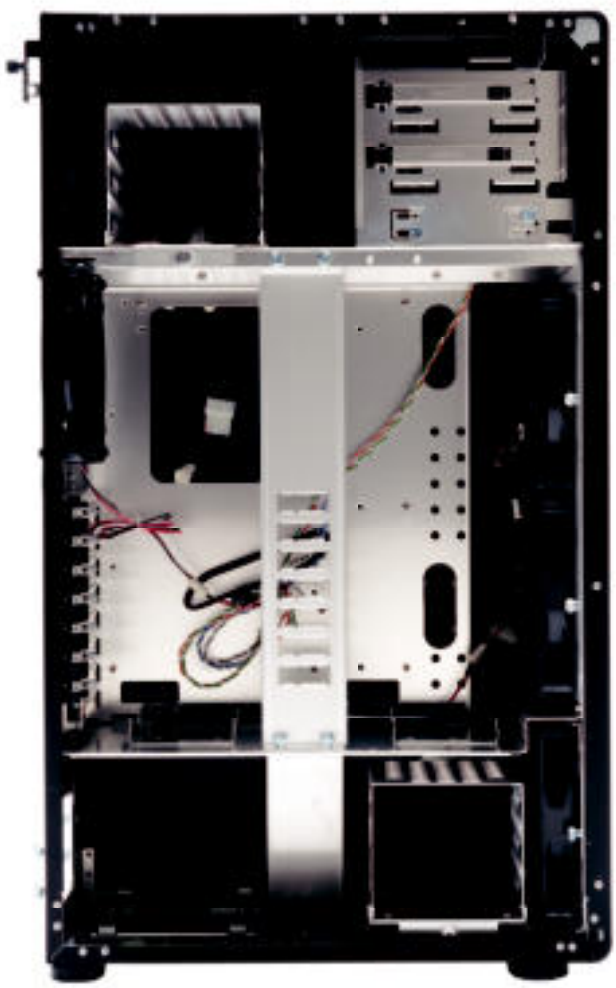
The Lian Li Tyr PC-X1000 offers a lot of great features and excellent build quality, but the price is obscene.

The hard drive bays aren't hotswap and don't use rails, unlike the bays in the X2000. Instead, drives are secured with rubber antivibration grommets and thick thumbscrews. The 2.5-inch bays at the bottom of the motherboard compartment are also removable.

We dig the sturdy PCI-card retention latches, which work well to keep your expansion cards secure in lieu of screws, but the plastic cowling on some dual-slot graphics cards can keep the lower slot from latching securely. Fortunately, the whole set is removable, so we were able to use more-standard thumbscrews when we needed to.

That's a lot of stuff to fit into a case that's only 18 inches from front to back, and Lian Li takes some steps to maximize usability—most notably in that virtually every cage and bay is removable. Both the top and bottom three-slot drive trays are easily removable using a thumbscrew, as is the front fan panel, for easy filter cleaning. Thanks to the removable motherboard tray and drive bays, installation was easy. Still, the closer quarters means there's not a lot of room to hide cables, so you'll have to work hard to avoid a cluttered-looking build.

The Lian Li Tyr PC-X1000 is a good-looking, well-constructed case with excellent cooling and a whole host of conveniences. But it's also a bit cramped inside, with no room for an internal water-cooling reservoir. And we miss the SATA backplanes of the PC-X2000. But the biggest downside to this case is its price. The PC-X1000 retails for $400—twice the price of the Cooler Master ATCS 840, our favorite full-tower. If the PC-X1000 were $200, it would be a compelling alternative to bulky full-towers and shoddy mid-towers. At $400, it's skippable. **—NATHAN EDWARDS**



The PCI card retention bar is one of the first things we remove from any Lian Li case.

VERDICT 7

LIAN LI TYR PC-X1000

+ PLINY THE ELDER	− VESUVIUS
Well-constructed and stylish; good toolless mechanisms; five multi-speed fans; built-in 2.5-inch bays; removable mobo tray.	Way overpriced; no hard drive rails/SATA backplanes; just two optical bays.

$400, www.lian-li.com

Dell Ultrasharp U2410 24-inch Display

Sometimes you have to pay to play

A proximity sensor in the UltraSharp U2410's bezel lights up its capacitive-touch controls when your finger approaches.

At a time when you can buy a 24-inch LCD monitor for less than $300, why would you ever consider spending twice that much for Dell's 24-inch UltraSharp U2410? Because the U2410 is a precision instrument; those $300 monitors are really just HDTVs sans tuners.

To be fair, those cheap monitors are a good deal if all you need is a display for watching movies, surfing the web, playing games, and editing snapshots destined for Flickr or grandma's digital picture frame. But if your livelihood depends on factors such as visual accuracy and color fidelity—or if you're just passionate about excellence—the U2410 is the better value.

The U2410 is based on an IPS (in-plane switching) LCD panel, which is considerably more expensive to manufacture than the more common TN (twisted nematic) panels you'll find in inexpensive monitors. IPS panels, on the other hand, typically boast superior color reproduction and much wider viewing angles compared to TN panels. The U2410 not only delivers on both those counts, it also boasts a gray-to-gray response time of just six milliseconds, which is very fast for an IPS panel.

The U2410 delivers native resolution of 1920x1200 pixels (16:10 aspect ratio) with true eight-bit color depth, which means it's capable of displaying 16,777,216 colors without resorting to dithering. It supports 12-bit color internally, imbuing it with a total palette of 1.07 billion colors. The display delivers 102 percent of the NTSC color gamut. TN panels, by contrast, are typically limited to six-bit color depth (262,144 colors) in order to achieve fast response times (some as low as two milliseconds); they use frame-rate control (dithering) to simulate 16,194,277 colors; and most deliver only 72 to 80 percent of the NTSC color gamut.

The U2410 boasts two DVI ports as well as one each of HDMI, DisplayPort, VGA, component, and composite (leaving out only S-Video). There are no integrated speakers (no great loss as far as we're concerned), but the monitor will accommodate Dell's AX510 Sound Bar if you really need it. There's a media-card reader and a four-port USB 2.0 hub, too. The display is mounted on a height-adjustable stand, and it tilts, swivels, and pivots so you can work in portrait mode.

