

AMD Phenom II X4 | Sapphire Vapor-X | Auzentech  
955 Black Edition | Radeon HD 4870 | X-Fi Forte 7.1

# CPU

COMPUTER POWER USER



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## Make Your Rig SCREAM (Not Your Wallet)

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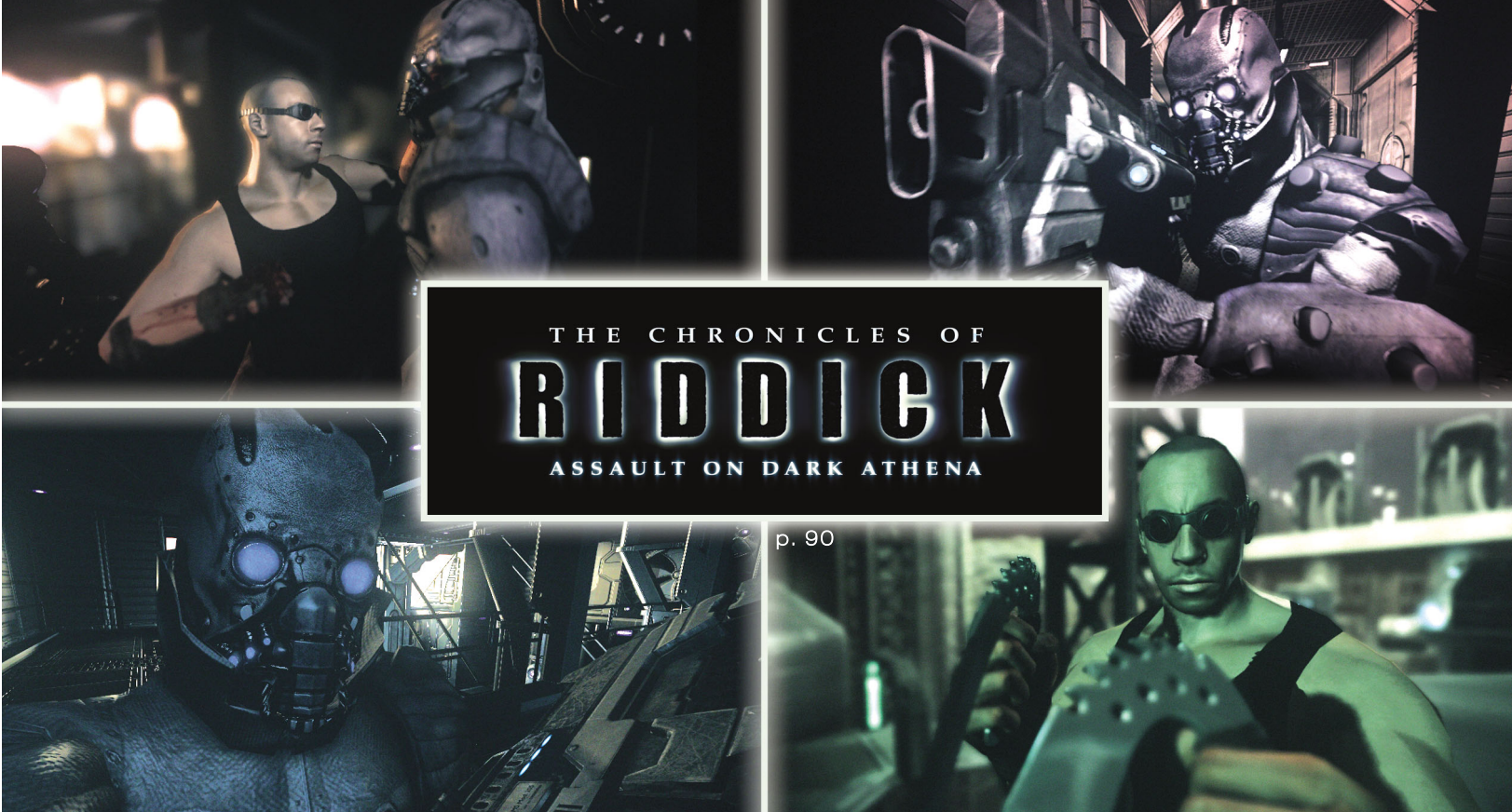
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The economic situation of the last year or so has prompted some pretty profound changes in the way we as consumers do things. As I write this, leading economists and financial indexes alike are indicating that for the most part, things have started to turn around and we may be in the early stages of a recovery. But even if the world economy resets tomorrow to its 2007/early 2008 state of bullish financial markets, easy job availability, and readily available credit—and that's probably not going to happen—it's increasingly looking like the current recession has left a lasting mark on many of our habits.

We're more interested in pay-as-you-go cell phone plans than bloated, one-size-fits-all contracts with huge monthly payments. We are eager to take advantage of the wealth of surprisingly high-quality TV online so we can save a few bucks on our cable bills. We're turning off lights in rooms we're not in, we're looking for ways to do less driving and sharing rides more, and we're finally paying attention to the folks who have been telling us for years how to save money by clipping coupons.

People in general seem more willing to save and less inclined to borrow, and we are far more interested these days in doing more with less. This is as true among high-end PC users as it is for anyone; that's why we've dedicated this issue to doing something we can all agree is worthwhile (making your PC run faster, more smoothly, and more reliably) without spending a ton of cash.

Starting on page 54, you'll find

14 pages of practical, no-nonsense advice you can use to get your computer(s) in ship-shape, including often-overlooked Windows adjustments, platform-specific BIOS tweaks you can either use directly or modify to fit your needs, and hardware tips straight from Intel, OCZ, Danger Den, and others. Also, be sure to stop by page 40 and find out how we turned a modestly priced Phenom II X3 triple-core chip into a fire-breathing quad-core.

Now, if you'll excuse me, I have to go eat three more boxes of Pop-Tarts so I can send in for a free ticket to "Star Trek."



Chris Trumble, Publication Editor, *CPU*



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Here it is.





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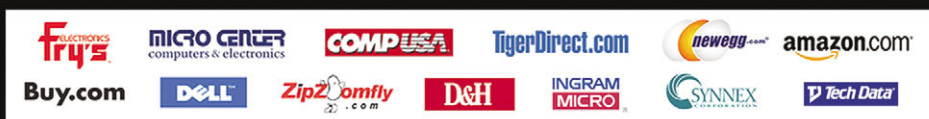


## Xtreme Overclock

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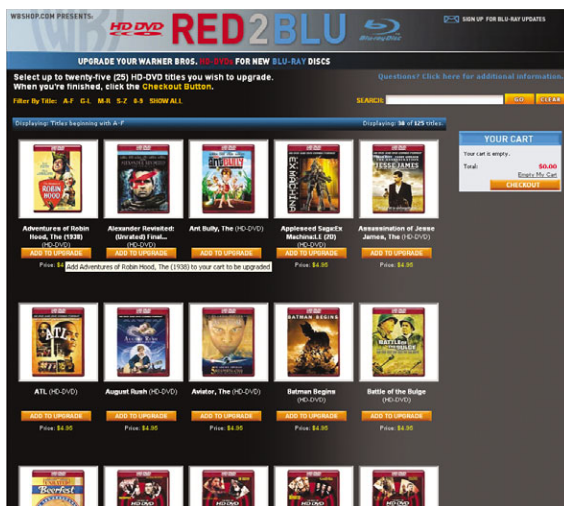


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## Blu-ray Sales Climbing; Warner Bros. Offers HD DVD Exchange

Considering the recession, Blu-ray Disc is doing fine, thank you. According to Adams Media Research, U.S. consumers bought roughly 9 million BDs in Q1 2009, nearly double the Q1 2008 total. The research also revealed that there are now 10.5 million U.S. BD households (standalone players and PS3s included). Sales should only increase if a Blu-ray.com report that the average price for entry-level players will sink to sub-\$100 levels possibly by Christmas are true. A major factor in the price cut is the notion that Chinese makers are preparing to flood the market with inexpensive players. Warner Bros., meanwhile, recently announced it will support the competing China Blue HD format with titles priced between \$7.30 and \$10.22. The studio also recently launched a Red2Blu Web site ([www.red2blu.com](http://www.red2blu.com)) where unfortunate HD DVD buyers can exchange a maximum of 25 discs per home for the same titles on BD (one copy per flick) for \$4.95 plus shipping. Only 125 movies are now available, however. Finally, clues within the upcoming iTunes upgrade already in developers' hands hint that Apple may finally be adding integrated Blu-ray support in Mac systems, though Apple hasn't confirmed those rumors. ▲



## USA! USA! USA!

If you see Jeremiah “miahallen” Allen, give the award-winning overclocker the patriotic salute. He is representing North America at Gigabyte’s 2009 Open Overclocking Championship in Taipei during Computex with \$5,000 and prizes at stake. Allen topped about a dozen other North American regional finalists competing near Los Angeles in late April where overclockers ran Super PI (Allen posted a 1:30:969 score) and 3DMark06 after overclocking their rigs as highly as possible. Jeremy “sno.lcn” Clifton, who finished second overall, posted the best overall 3DMark06 score, charting 10486 in SM3.0/HDR for a 24869 overall mark. Competitors were supplied a Gigabyte GA-EX58-UD4P board, Intel Core i7-965 Extreme, Gigabyte GV-N26OC-896H-B GeForce GTX 260 cards, Kingston KHX16000D3K3/3GX DDR3 memory, 80GB Intel X25-M SSD, and Enermax Revolution85+ 1050W PSU for competition. Dry ice and liquid nitrogen were the coolants of choice. ▲



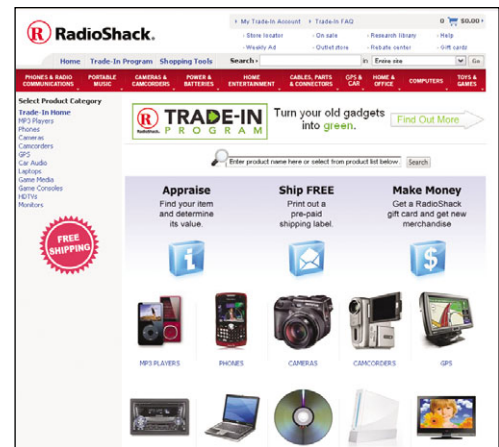
## Is Moore's Law Ending? One IBM Fellow Thinks So

We know; plenty of prognosticators have incorrectly predicted Moore's Law's demise over the years. Still, when a guy like IBM Fellow Carl Anderson alludes to as much, he deserves a listen. Speaking recently at the 2009 International Symposium On Physical Design, Anderson likened the semiconductor industry to the railroad, aviation, and automotive industries, stating, "There was exponential growth in the railroad industry in the 1800s; there was exponential growth in the automobile industry in the 1930s and 1940s; and there was exponential growth in the performance of aircraft until the speed of sound. But eventually, exponential growth always comes to an end." Anderson predicts multi-core processors and other cutting-edge chips will likely see another generation or two of exponential growth; optical interconnect, 3D, and accelerator technologies are where the immediate future lies. A possible kink in Anderson's prediction could come from Ali Hajimiri, a Cal Tech professor who DARPA recently awarded \$6 million over four years to research self-healing circuit technology. Reportedly, the tech would involve workarounds for defective transistors in a manner similar to how biological systems in nature "constantly heal themselves in the presence of random and intentional failures." ▲



## RadioShack Wants Your Old Gear

Looking to get rid of your old electronics? Head to a local RadioShack. The electronics seller launched a program in mid-April to take unwanted but working cell phones, MP3 players, digicams and camcorders, video games, GPS units, and game consoles off your hands as part of its trade-in program. If you're satisfied with the appraisal your friendly RadioShack clerk provides (including the original cables, manuals, chargers, and accessories will help your financial cause), you'll get a Radio Shack gift card in return. A similar online trade-in program accepts the same electronics, plus car audio head units, notebook computers, HDTVs, and monitors. ▲



## HARDWARE MOLE

### Zune HD In The Fall? Say It's So, Microsoft

The “oohs” and “aahs” floating out of the blogosphere (wmpoweruser.com, neowin.ent, LiveSide.net, Engadget, etc.) in mid-April stemmed from leaked photos and rumored specs tied to a possible Zune HD release this fall. Among the tantalizing features rumored are an Nvidia Tegra processor, a 3.6-inch OLED touchscreen, HD Radio, 720p playback, 3D Xbox games support, and wireless computer syncs. Additionally, an HDMI-out port; 16GB, 32GB, and 120GB options; and integrated Web browser in a body smaller than the iPod touch are predicted. An audio-related product we can confirm is Southern Audio Services' Woodees (\$59.99; [www.bazooka.com](http://www.bazooka.com)), which are among the best low-cost sound-isolating earbuds we've used. The logic behind the natural wood-constructed Woodees is “the finest musical instruments have always been made from wood,” so why not earbuds? After experiencing the Woodees' stellar, seemingly bottomless bass and overall tone, we can't argue. The Woodees house 10mm drivers, sport a gold USB connector, and use a 3.2-foot low durometer resin cord designed to not develop a memory coil or kinks. ▲

### Blurry Photos? Use A Heavier Tripod

Is blurriness marring your digital photos—even when using a tripod? Japan's Nishi Lab at the University of Electrocommunications may have a good explanation. While testing a new tool that measures camera shake related to mirror and shutter movement in SLR cameras, scientists found camera shake worsened when mounting numerous cameras on a light tripod (about 3.3 pounds) with image-stabilizing technology turned on and off. Ultimately, Nishi Lab hopes the “measurement tool will be used to totally evaluate various kinds of vibration caused by a tripod, not just camera shake.” In other SLR news, IDC predicts the recession will take its toll on digicam shipments, including SLR units that have performed strongly recently. IDC predicts total global shipments will dip 6% in 2009 to 129 million units, with SLR shipments slipping 5% to 9.2 million units. The decline is expected to last through 2010, with the entire market falling another 1% to 128 million units. ▲



### Signs Point To Apple Designing Chips In-House

Recent hires that include former AMD CTOs Bob Drebin (also GameCube graphics chip designer) and Raja Koduri have many industry insiders believing that Apple is amassing the means to design its own graphics chips. In combination with Apple's purchase of low-power semiconductor maker PA Semi last year, it's believed Apple is working toward bolstering iPhone and iPod features, including upping mobile gaming abilities and adding HD support. An alliance IBM is heading up, meanwhile, recently announced plans to output chips based on 28nm HKMG (high-k metal gate) technology by next year. The technology will bump performance 40% while using 20% less power than current 45nm chips and let customers migrate from 32nm HKMG technology already in the works. Elsewhere, Taiwan Economics Minister Yiin Chii-ming stated in April that the government-backed Taiwan Memory Company created to help Taiwan's tanking DRAM industry is still on track despite rumors that John Hsuan, United Micro-electronics honorary vice chairman, reportedly pondered quitting as TMC's convener following criticism about TMC's direction or lack thereof to date. Micron recently spurned an invitation to join the TMC, citing competitor Elpida Memory as TMC's main technology partner as a barrier. Micron instead formed its own alliance with Nanya Technology and is seeking similar support from Taiwan's government as the TMC has received. ▲



## Surfing Good For Productivity; Internet Fraidicats; Politics Popular

Good news, Web addicts: Next time your boss catches you watching “Family Guy” reruns on Hulu, tell him your questionable work habits will “actually increase our concentration levels and help make a more productive workforce.” So indicates a recent study from the University of Melbourne involving 300 workers. According to Dr. Brent Coker, workers surfing “within a reasonable limit of less than 20%” of total office time are about 9% more productive than nonwork surfers. In Japan, meanwhile, a Marsh Research study found roughly 84% of 300 adults have found the Internet scary at least once, with 11.7% finding it “really scary” and 72.7% just scary to some degree. Stateside, a recent Pew Internet & American Life Project survey of roughly 2,255 U.S. adults found 74% of Internet users, or 55% of the entire U.S. adult population, tapped into the Internet for news, research, and other purposes related to the 2008 U.S. election, marking the first time Pew “has found more than half the voting-age population used the Internet to connect to the political process during an election cycle.” ▲

## Are You A Victim Of Cybercrime? McAfee Wants To Help

We’re fairly certain McAfee’s new Initiative To Fight Cybercrime—a “global effort with a concrete action plan and support for global leaders”—isn’t going to knock the socks off of CPU readers because the information and tools available are likely matters you addressed long ago. Still, give McAfee credit for reaching out to less Internet-savvy users and small-business owners concerning malware and other lurking risks and for offering advice on how to seek intervention from law enforcement in cases of fraud and other possible crimes. In addition to providing a free Cybercrime Scanner (Windows and Internet Explorer only) for checking a system for malware and other risks, McAfee is making its McAfee Virus Scanner available for “more exhaustive viral analysis.” ▲

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Are you a victim of cybercrime? We can help...

**Assess Your Risks**

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☐
**There are unexplained charges or suspicious activity on one or more of my financial accounts, or there are indications that I am the victim of identity theft.**

Financial fraud, identified by suspicious or unexplained charges, can happen from unsafe online transactions, from clicking on links that download malicious software onto your computer, or from the theft of your identity through other means.

☐
**My computer is not acting the way it normally does.** Choose this option if you have noticed any of these changes in the way your computer is functioning:

- Your computer is running more slowly than usual.
- Your computer is having difficulty shutting down or starting up.
- You are seeing more pop up ads.

☐
**I responded to an email or website request for personal information and am now concerned that it might have been a scam.**

In a typical illegitimate email or website request, victims receive emails that look like they are from a reputable credit card company, online retailer or bank. They suggest that there is a problem with an existing account and request account information or ask you to click on a link – something that none of your banks, retailers, or credit card companies should legitimately ask you to do.

☐
**I opened an attachment to an email and am now concerned that it might have been malicious.**

☐
**My computer was lost or stolen.**

**Take Action Now**

☐
**Report a Cybercrime**

☐
**Keep Your Family Safe Online**

☐
**Deal with Financial Fraud / Identity Theft**

☐
**Protect Your Business**

☐
**Safeguard Your Computer**

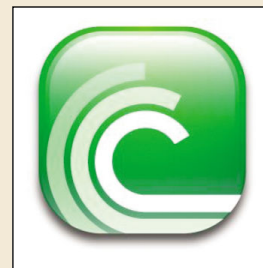
☐
**Transact Securely**

☐
**Follow Best Practices**

## SITE SEEING

### Confused About BitTorrent? Get The Big Book

You don’t have to be a grizzled computing vet to know that ultimately BitTorrent boils down to being “just a simple way to share files.” What most newbies and even some otherwise experienced vets don’t know, however, are the exact ins and outs of BitTorrent, let alone how to use a client to share said files. Well, new help is available in the form of “The Big Book Of BitTorrent,” a 28-page, illustrated PDF guide from Saikat Basu, author of “The Things I Do” blog. Hosted by MakeUseOf.com, Basu’s exploration into BitTorrent’s underbelly explains the pertinent jargon, how to acquire a client, copyright concerns, torrent storehouses, installations, downloads, uploads, pitfalls, codecs, protocol encryption, creating torrents, and more. ▲



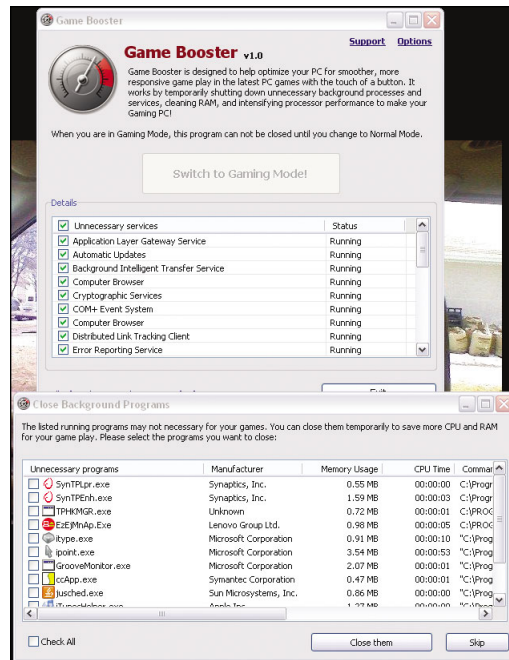
### Waste Not, Want Not

Some of us donate our old computer gear to charities, schools, churches, or other good causes. Some of us recycle what we can. Others, unfortunately, just dump their systems. The more creative types among us, however, create works of art, as witnessed in the recent article/gallery “20 Amazing Examples Of Art From Obsolete Technology” at WebUrbanist.com, a site dedicated to urban design, subversive art, and strange architecture. As writer Matthew Rogers aptly put it, few of us stop to ponder the fate of once-beloved but now defunct technological relics of the past. A growing trend within the art world, however, is seeing artists construct “amazing works of art by utilizing the very technology that we let fall into disuse every day.” Among such works is the nearly 23-foot WEEE Man, a “politico-ecological statement against improper disposal of our most ubiquitous everyday appliances” that sports computer mice for teeth, washing machine doors for eyes, and monitors and other hardware in the skull. ▲



## Who Says Violent Video Games Are Unsightly?

In positive gaming news, a recent study appearing in *Nature Neuroscience* states that playing action-based video games can help adults improve their eyesight. For the study, 22 adults gamed 50 hours over nine weeks. A group playing *Call of Duty 2* and other action titles showed a 43% average improvement in contrast sensitivity, while a second group playing *Sims 2* and other non-action titles showed no improvement. "When people play action games, they're changing the brain's pathway responsible for visual processing," stated Daphne Bavelier, professor of brain and cognitive sciences at the University of Rochester. If you'd rather improve your PC's gaming performance, meanwhile, IObit released a free, one-click Game Booster app that will temporarily close other programs that are currently running, turn off background processes, shut down unnecessary Windows services, among other things. ▲



