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Well, Well. We Meet Again

Yes, I'm back. But don't get too attached to me, because my plan is to leave this space in short order, and install in my place a new leader for the *Maximum PC* faithful. Confused? Then you probably didn't read last month's Ed Word column, or have a complete understanding of this magazine's history.

In his March column, Editor-in-Chief Will Smith announced he was leaving the magazine. Where's he going? I'm not yet able to share that info. But I can tell you that he'll be writing a regular column for MaximumPC.com (more about our website below), and we all wish him luck in his new adventure. And pie. We wish him pie.

As for me? Well, I've been with the magazine since 1996, when it was known as *boot*. I was also Editor-in-Chief of *Maximum PC* from 1999 to 2003, at which point some suit in the front office ripped me from the best editorial job in the world and made me Editorial Director of our company's tech group. And since that time, I have been working with your favorite crew, helping them choose which stories to cover, debating verdict scores, writing headlines, conceiving photo shoots, and just being a general pest.

Uh-oh. Think Will left because of me?

At any rate, I'm on the hunt for a new editor-boss, but will fulfill those duties until I find a worthy captain, or the editors will stage a coup. Gordon has always told me that he wants no part of the unseemly management duties that an editor-in-chief must endure, but we *do* know that he's a grouch and has a short fuse.

And speaking of Gordon, let's talk about our website, as promised above. Did you know that you can hear our senior editor rant like a tech nerd caught in a bear trap just by listening to our weekly No BS Podcast? We get about 30,000 downloads every month, and we'd like you to listen, too. Just go to our website and hit the No BS Podcast. You will hear tech opinions that we'd *never* print in the magazine.

Another website highlight: More reviews! In the coming weeks, we will be dramatically increasing the number of product reviews we post online. Spearheading this effort is our own Michael Brown, who's segueing from editor-at-large to reviews editor.

Finally, if you haven't yet subscribed to our Twitter feed (@maximumpc), you really must. Yeah, I know. The very concept of "social media" can reek of black turtlenecks and hipster glasses. And, personally, I would have signed up sooner if not for the fact that "tweeting" something sounds so damn wussy. But by following our Twitter feed, you'll get the quickest alerts to the content we publish online.

Drop me a line if you have questions, gripes, or suggestions for a new lead editor. I promise to pick a good one.

—JON PHILLIPS @JonPhillipsSF

DIG THIS

Google Apps
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Digital Rights
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Water Cooling
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LETTERS POLICY Please send comments and questions to jon@maximumpc.com. Include your full name, city of residence, and phone number with your correspondence. Unfortunately, Jon is unable to respond personally to all queries.

THE NEWS

Tabletmania!

Is the timing finally right for tablet computing to take us by storm?

—GORDON MAH UNG

After seeing numerous tablet computing products come and go with little fanfare, industry observers are predicting that tablets could be the next must-have gadget for consumers, thanks to the launch of Apple's iPad.

ABI Research is forecasting that Apple could sell 4 million iPads this year—and that the entire tablet computing market could grow to 57 million devices by 2015.

But if consumers are ready to buy tens of millions of devices in the next few years, why now and not before? In fact, few consumers even realize that there are already tablet devices using a Microsoft OS. Microsoft's first tablet OS, Windows XP Tablet, came out in 2001. Tablet functionality was included in all versions of Vista and Windows 7.

Despite the failure of previous tablet products to take off, many see Apple's iPad as the forerunner in a new category of consumer gadgets.

Tablet PC sales, however, have been consistently dismal among consumers. Microsoft tried another approach with its Mira, or Smart Display, technology. These tablet-like devices, introduced in January 2003, were battery-powered 10- or 15-inch LCD displays that hooked up to a desktop wirelessly. Running Windows CE, the Smart Display let you browse the web or control most things on your desktop—provided you were using the device from no more than 100 feet away. Unfortunately, the host PC couldn't be used simultaneously and the starting cost for the Smart Display was $1,000. By December 2003, Smart Displays were killed off. But Microsoft hasn't given up, and leaked details about its upcoming Courier tablet are garnering lots of buzz.

APPLE'S FIRST FORAY INTO TABLET COMPUTING WAS THE NEWTON, WHICH ULTIMATELY FLOPPED

Microsoft isn't the only company with an epic fail in tablet computing. Some would say Apple's first foray into tablet computing was with the Newton, which ultimately flopped. Designed to change computing, the Newton was too big to be a PDA and only developed a cult following right before being canned.

So, why would the iPad succeed now, after consumers have roundly rejected the concept in Tablet PC, Smart Display, and Newton devices?

Leslie Fiering, a VP for market research firm Gartner, said a number of factors prevented consumers from adopting tablet computing previously.

Fiering said Microsoft hasn't been able to make the tablet experience consistent. Even though the OS underpinnings have been in place for years, many applications are still laid out and designed for a keyboard and mouse. Even within Microsoft's own apps there has been inconsistency. One Note, Office, and Journal, Fiering said, all use gestures differently.

In many ways, the timing is just right for Apple, according to Fiering. Technology advances in screens, CPUs, and batteries will make the iPad a smaller, lighter, and better performing device than previous tablet products.

The type of pen-based digitizers used in Tablet PCs added about 10 percent to the cost and didn't get much cheaper over the years. These days, pen-based input is an unnecessary feature, now that years of using smartphones with touch screens have primed consumers for touch input on a larger surface. Those same smartphones have also created more sources for screens, which further helps lower the cost of today's tablet computers.

And that lower cost is one of the key factors that will likely make the iPad a hit, Fiering said, adding that it won't all be about Apple.

The same PC vendors who have sold tens of millions of netbooks are now looking for the next big field to hoe, and they see that opportunity with tablets.

Leatherman Squirt ES4

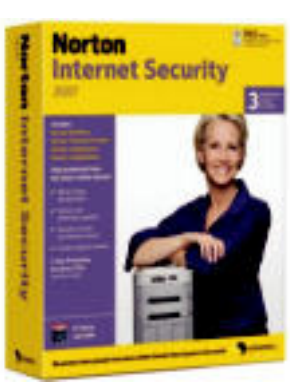
Silly name aside, Leatherman's Squirt ES4 ($40, www.leatherman.com) comes correct for Lab work. Geekcentric tools include: spring-action needle-nose pliers for cramped extraction and insertion jobs, both flavors of screwdriver, a file for blunting metal burrs, a wire cutter *and* five wire strippers, and, of course, scissors and knife blade. Best yet: It's small and light enough for placement in a pants pocket—unless you have the kind that are "on the ground." –JP

Symantec Sued

AV maker accused of shady subscription-renewal practices

Seven months ago, the New York Attorney General's office slapped both Symantec and McAfee with a $375,000 fine to settle charges that they automatically charged customers software subscription renewal fees without their consent. Symantec may have been slow to learn its lesson, because now a New York man is suing the security software maker for the same reason.

In the lawsuit, Kenneth Elan says he purchased a copy of Norton Antivirus in 2007. According to Elan, Symantec notified him in early 2009 that his software license had been automatically renewed and his credit card charged $76.03. Now Elan is taking Symantec to court, claiming the company did not abide by the above-mentioned settlement, in which Symantec and McAfee agreed to "provide electronic notification to consumers before and after renewal of the subscription."



Elan is seeking both a refund and class-action status for the lawsuit. –PL

Jammie vs. RIAA, Round 3

Once known for being the first-ever U.S. defendant in an RIAA copyright-infringement trial, Jammie Thomas-Rasset is now more noteworthy for her unwillingness to back down in her battle with the recording-industry trade group. After more than two years, two trials, two guilty verdicts, and a nearly $2 million dollar judgment against her, Thomas-Rasset is still fighting claims that she made 24 copyrighted songs available for distribution on the file-sharing site Kazaa, despite clear evidence against her.

What's more, her fight flies in the face of a dramatic decrease to the fine levied against her. In February 2010, the judge in Thomas-Rasset's 2009 retrial with the RIAA tossed out the jury's $1.92 million judgment as "monstrous," reducing the award to $54,000. The RIAA countered—with a still lower amount! By offering to settle with Thomas-Rasset out of court for just $25,000, the RIAA hoped to avoid legal precedent for a judge to reduce a copyright-infringement fine at whim (something never before done). Amazingly, Thomas-Rasset refused both offers, opting for a third trial in the hopes of avoiding any penalty whatsoever. Her attorneys are representing her pro bono. –KS

What's So Special about Apple's iPad Chip?

Everyone is talking about the chip in Apple's iPad. Everyone but Apple. One reason may be that the chip is nothing special.

Apple's skimpy description: "a 1.0GHz Apple A4 custom-designed, high-performance, low-power system-on-a-chip... custom-designed by Apple engineers to be extremely powerful yet extremely power efficient."

Yes, the chip was designed by Apple engineers. But they almost certainly used readily licensable components. Which means other companies can design similar chips—some already have. And those chips are sold as off-the-shelf parts, so competitors can design similar (or better) tablets.

The Apple A4 most likely has one or two Cortex-A8 or Cortex-A9 processor cores licensed from ARM, a British company whose processors are common in cell phones, including Apple's iPhone. Anyone can license an ARM processor. It's possible that Apple designed its own ARM-compatible processor core, but it would have been a rush job, and other companies have done that, too.

One rumor claimed the A4 has a PowerPC-compatible processor designed by engineers from P.A. Semi, which Apple acquired in 2008. I doubt it. The iPad is compatible with the iPhone, which uses ARM. Although Apple could port its software, ARM has a better reputation for low power. And it's unlikely that former P.A. Semi engineers were primarily responsible for the A4. Such a chip requires 12 to 18 months to develop. Most likely, the project was underway when the company joined Apple.

Apple probably licensed the A4's integrated GPU from Imagination Technologies, a British company partly owned by Apple and Intel. It's what the iPhone 3GS has. An alternative is ARM's Mali GPU.

The 1GHz iPad is 400MHz faster than the iPhone 3GS. But other smartphone chips can run at 1GHz, and the iPad's larger batteries permit higher clock speeds.

So, as far as we know, the A4 isn't unique. It's like chips from Freescale, Nvidia, Qualcomm, and Texas Instruments, and soon from Intel. Apple's sales volumes justify a custom chip project, but competitors can build similar tablets using off-the-shelf components.

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

The Optimus Difference

Nvidia reinvents hybrid graphics

For mobile users, the concept of hybrid, or switchable, graphics makes a lot of sense. By being able to choose between a notebook's integrated and discrete graphics based on application or power needs, users get the best of both worlds—theoretically. But hybrid graphics have been slow to catch on. The requirement that users manually flip a switch, shut off conflicting apps, and reboot, has made it a hassle to use.

Nvidia's Optimus promises a more streamlined solution. Rather than relying on wonky drivers, manual switches, and special muxes on the motherboard, Optimus works by rerouting GPU data, when needed, directly through the integrated graphics, with minimal latency. When the GPU is not needed, it's electrically off. Optimus software detects an application's needs automatically, based on its calls or application profile, and implements the graphics solution accordingly. No intervention by the user is necessary. —KS

The first Optimus notebooks, like this Asus UL50VF, will arrive with Penryn, Arrandale, and Pine Trail CPUs combined with 300M, 200M, or next-gen Ion GPUs.

Online Rep Hurts Job Hunters

According to a Microsoft study, 70 percent of surveyed HR professionals in the U.S. have turned down a potential job candidate based solely on online reputation information. The top three reasons cited for rejecting a candidate were concerns about lifestyle, inappropriate comments, and unsuitable photos and videos.

The survey, which was conducted to commemorate Data Privacy Day, pinged 2,500 consumers, HR managers, and recruitment professionals in the United States, United Kingdom, Germany, and France to find out what effect online profiles and activities have when it comes to job hunting.

Interestingly, of the consumers surveyed, fewer than 15 percent of respondents in any of the countries believed that information found online might hamper or help their ability to land a job. —PL

Solid State Drives Speed Up

New SandForce SSD controller doesn't need cache

OCZ's Vertex 2 Pro, with a reported 250MB/s transfer speed, is just one of a spate of new and upcoming solid state drives utilizing DRAM-less controllers from SandForce, a new fabless SSD controller company. —NE

GAME THEORY

Browsing for the Next Big Thing

If there is ever another paradigm-shifting PC game—another Civilization or Doom—it will be an independent game, and it will be browser-based.

That might sound like heresy to those of us still trying to keep the flame of PC gaming burning bright amidst the darkness of a console-driven marketplace. The strength of PC gaming is in flexible control schemes, robust online features, and raw horsepower, right?

Well, not so much anymore. When Microsoft waded into the console wars, it helped narrow the gap between PC gaming and console gaming, and that gap will continue to narrow. We're one hardware generation away from World of Warcraft for Xbox. This means the mainstream developers are going to continue designing games for dual-use, such as Arkham Asylum, Mass Effect, BioShock, Call of Duty, and Assassin's Creed.

There's nothing wrong with this, since they're all excellent games, but it does gradually erode the unique elements of PC design. Thank God for the Independent Games Festival and other programs that encourage indies and help them reach a wider audience, because that's where our future is still bright. And many of the best indie games are browser-based.

There's something remarkably liberating in this realization. I remember the days of zip-lock bags, floppy discs, and photocopied manuals. There was something raw and exhilarating in PC gaming, when you never quite knew where a design would take you next. We lost some of that wild-west feel as we chased technology around.

We're getting a bit of it back now, as developers are able to create brilliant pieces of work like Auditorium and Icycle with tiny teams and a Java SDK. It's already happened once: On a very short list of PC Games That Changed Everything, Bejeweled would be right near the top. It created a different kind of PC gamer, and everything that followed (right down to iPhone apps) owes a debt to PopCap.

It will happen again. It may not be as technologically sexy, but I think it will be fresh and different. I'm looking forward to that.

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

Nvidia's GF100: Four Burning Questions Answered

Our straight skinny on Nvidia's long overdue, next-gen graphics card

AMD's Radeon 5000 series graphics cards have dominated the market recently—while archrival Nvidia has been reduced to offering architecture briefings and sneak peeks at a non-final version of its upcoming GF100 GPU. We've seen the GF100 in action, so allow us to answer four key questions.

The GF100's GPU compute technology could pave the way for decidedly realistic-looking hair in games.

Q *Is the GF100 simply a rebranded Tesla?*

A *The GF100 and the Tesla are both based on Nvidia's next-generation Fermi architecture. But the Tesla is the high-performance compute version, aimed at customers needing massively parallel computing performance—like scientific, industrial, and even economic simulations. The GF100, meanwhile, is a consumer graphics chip, and has all the stuff needed for full DirectX 11 applications: pixel, vertex, and geometry shaders; hardware tessellation; DirectCompute; and rendering output. The GF100's architecture is optimized for DirectX 11, and is a brand-new design—not just old technology with new stuff bolted on.*

Q *Will the GF100 cards be 'DustBuster 2.0'?*

A *Clock speeds and configurations are unknown for now, but the GF100 will use more power than Nvidia's previous top end. Reference cards we've seen use two 8-pin PCI Express power plugs. Early cards also ran hot and loud. Of course, a lot can change by the time final versions hit the streets this spring. Nonetheless, keeping 3 billion-plus transistors cool when running at high clocks with a boatload of fast memory is no mean feat.*

Q *How will the GF100 compare to AMD's products?*

A *The GF100 will be faster than AMD's Radeon HD 5870—but it will also cost more. How much more is uncertain, but the GF100 GPU is a huge chip, which will force Nvidia to charge a premium to avoid losing money. The Radeon HD 5870 is already wicked-fast in most modern games, and will certainly cost less. The wild card is DirectX 11. If the GF100's DX11 performance beats AMD's, that could matter. But many users may not care enough to shell out the extra dollars.*

Another wild card: Nvidia could also take "salvage" chips and sell lower-cost cards using GPUs that would have been discarded, as they did with the original GeForce GTX 260. These could compete directly with the 5870.

Q *So, should we wait for the GF100 or buy a Radeon?*

A *The GF100 won't show up until late March at best, and supplies will be tight. If you really need an upgrade now, then a Radeon HD 5850 or 5870 is still a good deal. But if you bought a new card a year ago, it's worth waiting to see what Nvidia delivers. Buyers on tighter budgets will have a longer wait. Sub-$200 cards built with GF100 derivatives will take longer to arrive. So that HD 5770 may still be a viable option.* **—LC**

BYTE RIGHTS

QUINN NORTON

Google Books Settlement Still Unsettled

Another year, another iteration in the fight over Google Books, and we're not much closer to settling the copyright fate of millions of orphan, or unclaimed, works.

For those of you who don't constantly follow Google's legal minutia, here's the recap. For some years, Google has been trying to scan all books ever published. Authors and publishers responded by trying to sue the company's pants off, at which point Google offered a settlement that would make it the sole purveyor of out-of-print books, giving the authors and publishers a cut. They went for it.

Other book scanners, companies, the copyright office, foreign governments, and the court itself said no, largely on antitrust grounds. But at least as important as the antitrust issues was the ridiculous scope of the settlement. It read more like an addendum to copyright law than a deal to keep everyone out of court. The judge sent them back to try again, an effort nicknamed GBS 2.0. Yet another bug patch billed as a new release.

But they didn't really get the bugs. "The fundamental procedure and fairness issues are still serious," says NYLS Professor and settlement watcher James Grimmelmann. "The most substantial difference is the enormous reduction in [international] scope." This new version applied to books in the English-speaking countries because—and I am not funny enough to make this up—no one translated the settlement into any other language in time for other countries to comment. The provision was there, but apparently, someone just forgot to enact it. ("What did you do before the Language Wars, Grampa?" "Well, Bobby, let's just say if it wasn't English, you weren't going to find it...")

The DOJ still found 2.0 too far-reaching, and too much Google writing its own ticket.

The real and inescapable problem is that this class action is seeking to do Congress's job, because Congress has failed so completely to do it. The best settlement is a reasonable orphan works law. If Google wants to write that, it should do it the old-fashioned way, with rich lobbyists.

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

Maximum PC's 9 Most Coveted Geek Rides

9 NISSAN GT-R

Dash-mounted LCD display reveals insane amounts of telemetry data—and it was designed by a game developer!

8 LANDSPEEDER

Screw jet packs. We prefer the faster speed and horizontal orientation of Luke's desert duster.

MACH 5

7 Go Speed Racer? We say, Go *Geek* Racer!

DELOREAN DMC-12

6 Primed and ready for flux capacitation!

5 KITT

We would scrub off all the 'Hoff cooties and take this self-driving, human-talking, artillery-rejecting, 1982 Trans Am out for a spin.

4 BATMOBILE

We prefer the 1989 model—the Tim Burton Special Edition powered by a jet turbine producing 1,750 lbs/ft of torque.

3 SEGWAY

So blatantly dorky, it's actually cool

2 TESLA RADSTER

With some 6,800 li-ion cells, this electric car qualifies as a consumer electronics gadget!

1 LITTLE NELLIE

The absolute coolest of all James Bond vehicles, this heavily armed autogyro discourages road rage aggression before it happens.

Ask the Doctor...

Backup for Free?
Safe to Eject
Graphics for Non-Gamers

Eject! Eject!

Is it necessary to eject a USB flash drive, or can I just yank it out? They're called flash drives, so shouldn't they be like SWAT teams or something: Get in and get out, job done?

—Jamie Mack

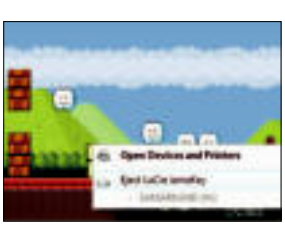
As long as you're not actually accessing the drive—reading or writing to it—just yanking it out is usually fine. Some of our editors use the Safely Remove Hardware feature in the system tray; others just grab and go. Doctors tend to prefer the safe route—after all, it's easy to forget a file transfer mid-task and yank out the drive. Hitting Safely Remove Hardware before you go can help save your data in a moment of absentmindedness, if only by throwing up a dialog box before you do something stupid.

Free Backup?

I have Windows Vista on my desktop computer and I'm stuck on what to do about backing up my more than 500GB of videos and music. I've read that external is the way to go, but I'm a little iffy because of expense and the fact that the backup drive can crash. DVDs are not a bad idea, but it takes forever to back up that much data. I use these files every day and want easy access to them. The most reliable method, plus easiest to access, would be an online site, but that costs a lot of money. Please help me make a decision so I can install Windows 7 worry-free.

—Tony Fugate

Tony, if you use those files every day, they must be worth something to you. And if they're worth something to you, they're worth spending money to protect. The Doctor is continually baffled by people who will drop a few hundred or even a few grand on computer components and games, but nothing on a backup plan. Of course, provided you only want to back up a few gigabytes of files, you can use a free online service like Dropbox, Carbonite, or Mozy, but to back up more than that, you're going to have to shell out some dough. And though online backup might be safer (because it's offsite), it has several disadvantages. First, half a terabyte of data is going to take forever to transmit, assuming you can find a backup solution that lets you back up that much data—not to mention an ISP without a bandwidth limit. Second, it's going to be expensive. And third, you're trusting that the company you're using to back up your files won't go out of business or suffer data loss. This last point is the least likely, but still possible.



The Safely Eject Hardware button is your friend. A little inconvenience can save your data.

The Doctor recommends a two-tiered approach to backup. Get a free backup account from a reputable provider, like Mozy. Make sure your most important files are backed up there. You'll have limited space—no more than a couple of gigabytes, probably. Then suck it up and go buy an external hard drive—one to two terabytes should do it. That's for the bulky stuff like videos and music. If you're feeling really paranoid, get two drives, back up to each of them regularly, and keep one offsite. It won't cost you that much, and it can save your bacon.

IT'S EASY TO FORGET A FILE TRANSFER MID-TASK AND YANK OUT THE DRIVE

Microsoft Security: Essential?

After reading the Ultimate Malware Removal Guide (http://bit.ly/18BEOf), I have a question: Do you recommend using SuperAntiSpyware, Malwarebytes' Anti-Malware, and an antivirus program like Norton Internet Security, or is Microsoft Security Essentials a good enough antivirus/spyware/malware solution on its own?

—David Boerner

Check back next month for our annual antivirus roundup, David, but from what we've heard and seen of Microsoft Security Essentials, it's powerful and comprehensive. We'd still recommend doing regular scans with SuperAntiSpyware and Malwarebytes' Anti-Malware just to make sure nothing slips through the cracks, but MSE appears to be a pretty good always-on protection.

Multiplier Math

I built a computer a month ago that's running Windows XP on a 2.6GHz Pentium 4 CPU. For some reason the computer thinks it is 1.3GHz. I've tried to change it in the BIOS but it will only let me overclock it to 1.54GHz.

—Daichi Tang

The Doctor suspects that you have something set incorrectly in the BIOS. Remember, non-Extreme Intel CPUs are upwardly locked, but can be underclocked. The solution depends on what Pentium 4 you have. There were actually two different .13 micron

Northwood 2.6GHz Pentium 4 processors (not counting the numerous 2.66GHz Pentium 4s). The two 2.6GHz P4s include the original running on a 400MHz bus, and a second iteration running on an 800MHz bus. The 400MHz bus chip gets to 2.6GHz by using a 26x multiplier on a 100MHz bus (26 times 100MHz gives you 2,600MHz). The chip that runs on the 800MHz bus has a 13x multiplier with the base clock of the bus running at 200MHz (13 times 200MHz gets you to 2,600MHz). The Doc is guessing that you have the 400MHz version processor, but that the multiplier is set for 13x, which multiplied by 100MHz would yield 1,300MHz, or 1.3GHz. You should go back into the BIOS and try setting the multiplier for 26x on a 100MHz bus. Or try setting it for 13x at 200MHz. If you actually have a 2.66GHz Pentium 4, it uses a 20x multiplier on a 133MHz FSB.

Hot Southern Night

I recently had a number of issues with my PC. It seemed that my keyboard was sluggish, if not unresponsive. I also experienced some unusually slow hard drive response times now and then, and there have been times when my computer wouldn't even boot (the BIOS doesn't even recognize that my RAID 0 stripe is set up when I reboot). However, if I shut down the PC for a few minutes and then reboot, everything works fine.

I decided to give the insides a thorough dusting, and I discovered there was quite a large dust bunny lodged in my south-bridge chip fan, most likely preventing it from spinning. Since I've removed that dust bunny, I haven't noticed any of the previously described issues with my computer.

I DISCOVERED QUITE A LARGE DUST BUNNY LODGED IN MY SOUTH-BRIDGE CHIP FAN

Could my problems really have been caused by the south-bridge fan not spinning? Could an overheated south-bridge chip cause issues like that, and eventually cripple a computer? I want to believe the answer is yes, but am I getting my hopes up? The system is an EVGA 680i LT board with a 2.4GHz Core 2 Duo, 4GB of RAM, and 64-bit Windows 7.

—McKenna Spaeth

There was a time when the Doctor would have said no, because it was pretty hard to overheat a south-bridge chipset. But modern chipsets are a lot hotter. And Nvidia chipsets in particular are known for pushing the thermal envelope, so it's entirely possible your dust-clogged south bridge caused the problems, especially given that your problems concerned RAID and the keyboard—both of which

Gamers aren't the only ones who can benefit from modern videocards—photo editors can take advantage of modern GPU computing.

Other common sources of chipset overheating are dried-up thermal paste, a heatsink that's not making full contact with the chip, and exhaust from a hot GPU.

Graphics for Non-Gamers

Even though I have absolutely no interest in computer games, I study *Maximum PC* for the best information on the best computer components. However, I have not been able to identify graphics cards that are best for graphics-editing applications such as Photoshop. The outstanding gaming graphics cards seem to consume too much power and too many dollars without much benefit for non-gaming applications. Can you recommend a good GPU for non-gaming graphics work?

—Wayne Godsey

gaming, many graphics applications can benefit from GPU acceleration. Photoshop CS4, for example, benefits greatly. You won't need the fastest and the most expensive, but a decent DirectX 10 card with at least 1GB of frame buffer will help you immensely. You can get an Nvidia GT 220, which fits the criteria nicely but won't draw excessive power, for about $70.

Power-Not-Good Signal

I have been having an issue with the rig I built back in June. Occasionally, usually when I first boot in the morning, nothing happens when I press the power button. I have found that cycling the power strip and power supply, disconnecting and reconnecting the cord, or slapping the side of the case fixes the problem. I have also had some rare instances

pectedly shuts down, as if it were unplugged. Since this is a relatively new rig, most of the parts (with the exception of the motherboard, which I purchased as an open-box item) are still under warranty. I just need to know what component might be at fault—I suspect the power supply or the motherboard.

—Scott Odle

The Doctor concurs with your diagnosis that the power supply is the likely culprit. When you press the power button, the PSU turns on, does a diagnostic, and settles the voltage down to the point where it is safe to boot. Once that's done, it sends a "power-good signal" to the motherboard, and the system boots. If the power-good signal is not sent, the board will not boot. If the power-good signal stops during operation, the system will shut down as though the plug has been pulled. So, that's your first area to investigate. Since it's under warranty, you'll want to exchange the PSU. The fact that your motherboard was an open-box item is also a cause for concern, and it may very well be bad, which is why it got returned to the store in the first place. Your experience with a new PSU should answer that question.

Did I Miss the Bus?

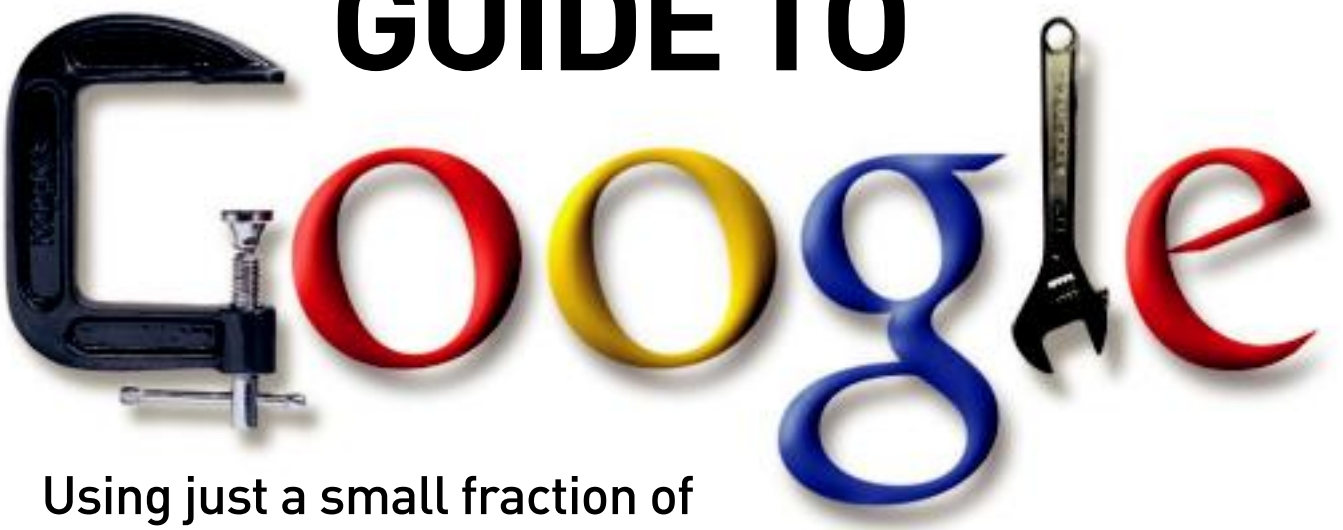
The maximum supported bus speed on an Intel P55 motherboard is 1,333MHz, right? So I figured it would not be necessary to buy RAM that clocks beyond 1,333MHz. However, if I plan to overclock my memory, is it best to buy RAM rated for higher clock speeds, or does it not matter?