Dell calibrates the Adobe RGB and sRGB modes for each U2410 before it leaves the factory, and we didn't find any need to change the settings for either. The first thing we noticed when we began testing the display with DisplayMate Multimedia with Test Photos Edition (www.displaymate.com) was the total absence of leakage from the screen's CCFL backlight: Gazing at DisplayMate's Dark Screen test looking for stuck or discolored pixels was like staring at the monolith from *2001: A Space Odyssey*. Color uniformity was fantastic and grayscale performance was exceptional.

Although the U2410 has a relatively slow response time and is limited to a 60Hz refresh rate, we didn't encounter any problems with motion blur or ghosting while watching movies or playing games. If you're extremely sensitive to these phenomena, you probably won't like the U2410 for those applications. But for everyone else, this is the 24-inch monitor to buy—if you can swing the budget. **—MICHAEL BROWN**

MAXIMUM PC KICK ASS!

VERDICT 9

DELL ULTRASHARP U2410 24-INCH

+ CHESHIRE CAT	− JABBERWOCK
IPS panel; relatively fast response time; excellent color accuracy; ergonomic stand; integrated USB hub and media card reader.	Expensive; slow response time (at least when compared to TN panels).

$600, www.dell.com

Lite-On iHAS424

Hang onto your old DVD drive

Lite-On's iHAS424 is the first 24x DVD burner we've tested so far, and sadly, the experience doesn't sell us on the speed bump. Currently, DVD+R media is capped at 16x speeds, but drive makers will nevertheless tweak their hardware to exceed that limit. Often such "over-speeding" techniques are restricted to higher-quality, name-brand media to ensure reliability—in Lite-On's case that means DVD+R discs bearing the Taiyo Yuden brand. With anything else, you're stuck at regular-ol' 16x.

This was the caliber of performance we experienced in our tests, since we always use Verbatim media (manufactured by Mitsubishi) to evaluate optical drives. The iHAS424 filled a single-layer DVD+R disc in 5:53 (min:sec), with an average write speed of 11.66x. That's more than a minute slower than Samsung's SH-S223 22x drive (4:46), which happens to be tuned for Verbatim media, but not necessarily other brands (the upshot is that speed claims above 16x only apply to specific types of media). In DVD+R reads, the Lite-On and Samsung drives were more simpatico, with times of 4:56 and 4:55, respectively.

The iHAS424 doesn't make any highfalutin claims about its dual-layer performance. It's rated at a fairly typical 8x. We were surprised, however, by how much longer this drive took to fill a DVD+R DL disc compared with its similarly spec'd peers, including the iHAS424's predecessor, the iHAS422 (reviewed May 2009). Lite-On's older 22x drive wrote 7.96GB of data to a DL disc in 16:36, while the new iHAS424 turned in a slacker's time of 23:36. Samsung's SH-S223, also rated at 8x for DL, still holds the record at this task with a time of 13:13. Again, the iHAS424 put in a better showing with its read times. This was particularly evident in our disc-ripping benchmark. The iHAS424 copied the contents of a dual-layer movie disc to the hard drive in a brisk 10:24.

That alone can't earn this drive our highest recommendation, though. To begin with, unless you're wedded to Taiyo Yuden media, you're no better off in terms of write speeds than with a drive that's two or three generations old. So, if your 16x or 18x burner is still functional, stick with it. If you truly are in need of a new burner, however, by all means, go for a fast one—with many priced below $50, there's no reason to leave even nominal performance gains on the table. But given the iHAS424's slow dual-layer writes, this isn't the drive we'd move up to.

—KATHERINE STEVENSON

BENCHMARKS

	Lite-On iHAS424	Lite-On iHAS422	Samsung SH-S223
DVD+R Write Speed Average	11.66x	11.82x	**14.94x**
DVD+R Read Speed Average	12.09x	12.14x	**12.16x**
Access Time (Random/Full)	148/228ms	**113/174ms**	117/204ms
DVD+DL Write Speed Average	6.17x	6.99x	**9.12x**
DVD Ripping (min:sec)	10:24	**10:16**	15:26/8:13*

*Best scores are bolded. Our test bed is a Windows XP SP3 machine using a 2.66GHz Intel Core 2 Quad Q6700, 2GB of Corsair DDR2/800 RAM on an EVGA 680 SLI motherboard, one EVGA GeForce 8800 GTS card, a Western Digital 500GB Caviar hard drive, and a PC Power and Cooling Turbo Cool PSU. All tests were conducted using Verbatim media and Nero DiscSpeed, except the ripping test, in which we time how long it takes to copy the contents of a double-layer DVD to a VelociRaptor hard drive. *Time after third-party patch.*

VERDICT 7

LITE-ON iHAS424

+ DEADWOOD	− DEAD WOOD
Affordable; capable of exceeding 16x DVD+R performance.	Brand-specific 24x performance; slow DL writes.

$40, www.liteonit.com

The iHAS424 will only reach 24x speeds with one particular brand of media.

Flip Video MinoHD 8GB

Useful improvements make this the iPod of pocket video cameras

With the original MinoHD, we were impressed with Flip Video's ability to pack 720p video into a truly pocket-size cam. But we nonetheless wished the product offered a bit more, such as more recording time, HDMI support, and a bigger screen.

Those are three of the top improvements Flip Video made to its new MinoHD 8GB. Recording time has doubled from the original's one hour, a mini HDMI connector lets you play your videos on a large high-def display, and the device's screen now pushes two inches, up from the postage stamp–size 1.5 inches in the original MinoHD. The transflective screen isn't just bigger, either; it also increases pixel count from the original's 528x132 resolution to 960x240. Side by side, it's obvious that the new screen is a major improvement.