## Video Game Study Raises Ire Of ESA

The Entertainment Software Association isn't taking kindly to a recent study Douglas Gentile, director of research for the National Institute on Media and the Family, conducted that stated 8.5% of the overall population playing video games exhibits "pathological patterns of play." For the survey, published in *Psychological Science's* May issue, Gentile posed 11 questions via a Harris Poll to roughly 1,200 U.S. gamers ages eight to 18. Those responding to six or more questions positively were deemed "pathological." ESA CEO Michael Gallagher, however, later requested via letter that *Psychological Science* postpone the study's inclusion, citing that study participants weren't selected randomly but rather recruited through an online panel that involved prizes for participation. The NIMF responded, "Regardless of whether you agree with the exact statistics in Dr. Gentile's study, it provides the gaming industry, medical experts, and public policymakers with a new opportunity to have a thoughtful conversation regarding the effects of video games on kids." ▲

## iCloud Takes To The, Er, Cloud

Say hello to iCloud ([icloud.com/en](http://icloud.com/en)), the "world's first free online computer" that runs within your Web browser. Founded in 2001 by Daniel Arthursson and brought forth by Xcerion, the still-in-beta iCloud puts a "virtual computer together with free storage and free apps in the hands of everybody in the world." Besides 3GB storage and desktop customization abilities, iCloud includes 30 apps (Word-compatible editor, calendar, photo organizer, audio player, RSS and Atom feeders, IM, etc.), 20 widgets, free backup, and more in a Windows-like interface with no installation required. Internet and Firefox are supported, though Firefox is in alpha development, as iCloud is "using a lot of XML technologies due to its XML Virtual Machine." ▲





## SOFTWARE SHORTS

## SafeHouse Protection &amp; Blazing Mac Backups

We see mucho press releases each month for products promising mucho benefits, but none has ever offered to help us hide “incriminating photos taken at the slumber party” before the recently released SafeHouse Explorer ([www.safehousesoftware.com](http://www.safehousesoftware.com)). The free Windows XP/Vista/Server (32- or 64-bit) app from PC Dynamics uses password protection and 256-bit Twofish encryption to protect files on hard and flash drives, servers, CD/DVDs, and MP3 players. A Windows Explorer interface lets you create unlimited “vaults” of up to 2TB. You can also run the app as a standalone and share protected files with others, provided you supply your password. For Mac users, meanwhile, Backblaze ([www.backblaze.com](http://www.backblaze.com)) recently lifted the beta tag off its online backup Mac service, which provides incremental, continuous backups for \$5 per month. The program lets you back up an entire system, encrypting files on the PC before moving them via encrypted connection to Backblaze’s data center. Restoring files happens via downloads or Backblaze overnighting files on CD/DVD or flash drive. ▲

## You, Too, Can Give A Line Of Code A Good Home

It’s possible to adopt a whale, star, child, puppy, and even a new lifestyle, so why not a line of code? Well, you can with a \$4 donation to the nonprofit Participatory Culture Foundation, which develops the free, open-source Miro, an app for “watching and subscribing to shows and videos from all over the Internet” and which aims to promote “a more decentralized and democratic way of doing Internet video.” Besides watching your “little buddy” grow up as the code matures, adopters get a customized Web page displaying an adoption certificate, photo, personalized name, widget, and “your name in the source code and in the About section on every copy of Miro.” ▲

WELCOME TO THE  
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Adopt a line of source code for just \$4 a month, and together we can keep Miro alive and growing!

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34983 newbuddy = m...  
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**Why Adopt? Why Miro?**  
A Letter from Miro co-founder Nicholas Ferville

Adopting is a fun way to Support Miro

1. Miro is Built by a Non-Profit Organization!
2. You Adopt a Real Line of Code!
3. Your Name Appears in the "About Miro" Credits!
4. Show Off Your Adorable Code with a Blog Widget!

I'm a REAL Line of Code

Dear Potential Adopter,

Miro is built by a non-profit organization. Its sole purpose is to ensure that internet video is a far more open, democratic, and culturally engaging medium than traditional television. Miro is growing at an amazing pace, now with more than a million unique users each month, and it's beginning to have a real impact on openness in video distribution. To broaden this impact, we need to make Miro an even better tool for connecting video creators with audiences, and we need your help.

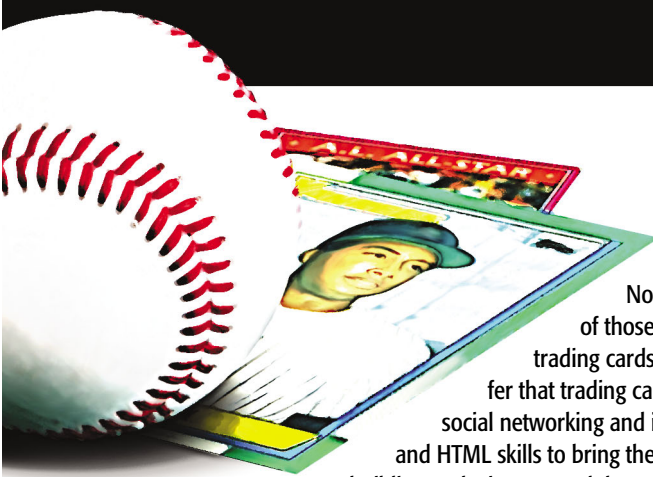
The heart of Miro is its open source code, carefully crafted and maintained by the staff and the global Miro community of volunteers. But creating world-class code is tough! We have one of the smallest and most efficient...

Read More...

## Concerning All Things Malicious

Hackers compromised 258 million-plus electronic records globally in 2008, according to a recent Verizon study focused on 90 confirmed breaches. Organized criminal groups accounted for 91% of all compromised records, with 99.6% of records being lifted from servers and apps and 74% of breaches resulting from external sources. Elsewhere, U.S. military leaders reported in April that the Pentagon has spent \$100 million-plus in the last six months responding to and repairing cyber-based attacks, though the total is an estimate, as officials have only begun tracking costs. Sticking to the military theme, Pink Floyd member David Gilmour has reportedly recorded a song for an upcoming CD in support of Gary McKinnon, the admitted British hacker who cracked DoD, NASA, and Army systems in 2001 while seeking evidence of UFOs. McKinnon has successfully fought U.S. extradition efforts since 2002. Finally, Symantec’s recent Internet Security Threat Report indicates the company created 1.6 million-plus new malicious code signatures last year (more than 60% of all malicious code signatures it has created ever) to address an average of more than 245 million attempted attacks globally each month. ▲





## Job Of The Month

Remember those lazy summer days of childhood? You and the kid next door spent hours rifling through each other's baseball card collections, comparing and trading. Now you can be part of the company behind those memories and program a virtual version of those experiences for the next generation. Upper Deck, maker of sports and entertainment trading cards for everything from baseball to World of Warcraft, is looking for programmers to transfer that trading card ethos to the Web. The company is expanding into ecommerce, social gaming, and social networking and is looking for a Web Developer and Designer with all the usual Flash, JavaScript, .NET, and HTML skills to bring the Upper Deck brand to the next level online. The Web Developer will be responsible for building Web sites around the Upper Deck brands and creating interactive experiences. You could be the guy behind a Yu-Gi-Oh! online community or a next-gen virtual world of comic book heroes. Or maybe you'll introduce another young fan to the wonders of discovering his favorite shortstop's rookie card.

[seeker.dice.com/jobsearch/servlet/JobSearch?op=302&dockey=xml/3/7/37fab755d363cfb274512fb7769d074c@endecaindex&source=3](http://seeker.dice.com/jobsearch/servlet/JobSearch?op=302&dockey=xml/3/7/37fab755d363cfb274512fb7769d074c@endecaindex&source=3)

## By The Numbers

### 200 Million

Facebook members

(Facebook)

[blog.facebook.com/blog.php?post=72353897130](http://blog.facebook.com/blog.php?post=72353897130)

### 10 Million

Monthly Twitter visitors

(comScore)

[www.comscore.com/blog/2009/04/twitter\\_traffic\\_explodes.html](http://www.comscore.com/blog/2009/04/twitter_traffic_explodes.html)

### 427%

Percent increase in daily unique uses of mobile social networks

(comScore)

[www.mobilemarketer.com/cms/news/research/2842.html](http://www.mobilemarketer.com/cms/news/research/2842.html)

### 67%

Share of global Internet population engaging in social networks and blogs

(Nielsen)

[tinyurl.com/csgshe](http://tinyurl.com/csgshe)

## IT Spending Can't Buck The Recession, Either

Technology and IT spending by U.S. businesses and government will decline 3.1% in 2009, Forrester Research reported recently, revising its earlier estimate that spending would grow this year by 1.6%. "The capital crunch is still causing companies to dramatically cut back on all forms of capital investment, including many IT goods and services," says Andrew Bartels, VP and principal analyst. The company expects growth in IT spending to start again in late 2009. Hardware purchasing will take a hard hit, however—down 6.8% this year. Worse, communications equipment purchases will drop 7.8%. For many of these IT sectors, these trends won't reverse until 2010.

[www.forrester.com/ER/Press/Release/0,1769,1270,00.html](http://www.forrester.com/ER/Press/Release/0,1769,1270,00.html)



## The Big Ad Shift

According to eMarketer, the share of ad revenue going to online media will almost double by 2013.

U.S. Online Ad Spending As A Percent Of Total Media Advertising Spending, 2007 To 2013

2007	2008	2009	2010	2011	2012	2013
7.6%	8.7%	9.9%	11.2%	12.3%	13.8%	15.2%

[www.emarketer.com/Article.aspx?R=1007024](http://www.emarketer.com/Article.aspx?R=1007024)



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NVIDIA® GeForce® 9500 GT 512 MB DDR2, Over 80%  
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Quad Q9400 2.83GHz \$915  
(8MB Cache, 1066MHz FSB)  
Quad Q8400 2.66GHz \$879  
Quad Q8200 2.33GHz \$859  
(6MB Cache, 1333MHz FSB)  
E8600 3.16GHz \$865  
E8500 3.16GHz \$879  
E8400 2.83GHz \$855

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Supporting 2 Way X16 SLI™  
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Corsair® 4GB PC-6400 DDR2-800 Dual Channel Memory  
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NVIDIA® GeForce® GTS 250 1GB DDR3  
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580 SLI™ Power Supply  
XG XtremeCool Silent & Overclocking Proof CPU Cooling System

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Extreme i7-975 3.33GHz \$2429  
i7-950 3.06GHz \$1969  
i7-920 2.66GHz \$1679

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**Genuine Windows Vista™ Home Premium**  
Corsair® 6GB DDR3-1333 Tri Channel Memory  
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NVIDIA® GeForce® GTX 295 1.79GB supports SLI™ mode  
Azaa Solano Full Tower Case 800 Watt Power  
Asetek Liquid Cooling System

System included the following



# \$995

## Gamer Infinity HD 4850

**Intel® Core™ i7 Processor**  
(8MB L3 Cache, 1066MHz)  
Extreme i7-975 3.33GHz \$1755  
i7-950 3.06GHz \$1325  
i7-920 2.66GHz \$995

Gigabyte Intel® X58 Chipset MB Supporting CrossFireX™/SLI™  
**Genuine Windows Vista™ Home Premium**  
Corsair® 6GB DDR3-1333 Tri Channel Memory  
500GB 7200RPM SATA-II 3.0Gb/s 16MB Cache Ultra Fast HD  
ATI Radeon™ HD4850 512MB in CrossFireX™ mode  
Nxt Zero 2 Full Tower Gaming Case / 580 Watt Crossfire™ Power

System included the following



# \$529

## Gamer Infinity 8000 Dream

**Intel® Core™ 2 Duo Processor**  
(12MB Cache, 1333MHz FSB)  
Quad Q9650 3.00GHz \$755  
Quad Q9550 2.83GHz \$699  
Quad Q9400 2.66GHz \$645  
(8MB Cache, 1066MHz FSB)  
Quad Q9400 2.66GHz \$609  
Quad Q8200 2.40GHz \$589  
(8MB Cache, 1333MHz FSB)  
E8500 3.00GHz \$605  
E8400 2.83GHz \$585  
E7400 2.80GHz \$529

Intel G31 Chipset Motherboard  
**Genuine Windows Vista™ Home Premium**  
Corsair® 4GB PC-6400 DDR2-800 Dual Channel Memory  
500GB 7200RPM SATA-II 3.0Gb/s 16MB Cache Ultra Fast HD  
NVIDIA® GeForce® 9400 GT 512MB DDR2  
Cooler Master Elite 310 Gaming Case 420 Watt

System included the following



## Gamer Xplorer X5-7800

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(1066MHz FSB)

T9800 6MB L2 Cache, 2.93GHz \$1245  
P9600 6MB L2 Cache, 2.80GHz \$1039  
T9550 6MB L2 Cache, 2.66GHz \$999  
P8700 3MB L2 Cache, 2.53GHz \$919  
P8600 3MB L2 Cache, 2.40GHz \$875

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Free Carrying Case  
6 Custom Colors to Choose From



# \$875



## Gamer Xplorer X7-7700

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(800MHz FSB)

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P9600 6MB L2 Cache, 2.80GHz \$1345  
T9550 6MB L2 Cache, 2.66GHz \$1299  
P8700 3MB L2 Cache, 2.53GHz \$1219  
P8600 3MB L2 Cache, 2.40GHz \$1179



# \$1179

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• Intel® PM45 Chipset  
• Intel® WiFi Link 5300 802.11 A/G/N

**Genuine Windows Vista™ Home Premium**

4GB DDR-II PC6400 800 Memory  
320GB SATA150 Hard Drive  
17" WXGA TFT Display 1600x1050 pixels  
8x DVD+-RW Drive  
1000/100/10 Network & 56K V.92 Fax/Modem  
NVIDIA® GeForce® Go 9600 GT 512MB w/HDMI Output  
3-in-1 Built-in Media Reader  
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## Here We Go Again

I guess the recession must be winding down. Venture capitalists are funding huge, crazy ideas again, and the media seems to have run out of depressing economy news. Apparently, the big news at the Game Developers Conference in March was a new gaming service called OnLive that is purported to move video game serving to “the cloud,” thus enabling you to play the latest, greatest video games as streaming video on your PC, Mac, or TV. Rumor has it that they’ve raised enormous sums of capital and are launching the service this winter. I’m going to lay down early money that this offering becomes the Homegrocer.com of the game industry. As much as it pains me to say this, I love the concept. But speaking as one of the guys who made DirectX and the founder of the world’s largest private online game publishing company, it’s not going to work.

I haven’t met the founders of the company personally, I respect what they’re attempting, and I certainly wish them the best, but there are insurmountable hurdles that make this idea implausible to execute in the end. For starters, there are several criteria users will apply to deciding whether a service like this is as good as or better than the current gaming model:

- The get-in/get-out experience must be as good as or better than the boxed experience
- The video quality must match the frame rate at the resolution and image quality of the same games playing locally
- The control latency must match that of the local game
- The games must cost as much or less to deliver this way

Let’s start with the easy win, criterion No. 1. Yes, it’s true that video streaming should be a much better user experience than the extremely arduous install and patching process users experience on the PC today. OnLive still needs to install a client on your PC, but at least it’s just one arduous Vista downloadable installation instead of one for each game.

Next up, item No. 2. Is anybody watching Hollywood movies at DVD quality over the Internet yet at full quality without noticeable lag or frame dropping? The irony of this claim is that OnLive’s promotional video proclaiming the brilliance of their company’s solution

for games was dropping frames as I watched it. Forget interactivity and latency issues for a moment; the cost of delivering a continuous, real-time stream of video over the Internet is still excessive.

Consider the Pixar movie “Finding Nemo.” This 100-minute movie is available for online purchase in several compressed video formats. At DVD quality, the movie is 1.4GB, or requires 1,239Kbps to stream continuously at 24fps. In HD, the movie is 4GB. We’ll ignore for the sake of argument the observation that this movie took hours of dedicated encoding time to compress into these formats, because OnLive has invented new, magical server hardware that solves this problem, giving them superior compression results nearly instantaneously. Apparently, this new technology can do all this even when missing some of the video data, since a game obviously won’t have the next frame available to encode until after the user has seen the current one and reacted to it.

This analysis also assumes that everyone in the gaming world is good with 24fps, right? The bandwidth-hosting cost of delivering 1GB of data over the Internet in real time without including any other server-related expenses is \$1 to \$2, so watching streaming DVD-quality video costs the host around 90 cents to \$1.80 per hour, and HD video would run \$2.50 to \$5 per hour. Since the average PC gamer plays around 20 hours per month, the service would need to cost \$17.50 to \$35 per month just to cover the bandwidth alone—forget the games, the giant server farm, and the massive amounts of electricity needed to run it.

Now let’s talk about the video quality. The introduction of JPEG2000 was a major leap in image-compression technology. It’s very hard to beat JPEG2000 for compressing single frames of images while preserving quality. JPEG2000 lends itself nicely to hardware acceleration, and if I were really smart, I could use information from the previous frame rendered to accelerate encoding speed and decrease the size of the next frame. Also, now that the user’s GPU is free from heavy 3D rendering, I could put it to work image decoding and filtering to try to restore a highly compressed frame of game graphics to its former glory in real time. A single frame of DVD-quality video is roughly 720 x 480 x 24 bpp, or about 1MB uncompressed. We need to get 24MBps over a 2Mbps

The idea that traditional game publishers will abandon their DRM solutions and risk cannibalizing their deeply entrenched retail channel relationships by supporting an unproven new online game publishing service is of course absurd.





connection, and that's before you factor in data for an audio channel or from an input device. That's 168X image compression by my count. Remarkably, even at this compression ratio, JPEG2000-compressed images look OK! So it's not impossible to look respectable at this compression level, and it's not technically impossible to deliver it in real time with magic encoding hardware.

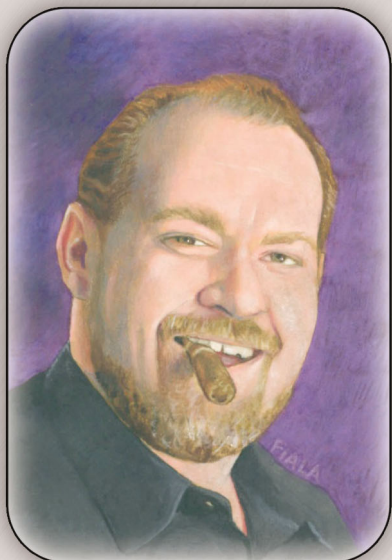
The real catch, though, comes with item No. 3: In order to render 24fps of game video, I need a game server with the graphics power to do that. Of course, I want the game to be responsive, as well, so the time it takes to send my input over the Internet to the server, render the next video frame, and send it back to my computer to display must be fast enough for the game to feel responsive. Despite OnLive's claim that building an Akamai-style edge network with hosting centers within 1,000 miles of gamers will solve the problem, the reality is that exceeding 100ms response times (think 10fps) for gameplay is risky, especially for FPS-style games that demand extremely low response times. The round-trip speed over a typical Internet connection to an edge server may barely be fast enough for some games, but the consistency for most consumers will be abysmal; responsiveness will most likely fluctuate noticeably. It's not going to work for a console-style game experience or any FPS. It's also very risky for the multiplayer games typical of the PC because it adds an extra network latency jump to games that were carefully designed to hide network latency by knowing exactly what it is on the client. In short, this service will almost certainly feel "laggy" for most games.

Finally, criterion No. 4. There is really no efficiency of scale to be gained by this approach to game delivery. One might think that since the average gamer plays 20 hours per month and there are 960 hours in a month, one great gaming server could serve as many as 48 gamers. But keep in mind that Windows simply can't run multiple games simultaneously on a single computer, and in

practice, everyone games between 5 p.m. and 10 p.m., mostly on weekends. In order to ensure a great experience for all members during peak play times, these guys will basically need to host one great gaming computer per player, or somebody will have to wait in a queue to play. The cost of doing that is, of course, staggering.

There is also the story out there that game publishers are dying to support this service because of its obvious antipiracy advantages. But if this were true, wouldn't these publishers already have ditched antiquated CD-ROM-based DRM in favor of established download services with huge audiences, such as Direct2Drive, Steam, WildTangent Orb, and other online game publishing services? (By the way, who's going to be swapping the key disks at the server farm for these games when you want to play?) The idea that traditional game publishers will abandon their DRM solutions and risk cannibalizing their deeply entrenched retail channel relationships by supporting an unproven new online game publishing service is, of course, absurd. It's more likely that large VC checks will have to be written to motivate the big publishers to adapt their titles to work in this kind of environment.

So why would respectable venture capitalists fund such an obviously flawed proposition? This becomes much clearer when you consider who OnLive's big investor is: Time Warner, a cable company. These guys have an obvious interest in increasing demand for bandwidth, and nothing sucks up Internet bandwidth like gaming. Their hope may be to drive demand for consumer bandwidth through the roof and be their own biggest "customer" for that bandwidth. You're going to need to sign up for the best Internet connection money can buy to have any hope of experiencing this service at its full potential. In short, like Homegrocer.com, it may all seem like a great deal to you (the consumer) until the VC capital that props it up runs out and it all collapses or gets sold off and reported as a huge success anyway, as happened with Massive and WebTV. ▲



*Alex St. John was one of the founding creators of Microsoft's DirectX technology. He is the subject of the book "Renegades Of The Empire" about the creation of DirectX and Chromeffects, an early effort by Microsoft to create a multimedia browser. Today Alex is President and CEO of WildTangent Inc., a technology company devoted to delivering CD-ROM-quality entertainment content over the Web.*

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# DREAM HARDWARE

These Gizmos Don't Sing It, They Bring It

This month's haul of Dream Hardware boldly takes you where no house has walked before. As a bonus, it's European, expressed in all caps, or both.

by Marty Sems

## Lockheed Martin HULC

Not since CAN-SPAM have we encountered a more intentionally evocative acronym. HULC (Human Universal Load Carrier), a Berkeley Bionics ([www.berkeleybionics.com](http://www.berkeleybionics.com)) and Lockheed Martin ([www.lockheedmartin.com](http://www.lockheedmartin.com)) exoskeleton project, boosts the wearer's strength and endurance without resorting to gamma rays. The 61-pound, 250W system uses lithium polymer batteries and hydraulics for a burst running speed of 10 mph. A chief military goal, besides increasing the weight an individual can carry (up to 200 pounds) where vehicles might not be able to go, is to decrease the amount of oxygen a soldier must breathe while carrying a load. Reducing oxygen consumption, in turn, reduces fatigue, so forces can travel farther and still be in good enough shape to throw tanks and rescue the daughter of the general sworn to destroy them. HULC smash, indeed.