—Dany Nelson

Actually, the Core i7/i5/i3 CPUs do not have a traditional front-side bus like the older Core 2 and Pentium 4 CPUs. Rather, they feature a base clock that is somewhat similar to the front-side bus, and which is used to overclock the CPU. On the P55 chipset and Core ix CPUs, you can overclock the RAM to higher levels without having to bump up the 133MHz base clock—thus, not overclocking the CPU. So you could actually run DDR3/1600 or higher if you wanted to. If you do plan to overclock your RAM, you probably should buy RAM that has been qualified to run at higher clocks, so DDR3/1600 instead of DDR3/1333. Keep in mind, however, that you don't get much real-world performance by pushing the RAM to very high clocks, so you might not even want to bother.

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

THE POWER USERS GUIDE TO Google



Using just a small fraction of Google's vast application offerings? That's about to end!

BY GINA TRAPANI

Remember that old maxim that says we use only about 10 percent of our brain's capacity? It's been proven as hokum by modern neuroscience, but we think we can safely apply the same basic analogy to Google: The vast, vast, *vast* majority of computer users—even those practiced in hardcore nerdery—are almost certainly using a pitiful fraction of all the applications and features intrinsic to Google's ever-expanding matrix of software code.

Sure, a *Maximum PC* reader may be well-versed in Google's advanced search operators (Google **allintext: "advanced search operators**" if you missed that chapter), but we're willing to wager that even the most curious among you haven't taken the time to play with more than a few Google applications, let alone explore all their advanced features. Indeed, Google HQ is a fan-friggin'-amazing hotbed of R&D, but its developers are relatively quiet about the tools they've released. And that's a shame, because Google's constant innovation should get more press.

To address your inevitable Google knowledge deficit, we commissioned Gina Trapani to share her favorite tips. Gina launched Lifehacker.com, writes about Google for a bazillion media outlets, co-hosts the "This Week In Google" netcast, and pretty much makes it her job to know as much as possible about Google's sundry apps and features.

Want even harder hardcore tips? Or did we leave out an application you really want to know about? Send your requests to comments@maximumpc.com. Oh, and by the way: Google Buzz was announced literally minutes before this article went to press. But we'll certainly cover this app in a future issue—because if there's one thing this world needs, it's more social media options. FTW!

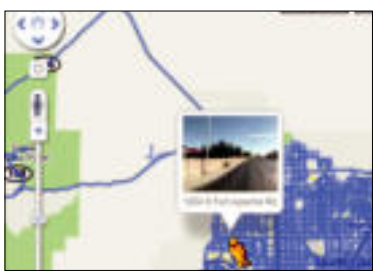
—JON PHILLIPS

MAPS

Google Maps (http://maps.google.com) is a mapping application and route planner that provides driving, walking, and public transit directions from your starting point to one or more destinations. Launched in 2005, Maps is based on technology created at Australian startup Where2 by brothers Lars and Jens Rasmussen (currently the lead engineers on Google Wave). Along with Gmail, Google Maps was one of the first web apps to extensively use Ajax, a JavaScript programming technique that updates map imagery as you pan and zoom, all without reloading the page.

Preview Which Streets Made Street View's Cut

Not only does Google Maps display aerial imagery in Satellite view, it also offers a huge database of on-the-ground photos via Street View. To switch to Street View from the basic map screen, drag and drop the yellow "pegman" from the top of the zoom control onto the map. When you do, blue lines appear on the streets where ground imagery is available (throughout the United States and in select other countries). Drop the pegman onto the road of your choice, walk down the street by clicking the navigational arrows, and double-click any area of a photo to zoom in on it. Some images are so clear, you can read the hours on No Parking signs.



The abundance of blue lines shows us that Google's Street View van covered Las Vegas pretty well, but didn't venture very far into the desert.

IN-CAR NAVIGATION?

In Maps Help, search "Using Maps with your navigation device" to learn how to send directions straight from Google Maps to your TomTom, Garmin, BMW, or Mercedes navigation systems.

Add Local Color to Your Map

Don't miss out on the brave new world beyond the Map, Satellite, Terrain, and Street View features in Google Maps. Under the More button (located between the Traffic and Satellite buttons on the top-right of a map), you can overlay links to photos, videos, Wikipedia articles, webcams, transit maps (in some cities), and real estate listings. This feature is perfect when you want to know the history of a monument, find open homes for your Sunday real estate tour, or see what's happening on the local zoo's "panda cam."

Click a few boxes, and Google's View of New York City becomes absolutely silly with user-contributed photos and videos. And when you switch to Street View, you'll be able to peruse your More choices in a thumbnail gallery.

Using predictive analysis of data collected from road sensors and GPS-equipped mobile phones, Google's Traffic function gives you a color-coded snapshot of how road conditions might shape up.

Check Traffic to Avoid the Madness!

Before you start the car, check for clogged arteries by clicking the Traffic button. By default you'll see live, current traffic conditions—anonymously collected from drivers' mobile devices—but you can change the day and time to see extrapolated predictions. To do so, in the Traffic pop-up click the Change link, and set the day and time of your departure. Things looking bad out there? Well, when you get directions in Google Maps, you can always opt for an alternate route by clicking and dragging the suggested route to another road. Or you could opt to ditch the car entirely: Click the Public Transit or Walking link on the right panel below the starting point and destination to see how you can get there by bus, train, trolley, or on foot.

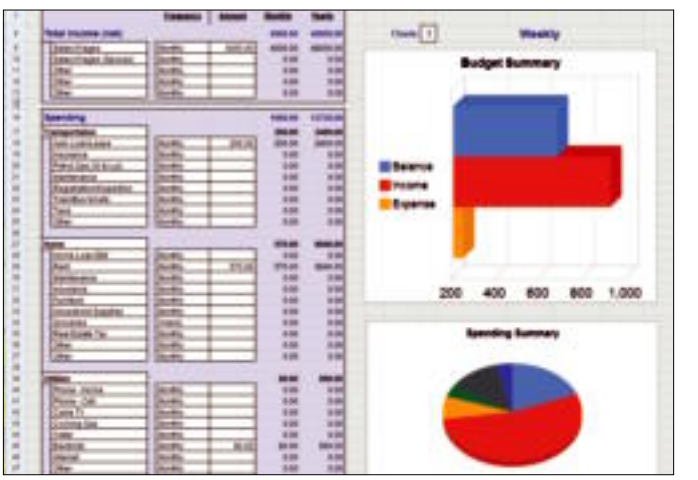
DOCS

Google Docs (http://docs.google.com) is a web-based word processor, spreadsheet, and presentation application that stores any files you create in it, as well as files you upload.

While Google Docs doesn't offer all the functionality you'd find in Microsoft Office, its web-based collaboration features present a whole new world of utility.

Save Time on Formatting with Templates

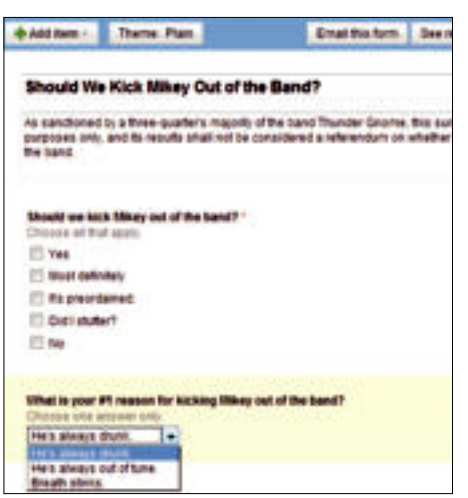
Whether you need an invoice, resume, or calendar, you don't have to design it from scratch—just grab a template, thousands of which can be found in the drop-down menu of the Create New button. Various spreadsheets, text documents, presentations, and forms are broken down by categories like "Resumes and Cover Letters," "Personal Finance," and "Legal." (Hint: Choose your language from the "Narrow by language" drop-down to hide foreign-language templates.) Google Docs will keep track of which templates you've used in the past for easy reuse. The spreadsheet templates—pre-formatted with built-in formulas and charts—are reason enough to check out Docs.



This personal financial budget shows you *exactly* where all your money's going. Oh well, at least the spreadsheet is free!

Conduct Surveys with Forms

Google's form templates are awesome for not only collecting data from co-workers, loved ones, and website visitors, but also for tallying responses. In Google Docs, click the Create New button, and chose "form" from the drop-down. Now, enter your questions, as well as the types of answers each question should get. You can format answers for multiple choice, check-boxes, and other common survey criteria, as well as add section headers and choose custom visual themes. Clicking the "Email for" button will send your contacts a link to the form (you also can copy and paste the link to publish it yourself). When your recipients answer the form's questions, a Google spreadsheet living in the cloud collects and charts the responses for you to see. For example, you can gather all your friends' vital personal specs—phone numbers, home addresses, even favorite foods—with one simple questionaire.



Feel free to mix in "check all that apply" questions with those demanding "one answer only."

Chat While You Crunch Numbers

When you give other people access to a document in Google Docs, a blue notification icon on the far right of the menu bar will inform you who else is viewing and/or editing the document while you have it open. In spreadsheets, this bar has a down arrow on it, which you can click to expand a chat panel. Not only will you be able to see real-time updates to your spreadsheet as others change it, you can instant message your collaborators as you work. This feature is conspicuously absent in documents and presentations.

Visualize Data with Interactive Gadgets

Once you've got a spreadsheet full of data, you'll want interesting ways to visualize it without doing too much work. Enter Google Docs gadgets, which are interactive charts, maps, and other data visualizations you can embed in a spreadsheet, publish on a web page, or include on your iGoogle homepage. From your Google Spreadsheet's Insert menu, choose "Gadget..." to choose and configure a gadget that displays your data in informative ways. You can create your own gadget or use one of the many provided, which include charts, guages, timelines, org charts, and the fun "Bars of Stuff."

Ditch the Thumb Drive and Store Files at Google Docs

Google Docs isn't just for office files anymore: You can now upload, store, and share any kind of file, including music, video, photos, and zip files. A simple click of the Upload button will save files to your home in the cloud. File sizes can be as high as 250MB, and you get up to 1GB of space for storing non–Google Docs files. Once your treasures are uploaded, select a file and click the Share link to give others access to it. You can also share entire folders, creating a Dropbox-like meeting space for your friends and colleagues to work on files together.

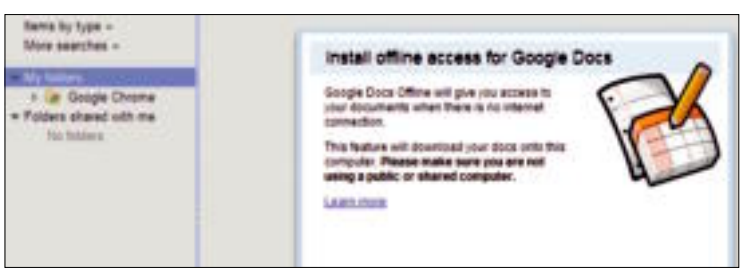
Files converted to Google Doc documents don't count toward the 1GB storage limit. Microsoft Word, PowerPoint, and Excel files can all be converted and stored for free, but you might lose features and formatting.

See a Document's Revision History

When multiple people are working on a document, things can change fast. To see who changed what and to compare revisions, open a document and from the File menu choose "See revision history." You'll get a list of all the changes a document has undergone. You can also select two revisions and compare them to see exactly what changed between them. Just be aware that revision history is available to anyone you share a document with—even your boss. So, if you don't want collaborators or viewers to see the history, make a copy of the document, which wipes away the bread-crumb trail of its changes.

Get Your Documents Offline

One of the biggest concerns about keeping data in the cloud—instead of on your hard drive—centers on the question of offline access. So, if you're wondering how you'll work on your Google Docs files when you're on a non-Wi-Fi-equipped flight, Google Gears has you covered. This free browser add-on for Firefox, Internet Explorer, and Safari gives you access to your files offline, and syncs changes when you connect to the Internet again. You can download Google Gears at http://gears.google.com.

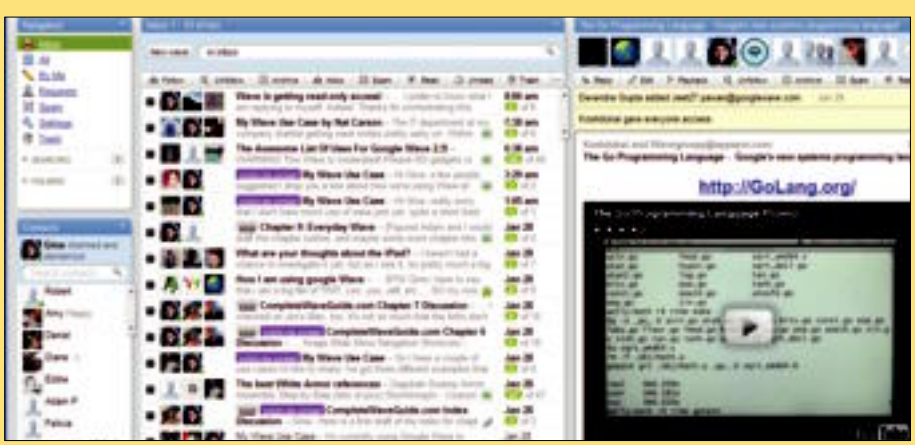


Google Gears helps you keep your cloud business in sync.

GOOGLE WAVE

Collaboration Made Easy

At first glance, it seems like there's nothing Wave can't do.



Google Wave (http://wave.google.com) is a new, real-time group collaboration tool that's currently an invitation-only beta product. Combining features from email, chat, wikis, and forums, Google Wave is best described as a mash-up between a real-time wiki and multimedia chat. You do all your group collaboration in "waves" (note the lowercase W), which function as a hybrid conversation/document—wrap your head around that!—that multiple people can view, edit, and add to.

Waves are live documents and change right before your eyes: You can watch collaborators' cursors move about with fury, keystroke by keystroke. You can also embed interactive content—like polls, YouTube clips, and slide shows—and easily discuss a particular sentence in a block of text with the inline reply feature. Wave is young and missing essential features (like the ability to remove someone from a wave), but there's no mistaking its ambitions to change how power-users work together online.

CALENDAR

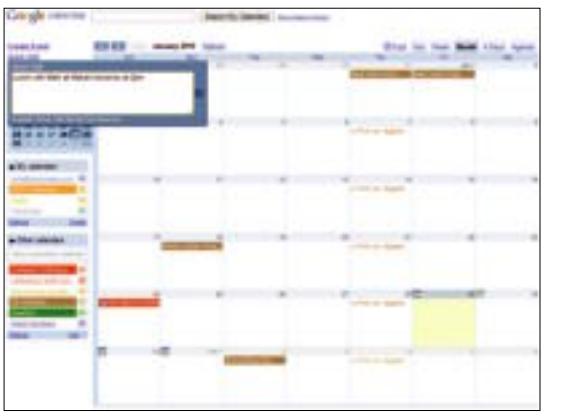
Google Calendar (http://google.com/calendar) is a scheduling application that offers email, SMS alerts, and collaboration features. The interface is similar to Microsoft Outlook's calendar, with daily, weekly, and monthly views, as well as a customizable time period and agenda views. Launched in April 2006, Google Calendar officially graduated from beta status in July 2009.

Get Your Agenda via Email or Text Message

When you create an event in Google Calendar, you can also configure an email or SMS reminder to come to you minutes, days, or weeks in advance—great for remembering to order flowers for Mom's birthday. You can also receive your daily agenda via email first thing in the morning. To do so, in the calendar list on the left, click the down-arrow button next to the appropriate calendar, then select Notifications. Check the "Daily agenda" box, and save your settings to get an email each morning at 5 a.m. in your timezone of the day's upcoming events. You can also get your schedule via text message: Text the word **day** to shortcode GVENT (48368) to receive your day's agenda. The word **next** will get the next event on your calendar, and the **nday** command will send back tomorrow's events. (Standard text messaging fees apply.)

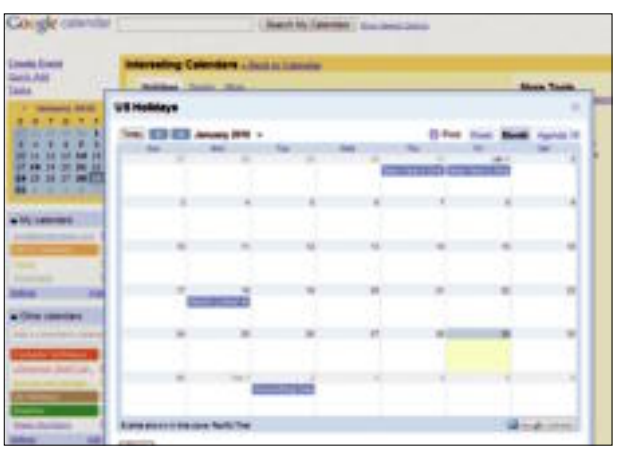
Quick-Add Events with Natural Language

The Google Calendar app is quite remarkable in its ability to generate calendar items from events you describe in natural, conversational language. For example, if you type "Lunch with Mark tomorrow at 2pm at Maria's," Calendar will parse "tomorrow at 2pm," scheduling the event for the correct day and time, and even fill in "Maria's" as the event location.



We wish more apps—and even people—could intelligently interpret conversational language.

Subscribe to Team Schedules, Birthdays, and More



Does your company give you a paid vacation for Groundhog Day? Your IT department can share your company's complete paid vacation day schedule via Google Calendar.

You can instantly add sports team schedules, holidays, and your contacts' birthdays to your schedule by subscribing to public calendars. In the Other Calendars module on the sidebar, click the Add link. From the drop-down, choose "Browse interesting calendars" to pick and choose from a selection of calendars, like religious or U.S. holidays, or your contacts' birthdays (compiled from your Google contact entries and their Google Profiles). You can also subscribe to any public calendar, or any of your contacts' Google calendars by choosing "Add by URL" or "Add a friend's calendar."

Incorporate the Weather Forecast on Your Calendar

Get the weather forecast for this weekend's softball game directly on your Google Calendar. In Settings, under the General tab, enter your location (either city and state or zip code) and then, near "Show weather based on my location," choose whether you'd like the temperatures in Celsius or Fahrenheit. Save your changes, and GCal will display a small weather icon for the next four days; click the icon to expand forecast details.

GMAIL

When Google's free, web-based email service (http://mail.google.com) launched as an invitation-only beta on April 1, 2004, initial speculation had it that the 1GB storage offer was an April Fool's gag. It wasn't a gag, and Google has only gotten more generous; as of this writing, Gmail storage capacity is up to 7GB. Thanks to all this storage space—along with threaded conversations, a powerful spam filter, conversation labels, and more—Gmail remains a standout amid other free webmail products that have been around much longer.

Access Gmail via IMAP

While most email providers offer only one-way POP downloads of your messages, Gmail offers the more sophisticated, two-way sync protocol, IMAP. With IMAP, you can access your Gmail on multiple computers and mobile devices, and changes you make on one device are immediately reflected everywhere else. IMAP syncs the read and unread status of all your Gmail messages in all your labels (represented as traditional folders in your IMAP client of choice). To enable IMAP in Gmail's Settings, click the "Forwarding and POP/IMAP" tab. You'll have to configure your email program using Gmail's secure IMAP settings; click the "Configuration instructions" link to get the details for your email software.

With IMAP settings, you can keep Gmail properly synced on all your sundry Internet machines.

Just check the box of a thread you want to silence, then mute it—mute it good.

Mute a Chatty Email Thread

When an email conversation is stuck in a never-ending "reply all" cycle and you wish you weren't on the recipient list, open the conversation and choose Mute from Gmail's More Actions menu. This will silence the thread, meaning that any new replies to it will skip your inbox and be archived automatically. You can still search for and find muted messages; you just won't get notifications of new replies while it's going on. To find conversations you've muted, enter **is:muted** into Gmail's search box.

Master Gmail's Keyboard Shortcuts

If you receive a lot of email, Gmail's keyboard shortcuts are essential, and should be committed to muscle memory as soon as possible. To enable keyboard shortcuts in Gmail's settings, go to the the General tab, and select the "Keyboard shortcuts on" radio button. Now you can move forward and back between your messages using the J and K keys, tap R to reply to a message, C to compose a new message, and the / key to move your cursor to Gmail's search box. Some keys even perform multiple actions. For example, if you're done reading a message, press] to archive it and move to the next message. See all the available keyboards shortcuts at http://goo.gl/hlBI.

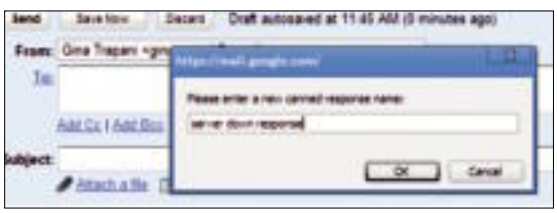
Catch Embarrassing Email Mistakes Before You Send

Just sent an email you wish you could take back? Told someone the file was attached and sent the message before you actually attached it? Gmail Labs, Gmail's "testing ground for experimental features," offers two tools that can help. The Undo Send feature gives you a few minutes to click an undo link after you've sent a message you immediately regret. The Forgotten Attachment Detector checks to see if you mentioned the words "attachment" or "attached" in your message but did not attach a file. If it suspects you've made a mistake, it prompts you with a dialog box that asks if you forgot your attachment—all before it sends the email. To enable Gmail Labs and get these and other Labs features mentioned on this page, click the Labs tab.

Google has a very canny way of making us feel slightly incompetent, doesn't it?

Send Repetitive Replies Faster with Canned Responses

When you receive a lot of email that requires the same response, you need not suffer the indignity of same-replying from scratch every time. Gmail's Canned Responses feature (another tweak from Gmail Labs) lets you set up email scripts that you can choose from a drop-down to send as a reply to a message. For example, you could have a Canned Response called "thanks" associated with the message, "Thanks for letting us know, we're working on it!" With Gmail Labs and Canned Responses enabled, open a new email, compose your canned response, and from the Canned Responses drop-down under Save, choose "New Canned Response" and enter a name for it. Then, any time you want to use the response when replying to an email, click the Canned Responses link, and choose its name from the Insert section. Canned Responses also work in filters. For example, you could say that any email from certain addresses should automatically get a particular canned response.



Whether you need a uniform reply to server-outage complaints, or just want to tell that latest Nigerian 419 scammer that you thank him for thinking of you but aren't currently interested, a Canned Response will get the job done.

Which email identity does Gina want to use today?

Send and Receive Mail from Other Accounts in Gmail

Switching to Gmail sounds tempting, but what if you don't want to change your email addresses? You don't have to. Gmail comes with a built-in POP fetcher, which can retrieve messages from up to five existing email accounts and drop them in your Gmail inbox. You can also set up multiple "From:" addresses that match your existing accounts. This way, when you send an email in Gmail, you can have it originate from your Gmail account, or from your alternate "From:" addresses. To start using other email addresses within Gmail, go to Settings and enter your other account details in the Accounts tab.

Add an Email to Your Task List

Gmail's built-in to-do list application, Tasks, makes it easy to turn messages into to-dos. You can manage your tasks, subtasks, task descriptions, and due dates just by clicking the Tasks link in the Gmail sidebar. And if you've got an email message that contains a to-do item in it, choose "Add to Tasks" from the More Actions menu to add it to your list with a link to the message.

If a message has a chore attached to it, just add it to Tasks, and it will loom over your to-do list like the proverbial albatross.

CRAWLER ALERTS

Let Google Do the Search Work for You

You want to see the latest, greatest search results for a brand name, person, or any keyword, but find it too time-consuming to manually search Google every few days? Then turn to Google Alerts (http://google.com/alerts), which will automatically deliver these hits via email or RSS feed. Simply enter the keyword you want new results for, what sources you want to monitor (News, Blogs, Web, Video, Groups, or Comprehensive), how often you want the email alerts, how many results the alerts should contain, and what email address the alerts should go to. Then, as Google crawls the Internet and indexes new content that contains your keyword, you'll get an email summarizing those results. If you've already got too much email, choose Feed from the "Deliver to:" drop-down to subscribe to alerts in your feed reader instead.

Want to know how many people are referencing your name online? Setting up a Google Alert will keep you appraised.

READER

Google Reader (http://reader.google.com) is a news aggregator that lets you subscribe to website RSS and Atom feeds, organize them into folders, share items with followers, and read their content offline. Billed as "an inbox for the web," Reader displays the number of unread items per feed (and per folder of feeds), just like an email client does.

Follow People in Addition to Feeds

Your friends are your most trusted informants, and seeing what they've been reading might bring you the news you care about more quickly than a faceless website could. To get started following people in Reader, click the "People you follow" link in the sidebar. You can find people to follow by name or email address, as well as configure access to your own shared items. Click the Follow button to add someone to the "People you follow" area, where each person's profile will display a count of things they liked, shared, or commented on.

Once all your pals begin following each other, your reads on good reads will grow exponentially.

READ YOUR FEEDS OFFLINE

To read your feeds somewhere other than in a web browser, try the free desktop newsreader FeedDemon (http://goo.gl/ALNW). It syncs with Google Reader, and maintains your subscriptions, tags, and read and unread item status whether you changed them on the desktop or in the web application.

Sort Feed Items 'By Magic'

You can instantly see the most interesting feed items first, using Google's version of magic: Hover over any feed, and from the drop-down menu change the sort order from "newest" (the default) to "by magic." The "Sort by magic" algorithm ranks items based on your reading habits as well as global Google Reader activity to predict which items will interest you most. The more feed items you like and star in Google Reader, the better the magic will work.

Is Doug Henning still alive? Something tells us he'd like this feature.

Graph Your Reading Habits

How much time do you spend reading and sharing feeds? Click the Trends link on the Reader sidebar to get an overview of how many feed items you read per month, with navel-gazing stats like what day of the week and hour of the day you read feeds most. Trends also shows you which of your feeds are most frequently updated, inactive, and least subscribed-to, as well as how active your Reader friends are. To see how much you interact with an individual feed, click it and then click the Show Details link on a feed's blue menu bar to see a bar graph that displays how many items that feed has published compared to how many you've read.

Spending too much time reading, and not enough time writing? The Trends feature can chart this in living color.

CHROME

Google Chrome (http://google.com/chrome) is an open-source, tabbed web browser developed with a focus on simplicity and speed. Its design is extremely minimalist, stripping away many of the menus and buttons common in other web browsers. A mere 16 months after it launched, Chrome is the third most widely used web browser, after Internet Explorer and Firefox. The latest stable build of Chrome is available as a free download for Windows, Mac, and Linux. Willing testers can also use beta versions of Chrome, which include previews of new features that are in development.

Customize the 'New Tab' Screen

When you open a new tab in Google Chrome, by default you get the aptly named "New Tab" screen, a smart grid of thumbnail previews of your most visited websites. You can customize the look, layout, and position of the thumbnails on this launcher page to make it more useful. To remove a thumbnail, hover over it and click the X in the upper right-hand corner. To relocate a thumbnail to a different position in the grid, hover over it, then drag and drop it to its new location. To pin a thumbnail to a spot—so it's always there, no matter how often you visit it—hover over it and click the thumbtack button on the upper left-hand side.

Stabbing a tab with a thumbtack insures it will remain stationary on your thumbnail view.

HONEY, I HID THE PRON

If you want to web surf without leaving behind traces of your activity—"to plan surprises like gifts or birthdays," according to Google's faux-naïve language—you can activate Incognito mode, which is under Chrome's Tools menu. Downloaded files and visited webpages won't appear in the browser's history, and new cookies will be closed upon exiting the incognito window.

Manage Tab and Extension Memory Usage

Chrome is a speedy browser, but once third-party extensions are in the mix, you're a bit vulnerable to memory leaks and slowdowns. To see what's eating Chrome's memory, launch its internal Task Manager using the Shift+Esc keyboard shortcut. Much like the Windows Task Manager, it will show you how much memory, CPU, and network bandwidth each tab and extension is using. Select a runaway memory hog and choose "End process" to nix its greedy activities.

Sync Your Bookmarks—Everywhere

If you're running Chrome on several computers, you don't have to worry about missing bookmarks you saved while working on another machine. Press Ctrl+Shift+B to launch the Bookmark Manager, and click the "Synchronize my bookmarks..." button. Sign into your Google account, and Chrome will merge and sync the bookmarks in your current instance of Chrome with every other installation of Chrome that has sync enabled (and is signed into your Google Account). Chrome actually saves your bookmarks in Google Docs. After you sync your bookmarks, you'll find a Google Chrome folder in your Google Docs account with a Bookmarks subfolder, and all your links stored within. This way, if you want to access your bookmarks from a different browser, you can access them by logging into Google Docs.

Add Features to Chrome with Extensions

The latest stable version of Google Chrome includes support for third-party extensions: installable plugins that add features to Chrome, like ad blocking, email notifications, or a session manager. To start exploring extensions, choose Extensions from the blue-wrench menu on the far right of the Chrome menu bar. If you have extensions already installed, they'll be listed here. Otherwise, click "Get more extensions" to browse a catalog of extensions categorized and ranked by popularity. We especially like the One Number extension, which adds a button to Chrome's toolbar that displays the number of unread messages in your Gmail, Google Reader, Google Voice, and Google Wave accounts.

PICASA

Google's Picasa photo management software (http://picasa.com) comes in two flavors: desktop software you install on your PC or Mac, and an online version called Picasa Web Albums (http://picasaweb.google.com). While you'll want to sort, organize, tag, rate, and edit the gigabytes of digital photos you've collected on your desktop, Picasa's Web Albums interface makes publishing and collaborating on those photos easier.