Flip didn't stop there in its MinoHD upgrade. The lens is slightly wider than the original's, which makes it easier to frame two people without having to back way up. The newer version also features a brushed-aluminum façade and feels more solid than the older model. Startup seems slightly improved, too, taking just a little over two seconds. Features we've always liked about the Flip Video cameras live on in the newer version: Plug the device into a USB port and it auto-launches the FlipShare software to let you view, import, edit, mail, or burn your videos. The app is kept simple for stupid folks, so even if you've never edited a movie or uploaded to YouTube, you will find it incredibly easy to use. Heck, the camera is so simple, you could hand it to Fredo without worrying he'd botch a shoot like he botched the hit on the Don in Cuba.

That strength is also a weakness, as it doesn't take long for you to outgrow the app. That simplicity also cuts out more-advanced features, like the ability to take still images, lower the resolution, or increase the frame rate. The MinoHD 8GB is, like all of Flip's cameras, a truly dummy-proof device. Flip even borrows a feature from Apple's playbook by using a non-user-replaceable battery in the MinoHD—we guess that's to keep you from hurting yourself.

Video quality is good for this class of device. The H.264 files are not overly compressed and the auto white-balance is decent. Low-light performance is also OK, thanks to its F/2.4 lens. The output is far from what you would get with a typical HDV camera or a good-quality AVCHD cam, but frankly, this camera is perfect for spontaneous moments, like when a classmate is streaking the quad. Audio is also quite good and is now stereo instead of mono. Unfortunately, you can't change the audio recording level, but again, if you could do that, you'd only screw it up, right?

So, what's not to like? First, there's no HDMI cable. For $230, you'd expect the cable to be thrown in. And maybe a charger, too. But Flip has never included a charger, assuming we all have a USB port handy at all times. These are minor problems with an otherwise handy video camera. It's not for advanced users by any stretch of the imagination, but it's still a hoot to use and have around. —GORDON MAH UNG

VERDICT 9

FLIP VIDEO MINO HD 8GB

+ FLIP WILSON	− FLIP FLOPS
Larger screen; HDMI; miniature size.	Should come with HDMI cable and charger.

$230, www.theflip.com

There's a reason the MinoHD is popular with celebrities: It's kept simple for stupid.

Auzentech X-Fi Home Theater HD

Not so evil, but not so necessary

When we reviewed Asus's Xonar HDAV 1.3 Slim in November 2009, we described it as a necessary evil for home-theater enthusiasts because of its unique ability to send Dolby TrueHD and DTS-HD Master Audio bit streams from a PC's Blu-ray drive to an A/V receiver over HDMI. By the time you read this review, you should be able to do the same thing with any video-card equipped with a Radeon HD 5000-series GPU. How much value will Auzentech's premium-priced X-Fi Home Theater HD retain under those circumstances?

The answer depends on how fanatical you are about audio quality. Auzentech's PCI Express card features Creative's awe-some 20K2 audio processor and all the great software features that go with it, including the X-Fi Crystalizer for music playback, ASIO 2.0 support for audio recording, and EAX 5.0 and OpenAL support for gaming. The onboard Cir-rus Logic CS4382 DAC boasts dynamic range of 114dB, and the stereo operational ampli-fier plugs into a socket, so you can swap out the stock National Semiconductor model for something stronger. There's an onboard head-phone amplifier, and a combo TOSLINK and S/PDIF connector on the mounting bracket, so you can use either optical or coaxial cables for digital audio connections.

Analog audio connections are handled by a D-Sub connector on the mounting bracket. This connector mates to a proprietary analog audio I/O cable with four 1/8-inch stereo line-level outputs, one 1/8-inch MIC input, and one 1/8-inch line input. There's a 1/8-inch headphone jack on the mounting bracket, too. Internally, the board has an Intel HD Audio–compatible front-panel audio header, plus the proprietary connections to accommodate Creative's X-Fi Titanium I/O Drive.

We predict most people will eschew the multichannel analog outputs in favor of HDMI. But bits are bits, and if an HDMI connection is all you're looking for, Auzentech's solution won't sound any more fabulous than two far cheaper solutions: a Radeon HD 5750 video-card or an Asus HDAV 1.3 Slim.

Unlike Asus, Auzentech doesn't include the Blu-ray player software you'll need to stream Dolby TrueHD and DTS-HD Master Audio over HDMI. At press time, CyberLink's PowerDVD 9 Ultra ($90) was the only compat-ible software (Asus bundles ArcSoft's Total-Media Theatre 3 with its HDAV series cards).

There are cheaper alternatives to Auzentech's no-compromises X-Fi Home Theater HD card, but none that offer more features or better analog quality.

Cyberlink added this functionality to the OEM version recently, so if you received a copy with your Blu-ray drive, you're all set.

We criticized the HDAV 1.3 Slim because it relied on the increasingly archaic PCI architecture. Auzentech's card will plug into any PCI Express slot, but its 3.75-inch height prevented us from putting the lid back on our home-theater PC (AMD's Maui refer-ence design, which is housed in an nMedia HTPC 2000 case). We also had to remove the mounting-bracket screw because it blocked the card's HDMI input.

The X-Fi Home Theater HD will be over-kill for most, but gaming audiophile home-theater enthusiasts with deep pockets will dig its pristine sonic qualities and extensive feature set. And this being *Maximum PC*, we're willing to overlook its high price tag and the fact that it doesn't come with all the software it needs. But we're withholding a Kick Ass award because the card is too tall to fit in many home-theater enclosures, and there's just no excuse for not being able to put a screw in the mounting bracket without block-ing the HDMI socket. —MICHAEL BROWN

VERDICT 9

AUZENTECH X-FI HOME THEATER HD

+ PIE	− CAKE
Top-shelf compo-nents; swappable op-amp; pristine analog audio quality.	Expensive; Blu-ray player software not included; too tall to fit in many home-theater PC cases.