## THINK FROST

Christopher Nolan need look no farther than Norway for his next Batman movie. Designer Anders Gloslie has the next Batmobile covered. The FROST is a concept study under consideration by the TH!NK car company ([www.think.no](http://www.think.no)), which specializes in zero-emission electric cars. Although it isn't the first sports car for ice, it's quite possibly the first electric one with four-wheel tracks and all-wheel steering. The FROST can hydraulically go wide track when it needs to, such as during a subzero assault on Mr. Freeze's lair. And it might go without saying, but had Scatman Crothers had a snow car like this in "The Shining," Jack Nicholson might have come out on the short end of the axe. Unfortunately, the FROST may get the cold shoulder, according to TH!NK representative Katinka von der Lippe. "Most probably the chance of this project becoming a reality is rather minimal, but the design content and ideas might be used in other concept development activities."

## Walking House

Baba Yaga might have been onto something. Her walking cottage, we mean, not the whole child cannibalism thing. N55 ([www.n55.dk](http://www.n55.dk)), a design group in Denmark, wanted to build a modular home that fit its ecological and anti-land ownership sensibilities. The group came up with this. The 2,650-pound, 11-foot Walking House can be made to connect to other Walking Houses honeycomb-style, in case you're a nomad itching to go condo. It moves verrrrrry slowly, three legs at a time. Its max speed is 60 mph—erm, that's 60 *meters* per hour, not miles. Still, it's solar- and wind-powered and includes a wood stove, a composting toilet, and a greenhouse for food. We'd imagine you could pot a few innocent, adorable, and protein-rich woodland creatures from the roof, too. ▲





# HD & Widescreen Abound

## We Screen These Screens

With technological improvements in LCD technology filtering down to consumer monitors, including 5ms or lower response times, displays smaller than 24 inches with 1,920 x 1,080 native resolution, 1,000:1 or greater contrast ratios, and HDMI inputs, many monitors now offer features similar to what you'll find on LCD HDTVs. Additionally, several monitor manufacturers, including Acer, HP, LG, and Samsung, are switching from the 16:10 aspect ratio to 16:9, so you can watch movies or TV shows without wasting screen space for black bars or distorting the picture.

A few monitors, including Samsung's 2233RZ and Viewsonic's VX2265wm seen in this roundup, also feature 120Hz technology to deliver smooth, fast-motion video, as well as support for Nvidia's GeForce 3D Vision. Both options are tantalizing, but because there's a dearth of 3D content available, we didn't factor a monitor's 3D abilities into our performance marks. Our LCD roundup features high-end consumer monitors between 22 and 24 inches, which seems to be the sweet spot between price and performance right now.

### How We Tested

We used DisplayMate Multimedia with Motion Bitmaps 2.2 to calibrate the monitors and test the displays' color accuracy, contrast ability, scale gradations, and text readability. Additionally, we watched clips from "Transformers" and played Crysis to test gaming performance, DVD playback quality, and overall real-world color accuracy. The hardware in our test system included a 3.33MHz Intel Core 2 Duo E8600, 4GB of Corsair Dominator DDR2-1066MHz memory, an Nvidia

GeForce 8800GT, and a 500GB Samsung Spinpoint F1.

### Acer G24

This glossy-screened orange wonder from Acer displayed vivid color, and in DisplayMate's Color Spectrum test, it featured the cleanest color blending of our test group. We also liked that the wide, sturdy stand anchors the 24-inch monitor without robbing desk space in front of, or behind, the monitor. There are HDMI, DVI (with HDCP), and VGA inputs but no integrated speakers. Acer lists a Dynamic Contrast Ratio of 50,000:1 using its ACM (Adaptive Contrast Management), but we tested with ACM turned off. (We did notice a slight improvement in gradation and detail with ACM turned on when running through DisplayMate's tests.)

The G24 offers preset display modes for Work, Graphics, and Movies, among others. Many of the preset modes featured overpowering red hues, but the colors looked fine after we configured the monitor. Our test model featured a small amount of backlight bleed at the bottom of the monitor when viewing darker content. Similarly, colors appeared darker at the top of the screen than they did at the bottom. Even with the color purity issues, Acer's "Crystal-Brite" screen produced colors that seemed to pop off the screen. The glossy screen wasn't quite as reflective as other glossy models in this roundup—most notably, overhead lights didn't cause any problems during our testing. We also felt the G24 offered one of the quickest response times during our movie and gaming tests.

Backlight bleed notwithstanding, the G24's detail level and quick response times make this monitor one of our



**G24**

\$399.99 | Acer  
us.acer.com | ●●●●

favorites. For example, the G24 was one of the few models that delivered readable 7.5-point fonts (Arial) from 2 feet away. If you regularly watch movies or work in dark environments, the backlight bleed may cause a problem. The orange color may be off-putting for some, but a black bezel model is available.

### Asus VH222H

Although the Asus VH222H offered the same 1,000:1 contrast ratio



**VH222H**

\$209.99 | Asus  
usa.asus.com | ●●●●

specification found on many of the monitors in this roundup, we felt it produced slightly darker darks and brighter whites than many of the other models in our roundup. The 16:9 (1,920 x 1,080 native resolution) monitor offers HDMI (both video and audio), DVI (with HDCP), and VGA inputs, as well as a 3.5mm mini-jack input and SPDIF audio output. The SPDIF output is an odd addition, but if you have headphones that can use the digital connection, you'll appreciate the convenience.

Asus does a nice job of concealing the monitor controls, but we think the menu interface could have been more intuitive. Unlike traditional button layouts, the Menu button sits in between the lower and raise buttons, so we often deselected the option when we were attempting to



#### E2400HD

\$319.99 | BenQ

www.benq.us | ●●●

this roundup, and if you don't work with fine detail on your PC, you may not notice the monitor's detail issue. The impressive contrast ratio and 1,920 x 1,080

technology, which automatically sharpens images, reduces aliasing artifacts, and fixes blurred images. The 24-inch E2400HD delivered a true black level in DisplayMate's Gray-Scale test, which helped produce crisp, intense colors. The E2400HD stood out in DisplayMate's Color Registration Blink test, where the red and green patterns were incredibly crisp.

Grayscale performance was good, but with colors in DisplayMate's Color Smear and Moire Montage tests, we noted variations in color intensity that appeared as smear and dark smudges. The dark patches only appeared in pattern tests, where dark and light bands are more likely to show up. For example, in our movie and game tests, the E2400HD delivered accurate color without any banding or other

Our LCD roundup features high-end consumer monitors between 22 and 24-inches, which seems to be the sweet spot between price and performance right now.

bring settings up or down. In terms of color, we noticed that the monitor's dark blues tended to look muddy in DisplayMate's Sharpness and Resolution tests. We also noted VH222H lost fine detail in bright colors, such as yellow, magenta, and cyan. Overall, color accuracy was good, and we saw no ghosting in our games or movie testing.

The VH222H has a glossy bezel that brings attention to fingerprints, particularly around the monitor's control panel, but the TFT screen didn't reflect any overhead lighting. Asus integrates five video modes (Scenery, Theater, Gaming, Night View, and Standard) and three preset skin tone levels (Yellowish, Natural, and Reddish), so you can adjust the display to suit different graphic applications. The color changes in the video modes seemed appropriate for the preset conditions.

The 21.5-inch widescreen VH222H is more affordable than the other models in

resolution make the VH222H a great monitor for those that watch movies and TV on their PC.

#### BenQ E2400HD

This 16:9 aspect ratio, 1,920 x 1,080 resolution features HDMI, DVI (with HDCP), and VGA inputs. BenQ also integrates its Senseye+Photo Image



#### w2338h

\$299.99 | HP

www.hp.com | ●●●

artifacts. The E2400HD also displayed some dark shading at the bottom and top of the screen when displaying bright colors. Despite these issues, the E2400 displayed one of the truest black-and-white gradations of our test group.

The stand for the 24-inch monitor is sturdy, but it only allows you to tilt the E2400HD up or down. BenQ integrates five preset modes, including Standard, Movie, Dynamic, Photo, and sRGB (ideal for people who use sRGB devices to match color), and the controls are built onto the right side of the monitor. We had complete control of the brightness, contrast, and sharpness, as well as the red, green, and blue levels on the monitor. We thought the built-in speakers produced the best audio clarity and overall volume of the group. The monitor's subtle dark patches may deter graphics professionals, but the people looking for a monitor for watching movies and TV will appreciate the deep



contrast ratio of the E2400HD's 24-inch screen.

### HP w2338h

If you're looking for a monitor that's as attractive when it's turned off as it is when turned on, the HP w2338h is for you. HP includes its BriteView Technology in the w2338h, which gives the w2338h a glass-like appearance, including significant reflections in bright rooms when the monitor's off or displaying extremely dark video. That being said, the monitor produces bright whites, yellows, and light blues without any blooming, which we couldn't say for many of the monitors in this roundup. The w2338h also excelled in DisplayMate's Dot Crawl Check (a test pattern that will show any interference between hue, saturation, and various light intensities).

DisplayMate's Extreme Gray-Scale with Bar test produced impressively crisp gray gradation, and we also noted crisp line definition with dark colors in DisplayMate's Test Pattern. We saw a little moiré effect in some tests, but other than the small artifacts, the w2338h produced excellent, accurate color. The w2338h's glossy screen proved less impressive with our gaming and videogames tests, where



**EA221wm**

\$299 | NEC

www.necdisplay.com | ●●●●●

dimly lit scenes in "Transformers" and Crysis invited a lot of glare.

Oddly, the w2338h only offers HDMI and VGA inputs, so you may need to purchase a DVI-to-HDMI cable or adapter to see the highest-quality video. HP includes a strong, attractive silver stand that you can tilt up and down. The w2338h also has built-in speakers, but even with the audio jacked, the 2-watt, rear-mounted speakers were barely audible. The bezel on the w2338h is just as glossy as its screen's appearance. If you work in a bright environment, the w2338h glossy screen may become

distracting, but otherwise, we feel it's one of the top monitors of the group in terms of video quality.

### NEC EA221wm

NEC Display primarily focuses on business users, and its EA221wm offers a number of usability features, such as its lazy Susan monitor stand and integrated USB hub. The EA221wm is a 22.1-inch, 16:10 aspect ratio monitor with a 1,680 x 1,050 native resolution. We appreciate the display's thin-frame (a little more than half an inch) bezel, because it's ideal for dual-screen setups, as well as the stand's ability to swivel (360 degrees), raise and lower, and tilt.

In terms of video quality, the EA221wm delivered true black levels in DisplayMate's Medium Sensitivity Black-Level Check, and we noted impressive color gradation in the Low Saturation Colors test. Detail was also good on the EA221wm, as it was one of the few monitors that produced visible pixel dots for all colors in DisplayMate's Set Up Cross Hatch test. On the downside, our test monitor displayed a dark bar along the bottom portion of the screen in bright and light video. The EA221wm, which lists a 5ms response time, also showed a little

LCDs On Display							
	Acer G24	Asus VH222H	BenQ E2400HD	HP w2338h	NEC EA221wm	Samsung 2233RZ	Viewsonic VX2265wm
Although you'll find a lot of marketing tools within monitor specifications, we've tried to provide all the VESA-based testing standards we could find to give you an accurate idea of each monitor's capabilities.							
Screen size (inches)	24	21.5	24	23	22	22	22
Viewing angle (V/H)	160/160	160/170	160/170	160/160	170/176	160/170	150/160
Native resolution	1,920 x 1,200	1,920 x 1,080	1,920 x 1,080	1,920 x 1,080	1,680 x 1,050	1,680 x 1,050	1,680 x 1,050
Contrast ratio	1,000:1	1,000:1	1,000:1	1,000:1	1,000:1	1,000:1	1,000:1
Response time	2ms*	5ms	5ms	5ms	5ms	5ms	5ms
Inputs	VGA, DVI, HDMI	VGA, DVI, HDMI	VGA, DVI, HDMI	VGA, HDMI	VGA, DVI	DVI	DVI
Weight (with stand, lbs.)	15.9	10.8	15.4	13.2	17.4	11.5	12.2
Aspect ratio	16:10	16:9	16:9	16:9	16:10	16:10	16:10
Hertz	60	60	60	60	60	120	120
Speakers	No	Yes	Yes	Yes	Yes	Yes	Yes
MSRP	\$399.99	\$209.99	\$319.99	\$299.99	\$299	\$399	\$359.99
CPU rating	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●
* gray-to-gray							

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●● 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT



ghosting in our gaming tests. In our movie tests, we noted that the colors seem muted compared to the other monitors in our roundup, but the colors were still accurate.

Eco-conscious people will like the EA221wm's Eco mode, which drops the screen's brightness by 60%; NEC indicates the screen reduces energy consumption from 39W to 27W in Eco mode. We found it was easy to switch to Eco mode and adjust the screen settings using the monitor's 4-way navigation key. It features DVI (with HDCP) and VGA video inputs, as well as four USB ports (two on side, two on back), a mini-jack audio input, and headphone output. All in all, the EA221wm has a lot of convenience features, and it offers good video quality to match.

### Samsung SyncMaster 2233RZ

This 120Hz LCD monitor from Samsung features a 1,680 x 1,050 native resolution and support for Nvidia's GeForce 3D Vision. The 2233RZ produced some of the most impressive black levels and brightest colors of our test monitors. Additionally, the 120Hz technology produced smoother motion in our games tests, and we found less judder when watching movies, compared to the 60Hz monitors we tested.

In terms of video quality, the 2233RZ shined in DisplayMate's black level tests, including the Medium Sensitivity Black Level and Static Gamma Correction Measurement screens, where it showed the best contrast of our roundup. For the most part, the monitor also presented excellent color. With our test monitor, we needed to pull down the brightness and contrast quite a bit to avoid oversaturation in the bright white spectrum. Thankfully, Samsung includes plenty of controls to fine tune the monitor's contrast and color. In some scenes in our movie tests, we thought that the 2233RZ's colors appeared more crisp and defined than many of its competitors.

Although it's not too flashy, the 2233RZ offers an appearance that we think is elegant. There's a subtle blue power light on a thin, clear bar at the



**SyncMaster 2233RZ**

\$399 | Samsung

www.samsung.com | ●●●●●

bottom of the monitor, and the controls are positioned on the far right-hand side. The menu layout is fairly intuitive as we'd like, and you have plenty of options, including controls (such as Color Tone, Color Control, and Gamma) that weren't typical of our other test monitors. Our only real problem with the 2233RZ is its stand, which is tough to adjust, and it's a little wobbly when tilting the screen up or down. Otherwise, we found the monitor to be a great monitor for gaming, working, and watching movies.

### Viewsonic VX2265wm

With the ability to produce video at 120Hz, the VX2265wm provides a rare feature that improves the appearance of fast-motion video in games and movies. On the flip side, the VX2265wm doesn't include the connectivity options (only



**VX2265wm**

\$359.99 | Viewsonic

www.viewsonic.com | ●●●●●

DVI), display adjustments (only tilt), or image controls (it can only adjust brightness) common on the other monitors in this roundup. It also supports Nvidia's GeForce 3D Vision, and Viewsonic includes a dual-link DVI cable that, according to Viewsonic, is necessary for use with the 120Hz display.

This glossy bezel, 22-inch monitor features a 1,680 x 1,080 resolution. In our DisplayMate tests, colors appeared vivid and mostly accurate, but we noted some blooming in whites and other brights. The contrast troubles also limited the VX2265wm's performance in DisplayMate's 128 Step Gray-Scale test, where details were obscured at the white end of the gray scale. Because the monitor provided us no ability to adjust the contrast, we couldn't resolve the problem. On the plus side, the VX2265wm delivered the best response time in our gaming and movies tests. Background content and character movements in Crysis appeared particularly crisp.

We also tried 3D gaming (thanks to Nvidia for providing the 3D kit) in World Of Warcraft and thought this feature made the VX2265wm stand out. You'll need a recent Nvidia GeForce graphics card and Nvidia's 3D glasses to view content in 3D, but gamers looking to enhance their experience will want to check it out. Even without the 3D equipment, the monitor's 120Hz technology and vivid color make the VX2265wm a good monitor for gamers, while those who look for smooth graduation and accurate light colors, such as photography enthusiasts, may prefer another monitor.

### And The Winner Is . . .

We'd be hard pressed to pick one monitor out of the group, but a few stand out. Acer's G24, Samsung's SyncMaster 2233RZ, and HP's w2338h were all colorful and attractive, while NEC's EA221wm offered the most convenience features, as well as good image quality. If you're still debating, check out our specs comparison chart for some side-by-side assessments. ▲

by Nathan Lake



# Solidata X2-512 512GB

SSDs are catching up to hard drives on the capacity front. Here's one packing half a terabyte, for crying out loud.

This MLC drive is a 2.5-inch unit, despite its remarkable capacity. (It's also available as a 3.5-inch). At 13mm thick, it won't fit in every laptop. The 256GB and smaller units are but 9.5mm thin.

Solidata posits this drive as an Intel whopper, but my tests showed a distinct advantage on the part of the X25-M, even before the recent Intel firmware upgrade to address declining write performance over time. Even without HD Tach write results—my X25-M was borrowed and contained data, so I couldn't run write tests—the Intel SSD kicked rump. The Solidata scored quite low in Iometer's File Server test,

which consists of mostly reads with some writes. Still, the 100% reads Web Server test looked much better.

Then again, you can't get 512GB from Intel. As Kirk taunted Khan, Solidata may as well be saying, "I'm laughing at the superior intellect. Neener, neener." ▲

(Special thanks to DVNation.com for the Solidata and to Intel for the X25-M.)

by Marty Sems

**X2-512**  
\$1,999 [DVNation price]  
Solidata  
www.solidata-usa.com  
● ● ● ●



**Specs:** 240MBps read/190MBps write, sequential; 130MBps read/35MBps write, random; MLC; 3Gbps SATA; >2 million hours MTBF

## Benchmark Results

	Solidata X2-512	Intel X25-M 80GB
<b>PCMark Vantage 1.0.0 (64-bit, Nov 07 patch)</b>		
HDD score (points)	11893	26193
Defender (MBps)	100	134
Gaming (MBps)	120	139
Photo Gallery (MBps)	165	150
Vista startup (MBps)	51	154
Movie Maker edit (MBps)	36	103
Win Media Ctr (MBps)	55	116
WMP music add (MBps)	19	82
App loading (MBps)	24	116
<b>HD Tach RW 3.0.4.0, Long Bench</b>		
Read, avg/max (MBps)	180/198	209/221
Write, avg/max (MBps)	149.4/188	n/a
Random access (ms)	0.2	0.1
Burst read (MBps)	232	250
CPU utilization (%)	4	4
<b>Iometer 2006.07.27</b>		
File Server (I/Ops)	22	5860
File Server (MBps)	0.2	63.5
File Server avg/max response (ms)	773/2976	3/351
CPU utilization (%)	0.2	7
Web Server (I/Ops)	4048	13137
Web Server (MBps)	62	202
Web Server avg/max response (ms)	16/47	5/23
CPU utilization (%)	6	18

Test system specs: Vista Home Premium (32-bit), Core 2 Extreme Q6850 (3GHz), 4GB DDR3 (1,333MHz), Intel DX48BT2, ICH9R.

# Seagate Momentus 7200.4 500GB

Power savings is the big idea behind Seagate's newest consumer laptop drive, but don't think for a moment that its performance isn't up to scratch. Although it won't make recent SSDs scurry for cover, there's a lot to like in the Momentus 7200.4's benchmark results. (That is, if you can push Seagate's recent firmware debacle with the Barracuda 7200.11 and other drives out of your mind.)

The dollars-per-GB ratio still heavily favors hard drives such as this one, even if an SSD such as Solidata's X2-512 can match it in capacity. And although eminent tech journalists have rightfully

declared that a good SSD is currently the PC upgrade with the most noticeable across-the-board performance

boost, most users would still rather pay \$145 for 500GB than \$1,999.

With fluid dynamic bearings, a head offload ramp, and various power management techniques, the 7200.4 manages to eke out a living on slightly more than a couple of watts. In fact, Seagate claims that it's the most power-sipping 7,200rpm laptop drive around.

Like its 160GB, 250GB, and 320GB brethren, this 500GB Momentus 7200.4 (model ST9500420AS) features a 16MB cache.