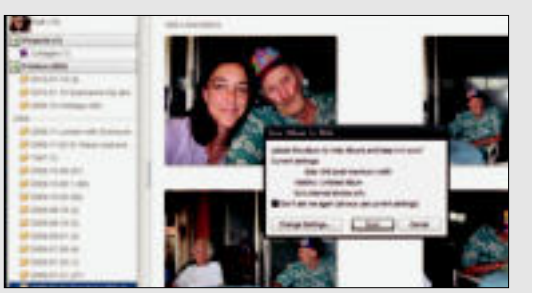
Group Your Photos by the People in Them

Both Picasa and Picasa Web Albums can recognize faces in your photos, and let you identify those faces by assigning Name Tags to them. Once your photos are loaded into Picasa on the desktop, it will scan them and place all the images with faces in them in an Unnamed People album (under People in the left column). Browse that album, and add a name to each person pictured to identify them. If you're signed into your Google account, link those photos with the corresponding person in your Google Contacts list. For each person you identify, Picasa creates a person-specific album, and continually scans your library for new photos that include faces matching ones you've already tagged. Picasa will ask you to confirm its name tag suggestions on faces it finds. The suggestions are often, but not always, accurate. Regardless, you can always correct an inaccurate name tag. Picasa Web Albums also uses name tags, and can list photos by the people in them. To turn on this feature, click the Try It button on the right side of your album list, in the Name Tags section.

Put Your Photos on the Map

You can easily add location information—aka geotags—to your photos and display them on a Google Map, with each photo pinned to the location where it was shot. To assign location data in the desktop app, click the Places button on the bottom right, between People and Tags. In the Google Maps panel that appears, search for an address. Once you've found the location where a photo was taken, click OK in the "Put photo here?" dialog. In Picasa Web Albums, choose a photo, and in the information panel on the right, click the Add Location link to find an address in Google Maps, and then put the photo there. Once you've geotagged your photos, you can view a map of photos by clicking the View Map link for an album.

Picasa let's you geotag in a Google Maps view, and you can also "View in Google Earth" by hitting the link at the top right.



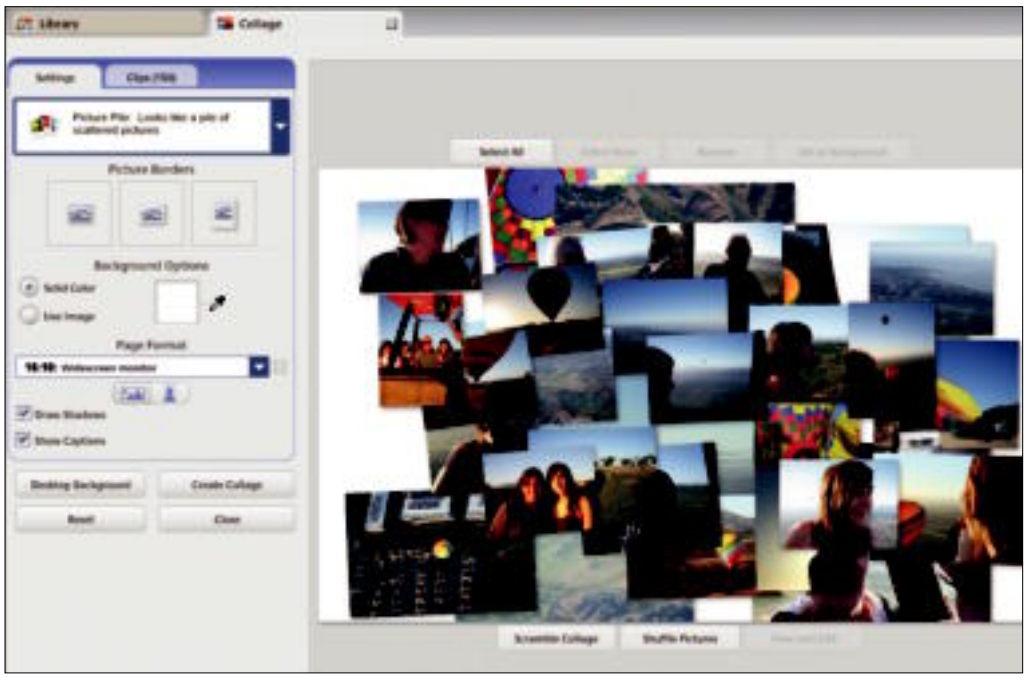
Behold, the Picasa desktop app in all its glory.

Automatically Sync Photos (and Edits) on Your Computer to the Web

Once you publish a photo album in Picasa Web Albums, you don't have to re-upload an image by hand every time you change a caption, add a name tag, or crop a photo. Instead, you can automatically sync changes to photos. To do so, go to the desktop app and select an album or a folder of photos. Toggle on the "Sync to Web" control, and sign into your Google account. Now, configure your sync settings—what size photos should be, whether they should have a watermark, whether they should be public or private—and start automatically syncing that local album to Picasa Web Albums. With web syncing on, any photos you add to the album or edits you make to existing photos automatically update in Web Albums—all without having to manually upload them again.

Get Arts-and-Crafty with Your Photos

The desktop version of Picasa comes with several built-in tools to create nifty projects from your photos. To get started, choose an album or folder of photos, and from the Create drop-down menu choose Picture Collage, Movie, or Gift CD. Picasa's built-in Movie Maker tool can create photo slide shows with music, transitions, text, and captions, and includes an option to instantly upload your project to YouTube. The Picture Collage maker organizes a set of photos into various layouts, such as a picture pile, grid, contact sheet, or mosaic. You can save the collage to edit later, or set it as your desktop background. Finally, the Gift CD maker burns a disc of selected photos and an accompanying slide show.



Notice that you can set the aspect ratio of your Picture Pile so that it matches the dimensions of your desktop.

Make Your Photo Albums Collaborative

When you've taken photos at an event with other attendees—say, a wedding—everyone's got his or her own pictures, and they're not always stored in the same place. But when you share a photo album in Picasa Web Albums, you can allow others to edit the photos in it, as well as add new photos to make that album collaborative. In both Picasa and Picasa Web Albums, choose an album or folder of photos, and click the Share button at the top. In the Share Photos dialog, enter the email addresses of the people you want to see the album, and check the "Let these people contribute to my album" box to grant them permissions. Now your collaborators can add and edit photo captions, apply name tags, edit the photos themselves, and add photos to the album. Just remember that any photos added by collaborators will count toward your Picasa storage quota, which is 1GB if you haven't yet upgraded from a free Picasa account.

Inviting friends and family to collaborate on albums is as simple as sending a quick invite.

Don't even try uploading a photo to Gina's Picasa account. You will be stymied!

Upload Photos via Email

Sure, you can upload photos to your online albums from within Picasa itself, but you can also upload photos via email—a perfect method for your camera phone. To set up your secret upload email address, go to Picasa Web Albums and click the Settings link in the top-right corner. Under the General tab, in the "Upload photos by email" section, check the box next to "Allow me to upload photos by email." Enter a secret word to get your unique email address, and click the Save Changes button. Now add that secret email address to your contacts. Next time you snap a photo from your smartphone and want to instantly upload it to Picasa, send it via email to that address. To add a photo directly to a particular album, enter the name of the album in the subject line of your message.

SEARCH

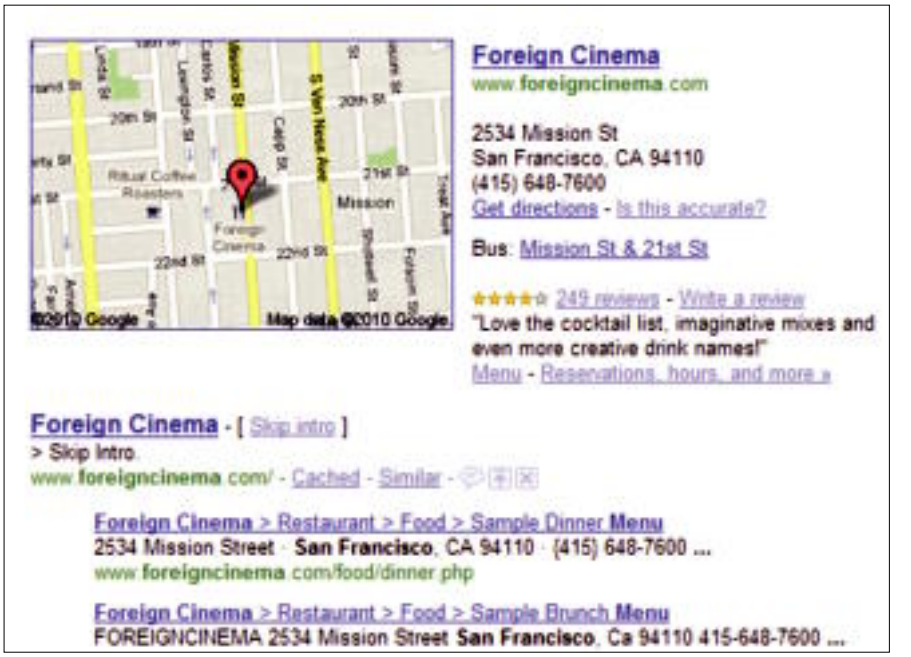
The front door to the grandaddy of all of Google's web applications—its web search engine—is an unassuming text box that doesn't give you any hint to what it can do. In July 2008, Google's index exceeded 1 trillion unique websites, and a billion new web pages are purportedly added per day. Here's how to twiddle Google's knobs and levers to find your needle in that haystack.

CHROME OS

Just a Lean Browser Wrapper?

Google Chrome OS is a yet-to-be-released, open-source operating system whose sole purpose is to quickly get you online. As such, only a single, installed application runs on it: the Google Chrome browser, which provides shortcuts to web applications like Google Calendar, Yahoo Mail, Hulu, Facebook, and Twitter.

Everything you do in Chrome OS happens in the browser, on the web. Speed is the highest priority in Chrome OS development, and early builds running on netbooks boast promising boot speeds of four to seven seconds—which Google engineers say they will work to reduce! Currently, only source code for the open-source project—called Chromium OS—is available (find it at www.chromium.org/chromium-os). In the fall of 2010, Google and its hardware partners are slated to announce netbooks and other devices running this most lean of OSes. For more on *Maximum PC*'s unique take on Chrome OS, go to http://bit.ly/4b4Y6e.



The *Maximum PC* crew can't get enough of Google's savvy in finding food menus.

Find Business Hours, Restaurant Menus, and What's Nearby

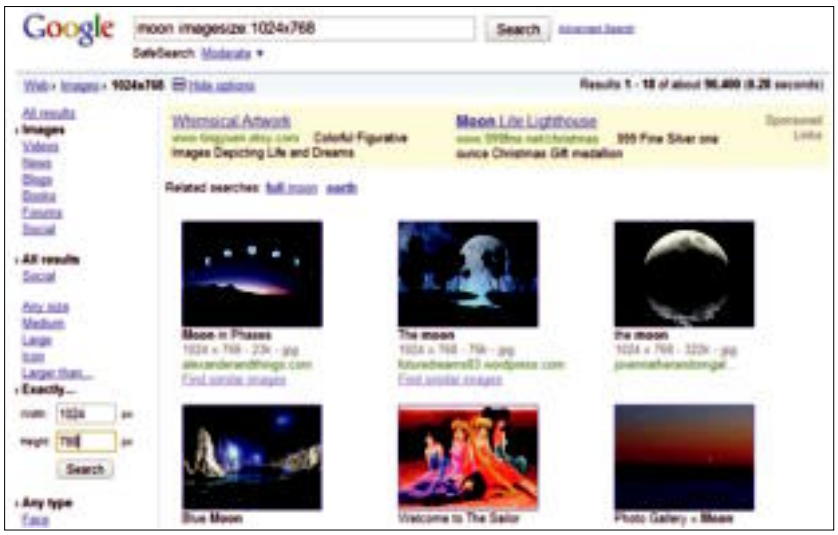
Get business hours in your Google search results by searching for the business name, city, and the word "hours." For example, a search for **Seaworld, San Diego hours** includes the days and times the park is open, right on the results page. Likewise, a search for a restaurant name and the word menu (like **Ranchos Cocina Ocean Beach menu**) includes a blue link directly to the menu in the first result. Finally, when you visit Google.com in the browser on your location-aware iPhone or Android phone, you'll see the name of your current location. Click the "Near me now" link to see restaurants, coffee shops, banks, and ATMs in your vicinity.

Calculate, Convert, and Get Local Time Instantly

Google's search box doesn't just return links to web pages, it can also perform calculations and conversions, as well as tell you the local time in places around the globe, and what time a plane flight might arrive. For example, search for **20% of 37.45** to see how much you should tip the waiter for dinner. To see what the local time is in faraway places like Tokyo, you would search for **what time is it in Tokyo**. Google also comes in handy while you're cooking: Enter **quarter cup in teaspoons** when you can't find your measuring cup. Finally, to quickly check whether a flight is on time, search for it by airline and flight number, e.g., **JetBlue flight 185**, and you'll get arrival and departure times at the top of the results page.

Find Images and Videos of a Certain Size and Type

Google Image search has special filters you can use to specify the size and type of the image you're looking for. For example, if you're looking for desktop wallpaper images of the moon that are 1024x768 pixels, first go into Google Images, search for moon, then in your results, click the Show Options link to set the exact size. In those options, you can also narrow down results by the type of image you're looking for—images that contain faces, a photo, clip art, or line drawing. Google's Video search offers similar options. You can specify the length of a video you're looking for as well as whether it's a cartoon, slide show, or high quality.



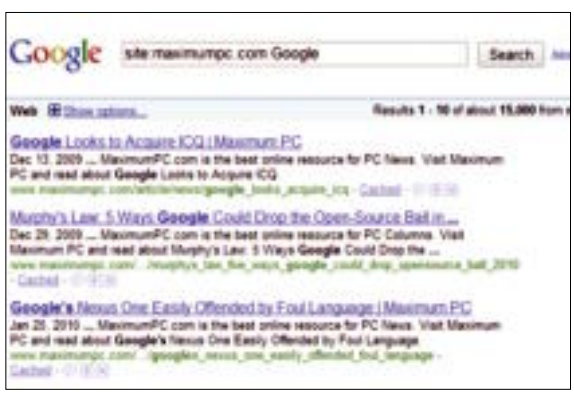
Sure, but can it find a video of a Simpsonized Christopher Walken reading *Goodnight, Moon*?

Add Custom Sections to Your Google News Page

Google News (http://news.google.com) comes with built-in sections like Top Stories, Business, Entertainment, and Sci/Tech, but you can also create a custom news section that you monitor over time. For example, to track news related to the Apple iPad, in News, search for iPad. Then, at the bottom of the search results page, click "Add a custom section for iPad to Google News." This will add it to your section list on the Google News sidebar.

Search Within a Single Website

Many websites don't offer their own built-in search box, and those that do don't usually provide results as good as those you get from Google. Luckily, you can search a single site from Google's search box using the site:example.com operator. For example, to search maximumpc.com for the word Google, search for **site:maximumpc.com Google**.



PROFILE ENHANCEMENT

Finally, for the Eternally Anonymous

When potential bosses, dates, clients, and old high school friends type your name into Google's web search box, what do they get back? If you've got a common name or just don't have the time to keep up an active web presence, you can still get listed in search results with Google Profiles. Head over to http://google.com/profiles to set up a personal page with your name, a head shot, a short bio, places you've lived, schools you've attended, and your websites. You can even include photos from Flickr, Picasa, or any online photo feed. (Hint: specify an album that contains pictures of you so that searchers can identify you!) Once you've added enough information to your Google Profile, a search for your name will include your profile (along with anyone else who has your name) at the bottom of the Google results page. The more information you add, the higher you'll move up the rankings.

Blessed with a relatively uncommon name, our author boasts the only profile that shows up at the bottom of a "gina trapani" search.

For more info on Gina Tripani and all her Google projects, go to http://ginatrapani.org.

What's Your PC Made Of?

You might think your rig is up for any task you throw at it, but the only way to know its true capabilities is to benchmark it, subsystem by trusty subsystem. We'll show you how...

BY GORDON MAH UNG AND LOYD CASE

To the casual observer, PC builders who fixate on benchmarks are geeks who can't see the forest for the trees. Why, they ask, can't you just enjoy your new computer and let it be? Our answer: The difference between a person who cares about benchmarking and one who doesn't comes down to how much each person values free time.

Case in point: We recently performed the simple act of downloading two large zip files at the end of a workday. But instead of strolling out at 6 p.m. as we normally would, we ended up waiting 15 minutes for the files to decompress on our (admittedly lame) company-issued PC. So, to care about benchmarks is to care about performance. And to care about performance is to care about having more free time. By benchmarking your rig, you not only get a clearer picture of what your PC is capable of, you can also see quantitatively how the changes you make to your components and system settings impact performance.

But you shouldn't download just any benchmarking tool, as there's a right and wrong way to benchmark your machine if you want to get meaningful results. In this article, we'll point you to a number of reliable free benchmarks, teach you proper benchmarking techniques, and explain how to interpret your results. We'll also show you how *Maximum PC* plans to test the most powerful PCs on earth going forward. That's right, folks, we proudly reveal our all-new system benchmarking suite!

THE THREE Rs

Qualities that Make a Good Benchmark

REAL WORLD

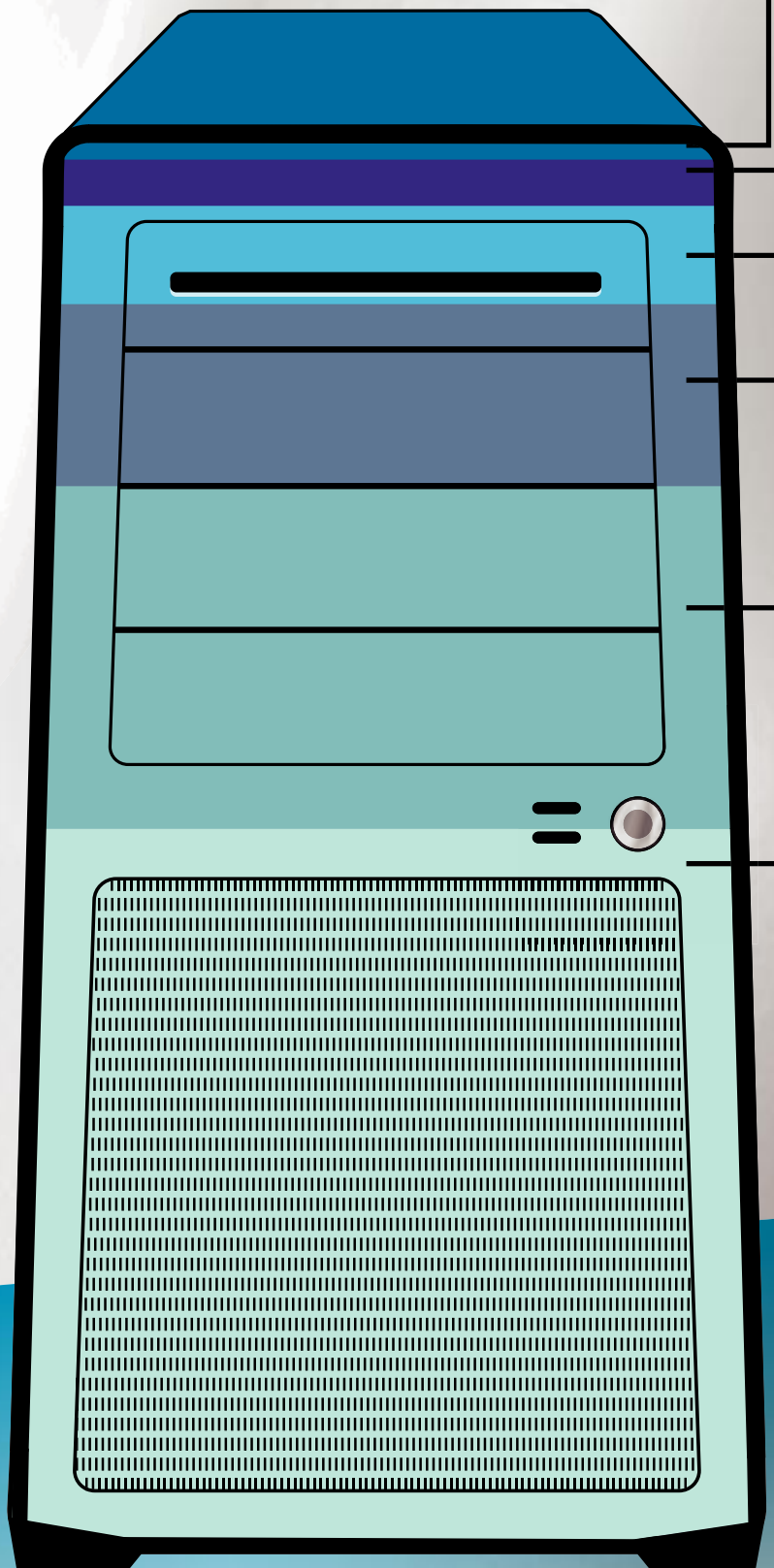
Real-world benchmarks weren't always in vogue. Years ago, the enthusiast community mostly relied on synthetic benchmarks (aka "artificial benchmarks"). But that trend ended when people realized that vendors were skewing their drivers to increase performance in the synthetic tests, all at the expense of real-world performance. These cases of "gaming the driver" pushed benchmarkers toward real-world apps and games. (See sidebar on page 42 for more on synthetics versus real-world).

RELEVANCE

Just like you wouldn't bring a Klingon d'k tahg to a phaser fight, you shouldn't use a CPU benchmark to test a hard drive. As obvious as that sounds, you wouldn't believe how often we see people citing a benchmark intended as a GPU test to illustrate CPU performance. For every benchmark you run, you'll want to understand what component it's most influenced by: CPU, GPU, RAM, or HDD.

REPEATABILITY

So you've found a benchmark that actually works for your needs. Great! But is it repeatable? Can you run it five times on the same machine and have it produce the same results within a tolerable level of variance—say, 3 percent?



2% Trace amounts of chicanery, hubris & guile

3% BSOD hobgoblins

7% Dust bunnies, grime & upgrading detritus

13% Unflagging optimism

24% Blood, sweat & tears

51% Pure PC power

Pre-Flight Your PC

A few precautionary measures go a long way toward more accurate results

Getting repeatable, reliable benchmark results isn't just about picking the right benchmark, it's also about properly configuring your PC. Here are some basic steps every benchmarker should perform before running his or her first test.

TURN OFF ANY SCREEN SAVER Even though the screen saver is supposed to stay inactive during use, you should always completely disable it.

TURN OFF POWER SAVING MODES Unless you're interested in measuring the power consumption of your machine using a watt meter, all benchmark runs should be conducted with the machine set to high-performance mode in the OS.

DISCONNECT FROM THE INTERNET Remove any Ethernet cable and disconnect any Wi-Fi connection unless it's needed for your benchmarking run.

DISABLE ANTIVIRUS APPS Unless you want to see the impact of having AV overhead on a machine, disable any antivirus tools for your benchmarking run.

DISABLE SYSTEM RESTORE Turning off System Restore will prevent Windows from creating those restore points.

TURN OFF AUTO-UPDATE Windows update should be switched off to prevent it from downloading a massive patch (you did disconnect the network connection, right?) or to prevent it from eating CPU cycles looking for one. Other apps that auto-update should also be turned off.

DEFRAG YOUR HARD DRIVE If the drive is heavily fragmented, we recommend that you invoke a defrag of the disk. Folks with SSDs, obviously, need not perform this step.

REBOOT Self explanatory. Wait for the machine to fully boot. As we all know, it takes a minute or three for the OS to load all of the files it needs—even after you're presented with the desktop. Wait a few minutes until disk activity has subsided.

RUN PROCESSIDLETASKS Spawn a "DOS box" by going to Run, typing CMD, and then typing the following command line: `Rundll32.exe advapi32.dll, ProcessIdleTasks` This will order Windows to perform all of the tasks it normally would when the system is idle.

REPEAT YOUR BENCHMARK We recommend that you run your benchmark at least three to five times and take an average of the scores.

KEEPING IT REAL

Synthetic vs. Real-World Benchmarks

As mentioned, real-world applications have been established as the preferred benchmarking method for quite some time, but that doesn't mean synthetic benchmarks are irrelevant. In fact, synthetic benchmarks can be quite useful in evaluating a focused set of components such as RAM, CPUs, or hard drives. Some synthetic tests can even be considered quasi-real-world.

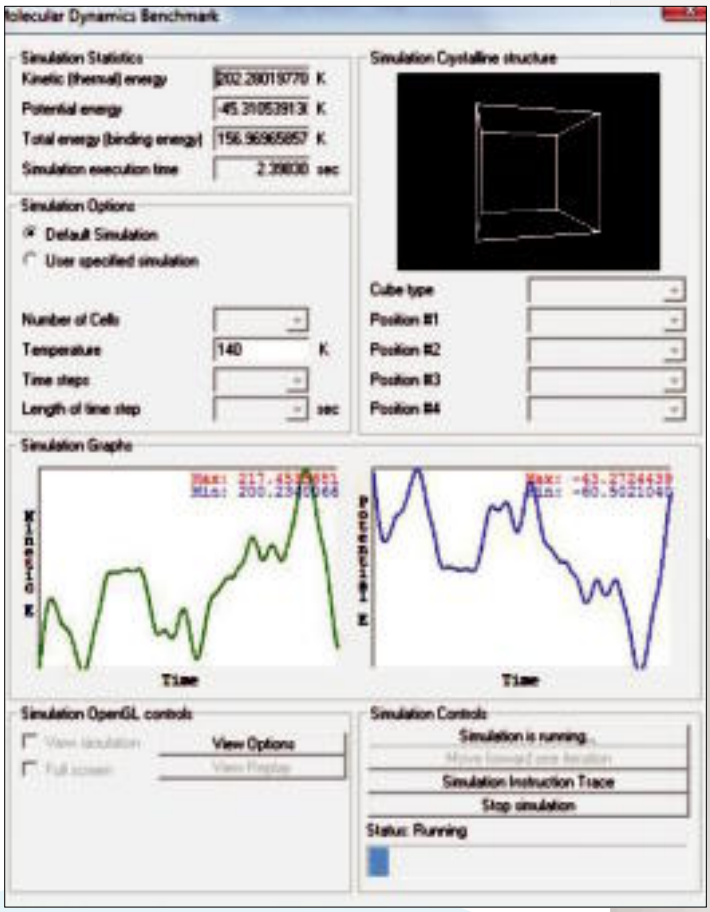
The classic complaint against synthetic tests is that they once used scripts and/or engines that were optimized solely for the benefit of the benchmark results. Similarly, a vendor could tweak its drivers to favor performance in the precise scripts a benchmark was running. Today, however, many synthetic benchmarks are based on real-world engines or algorithms developed from popular applications. PCMark's hard drive tests, for example, use traces taken from apps or the OS. It then runs these traces against the hard drive to measure performance.

You can see how the line between synthetic and real-world benchmarks can get blurred, though. In some cases, actually finding real-world benchmarks that stress a particular component is difficult. RAM is probably one of the best examples of that. It's actually very difficult to find real-world benchmarks that will exploit either the low-latency or high-bandwidth features of modern RAM. It's only through synthetic benchmarks that you can actually see that you're benefiting from any additional bandwidth at all. Hard drive features are also fairly difficult to discern without the use of at least some synthetic benchmarks.

Putting It to Your Proc

Rookie benchmarkers often make the mistake of running but a single benchmark, thinking that one test is enough to know everything about a component's performance. But all a single benchmark tells you is how a component performs with *that one benchmark*. And of all the parts in a PC, the CPU is the most complex and multifaceted. Even with the GPU now encroaching on its chores, the CPU continues to do the heavy lifting for the vast majority of apps, from photo editing, to video editing, to 3D modeling, antivirus scans, and file decompression. How you go about testing the CPU really depends on what kind of performance you want to test for. Floating-point performance? Integer performance? How fast it encodes video or plays certain games?

Another key element to consider before you benchmark your CPU is multithreading. Just as very few applications exploit all the threads available in a processor, very few benchmarks do, as well. That is changing, but you'd be surprised at how many benchmarks fail to measure the performance of a modern quad-core processor. So, let's take a look at not one benchmark, but a suite of publicly available tests that can expose your proc's performance.



ScienceMark 2.0 evaluates CPU performance using science- and engineering-based algorithms.

CINEBENCH 10

One of the heaviest jobs you can throw at a CPU is a 3D modeling task. In 3D modeling, performance is the difference between getting the project done on time or not at all. There are benchmarks for Autodesk's 3ds Max, NewTek's LightWave, and other pro apps, but you need a licensed copy of those apps, which can run thousands of dollars. Fortunately, there's a free alternative. Maxon's Cinebench R10 (www.maxon.net) is based on the rendering engine used in the company's Cinema 4D modeler. Most 3D modeling is floating-point intensive. Cinebench has both 64-bit and 32-bit modes, and lets you test in single- or multithreaded environments. To run it, simply install the app and launch it. Select Rendering 1 CPU to run a single-threaded test or Rendering X CPU to run a multithreaded test. The results are expressed as a numerical score—the higher the better.

Cinebench gives you an easy way to tell how fast your machine will render 3D modeling.

FRITZ 9 CHESS BENCHMARK

For a different view of CPU performance, you can turn to the Fritz 9 Chess Benchmark (http://bit.ly/bEy1eJ), which is based on the popular Chessbase engine (although not the most recent version), so it's considered real-world. Running it is straightforward: Simply fire up the app and click Start. Fritz will indicate how many "processors" it's going to use. The number will include all of the physical cores in your chip as well as any virtual cores. The result gives you a comparison of your machine's performance versus that of a 1GHz Pentium III, as well as how many kilo nodes per second, or moves per second, your rig can compute.