$250, www.auzentech.com

Western Digital WD TV Live

One media streamer to play them all

High-definition video files were meant to be seen on big-screen televisions, not your 19-inch PC monitor. But getting these files—either personally ripped from high-def sources or downloaded from the Internet—from your desktop to the living room has always been a cumbersome process. Users previously had the option of streaming over a network to devices like the Xbox 360 or PlayStation 3, which have restrictive file compatibility, or they could use a dedicated video player like Western Digital's WD TV, which could only play back files from attached USB drives. The new WD TV Live, however, comes with a much-needed Ethernet port, and along with the addition of other new hardware and software features, is the best video streamer we've tested yet.

Like its predecessor, the WD TV Live doesn't actually store any media. Plug portable hard drives filled with your movies, music, and photos into the player's two USB ports and it'll output the content to your home theater via either an HDMI, composite, or component video connection (also added since the original design). And while the first WD TV supported a host of popular file types, format compatibility on this successor is even more impressive. In our tests, high-bitrate 1080p videos encoded with MPEG, Xvid, H.264, or WMV codecs played without a hitch, even when housed in a variety of file containers, like Matroska MKVs. You can also play videos with multiple audio tracks, soft subtitles, and even DTS audio—a big omission in the last iteration. We only ran into problems on a few occasions, most notably with WMV 9–encoded files that wouldn't play audio, and raw video recorded from high-end digital cameras.

The player earns its Live moniker with a built-in Ethernet port, so it can browse and play files off media servers, and network shares off your home network. High-def videos stored on a local PC, NAS box, and even Windows Home Server played smoothly over a 100Mb wired connection, though 16x fast-forward seeking during playback sometimes kicked us back to the menu. Wireless streaming also worked by tethering the player to a Wi-Fi bridge, but you'll need an 802.11n connection to get reliable high-def streaming. While connected, the WD TV Live appears on your network as a network share, so you can drop files directly onto a USB drive attached to the player.

Being connected also lets you browse videos from YouTube, play music from streaming services like Pandora, and view photos from Flickr, but logging in or navigating through these services is frustrating given the unit's difficult-to-use onscreen keyboard.

With the player's emphasis on video playback, audiophiles will be a bit disappointed by the lack of gapless music playback and playlist customization. Sure, the WD TV Live will play every DRM-free music file in your collection, but sifting through a list of hundreds of albums is annoying. Some users have also reported that their players cut off half a second of playback from the beginning of songs, though we didn't encounter this problem.

These gripes aside, the WD TV Live is still a significant step up over last year's model—the network support alone justifies an upgrade. There's still room for improvement, much of which may be addressed by community-released custom firmware, but even out of the box, the WD TV Live is your best bet for liberating videos from the confines of a dinky desktop display.

—NORMAN CHAN

VERDICT 9

WESTERN DIGITAL WD TV LIVE

+ BLU-RAY RIPS	− DVD RIPS
File playback over a network; component video output; improved file compatibility over the first WD TV.	No DRM-encrypted file support; time-consuming directory navigation; not ideal for music playback.

$150, www.wdc.com

Robust media-format support on the WD TV Live means you can finally leave the time-consuming process of video transcoding behind.

Canon Pixma Pro9000 II

Make big, beautiful color prints in a hurry

Canon's low-end large-format printer offers superb color output, but lacks a photo black cartridge for speedy black-and-white printing.

If you're going to print your photos yourself, you might as well print them really big. After all, you can always show your photos to friends and family on your laptop or mobile phone, but there's nothing quite like a framed 13x19-inch print to really show off your skills as a photographer.

Canon's Pixma Pro9000 II is the low-end model in the company's large-format printer line, but with prices ranging from $370 to $460 online, it's hardly a frivolous investment. Plus, you need to factor in the cost of ink—$12 per cartridge or $86 for a full eight-pack. The Pro9000 II uses eight different ink colors: cyan, magenta, yellow, green, red, and black, plus photo cyan and photo magenta.

The combination of eight inks and 6,144 nozzles allows for fast printing, even in high-quality mode. In our testing, a 5x7 test print took 34 seconds, an 8x10 took 71 seconds, and an 11x17 on fine-art paper took 4 minutes, 15 seconds. Black-and-white prints, however, took considerably longer; an 11x17 black-and-white print took a little more than 19 minutes.

We printed 16 13x19 prints and 10 5x7 prints before we had to replace the first ink cartridge. Your results will vary, depending on the color mix in your prints. The first cartridge to run out in our tests was photo cyan, with photo magenta and yellow close behind.

The printer ships with printer drivers for Vista, MacOS, and Windows XP. Windows 7 drivers are available online. Canon offers helpful documentation on calibration and obtaining the best possible output using fine-art paper. While you can get superb prints using fine-art paper, it will cost a pretty penny. For example, 20 sheets of Hahnemuhle 13x19 Fine Art Baryta 325 can set you back $87. That's more than $4 per print, not counting ink!

You can do a color-balance thumbnail comparison using the bundled Easy-PhotoPrint Pro.

Canon includes Adobe Photoshop Elements 6, an older version of Adobe's entry-level Photoshop app. (The current version of Elements is 8.0). Also included is the Easy-PhotoPrint Pro plugin for Photoshop, which offers very fine-grain control over color balance and output settings. One of the cooler features is to print out a series of thumbnails on a single sheet with different color-balance settings, so you can pick which image best suits your needs.

We also liked the feature that allows you to print directly from USB flash memory keys using the USB port on the front of the printer.

Color output is stunning, even when creating quick prints. The printer control panel offers very granular control over the layout of the print. Also included are specific ICC profiles for Canon art papers, enabling better color matching. You can actually feed paper into the printer from either a rear, top feeder or from the front tray. Fine-art paper is best used by feeding single sheets from the front tray.

In the end, the Pixma 9000Pro II is a wonderfully fast printer with great output, but its Achilles' heel is black-and-white printing and the cost of keeping it fed with ink and paper worthy of it. —LOYD CASE

VERDICT 8

CANON PIXMA PRO9000 II

+ GLOSSY	− DULL
Superb color output; useful utilities; up to 13x19 print output.	Long wait for black-and-white prints; old Photoshop Elements version; large prints are costly.

$370, www.usa.canon.com

HP MediaSmart EX495

Last year's chassis, packed with major under-the-hood upgrades

The improvements HP made to its flagship Windows Home Server are a direct response to feature requests made by consumers—including us.