**Momentus 7200.4 500GB**  
\$145  
Seagate  
www.seagate.com  
● ● ● ●

**Specs:** 16MB cache; 7,200rpm; 3Gbps SATA; NCQ; 11ms advertised random seek time; 9.5mm thickness; 600,000 load/unload cycles; 0.69 to 2.2W; 23 to 27dBA; 350G/2ms operating, 100G/1ms non-operating shock tolerance; 4 heads/2 disks; RoHS; three-year warranty

For a hard drive, the Momentus 7200.4 is quiet, speedy, spacious, tough, and green-ish. ▲

by Marty Sems

## Benchmark Results

	Seagate Momentus 7200.4 500GB
<b>PCMark Vantage 1.0.0 (Nov 07 patch)</b>	
HDD score (points)	4129
Defender (MBps)	18
Gaming (MBps)	12
Photo Gallery (MBps)	42
Vista startup (MBps)	17
Movie Maker edit (MBps)	32
Win Media Ctr (MBps)	95
WMP music add (MBps)	9
App loading (MBps)	5
<b>HD Tach RW 3.0.4.0, Long Bench</b>	
Read, avg/max (MBps)	87/110
Write, avg/max (MBps)	85/111
Random access (ms)	15.4
Burst read (MBps)	205.2
CPU utilization (%)	2
<b>Iometer 2006.07.27</b>	
File Server (I/Ops)	95
Web Server (I/Ops)	121

\* Test system specs match those used in the Solidata X2-512 review.





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# Icy Dock MB882SP-1S

"Icy Dock MB882SP-1S" is a long name for a clever little device that allows you to insert your 2.5-inch SATA notebook hard drive or SSD into a converter that effectively makes the drive physically the same size as a 3.5-inch hard drive.

The converter solves the problem of trying to fit an SSD or notebook drive into a desktop PC case. Indeed, when a drive is safely inserted into the Icy Dock MB882SP-1S, the whole shebang will fit into a drive bay or external hard drive enclosure designed for a 3.5-inch drive.

The converter can handle 3Gbps drives with a max capacity of 500GB and sports airflow vents for heat dissipation. Even with a 2.5-inch drive inside, the Icy Dock MB882 is incredibly light. Altogether, the 2.5-inch drive and the enclosure weigh

less than a typical 3.5-inch hard drive.

I was impressed by how easy it was to install the hard drive in the enclosure. There are no screws required. You just slide the top open, place the drive inside, and slide the lid shut. Done.

To test whether the MB882SP-1S would affect read/write speeds, I ran the drive on PCMark Vantage with and without the converter. The resulting scores showed a slight but negligible difference in performance between the two. Without the converter, the hard drive averaged 3318 over two runs with an average of 3286 over two runs with the converter.



**MB882SP-1S**

\$24.99

Icy Dock

www.icydock.com



I pulled the hard drive out of the converter after a few rounds of PCMark to check the temperature, and I was disappointed to find it quite warm.

The bottom line is that the Icy Dock MB882 is a device designed so simply and elegantly that it requires infinitesimally more effort to swap in and out of a computer as any 3.5-inch hard drive. This is definitely a product you want to have in your toolbox if you work with SSDs or notebook hard drives. ▲

by Seth Colaner

**Specs:** Compatible drives: 2.5-inch SATA I/II; Fits into a 3.5-inch SATA hard drive bay; 3Gbps transfer rate; Supports hard drives up to 500GB; 145 x 101 x 25mm (LxWxH); 195.3g

# Ultra-X R.S.T. Pro3 & QuickTech Pro

PC enthusiasts love benchmarks. In providing hard numbers, benchmarks allow us irrefutable bragging rights about how well our builds perform. Ultra-X's testing kits go way beyond simple benchmarks: These are serious tools that help professionals test and troubleshoot hardware issues to a level of minutiae most of us have probably never encountered.

Though Ultra-X's catalog of testing tools is extensive, we tried out two of its kits, the R.S.T. Pro3 and the QuickTech Pro. The devices will give you *all* the information, but it's up to the user to make some kind of sense of it.

## R.S.T. Pro3

The R.S.T. Pro3 comes in a PCI-E card form factor and is designed to test memory for servers and workstations, though you can use it for testing any system, really. (Note that the R.S.T. Pro2 is ideal for desktop system memory.) To use it, just plop the card into an available PCI-E slot, restart the system, and

configure the card as the first boot priority in the BIOS.

The system will boot from the card and present you with options for testing. The level of detail to which you can drill down to test and evaluate is staggering. If there's any information you care to know about your system's memory, the R.S.T. Pro3 will find it for you.

## QuickTech Pro

The QuickTech Pro device we tested is in a USB form factor, and like the R.S.T. Pro3, you can boot directly to the USB dongle after configuring the boot order in the BIOS. Unlike the R.S.T. Pro3, which is designed specifically to test memory, the QuickTech Pro tests virtually everything—memory (though not in as much detail as the R.S.T. Pro3), CPU, hard drives, optical drives, graphics, and more.

Included in the testing kit is a variety of devices you can plug into the machine for loopback tests, including ones for a 9-pin serial port, 25-pin serial/parallel port,

network connection, and audio jack. It also includes a CD-ROM and DVD-ROM equipped with media for running optical drive tests. ▲

by Seth Colaner



**R.S.T. Pro3**

\$859

**QuickTech Pro**

\$429

Ultra-X

www.uxd.com





# Asus N10JC-A1

We don't care if you call it a netbook or a notebook. The Asus N10, with a 10.2-inch screen (800 x 480), 1.46-inch maximum thickness, and 3.1-pound weight, is a slick ultra-portable with a sweet surprise. Yes, like other netbooks, this one uses the 1.6GHz Intel Atom Processor N270 paired with the Intel 945GSE chipset. This means that the Intel GMA 950 graphics engine is built in. However, flip a little switch on the left edge before booting, and you can boot using discrete Nvidia GeForce 9300M GS graphics. You pick Intel for battery life and Nvidia for performance.

How big is the performance difference? Potentially huge. With CUDA-enabled apps, some tasks that would normally bring this netbook's Atom N270 to its knees (say you want to transcode your media files with Nero Move or watch something encoded in H.264) will be considerably better, thanks to the 9300M

**Specs:** CPU: 1.6GHz Intel Atom Processor N270; Chipset: Intel 945GSE; GPU: Nvidia GeForce 9300M GS (256MB VRAM); Gigabit Ethernet, 802.11b/g; 3 USB ports

## N10JC-A1

Asus  
\$649  
www.asus.com



GS. At the end of the day, though, this is a platform for basic 2D and 3D entertainment; the Atom N270 remains a performance bottleneck.

Our unit shipped an 8-in-1 card reader, 1.3MP Web cam, HDMI port, ExpressCard slot, and fingerprint reader built into the touchpad. You'll have to load apps from an external USB or LAN source, because there's no built-in optical drive.

Honestly, the N10 was a little heavier and thicker than we would've liked. The screen bezel feels excessively thick, but we're guessing this is a concession made by opting for a 10.2-inch screen along with a comfortably broad keyboard. Still, we

found the screen very decent for prolonged viewing, including for video playback. We love the button above the keyboard for toggling between different power/performance profiles. In High Performance mode with Wi-Fi enabled and all power-saving features disabled, we achieved a battery runtime of 4 hours and 54 minutes—nice.

The N10 is convenient, affordable, and effective for nongaming tasks. We hope this sparks a trend in pushing the envelope for netbook expectations. ▲

by William Van Winkle

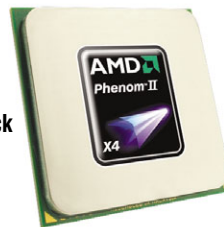
# AMD Phenom II X4 955 Black Edition

If you just got a brand-new Phenom II X4 940 BE and are kicking yourself for not waiting for the 955 BE, you can stop. The 955 is pretty much the same story as the 940, but with a slightly faster clock (3.2GHz vs. 3GHz, respectively). AMD pulled the same stunt with the Phenom X4 9850 BE and 9950 BE.

It's not that the 955 is unimpressive, it's just that it's not any *more* impressive than its predecessor, the 940. The slight bump in benchmark performance is easily explainable with the slightly higher clock of the 955. If you're overclocking, the bump is a bit more noticeable. I hit

**Phenom II  
X4 955 Black  
Edition**  
\$245  
AMD

www.amd.com



P9642 in 3DMark Vantage with a clock speed of 3.86GHz—a significant step up from the stock-speed score of P6488.

The bottom line is that the Phenom II X4 955 Black Edition is a slightly better chip than the 940 and enters the market at a better price—\$30 less, to be exact. We can only assume that price will drop with the next batch of AMD CPUs, so it's a great deal for AMD's best processor. ▲

by Seth Colaner

## Benchmark Results

	AMD Phenom II X4 940 BE	AMD Phenom II X4 955 BE
<b>3DMark Vantage</b>		
Overall	P7214	P7488
GPU	6564	6767
CPU	10260	11009
<b>PCMark Vantage Pro</b>		
Overall	5917	5939
Memories	4205	4205
TV And Movies	4273	4370
Gaming	5410	5479
Music	5223	5425
Communications	5535	5787
Productivity	5213	5397
HDD	3433	3471
<b>Dr. DivX 2.0.1*</b>		
	5:04	5:08
<b>WinRAR 3.71*</b>		
	2:30	2:20
<b>Cinebench 10</b>		
Multi-threaded*	1:30	1:24
Multi-threaded (score)	9786	10487
<b>Crysis 1.1***</b>		
Low quality	93.81fps	99.95fps
* minutes:seconds		
** pixels per second		
*** Crysis tested at 1,280 x 1,024		

**Specs:** Socket AM3; Clock Speed: 3.2GHz; HyperTransport 3.0 Link: 4GHz full duplex; 45nm process; Cache: 2MB total dedicated L2 cache, 6MB L3 cache; 125W max TDP

**Test System Specs:** Processor: 3.2GHz AMD Phenom II X4 955 Black Edition; RAM: 2GB Corsair DDR2-800; Graphics: ATI Radeon 4850; Hard Drive: 150GB Western Digital Raptor 1500



# Wilson Electronics iBooster

In November 2008, I reviewed the Wilson Electronics SignalBoost Mini-Mobile Amplifier. (See page 31.) This original model is designed to strengthen the cellular connection of nearly any mobile phone. Now that this technology has made its mark, Wilson has committed to providing a signal boost for the iPhone.

The iBooster features similar components as the Mini-Mobile: a cradle to secure the phone, exterior magnet-mount antenna, and the signal amplifier itself. The difference between the two amplifier kits, however, is that the iBooster charges your iPhone (via cigarette light power adapter) when it's in its resting state and plugged into the charger and combines the signal amplifier, charger, and cradle into one unit.

When you open the box, it may seem like the separate pieces will require a stress-inducing assembly, but in reality, it takes a minimal amount of effort to install and

mount the iBooster. I plugged one end of the DC power adapter into the amplifier/charger and the other into the cigarette lighter to power up the device immediately; don't overlook the power switch on the end of the cigarette adapter, indicated by a red light. The amplifier/charger connects to the antenna with a mini-coaxial connector. I extended the antenna cable behind the driver's seat and snaked it up to the door seal, a discreet way to install this component.

As far as my experience goes, the iBooster increased signal strength in the rural and urban areas I drove through. I didn't think that it was as effective as the Mini-Mobile, but the precision of the iBooster is somewhat difficult to calculate because the iBooster is designed purely for the iPhone.



## Wilson Electronics iBooster

\$240

Wilson Electronics

www.wilsonelectronics.com



**Specs:** Dimensions: 2 x 4.75 x 1 inches (HxWxD); 824 to 894MHz/1850 to 1990MHz; 1,000mw max output; +30dBm max RF; 12V power requirement; supports SMA female connector

It's tricky to know for certain if this issue can be attributed to the iBooster itself or the wireless coverage in our local area.

Keep in mind that the iBooster must remain in its cradle to operate, so be sure to utilize the speakerphone on your iPhone (or opt for a Bluetooth headset). In the most general terms, the iBooster is ideal for anyone who hates poor reception or inconsistent data rates. ▲

by Joanna Safford

# Imation M-Class 2.5-inch SATA 128GB Upgrade Kit

It's one thing to lead the charge into a hot new technology. It's quite another to take a good look at what users really want and need and then field a kit to fill the bill.

Imation offers several of its M-Class (MLC, or multilevel cell) and S-Class (SLC, or single-level cell) SSDs as upgrade kits. You'll get a SATA-to-USB converter cable and an AC adapter with a SATA power connector. These items let you do an SSD migration even with a one-bay laptop.

Be sure to drop your boot drive out of AHCI or RAID mode, then boot from the included Acronis True Image HD CD to perform the drive copy.

This isn't the screamingest MLC drive on the market, but it's a fair value, especially when you consider its hardware bundle and ease of installation. And a VelociRaptor hard drive really isn't the primary rival for this sort of SSD—a notebook drive would be a fairer comparison. Still, we were struck by the give-and-take of the benchmark battle. In some areas, the Imation seems to dominate; in others, the WD drive lands a few body blows.



## M-Class 2.5-inch SATA 128GB Upgrade Kit

\$449.99

Imation

www.imation.com



**Specs:** 1.5Gbps SATA; sequential 150MBps read/90MBps write (advertised), random 6,000IOps read/380IOps write (advertised); two-year limited warranty

In day-to-day use, however, this SSD noticeably perked up our system more than the vaunted VelociRaptor. Vista and applications launched more quickly, although certain file transfers and write operations took slightly longer. Still, the Imation M-Class seems able to whip any laptop drive, and that's the primary goal of this kit. ▲

by Marty Sems

## Benchmark Results

PCMark Vantage 1.0.0 (64-bit, Nov 07 patch)	Imation M-Class 2.5" SATA 128GB	VelociRaptor 300GB
HDD score (points)	11051	6002
Defender (MBps)	80	28
Gaming (MBps)	92	20
Photo Gallery (MBps)	121	60
Vista startup (MBps)	58	23
Movie Maker edit (MBps)	33	51
Win Media Ctr (MBps)	49	108
WMP music add (MBps)	23	14
App loading (MBps)	26	6

## HD Tach RW 3.0.4.0, Long Bench

Read, avg/max (MBps)	133/147	106/126
Write, avg/max (MBps)	84/88	98/118
Random access (ms)	0.2	7.3
Burst read (MBps)	168	245.1
CPU utilization (%)	3	4

## Iometer 2006.07.27

File Server (IOps)	23	183
Web Server (IOps)	3089	199
4K Random Writes (IOps)	5	300
4K Random Writes (MBps)	0.02	1.2
4K Random Writes avg/max response (ms)	3515/8592	53/125
Boot to Desktop (min:sec)	1:05	1:14

**Test System Specs:** Vista Home Premium (32-bit), 3GHz Core 2 Extreme Q6850, 4GB DDR3 (1.333MHz), Intel DX48BT2, ICH9R.

# Commodore Gaming Commodore xx

Commodore often triggers a sense of nostalgia for gamers who got their start in the 1980s. In 2005, the Commodore brand was reinvented, and now it has a solid lineup of boutique gaming PCs, including the Commodore xx.

The first thing that we noticed when we popped the Commodore xx open was its tidy appearance, with clean and orderly interior cabling. Our attention was quickly refocused to the cooling scheme, however, which is one of its biggest strengths. The Commodore xx includes the CoolIt Custom Domino liquid-cooling system, which is a bit blue-collar, but it gets the job done well. Also, there are plenty of fans in all the right places—a 120mm intake fan in the front, a 250mm side fan, and a 120mm exhaust fan at the rear—producing a nice airflow through the system.

Commodore is looking to distinguish itself with its customizable C-Kin cases. According to Commodore, the artwork is baked onto the panels in a 350-degree Fahrenheit oven and then painted over with an antiscratch layer. Although you can't submit your own work, Commodore offers more than 50 designs to

choose from. The artwork was impressive, but we noticed the color patterns weren't even and looked cheap.

The Commodore xx packs a long list of the best hardware available, which allowed it to blast through benchmarks, posting a 32513 overall score in 3DMark Vantage, for example. Additionally, the Crysis Warhead (20.81fps), Crysis 1.1 (37.95fps), and the World In Conflict (74fps) scores were all blistering, thanks to the trio of Nvidia GeForce GTX 285s (in 3-Way SLI).

The Commodore xx is a great deal when you consider that it's reasonably priced for what you get. Unfortunately, Commodore has closed its North American office, and at press time Commodore's site did not include a North America-specific online store. According to Taco van Sambeek, Commodore Gaming's global product manager, the company shut down the store temporarily and will be processing orders from the United States again soon. ▲

by Tessa Warner Breneman



**Commodore xx**  
\$4,599 (as tested)  
Commodore Gaming  
[www.commodoregaming.com](http://www.commodoregaming.com)  
●●●●●



Benchmark Results		Commodore xx
3DMark Vantage		Performance
Overall		32513
GPU		29096
GPU1		82.75fps
GPU2		87.8fps
CPU		50192
CPU1		3221.15 Plans/s
CPU2		160.04 Steps/s
Cinebench 10*		
Multithreaded (score)		21,522
Multithreaded (min:sec)		0:41
POV-Ray 3.7 Beta**		4686.42
PCMark Vantage Pro 1.0		
Overall		8922
Memories		6889
TV And Movies		5630
Gaming		11363
Music		6715
Communications		7570
Productivity		8406
HDD		5817
SiSoft Sandra Lite XII SP1		
Processor Arithmetic		
Dhrystone ALU (MIPS)		90,047
Whetstone iSSE3 (MFLOPS)		77,264
Processor Multi-Media		
Integer x8 iSSE3 (itps)		617,242
Floating Point x8 iSSE2 (itps)		431,449
Memory Bandwidth		
Integer Buffered iSSE2 (GBps)		24.90
Floating-Point Buffered iSSE2 (GBps)		24.89
<b>Crysis Warhead (4XAA)</b>		<b>20.81</b>
<b>Crysis 1.1 (no AA)</b>		<b>37.95</b>
<b>World In Conflict 1.005 (4XAA, 16XAF)</b>		<b>74</b>
<b>FarCry 2 (4XAA)</b>		<b>94.84</b>
* minutes: seconds		
** pixels per second		
Games tested at 2,560 x 1,600.		

**Specs:** CPU: Intel Core i7-965 Extreme @ 3.74GHz; Motherboard: Evga X58 SLI; RAM: 6GB Corsair Dominator DDR3-1866MHz; HDDs: Western Digital 300GB VelociRaptor, 1.5TB Seagate

Barracuda 7,200rpm SATA Hard Drive; GPU: Nvidia GeForce GTX 285 (3-Way SLI); PSU: Corsair HX Series, 1,000W Modular Power Supply; OS: Windows Vista Ultimate 64-bit



# Eurocom T890M Element

People buy ruggedized computers for two reasons: Either they're clumsy or their occupation doesn't tie them to a desk—be it the military, construction, or other field in which conditions occasionally get gritty. Enter Eurocom's Intel Atom-based T890M Element, a die-cast magnesium-constructed tablet that's drop-resistant to 4 feet and wrapped in thick, black rubber strips. Additionally, rubber covers the connectors/ports, the shock-mounted HDD is drop-protected, and IP54 compliance signifies the T890M is splash- and dustproof. The T890M also provides fingerprint and BIOS protection, an RFID or 2D barcode reader, GPS module, Bluetooth and Wi-Fi, and Web cam. Although hefty at 3.3 pounds, my WinXP-equipped T890 performed

lightly on its feet executing common Internet and mobile tasks.

An 8.9-inch LED-backlit resistive touchscreen (1,024 x 600) dominates the T890M's makeup. You'll also find two integrated speakers, microphone, Kensington lock, slot, headphone jack, two USB 2.0 ports, and menu buttons to access wireless and other functions. My T890M shipped with a 1.33GHz Intel Z520 Atom CPU and integrated Intel GMA 500 graphics. Eurocom offers configurations of up to a 1.86GHz Z540, 500GB SATA storage, SSD drive, and Vista Business.

The T890M didn't blink at basic productivity and Internet tasks but gulped a bit at more-taxing tasks, including completing current graphics- and resource-hungry benchmarks. In real-world use, the T890

made fast work of Wi-Fi connections, pairing with Bluetooth gear, and running Web-based productivity apps. Multimedia-wise, photos and video were darkish and lacked detail, but audio (aided by Intel HD Audio and a RealTek audio mixer) was borderline outstanding, considering the T890M's tablet nature. The touchscreen was comfortably viewable indoors and out, though you'll likely prefer the stylus to fingertips for most navigation.

If you make your living in a sometimes-bruising environment, the T890M is built to withstand nature's elements while simultaneously offering solid mobile connectivity options. ▲

by Blaine Flamig



**T890M Element**

\$2,500 (as tested)

Eurocom

www.eurocom.com



**Specs:** 1.2 x 7.6 x 9.6 inches (HxWxD); Li-polymer 6600mAh battery; 10 hours rated life; 0 degrees to 40 degrees C operating temp, -20 to -60 C non-operating temp; 20 to 80% operating, 10 to 90% non-operating relative humidity; optional SSD

# Archos 5 60GB Internet Media Tablet

The Archos 5 Internet Media Tablet (PMP, MID, etc., etc.) is getting a lot of attention lately, and rightly so. It combines the performance, function, and content most of us are looking for in a portable media device: full Web connectivity, PC compatibility, music, video, photos, and games. There's even more than that, though.

If you're not sold on netbooks and don't want to give in to a smartphone, the Archos 5 is probably a good fit for you, especially if you really only care about the multimedia capabilities.

Starting with menu features, the Play category is where you store files from your PC—you can also access Web Radio (with an incredible 10,000 stations), built-in games, and added Flash applications. PC connectivity requires the included USB cable, and syncing the

media from your hard drive is extremely easy. Windows Media Player assists you in the syncing process, so you can quickly transfer MP3s, videos, and your photo collection. Videos on the Archos 5 are crisp, and the audio is consistent on both the uploaded content and Web Radio—clear highs and lows provide a well-rounded sound.

The touchscreen is highly responsive, but you do have to tap twice to select options in each media category. If browsing via Opera is new to you, be assured that there is practically no learning curve. You can also set up a Gmail, Yahoo!, or Hotmail account that's accessible with a few taps.