SCIENCEMARK 2.0

ScienceMark 2.0 (http://bit.ly/do2n6Z) is a synthetic benchmark rooted in a real-world engine. It uses mathematical algorithms common in scientific and engineering applications, and also stresses memory performance and latency. Back in the days when the Pentium 4 would get soundly splattered by the Athlon 64 in ScienceMark 2.0, Intel would grouse that the authors of ScienceMark 2.0 weren't interested in addressing optimizations for its CPUs. But with Intel now taking the lead with Core 2 and Core i7, the company doesn't seem to object to this test as much anymore. The one caveat to this benchmark is that it doesn't seem to be particularly multithreaded. Running it is easy. Download the installation file and decompress it. Execute the app and click File, Run All

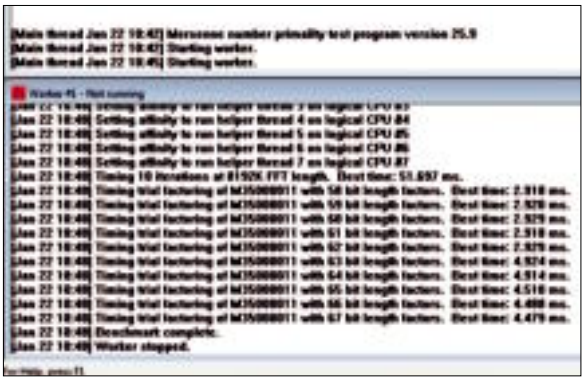
Benchmarks. The results will give you an overall ScienceMark score as well as sub scores for molecular dynamics, cryptography, and memory, among other benchmark scores.

SUPERPI

Although both SuperPi and Prime95 (below) are single-threaded, these popular benchmarks are great for evaluating the math prowess of a CPU. Both have long been favored by overclockers as stress tests, but they will also give you overall scores as a performance indicator. The weakness of both tests, obviously, is the lack of multithreading. The preferred version of SuperPi is 1.5 (http://bit.ly/6RCAZZ) and has been modified by Xtreme-Systems.org to make it more amenable to stress testing. To run it, execute the app, select Calculate, and select 1M. The program will calculate pi to 1 million digits.

PRIME95

Like SuperPi, Prime95 (www.mersenne.org) is considered more a stress test than a benchmark. In fact, we use a custom blend of Prime95 developed by an OEM PC builder to stress test many of the overclocked PCs we review. Prime95 is a distributed project used to search for Mersenne prime numbers. To run the benchmark, start the application, dismiss the stress-testing screen, and go to Options > Run Benchmark. When it's complete, the results are dumped into a file named results.txt that should be in the same folder where the executable resides. Open the file and you should find results for each separate run you conducted, reported in milliseconds. You can compare your results to those of others at http://bit.ly/bNZdje.



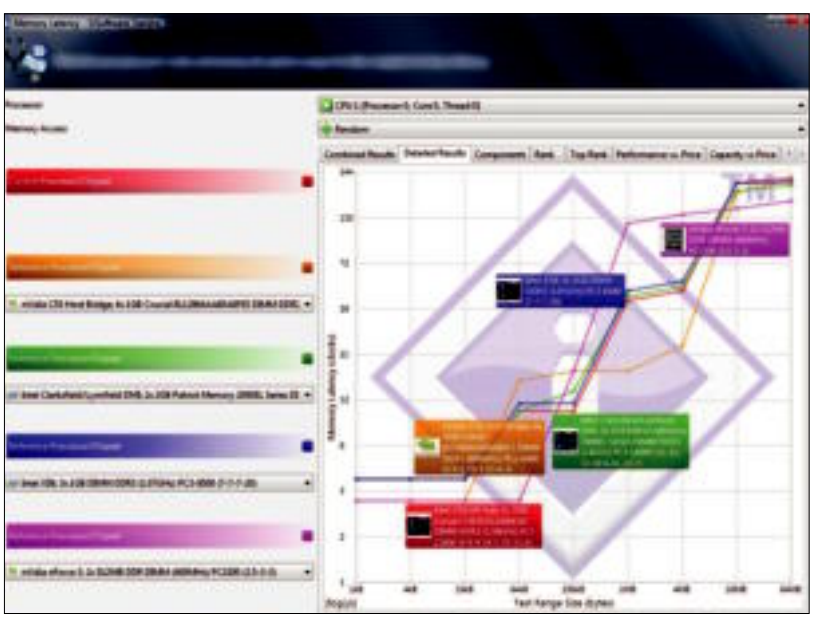
Prime95 is a wonderful stress test as well as a good single-threaded benchmark of FPU-intensive math.

Getting a Read on Your RAM

Gauging RAM performance with real-world applications is difficult. We've long sought the application that would instantly reveal how much more performance comes from running ultra-tight RAM timing tolerance or clocking the modules past the 2GHz mark, but we have yet to find it.

To actually see if your overclocked RAM gives you more bandwidth, you'll have to turn to a synthetic test. We favor SiSoft Sandra Lite (www.sisoftware.net) and Everest Ultimate (www.lavalys.com). In SiSoft Sandra Lite, launch the app and click the benchmarks tab. Select Memory Bandwidth and press the F5 key to run the benchmark. The app will give you a score, as well as the scores of four other chipset/RAM/CPU combos that you can compare your results to. You can do the same with Memory Latency, as well.

Everest Ultimate gives you a 14-day trial period—plenty of time to run all the benchmarks you want. To test your RAM with Everest, install the app, launch it, and click the Benchmark icon. Select Memory Read and click the refresh icon on top. You can do the same for Memory Write, Memory Copy, and Memory Latency. Like Sandra, Everest Ultimate will also give you a lengthy comparative list of motherboard/CPU/chipset configs.



A synthetic test, such as Sandra, is just about the only way to measure the impact of greater memory bandwidth or lowered latency.

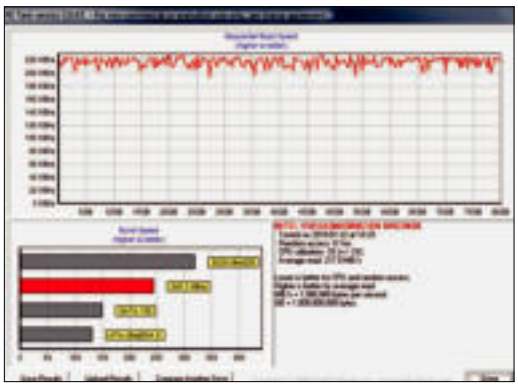
You can use these two tools to tune your RAM for higher bandwidth or lower latency. Just note your score before rebooting into the BIOS, where you can clock your RAM higher or latency lower.

Hazing Your Hard Drive

Hard drives are perhaps one of the most difficult components to benchmark. For many years, users relied solely on straight file-copying tests: Take a few gigabytes of files and dump them to a target hard drive three or four times, timing the process with a stopwatch. Sounds real-world and accurate enough, doesn't it? Unfortunately, it isn't. That's mainly because you have no control over where the data is dumped on a mechanical drive, so results can vary wildly (thus putting the kibosh on our "repeatability" requirement).

This is an area where synthetics can be more reliable than real-world tests. Two of the most popular tests include HD Tach 3 (www.simplisoftware.com) and HD Tune 4 (www.hdtune.com). For Vista and Windows 7 users, HD Tach requires a bit of tweaking since it was designed for Windows XP. In Vista or 7, right-click the icon, go to Properties, and under the Compatibility tab, select Windows XP SP2. On startup, choose the target drive to test and choose Long Bench. Click Run Test.

You'll be given four results: the average read performance, random access time, CPU utilization, and burst speed. The two that matter are average read performance and random access time. The relevance of burst speed to performance is up for debate. The general consensus is that it doesn't matter much, as the cache in a hard drive (even today's supersize 64MB cache) is so small that it can't really help much. CPU utilization is also fairly meaningless since it's usually below 5 percent. This figure should only be a concern if it's in the double digits, which might indicate some problem with the storage subsystem.



A synthetic benchmark, such as HD Tach, can be more reliable than the copying-and-dragging method.

HD Tach's one weakness is its inability to perform write tests (at least in the free version.) Fortunately, that's one thing you can do with HD Tune. The trial version lets you run write tests on drives for the duration of the 14-day trial period. Starting it is simple: Launch the app, select your target drive, and click Start. If you plan on running the write tests, you'll have to delete the partition on the target drive first. Obviously, don't do this on the primary partition that you are using.

Gauging the Strength of Your Graphics

Games are excellent real-world tests for graphics. Benchmarking videocards gets more difficult every year. In the old days, most people had 4:3 CRT displays, and usually ran games at relatively low resolutions. Today's gaming environment is considerably more complex. We've now got widescreen displays running in a variety of resolutions and two different aspect ratios (16:10 and 16:9).

Then there's the confusing issue of APIs. It's true that OpenGL for PC gaming is less relevant than it used to be, but now we have multiple versions of DirectX: DirectX 9, 10, and 11. Each offers different capabilities and feature sets. Currently, only AMD offers DX11-class GPUs, though that may change by the time you read this.

Then there's the resolution question. If you're looking to just hammer on the GPU, run your benchmark at the highest possible resolution. Then add to the GPU's pain by pumping up antialiasing and maxing out game detail and effects.

We've already discussed how to set up your system for reliable benchmarking. What works for CPUs and systems also works for graphics cards, with two additional wrinkles: Make sure you're running the latest graphics driver and watch out for vsync. Performance in some titles can improve by more than 10 percent with just a driver update (though in rare cases, you may actually see performance decrease.)

Call of Pripyat supports the latest APIs and is fairly simple to run.

Vsync needs to be disabled in all benchmarks, or you'll see results locked at the refresh rate of the display (typically 60fps for LCD monitors). So, make sure it's either disabled in the graphics control panel or the game's options.

The good news is that you can find a pretty good set of graphics benchmarks that cost you nothing but download time and some time to learn. If you want to spend $50 for a particular game to run as a benchmark, feel free. But here's our handy guide to a few of the good, free graphics tests.

S.T.A.L.K.E.R.: CALL OF PRIPYAT

The developers at GSC Game World have released two benchmarks based on their excellent S.T.A.L.K.E.R. series. The latest is the Call of Pripyat test (http://bit.ly/2Vz646), which supports DirectX 9, DirectX 10, and DirectX 11.

Call of Pripyat is a first-person shooter, but there's no actual action in the benchmark, though AI is active. You'll see characters walking around,

but not actually engaged in combat. Since it tests multiple APIs, it's good for finding the sweet spot for your particular GPU. CoP, as it's often called, offers a fairly simple set of parameters: pick an API, pick a detail level, and, if you like, enable AA and other features.

DIRT 2

Dirt 2 is the latest in the series of racing titles that started with the original Colin McCrae game. The free, downloadable demo (http://bit.ly/acOWr3) of the game supports DirectX 11, 10 and 9, so is about as current as you can get.

The problem with Dirt 2 is that it's somewhat cumbersome to run as a benchmark. First, you need to run the demo. Then you have to navigate the menu to find the Options screen. You start inside your in-game RV trailer, then have to leave the trailer to go outside, find the Options table, and then select Graphics. After all that, you still need to scroll down to the bottom of the graphics options to find the benchmark mode.

RESIDENT EVIL 5 DEMO

The Resident Evil 5 demo (http://bit.ly/EVCkE) supports DirectX 9 and 10, but also has support for Nvidia's 3D Vision stereoscopic 3D, so you can even benchmark a supported card wearing shutter glasses, if you find that interesting.

As game demos go, it's not a huge download at about 580MB. It's dead-simple to run, too. When you run the launcher, choose either DX9 or DX10 mode. When in the demo, you press a key, select System Settings, then set the resolution and features. Once you ESC back to the main screen, you hit a key again and select Benchmarks. The Fixed Benchmark is shorter, and generates more repeatable results. At the end, you'll get a summary screen, showing you an average frame rate and a chart of frame rates over time.

Resident Evil 5, with all the eye candy turned up, can still stress a graphics card, even though it's almost a pure port of the console title.

UNIGINE HEAVEN

Although based on an actual game engine, Unigine Heaven (www.unigine.com) is a synthetic test, designed to check out DirectX 11 performance on the latest generation of graphics cards. It even offers manual settings for hardware tessellation, a feature available only on DirectX 11–capable GPUs. It will also run in DX10, DX9, and OpenGL, so you can test a variety of APIs, but remember that performance will vary by API and enabled, API-specific features like hardware tessellation.

Unigine's Heaven benchmark runs all currently supported graphics APIs, and supports hardware tessellation under DX11.

REMEMBER THE CONTEXT

It's easy to get mired in frame rates, feature sets, and driver versions. Remember, however, that a difference of a few frames per second really doesn't matter, as long as you're staying above 45fps in shooters and 30fps in simulation and RTS titles. Benchmarking graphics cards is a great way to check out the performance of your rig, and maybe help you decide when it's time to upgrade. In the end, though, it's about how well the games you like perform on the hardware you own. Benchmarking should be a tool to help you enjoy your gaming experience, not a competition unto itself.

ALL WORK, NO PLAY

Benchmarking Professional Graphics

If you're a graphics artist or professional CAD user, you may want to test performance of your card in that context. The problem here is that professional graphics apps vary in performance on specific GPUs even more than games do, and the CPU can often be a big factor.

If you do want to see how your graphics card performs, there are several free benchmarks that can assist you. One quick and easy source is SPEC (www.spec.org), the Standard Performance Evaluation Corporation, a standards group that develops a variety of benchmarks. One free benchmark that's widely used is SPECViewperf, now at version 10. SPEC also offers app-specific tests for 3ds Max 9, Maya 6.5, SolidEdge, and others.

Benchmarking in the Big Leagues

Any system that enters the Maximum PC Lab will have to run the gauntlet of our new, loaded-for-bear benchmarking suite

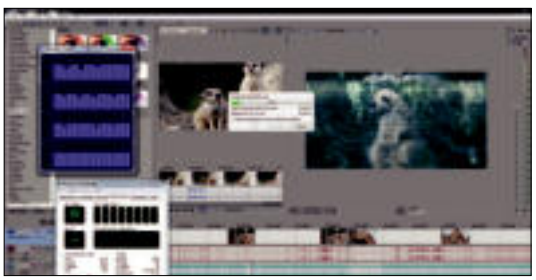
Picking new benchmarks to keep up with the world-class systems we review is no easy task in the fast-moving world of technology. For example, our last benchmark suite was created at a time when quad-cores were exclusive, $1,000 parts—now they can be had for $99. SSDs were just as exotic, and DX10 was the hot new API.

In other words, we've come a long way, baby. Unlike component-level testing, where we start with a clean-slate OS, testing production machines means testing the rigs as they ship. 100GB of bloatware? An AV suite that won't let you move the cursor 10 inches before launching a popup? That all figures in. We do, however, disable screen savers, limit power-saving modes (unless we're specifically looking at energy savings), and disconnect the PC from the network.

Here's a rundown of the benchmarks we'll be running going forward.

APPLICATION WORKLOADS

As before, our application workload will stick with the chores that make everything drag: content creation. Why use content creation instead of, say, an Office benchmark? Frankly, there are very few workloads in the Office suite that take a modern machine, especially a 4GHz Core i7 machine, very long to run. Two of our content-creation apps are familiar (although updated): ProShow Producer and MainConcept Reference; and two are new: Photoshop Lightroom 2 and Vegas Pro 9.

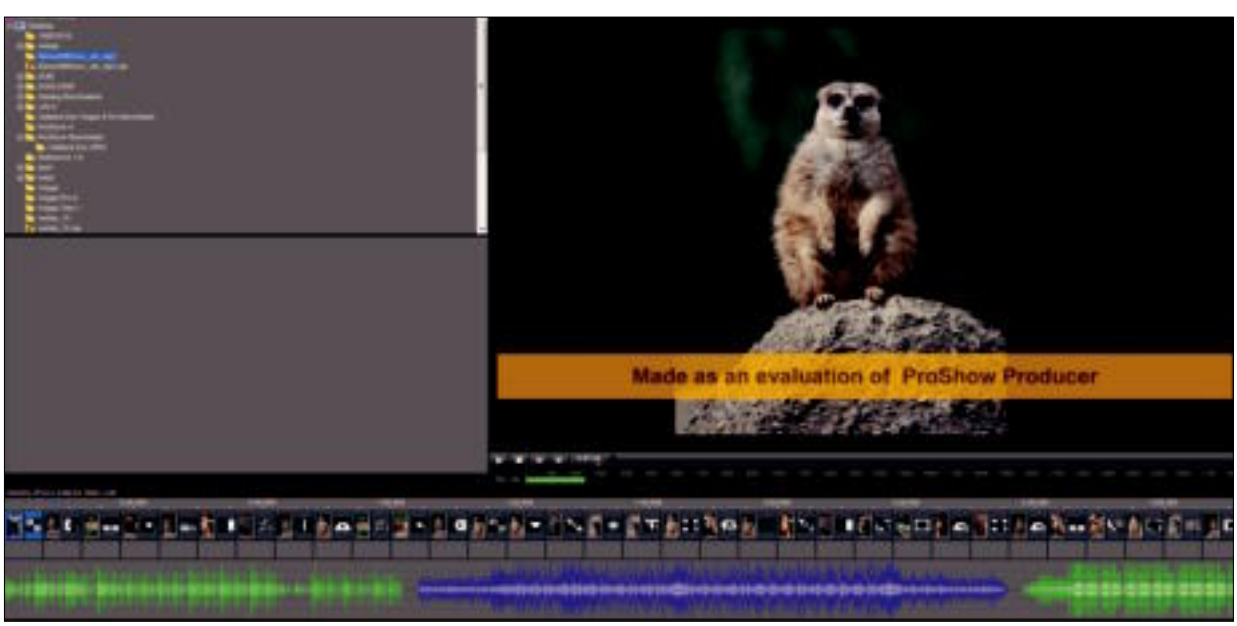


Our Vegas Pro 9 workload and render is capable of hammering all the threads a Core i7 CPU makes available.

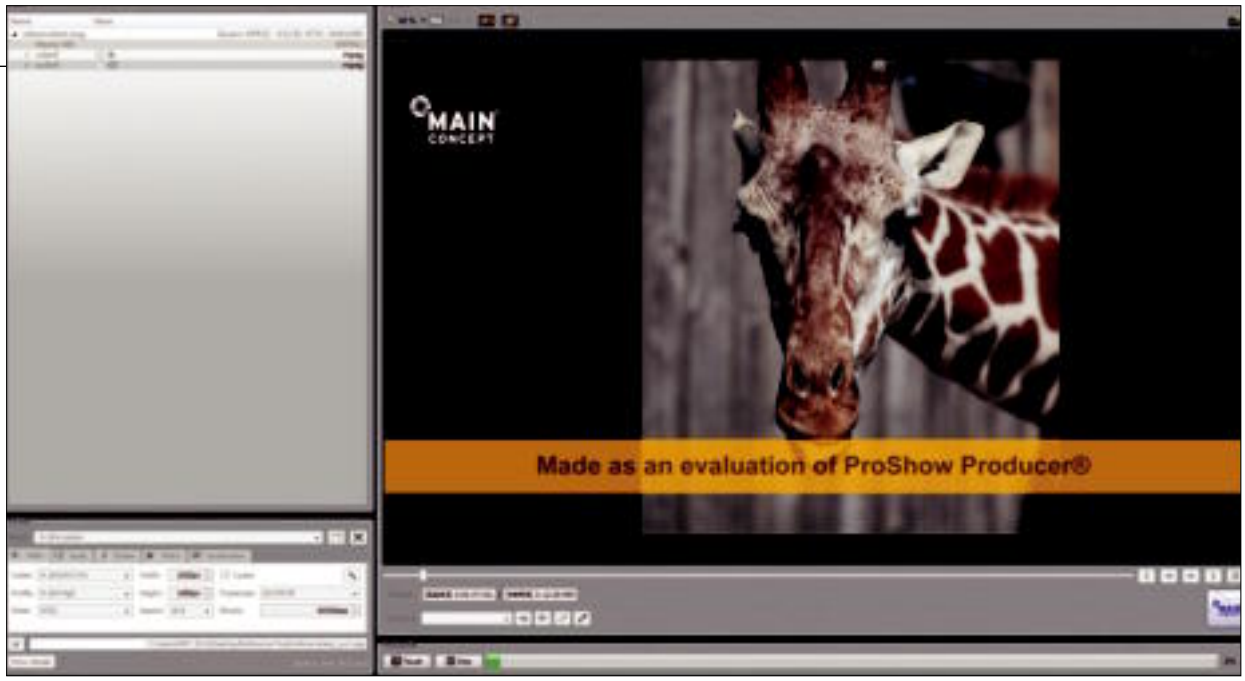
For our source material, we went to the Oakland Zoo equipped with the hottest DSLR in town: Canon's 5D Mark II. With a Canon EF 300 F/2.8 L and matched EF 1.4x Extender, we shot video and still images of the animals. The 5DMII's full-frame 21.1MP sensor produces massive 12-bit RAW files and will also shoot 1080p video at 30fps in a .mov container file using the H.264 codec. We took the images and videos from our shoot and created small projects to simulate modern-day content-creation workloads.

ProShow Producer 4

We've long used ProShow Producer as a benchmark for slide-show creation. For this revision, we update to version 4 of the app, and instead of using files generated with a Canon 5D, we're using the much larger, higher-res photos of a 5D Mark II in .jpg format. An audio track (courtesy of *Maximum PC* podcast producer Andy



We use ProShow Producer 4 to output a high-res MPEG-2 file from a crapload of high-resolution JPEG files.



MainConcept's Reference 1.6 has huge market share, and good encoding performance here will translate into good performance elsewhere.

Bauman) is inserted into the project and a 1920x1080 MPEG-2 is output by the application. This test has been and remains a CPU-intensive application.

MainConcept Reference 1.6

Using version 1.6 of MainConcept Reference, we take the MPEG-2 generated by Producer 4 and encode it to H.264. This is purely an encoding test and it's made more important because MainConcept's encoder is found in many commercial video-editing and video-oriented applications, making it particularly relevant as a performance indicator.

Adobe Photoshop Lightroom 2

We've moved away from our long-time standby Photoshop test, which has quickly become a pushover for most editing chores. Let's face it, even the largest image file can be easily manipulated on a modern computer. Photographers are instead challenged by managing the gigabytes of images high-resolution bodies create. The CR2 files that the 5DMII produces are in excess of 22MB per click. For our test, we use the workflow manager Photoshop Lightroom 2.6 to import 210 CR2 files and then export them to Adobe's DNG format. For folks who don't know it, camera manufacturers' native sensor formats are proprietary, so it's possible that in time, you might not be able to open an obsolete vendor's specific RAW file. As an alternative, Adobe is pushing its DNG, or Digital Negative, format. Adobe owns DNG but the spec is public, so it should be possible for someone to open your DNG photos 100 years from now.

The weakness of this test is that it's not particularly multithreaded, but it is sensitive to drive I/O. And we like the real-world value of Lightroom 2's performance.

Sony Vegas Pro 9

Sony Vegas has long been a trendsetter in the nonlinear-editing category and Vegas Pro 9 continues that tradition. With native Red support for up to 4K resolution, Vegas Pro 9 is capable of handling the power-hungry video from the 5DMII. For our bench, we cut together a small video shot with the 5DMII, add motion effects, transitions, and an audio track (again, courtesy of podcast producer Andy Bauman) and render the project to WMV11. Of the four tests here, Vegas 9 is most able to push all cores.

GAMING

In the past, we've focused our system gaming benchmarks on first-person modes as opposed to, say, overhead flybys. We felt that the tests should mimic an experience you'd actually get in-game. But with today's super-powerful multi-GPU machines, our philosophy has changed. The most graphically intense demos these days typically focus on modes that generate larger, more panoramic views. For this round of tests, we've selected S.T.A.L.K.E.R.: Call of Pripyat and Far Cry 2, both of which use flyby modes and stress the GPU more than the CPU. That's OK with us, as modern gaming is 80 percent GPU, and our other four benchmarks are weighted in the CPU.

S.T.A.L.K.E.R.: Call of Pripyat

S.T.A.L.K.E.R. features DX9, DX10, and DX11 render paths. Since we don't look backward, we run the game in DX11 mode with hard shadows and tessellation enabled. We considered running the benchmark on a 24-inch panel, common among enthusiasts, but with the advent of incredibly powerful GPUs such as ATI's Radeon HD 5970, we decided that a 30-inch, 2560x1600 panel was appropriate. Our score is derived from an average of three "SunShaft" runs.

Far Cry 2

Far Cry 2 features a robust benchmarking tool buried in its install directory. One problem with the tool is that there are almost too many choices. In the end, we decided to use the Ranch Long benchmark, which is almost entirely a GPU test. Again, the vast majority of applications we're running here lean mostly on the CPU and the reality of modern gaming has long been that the GPU matters the most. By sticking with the Ranch Long GPU test, we're giving the powerful graphics cards their best chance to strut their stuff. Like S.T.A.L.K.E.R., we'll run Far Cry 2 at 2560x1600, but we suspect that multi-GPU machines will quickly chip away at our zero-point scores.

S.T.A.L.K.E.R.: Call of Pripyat features DX11 call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Don't Blame Me, the Browser Did It!

Before you find yourself being grilled by the Computing Crimes Unit, know where your activities fall on the scale of digital rights and wrongs

BY QUINN NORTON

Make no mistake, we *are* living in the future. In a matter of moments, we can publish our thoughts, communicate with people on other continents, or start downloading more information than we can ever consume. We are presented with hundreds of great offers every day—each with a thousand caveats. We hear about hackers stealing identities and kids being sued for copyright infringement, and even a New York socialite slap-fight taking place in an anonymous forum can take the national stage. The future is odd, indeed. To help you get some of it straight, we sat down with various lawyers and asked: How do our rights work in the digital age? Can you get in trouble posting messages about someone online? Are there exceptions to copyright? Is it legal to back up your ebooks? Not all of these questions have clear answers, and some answers don't make much sense. We might be living in the future, but the legal system was designed to deal with the increasingly obsolete present.

Can I be sued for anonymously posting on the Internet that someone is a 'ho'?

Anyone can sue you for anything, anytime, provided they file the paperwork and pay a fee. Whether they have a case is a completely different matter. "Falsely accusing someone of being a prostitute may be defamation, but, depending on the context, a court might read the statement as mere hyperbole, not an actual accusation that [the person] exchanges sexual favors for money," says Kurt Opsahl, senior staff attorney at the Electronic Frontier Foundation. (DISCLOSURE: Quinn Norton does paid photography for the EFF occasionally.)

The intention of the writer matters. "For example," says Opsahl, "It was not defamation for ESPN to caption a photo 'Evel Knievel proves you're never too old to be a pimp,' since it was—in context—not intended as a criminal accusation, nor was it reasonably susceptible to such a literal interpretation." (Besides, with Knievel, it's so clearly true.)

Even if the plaintiff doesn't know your identity, you can be sued as a John or Jane Doe, or they can use the pretense of the lawsuit to get access to records that will identify you, as was the case with the New York–based model who subpoenaed records from Google to find out which socialite blogger was dissing her. She dropped the case as soon as she found out who had called her a skank. This is yet another reason to use the anonymous Tor web browser when you're sophomorically taunting D-list celebrities.

IF YOU WANT TO SCAN YOUR BOOKS AND BACK UP YOUR SOFTWARE OR MOVIES FOR YOUR OWN PERSONAL USE, HAVE AT IT

Is there any circumstance that allows for legal downloading of copyrighted material through torrents or P2P?

Definitely, but we've got to make a few things clear. First off, copyright is automatic and pervasive. "All creative content is automatically copyrighted as soon as it is created—if you scribble on a napkin, that's copyrighted," explains Nicholas Reville, cofounder and executive director of the Participatory Culture Foundation.

To "un-copyright" something, the copyright has to expire or be waived, as the U.S. government has done on all content it produces. To legally download something copyrighted—be it over P2P, BitTorrent, or even off an FTP site—you'll need permission. That second point, authorization, is where the P2P legal action comes from.

"Content that people put online for free download—for example, anything on Legaltorrents.com—is perfectly legal to download and is also copyrighted. The key question is whether the copyright holder has authorized the content to be posted or downloaded," says Reville.

Is it legal for software that I buy to expire?

Probably, but the vendor has to tell you that up front. What software companies sell you isn't the stuff they've made; they sell you a specialized contract called a license that lets you *use* the stuff they've made. That license, generally printed on the plastic the software is wrapped in (hence, "shrink-wrap license") or on a webpage in a very small font with an "I agree" button at the bottom, actually tells you what you just bought. "What you see in the fine print is what you get," says Wendy Seltzer, a fellow with the

Berkman Center for Internet & Society at Harvard Law School. "Under a license, you might be denied the right to transfer or reverse engineer the software, or the amount of time you may use the software could be limited. Some courts have been saying, however, that if it looks like a sale, it should be treated as a sale, in rulings that limit the effect of some of these unexpected provisions."

While selling you just about any kind of license is legal, vendors have to be clear about what they're selling. If it says that it's reliable forever on the box, and in the small print it says it may knock out your power grid, sour your fruit, shave your cat, and stop working after a week, you probably have a case. "If you've been misled about what's in the package, the Federal Trade Commission might like to hear about unfair or deceptive trade practices," says Seltzer. "If the box or download page doesn't clearly say 'time-limited,' yet the software goes poof in the middle of a critical project, you'd have a good argument that you didn't get what you paid for."

The moral of the story is that when it really counts, always read the fine print.

We can 'format-shift' music by ripping CDs; what about movies or books?

Copyright allows you to make a backup of anything you've legally acquired for your own use. If you want to scan your books and back up your software or movies for your own personal use, have at it. But (there's always a but, right?) the Digital Millennium Copyright Act (DMCA) makes it illegal to get at the things you're trying to back up if they are copy-protected. "If the media is restricted by DRM... the DMCA forbids 'circumventing' the DRM, even for media you own," says Fred Von Lohman, the EFF's senior intellectual property attorney. So, while the backup itself is a fair use, making it is breaking the law. "The MPAA has argued consistently that ripping a DVD you own for use on an iPod is always illegal," reminds Von Lohman. It's the perfect catch-22 that let former MPAA president Jack Valenti tell consumers, "If you want a backup copy, you buy another one."