Last year, HP impressed us with its MediaSmart EX487 (February 2009), a Windows Home Server that shipped with proprietary software we actually found useful. The EX495, this year's follow-up, is focused on improving accessibility and addressing user requests. This third-generation Windows Home Server isn't so much an overhaul of last year's machine as it is a calculated iteration; the same unassuming case packs significant hardware and software upgrades that are the most compelling reasons yet to adopt the Home Server platform.

First, the hardware in this box looks more like a desktop PC than a bare-bones backup device. Instead of an Atom or Celeron processor, the EX495 is powered by a Pentium Dual Core CPU running at 2.5GHz—an upgrade that speeds up video processing and opens the door to real-time transcoding. Even with the increased horsepower, the machine maintained low power consumption during backups and idle states, and pulled far less than 100W during heavy load.

Performance tests clearly demonstrated the advantages of a dual-core processor. File transfer speeds outpaced those of Atom-based severs, and matched the dual-core Home Server we built in our November issue. We were also able to transcode and stream video in real time with TVersity and PS3 Media Streamer—though source videos larger than 720p required some buffering.

The rig also comes with the same 1.5TB of included storage as the EX487, but that's thankfully now on just one hard drive, leaving three open bays for expansion. The eSATA port now works as a port multiplier (for up to five drives), which was a disappointing omission from last year's model.

The new MediaSmart 3.0 software is equally impressive. Accessibility is improved with a simple local webpage where your mom and pop can perform manual backups and access media without using the Home Server Console (which has also been tweaked to be more user-friendly). The Console now has advanced options for the Media Collect and Video Conversion tools, which let you specify exactly how to monitor, extract, and process your files into network shares. Video settings, for example, now include custom profiles for choosing specific source folders, output resolution, frame rate, and audio and video bitrate. These robust settings are a godsend for automatically converting downloaded video for multiple mobile devices, like the Zune and iPhone.

For Mac users, the 3.0 software grants improved compatibility with OS X, now letting you access your server's settings and status (with remote desktop or the webpage interface) and run Media Collector on connected Macs. The EX495 can also perform a Time Machine–based hard disk restore with a bootable flash drive—yet another feature that many MediaSmart users requested. The best news for early adopters, though, is that HP is planning to release the MediaSmart 3.0 software as a free upgrade in the near future.

Finally, the EX495 is actually $100 cheaper than its predecessor—though still almost twice as expensive as Atom-based Home Servers. If you own an EX4xx series model, it's not worth upgrading to new hardware since you can upgrade to MediaSmart 3.0.

But if you're buying your first Home Server, no other solution on the market comes close to matching the EX495's performance, feature set, and ease of use. **–NORMAN CHAN**

BENCHMARKS

	MediaSmart EX495	Custom WHS
Small Files Upload (sec)	**9.0**	10.8
Large File Upload (sec)	4.0	**3.9**
Small Files Download (sec)	**8.9**	9.0
Large File Download (sec)	4.1	**3.8**

Best scores are bolded. To measure transfer speeds, we copy a 695MB folder and a 263MB video file from a desktop machine hardwired to the server and back using the Windows browser.

MAXIMUM PC KICK ASS!

VERDICT 9

HP MEDIASMART EX495

+ SCROOGE MCDUCK	– FLINTHEART GLOMGOLD
Dual-core processor; improved front-end software; cheaper than last year's model.	Still not cheaper than building your own WHS; only four drive bays.

$700, www.hp.com

Left 4 Dead 2

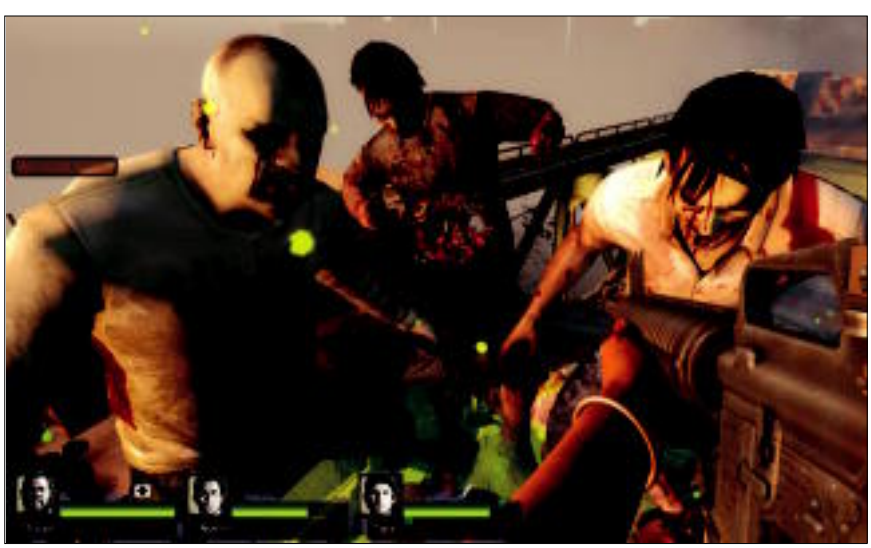
Does the world really need a Left 4 Dead sequel already?

We love killing zombies. When Left 4 Dead came out, we feared that eventually we'd tire of returning the walking dead back to the hell from which they spawned, but it turns out we didn't. However, we did quickly tire of the lame "optimal" ways that hardcore gamers developed to beat Left 4 Dead campaigns in the most efficient—yet boring—manner possible.

The bad news is that finales in Left 4 Dead 2 force you into the open. The good news? Pyrotechnics!

Enter Left 4 Dead 2. The biggest change to the established formula is the redesigned finales and crescendos—those mid-level events that attract unending hordes of zombies. Instead of simply finding a good closet and holing up for 15 minutes, popping out only to kill the occasional tank, the crescendos now require you to keep moving—either to reach a goal or collect and deliver items. The zombie closet is no more, and we don't miss it at all.