The cons are moderately annoying at worst. A stylus would have been a practical accessory; some Web pages are difficult to navigate on the touchscreen. (Still,

you can zoom in and out by double-tapping.) The glossy metal finish is in no way a fingerprint deterrent, but Archos does include a cleaning cloth to remove smudges.

By no means have we covered every significant feature; however, we can confidently say that the Archos 5 is beyond adequate for its purposes. ▲

by Joanna Safford



**Archos 5 60GB Internet Media Tablet**

\$349.99

Archos

www.archos.com



**Specs:** Display: 4.8-inch TFT LCD touchscreen (480 x 800); 32-bit ARM Cortex-A8 processor; Video playback: MPEG-4/WMV/M-JPEG; Audio playback: MP3/WMA/WAV; Photo viewer: JPEG/BMP/PNG/GIF; PDF viewer, USB 2.0 interface; 3.5mm jack

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●● 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT



# HYPER

SERIES COOLING



**N-520**



**N-620**

The Hyper N Series is going back to basics with optimum airflow and superior cooling performance. The Hyper N520 and N620 have a unique dual fan cooling design that provides cool air throughout the heatsink. Both are designed with a mirror finished copper base that guarantees perfect contact between the CPU and cooler.



Copper base mirror finish.

Cooler Master's Hyper Series has evolved along side today's demanding mainstream CPUs. Now the new Hyper 212 Plus and Hyper TX 3 are Cooler Master's first direct contact heat-pipe design to provide efficient heat dissipation.



**212 PLUS**



**TX-3**



Direct contact heatpipe design.

[www.cooler-master-usa.com](http://www.cooler-master-usa.com)

[amazon.com](http://amazon.com)

[buy.com](http://buy.com)

**COMPUSA**  
We got it. We get it.

**fray's**  
ELECTRONICS

**MICRO CENTER**  
The Computer Store

**newegg.com**

[TigerDirect.com](http://TigerDirect.com)



# Logisys Two Color (Blue/Red) Character-Illuminated Keyboard

The combination of the illuminated keyboard and the hotkeys on the Logisys Two Color (Blue/Red) Character-Illuminated Keyboard (Model KB208BK) makes this an appealing keyboard for those looking to control music on a PC and pull all-nighters in a poorly lit office or dorm room. The slim, black design gives it a sophisticated look, and it has a palm rest with tall legs, which makes the keyboard comfortable to use.

The keys are arranged well, so my fingers didn't feel crowded as I typed, but the ENTER key is large, which affects the position of the keys around it. If you are used to the standard-sized ENTER key, this could take some adjusting. The soft-touch keys, however, were slightly



**Two Color (Blue/Red)  
Character-Illuminated Keyboard**  
\$39.99

Logisys  
www.logisys.com



sluggish and unresponsive, which meant it skipped a few letters keeping up with this speedy typist.

The hotkeys, which are lined up vertically on both sides of the keyboard, add to the elegant look of the keyboard rather than detract from it. There are 15 hotkeys (which are a combination of multimedia and Internet hotkeys) and a dial that adjusts the brightness of the illumination. Don't be fooled by what you read on the Logisys Web site and keyboard packaging, though. The dial doesn't control the volume, as the Web site claims; the volume hotkeys control the volume. Also, the packaging indicates there are application hotkeys for sleep mode, your My Computer folder, and the Windows calculator, but those keys didn't exist on my keyboard.

The red and blue illumination, however, is just as bright as the pricier Logitech Illuminated keyboard (which has white backlighting). The PS2 and USB interface options, along with the other features, make the Two Color (Blue/Red) Character-Illuminated Keyboard a decent illuminated keyboard for its price. ▲

**Specs:** 1.2 x 19.4 x 8.5 inches (HxWxD); backlit keys; 15 hotkeys; soft-touch key system

by Tessa Breneman

# Icy Dock EZ-Dock SATA HDD Docking Station

If you're like us, you probably have a few spare hard drives lying around gathering dust. But with Icy Dock's EZ-Dock docking station, you can put those idle drives to good use as an external hard drive.

The EZ-Dock's compact design supports both 3.5-inch and 2.5-inch SATA drives and lets you choose your interface; USB and eSATA are both supported with the onboard connectors. If you're using the USB 2.0 interface, the included USB Y-cable serves both data and power. If you're gunning for 3Gbps transfer rates, however, eSATA and the external power brick are the way to go.

I transferred 37.6GB of music and videos from a Vista machine to an 80GB Intel X25-M SATA SSD transferred data at 28.8MBps over an eSATA connection. As you'd expect, hot-swap is supported, and you can shut down the drive when you're not using it with the integrated

power button. The Windows- and Mac-compatible EZ-Dock comes with an attractive and hefty stand for fixed use and a carrying case with holes that provide instant access to all the necessary ports. The included eSATA cable was a nice bonus, as was the single-port eSATA bracket that you can use to turn a spare internal SATA port from your PC into an eSATA port. ▲

by Andrew Leibman

**Icy Dock EZ-Dock SATA  
HDD Docking Station**  
\$49.99

Icy Dock  
www.icydock.com



**Specs:** Supports 2.5-inch, 3.5-inch HDDs; eSATA, USB 2.0

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●● 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

# Solid-State Showdown

## Two RAM Leaders' SSDs Square Off

The solid-state storage market has really been heating up as of late, with a constant influx of faster—and sometimes more affordable—drives, in addition to firmware updates that enhance the performance of existing products. For example, fierce memory rivals Corsair and OCZ recently began offering new products designed to compete in a few performance categories with Intel's much-heralded X25-M, the Corsair P256 (model tested: CMFSSD-256GBG2D), and the OCZ Vertex Series SATA II SSD (model tested: OCZSSD2-1VTX120G), respectively.

The Corsair P256 and OCZ Vertex Series drives share some similarities, namely their 2.5-inch form factors, SATA 3Gbps interfaces, and Samsung MLC NAND flash memory chips that reside at the hearts of the drives. Setting up the drives was simple and straightforward. And neither exhibited any compatibility problems with Intel-, Nvidia-, or AMD-based southbridges on various Gigabyte- or Asus-built motherboards.

But each uses a different controller technology to manage the data being sent to and retrieved from the drive, which results in drastically different performance, as you'll see in our benchmark results.

As its name suggests, the Corsair P256 is a 256GB SSD. It features a sturdy, brushed aluminum shell, which encases a new Samsung S3C29RBB01-YK40 drive controller and double-stacked flash memory, as well as 64MB of onboard cache. The OCZ Vertex Series drives, which are available in capacities ranging from 30 to 250GB, also sport 64MB of cache and hard metal casings, but the OCZ drives use Indilinx IDX110M00-LC drive controllers.

As our performance chart shows, the Corsair P256 trailed the OCZ Vertex Series drive in average read and write speeds but pulled ahead in burst speed and random

access time. And although both drives blow past Intel's X25-M in terms of average sequential write speeds, neither could come close to the excellent X25-M in random writes, as is evident by the Intel drive's dominant performance in the IOMeter tests. Both Corsair and OCZ S drives' performance is a significant step up from traditional hard drives.

One area where the Corsair P256 and OCZ Vertex Series 120GB drives (sort of) blow away Intel is price. The 256GB P256's \$699 and the 120GB OCZ Vertex Series' \$345 price tags are higher than Intel's \$319 80GB X25-M. Those prices, however, equate to a \$2.73 and a \$2.87 cost per gigabyte for the Corsair and OCZ drives, respectively. The Intel X25-M commands a hefty \$3.98 per gigabyte.

Intel's X25-M drive is still the cream of the crop when it comes to overall system

### P256 CMFSSD-256GBG2D

\$699

Corsair

www.corsairmicro.com



**Specs:** Capacity: 256GB; Interface: SATA 3Gbps; Storage technology: MLC NAND Flash; Read: 220MBps, Write: 200MBps (sequential); Cache: 64MB; Form Factor: 2.5-inch; 1 million hours MTBF

### Vertex Series OCZSSD2-1VTX120G

\$345

OCZ Technology

www.ocztechnology.com



**Specs:** Capacity: 120GB; Interface: SATA 3Gbps; Storage technology: MLC NAND Flash; Read: 250MBps, Write: 180MBps (sequential); Cache: 64MB; Form Factor: 2.5-inch; 1.5 million hours MTBF

performance, but the Corsair P256 and OCZ Vertex Series drives are excellent performers in their own right and offer higher capacities at a significantly lower cost per gigabyte. ▲

by Marco Chiappetta

## Benchmark Numbers

	Corsair P256 CMFSSD-256GBG2D 256GB	Vertex Series OCZSSD2-1VTX120G 120GB	Intel X25-M 80GB
<b>HD Tach RW</b>			
Average read (MBps)	178.1	228.6	235.1
Average write (MBps)	152.5	189.4	78
Burst speed (MBps)	248.5	193.6	260.3
Random access (ms)	0.1	0.1	0.1
CPU utilization	2%	2%	1%
<b>IOMeter (Default Access Pattern)</b>			
Total IOPS	4345.79	4850.96	12108.37
Total MBps	7.23	9.48	23.61
Average response time (ms)	0.29	0.205	0.082
Max response time (ms)	6.01	6.32	2.15
CPU utilization	1.87%	2.08%	5.21%
<b>SiSoft Sandra Physical Disk Benchmark</b>			
Drive index (MBps)	235	243.63	234.88
Random access time (µs)	10	50	100

**Test system specs:** Intel Core i7-920 2.66GHz, 6GB OCZ

DDR3-1333, Gigabyte EX58-Extreme (ICH10R), Windows Vista Ultimate SP1



# Sapphire Vapor-X Radeon HD 4870

It's evident from the box that the Sapphire Radeon HD 4870's Vapor-X feature is a big deal. Vapor-X is a newer feature from Sapphire that gives the Radeon HD 4870 superior cooling and quieter operation. Without delving into specifics, Vapor-X technology is similar to a heatpipe, using a hot, flat surface over which a liquid coolant is vaporized and then condensed, all within a small chamber mounted on the card.

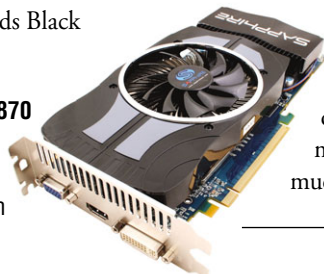
The Radeon HD 4870 is built on a custom PCB that adds Black Diamond chokes and

## Vapor-X Radeon HD 4870

\$259.99

Sapphire

www.sapphiretech.com



high-polymer capacitors, which make this card cooler, more power-efficient, and more reliable. The Vapor-X also has an HDMI output with 7.1 surround-sound support.

Benchmark scores for the Radeon HD were relatively predictable for a card of its caliber. 3DMark Vantage ranked at P9936, while Crysis Warhead scored almost 10fps at 2,560 x 1,600 resolution. Far Cry 2 posted slightly lower than expected, with about 31fps at 1,920 x 1,080 and almost 23fps at the highest resolution.

Overall, Sapphire's take on the Radeon 4870 is a winner, especially considering its reduced price tag compared to other manufacturers who are charging as much or more for inferior specs. ▲

by Kris Glaser

## Benchmark Numbers

### Sapphire Vapor-X Radeon HD 4870

3DMark Vantage Overall	P9936
3DMark GPU Score	8710
GPU1 (fps)	24.95
GPU2 (fps)	26.1
3DMark CPU Score	17106
Crysis 1.1 (no AA)	21.06
Crysis Warhead	1,920 x 17.25
Far Cry 2	1,080 x 31.09
World in Conflict (4XAA)	47
Crysis 1.1 (no AA)	12.1
Crysis Warhead (4XAA)	2,560 x 9.92
Far Cry 2 (4XAA)	1,600 x 22.72
World In Conflict 1.005 (4XAA)	26

**Specs:** GPU: Sapphire Radeon HD 4870; Core clock: 750MHz; Memory: 2GB GDDR5 (900MHz; 800 stream processors)

**Test system specs:** 2.66GHz Intel i7-920; MSI X58 Eclipse; 3GB DDR3-1600, 74GB WD Raptor; Corsair HX1000W PSU.

# Auzentech X-Fi Forte 7.1

Whether you're building the ultimate gaming machine or configuring the best movie-viewing setup, graphics capability is likely at the forefront of your mind. But getting the most out of your media requires a sound card with the best in audio fidelity, and Auzentech's X-Fi Forte 7.1 is just that.

The Forte 7.1 builds on Auzentech's previous sound card, the Prelude 7.1. The major difference between the two cards lies in the Forte's PCI-E interface, which offers a higher throughput than the Prelude's PCI interface. Like the Prelude, the new Forte sports Creative's X-Fi chipset, but receives a boost with updated circuitry and components, including EAX 5.0 support.

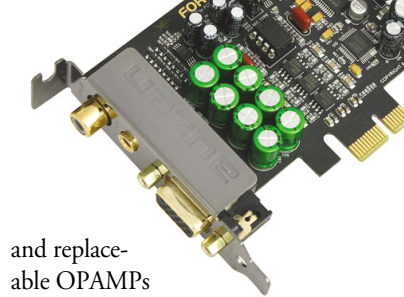
The Forte has a 120dB D/A converter, headphone amplifier, and microphone pre-amp. It also features 64MB of X-RAM. Other worthwhile specs to mention include the 15-pin analog I/O multicable

## X-Fi Forte 7.1

\$149.99

Auzentech

www.auzentech.com



and replaceable OPAMPs (operational amplifiers) for the front left and right audio.

Installation was a cinch. The card is shipped with a low-profile bracket—perfect for fitting into HTPCs. But we tested the Forte in a desktop computer, so we attached the standard bracket that is included in the package. To switch brackets, we had to

remove a single Philips head screw and two jack screws. It's worth mentioning that you'll need a 3/16 nut driver for the jack screws, a tool that not everyone will have lying around.

We tested the Forte 7.1 using M-Audio's Studiophile AV 40 reference speaker system. We were quite impressed with the clarity and intensity of the sound. There was a significant difference from our system's onboard audio, and by tweaking the options in the included audio software, we were able to customize the audio.

The software was easy to use, with Entertainment, Game, and Audio Creation modes. The Entertainment and Game modes were pretty intuitive, with a basic volume wheel and equalizers. The Audio Creation mode was much more involved and should be reserved for advanced (or meticulous) users, as there are far more options to configure, including dB levels for all speakers and auxiliary effects. ▲

by Kris Glaser

**Specs:** Interface: PCI-E 1.1; Speaker/headphone connections: Stereo to 7.1; Analog I/O Multi Connector (3.5mm Line In/Mic In/Side, Rear, Center, Front); 64MB X-RAM.

# Anand's Corner

by Anand Lal Shimpi

## Why AMD Wins At \$200 But Loses At \$300 & \$70

So, this is kinda interesting. AMD just introduced the Phenom II X4 955, and at its price point, it's very competitive. The chip retails for \$245 and, as it turns out, is faster than any Core 2 Quad that's similar in price. Even AMD's Phenom II X3 720 has the performance-per-dollar advantage at its price point. Where AMD can't compete is at Nehalem's price points, anything priced at \$284 or higher.

AMD's dominance doesn't extend all the way to the bottom of the price ladder, either. In addition to the Phenom II X4 955, AMD just released the Athlon X2 7850, priced at \$69. A very affordable CPU, yes, but it doesn't compare well with its closest competitor, Intel's Pentium E5300, in terms of price/performance.

Why is it that AMD is competitive in one price band but not another? Or, looked at from the opposite perspective, how can Intel dominate performance at one end but not at another? As you can guess, it boils down to having a multitude of architectures in the market at the same time.

Intel's high-end processors are truly next-gen where performance is concerned. The Core i7 starts at \$284 and goes all the way up to \$999, and AMD simply can't outperform those chips. In some situations it gets close, but overall, Core i7 offers a 0 to 40% performance advantage over the best of the rest.

Unfortunately, the Core i7's underlying Nehalem architecture won't make its way into mainstream parts until the last quarter of this year. It's unclear what Intel will call the mainstream version, but most are speculating that it'll carry the Core i5 name.

The i5 should be able to compete quite well with AMD's Phenom II, but given that it won't be out until sometime around October, that leaves Intel's Core 2-based CPUs to compete with Phenom II. Clock-for-clock, Intel has the advantage, however, AMD is very aggressive on its pricing, and Intel fully intends to keep turning a

profit even in poor economic times. The end result is what happened with the Phenom II X4 955; AMD's 3.2GHz offering competes with Intel's 2.83GHz Core 2 Quad Q9550. It keeps the marketplace competitive for the consumer, but AMD turned in a hefty loss on its earnings last quarter, so it's not an approach the company can keep up for long.

Move down in price again, and this time AMD's architecture is the one that changes. Phenom II CPUs are built using AMD's 45nm process on a die that's nearly as large as Nehalem's; there's simply no way they could be sold for under \$100 at this point. Instead, AMD is rebadging last year's Phenom processors as Athlon X2s. These things are 65nm quad-core chips with two cores disabled. The dies are too big to be sold for under \$100, but after Phenom II, no one really wants an original, so AMD has no other option than to rebrand them as dual-core Athlon processors.

Intel doesn't switch architectures as you drop down to the \$70 price point. The Pentium processor is a Core 2 derivative, albeit with less cache. At around \$70, you've got the Athlon X2 7850 and Intel's Pentium E5300. In pretty much all application benchmarks, Intel takes the win there. The notable exception is gaming performance, where AMD is the winner. Intel has the lower power consumption, as you're getting a small 45nm die instead of a large used-to-be-a-quad-core 65nm die. I'd say that Intel is the victor at \$70, but that all depends on whether you're building a gaming machine.

Over the next six to 12 months, we'll see both manufacturers try to transition all of their CPUs to the same architecture, which may make things more clear-cut. Until then, that's why the world performs the way it does. ▲



*Anand Lal Shimpi has turned a fledgling personal page on GeoCities.com into one of the world's most visited and trusted PC hardware sites. Anand started his site in 1997 at just 14 years old and has since been featured in USA Today, CBS' "48 Hours," and Fortune. His site—[www.anandtech.com](http://www.anandtech.com)—receives more than 55 million page views and is read by more than 2 million readers per month.*

Talk back to Anand at [anand@cpumag.com](mailto:anand@cpumag.com)



# PC Modder

## Tips & Tutorials

Modding does the body good. A PC's body anyway, inside and out. Here you'll find hardware, firmware, tools, tips, and tutorials for modding your rig's performance and appearance. Send us your own mod-related tips and ideas at [modding@cpumag.com](mailto:modding@cpumag.com).

Modding enthusiasts have a penchant for the latest toys. Fast processors, powerful video cards, silent SFF enclosures, and radically lit motherboards are all fair game when it comes to a modder's creative mind. Recognizing the appeal of unconventional customization, an entire industry has emerged to support the community.

### Mods & Ends

#### Lian Li EX-H34

Power users who want the ability to swap multiple hard drives into and out of a system at a moment's notice may be intrigued by Lian Li's new EX-H34 SATA hard drive rack (\$72.99; [www.xoxide.com](http://www.xoxide.com)). The EX-H34, which is available with a black or silver finish, is a sleek-looking drive rack that mounts in three adjacent 5.25-inch drive bays. Although the EX-H34's aesthetics match many of Lian Li's current cases, it is compatible with most other brands, as well.

At the back of the EX-H34 is a low-rpm, low-noise 120mm cooling fan with a washable air filter. The front is a door that opens up to reveal the hard drive



The Lian Li EX-Hxx series of hot-swappable hard drive racks makes it quick and easy to swap out hard drives on the fly.

mounting slots. The device supports up to four standard 3.5-inch SATA hard drives, which are secured in place by aluminum rails with protruding handles. To add a drive, simply fasten one of the rails to it, and it will slide into the rack; yank the handle to pull it out. Smaller racks compatible with only two (EX-H22) or three (EX-H33) drives are also available.

#### Thermaltake S Orb

There is a slew of enhanced cooling accessories available for high-end graphics cards out there, but cards that fall into more mainstream market segments don't always receive much attention. Thermaltake, however, has released the S Orb GPU cooler (\$49.99; [www.thermatakeusa.com](http://www.thermatakeusa.com)), designed for some of the more affordable graphics cards currently on the market.

The S Orb has a near-universal mounting bracket design that is compatible with a bevy of AMD- and Nvidia-based graphics cards, including Radeon cards dating back to the X800 series (and up to today's HD 4850) and GeForce cards from the FX 5700 to the 9600 GT.



Thermaltake's S Orb GPU cooler is compatible with a broad range of Nvidia- and AMD-based mainstream graphics cards.

The cooler features two curved copper heatpipes that run through a polished copper base to form what looks like an "S" shape. The heatpipes also have plenty of aluminum fins attached. A quiet 80mm fan sits in the middle of the heatsink fins to keep the GPU cool. Thermaltake also includes heatsinks for the graphics card's memory chips.

#### Cooljag Falcon-2 CPU Cooler

Users in need of a high-performing, low-noise, low-profile cooler for Intel processors have a new option to consider: Cooljag's Falcon-2 (\$39.99; [www.xoxide.com](http://www.xoxide.com)). Compatible with Intel LGA 775, 1366, and upcoming 1156 processor sockets, the Falcon-2 features four copper heatpipes, a solid-copper base, and aluminum cooling fins stacked in a low-profile array. A 120mm variable-speed PWM (pulse-width modulated) fan (approximately 500 to 2,000rpm) is also included with the Falcon-2, which, according to its specifications, outputs only 15-25dBA, making this cooler a good fit for HTPCs or SFF PCs.