Of course, it's worth noting that as long as your backups remain in your possession and aren't distributed, there is little likelihood of you ever getting caught.

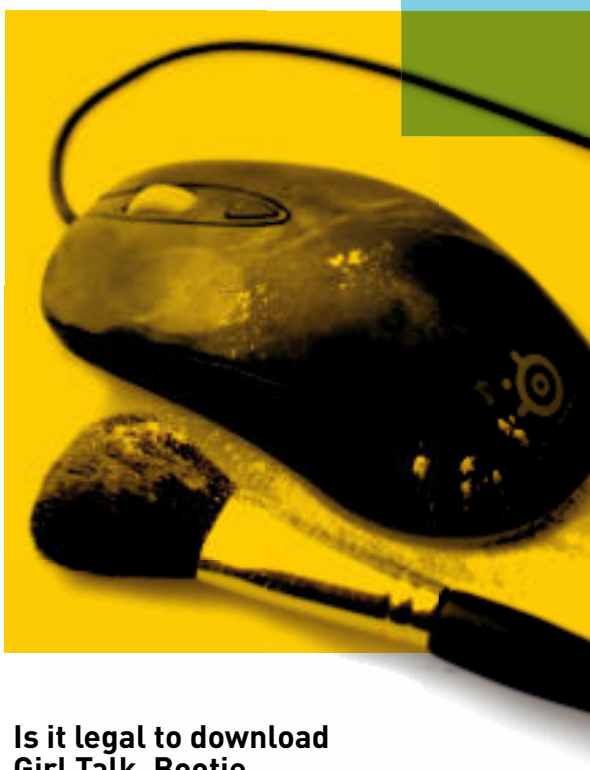
Is downloading TV shows off BitTorrent illegal? After all, I can have recorded versions of TV content via TiVo.

This issue haunts the space somewhere between "it depends" and "no one knows." You have to have permission from the copyright holder, except when it's a fair use. Owning a TiVo gives you permission (for the stuff on the TiVo). The Pirate Bay can't give you permission—but even so, it depends how you use it. "Where time-shifting is concerned, the most relevant exception will be fair use. If you are a student and need a 30-second clip for a class assignment, that's likely a fair use. On the other hand, if you download the latest episode of *Weeds* simply because you don't want to pay for Showtime, that's probably not a fair use," says Von Lohman.

TiVo has negotiated contracts for you, and the court has cleared using a VCR to tape something for later. But P2P is still in legal limbo.

"What about downloading a TV show that you would otherwise have been entitled to TiVo, but the power was out and it's not on Hulu? I think that's probably a fair use, but it's hard to know without a court getting involved," says Von Lohman. It might even depend on what protocol you're using, since using BitTorrent makes you a distributor as you download, and you probably don't have the right to distribute, even if you can argue the right to download.

Also, is that really what you should be using your UPS for?



Is it legal to download Girl Talk, Bootie, and other mashup music, or to host them for download?

Thus far, the answer seems to be that it depends on the musical taste of the judge, which is really no way to run a legal system. The legal question is: Does the remix so transform the music that the mashup itself counts as a whole new form of expression? "At the Organization for Transformative Works, we take the position that remixes, distributed noncommercially, are generally fair use because they represent new creative works that add to the variety of expression available and don't generally

interfere with the market for the originals. That said, not all copyright owners agree," says Rebecca Tushnet, professor at Georgetown Law and a legal advisor for OTW. It's even hazier for commercial works, which are OK in some circuit courts and not others—a recipe for getting the Supreme Court involved.

"It would be great to have a bright-line rule, but there simply isn't one. Larry Lessig has suggested that we should reform the law to make clear that non-commercial remix is legal," says Tushnet. Then it would be nice to reform the law to make the status of commercial remix clear, as well.

Downloading isn't legally different from hosting files, but generally, copyright holders send cease and desist letters to the host rather than the downloaders. Since EMI gave itself a public relations black eye by going after DJ Danger Mouse's *The Grey Album* in 2004, not many rights holders have pursued the mashup world, preferring to focus on more straightforward piracy.

If I bring my work home and my own PC is hacked with my work stuff on it, am I liable?

If you're following your employer's rules, you're OK. "So far, no one has been held liable for someone else's hacking in the absence of any specific statutory or contractual responsibility to keep the information safe," says Jennifer Grannick, civil liberties director of the EFF. That bit about "statutory or contractual responsibility" is important, though. If you're a government employee or contractor, there are certain types of work you either can't take home or can't expose to the Internet, like Social Security information. You may have sensitive information from your private employer that's not supposed to leave the building, as well. It should be a no-brainer that you don't take that kind of stuff and put it on a home PC connected to the Internet, or leave it on a laptop in the car while you eat lunch, but people keep doing it—and their Data Valdezes keep ending up in the news.

Think before taking work home, or better yet, leave work at work. Your Blood Elf Warlock won't level himself!

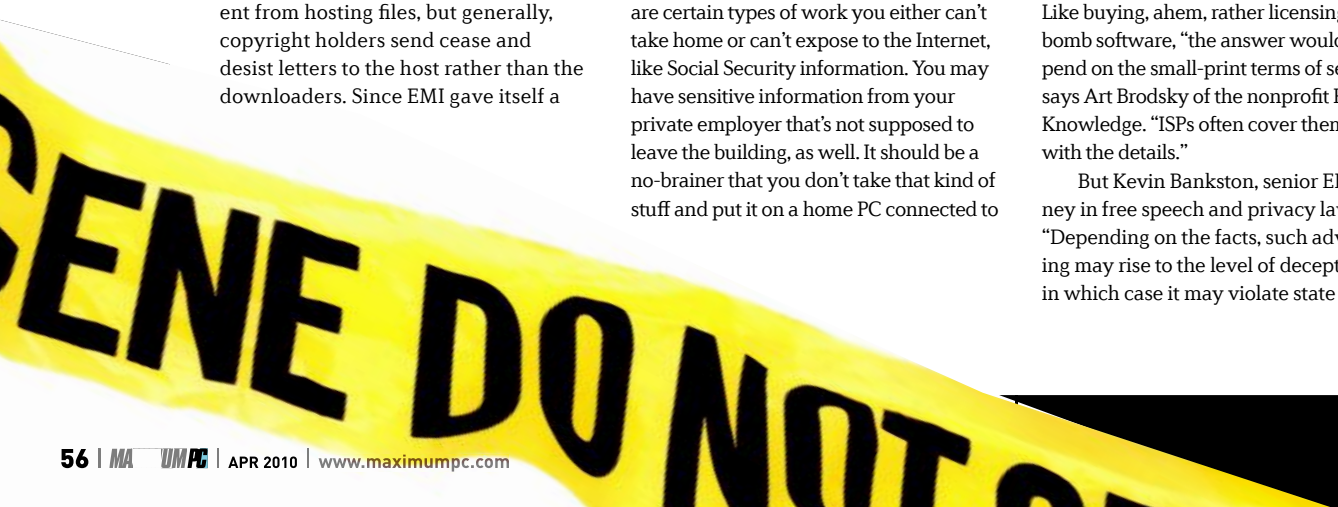
Am I liable if I share my Wi-Fi, or leave it open, and someone else breaks a law from my IP?

The law is all about intention. "People aren't held liable for the bad actions of others, unless they have a duty to prevent the harm, or they conspire, solicit, aid, or abet the wrong-doer," says Grannick. If you aren't nudging and winking at the lawbreaker, and if you had no idea it happened, you haven't broken the law. But we don't have court-appointed mind readers yet, and it's not impossible to find yourself pressed to prove you weren't knowledgeable of or complicit in a crime committed from your Wi-Fi. "Merely having open Wi-Fi should not cause you any liability, but it does leave open the possibility that law enforcement investigating a crime will think you are the culprit and act accordingly." Even though you are likely to clear your name, it might be a headache to get there. If someone breaks your WEP key, you could find yourself in the same position anyway—fortunately, both situations are more rare than getting struck by lightning.

Is it legal for my ISP to advertise unlimited Internet, then throttle my usage?

Like buying, ahem, rather licensing, time-bomb software, "the answer would depend on the small-print terms of service," says Art Brodsky of the nonprofit Public Knowledge. "ISPs often cover themselves with the details."

But Kevin Bankston, senior EFF attorney in free speech and privacy law, says, "Depending on the facts, such advertising may rise to the level of deception, in which case it may violate state laws



prohibiting unfair and deceptive business practices, as well as the Federal Trade Commission Act, which (among other things) prohibits false advertising." They'd have to make that asterisk on the word "UNLIMITED!" very small to be liable, and the best protection is still reading the annoying fine print in the first place.

If I bring my personal laptop to work, does my employer have the right to search that computer?

The net may be complex, but legally speaking, personal property is pretty well understood. Both taking your property and searching it are issues the law is quite clear about. Your employer can potentially get into all kinds of trouble, both criminal and civil, if you haven't given your permission for the taking, much less the searching, of your property. If any damage is done to your property in the process, you can sue your employer under various tort laws, with names like "tort of conversion" and "trespass to chattels," not to mention the crime of theft. Plus, there's "potential... liability under federal and state laws criminalizing unauthorized access to a computer system," says Kevin Bankston. "Depending on how invasive the search is and what kind of personal data is stored on the computer, such a search may also constitute an invasion of privacy under state law," Bankston adds. Of course, you can sign all those rights away with your employment contract. It's all there, in the really tiny print.

Can my company legally install a keylogger or track everything I do?

We don't know, and it's not because we didn't do our homework. "The federal courts are currently split on whether secretly installing a keylogger violates federal wiretapping laws," says Bankston. What that means, in a practical sense, is that there either is no law, or existing law hasn't been interpreted such that the matter is settled.

There's a lot of law like this in every field—it's just unknown until the courts take it up and argue over it for a few years. But the Internet is new enough and strange enough that places where it touches (like copyright and privacy) are in real legal turmoil. And if that weren't enough, these debates get to be hashed out on the state level in every single state, as well.

"One district court in New Jersey has found that it is a wiretapping violation if the keylogging occurs while the computer is connected to the Internet, while another district court in California has found that it is not a wiretapping violation at all, although it did so in part based on the reasoning in another wiretapping decision from the Sixth Circuit that was later vacated," says Bankston. Meaning that the precedent for that decision fell apart, leaving it on precarious grounds. None of that even gets into the possible privacy claims, which could be harsh and would vary between states.

THE FEDERAL COURTS ARE CURRENTLY SPLIT ON WHETHER SECRETLY INSTALLING A KEYLOGGER VIOLATES FEDERAL WIRETAPPING LAWS

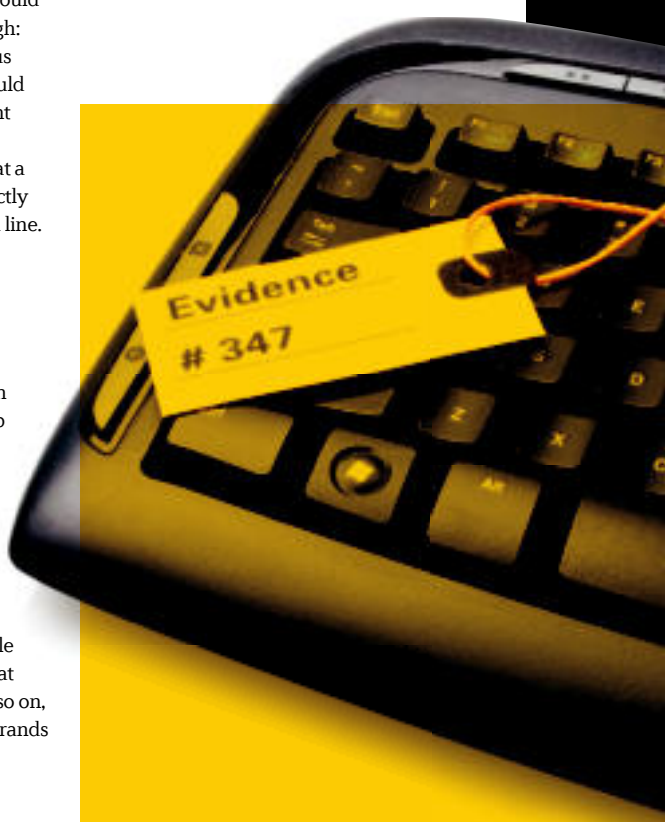
There is one way your company could surveil you without any trouble, though: with your permission. "A conscientious employer with good legal counsel would likely seek to notify and obtain consent from an employee before installing a keylogger," says Bankston. Making that a condition of your employment? Perfectly legal as soon as you sign on the dotted line.

When All Is Said and Done...

It's an interesting time to be a lawyer (if a stressful time to be a PC user) with the legal eight-ball so often coming up "Answer hazy, try again later." Don't expect the situation to settle down anytime soon. The law moves notoriously slowly and the net hasn't shown any signs of waiting for the law to catch up. Now more than ever, it's important to read the fine print, but often we deal with impossible amounts of fine print. Try to know what you're buying, renting, licensing, and so on, and be aware that even well-known brands often bait-and-switch their services.

The good news is that this legal incoherence has turned so many of us into scofflaws that getting caught is like winning the reverse lottery—unpleasant, to be sure, but also unlikely. Wait, that's the good news? Let's try that again: The good news is that we have so many more ways to express ourselves, be creative, and connect to each other that the law is floundering trying to understand it, and we're making a new world while it flounders. So happy netting, people of the future!

Quinn Norton has written about the intersection of technology and law for *Wired*, *The Guardian*, *FAIR*, *The Irish Times*, and more. She knows too many lawyers, and has been known to get them drunk, hang out at their parties, and DM their D&D sessions. Quinn is reachable at quinn@quinnnorton.com.



WHITE PAPER

Stereoscopic Imaging

3D is threatening to go mainstream in games, movies, Blu-ray discs, and even cable/satellite content. Here's how it works –MICHAEL BROWN

You can't swing a dead Na'vi without hitting a new 3D display product these days. Three-dimensional imaging was actually invented in the 1800s, and has been used sporadically in movies since the 1920s, but James Cameron's sci-fi epic *Avatar* is bringing it into the mainstream.

Now that 3D is less of a gimmick, TV manufacturers are beginning to incorporate the technology into their products. Panasonic, Samsung, and Sony all announced new 3D TVs at CES this past January. And *Avatar* could be the best thing to happen to Nvidia and Zalman in their efforts to sell PC gamers on their respective videocards and 3D displays. Market research firm DisplaySearch projects that annual sales of 3D-ready monitors will grow from 40,000 units in 2009 to 10 million by 2018.

So, given that at least some early adopters will buy a 3D display in due time, it's worth knowing how this visual trickery works. Knowledge is power in the world of upgrading.

Competing technologies may use different implementations, but all 3D video is based on stereoscopic imaging: An illusion of depth is created by presenting a slightly different image to each eye. Each image is of the same object or scene but from a faintly different perspective. Your brain then synthesizes the two images into a spatial representation. The most common 3D applications depend on the viewer wearing either active eyewear (e.g., liquid-crystal shutter glasses) or passive eyewear (e.g., linearly or circularly polarized 3D glasses).

LIQUID-CRYSTAL SHUTTER GLASSES

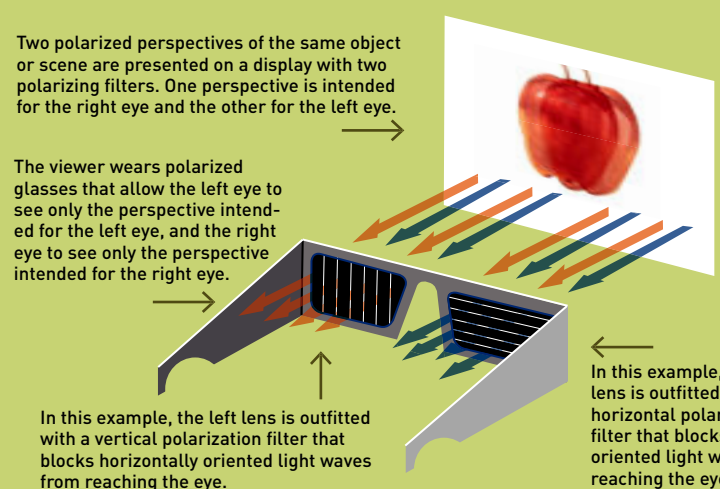
Liquid-crystal shutter glasses, the technology Nvidia uses for its GeForce 3D Vision product, interact with a display or a projector (we'll use an LCD monitor for the purposes of this example, since that's the most common solution for PC users). The lenses in these glasses contain liquid crystal and a polarizing filter that is transparent in the absence of voltage, but darkens when voltage is applied.

The monitor, meanwhile, rapidly alternates between showing an image from one perspective and then another. The shutter glasses and the display are synchronized so that the left lens darkens when the display is showing an image intended for the right eye, and the right lens darkens when the display is showing an image intended for the left eye. Nvidia uses an infrared wireless connection to sync its glasses to the display, but Bluetooth, RF, or any type of wired connection can also do the job.

Since the display's refresh rate is effectively halved, the viewer's eyes will detect noticeable flicker unless the monitor uses a very high refresh rate. Nvidia's technology requires a monitor with a 120Hz refresh rate in order to deliver an effective refresh rate of 60Hz. Shutter glasses also deliver a darker picture than you would see without them. This is because they block half the light from reaching your eyes, and their polarizing filters are slightly dark even when they're allowing light to pass through.

HOW IT WORKS

Linear Polarized Glasses



All 3D display technologies create the illusion of depth by simultaneously presenting the viewer's left and right eyes with a different perspective of the same object or scene. Polarized glasses, as shown in this example, passively block light waves. The lenses in LCD shutter glasses darken when voltage is applied.

POLARIZED 3D GLASSES

Polarized 3D glasses cost much less than shutter glasses because they produce the illusion of a 3D image without active electronics. In this "passive" scheme, polarized filters in each lens restrict the light that reaches each eye. The glasses are paired with a monitor or a projector that uses two polarized filters to display two different perspectives of the same object or scene superimposed over one another.

Light emanating from natural sources, or even common light bulbs, is randomly polarized—its wavelengths "spray" in various directions. When one of these light waves passes through a polarizing filter—say, your polarized sunglasses—only those waves parallel to the direction of the filter emerge from the other side. Glare reflected off road surfaces and water tends to emanate horizontally, and this is why polarized sunglasses with horizontally oriented filters

are popular among drivers and fishermen.

In a pair of eyeglasses set up for 3D polarization, the two discrete lenses are imbued with different polarization filters. This scheme ensures that the viewer will see one "set" of light waves through one eye, and a second "set" through the other. Linearly polarized glasses use a horizontal polarization filter for one eye and a vertical polarization filter for the other. The drawback to linear polarization is that if the viewer tilts his or her head, images from the left and right channels can leak into each other. When circular polarization technology is used, a clockwise filter is used for one eye and a counterclockwise filter is used for the other. With this technology, the viewer can tilt his or her head without destroying the left/right image separation, but tilting the head still causes vertical misalignment. Zalman utilizes circular polarization in its Trimon 3D monitor.

STEREOVISION IN GAMES AND MOVIES

Stereovision can make games look fantastic, but you'll take a significant hit in frame rate because the videocard must render twice as many images to produce the effect. For example, when we benchmarked Batman: Arkham Asylum with a GeForce GTX 285 at 1680x1050 with stereovision turned off, we achieved an average frame rate of 55fps. When we turned stereovision on, frame rate dropped to 36fps.

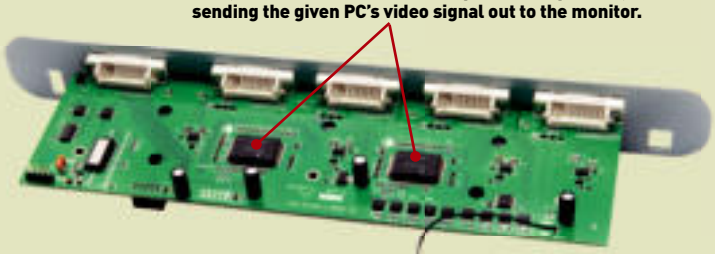
Movie theaters typically rely on passively polarized glasses because they're cheaper to manufacture. Sony's 4K system, for instance, places a circularly polarizing filter in front of a pair of projection lenses. One lens projects the right-eye image and the other projects the left-eye image. The two images are then superimposed on the screen, and the glasses filter the light bouncing off the screen so that the audience's right eyes see only the right-eye image and their left eyes see only the left-eye image.

After spending many hours comparing 3D-enabled games on a high-refresh-rate monitor and Nvidia's LCD shutter glasses versus Zalman's Trimon monitor and circularly polarized passive spectacles, we developed a strong preference for Nvidia's active solution. Ultimately, however, the quality of the gaming experience depends on how much effort developers invest in implementing the technology. Some games, like the aforementioned Batman: Arkham Asylum, look stunning; others will leave you wondering why the developer even bothered.

As for watching 3D movies at home, it's too early to pick a winning technology. The Blu-ray Disc Association published its specification for 3D-enhanced Blu-ray video only last December, and none of the 3D-capable televisions announced at CES were shipping as we went to press. But one thing is certain: It will be far more economical to outfit the entire family with passive 3D eyewear than LCD shutter glasses.

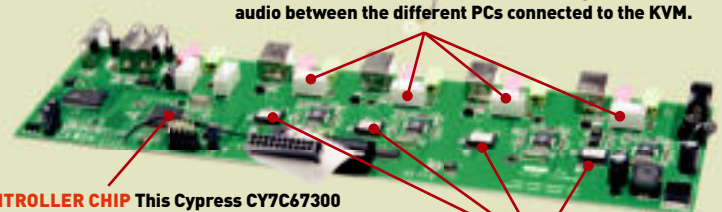
Belkin SOHO KVM

With KVM (short for keyboard, video, mouse), you can share one monitor, mouse, keyboard, and set of speakers among multiple systems. This month, we cracked open a Belkin SOHO KVM to see just how it manages to let you use up to four PCs with a minimum of clutter.



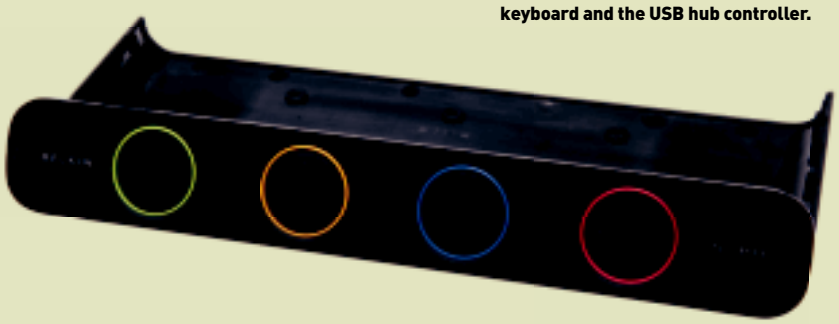
TMDS REGENERATORS/MULTIPLEXERS When a DVI signal comes into any of the four DVI inputs on the KVM, these Intersil ISL54100 chips act as repeaters, sending the given PC's video signal out to the monitor.

RELAYS These Taknamisawa NA5W-K chips are used for shunting audio between the different PCs connected to the KVM.



USB CONTROLLER CHIP This Cypress CY7C67300 acts as both a host for and controller of peripheral USB hardware, such as your keyboard and mouse, and selects which USB hub controller to use depending on which PC is selected.

LOW-SPEED USB CONTROLLER The Cypress CY7C63722 chips serve as the interface between the USB mouse and keyboard and the USB hub controller.



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.

Step-by-Step Guides to Improving Your PC

THIS MONTH

DESKTOP CUSTOMIZATION

NORMAN CHAN
ONLINE EDITOR

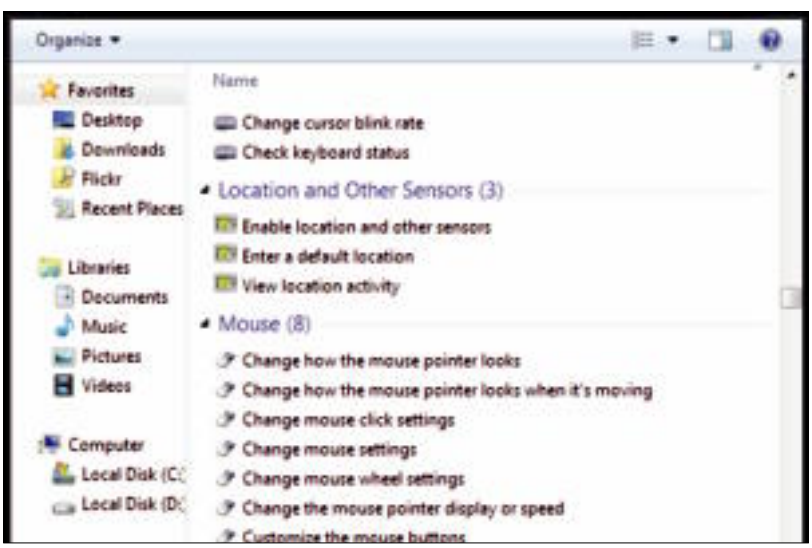
If I'm going to spend more than eight hours a day in front of my PC, my desktop needs to look more dashing than the default Aero theme. Rainmeter (http://rainmeter.net) is a powerful Desktop customization tool that lets you create or load widget-infused themes to overhaul the Windows UI. The included Enigma theme has a slick look that can be adjusted to your tastes, and Rainmeter's recently updated configuration wizard streamlines the tweaking process. My favorite theme is called Gaia 09 (http://bit.ly/d7h3m9), and *Maximum PC* contributor Paul Lilly recently wrote a comprehensive Rainmeter guide that covers every nook and cranny of this app: http://bit.ly/9lhouo.

Even if you're uncomfortable revamping your Windows Desktop, there's still one customization tweak that no user can resist: changing the Windows 7 login screen background. The default screen, with its soft-blue hue and minimal design elements, is OK, but it's time for some change. Use the free Background Changer utility (http://bit.ly/bmqtK6) for a new look.

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

Windows 7's All-Access Pass



Avid Windows 7 tweakers recently uncovered a hidden shortcut that grants users access to all of the OS's configuration settings in one unified window. To get at this secret dashboard, create an empty folder and rename it the following: GodMode.{ED7BA470-8E54-465E-825C-99712043E01C}. The folder icon will instantly change into a shortcut to the ultimate control panel!

Water Cool Your PC

In the pantheon of nerd achievement, water cooling ranks near the top—somewhere between installing Linux and becoming fluent in Klingon. And there's a reason the hardest of the hardcore prefer water cooling: It's incredibly effective at lowering the temperatures of core system components. With higher thermal conductivity and specific heat capacity than air coolers, water cooling can mean double-digit drops in CPU and GPU temperatures.

However, water cooling isn't exactly a walk in the park. You've got two challenges ahead of yourself: Designing the water-cooling system that's right for your PC, and actually putting it together. Both tasks will take some time and effort, but neither has to be daunting. Every first-time water-cooling build is a learn-as-you go experience, but we'll walk you through the details and help you avoid the mistakes that would take the biggest toll on your system and your wallet. –ALEX CASTLE

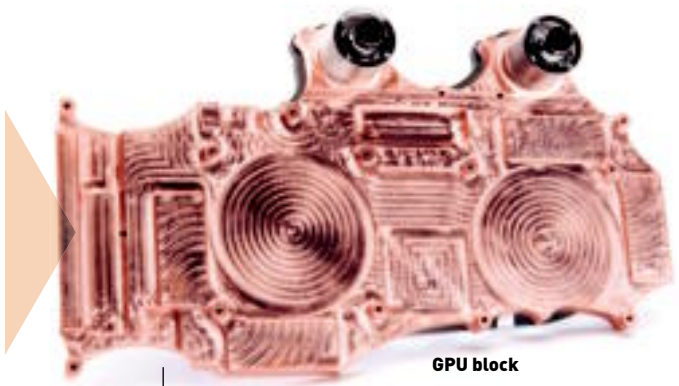
PICK YOUR WATER-COOLING COMPONENTS

The advantage of a custom water-cooling system is that it's just that—custom. By picking out exactly which parts you want, you're able to create a system that matches your cooling needs and your aesthetic sensibilities. To get you started building your system, we'll go through every major component of a water-cooling system, describing what each one does, and what your options are.

▶ **Case** Even though there's no fluid touching your case, it's one of the most important parts of a good water-cooling setup. For water cooling, you'll need a case with plenty of room on the inside and a large fan grate, ideally on the top or bottom of the case. Although it can be a little hard on the wallet, getting a case that's been designed with water cooling in mind will ensure that your install goes as smoothly as possible. In our build, we used the Cooler Master 800D full-tower case.

▶ **Water Blocks** A block is the piece of hardware responsible for drawing heat out of your computer hardware (your CPU and GPU, for instance) and into the liquid coolant in a water-cooling system. A block of heat-conducting metal makes contact with your CPU or GPU (aided by thermal paste) on one side, while water is forced across the other, literally flushing away excess heat.

You need a separate block for each component you want to cool. The obvious component to water cool is your CPU, which will see some of the greatest benefit in the form of increased overclocking potential. The GPU on your videocard is another good candidate for water cooling, as is your chipset. For this build we've chosen to focus on CPU and GPU cooling.