Additionally, the five campaigns are more connected—one picks up where the last left off—and more dynamic, with multiple paths through key bottlenecks in the levels. The available paths—as well as rain, fog, and other dynamic weather effects—are controlled by the improved AI Director. As before, the Director monitors the overall status of your party—health, weapons, ammo, and progress through the level—and automatically adjusts the difficulty to maintain tension while not overwhelming your party. The Director does this by sending zombie hordes, limiting ammo and weapons, and spawning the special infected.

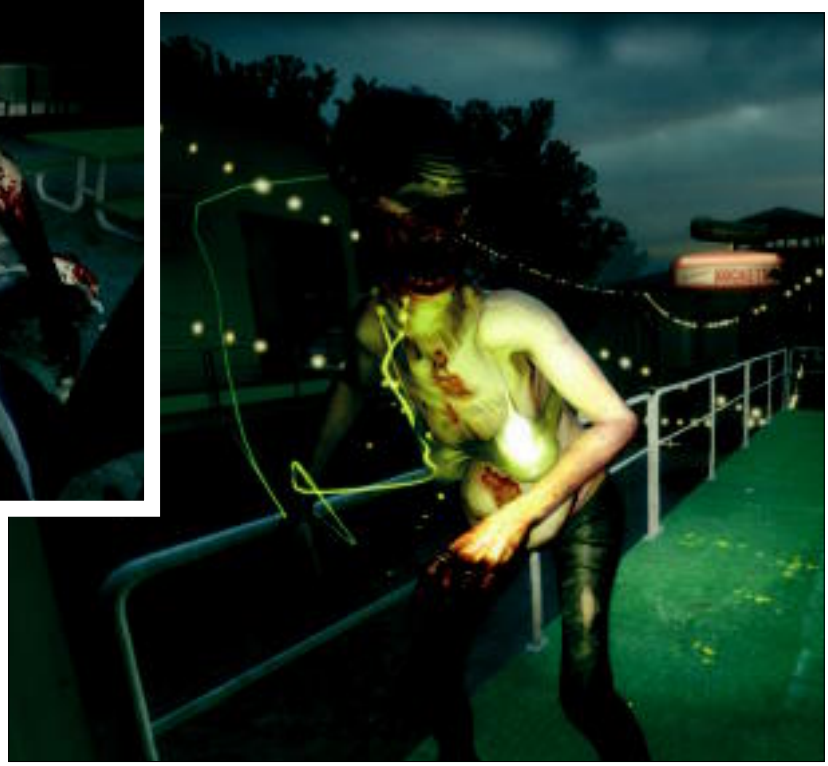


In Left 4 Dead 2, the zombie models are much more dynamic—taking damage, losing limbs, and acting more ragdoll-y.

And the special infected are back—with friends. In addition to the classic hunter, smoker, boomer, witch, and tank, Left 4 Dead 2 adds three new specials: the charger, the spitter, and the jockey—all designed to force players to keep moving and make it easier for infected to split up even good human players, which is important for both single-player and versus. Additionally, each campaign has a unique type of uncommon common zombie. These undead are not much stronger than garden-variety zombies, but each has a unique power, making the uncommon common more difficult to kill.

Naturally, there's a host of new assault rifles, shotguns, submachine guns, and pistols; but L4D 2 also adds special ammo types, grenade launchers, and melee

This lovable uncommon is ready to entertain the young 'uns by juggling, riding unicycles, and eating your brains!



With a stomach full of deadly, deadly acid, the Spitter's job is to put a stop to your forward progress.

weapons. Whether you're talking about the katana, machete, cricket bat, or chainsaw, we love the melee weapons. While you give up your pistol slot to carry a melee weapon, it's dead useful for one or two members of your party to go melee to serve as the front-line against big hordes.

Last but not least, there are a couple of new game modes. For aficionados of versus mode, which pits a team of human-controlled humans against a team of human-controlled zombies, there's Scavenge mode. Scavenge puts the combatants on small maps with tight time limits. Human players must collect fuel and return it to a generator, while the zombies try to prevent that. Because the action is condensed in a relatively small area, it's much more intense than more traditional versus battles we're accustomed to. We also really dig the new Realism mode. Realism requires players to head-shot zombies, while removing the auras that make it easy to identify friendly players, weapons, ammo caches, and other items from afar. Because you can enable Realism at any difficulty level, it helps bridge the jump from Advanced mode to Expert, although we don't recommend turning on Realism if you're not playing with your regular group.

Each campaign has a unique uncommon common zombie, which you'll find mixed in with the rest of the horde.

Our only real complaint with Left 4 Dead 2 is that the Source engine is beginning to show its age, especially in areas where there's any kind of ground cover, uneven ground, or foliage. While the new character animation system and ragdolls are impressive, it can't hide the fact that this engine is approaching its 10th birthday. Despite some graphical shortcomings, the game is a blast to play, and delivers an experience whose only real rival is its predecessor. —WILL SMITH

MAXIMUM PC KICK ASS!

LEFT 4 DEAD 2

VERDICT 9

+ GEORGE ROMERO	− JOHN ROMERO
Lots of deformable zombies + scavenge mode + melee weapons = more badass zombie killing.	Needs more weapons. Gameplay essentials essentially unchanged. Source engine looks dated.