### Fashionably Fresh Firmware

#### TrendNet TEW-453APB (v2303)

An update for the TrendNet TEW-453APB enhances WPA2 and WPA/WPA2 mix modes. The update improves WMM support and adds Universal Client and Universal Repeater modes.

[www.trendnet.com](http://www.trendnet.com)

#### Thecus N8800 (v2.01.08)

A firmware update for the Thecus N8800 NAS server fixes a CPU fan speed-detection issue, changes the S.M.A.R.T. information displayed in the Disk Status section of the interface, and adds XFS support while building a RAID volume, among other features.

[www.thecus.com](http://www.thecus.com)

#### LG BE06LU10 (vYE05)

LG's recent update to the BE06LU10 external Blu-ray drive improves write performance on new types of BD-R and BD-RE media.

[www.lgservice.com](http://www.lgservice.com)

by Marco Chiappetta



# Performance for Players



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# TRENDnet®



# Tri-Core Transformer

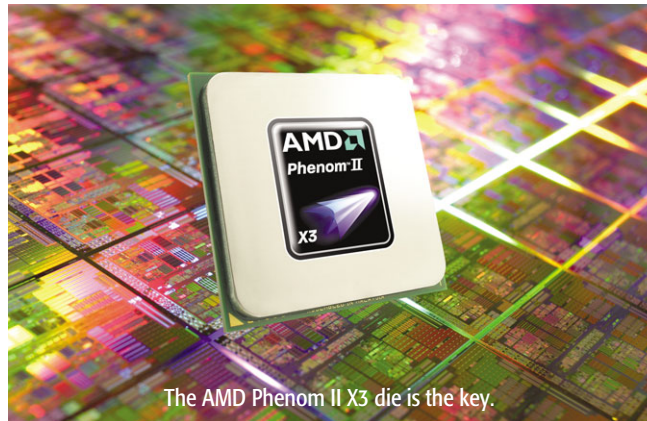
Turn A Phenom II X3 Into An X4

Back on Feb. 9, AMD launched a handful of AM3 Phenom II processors built using the firm's latest 45nm manufacturing process. We came away from our initial testing satisfied that AMD had a real winner on its hands in both the Phenom II X3 and X4 processors. The new CPUs launched at higher initial clocks than their predecessors and also exhibited significantly more overclocking headroom. Add the multiplier-unlocked Black Edition models and prices that put the squeeze on some of Intel's midrange offerings, and you have all the makings for a successful product.

But two weeks later, the Korean hardware site Playwares ([www.playwares.com](http://www.playwares.com)) discovered a somewhat obscure BIOS setting available on some AMD chipset motherboards that, when set to Auto, would turn select tri-core Phenom II processors into fully operational quad-cores. As the news filtered through the enthusiast community, others began reporting success with certain motherboards and processors while sales of AMD's Phenom II processors started to take off. DigiTimes ([www.digitimes.com](http://www.digitimes.com)) reported high demand for AMD's new Phenoms, and motherboard makers claimed AMD could earn up to a 30% share of the global desktop CPU market in Q2 (up from a previous 20%). There's no data to show a direct correlation, but the exploit couldn't have hurt the Phenom II's popularity.

We contacted AMD to get its take. Product Manager Damon Muzny responds, "We're quite excited by the attention and interest folks are showing in the new 45nm Phenom II processors, especially for our Black Edition X3s and X4s."

And AMD should be proud of its Phenom IIs. But if there's a chance of



getting a quad-core Phenom II for \$145 or \$125, well, that's just icing on the cake. Read on as we cut through the speculation and attempt to unlock a Phenom II X3 and show you what it takes to do it yourself.

## Quad-Core Caveat Emptor

This is the part of the show where we tell you that although it's possible for you to replicate our successes (more on those later), it's also more than likely that you'll replicate our failures (more on this, too). Every three-core processor has four cores, but the disabled core presumably didn't pass validation testing and was disabled for that reason. Even if you manage to unlock this core, it may be unstable, negatively impact your system performance, and could cause your system to become unbootable. Should you be one of the lucky few who manages to get a fully functioning

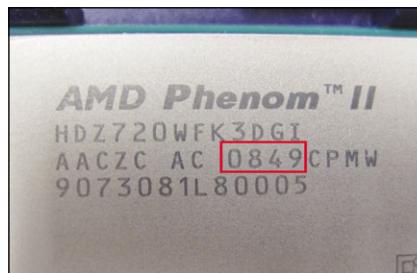
quad-core CPU from your Phenom II X3, it will draw significantly more than its rated 95W (expect closer to 125W under full load). Enabling the fourth core would likely also void your warranty and has the potential to shorten the life of your hardware. Having said that, let's dig in.

## Platform Prerequisites

The first thing you need is a Phenom II X3 processor, of which there are currently two: the 2.6GHz Phenom II X3 710 and the 2.8GHz Phenom II X3 720 Black Edition. We had a 720 in house that AMD sent us for the initial launch of the series, but we asked the firm to send us a 710, as well.

But not just any old Phenom II X3 will do. According to the information we've been able to uncover, only 720 and 710 processors from batches manufactured on certain dates have any success with the exploit. Playwares achieved its results using processors manufactured in the fourth week of 2009, while other sources claimed varying degrees of success with processors dated in the 46th and 51st weeks of 2008 and the fourth and sixth weeks of 2009.

To determine if a given Phenom II X3 processor has a good chance of working with this exploit, you'll need to look at the three rows of alphanumeric characters that make up the part number etched into the CPU's heatspreader. Pay particular attention to the far right block of four numbers followed by four letters in the middle row. For our Phenom II X3 720, the number is 0849CPMW, while the 710's number is 0906MPMW. The numbers refer to the week the die was manufactured. For instance, our 720 was manufactured in the 49th week of 2008, and the 710 was manufactured in the sixth week of 2009.



Only certain Phenom II X3 batches work with the exploit.

Despite the fact that only the 710's date batch had any reports of success, we resolved to try both processors.

Regarding a motherboard, you will need one with the AMD 790FX or GX chipset, particularly one that features the

SB750 Southbridge, and a BIOS that supports ACC (Advanced Clock Calibration), the feature that enables the system to recognize the fourth core of an X3 processor. (See the "X3-Unlocking Motherboards" sidebar for a list of compatible

motherboards.) At press time, a German site ([www.hwbox.gr](http://www.hwbox.gr)) also reported success using the Nvidia chipset-based Gigabyte GA-M720-US3 paired with a beta BIOS. Because the first site to report the exploit, Playwares, used the Biostar TA790GX 128M, we decided to use that motherboard as the platform for our testing.

### Try, Try Again

Our system consists of the Phenom II X3 710 and 720, a Cooler Master V8 CPU cooler, Biostar TA790GX 128M (AMD 790GX + SB750) motherboard, 2GB Corsair TWIN2X2048-6400C4 (2x 1GB, DDR2-800) SDRAM, ATI Radeon HD 4890 graphics card, PC Power & Cooling Silencer 500 EPS12V power supply, and a 1TB Western Digital Caviar Black

## Unlocked & Overclocked

We ran our system through a series of CPU-intensive synthetic and real-world benchmarks to give you an idea of how the Phenom II X3 710 will perform at stock settings with the fourth core unlocked, and unlocked and overclocked for maximum performance. The three columns on the right show you performance increases in green, performance drops in red, and no change in gray. The leftmost column shows the difference between the Phenom II X3 710 at stock settings and the same processor with the fourth core unlocked. The middle column shows you the dramatic increases you can get from a Phenom II X3 if you manage to successfully unlock it and overclock it modestly to 3.2GHz. Notice the abundance of green? The rightmost column shows you the gains you get between the 710 with the fourth core unlocked vs. the same unlocked processor overclocked.

3DMark Vantage	AMD Phenom II X3 710	AMD Phenom II X3 710 (unlocked)	AMD Phenom II X3 710 (unlocked @3.2GHz)	Stock 710 vs. Stock 710 unlocked	Stock 710 vs. 710 unlocked & OCed	710 unlocked vs. 710 unlocked & OCed
Overall	P8924	P9750	P10522	9.26%	17.91%	7.92%
GPU Score	10024	10020	10338	-0.04%	3.13%	3.17%
GPU1 (fps)	28.83	28.67	30	-0.55%	4.06%	4.64%
GPU2 (fps)	29.92	30.06	30.58	0.47%	2.21%	1.73%
CPU Score	6713	9021	11116	34.38%	65.59%	23.22%
CPU1 (Plans/s)	863.67	1159.51	1444.9	34.25%	67.30%	24.61%
CPU2 (Steps/s)	10.54	14.19	17.08	34.63%	62.05%	20.37%
PCMark Vantage Pro 1.0						
Overall	5158	5476	6458	6.17%	25.20%	17.93%
Memories	4486	4992	5706	11.28%	27.20%	14.30%
TV And Movies	3640	4206	4931	15.55%	35.47%	17.24%
Gaming	4908	5382	6178	9.66%	25.88%	14.79%
Music	4166	4626	4456	11.04%	6.96%	-3.67%
Communications	4398	4466	6115	1.55%	39.04%	36.92%
Productivity	5110	5129	5675	0.37%	11.06%	10.65%
HDD	4772	4851	4817	1.66%	0.94%	-0.70%
POV-Ray 3.7 Beta 31	1622.33pps	2142.01pps	2647.57pps	32.03%	63.20%	23.60%
WinRAR 3.71	2:38	2:22	2:12	10.13%	16.46%	7.04%
Dr. DivX	5:49	5:38	4:32	3.15%	22.06%	19.53%
Cinebench 10						
Multithreaded (min:sec)	2:16	1:44	1:24	23.53%	38.24%	19.23%
Multithreaded (score)	6484	8448	10406	30.29%	60.49%	23.18%
SiSoft Sandra Lite 2009 SP2						
Processor Arithmetic						
Dhrystone ALU (GIPS)	26.62	35.36	43.32	32.83%	62.73%	22.51%
Whetstone iSSE3 (GFLOPS)	25.61	34.15	41.72	33.35%	62.91%	22.17%
Processor Multi-Media						
Int x8 aSSE2 (MPixels/s)	75.81	101.59	124.57	34.01%	64.32%	22.62%
Float x4 iSSE2 (MPixels/s)	33.37	44.51	54.55	33.38%	63.47%	22.56%
Double x2 iSSE2 (Mpixels/s)	18.27	24.32	29.85	33.11%	63.38%	22.74%
Memory Bandwidth						
Int Buff'd iSSE2 (GBps)	9.61	9.82	12.57	2.19%	30.80%	28.00%
Float Buff'd iSSE2 (GBps)	9.63	9.80	12.57	1.77%	30.53%	28.27%
Games						
Far Cry 2	48.97fps	50.34fps	64.41fps	2.80%	31.53%	27.95%
World in Conflict (4XAA, 4XAF)	32fps	32fps	42fps	0%	31.25%	31.25%



WD1001FALS hard drive. The Biostar motherboard's BIOS is version 2.61, and Windows Vista Ultimate is our OS.

We started with the higher-performing processor first, the 2.8GHz Phenom II 720 Black Edition. We installed it into the system, entered the BIOS Setup Utility, navigated to the Advanced tab, selected CPU Configuration, scrolled to the bottom of the page to highlight Advanced Clock Calibration, and set it to Auto. After saving the changes and restarting, the PC wouldn't budge from a black screen, failing to boot or even begin the POST. We pressed CTRL-ALT-DELETE and tried to reboot, and again, the system failed to even initialize the display. This unsurprising result is likely to happen when you turn on ACC with most Phenom II X3s that aren't from one of the magic batches.

According to a product manager from a prominent motherboard manufacturer, "The original function of Advanced Clock Calibration is to sync the different speeds of each core of a multicore processor—to help when overclocking the original Phenom processors. Prior to the launch of the Phenom IIs, and before the

are actually X4 cores, and . . . the ones that fail in certain cores, instead of throwing them away, [the chip maker] just disables [the core] with a register that they add in, and in certain date codes, [AMD's] manufacturing plant failed to add that register." Then presumably, stability concerns notwithstanding, this exploit should work on every processor from those certain date batches? "Yes. Actually, we've known about this for some time." When pressed for when the ACC exploit first came to his attention, our contact explains, "I seem to remember seeing something about this in . . . November or December."

Armed with renewed confidence and one more Phenom II X3 processor to test, we cleared the CMOS, removed our stubborn Phenom II X3 720 Black Edition, installed the Phenom II X3 710, switched ACC to Auto, crossed our fingers, and restarted. Almost immediately, we were greeted with a positive sign, as the POST displayed our CPU as an "AMD Phenom II X4 10 Processor." In Windows, a pop-up informed us that device driver software installed successfully for an "AMD Phenom II X4 10 Processor." CPU-Z also confirmed that although we were running a Deneb-based Phenom II X3 710, it was equipped with four cores and capable of handling four threads.

To determine if a heavy load would trip up our new quad-core, we ran Prime95 on all four cores for an extended period, and it breezed through with flying colors. We ran our suite of processor-stressing benchmarks, and the system remained stable throughout. Better than stable: In benchmarks that scale well between multiple cores, our unlocked Phenom II X3 710 was performing in line with what we'd expect from a quad-core Phenom II. Check out the "Unlocked & Overclocked" chart to see the numbers.

Having proven that our Phenom II X3 710 can be unlocked to take advantage of its dormant fourth core, we decided to push our luck a bit and overclock it. Although we wanted to get as much performance out of the chip as possible, we were also wary of pushing the thermal envelope too much. We managed to get stable

## X3-Unlocking Motherboards

Here's a list of motherboards that reportedly feature the SB750 Southbridge and the requisite ACC setting in the BIOS.

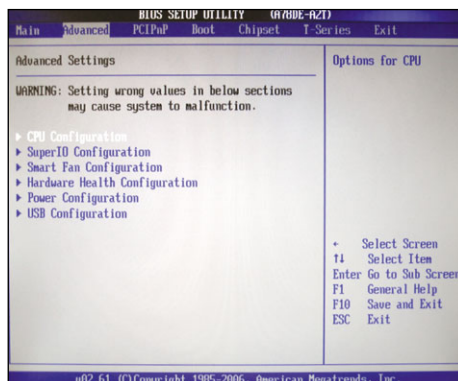
- ASRock AOD790GX/128M
- ASRock M3A790GXH/128M
- Asus M3A79-T Deluxe
- Asus M4A79-T Deluxe
- Biostar TA790GX3 A2+
- Biostar TA790GX 128M
- DFI LANParty DK790FXB-M2RS
- Gigabyte GA-MA790GP-DS4H
- Gigabyte GA-MA790GP-UD4
- Gigabyte GA-MA790GP-UD4H
- Gigabyte GA-MA790FXT-UD5P

performance at 3.18GHz by tuning the CPU HyperTransport clock to 245MHz, increasing the northbridge frequency to 2,000MHz and giving the CPU an additional 0.125V to work with. As a result, our unlocked and overclocked Phenom II X3 710 outperformed AMD's Phenom II X4 940 Black Edition (see page 43 in *CPU's* March 2009 issue), a processor that—as we went to press—was selling for close to \$100 more than the Phenom II X3 710.

### Four Is Better Than Three

As hacks, mods, and exploits go, unlocking the fourth core on a Phenom II X3 processor is about as easy as it gets. Unfortunately, the hard part is just getting your hands on a processor from the batch missing the fourth core disable register. Unless you can find an online retailer that will reveal the batch numbers prior to purchase, there's no way to know if you're getting an X3 from an exploitable batch. On the other hand, our winning 710 is one of the more recent X3s to show success, so there's a possibility that any X3 that has a stable fourth core will work. ▲

by Andrew Leibman



ACC is found in the CPU Configuration menu.

tech press discovered ACC's special new ability, an AMD product manager had this to say about ACC: "Things learned through developing ACC with the 65nm Phenom were baked into our new 45nm Phenom II silicon. . . . You can just as well leave ACC off for Phenom II [overclocking] testing."

Our unnamed source tells us his theory as to why ACC unlocks the fourth core of Phenom II X3 processors. "These X3 cores

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# Mad Reader *MOD*



## Give Us Your Mod

Have a computer mod that will bring tears to our eyes? Email photos and a description to [madreadermad@cpumag.com](mailto:madreadermad@cpumag.com). We're looking for rigs that are recognizable as PCs; your Wookiee mod won't find a home here. If we include your system in our "Mad Reader Mod" section, we'll help you load up your modder's toolbox with \$1,500 and a one-year subscription to *CPU*.



## Egypt Mod

Chris “jadragon” Kramer’s Egypt Mod nearly slipped through the cracks; he submitted it in August 2007 after completing the work in the summer of 2006, and somehow we missed it until stumbling across his submission a couple months ago. You can no doubt see why we’re glad we found it.

The aptly named Egypt Mod looks cool at a glance, but unless you know what to look for, you might not appreciate just how insanely detailed and authentic this mod is. Kramer researched his theme meticulously and found that many ancient Egyptian tombs are carved from limestone bedrock, so he found smooth-grain natural limestone floor tiles he could use to build the shell around the frame of a NZXT Nemesis case. The hieroglyphics

are painstakingly carved into the limestone, inspired by passages like this one that Kramer discovered in “The Egyptian Book of the Dead,” by E.A. Wallis Budge: “I am a shining being, and a dweller in light who hath been created and hath come into existence from the limbs of the god.”

As impressive as the limestone is, it’s only the beginning. Kramer spent years as a lapidary and jeweler. He brought his considerable skills to bear in adorning the Egypt Mod with gemstone inlays of lapis lazuli, opal, malachite, carnelian, turquoise, brass, and gold leaf.

Kramer says he spent about 200 hours on the case, prepping the NZXT frame, affixing the limestone, creating and hanging the front bay doors (which close on brass hinges; the top door

stays closed thanks to a hidden magnet latch), carving the hieroglyphics and the hunt and chariot scenes, and crafting the inlays. Kramer attached the limestone to the case using silicon adhesive; he removed the front bezel and replaced it with a custom frame of aluminum tubing for the drive bays and wired the Nemesis’ power and hard drive LEDs so they light up gemstones on the case’s front panel.

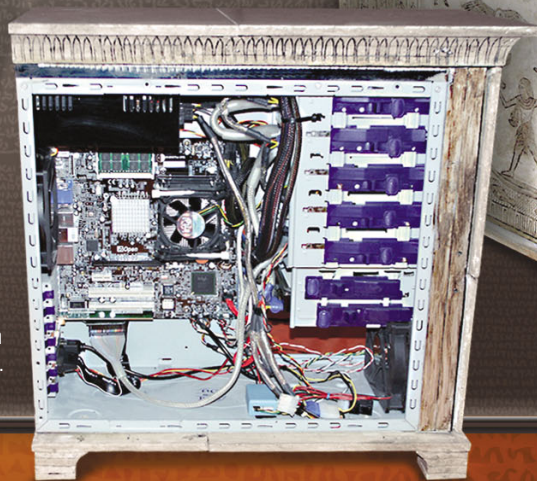
Kramer’s third case mod, the Egypt Mod weighs 96 pounds, and Kramer confirms that he’s learned to lift with his legs, not his back. His other projects include a Tron-themed mod, which trades limestone for Plexiglas, and a steampunk case he hopes to have finished by the end of the year. We’ll be watching, Chris.

Egypt Mod’s front panel doors are elaborate constructs of limestone, gems, and brass, held in place by hidden magnetic latches.

A case constructed of such precious materials needs a fitting guardian. Anubis, gatekeeper and ruler of the underworld, will probably do the trick.



Kramer powers his mod with a mobile, Socket 479 Intel Core Duo T2300 and 2GB of DDR2 plugged into an AOpen i945GTm-VHL motherboard.





Get informed answers to your advanced technical questions from *CPU*. Send your questions along with a phone and/or fax number, so we can contact you if necessary, to [q&a@cpumag.com](mailto:q&a@cpumag.com). Please include all pertinent system information.

“ Anything that  
gets in the way  
of gameplay and  
immersion just  
doesn't cut it. ”

*Each month we dig deep into the mailbag here at CPU in an effort to answer your most pressing technical questions. Want some advice on your next purchase or upgrade? Have a ghost in your machine? Are BSODs making your life miserable? CPU's "Advanced Q&A Corner" is here for you.*

**Mike G. asked:** I was just wondering what the technical “requirements” are for an improvement from a previous generation of DDR. What I mean to say is that I have read plenty about DDR3 having little to no benefit from DDR2 in desktops. And when the Athlon64 only had a DDR memory controller (in the Socket 939 days) many people said the same thing about Intel moving to DDR2.

Now, the contrast of that is video cards. They seem to (or reviewers claim) benefit from a new generation of DDR. For example, in your AMD Radeon HD 4850 volt mod article (see page 41 in the May 2009 issue of *CPU*), you mention some of the clock ceilings are imposed by the fact that the 4870 uses DDR5 as opposed to the 4850, which uses DDR3. What is the deal with memory manufacturers and the seemingly pointless/totally unnecessary march toward newer iterations of DDR memory?

**A:** We can understand your confusion, Mike, but must stress that there is a point to each new generation of DDR memory. As you mentioned, there was little reason to upgrade to DDR2, or to DDR3, when each new iteration was *first* introduced on the desktop. When DDR2 and DDR3 system memory first hit the scene, it offered little to no additional performance. But over time, it became clear why each new generation was introduced. Just look at the maximum speed ratings that are widely available for each memory type at your favorite online retailer. Standard DDR system memory peaked at about 400MHz (give or take a few MHz). DDR2 leveled off at about 1,200MHz. And DDR3 is still going strong at speeds over 2,100MHz.