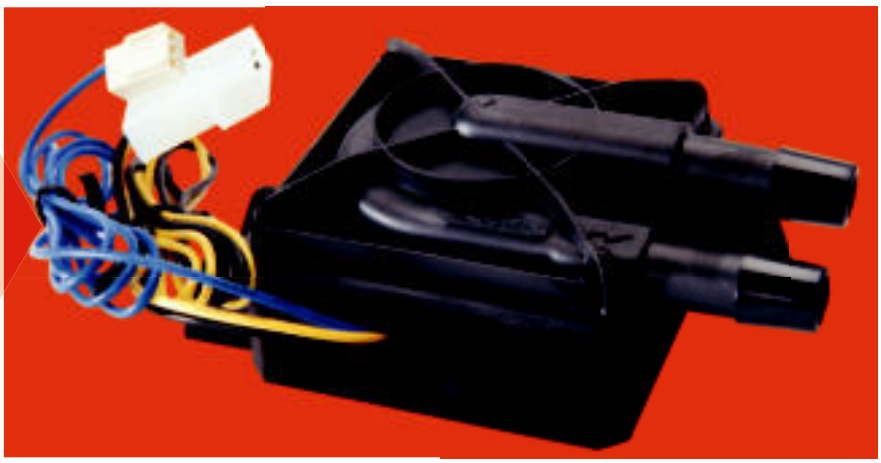
GPU block

As for actually picking which water block to use, it's generally a matter of brand and the right block for your part. For instance, if you're using a socket 1156 CPU, a quick Internet search for "socket 1156 water block" will turn up a handful of compatible water blocks, as well as some performance comparisons. We've chosen CPU and GPU blocks made by DangerDen (www.dangerden.com).

CPU block

▶ **Radiator** In a water-cooling setup, the radiator is the water block's complement, releasing heat absorbed from the block into the air. It accomplishes this by forcing the liquid coolant through an array of thin tubes attached to metal fins. Traditional case fans pull air through the capillary-like radiator, absorbing heat from the liquid and forcing it out of the case.

There are radiators big enough to support one, two, or three fans. Of course, bigger radiators and more fans amount to better cooling, so we generally recommend going with the biggest radiator that fits your case and your budget.



▶ **Pump** The fanciest water-cooling equipment in the world won't do a thing unless the water's moving through it, and that's accomplished with a pump. There are quite a few pumps on the market, and although it's on the pricier side, we recommend the Laing DDC 3.25 (http://bit.ly/buzLSj) for its reliability and small formfactor. If you go with a different pump, make sure to read user reviews before you buy—a shoddy pump will wear out or break down over time.

▶ **Reservoir** In water cooling, a reservoir is a pretty simple thing—it's a tank of water, with an inlet and an outlet. You might

wonder why, exactly, you need a big tank of water in your system, since it doesn't have an immediate function, like absorbing or dispelling heat. However, the reservoir performs a number of important duties:

▶ A reservoir has a port on it, which allows you to actually fill your water-cooling system with liquid.

▶ A reservoir generally isn't filled all the way to the top with liquid. The extra air provides a buffer, which gives the liquid room to expand and contract as it changes temperature.

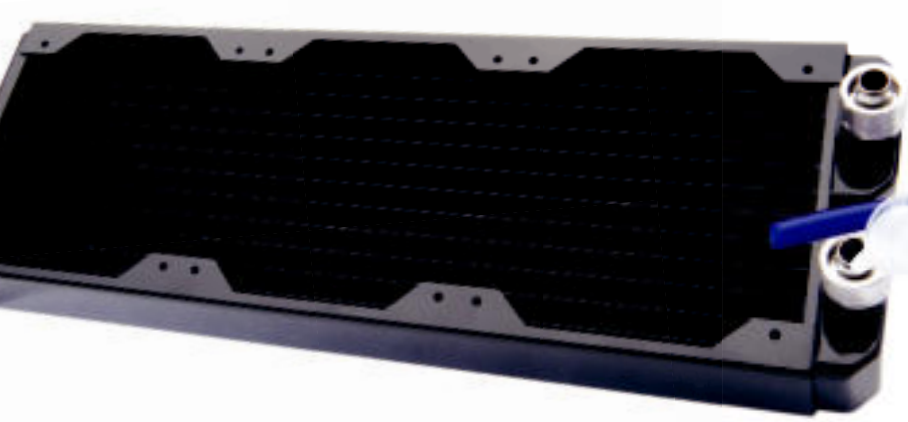
▶ Because the reservoir is not entirely full, it also provides a place for air bubbles in the liquid to escape, which makes for greater cooling efficiency and quieter operation.

As for which reservoir to use—well, it's really just a tank; pick one that fits in your case and looks nice. For this build, we used a double optical-drive bay acrylic reservoir from Danger Den, which comes with a pair of Molex-powered LEDs to light up the front of your case.

▶ **Tubing and Fittings** Finally, you need tubing to combine all the other parts. The most common sizes of tubing used are 1/2-inch and 3/8-inch diameter. The demonstrable performance difference between the two sizes of tubing is slim, and 3/8-inch tubing can bend more without kinking, so we used that for our system. Whichever you pick, just make sure that all the rest of your water-cooling hardware has fittings of the same size. Most all hardware is available with either 1/2-inch or 3/8-inch fittings; if you get a size that doesn't match your tubing, you're hosed.

Beyond the diameter of the tubing, you just need to pick a color. Most sites that deal in water cooling sell pretty much the same PVC-based tubing. It works well, it's fairly cheap, and it's available in a bunch of UV-reactive colors. Some sites offer slightly more expensive Tygon tubing, which is more flexible and durable. Fittings come in barbed or compression styles. Both will work just fine, though compression fittings look nicer and are a bit more expensive.

You'll also need coolant to put into your system. Although it's commonly referred to as "water cooling," most modern cooling systems use some sort of coolant with anti-corrosive and anti-conductive properties. This fluid is available from any distributor of liquid-cooling products, and comes in various UV-reactive colors.

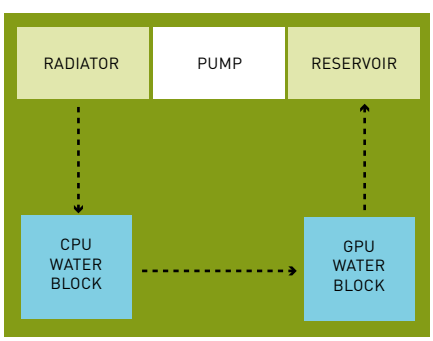


DESIGN YOUR WATER-COOLING LAYOUT

Once you've picked out the individual components, you'll need to design the layout of your water-cooling system. For this, it helps to make a simple diagram, showing how you want everything to be hooked up. A simple system has the water passing from the radiator to the CPU, then to the GPU, the reservoir, pump, and finally, back to the radiator. This design works well because then the water passes over the CPU while it's at its coolest, and also because the CPU and the GPU tend to be physically near each other.

Before we actually start installing anything, have a good long look at your case, and consider where each component will sit. Is there a clear pathway for the tubing to run from one component to the next? When the tubing is in place, will it be difficult to access other hardware, such as hard drives or optical drives? Will you be able to get the sides back on the case? By considering potential hazards like these now, you can save yourself a lot of headaches further down the road.

Finally, it's time to discuss the actual installation of water-cooling hardware.



1 MOUNT THE CPU WATER BLOCK

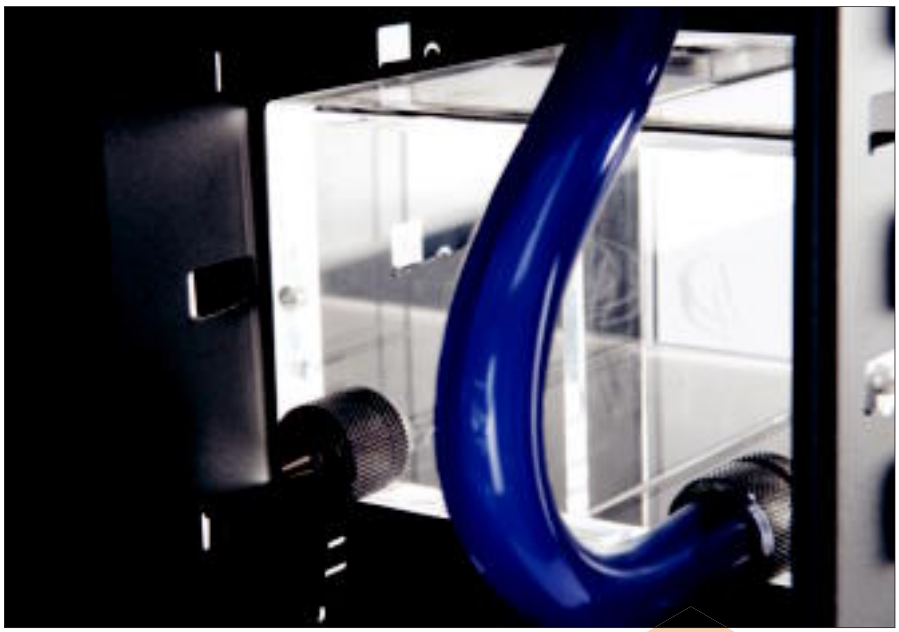
We recommend starting with the CPU water block, because it usually installs with a mounting backplate, so you'll need to install it before you can screw the motherboard to the case, and you don't want to install any other component until the motherboard is securely in place.

Your experience may vary, depending on what CPU block and motherboard you use, but for us the water block was a fairly standard backplate cooler installation. The opening in the motherboard tray on our Corsair 500D case made the process easy.

Connect the tubing to the CPU block before you install it, since it can take some pressure to get the tubing snugly into the fittings, and it's always best to avoid putting extra pressure on the motherboard if possible. Now, attach the motherboard to the case.

2 ATTACH THE RADIATOR

Now we can move onto the radiator, the largest component. The radiator can be installed over any fan grate that's large enough, and most simple radiators are designed with screw holes that have the same dimensions as standard case fans. Thus, if your case has a grate big enough for two fans, you can mount a double fan–size radiator onto it. You can mount a radiator inside or outside of a case, but make sure that the fans blow hot air out of the case and away from your PC's hardware. If you mount the fans outside the case, make sure you've got a plan for how you're going to plug them into your power supply.



Once the radiator is in place, cut the tubing from the CPU to the right length and connect it to the radiator, making sure not to kink it in the process.

3 AFFIX THE RESERVOIR

Continuing with the practice of installing largest parts first, it's time to install the reservoir. There's a wide variety of reservoirs available to suit your setup. They can be attached inside or outside of the case, to the radiator, or into a drive bay. No matter what style of reservoir you have, take note of the location of the fill port, and have a plan for how to access that port when it comes time to fill your cooling system with liquid.

4 MOUNT THE GPU BLOCK

Finally, we'll close off the loop by installing the GPU block, assuming you want one. Some of the highest temperatures in your system can be found on your videocard, so there are definite advantages to water cooling it. At the same time, it's also one of the riskier aspects of liquid cooling, since you have to remove your videocard's existing cooler, directly exposing its processing cores.

Every GPU block install process is unique, so check the directions that came with the block you purchased. Generally speaking, it will go something like this:

1. Remove the videocard's built-in cooler by unscrewing it from the board or boards.
2. Clean up leftover thermal paste and reapply paste or thermal material to contact spots, as illustrated on your instruction sheet.
3. Attach the board or boards to the water block, being careful not to apply uneven pressure to the processors.

Since GPU cooling blocks tend to be big, heavy hunks of metal, make sure to secure your videocard tightly to your case after plugging it into one of your PCI-E slots. If you don't secure it, it can warp your motherboard, which will ruin it. Being careful not to put too much pressure on the card, connect the GPU water block to the CPU block and the reservoir.

COOL RUNNING

How to Monitor Your PC's Temperature

Whether you overclock, or just want to make sure your processor lasts as long as possible, it's important to keep an eye on your system's temperatures. These two free programs help you do just that.

SpeedFan SpeedFan uses the built-in temperature-monitoring hardware in your chips to display temperatures for all of your individual components, and it allows you to control fan speeds in your case automatically, based on temperature readings. SpeedFan also monitors S.M.A.R.T. readings and analysis, so you can make sure your hard drives are healthy. (www.almico.com/speedfan.php)

HWMonitor From CPUID, the makers of CPUZ, HWMonitor keeps track of all the temperatures and voltages in your system. It doesn't have the advanced S.M.A.R.T. features or fan-speed controls of SpeedFan, but its temperature-reporting functionality is top-notch. (www.cpuid.com/hwmonitor.php)

5 ADD THE PUMP

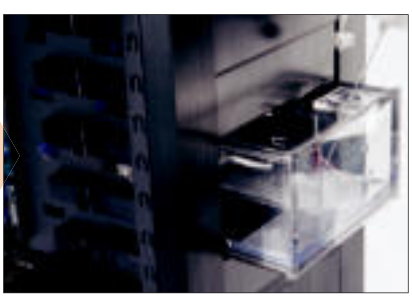
The pump should be really easy to install. Most pumps are fairly small and can be attached almost anywhere in your case, using screws or Velcro tape. Next, complete your loop by connecting the output barb of the pump (usually marked with an arrow pointing away from the pump) to the radiator, and the input barb to the reservoir. When you're cutting tubing, don't just go with the shortest amount possible—also consider how the tubing will affect how you access your PC hardware. You don't want to have to dismantle half your water-cooling system just to swap out a hard drive.

6 GET THOSE JUICES FLOWING!

Now that your water-cooling loop is completed, it's time to add the coolant. Give your system one last sanity check, making sure that each fitting is tightly connected, and that all components are hooked up in one continuous loop. Once you're confident that your system won't leak, and without plugging anything in, start filling up the reservoir to the manufacturer's recommended level. Keep an eye on the rest of the water-cooling system, and be ready with a towel in case anything springs a leak.

With the reservoir filled with coolant, you can now fire up the pump. You don't want to actually turn on your motherboard yet, so you'll need to trick the power supply into powering the pump. Generally, this is done by shorting the green wire on the power supply's ATX connector to one of the black wires, although it's wise to consult the manual for your specific power supply.

As long as nothing is leaking, let the pump run for 10 minutes or so to let air bubbles escape. Slowly rock your case back and forth, to let any air that's trapped in the water blocks or radiator escape. Once all the air bubbles are out of the liquid (you should be able to see them in the tubes if there are any left), you may need to add more liquid to the reservoir to reach the recommended level.



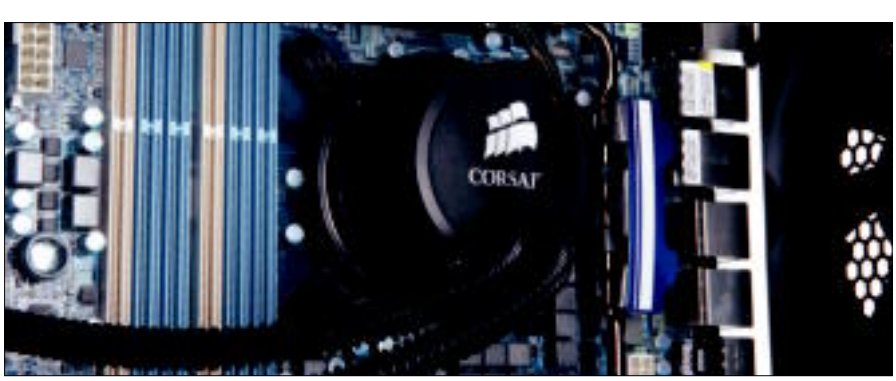
Install an All-in-One Water-Cooling Kit

As you can see, although water cooling provides exceptional cooling power, it isn't the easiest—or cheapest—way to cool your PC. If you just want to cool your CPU more effectively and quietly than a performance air cooler but without the hassle of building a custom water-cooling rig, there's an alternative: a prebuilt, closed-loop system like the Corsair H50 or the CoolIT ECO.

These systems achieve cooling performance near that of a custom water-cooling rig, but save you the hassle of building one yourself, or ever having to replace the fluid. They cost more than an air cooler, but significantly less than building your own water-cooling system. And, unlike full-blown water coolers, they're easy to install and don't take up much room in your case.

Installation for this type of cooler is simple. It's a backplate-mounted water block for the CPU, connected to a small, one-fan radiator. You just attach the radiator and fan to an exhaust grate on your case, and that's it; the pump and reservoir are built into the radiator.

You won't get quite the same CPU cooling as in an all-out water-cooling system—or the nerd cred that comes from a tower full of tubes—but closed-loop coolers are definitely an excellent alternative for enthusiasts who want some extra cooling performance without a lot of hassle.



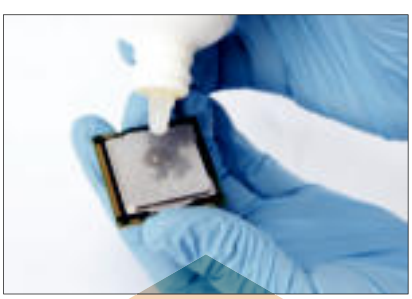
Properly Apply Thermal Paste

Building a PC is a multi-step process, but one step in particular can be intimidating to first-timers: properly mounting a CPU and cooler. Why? Because, generally speaking, that one little CPU chip is simultaneously the smallest, most delicate, and most expensive part of your system. Mount the cooler wrong, or improperly apply the thermal paste, and you're looking at (at best) a drop in performance and system crashes, or (at worst) a costly disaster.

But don't worry! It's actually not terribly hard to apply thermal paste. We'll show you the right way to do it. –ALEX CASTLE

SO WHAT IS THERMAL PASTE, ANYWAY?

Thermal paste is a type of heat-transferring agent that serves to fill in the microscopic gaps that naturally occur when two flat metal surfaces—such as your CPU and cooler—are pressed against each other. These air-filled gaps hinder the rate at which the cooler is able to absorb heat from the CPU, and filling them with thermal material greatly increases performance.



1 PREP THE CPU AND COOLER

If either or both the CPU and cooler you're using have already seen a tour of duty, they're likely to have some gunky thermal-paste residue. Don't be tempted to just reuse this old paste, as it dries out over time and won't provide a clean connection between your CPU and cooler.

So, the first order of business is to remove the old thermal material. Here in the Lab, we use a two-stage cleanser called ArctiClean, although high-percentage rubbing alcohol will do the job just fine. Just apply a drop or two to the old material and let it sit for a minute while the cleaner breaks up the grease in the thermal paste. Then, wipe it clean with a lint-free cloth. (A coffee filter makes a terrific, cheap lint-free cloth.) Repeat the process until both the CPU and cooler are totally clean before moving on.

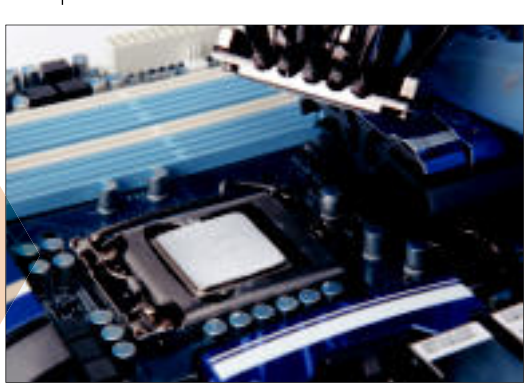
2 APPLY THE THERMAL PASTE

Looking around the Internet, you'll find a lot of different philosophies about how to apply thermal paste. Some people say you should apply it in a dot, some a line, some two lines, some an X pattern, and so on. Truth is, all you're trying to do when applying thermal paste is to get a paper-thin layer of the stuff over as much of your CPU as possible. For that, a dot is pretty much perfect, since a dot will squish into a circle, which will hopefully reach to all four edges of the CPU.

First, insert the CPU into its socket on your motherboard. Next, squeeze out a dot of thermal paste directly onto the center of your CPU. Your dot should be about the size of a small pea. Next, take your cooler and press it straight down onto the CPU so that the thermal paste spreads evenly in all directions. If you feel comfortable doing it, you can use a very slight rubbing motion as you press down on the cooler to help spread the paste better.

Ideally, you're now finished. You simply lock your cooler down and then move on. However, if you're afraid the thermal paste didn't get spread properly, you can give it a quick look by lifting the cooler back up, twisting slightly to break the vacuum seal that may have formed. If you've got too much paste on the CPU, you can wipe up the excess from around the edges, and if you've got too little, you can add some more. Of course, if you somehow totally screwed it up, you can always clean everything up and try again.

Note that we don't recommend doing this more than once—every time you lift up the cooler, you risk adding more air bubbles into the thermal paste, which will lower your cooler's efficiency. Don't let yourself get too worried about that, though—unless you're doing some really heavy overclocking, it isn't going to make or break your system.



REVIEWS

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Gateway Gaming Supercomputer

A super-duper amount of RAM!

A single Core i7 bested a real supercomputer, so maybe Gateway's Supercomputer can do the same.

There are two things we think of when we hear the word "supercomputer." The first is the failed 1970s NBC show *Supercomputer* (now available on DVD from Shinehart Wigs). The other is a massive room full of HAL9000-like scary boxes just two MIPS away from declaring thermal nuclear war on humanity.

So, what was Gateway thinking when it decided to call its FX6831 a Gaming Supercomputer? This is, after all, just a simple desktop housing a single 2.8GHz Core i7-860. Surely, that's not the stuff of supercomputing, is it? OK, we know that in January, Fabrice Bellard used a single Core i7 to smash a record set by, umm, a supercomputer for calculating pi. Still, Gateway's gone way over the line, right?

Perhaps. The specs certainly aren't extraordinary. Besides the Core i7-860, this Gaming Supercomputer packs an ATI Radeon HD 5850, a 1.5TB hard drive, and a DVD burner and Blu-ray combo drive, all running on a motherboard using Intel's new H57 chipset.

We know many enthusiast users think OEM boxes are boring, but as we saw with Alienware's Aurora ALX (reviewed in February), large OEMs are quite capable of turning out innovative cases. Gateway's Gaming Supercomputer is another such example: It features a hidden compartment up top for holding an external USB drive, with nearby access to two USB ports. Brilliant.

The most eye-catching spec of the Gaming Supercomputer is the amount of main memory it packs: 16GB of DDR3/1333. That's the most RAM we've ever seen in a production machine. Unfortunately, that kind of excess has limited utility. To be fair, you can probably say the same of a machine with three graphics cards or a four-drive SSD RAID. Still, if we had our druthers, we'd probably sacrifice 8GB of that RAM to buy a sweet SSD.

The Supercomputer had the honor of being the first machine christened with our latest benchmark suite.

For a midrange system, the Gaming Supercomputer does well, but it lagged behind our updated zero-point system. Our overclocked zero-point has a 25 percent clock advantage, and for the most part, it turned in scores about 23 to 24 percent faster.

The Supercomputer had the most difficult time trying to catch our zero-point in gaming. That's no shocker, though; the Gateway packs an ATI Radeon HD 5850, which is currently the reigning champ of the $300 videocard world. Our zero-point, however, runs an ATI Radeon HD 5970, which is currently the best graphics card. Period. However, it's a $700 videocard. Since few things today can be scored independently of price, consider that our zero-point rig totals about $2,300, which puts it in the category of high-end gaming machines. At $1,700, the Gaming Supercomputer is a solid midrange rig.

That doesn't mean we don't have our complaints. As we said, we'd forego the shock value of 16GB of RAM for an SSD or an upgrade to a 5970. So Gaming Supercomputer? Probably not. But then again, where's the allure in Nicely Balanced and Affordable Gaming Computer?

—GORDON MAH UNG

SPECIFICATIONS

Processor	Intel 2.80GHz Core i7-860
Mobo	Custom H57
RAM	1GB DDR3/1333 in dual-channel mode
Videocard	ATI Radeon HD 5850
Soundcard	Onboard Realtek
Storage	Seagate Barracuda 7200.11 1.5TB hard drive
Optical	Lite-On DH6E2S Blu-ray combo drive; Lite-On DH16AASH DVD burner
Case/PSU	Proprietary case / FSP 750-watt PSU

BENCHMARKS

	ZERO POINT	
VEGAS PRO 9 (sec)	3,049	4,017 (-24%)
LIGHTROOM 2.6 (sec)	356	444 (-20%)
PROSHOW 4 (sec)	1,112	1,436 (-23%)
REFERENCE 1.6 (sec)	2,113	2,747 (-23%)
S.T.A.L.K.E.R. (fps)	42	21.2 (-50%)
FAR CRY 2 (fps)	114.4	61.1 (-47%)

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

Our current desktop test bed consists of a quad-core 2.66GHz Core i7-920 overclocked to 3.5GHz, 6GB of Corsair DDR3/1333 overclocked to 1750MHz, on a Gigabyte X58 motherboard, with an ATI Radeon HD 5970 graphics card, and a 160GB Intel X25-M SSD, running 64-bit Windows 7 Ultimate.

VERDICT 7

GATEWAY FX6831 GAMING SUPERCOMPUTER

+ LOGAN 5	− JENNIFER 8
16GB of RAM! Super quiet; fair performance; reasonably priced.	16GB of RAM? A fatter GPU would make it much more super.

$1,700, www.gateway.com

XFX Radeon HD 5670

Can a budget card make you happy?

Can you get great gaming performance for $99? That's the burning question we wanted to answer when the XFX Radeon HD 5670 arrived. The version we tested, with 512MB of GDDR5, can be found for just under a hundred buckazoids on the web. The other question: How well does it stack up against a similarly priced Nvidia card?

Like other Radeon 5000 series GPUs, the 5670 chip is built on a 40nm manufacturing process. For those still trying to wrap their heads around the huge size of the Radeon HD 5970, the 5670 is a mere 6.5 inches long, occupies just a single PCI-E slot, and has no requirements for a power connector. The two cards, of course, are not in the same class.

XFX's Radeon HD 5670 delivers DirectX 11 on a budget.

The HD 5670 has half the stream processors, texture units, and ROPs of the Radeon HD 5770. The GPU core is also clocked lower, as is the GDDR5 memory. With these specs, we expected something to give when running games. Sure enough, when we tried running modern games at 1680x1050 at high detail, the frame rates were unacceptable. Antialiasing? No way.

We took the XFX card for a spin on our graphics test system, a Core i7-975 with 6GB of fast DDR, dialed the graphics option down a couple of notches and re-ran our benchmark games at 1280x720 (or 1280x768 for Battle Forge). Since we were running at a relatively low resolution, we did pump up AA to 4x, just to keep our eyes from bleeding at all the jaggies. We also ran our suite of tests on an EVGA GeForce GT 240, a $99 card based on Nvidia's GT 240 GPU. Like the AMD GPU, the GT 240 also has 512MB of GDDR5 running at 790MHz, and a core clock of 550MHz.

The Verdict? The XFX card beat the EVGA card in most benchmarks, but the overall margins were fairly small. The sub-$100 category keeps getting better—but games keep getting more demanding. If you're willing to sacrifice resolution and graphics detail, the XFX Radeon HD 5670 should get the job done. It's not a strong card for gaming, but it should shine in home theater PCs and other environments that have space and power constraints. **—LOYD CASE**

BENCHMARKS

	XFX Radeon HD 5670	EVGA GeForce GT 240
3DMark Vantage Performance (fps)	**6,305**	5,399
Battle Forge / DX10 (fps)	29	29
Far Cry 2 / Action (fps)	**44**	39
Far Cry 2 / Ranch Long (fps)	**46**	43
HAWX (fps)	**37**	36
STALKER: Call of Pripyat (fps)	**26**	23
Dirt 2 (fps)	**59**	52

Best scores are bolded. Our test system uses a 3.33GHz Core i7-95 Extreme Edition, 6GB of DDR3/1333, and Windows 7. Games were run at 1280x720 (except for BattleForge, which was run at 1280x768), and tested at medium-high detail with 4x AA.

ATI'S EVERGREEN FAMILY, COMPARED

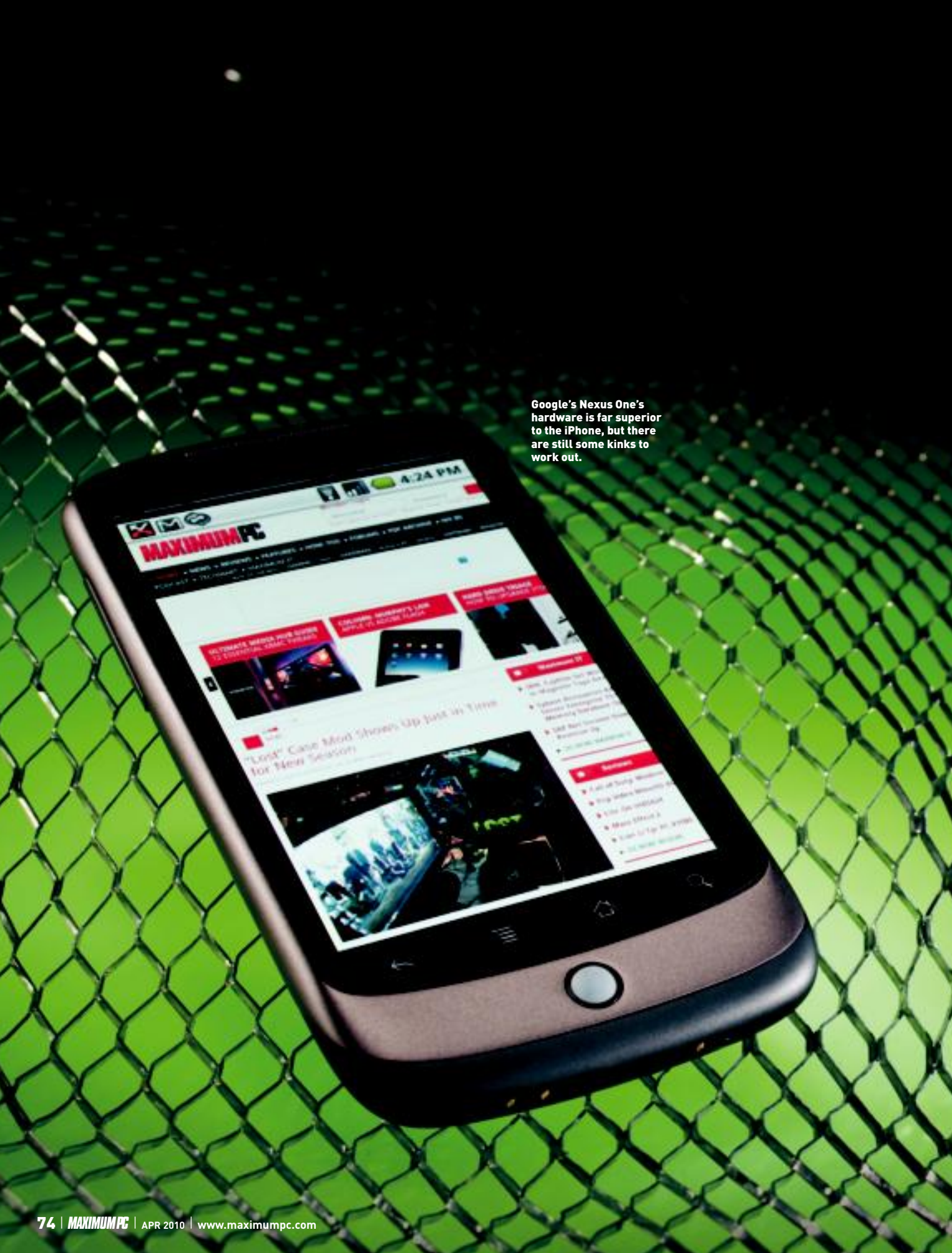
	HD 5870	HD 5850	HD 5770	HD 5670
Transistor Count	2.15 Billion	2.15 Billion	1.04 Billion	627 Million
Stream Processors	1,600	1,440	800	400
Texture Units	80	72	40	20
ROPs	32	32	16	8
Memory Interface	256 bit	256 bit	128 bit	128 bit
Memory	1GB GDDR5	1GB GDDR5	1GB GDDR5	512MB or 1GB GDDR5
Core Clocks	850MHz	725MHz	850MHz	725MHz
Memory Clock	1.2GHz	1GHz	1.2GHz	1GHz

VERDICT 7

XFX RADEON HD 5670

+ FIRE IN THE HOLE!	− MISFIRE
One-slot wide; no power connector needed; low cost.	Resolution and detail need to be dialed down for decent gaming performance.