$50, www.l4d.com, ESRB: M

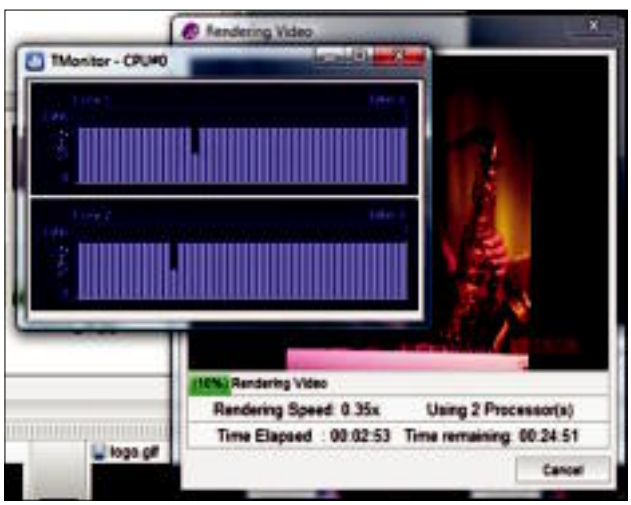
LAB NOTES

TMonitor to the Rescue

How a little utility—and a little chance—helped me troubleshoot a notebook's power problems

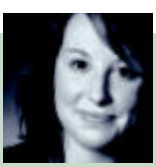
KATHERINE STEVENSON
DEPUTY EDITOR

This month, when I was benchmarking GammaTech's Durabook D14RM notebook, I became suspicious of the results, which were poor for a 3.06GHz processor. So I immediately got to troubleshooting. Using the TMonitor utility from CPUID.com, I could monitor the clock speed of the CPU's cores in real-time while I re-ran the benchmarks. And what I observed was alarming. Both cores were performing at approximately 1.5GHz under full load. There was, however, an instance when the CPU performed at full power—when the power connector just happened to become dislodged and the notebook was running on battery! This bit of chance revealed the flaw to be with the notebook's power management. I reported my findings to GammaTech and the company promptly whipped up a BIOS fix.



WILL SMITH
EDITOR-IN-CHIEF

'Tis the season to be immersed in awesome games. After playing through Borderlands a few times, I took a tour of duty through Torchlight, a Diablo-style action RPG from Runic Games. The click-fest works great on my thin-and-light, which only has integrated graphics, so I can collect loot pretty much anywhere! Next up? Dragon Age!



FLORENCE ION
EDITORIAL ASSISTANT

It was an exciting year tinkering with hardware and learning the ropes here at *Maximum PC*, but now it's time for me to move on and share my newfound expertise with the Apple-sphere. I'm joining sister publication *Mac|Life* as a member of its web team. I sure will miss the games. And Gordon's rants.

GORDON MAH UNG
SENIOR EDITOR

An intermittent hardware problem that happens only once every 25 boots can be one of the hardest things to troubleshoot because few people have the patience to reboot a system repeatedly until it blue screens again. In these cases, I turn to Passmark's free Rebooter (http://passmark.com) to reboot a system until I can reproduce the problem.

ALEX CASTLE
ASSOCIATE ONLINE EDITOR

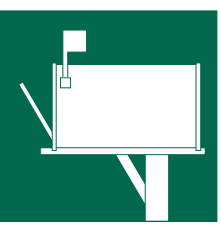
For MaximumPC.com this month, I wrote an article about SketchUp, Google's 3D modeling and design program. If you haven't tried it, you should—it's intuitive enough to learn in hours, and you can use it to model your house, make a papercraft model, or even build a Left 4 Dead map. Leave it to Google to take a program for professionals and make it *fun*!

NATHAN EDWARDS
ASSOCIATE EDITOR

This month found me buried in FreeNAS's not-always-intuitive WebGUI. FreeNAS is a powerful tool, and free is a powerful inducement. It's worth looking into, especially if you have hardware lying around—and who doesn't? I'm not sure what my next home server will be—there are a lot of great NAS boxes floating around, and some killer WHS machines, too.

We tackle tough reader questions on...

- More on PSUs, Please
- Firewalls
- The Windows Kite



Ignorant about PSUs

I've been a subscriber for years and I absolutely love the mag, but there is one way it could be better. Power supplies get very little focus from you, and just as little elsewhere in the media. Between variability in quality from one manufacturer to another and determining how many watts and 12V rails are needed when building a system, there is a great void of information you could help fill. Also, I don't know about anyone else, but over the years, I've had more problems that are a result of a dying power supply than I can remember. Assuming my plague of power supply problems aren't the result of bad mojo, I know I'd benefit from some quality PSU education by *Maximum PC*. Please save me from my ignorance!

—Todd Caldwell

Senior Editor Gordon Mah Ung Responds: As a magazine that has long derided the "free" PSUs that come with cases and preached that the power supply is one of the most important parts in your PC, we understand your dilemma, so here's the elevator speech: Buy more wattage than you need by about 25 percent; the longer the warranty, the better it likely is; and the heavier it is, the higher the quality is likely to be.

Firewall Follies

Do I need a firewall with Windows 7? Is the one built into the OS sufficient?

—Brian Commeans

Editor-in-Chief Will Smith Responds: A software firewall is absolutely vital for mobile machines, especially if you frequently connect to public networks. For desktop machines that sit behind a NAT router, which stops the brunt of malicious traffic coming from the Internet, a software firewall is less necessary. The firewall built into Windows 7 will protect your PC, but it doesn't give you the granular control, information, and filtering that a more fully featured paid product will.

Tasting the Forbidden Fruit

I am in the process of getting the parts to build my "Hackintosh" machine (June 2009). Your article calls for an Intel Core 2 Duo Processor. Will an Intel Core 2 Quad Processor also work? I am using the same motherboard that you used in your article for your build.

—Craig Schubert

Contributing writer Roberto Baldwin responds: As we pointed out in our story, the heart of your Hackintosh machine will be the EFI-X USB dongle that allows Apple's OS to run on PC hardware. Fortunately, the manufacturer's website (www.art-studios.net/goods/82) provides a thorough list of hardware that's compatible with the dongle; Intel's Core 2 Quad processor appears on that list.

Go Fly a Kite

OK, I admit, this is a bit off topic, but where did you get that Windows-logo kite (December 2009)? As a kite flyer, I can say it certainly looks real (twisted cords, texture on the seams, etc.), or is someone just that good with Photoshop? Seriously, I would like to find out where that kite came from.