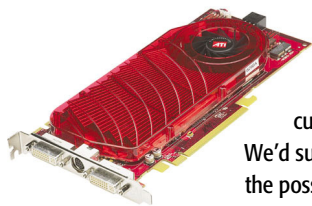
When used in a platform that can take better advantage of the additional bandwidth afforded by the higher memory frequencies, it absolutely has a measurable impact on performance. You see, the changes brought forth with each new generation of DDR were more about reducing power requirements and improving signal integrity, with the ultimate goal of attaining higher clock speeds. And in that respect, each new version of DDR system memory has been a marked improvement over its predecessors.

GDDR5 memory's benefits over GDDR3, however, were immediately apparent upon its introduction. It's true that GDDR5 is an evolution of GDDR3/4 technologies, but GDDR5 allows for shorter trace lengths, lower voltages, and most importantly, increased bandwidth. What makes GDDR5's ultimate bandwidth superior to

GDDR3/4 is that it offers double the I/O throughput with the same interface and clock speed.

For example, the Radeon HD 4850 initially shipped with 993MHz GDDR3. The Radeon HD 4870 used “slower” 900MHz GDDR5. And both cards had a 256-bit memory interface. But because GDDR5 can send twice the data per clock, it offered 1.8x the bandwidth on the 4870 (3.6Gbps vs. 2Gbps) than GDDR3 did on the 4850. The increased bandwidth offered by the GDDR5 memory used on the 4870, and the newer 4890, also allowed AMD to implement 256-bit memory interfaces on their high-end graphics cards, while Nvidia required 448-bit and 512-bit interfaces on the GTX series to offer similar bandwidth.

**Shawn T. asked:** I have been having graphics glitches recently during gaming and decided I best get some help on it before it makes me crazy. Over the past month or so, I started getting issues with some of my 3D games with what I would like to call texture skewing or texture artifacts. It started occurring in Far Cry 2, Medieval II: Total War, and Oblivion. Unfortunately, no steps I have taken thus far have cured these symptoms. However, it doesn't occur in other games I play (Rome: Total War, Unreal Tournery 2004). For graphics, I have a Radeon X1950 Pro 256MB card with no overclock on my GPU. I have tried several driver versions with it but with no success (currently Catalyst version 9.2). My issues never come up immediately upon playing the game, and the only games that it occurs in are the ones that are pretty intense on the card. Any clue what might be causing this? I've tuned up my machine several times, have updated drivers and OS patches, but it still happens during heavy-duty gaming with some of the new titles. It's driving me nuts! I want my Far Cry 2 looking as good as it gets.



It's highly unlikely that a Radeon X1950 Pro is producing Vsync texture-tearing artifacts in a cutting-edge game engine like Far Cry 2. We'd suggest looking at heat-related issues as the possible culprit of your texture anomalies.

**A:** Shawn, that's just not right. In fact, we're not surprised that you're reaching the point of frustration. Anything that gets in the way of gameplay and immersion just doesn't cut it. We feel your pain. Let's think about things a bit and back into a solution for you.

The obvious issue at hand here resides with the performance of your 3D graphics subsystem under gaming workloads, correct? In addition, you noted that this “texture skewing” is only present when you're playing more demanding game titles, such as Far Cry 2, Total War 2, and Oblivion, and not immediately but rather after the card is warmed up. Regardless, there are two primary reasons for texture artifacts in PC game environments, one of which is a hardware-related issue. The other occurs more in software.

In terms of troubleshooting, it's sometimes easiest to remedy the possibility of a software issue, so we'll tackle that first. We're not sure what resolution you're gaming at on your monitor, but it's possible (though admittedly not likely) that you're experiencing something called texture tearing. Remedying this situation is a simple switch in the game engine to enable Vsync; if it's not available there,

you can force it on in ATI's Catalyst driver control panel options. Enabling Vsync will cap the frame rate of your graphics card at 60fps, so it will be more in sync with your monitor's refresh rate.

Now, with all that out of the way, we don't necessarily think this is your issue. If it were a Vsync issue, you'd see this problem in lower-end games like Unreal Tournament 2004, as well. You noted your graphics card is an older model Radeon X1950 Pro. Relatively speaking, especially with respect to Far Cry 2, this graphics card is getting a bit too old now. As such, we're more suspect of overheating issues in this case. The graphics card you're running apparently is having this issue as a result of stress-related marginalities, which basically points to thermals.

A simple test would be to pull the side panel from your system and blow cool air across the motherboard with a room fan. If the texture artifacts go away, you've found your culprit: heat.

**Timbo asked:** I've been looking through the BIOS of my new Core i7 motherboard, and there sure are a lot of different settings to pick through these days. I'm running an Asus P6T6, and it has a lot of tweaking options like memory timings, voltage adjustment, and other options that are familiar compared to my Core 2 mainboard. However, there are a few Core i7-specific settings that I'm totally unfamiliar with. One of them is called the “Uncore” frequency, and I'm clueless as to what that does. Are there performance gains to be had by overclocking it, like I do the main core speed? It seems like the Core i7 is a fairly complex chip, and I want to tweak with both performance and stability in mind.

**A:** There's no question, overclocking the new Core i7 is a different ball of wax, as opposed to Intel's previous generation of Core 2 CPUs. The first thing to note is that your FSB frequency is no longer a “bus speed” but rather a “reference clock” that provides timing for every other subsystem on the chip including the system memory interface speed, QPI link, and Uncore frequency.

You can think of the Uncore frequency as a clock that is derived from that main reference clock but provides a timing source for other subcircuits of the chip, other than the CPU cores themselves. The Uncore frequency is the clock timing for things such as the Core i7 memory controller and the L2 cache. However, performance gains as a result of overclocking this section of the chip are not worth the risk of instability. It's best to set the reference clock speed and multiplier for the CPU cores to your desired target speed and then dial back the Uncore frequency multiplier to a lower setting that will provide better stability. The Uncore clock speed tends to be a bit twitchy at certain speeds; it's best to keep it in check while you scale up the core clocks—where the real performance gains are. The same can be said for the QPI link speed. In general, if you're overclocking the cores by dialing up the reference clock, select a lower QPI link multiplier to keep this clock speed on the chip within a more stable range. ▲

by Dave Altavilla and Marco Chiappetta,  
the experts over at HotHardware.com

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# X-Ray Vision

Fujifilm's 3D Digital Imaging System Brings Photos To Life

Digital cameras have become almost synonymous with photography in the past decade, supplanting film cameras. During that time, the quality of digital images has steadily improved as digital camera technology has matured. Today's digital images routinely contain 10 to 20 times as many megapixels as early digital cameras could produce.

Digital camera technologies are beginning to slow in terms of adding megapixels and increasing resolution, though. An Olympus Imaging manager said at the PMA 09 trade

show in March that he expects camera companies to begin focusing less on increasing resolution in future cameras, because 10 to 12 megapixels is more than enough for most consumer-level photographers. Such changes might mean the digital camera market is ready for The Next Big Thing, some sort of major technological change that will take still photography in a new direction.

Fujifilm hopes it currently is working on the technology that could change digital photography, called the FinePix Real 3D System. Real 3D involves photographing,

printing, and displaying images in three dimensions. Although Real 3D remains in the development stage, Fujifilm displayed a prototype camera at PMA 09. (Visit YouTube and search for "Fujifilm 3D camera" to find several videos of the prototype in use at various trade shows.)

## Working On 3D

Fujifilm has worked on its Real 3D System for the past five years. The company chose to move away from other companies' attempts at 3D photography in favor of a

## Fujifilm's 3D Technology



Although the Real 3D System involves a camera, LCD photo frame, and a printer, most of the research information Fujifilm has announced thus far involves the 3D camera (A). The prototype is shown here.

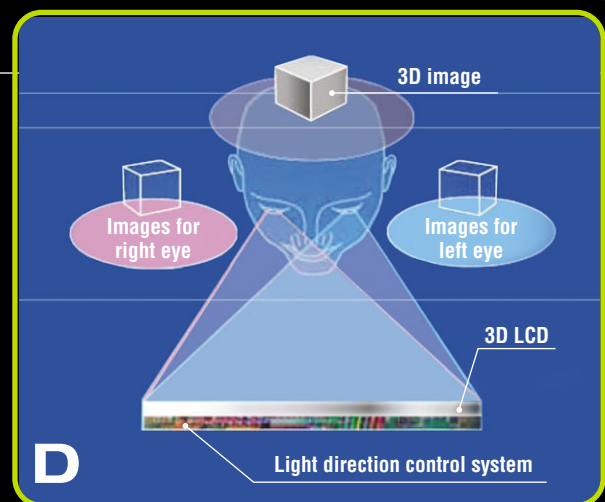
The 3D camera makes use of two identical Fuji lenses (B), each of which is connected to a separate image sensor. The two lenses snap two identically timed images from slightly different angles. When the images are blended, it yields the 3D effect.

The lenses are about 2.5 inches apart, which is similar to the distance between human eyes. The human brain is able to interpret a 3D environment because each human eye sees a slightly different image,

and, when the brain blends the images, it can interpret depth. If you cover one eye, judging depth becomes much more difficult.

The camera also can capture 2D images by shutting down one of the two lenses.

The heart of the 3D camera is a chip called **RP Processor 3D**. (RP is short for "real photo.") The RP processor (C) must blend the images from the two lenses to create the 3D image. It also must ensure synchronization of the two image sensors in terms of exposure, zoom, and focus. Finally, the RP processor ensures the camera's two shutters fire within 1/1,000th of a second of each other.



Without an image displayed, the 3D LCD looks like most LCDs, measuring 2.8 inches diagonally with 230,000 pixels of resolution. The 3D LCD can also display 2D images, and the 3D LCD on the back of the camera uses a technology similar to what would be found in Fujifilm's 3D digital photo frame, also being researched. The company has initially developed an 8.4-inch, 920,000-pixel 3D LCD photo frame.

At the back of the LCD system (D), Fujifilm uses a technology that it calls **light direction control**, which aims light from

each of the two images at each eye. The two images quickly switch back and forth, with a total of about 60fps. The switch occurs so quickly that the brain doesn't detect the switching. With each eye seeing a slightly different image, the brain blends the two images and creates a 3D effect.

Fujifilm also has announced plans for a 3D printing system, but the company hasn't revealed specific details about how the 3D prints will work, other than to indicate that they will require a special type of paper. ▲

Source: Fujifilm

new method. With past attempts at 3D imaging, users typically had to wear special glasses that create or help enhance the three-dimensional effect.

Fujifilm's Real 3D, though, requires no special glasses. Photographers would be able to view 3D images on the Real 3D camera's LCD screen. Without the need for glasses, the images seem to truly come alive.

The company hasn't officially specified a release date for the Real 3D System, although unofficial reports have hinted at a late 2009 release, starting in Japan.

### A Realistic Look At 3D's Future

3D digital photography looks like a very interesting technology. However, the consumer electronics market is littered with great technological ideas that never caught on with consumers. Two analysts are skeptical about how quickly Fujifilm's Real 3D System or another 3D digital photography system could make a significant impact among consumers.

"It will take the 3D camera technology some time to resolve all the kinks and meet consumer expectations shared by today's still-camera experience," says Harry Wang, director of health and mobile product research for Parks Associates. "It could be five years away before the technology becomes mature, stable, and affordable, or it could take even more time."

Chris Chute, the manager of IDC's imaging program, says he expects it will take at least a decade.

"3D, in general, is something that a variety of companies are looking at as the next-generation 'add,'" Chute says. "It's the next innovation. . . . [But] there's a whole list of questions that need to be answered."

### Overcoming Challenges

Obviously, 3D is growing in popularity, especially in video. 3D movies are becoming more prevalent, and advertisers even ran a couple of 3D TV commercials during Super Bowl XLIII in January. Both of these types of 3D require viewers to wear special glasses. Successfully incorporating 3D in digital photography—without the glasses—has some challenges to overcome.

**Cost for consumers.** As with any new technology, the cost of 3D cameras and

LCDs will play a big role in whether consumers accept and use them. Fujifilm has not announced any pricing expectations for its Real 3D System.

"Overall affordability of such 3D digital imaging experiences at this point and in the near future are certainly way beyond what consumers are willing to spend," Wang says.

**Ease of use.** It's one thing for consumers to put on the glasses and attend a 3D movie. It's a whole new concept to ask consumers to

**Research costs.** In a shaky global economy, Chute says, photography companies don't have a lot to spend on R&D. Perfecting 3D digital photography techniques could be an expensive process, he says.

"All of the companies in the photography market are in trouble," Chute says.

### New 3D Markets

3D imaging is not new. Various methods of creating 3D images and video have

## Beyond 3D

Fujifilm's research and development department's work on the dual-lens digital camera has sparked some ideas for 2D uses of the 3D Real System.

For example, as shown here, one lens could record

a movie as the second lens simultaneously captures a still image. Other interesting ideas include:

- One lens shoots a zoomed image, while the other captures the same image with no zoom.

- One lens shoots an image with an applied effect, such as sepia toning, while the other lens uses no effects.
- Each lens shoots half of an ultra-wide panoramic scene, and the RP processor seamlessly stitches the two images. ▲

Source: Fujifilm



shoot, display, and print 3D photos. Photography companies must make it an easy process, or consumers will be frustrated, Chute says.

"It's a much harder sell, rather than just consuming content created for them," he says. "You need an end-to-end solution . . . no one has really approached it from that angle, other than Fuji."

**File sharing.** 3D images will require a type of image file format different from any that currently exists. However, Fujifilm has not yet publicized the final details on the new file format. A new format could make it difficult to share photos with friends and family, a process that's very easy with 2D photos.

"I am not sure how sharing is going to be done with the 3D images," Wang says. "It requires an entire industry to collaborate. Will Fuji's innovations push others, like photo-hosting services or printer manufacturers, to join?"

been around for decades, mostly involving viewers wearing 3D glasses. What's new in Fujifilm's Real 3D System is the idea of bringing 3D to consumer digital photography without the need for the glasses or the difficult-to-master "cross-eye" technique.

It might not occur as quickly as anyone would like, but both Wang and Chute agree that the influence of 3D imaging will continue to grow, slowly, in existing markets and in new markets.

"In a decade's time, my assessment is that 3D will be part of our lives, but not all [encompassing]," Wang says. "I might be a bit pessimistic, but I remember watching my first 3D movie when I was 14, back in China. Now, it's more than 20 years later, still not many cinemas in the U.S. are 3D, and we still have to wear awkward glasses." ▲

by Kyle Schurman



# 6Gbps SATA

From Iowa's Speed Limit To Montana's

If only everyone had the foresight of the SATA-IO (Serial Advanced Technology Attachment International Organization, formerly known as the SATA II committee). City councils would build light rails and freeways before the urban sprawl made traffic intolerable. Sports stadiums would add overflow seating and sky-boxes before sellout crowds became the uncomfortable norm. DSL, cable, and wireless Internet providers would have rolled out high-speed service long before the rise of P2P and video streaming.

The new SATA specification with a 6Gbps signaling rate had yet to be formally approved by the SATA-IO as this issue went to press. It's meant to up the potential speed of consumer storage I/O (input/output) before its extra bandwidth over 3Gbps SATA becomes necessary to allow cutting-edge drives to transfer data at their top rates. The SATA-IO has striven to finalize new specs one to two years before hard drives need extra throughput. In 3Gbps SATA's case, hard drives might surpass its real-world throughput (about

250MBps) and possibly its theoretical ceiling (300MBps), as well, sometime in 2011, according to Seagate Senior Marketing I/O Development Manager Marc Noblitt.

"The math of it brings us back to the point of why we're coming out with 6Gbps (SATA) now," he says. "We want to (as we've been saying) widen the pipeline so that we're ready when we cross that bottleneck, and we're not introducing two technologies at the same time, which usually ends in disaster."

That said, hard drives' sustained data transfer speeds are only now peeking past the 150MBps theoretical maximum provided by 1.5Gbps SATA, which was introduced way back in 2001. Of course, the impetus spurring the doubled performance in the new 6Gbps SATA spec has nothing to do with rotational media. It's all about that new silicon upstart, the SSD.

The SATA-IO may have been trying to make 6Gbps SATA available well before it was needed by traditional mass storage devices, but it has been pipped to the post by top-end SSDs from the likes of Intel. These

are already bumping up against 3Gbps SATA's limitations, so the extra headroom of the 6Gbps spec will give today's best (and tomorrow's mainstream) SSDs more room to run.



## Breathing Room

To avoid any confusion, let's clarify what a faster interface really means. Speaking generally, 6Gbps SATA won't make your hard drive read or write data any faster, just as there was no discernible difference between 1.5Gbps and 3Gbps SATA versions of the same drive models back when the latter interface debuted in 2003.

Instead, you can think of 6Gbps SATA as a higher speed limit on a highway. Sure, a hot rod (a fast SSD) can take advantage of the extra speed the new SATA spec allows, but if a family car (a mainstream 7,200rpm hard drive) couldn't exceed the former 3Gbps limit before, it won't run appreciably faster on the new 6Gbps thoroughfare.

## NCQ Goes QoS For AV

Command queuing technology makes the best of the fact that hard drives' platters must physically spin in order to give the read/write heads access to their data. As multiple processes issue read and write requests to a hard drive, its native or tagged command queuing feature (if enabled) re-orders the requests' priorities from a first-come, first-served basis to an optimized disk access pattern.

In other words, instead of fulfilling task A, then tasks B and C, command queuing may move the heads into position to alternately perform a little of all three tasks as the platters carry relevant bytes past the heads. The net effect is to transfer as much data as possible with every revolution of the disks. (Because SSDs have no moving parts and are optimized for consistently fast random access, they neither need nor use NCQ.)

"The downside of this is that one particular request might be deferred slightly in order for the other more favorable requests to be serviced first, and this possible delay in the service time can be detrimental to

situations where some of the accesses correspond to media being played," says SATA-IO President Knut Grimsrud.

SATA Revision 3.0 adds a form of QoS (quality of service) to NCQ for streaming applications such as high-def video.

"Improved NCQ enables fast data-transfer rates for low-end servers, gaming systems, and media machines," says AMD Global Communications' Matt Davis. "These new extensions to the command are aimed at improving QoS for high-priority tasks (and interrupts), such as streaming video and online gaming, where the content (for example, streaming video) gets a higher I/O priority over other hard drive tasks happening in the background that don't require real-time updates."

For example, when one of the processes hitting a drive is involved in video playback, the drive's NCQ will give it priority over other tasks. The idea is to maintain a smooth, glitch-free streaming experience even during periods of heavy disk access. ▲

And what of a farm truck (your 1.5Gbps, 5,400rpm notebook drive from 2004)? The ol' rust bucket will be able to drive down the new road—6Gbps SATA is fully backward-compatible with 3Gbps and 1.5Gbps SATA drives and cables—but only at its customary huff-and-puff pace.

“No connector or cable changes were required,” says Noblitt. “A 6Gbps [device] will plug into a 1.5Gbps [one]; you can use a 1.5Gbps cable. All the work was done in the ASIC, and I’m not aware of any major hurdles to be overcome.”

“The primary challenge in doubling the SATA signaling speed for a second time while using the same connectors and interconnect that was originally defined for the 1.5Gbps Gen-1 version was ensuring the signal integrity,” says SATA-IO President Knut Grimsrud. “This required careful control over both the transmit amplitudes and the jitter, and those parameters were some of the most challenging technical items that the technologists undertook in ensuring a reliable high-speed solution.”

Note that 1.5Gbps and 3Gbps devices will drop 6Gbps SATA ports down to their top interface speeds.

“They negotiate down from the top, so if the drive doesn’t see anything at 6Gb, it’ll start stepping down, and so will the host,” says Noblitt. “Depending on . . . how they’re connected, they’ll both downshift to the speed where they can start talking to each other. Once they see each other, that’s the speed they lock in at.”

**Bursts.** And yet there is one small way in which 6Gbps SATA can give older drives a boost. If the host computer asks a hard drive for a bit of data twice in a short period of time, chances are good that the datum is still resident in the drive’s cache buffer. (Some SSDs have caches, too.) The fast DRAM in the cache can read the information much faster than the drive’s heads can retrieve it from the spinning platters (hard disks), and the drive can shoot the data across the SATA cable at a speed almost as fast as the interface itself (depending on the performance level of the DRAM in the cache, of course). This is called a burst transfer.

Burst transfers are impressively fast, sometimes clocking in at double a drive’s read rate. In a Seagate/AMD demonstration at the Everything Channel Xchange Conference last March, the Barracuda 7200.12 hard drive’s burst speed leapt from 250MBps under 3Gbps SATA to an astonishing 550MBps with 6Gbps SATA. The prototype drive ran on an AMD controller the company was still keeping under wraps at press time.

Unfortunately, burst transfers are also disappointingly brief. You can’t count on a day-to-day level of performance anywhere near the burst speed, as they’re sporadic and unpredictable. Still, today’s drives are coming with larger 32MB and even 64MB caches, making it slightly more likely that particular pieces of data will remain in the solid-state cache instead of being flushed to



Seagate used a 6Gbps SATA prototype of a Barracuda 7200.12 in its March demonstration with AMD, which supplied the drive controller.

make room for new info streaming in from the hard disks. Combine that escalated likelihood with 6Gbps SATA’s greater speed, and suddenly caches are a little more relevant to overall hard drive performance than ever before.

**Outside the box.** Another way in which 6Gbps SATA will eventually give hard drives a hand up is in the case of external RAID enclosures. We say “eventually” because, Noblitt says, “the 6Gbps specification we currently have includes the SATA specifications for the internal cabled interconnect, but it does not yet include the definition

## Why 6Gbps Equals 550MBps

You don’t get 187.5MBps from 1.5Gbps SATA, 375MBps from a 3Gbps interface, nor 750MBps from 6Gbps SATA Revision 3.0. Newbies may have trouble coming to terms with this, not to mention the discrepancy between their drives’ advertised and real-world capacities, but we power users tend to overlook overhead and rounding practices *as de rigueur*.