$99, www.xfxforce.com



Google's Nexus One's hardware is far superior to the iPhone, but there are still some kinks to work out.

Google Nexus One

Like all Google products, it's still a bit beta

On paper, Google's new Nexus One is the smartphone to beat. It's got a gorgeous screen, a svelte formfactor, and the hottest phone operating system on the planet, Android 2.1. Unfortunately, just like the Motorola Droid, the Nexus One has some problems that prevent us from recommending it wholeheartedly.

Let's start with the awesome. The Nexus One's screen, a 3.7-inch 800x480 active-matrix OLED display, is undeniably gorgeous, rendering pitch-perfect colors at high resolution in a way that makes the iPhone 3GS screen look simply sad by comparison. The Nexus One runs a Qualcomm QSD 8250 at 1GHz, comes with 512MB of RAM and 512MB of onboard flash, and includes a user-upgradeable 4GB MicroSD card. All this is packed into an HTC-designed body that's slimmer than an iPhone 3GS and *waaaay* sexier than the Droid.

The Android OS itself continues to impress. The 2.1 edition spit-shines the improvements to 2.0. We dig the speedier application menu and the dynamic wallpaper, which uses cues from the music you're listening to or the time of day to render interesting (but ultimately useless) visualizations behind your home screen. There are a few more substantial updates, as well—most notably, every text field in the phone is voice enabled. While this won't make in-car Twittering any safer (you still need to navigate to the right fields with your fingers), we found the feature occasionally useful, especially in the navigation app. It's worth mentioning that the voice recognition all happens server-side, so even though it's pretty accurate, it takes a moment or two to complete.

The best thing about Android continues to be the ability for third-party developers to integrate their apps with the phone's native apps. The widgets that have been part of Android since version 1.5 even allow you to customize your phone's home screen, something that's notably missing from the iPhone.

While the Android Marketplace now has more than 14,000 apps, the viewer software does a poor job of promoting the good apps and burying the bad. We still don't know how to sort by user rating or popularity, and the editorially driven selections are not compelling. All the applications in the world won't help your platform if your users can't find the awesome ones, Google.

We also experienced some pretty serious problems with the onscreen keyboard, on three separate occasions, with multiple handsets. It simply stopped registering touches accurately, which made it impossible to type. The problem was sporadic and difficult to reproduce but it was annoying as hell. We haven't experienced the problem since applying the multitouch update, but it's a serious enough problem that it warrants mentioning. We also feel that the soft buttons on the screen's fascia (Back, Menu, Home, and Search) are placed too high. It's too easy to accidently tap them when you hit the keyboard.

Of course, the worst of it is that this Nexus One is really only usable on T-Mobile's limited network for now. AT&T users can buy it unlocked but will be limited to EDGE speeds. The good news is that the Nexus One is coming out in Verizon trim this spring, with an AT&T version on tap, too. Having this phone on a more capable network would push the Nexus One up in value. Still, as is, even with its little foibles, the Nexus One is clearly the best Android-phone yet. —WILL SMITH

The Application menu in Android 2.1 received some cosmetic and performance improvements. Icons seem to scroll up and over a 3D cube, rather than up a flat surface.

Android includes a car-friendly nav menu that puts the apps you frequently use in a car at hand, so it is ever-so-slightly less dangerous when you use the phone while driving.

VERDICT 8

GOOGLE NEXUS ONE

+ RICK DECKARD	− ROY BATTY
Great OLED screen; replaceable battery; good call quality; infinitely customizable.	Keyboard wigs out; weird soft-key placement; Android Marketplace sucks; T-Mobile.

$530 unlocked, $180 w/T-Mobile contract, www.google.com/phone

Sony Vaio P

The perfect device for leprechauns

The Vaio P's 1600x768 resolution is sharp—but you have to move in really close to appreciate it.

The Sony Vaio P is a weird device. It's much smaller than a netbook, but much better-equipped. It has wireless broadband access from Verizon, onboard GPS, a ThinkPad-style pointing stick, and an eye-straining high-resolution screen. It's also incredibly expensive. So who exactly is the Vaio P for?

At just 9.8 inches across, 0.8 inches thick, and 4.8 inches deep, and weighing just one pound, five ounces, the Vaio P is made for mobility—it makes a 10-inch netbook look like a desktop replacement. Into those tiny dimensions Sony crams parts that—on paper—put your old Atom netbook to shame. The Vaio P uses a 2GHz Atom Z550 paired with the US15W chipset and GMA500 integrated graphics. By comparison, last year's typical netbook used a 1.6GHz N280 on an Intel GSE945 chipset with GMA950 graphics. The Vaio P also ships with 2GB of DDR2/533 and a whopping 256GB Samsung MLC SSD, which itself is responsible for $700 of the Vaio P's price tag. The full Windows 7 Professional OS is a welcome change from Windows XP—or worse, Windows 7 Starter.

The Vaio P's eight-inch screen offers an eye-watering 1600x768 resolution. This is the first time we've ever seen a screen that was too sharp; reading text on it for more than a few minutes hurt our eyes.

In fact, everything about the Vaio P is just a little too small. The chiclet-style QWERTY keyboard, though bigger than boards found on most MIDs and UMPCs, is still too small to type on comfortably, unless you have very nimble fingers. And the lack of a track pad hurts—the pointing stick, though reasonably sensitive, isn't as precise. The speakers have zero low end at any volume; you're much better off using the included headphones.

In our netbook benchmarks, the Vaio P fared about as well as we'd expect from a device with a faster CPU, more RAM, slower integrated graphics, and a smaller battery than our zero-point. It was 22 percent faster than the zero-point in our Photoshop benchmark and 50 percent faster in our MainConcept test, but 67 percent slower in Quake III, thanks to its crappier graphics chipset. Quake 4, which is unplayable on any non-Ion netbook, wouldn't even run on the Vaio P. To our surprise, the Vaio P bested the Toshiba Satellite T115 ultrathin notebook from last month in MainConcept, though in nothing else. Battery life, at two hours, 24 minutes, is impressive only in light of the Vaio P's size and the corresponding miniature battery.

So what do you make of a tiny, yet full-fledged computer with a screen that causes eyestrain, a keyboard that's hard to type on, and a nearly $2,000 price tag? The Verizon-enabled 3G wireless data connection and turn-by-turn GPS (utilizing Microsoft Streets & Trips 2009), offer some clues. The Vaio P is for the ultimate road warrior: someone who values portability above all else. And we mean all else—battery life, usability, even money. But given that modern smartphones offer a more usable, albeit smaller, interface along with mobile data and turn-by-turn navigation, we'd warrant that even the hardiest road warrior would prefer the combination of a smartphone and an ultraportable that's easier on the eyes and fingers. This leaves us with only one possible target demographic for the Vaio P: leprechauns. We can't think of anyone else with the small fingers, sharp eyes, and pot o' gold required to get the most out of this device. **–NATHAN EDWARDS**

SPECIFICATIONS

Processor	2GHz Intel Atom Z550
Chipset	Intel US15W
Graphics	Intel GMA500
Display	8-inch 1600x768 TFT LCD
RAM	2GB DDR2/533
Storage	250GB Samsung MLC SSD
Ports	2 USB 2.0, headphone, SD, MemoryStick, 10/100 Ethernet, VGA (on expansion card)
Wireless	802.11 b/g/n, Bluetooth 2.1, Verizon 3G
Lap/Carry	1lb, 5.3oz/1lb, 13oz

BENCHMARKS

	ZERO POINT	
Photoshop CS3 (sec)	708	584
Main Concept (mins)	251	166
Quake 3 (fps)	60.9	20.7 (-67.2%)
Quake 4 (fps)	3.6	WNR
Battery Life (mins)	255	142 (-44.3%)

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

Our zero-point netbook is a Lenovo IdeaPad S12 with a 1.6GHz Intel Atom N270, 1GB of DDR2/667 RAM, a 160GB hard drive, Intel GMA950 integrated graphics chipset, and Windows XP Home SP3.

VERDICT **6**

SONY VAIO P VGN-P799L/Q

+ STEVE VAI	– BIODOME
Windows 7; 2GB RAM; 256GB SSD; wireless broadband and GPS; incredibly portable.	Incredibly expensive; too tiny to use comfortably; no touch pad.

$1,900, www.sonystyle.com

Noctua NH-D14

The cooling is enormous!

When we tested Noctua's tower-style NH-U12P in August 2009, its performance was excellent, making it a close second to our then-champion Thermalright Ultra-120 eXtreme. Given the success of coolers with one fan and one set of cooling fins, it's logical to think that, hey, maybe two sets of fins and two fans would be even better! Thus (probably) was born the Noctua NH-D14, with its two pounds, 12 ounces of cooling power.

The NH-D14 consists of six heat pipes rising from a heat exchanger into two stacks of cooling fins, with a 14cm fan between the fins and a 12cm fan on the outside. It looks like the NH-U12P, doubled. And it's enormous, albeit easy to install. The center 14cm fan removes easily—Noctua has really improved its wire retention clips—and an included long Philips-head screwdriver makes attaching the NH-D14 to its mounting bars simple, though we struggled with the sheer footprint of the device; some configurations may require moving the 12cm fan, lest it interfere with RAM cooling fins.

Both the 12cm fan (NF-P12) and 14cm fan (NF-P14), like other Noctua fans, include optional low-noise (and thus low-rpm) adapters, though even at full blast the fans aren't too loud. Both fans connect to a PWM splitter cable, so you can run them both from the CPU fan power leads.

Once on, the NH-D14 performed to within a few degrees Celsius of our champion air cooler, the cheaper, smaller, and lighter Cooler Master Hyper 212+. And there's the rub. The NH-D14 is a great cooler, with massive airflow and great construction, but it can't take the top slot from a cooler that is half its size and a third its price.

–NATHAN EDWARDS

BENCHMARKS

	Noctua	Cooler Master	Stock
Idle (C)	31.25	31.25	36
100% Burn (C)	46.25	**44.25**	62.75

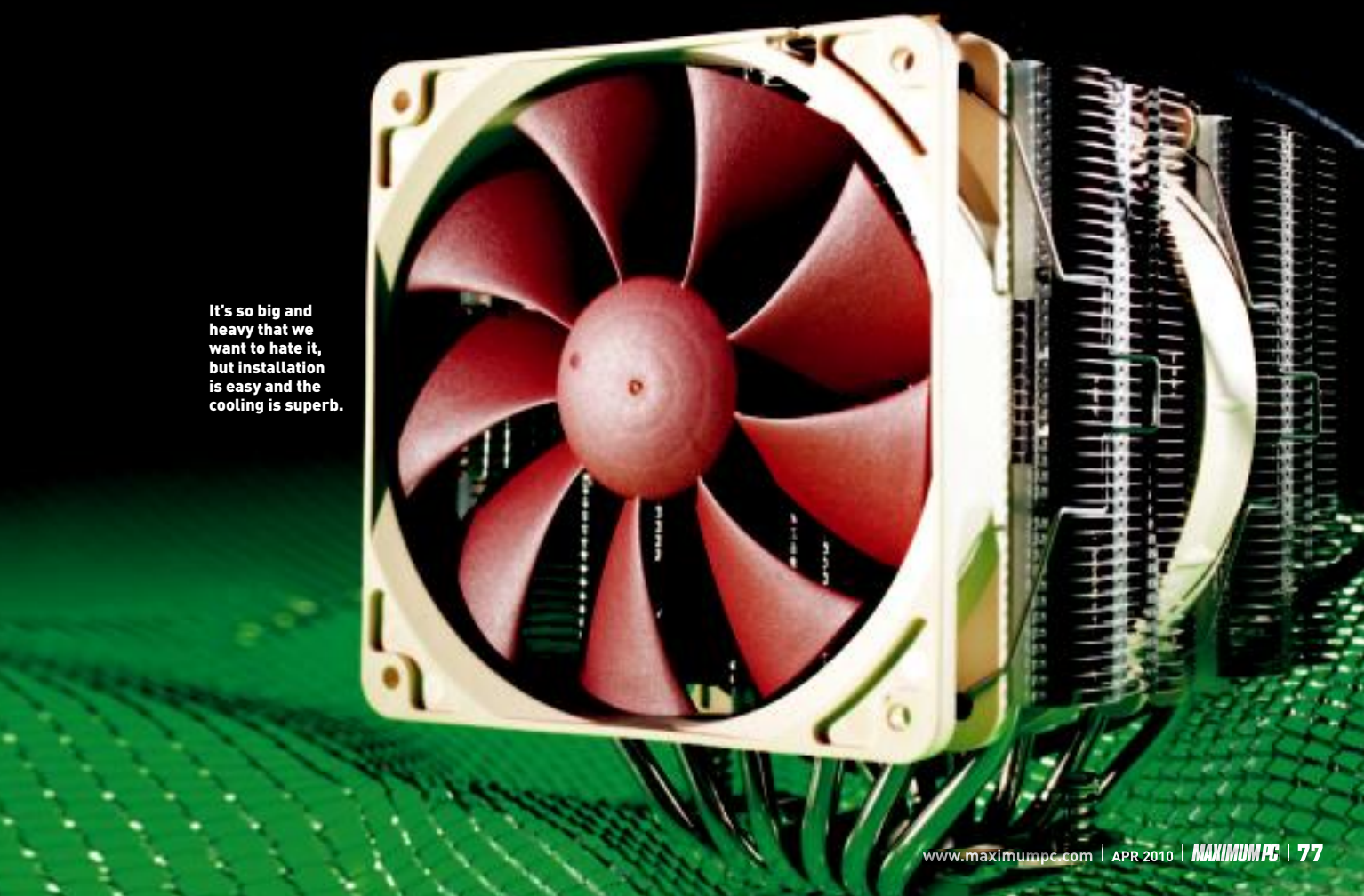
Best scores are bolded. Idle temperatures were measured after an hour of inactivity; load temperatures were measured after an hour's worth of CPU Burn-In (four instances). Test system consists of a stock-clock Q6700 processor on an EVGA 680i motherboard inside a Corsair 800D case with stock fans.

VERDICT 8

NOCTUA NH-D14

+ NICE	– NAUGHTY
Top-tier performance; massive airflow; relatively easy install; improved fan clips.	Massive; default 12cm fan placement interferes with tall RAM.

$90, www.noctua.at



It's so big and heavy that we want to hate it, but installation is easy and the cooling is superb.

Thermaltake Element V

The V could be for "very old design, very overpriced"

Since we reviewed the Thermaltake Element S (August 2009), Thermaltake has unleashed a dizzying deluge of Elements, from mid-towers G and T to the small-formfactor Q. The first full-tower, the Element V, feels like a bizarre mix of budget case and deluxe enclosure.

The Element V chassis comes with support for MicroATX, ATX, EATX, and various server motherboards, and its motherboard tray includes a CPU backplate cutout. At 21x21x8.7 inches, it's a full three inches shorter and three inches shallower than the Corsair 800D, which is one of the biggest cases we've tested. Still, the Element V is roomy enough inside to accommodate a Radeon HD 5970, the longest PCI-E graphics card on the market, with an inch or so to spare.

Because the Element V is made of steel, not aluminum, it's quite cumbersome, weighing 31 pounds empty. The side panels are similarly beefy, although we like the integrated 14cm fan in the left-side panel and the small plastic window above it. It's good that the window is so small, because the inside of the case is unpainted, unlike the Element S.

The Element V has 11 5.25-inch bays running from the top to the bottom of the case. That may seem like a crazy amount, but the lower six are dedicated to two 3.5-inch drive-bay cages. The cages can be held in with just one thumbscrew initially, but once you get your drives where you want them, you'll definitely want to secure the cages with additional screws to prevent them from rattling around. The hard drive bays themselves are a pain—you have to remove the cage from its chassis and use four screws to secure each drive into its recessed cage, which is awkward without a magnetized screwdriver. Considering that virtually every non-budget case on the market these days has some sort of drive-mount rail, Thermaltake's decision here is baffling—especially as there are no vibration-damping measures. The toolless optical-drive bay clamps are a nonstandard configuration, and flimsier than those found in Corsair, Cooler Master, or Silverstone cases.

The Element V has five fans—two 12cm front intake fans, one 12cm exhaust fan, and two 14cm fans. The 14cm fans on the case's top and left-side panel are LED-enabled, as is one of the front 12cm fans. The LED fans connect to a front-panel fan-speed control wheel, which also changes the LED colors, but the fans are noisy even at their lowest setting. And though there's room for more fans in the case, Thermaltake doesn't sell its LED fans à la carte, so you'll have to go with somebody else's.

The case includes an SSD mount, but the SSD must be secured to the bottom of the case from the outside, which is needlessly complex. Worse, instead of using two double-headed 9-pin adapters for the front-panel USB ports, the Element V uses four 5-pin headers—a totally unnecessary and confusing throwback. We haven't seen a case use these ancient headers in years.

Thermaltake is aiming the Element V at the "eSports" audience, and thus the Element V has a locking left-side panel (to prevent theft) and an optional mount for a water-bottle bracket. But if it really wants to attract a LAN-gaming crowd, Thermaltake would be better off with a lighter aluminum chassis and better hard drive brackets. At $180, the Element V is too much dough for not enough case. You can get the far-superior Silverstone Raven RV02 for that kind of money.

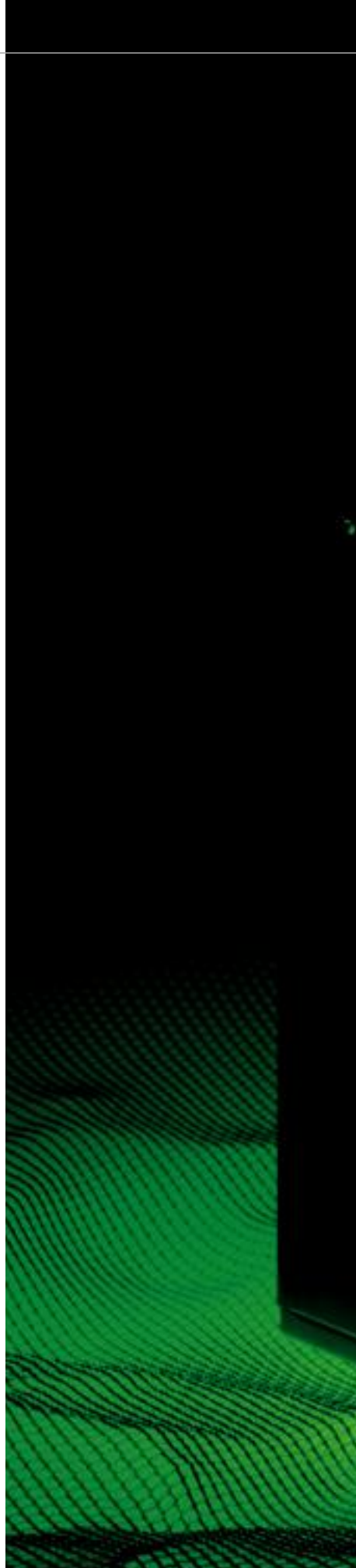
—NATHAN EDWARDS

VERDICT **6**

THERMALTAKE ELEMENT V

+ THE FIFTH ELEMENT	− BORON
Solid, roomy construction; fans aplenty and a dedicated fan-control knob; locking side panel.	Heavy and expensive; unfriendly hard drive install; ancient, confusing USB headers.

$180, www.thermaltakeusa.com



The Element V must be one of those heavy elements. It weighs 31 pounds, and not in a good way.

Buffalo Nfiniti WZR-HP-G300NH

This router really goes the distance

Buffalo's WZR-HP-G300NH didn't come close to beating the close-range performance of Trendnet's TEW-639GR, the router we've been using as our reference device for the past few months. And it wasn't as fast as the inexpensive Belkin N Wireless router that took first place in the budget category in our February 2010 roundup, either. But the Buffalo's TCP/IP throughput knocked our socks off in the tough environment of our double-walled media room, and its range took our breath away when we moved outside.

The "HP" in this router's name (and that of the WLI-UC-G300HP client adapter) stands for "high power," and that's not just marketing pabulum. Many of the routers we test can't maintain a connection when the client is placed in our two outdoor locations (almost 100 feet from the router, with the signal passing through several insulated interior and exterior walls). The WZR-HP-G300NH, however, delivered TCP throughput of 22.1Mb/s in one location and 15.0Mb/s in the other. Now consider its performance when the client was in the media room: TCP throughput of 53.5MB/s, compared to the rest of the field's average throughput of just 9.2Mb/s.

So, why didn't we include this screamer in our mainstream router roundup? Because we had asked Buffalo to send us its cheaper cousin, the WHR-HP-G300N, to fit our mainstream price target. That model is selling just about everywhere for $60; this one is currently street priced for around $100.

If you can swing the extra $40, the WZR-HP-G300NH is a fabulous router. And it doesn't just deliver fantastic range; it's endowed with a great feature set, too. First and foremost among these is a four-port gigabit switch with jumbo-frame support. And while we've seen plenty of routers with USB ports that allow you to attach an external storage device, this is one of the few that also has an integrated BitTorrent client that will download Torrents without the need to connect a PC to the router.

When Buffalo's Movie Engine is enabled, packets containing audio and video data are given priority status on the router's wireless network.

Buffalo brought over the well-regarded browser-based secure remote-access software from its NAS product line, too. Set up an account with a DDNS provider (or use Buffalo's free service) and you can use a web browser to access the files on a drive that's connected to the router from anywhere you have Internet access. Don't mistake the WZR-HP-G300NH with an attached hard drive for a full-featured NAS, though: While you can set up multiple user accounts, the attached drive is treated as a single share. The USB port can't be used to share a printer over the network, either. But that's a minor shortcoming, all things considered.

—MICHAEL BROWN

BENCHMARKS

	Buffalo WZR-HP-G300NH	Trendnet TEW-639GR
Kitchen, 20 feet (Mb/s)	67.6	**106.0**
Enclosed Patio, 38 feet (Mb/s)	**57.7**	57.1
Bedroom, 60 feet (Mb/s)	34.3	**51.3**
Media Room, 35 feet (Mb/s)	**53.5**	11.1
Outdoors 1, 90 feet (Mb/s)	**22.1**	4.8
Outdoors 2, 85 feet (Mb/s)	**15.0**	9.0

Best score in each scenario is bolded. A detailed explanation of how we test Wi-Fi routers can be found at http://bit.ly/16w27O.

MAXIMUM PC KICK ASS!

VERDICT **9**

BUFFALO NFINITI WZR-HP-G300NH

+ GRAPPA	− EVERCLEAR
Outstanding range; great QoS features; excellent NAS capability.	Not the fastest router at close range; can't share a USB-attached printer over the network.

$100, www.buffalotech.com

Acer Aspire One AO532h

Acer takes a jaunt down the Pine Trail, but doesn't really break new ground

First things first: This is not a revolution. Although the Acer Aspire One AO532h boasts Intel's new Pine Trail processor, the Atom N450, it's no game changer. Instead, think of it as a highly polished evolution of the standard netbook.

Intel's first Atom CPU, the N270, was the processor that launched a thousand netbooks, among them the 8.9-inch Aspire One, which was our favorite first-generation netbook, as well as one of the most popular. It's fitting, then, that an Acer Aspire One is one of the first netbooks to arrive with Intel's much-anticipated Atom N450, which consumes roughly 20 percent less power, and moves the chipset and graphics functionality into the CPU.

Other than the CPU, not much else is new about the AO532h—it has 1GB of DDR2; a 10.1-inch, 1024x600, LED-backlit LCD; and a glossy, fingerprint-magnet chassis. The hard drive is 250GB, which is nice, and both hard drive and RAM are easily upgradeable. It's the first netbook we've tested with Windows 7 preinstalled, albeit the needlessly crippled Starter edition. The track pad, which supports multitouch, is a textured area that's flush with the chassis; the chiclet-style keyboard is nearly full-size and easy to type on, although the keys depress lower than the chassis, which can be annoying when hitting the keys on the bottom row, where the sharp edge of the frame can dig into your thumbs.

The chassis of the AO532h is sleek and slim, and less than an inch thick. The whole shebang weighs two pounds, 11 ounces—slightly more than three pounds with the charger—which is lighter than most netbooks. The glossy lid's finish fades from black at the bottom to dark blue at the top. The interior chassis is a combination of matte and glossy black, except for the track pad button, which is a somewhat jarring blue.

Despite the N450's multithreading support, we didn't see much of a performance boost in our benchmarks. Photoshop and MainConcept scores were within 5 percent of our Atom N270-based zero-point, while Quake III was 7.7 percent slower. Quake 4 was slightly higher than our zero-point, but there's not much of a playability difference between 3.6fps and 4fps—the score might as well have been zero. For netbook gaming (such as it is), you really do need Ion.

Where the AO532h shines is in battery life. Thanks to the lower power draw of the Pine Trail chip, the AO532h eked out more than seven hours of battery life in our full-screen video rundown test. The only other netbook we've seen with that type of longevity was MSI's Wind U123 (reviewed September 2009), and that netbook was rocking a 9-cell battery—the Aspire One ships with a 6-cell, and a low-profile one, at that.

The best thing about the Acer Aspire One AO532h, though, is its price. At just less than $300, it's one of the most affordable netbooks out there. Heck, with the money you save, you can drop $80 on a Windows Anytime Upgrade to Home Premium.

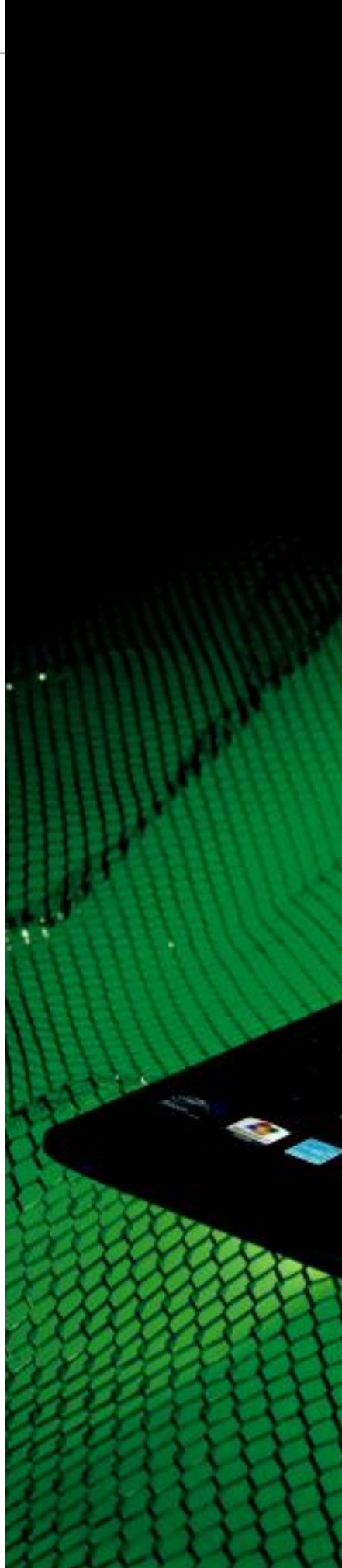
Bloatware notwithstanding—and we definitely recommend you run PC Decrapifier on this machine as soon as you get it—the Aspire One AO532h is a well-crafted, refined, inexpensive netbook. As such, it is near the top of its class. But with the rise of similarly priced CULV ultrathins, how much longer will Atom-powered netbooks be viable? —NATHAN EDWARDS

ACER ASPIRE ONE AO532H

VERDICT 8

+ ASPIRATION	− PUNCTURED
Well-crafted; decent performance; excellent battery life; roomy hard drive; inexpensive.	Still just an Atom-powered netbook; mushy keys; fingerprint magnet.