—Kris Knudsen

NOW ONLINE

20 Essential BitTorrent Tips

Whether it's used for downloading open-source software or... well, other content, BitTorrent has become an essential part of the Internet experience. We teach you 20 little-known ways to trick out this ubiquitous file-sharing protocol. From remote management to bandwidth prioritization, these tips will give you faster downloads and help you better wrangle your torrent files. Read the story at: http://bit.ly/4rAGCx

Editor-in-Chief Will Smith Responds: Yes, we had a real kite made, although we didn't spend the last few bucks necessary to attach mount points for a heavy-duty harness. Judging by the pull we were getting on it when we were trying to hold it in place, it was ready to fly. Kathy Goodwind of Gasworks Park Kite Shop in Seattle (www.gasworksparkkiteshop.com) designed the kite and her son Todd sewed the sails.

Catching Flak over FLAC

In your article on ripping archival-quality MP3s from CDs (Holiday 2009), you state that "LAME can encode MP3s in all sorts of bitrates, but we're not living in 2003 here—storage is dirt-cheap and everyone's an audiophile...." Wouldn't it have been a good idea to also explain how to rip audio from CDs into FLAC? If you are going to go through the trouble of installing EAC instead of using iTunes or Media Player to rip CDs, why not go the extra step and save a copy of everything in FLAC? If you want to listen to music at home on a good sound system, you are much better off with the lossless format FLAC than MP3. Unlike MP3, FLAC is truly an exact audio copy.

—Brian Di Cesare

Associate Online Editor Alex Castle Responds: Over the years, *Maximum PC* has conducted several listening tests, and our results have always been the same: Most people can't tell the difference between high bitrate MP3s and lossless formats like FLAC. When you factor in the dearth of hardware support for FLAC, it's difficult to recommend the format. However, it is easy to rip to FLAC with Exact Audio Copy. Simply open the compression options, and tell it to use flac.exe, which is included with EAC. Then, tell it to use these additional command line options: -8 -T "artist=%a" -T "title=%t" -T "album=%g" -T "date=%y" -T "tracknumber=%n" -T "genre=%m" %s

Antiquated AMD Recommendation

You've had the MSI K9A2 Platinum motherboard on your Best of the Best list as the best Socket AM2 Athlon 64 motherboard for a long time. So, long, in fact, that you can't buy it at a lot of big stores such as TigerDirect.com. You guys seriously need to update your AMD board.

—Joseph Zimmerman

Senior Editor Gordon Mah Ung Responds: Squeaky wheels get the most attention, and AMD's rock-steady platform hasn't squeaked much. Fortunately, we have an AM3 motherboard roundup in the works and will have the list updated soon. For what it's worth, I've done the majority of our Athlon II and Phenom II testing with Gigabyte's GA-790FXT-UD5P and have been quite pleased with its performance and stability.

LCD Letdown

I have to take issue with your LCD roundup (December 2009). CCFL backlight only? Where are the LED- and OLED-based reviews? If that were not enough, the monitors were also all TN panels! Why in the realm of all performance PC sanity would you limit the article to the sprite-graphics image quality, dollar-store special, grocery-store-checkout TN panel type LCDs?!?!?

You mention response times but do you really think a 2ms blocky, bleed-through black that is really gray is better than 6ms with an 8-bit S-PVA panel?

I can fully understand the need to be more financially frugal these days with the state of the economy... but really, guys. WTF?

—Travis Yu

WHY IN THE REALM OF ALL PERFORMANCE PC SANITY WOULD YOU LIMIT THE ARTICLE TO TN-PANEL TYPE LCDS?!

Contributing Editor Michael Brown Responds: We didn't set out to produce a roundup of mediocre monitors; our objective was to examine the state of the market for 23- to 24-inch displays. We asked manufacturers to send us what they had to offer consumers, and those eight displays are what we received. The upshot? Most computer manufacturers now build PC displays using the same LCD panels that consumer-electronics manufacturers use to build HDTVs. If you're looking for a great *commercial* display, check out our review of Dell's new U2410 in this issue—but steel yourself for the price tag.

LETTERS POLICY Please send your questions and comments to comments@maximumpc.com. Include your full name, city of residence, and phone number with your correspondence. Letters may be edited for space and clarity. Due to the amount of mail we receive, we are unable to respond personally to all queries.

NEXT MONTH

COMING IN

MAXIMUM PC'S KEEP OUT OF REACH OF CHILDREN

FEB ISSUE

Cheap Trick

You can build a kick-ass PC without spending big bucks. We'll tell you what parts to use and show you how to put 'em all together.

Casual Gaming

Warning: Our roundup of the most entertaining, most addictive browser-based games will lead to diminished productivity. Read at your own risk.

Get Connected

We'll dive into the wacky, wonderful world of Wi-Fi routers, with reviews of six single-band models.

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SOLID STATE DRI

Patriot Torqx 128GB SSD

Patriot's 128GB Torqx MLC SSD is the top of the line, thanks in large part to its excellent Indilinx Barefoot controller, which powers the Torqx series, OCZ's Vertex series, and G.Skill's Falcon series of SSDs. The Indilinx controller enables the Torqx's 200MB/s-plus sustained reads and unparalleled 175MB/s sustained writes. Intel's X-25M still reigns supreme in random-write speeds, but can't come close to the Torqx's sustained writes. And both beat the pants off any magnetic hard drive out there. The Torqx also includes support for the new slowdown-preventing TRIM command—something few SSDs, Indilinx-powered or otherwise, can claim yet.
www.patriotmemory.com

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LGA1156 Motherboard
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Capacity Hard Drive
Western Digital Caviar Black 2TB
www.wdc.com

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Samsung SH-S223
www.samsung.com

Blu-ray Drive
Pioneer BDR-2203
www.pioneerelectronics.com

Full-Tower Case
Cooler Master ATCS 840
www.coolermaster.com

Mid-Tower Case
Silverstone Fortress
www.silverstonetek.com

Gaming Mouse
Logitech G9 Laser Mouse
www.logitech.com

Gaming Keyboard
Logitech G19 Keyboard
www.logitech.com

Games we are playing

Dragon Age
http://dragonage.bioware.com

Left 4 Dead 2
http://l4d.com

Call of Duty: Modern Warfare 2
www.modernwarfare2.com

Torchlight
www.torchlightgame.com

For even more Best of the Best entries, such as speakers and budget components, go to http://www.maximumpc.com/best-of-the-best

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