$300, www.acer.com



BENCHMARKS

	ZERO POINT	
Photoshop CS3 (sec)	708	677
Main Concept (min)	251	244
Quake III (fps)	60.9	56.2 (-07.7%)
Quake 4 (fps)	3.6	4.0
Battery Life (mins)	255	425

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

Our zero point netbook is a Lenovo IdeaPad S12 with a 1.6GHz Intel Atom N270, 1GB of DDR2/667 RAM, a 160GB hard drive, Intel GMA950 integrated graphics chipset, and Windows XP Home SP3.

SPECIFICATIONS

Processor	1.66GHz Intel Atom N450
Chipset	Intel Pineview
Graphics	Intel GMA 3150
Display	10.1-inch LED-backlit TFT LCD@1024x600
RAM	1GB DDR2/667
Storage	250GB HDD (5,400rpm)
Ports	Three USB 2.0, audio in/out, SD/multi-card reader, VGA, 10/100 Ethernet
Wireless	802.11b/g/n, Bluetooth 2.1
Lap/Carry	2 lb, 11 oz/3 lb, 2 oz

The Aspire One AO532h is a well-designed netbook running the latest Atom chip. But is that enough?

ViewSonic VP2365wb

Who says you can't have an IPS panel on the cheap?

We wouldn't complain if we never had to review a cheap TN LCD panel ever again. Our experience with ViewSonic's VP2365wb, on the other hand, has taught us we shouldn't assume that the mere presence of an 8-bit IPS panel will ensure top-drawer performance. On the third hand, the fact that numerous online retailers are selling this monitor for just $300 renders it a solid value.

ViewSonic markets this model as a "professional grade monitor for pros," which is an unusual claim to make for a 23-inch display with native resolution of 1920x1080 pixels. A monitor of that size and resolution sounds much more like a consumer electronics product for watching HD movies than a tool for editing digital photos. It's also odd that ViewSonic would include HDCP in its DVI port but not include an HDMI port at all. Nonetheless, the VP2365wb is leagues better than the ViewSonic VX2433wm we reviewed in our December issue, a TN panel we dismissed as a "steaming pile of mediocrity."

The VP2365wb has plenty of other features, including a four-port USB hub and a height-adjustable stand that tilts, swivels, and pivots between landscape and portrait modes. ViewSonic also includes its own PerfectSuite Plus software, which incorporates basic calibration tools, and a program that recognizes the display's orientation and automatically configures Windows so that the desktop and any open applications are presented appropriately.

Don't dismiss the ViewSonic VP2365wb for its shortcomings (no HDMI port, 14ms pixel-response time...) until you take a gander at its street price.

Performance-wise, our biggest criticism of the VP2365wb is that it is relatively dim, especially when compared to the exquisite (but twice as expensive) Dell UltraSharp U2410 that we reviewed in January. Our DisplayMate tests revealed a few other problems that might be deal-killers for anyone looking for a truly professional-grade monitor. The VP2365wb's low brightness level hampered its ability to distinguish between very dark shades of gray in the extreme grayscale test, but the monitor also had problems with the near peak-white test: the horizontal color bars were slightly darker on the left side of the screen than they were on the right.

Our DisplayMate test also revealed a serious pixel-tracking error. The monitor exhibited severe flickering while displaying the highest-intensity dithering pattern in that set of tests. We didn't encounter this problem with any of the real-world applications we used, though, so it might not be as big a problem as it sounds. And on the bright side, so to speak, the VP2365wb was able to deliver a true black without any detectable leakage from its CFL backlight.

The VP2365wb's performance with games and movies really surprised us. Despite a very slow pixel-response time of 14ms and a maximum refresh rate of 60Hz, we didn't detect any ghosting or motion-smearing while playing Far Cry 2 and Left 4 Dead 2 or watching the Blu-ray version of *Watchmen*. This isn't the perfect monitor, but an 8-bit IPS panel that sells for $300 doesn't need to be. (Learn more about LCD technology at http://bit.ly/9kPQUO.)

—MICHAEL BROWN

SPECIFICATIONS

Viewable Area	23 inches
Native Resolution	1920x1080
Panel Type	IPS
Color Gamut	84 percent of NTSC
Color Depth	8-bit
Gray-to-Gray Response Time	14ms
Inputs	DVI, VGA

VERDICT 8

VIEWSONIC VP2365WB

+ ANDROIDS	− HEMORRHOIDS
Eight-bit IPS panel; delivers 84 percent of the NTSC color gamut; inexpensive.	Low overall brightness level; slow pixel-response time.

$300, www.viewsonic.com

Plextor B940SA Blu-ray Burner

BD write speeds reach the double digits

Once Blu-ray burners reached 8x writes, enabling them to fill a 25GB disc with data in less than 15 minutes, speed stopped being a major argument against the technology—now it's just price and consumer need that stand in the way of widespread adoption. Still, for what it's worth, Blu-ray write speeds continue to improve at a steady pace, and now, a mere six months after reviewing our first 8x drive, we've been presented with Plextor's 12x B940SA.

But, you'll probably wonder, what good is a 12x drive when today's BD-R media has a maximum rating of 6x? As is the case with DVD and Blu-ray drives alike, hardware is often tuned to exceed the media's spec, but typically such tuning is tied to a particular brand of media. Plextor's B940SA, for example, reaches peak speed when writing to Sony and Panasonic BD discs.

Thus, we were able to write 22.56GB of data to a Sony BD-R single-layer disc in 10:57 (min:sec), a 36 percent improvement over our 8x champ, Pioneer's BDR-2203 (reviewed September 2009), which took 14:56 at the task. When writing to a Panasonic BD-R double-layer disc, we achieved an unprecedented time of 22:05—that's for a 50GB disc, folks!

Even with Verbatim's BD-R media, which is officially spec'd at 4x, the B940SA was able to hit 10x during the course of filling a disc, to turn in a very impressive time of 11:13.

The Plextor B940SA has the chops when it comes to standard DVD media, as well. With a 16x rating for DVD+/-R writes, it filled a 4.5GB disc in 6:01. It wrote 7.96GB of data to a DVD+R DL disc in 15:29. And in our DVD-ripping test, we copied the contents of double-layer movie disc from the Plextor B940SA to our hard drive in a very competitive 10:09.

For a while it seemed like each new generation of Blu-ray drives also saw a drop in price, but the Plextor B940SA costs no less than our favorite 8x or even 6x drives before it. In fact, at $280, the B940SA is slightly more expensive. What's more, Plextor has shed its once-characteristic stylish faceplate in favor of a more common utilitarian look. Nevertheless, if you're one of the few people who has a real need for a Blu-ray burner, this one's the fastest.

—KATHERINE STEVENSON

BENCHMARKS

	Plextor B940SA	Pioneer BDR-2203
DVD Write Speed Average	**11.73x**	11.64x
DVD Read Speed Average	**11.97x**	11.93x
Access Time (Random/Full)	**163/361ms**	173/365ms
DVD Ripping	10:09	**10:06**
Time to burn 22.5GB to BD-R (min:sec)	**10:57**	14:56
Time to burn 22.5GB to BD-RE (min:sec)	**43:00**	45:35

Best scores are bolded. All tests were conducted using Nero DiscSpeed. 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, an EVGA GeForce 8800 GTS card, a Western Digital 500GB Caviar hard drive, and a PC Power and Cooling Turbo Cool PSU.

MAXIMUM PC KICK ASS!

VERDICT **9**

PLEXTOR B940SA BLU-RAY BURNER

+ TWELVE ANGRY MEN	– OCEAN'S TWELVE
Fastest BD writes; competitive DVD performance.	Do you really need a BD burner—and at this price? We miss the Plextor pizzazz.

$280, www.plextor.com

We know Plextor shares a manufacturing line with Lite-On, but did it have to adopt the latter's boring aesthetic?

Sonos ZonePlayer S5

It's a party in a box

The Sonos ZonePlayer S5 is a fabulous addition to the multi-room Sonos Digital Music System, even if the company's engineers did make some sonic compromises in the name of delivering an all-in-one model at a friendlier price point.

The passive ZonePlayer 90 sells for $350, and the ZonePlayer 120—which features an excellent integrated 55-watt-per-channel amplifier—goes for $500. The ZonePlayer S5 packs both an amplifier and speakers, and is priced at just $400. This low price, coupled with the company declining our query about the amp's power and total harmonic distortion specs and the material used in speaker fabrication, leads us to believe that Sonos is looking for a bridge to a more proletarian market.

Be that as it may, when we integrated the S5 into our existing Sonos system (ZonePlayers form their own wireless network, but at least one of them must be hardwired to your router), we were bowled over by its ability to fill two adjoining rooms (680 square feet in aggregate) with jangling guitars and the plaintive wail of Gillian Welch's voice singing "Burn My Stillhouse Down." The box houses five speakers altogether: a pair of 0.75-inch tweeters, two 3.0-inch midrange drivers, and a 3.5-inch subwoofer that delivers a lot more bass than you'd expect from a driver of that size.

Changing things up to test the S5's bass response, however, revealed a problem: When we cranked up the Peter Gabriel/Kate Bush duet "Don't Give Up," the cabinet began to rattle in sympathy with Tony Levin's prominent and sustained bass work. As it turns out, a screw inside the enclosure apparently worked its way out during our listening test. We finished our evaluation with a second unit and the issue didn't repeat itself.

Several hours of critical listening left our ears feeling a bit fatigued—an issue we didn't encounter with B&W's Zeppelin (not entirely an apples-to-oranges comparison, since the Zeppelin is a non-networked iPod dock), but the S5 was a huge hit when we had weekend guests over to listen to tunes and play pool.

—MICHAEL BROWN

VERDICT 8

SONOS ZONEPLAYER S5

+ ROOTS MUSIC	- ROOT CANAL
All-in-one design; wireless; powerful amp; outstanding price/performance ratio.	Audio quality not as high as the rest of the Sonos lineup; available only in white.

$400, www.sonos.com

The S5 doesn't have a battery-power option, so it's not entirely portable; but a handle cleverly integrated into the rear bass port renders the 9.15-pound system luggable.

Western Digital My Book 3.0 1TB

USB 3.0? Yes, please!

We wouldn't normally test two products from the same lineup in two consecutive issues of the magazine. But when Western Digital's My Book 3.0 showed up just days after the March issue went to print, we knew we had to review it. It doesn't have an e-label or capacity meter, like last month's My Book Elite. Nor does it include WD's SmartWare backup software or hardware encryption. But the My Book 3.0 has one feature that makes it awesome: USB 3.0. Oh, sweet mercy, yes.

The My Book 3.0 is, like its predecessors, a simple, vaguely book-shaped, black shell surrounding a 3.5-inch Caviar Green drive. It comes in four variations: 1TB or 2TB, and with or without a PCI-E 2.0 adapter card. The x1 PCI-E 2.0 card gives you two USB 3.0 SuperSpeed ports and is based on NEC's PD720200 chipset. It's worth noting that using an x1 PCI-E 2.0 slot limits the theoretical throughput of the USB 3.0 ports. USB 3.0's maximum theoretical throughput per port is 5Gb/s, or 640MB/s, while a x1 PCI-E 2.0's throughput is 500MB/s. But honestly, you're unlikely to see any hard drive or SSD saturate a USB 3.0 pipe at this point.

We tested the My Book 3.0 on the same rig we used to test last month's My Book Elite—an Asus P7P55D-based system running a 2.66GHz Core i5-750. For reference, we also tested the same drive in a USB 2.0 slot. In our standard HDTach full-drive variable-zone benchmark, the My Book 3.0's average read speed was 88MB/s, with average writes of 66MB/s. By contrast, both the My Book 3.0 and My Book Elite, when connected to a USB 2.0 port on the motherboard, averaged around 31MB/s reads and 26MB/s writes.

USB 3.0 is just beginning to show up in consumer devices, including a few high-end motherboards, but most of the peripherals that employ the technology so far are external hard drives, which benefit most from the bandwidth upgrade.

The Western Digital My Book 3.0 probably won't be the fastest USB 3.0 hard drive we test this year, simply because it's one of the first. It's absolutely no-frills; it doesn't even come with backup software. But it's fast and capacious, is first out of the gate, and brings affordable USB 3.0 to the masses—which puts the bottleneck back at the drive access speed where it belongs. That counts for a lot. —NATHAN EDWARDS

What it lacks in frills (and even features), the My Book 3.0 makes up in speed.

BENCHMARKS

	My Book 3.0 (USB 3.0)	My Book 3.0 (USB 2.0)	My Book Elite (USB 2.0)
Capacity	1TB	1TB	2TB
HDTach Avg. Read (MB/s)	**88.0**	31.6	30.2
HDTach Avg. Write (MB/s)	**66.3**	26.2	26.1
HDTach Burst (MB/s)	**92.1**	32.9	32.8
HDTach CPU Utilization	11%	**6%**	12%
HDTach Random Access (ms)	16.6	16.4	21.4

Best scores are bolded. HD Tach version 3.0.1.0 used. Benchmarks performed on our hard drive test bench, which consists of an Asus P7P55D Premium running an Intel Core i5-750 @2.67Ghz with Windows XP SP3.

MAXIMUMPC KICK ASS!

VERDICT **9**

WESTERN DIGITAL MY BOOK 3.0 1TB

+ C-3PO	− TOSH.0
USB 3.0 speed removes 33MB/s transfer limit; includes PCI-E adapter card.	Don't lose that USB SuperSpeed cable! No encryption or backup software included.

$200 (w/USB 3.0 expansion card), www.wdc.com

Laplink PC Mover Professional

Migrating data has never been so easy

Quick, what's the top reason people put off PC upgrades? It's the hassle of moving all those files, applications, and gigabytes of detritus built up on a PC over the years.

That's a hassle that Laplink says it can solve with PC Mover. According to the product claims, by hooking up two PCs, you can use the application to move all your documents, as well as applications!

Yeah, if you're as skeptical as we are, you don't believe it, either. Something that promises to make machine-to-machine migration that easy must be a joke, right? The results, however, put our doubts to rest.

To run PC Mover, you simply install the client on the two machines involved in the move. PC Mover also supports in-place upgrades using a single hard drive by accessing the files stored during the upgrade in the Windows.old file.

For our test, we decided to take a several-years-old Windows XP Pro install from an old Core Duo ThinkPad and move it to an updated Dell Core 2 Duo notebook. We used a crossover cable between the two notebooks' Gigabit Ethernet ports. Unfortunately, the move using that method took 52 hours. The company sells a USB 2.0 cable for $39, and we suspect that it works far faster. We let the machines churn away and when we returned two days later, we found that the target notebook had locked up. Whose fault? Probably ours. The target notebook had not been activated and Win7 was near the end of its trial period.

We started over again and were pleased to see that PC Mover picked up where it left off. When the move was finished, we found our new, previously clean notebook littered with desktop icons, and the hard drive stuffed to the gills with hundreds of gigabytes of crap—just the way we like it.

Don't expect a move to be quick: It took us more than two days to migrate from our old notebook to a new one.

With the Professional version, you have the option to deselect applications you don't want to migrate, but we decided to do it the lazy way and see what happened if we just moved everything—including Lenovo-specific utilities that have no use on our new Dell. Oy.

Documents moved over with full fidelity, as did many apps. Adobe Lightroom 2, for example, included a large photo catalog it had built up. But not every app worked. The most sensitive to failure were apps that worked a bit closer to the metal, such as SlySoft's AnyDVD, Nero 7, iTunes, and, oddly, Steam. Interestingly, some apps required reactivation, while others did not. The apps that did not work were easily uninstalled since the uninstallers were moved, too.

Overall, PC Mover Pro has a hell of a lot of utility. Would we use it to move our own daily machines? Probably not. With a new machine, we prefer to be more hands-on about what we transfer, to ensure we get everything just right.

But are we going to spend 12 hours performing a manual migration for a friend or relative? Hell, no. That's where PC Mover's worth comes in. Why kill your weekend when you can just start PC Mover and do a little trimming after it's done? Be advised that PC Mover Pro's $60 key only allows you to migrate one machine. You have to purchase a new $60 key for each additional machine moved. The Home version is cheaper at $40, but does not let you pick and choose which apps to move.

In the end, we're pleasantly surprised with PC Mover Professional. It's a bit like hiring a professional moving company to move you to a new house instead of doing it yourself. —GORDON MAH UNG

PC Mover Pro lets you select which apps you want to move between an old machine and a new one.

VERDICT 9

LAPLINK PC MOVER PROFESSIONAL

+ WILLIE NELSON	− FREE WILLIE
Machine-to-machine migration; moves many apps with surprising fidelity.	Large moves can take days, especially over gigabit; key purchase limits you to a single move.

$60, www.laplink.com

Mass Effect 2

Proof that videogame storytelling shouldn't be taken lightly

Like its predecessor, Mass Effect 2 is equal parts Roddenberry and Lucas—a space saga that combines the interplanetary politics and heroic adventuring of *Star Trek* with the gritty personality and blaster-duels of *Star Wars*. The plot is simple: A mysterious race called the Collectors has been abducting humans from colonies, and as Commander Shepard, it's your job to stop them and uncover their connection to the Reaper threat of the first game. A dramatic introductory cutscene sets the stage for a two-year fast-forward that resets your character's abilities and puts all players on equal footing.

The disconnect from the first game extends beyond the two-year time jump. Gone is your Spectre status that let you roam the galaxy like a Jedi peacekeeper. Instead, you're now an operative of Cerberus, a pro-humanity group with a strict ends-justifies-the-means mandate. Cerberus and its questionable morals set the stage for the theme of Mass Effect 2, as you are constantly confronted with choices that have no clear ethical answer.

Even though Shepard is the hero, Mass Effect 2's tone is really defined by its supporting cast of characters. By the end of the game, you recruit 10 squad mates (including some familiar faces), each with their own distinct personality, abilities, and interesting backstory that could warrant a full game in itself. The Salarian scientist Mordin, for example, was a major contributor to the Genophage virus that decimated the Krogan race. Without spoiling the details of the other teammates, we'll just say that all are interesting and complex, with personalities and motives that feel real (due in part to the superb voice acting).

The game's missions are driven by dialogue choices. The conversation chat-dial interface returns, along with the option to resolve confrontations with benevolence or malevolence. Mass Effect 2 also has a quick-time event system to interrupt cutscenes, which enhances the cinematic styling. This feature isn't used as frequently as we would've liked, but it's nonetheless effective at immersing you in the scene.

Salarians are just one of 15 alien races that populate the Mass Effect universe.

But Mass Effect 2 isn't all about talking. As a third-person shooter, Mass Effect 2 is more than competent—its combat areas were obviously designed to accommodate a cover system and real-time squad commands. The game is very action-centric; it's more of an action game with role-playing elements than vice versa. Instead of fixing the frustrating inventory system of the first game, the developers chose to get rid of equipment inventory-management altogether. In fact, we were a bit shocked to find that there are only 19 total unique weapons in the game. We would've welcomed some Borderlands-style randomization in weapon and equipment stats.

Main story and side-quests aside, it's your personal choices that ultimately shape the gameplay of Mass Effect 2. While the main story follows a locked path, the theme of your journey ebbs and flows around the decisions you make. Some of the more difficult choices aren't even apparent until you feel their consequences. Suffice it to say, more than one squad member's life is at stake. And we loved that these life-or-death decisions never felt arbitrary; your decisions are based on what you've learned about these characters throughout the story. Rush through conversations and you'll miss out on important clues that would otherwise help you make the best informed decision.

Mass Effect 2 sets a new high standard for action-RPGs. Whether you're familiar with the Mass Effect mythology or not, it's a gaming experience that shouldn't be missed.

—NORMAN CHAN

Depending on which of six character classes you choose, you'll have access to different weapon types and Biotic powers.

MAXIMUM PC KICK ASS!

VERDICT **9**

MASS EFFECT 2

+ PARAGON	− RENEGADE
Fast-paced action; compelling characters; immersive story.	Over-simplified equipment management; a few boss fight gimmicks.

$49, www.masseffect.com, ESRB: M

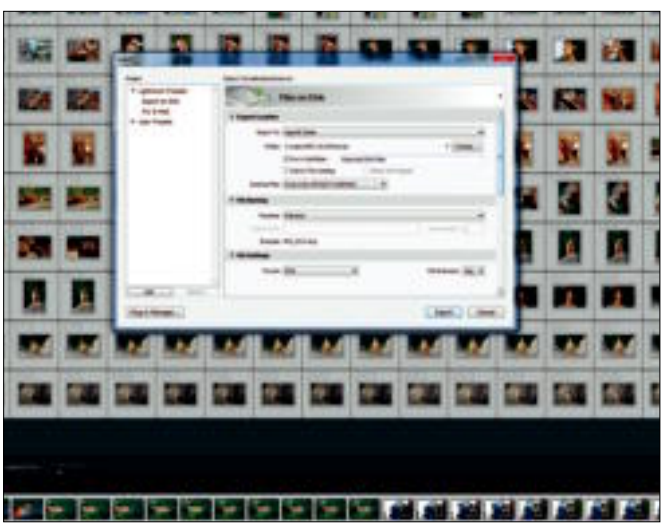
LAB NOTES

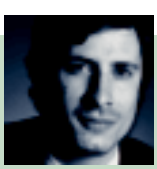
Our Benchmarks for You?

Maybe, maybe not

GORDON MAH UNG
SENIOR EDITOR

I've long had requests from readers to supply copies of the benchmark suite that we use to test the systems we review. That's never been possible before, because the apps were commercial and cost a buttload of cash and our workloads usually contained copyrighted material. This time, however, I made a conscious effort to build our benchmark suite using software that was available in full trial versions, and I avoided copyright issues by shooting all of the images and video myself; and I used zoo animals as the subject matter, thus avoiding consent issues. The audio tracks were provided gratis by our podcast producer Andy Bauman, who has no problem with us distributing his songs. So what's the hold up? The size. The source files and installers for our new benchmark tests (excluding Far Cry 2, which does not have a demo) totals around 18GB and nothing short of a Blu-ray disc would handle them. Still, we'll be looking at alternative ways to distribute our benchmark files to you, so stay tuned.





NATHAN EDWARDS
SENIOR ASSOCIATE EDITOR

Now that I've determined that the Sony Vaio P is for leprechauns, I will spend the next few months determining which tech products are best paired with other mythical beings. The Nexus One is for replicants, of course, while the iPad is for—well, we're not sure who the iPad is for.

NORMAN CHAN
ONLINE EDITOR

The problem with Apple's iPad is that it lacks a killer app. With the iPhone, Visual Voicemail and pinch-based web browsing made it a must-get device. iBooks and the redesigned iPhone apps don't excite me—they provide the same utility as applications I can find on other devices. I want a tablet computer to replace my moleskin notebook for note-taking. The iPad doesn't do that—yet.

KATHERINE STEVENSON
DEPUTY EDITOR

Now that the cat's out of the bag on Nvidia's Optimus, I'm looking forward to formally reviewing a notebook using this promising technology that, well, promises on-demand switchable graphics. If it works as claimed, it could free the masses from the horrible integrated graphics we've been subjected to.

MICHAEL BROWN
EDITOR AT LARGE

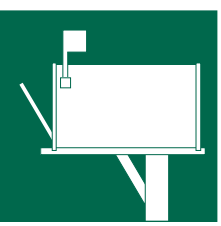
I finally ran out of luck running passively cooled gigabit switches in my clothes closet; I had a Netgear GS116 and a D-Link DGS-2208 fail within a few days of each other. I replaced them with an SMC Networks SMCGS24, which has its own fan, but I'm not taking any chances: I plan to install a ventilation fan in the ceiling, too.

ALEX CASTLE
ASSOCIATE ONLINE EDITOR

I'm intrigued by Google's new social networking utility, Buzz. It's a little bit of Friendfeed, and a lot of Twitter, all crammed into the Gmail client that you (probably) already use. Google's past attempts to topple established giants haven't always been successful (Google Video, anyone?) but it looks like it might have a real contender with Buzz.

We tackle tough reader questions on...

2TB BIOS Limit
Smart Doctor
Warhammer 40,000



Die, BIOS, Die!

Regarding your story on legacy technologies that should die (The List, December 2009), I'd like to point out the critical need for UEFI to replace the BIOS: greater-than-2TB bootable devices. With single 2TB hard drives on the market, it isn't unreasonable to expect that someone might use multiple large drives in a RAID array for speed or redundancy, but they would have to limit the array size to 2TB with the BIOS. With a RAID 5 or 6 array, you would be limited to buying small drives: 500GB. What is going to happen when hard drive manufacturers try to breach 2TB for their single hard drives?

—Chris Orwig

Senior Editor Gordon Mah Ung Responds: You've pretty much hit the nail on the head, Chris. What will the PC industry do the first time a person buys a 2.5TB drive, takes it home, and finds that his motherboard won't boot with the drive? I actually don't think there's any easy way out at this point. For those who don't know it, the only way to boot a PC with a 2TB+ drive is to have a board that supports UEFI 2.0 and run the 64-bit versions of Windows Vista SP1 or Windows 7. Interestingly, some Intel boards, MSI boards, and various newer notebooks support UEFI boot. However, the vast majority of motherboards don't, and that's the problem we're going to smash into the first time a vendor introduces a 3TB drive. How this plays out remains to be seen, but I know some board vendors are working to add the support to newer boards and even some older boards. As always, these fixes will take some time to trickle out and many older boards that are still serviceable won't be supported at all. For most enthusiasts, though, this won't be a problem, because we'll all be booting our systems from really fast (and much smaller) SSDs, right?

Taking Smart Doctor to Task

I recently put together a new PC, using the Asus EAH5850 videocard you recommended in your January roundup. After building, I updated the BIOS and got the latest x64 drivers for all components. I loaded several games that played flawlessly... except: Fallout 3 would crash to the desktop on load. Crysis would play, kind of, at about 5fps, but looked like crap. I spent about 40 hours troubleshooting to find a fix... adjusted the games' config files to work better with quad-core and HT. Hacked the registry as suggested in a couple forums, but nothing worked. Then I found the fix.

The Asus 5850 I used ships with Smart Doctor software to overclock the videocard. Smart Doctor says it loses some functionality unless Asus's Gamer OSD is installed.

Last night, I uninstalled Gamer OSD completely, and

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How to Make the Move to USB 3.0

One major purchasing decision you might need to make this year (aside from which tablet PC to buy) is whether you'll want to upgrade to USB 3.0. We're finally seeing some USB SuperSpeed products go on sale, and 90MB/s transfer speeds are certainly appealing. But before you spend any money, read our USB 3.0 FAQ (http://bit.ly/c4r5UU) and upgrade guide (http://bit.ly/bnEAkT).

everything works great! What troubles me is that one of the reasons you gave the Asus 5850 the nod was the Smart Doctor software. Didn't any of the staffers notice any of these issues? And if so, why weren't they mentioned in the article?

—Tobywan

Contributing Editor Loyd Case Responds: I encountered no issues either playing games or running benchmarks with the Asus Radeon HD 5850 when Smart Doctor was enabled. I normally don't use these types of tools on a daily basis, but do test them in normal usage scenarios for reviews. For example, Crysis ran without a problem on my test system when Smart Doctor was loaded. Based on my experience, I gave the Asus card a slightly better score due to its overclocking tool.

Other than being able to tweak voltage and clock speeds, you really don't "lose any functionality" with the card, at least for normal use. However, since these tools talk to hardware at pretty low levels, there's an increased chance that someone could encounter problems. Unless you really need that extra couple of frames per second, it's best to leave them disabled.

Who Got Ripped Off?

I enjoyed the Gaming Awards story in the March issue, but I could not believe my eyes when I read the comments you made about Warhammer 40K ripping off Blizzard's game series. I seriously hope those comments were said with sarcasm that I just wasn't picking up on.

—Tim

Associate Online Editor Alex Castle Responds: For reference, here's the passage Tim is referring to: "Games Workshop... could you be a little better about citing your sources? Everyone knows it was Blizzard that invented the Space Marines vs. Space Bugs vs. Space Elves setting, and absolutely didn't rip off anyone else. At all."

Now, we feel for you, Tim, we really do—it can be hard to decipher the often-subtle clues that indicate sarcasm on the printed page. But don't worry, we were indeed being sarcastic with that piece, and to prevent further confusion all sarcastic remarks will henceforth be presented in ***bold italics.***

So, thank you again, Tim, for reminding us that is was not Blizzard who invented space bugs, but rather Games Workshop, who ***didn't rip off Ridley Scott's Alien. At all.***

IT CAN BE HARD TO DECIPHER THE OFTEN-SUBTLE CLUES THAT INDICATE SARCASM ON THE PRINTED PAGE

Maximum Poor, Minimum Money—Not

Having been a loyal reader since the days of *boot* and having built three different Dream Machines spec-by-spec from your pages (Dream Machines 1998, 2003, and 2007), I am appalled at what I'm holding in my hands: the "$647 PC" (February). I look forward to reading *Maximum PC*, not *Broke and Busted PC!*

This mag is supposed to cater to the elite, and status still has a place here in the United States. I want to read about what no one else has. I want the best of the best and I'm willing to pay for it. I want my rig to elicit raves when people see it, and appreciation for its speed when they try it out.

Give me the best or give me nothing!

—Gee

Senior Editor Gordon Mah Ung Responds: Gee, we hear your message, but before you dismiss those broken-down budget boxes, you should look at budget PC stories as wonderful PC building exercises.

Sure, you might not want such a box for yourself, but if a friend down on his or her luck needs building advice, you can still be the expert. I'm a bit like you when it comes to the popular but way-too-slow netbooks. I generally try to steer friends and family away from them, but when they insist, I'll still try to help them pick out the best one for their budget. So, have faith that we haven't turned our backs on performance computing, because it's still the one thing that's kept us going all these years.

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