“The realizable transfer rate across a 6Gbps SATA link

depends on the efficiency of the controller design on both the host and device ends of the interconnect,” says SATA-IO president Knut Grimsrud. “The SATA interface transmits the information at 600MBps, but some of this is not realized as part of the user data payload, since the protocol includes other data and handshaking that is also communicated between the host and device.

“This includes transmitting the command to the device so

it knows what data to retrieve, as well as the device transmitting status to the host after the data is transmitted. In SATA, all this information is also transmitted as data packets over the interface, and this consumes some fraction of the total interface bandwidth.

“[Also, there] are protocol handshakes between the host and the device that are used as part of the mechanism for reliably transmitting the various

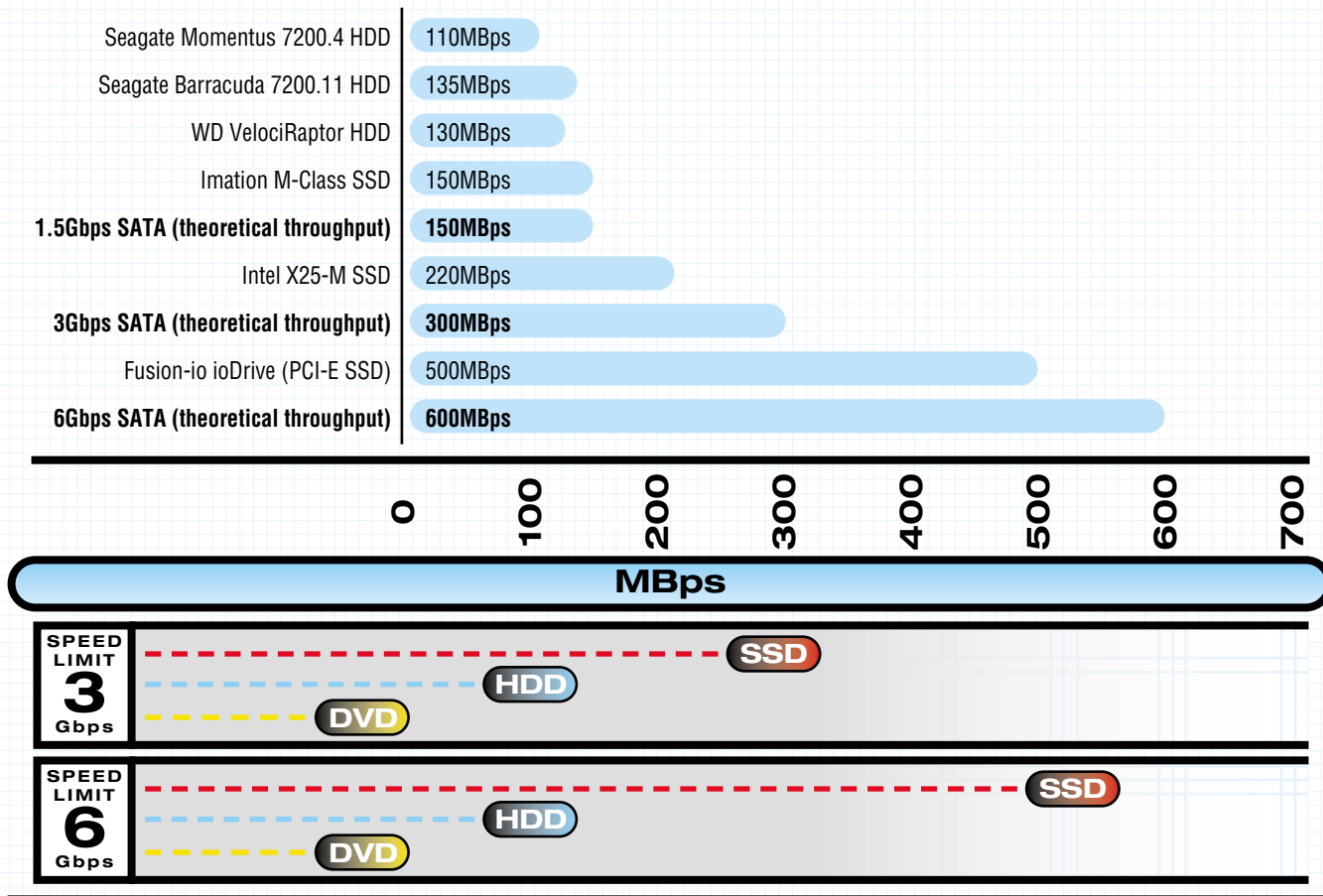
packets back and forth. When a packet is transmitted, the recipient must check the integrity of the packet and then signal to the transmitter that the packet was received OK.

“550MBps seems like it is in the right ballpark,” Grimsrud concludes. “In general, the SATA interface is very efficient in that the realized transfer rates are often a very significant fraction of the theoretical maximum.” ▲



## Maximum Read Rates

Clearly, SSDs are more in need of a faster SATA interface than hard drives. Note that real-world SATA throughput is approximately 30 to 50MBps less than these theoretical figures.



necessary for a 6Gbps external (eSATA) solution. The external interconnect is more challenging, since it requires more rugged connectors and currently supports slightly longer cable lengths to provide more cabling flexibility.”

Typically, SATA RAID boxes use port multiplication to funnel the I/Os of two

or more drives through a single eSATA port. Depending on the hardware, a bottleneck could be so pronounced that there may be little difference in performance between a RAID 0 and slower types of arrays in a port-multiplied, single-cable enclosure. Support for 6Gbps SATA could dilate the neck of that bottle, so to speak.

Speaking of port multiplication, some motherboard and controller card vendors already use it to provide extra SATA headers that split the bandwidth on certain 3Gbps or 1.5Gbps ports. 6Gbps SATA will simply make port multiplication less likely to incur a performance penalty in the near to middle term.

## PCI-E

As we mentioned, SATA SSDs (and a few RAM disks) are the real drivers behind the need for an interface speed boost. In fact, with recent advances in multichannel controllers, write streamlining, NAND design, and other areas, it's not out of

the question to assume that solid-state storage will be once again butting up against SATA's limits ere long.

That's why Fusion-io, OCZ, and others are working so hard on SSDs that interface at a higher rate of speed with

the fast PCI-Express interconnect. Could PCI-E become a SATA killer?

“PCI-E is not a standard I/O for hard drives,” says Seagate Senior Marketing I/O Development Manager Marc Noblitt. “(It) would require some

investigating. One issue comes to mind: cost.”

Indeed, Fusion-io's pricing for its innovative ioDrive is sky-high (\$2,995 for 80GB), although OCZ might undercut the newcomer with 1TB at roughly the same price. ▲

One thing you won't see are SATA data cables with connectors for more than one device like most PATA ribbon cables. SATA's point-to-point nature takes this option off the table, which is just as well: We'd rather not return to the days of slow devices dragging down faster ones on the same cables, even if automatic negotiation could replace the need for master/slave jumpers.

**Adapters.** As you can guess, you probably won't see any old-school 133MBps PCI cards with 6Gbps SATA controllers on them. However, an x4 (4-lane) card using either PCI-Express 2.0 (500MBps per lane) or 1.x (250MBps per lane) would be more than sufficient to carry 6Gbps SATA traffic in a typical PC. A RAID enthusiast should lean toward the faster PCI-E 2.0, of course.

### Tech Details

That grinding noise you hear is coming from the gritted teeth of the SATA-IO folks, who sincerely wish we would stop calling the new specification "6Gbps SATA." That's not its proper name, although it's certainly the most descriptive and concise. It's probably inevitable that the industry and end users will call the new spec something like this, just as most techies incorrectly called the 3Gbps version of the interface "SATA II."

The new specification is known as SATA Revision 3.0 or, more formally and pedantically, Serial ATA International Organization: Serial ATA Revision 3.0. The SATA-IO group released the PHY (physical) layer of the spec last August so that members could use the open industry

standard to design new products. As with 3Gbps SATA, this was a streamlined process, as the physical connectors and cables haven't changed since SATA's debut. By the time you read this, SATA Revision 3.0's first Plugfest, or manufacturer product testing event, will have taken place in June.

**Power management.** The latest version of SATA doesn't have any new power-saving features, but it does share earlier editions' ability to power down the interface when idle and instantly wake it up when needed. Additionally, the new spec's greater bandwidth can provide incidental efficiency, despite actually having somewhat higher power requirements.

"6Gbps PHY designs might have higher active power, depending on the specific design and/or implementation," says Grimsrud, "but the power efficiency is not necessarily adversely impacted, since for a given amount of data being transferred, the amount of active time to accomplish that is approximately cut in half compared with 3Gbps [SATA]."

**Optional features.** As many power users have learned to their chagrin, not every SATA controller and motherboard BIOS support all the cool features available in the specification.

"Most features are optional, and they're called out in the purchasing specification by an OEM as to what features they like, or want, or require," says Noblitt.

Most controllers support native command queuing (see the "NCQ Goes QoS For AV" sidebar in this article) and hot-plugging, or the ability to attach and detach drives without powering down the

system. However, staggered spin-up, which powers drives in sequence to reduce the shock to a PSU during boot-up, is generally limited to servers and external multi-drive enclosures.

In contrast, 5/12-volt power over eSATA (eSATAp) may become a more common feature, as it would enable bus-powered eSATA backup drives. Currently, the handful of eSATA flash memory drives on the market rely on powered adapter brackets or supplemental power from USB ports, both of which limit their ubiquity and portability.

"(Power over eSATA) has not been fully underpinned yet," says Noblitt. "They're still working on that in the committees."

### Future

Assuming that June's Plugfest doesn't uncover widespread problems, some 6Gbps SATA products may be out by the time you read this. Noblitt says that Seagate's initial offerings with the new interface will be 7,200rpm, 3.5-inch hard drives. SSD manufacturers will be close behind, and in all likelihood so will WD, with a follow-up to its VelociRaptor 10,000rpm enthusiast drive.

You shouldn't hold your breath for a 1.2Tbps version of SATA, by the way. This could be years away, if not superseded by faster interfaces.

"The SATA group has not yet started investigating a possible 4th-generation SATA development effort," says Grimsrud. "There are several areas of refinement for the 6Gbps generation that are the first focus," such as eSATA, he says. ▲

by Marty Sems

## SATA's SASsy Sibling

Products are already appearing with a 6Gbps version of SATA's servier sister, SAS (Serial Attached SCSI). For instance, Atto Technology ([www.attotech.com](http://www.attotech.com)) now sells the FastStream SC 8200 storage controller, which features 6Gbps SAS ports along with 3Gbps ports that are usable with both SAS and SATA drives.

"The SAS 6Gbps spec doubles throughput, obviously, but there are other changes in this generation vs. SAS at 3Gbps," says Seagate's Enterprise Storage Product Communications Manager, David Szabados. "Long story short, the driver for these improvements was the need to get deeper into helping enable SAS storage in the enterprise to coincide with emerging trends such as virtualization. Expander zoning, self-discovering

expanders, improved error management, multiplexing, external cabling, and Data Integrity Field are all part of SAS 6Gbps."

Despite the fact that some enthusiast motherboards now support SAS, which allows the use of hard drives of up to 15,000rpm, this trickle-down feature may be too late to excite power users now that SSDs have established themselves. In fact, SAS might even be counterproductive in a single-user system.

"In many cases, if one was to use SAS in a desktop SATA environment, performance could even be slowed down for tasks such as bootup, due to all of the additional functionality within SAS," Szabados says. ▲



# *SHOESTRING SYSTEM* **SUPERCARGE**

## Big-Time Boosts Without Big-Time Costs

**B**udget. Whether or not you're sick of hearing this word, the reality is that most of us have to pay a lot more attention to our budgets now than we have for many, many years. We all want new PCs with the latest parts, coolest features, and most bodacious bling. But today, most of us have to find ways to do more with what we have. In the "good ol' days," you might've had a pile of spare cash for your mondo upgrade. Now, the challenge is to take a few bucks and stretch them until they scream.

The good news is that you really can get a lot of fresh performance for only a little investment. In fact, you may not have to invest anything. While researching our subject, it became increasingly clear that a lot of the arduous steps—fun, but arduous—we used to take in order to squeeze more performance from our PCs have now been built into basic hardware and software. Believe it or not, power users spoke, and the vendors listened. A few clicks are often all it takes to hit your old box with 200mg of caffeinated madness.

Of course, don't think that all the fun of tinkering has been dumbed down and done away with. We have a few suggestions for your screwdriver to help improve your performance, and there's still a chance or two for some hot action with solder—if you have the nerve. But with complexity often comes cost, so we're focusing on simpler things. That doesn't mean dumb or inferior. It just means less stuff to buy, more of maximizing what you already have, and, when you do need to open your wallet, picking your targets more carefully. This is a time for smart but humble surprises rather than sweeping overhauls.

We're tackling the subject in three big pieces. First up is our dive into optimizing Windows. Love it or hate it, Vista is the biggest kid on the block. And you know how those big kids are. If you get along well, that big kid can be the best thing in the world. He has all the connections and can make anything happen. But he's big, so maybe he's a little slow. (On his feet. In the head. Go on, take a cheap shot.) Not to worry. We have some exercises that'll kick Vista's keister into overdrive.

Next up, the BIOS. BIOSes continue to evolve, and the capabilities you can find on modern chips have raced ahead of the functionality traditionally seen in years past. Are you making the most of all those options? If BIOS-based trial and error sounds like more than you want to bite off, how about tackling many of the same tasks from GUI-based tools? Utilities on this front continue to evolve at a lightning pace.

Once your BIOS is primed, it's on to the hardware. Even in this economy, the computer industry doesn't stand still. Gear keeps getting better all the time. If you have a system that's a year or two old, you could stick a faster CPU in it, but hey, that can cost serious green. We're going to try our best not to suggest anything that might

cost you more than \$200 from start to finish. Let's find some clever ways to tweak what you have. If nothing else, we can drop your thermal profile, grab some extra performance headroom, and just maybe make your PC a bit quieter in the process. If you need a more tactical approach to improving performance—say, in your storage or networking subsystems—we've included some ideas there, too. The object of the game is to find out where your PC is weakest and fortify those key spots.

Miracles do happen. You could win the lottery. You could perform a few of our suggested tweaks and suddenly find your dusty techno-slug blowing all your friends off the map. In the real world, though, tune your expectations before we start tuning your PC. This is going to be more like getting toned for a triathlon rather than roiding up for the Mr. Universe competition. Let's get to it. You're going to like the results. ▲

by William Van Winkle



**56 WINDOWS** Don't Settle For Default  
**60 BIOS** Tweaks That Make The Difference  
**66 GEAR MASTERY** Simple Hardware Mods That Produce Big Benefits  
**SHIFT**



# WINDOWS WORKAROUNDS

## Don't Settle For Default

We're not going to shine you on and say we have the magic cure to replace nuking Windows and reformatting your system when the OS gets corrupted or becomes too top-heavy every few years (or less). We're not omnipotent. But we do have a big bag of tricks for making your Windows experience faster and thus more enjoyable.

So this time, we're going to not only take a fresh look at some perennial advice but also look at some stuff that we think you'll find is off most people's radar. We also think it's important to view Windows optimizing from the perspective of how little total time you spend waiting, meaning it's not just about making operations run faster but making sure you use Windows more efficiently.

### Back To Basics

Windows Vista has been around since November of 2006, long enough for us to assume that you're a user (although certainly a lot of tips for Vista also apply to WinXP).

It's also been long enough to assume that many tips that were once little-known have now passed into common knowledge, especially among power users.

Still, sometimes we overlook the most obvious things, and sometimes we lose track of the bigger picture.

**Accelerate your total search time with metadata tagging.** Windows Search can only filter by basic attributes, such as date of creation, pieces of a file name, or text within the file, unless you give it more ability to help you. Say you want to find all of the photos taken at your 2008 birthday party on your system. If you simply dumped the files into My Photos straight from your camera, you may have to burn a lot of time sorting through folders, organizing files by date, and browsing through thumbnails to find what you want.

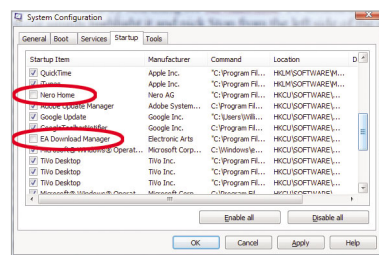
Try speeding up your searching by tagging these photos (or any other files). From Windows Explorer or My Computer, look down in the Preview pane bar along the bottom of the window and, if necessary, click the Show More Details link. Now, click where it reads Add A Tag and start typing the keywords you want ascribed to those files, separating each word with a semicolon. Click Save when you're done. To filter for these tags, go to the Search Folder within Windows Explorer, click the Advanced Search link in the top right, and fill in your keyword in the Tags field.

**Consider (temporarily) disabling System Restore points.** We remain big fans of the System Restore functionality in Windows and would never advise you to do away with it altogether (unless you're using a third-party alternative). However, if you get in a pinch for system resources, particularly hard disk space, you can disable System Restore. Go into Control Panel, then System. Provide permission to

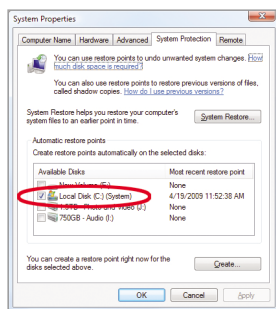
continue. Within the System area, click the System Protection link on the left. Now, in the System Properties box, go to the System Protection tab. You'll see checked boxes next to any volumes that currently have System Restore points applied to them. Uncheck these boxes, click Apply, and then click OK. Just remember to *re-enable* System Restore when you're through with your immediate need.

**Less bling can be good.** When Windows Vista launched, one of its key selling points was the shiny new interface called Aero, brimming with glowing this, transparent that, and a bunch of 3D gewgaws. All those funky effects require a fair bit of system resources, especially from the CPU, memory, and video subsystems. If you're more about function than form, you can benefit from turning off a lot of these extras.

In the Start menu Search bar, enter SystemPropertiesPerformance and give permission to continue. In the Performance Options box that springs up, you can always pick the Adjust For Best Performance option, but where's the fun



Just because you install an application doesn't mean it has to load every time you boot Windows. Use msconfig to turn off what you don't need.



You can get a little more performance from your storage subsystem by disabling System Restore, but use this tweak sparingly.

in that? Pick and choose the effects to disable so you don't lose the few that might actually matter. For example, we opted to disable Animate Controls And Elements Inside Windows. Animate Windows When Minimizing And Maximizing can go because it's one of the most demanding effects and nobody really *needs* to see windows shrink and grow as they're dismissed or called back up. If you like the glass look but don't really need to see the blurry shape of whatever is behind your window borders, kill off Enable Transparent Glass. Use A Background Image looks nice when you can see it, but it really contributes little to your experience.

Now, if you just don't feel your interface has gained anything worthwhile in the move from Windows 2000 to WinXP to Vista, by all means, gain some real performance and slide back into the 2000 look and feel by disabling Use Visual Styles On Windows And Buttons. For a happy medium, uncheck the Enable Desktop Composition option, and you'll revert to a non-glass interface very much like WinXP.

### Trim The Fat

Many people have described Windows as "bloatware." Microsoft calls this being "robust" and "feature-rich." Either way, there are tricks for making Windows' "robust" profile a little leaner and more efficient.

**Dry away that splash screen.** OK, so the Windows Welcome screen only sticks around for a few seconds, but sometimes seconds matter, and do you really want to

look at that Microsoft logo again? And again? Let's ditch it. Press Windows Key+R to bring up the Run dialog box, type `msconfig -2`, press ENTER, and input your UAC credentials (if applicable). Go to the Boot tab, check the No GUI Boot box, then click Apply and OK. Note that doing this will prohibit you from seeing blue screen errors during boot.

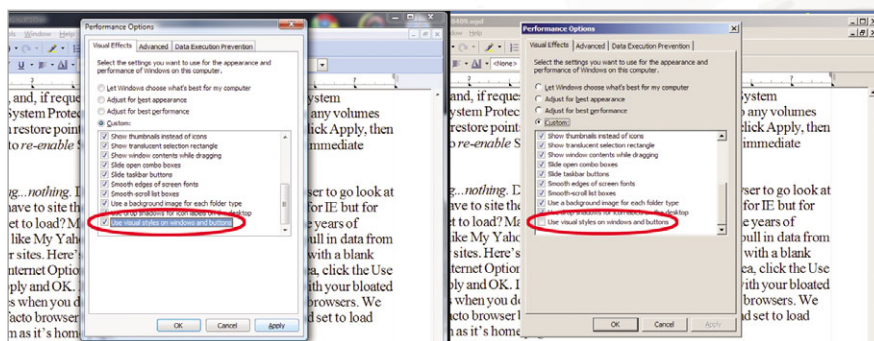
**Prefetch like a pro.** As detailed below, the SuperFetch feature in WinXP can help accelerate the operating system's performance, as the Prefetcher can in Vista. By default, Windows enables both application fetching and boot fetching. But you might be able to get faster boot times by turning off application fetching and going with boot-only fetching. From the Run dialog box, type `regedit` and press ENTER to get to the Registry Editor. Navigate to this folder: `HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Session Manager\Memory Management\PrefetchParameters`. On the right pane of the window, highlight the name `EnablePrefetcher`. (In WinXP, this will be `EnableSuperfetch`.) Right-click the name, select Modify, and then in the pop-up box, change the default value of 3 to 2. Click OK, exit the Registry, and reboot.

**Pass Go, collect faster boot times.** How many times have you reset your PC and walked away to go do something else for a few minutes while it booted, then returned to find it sitting at a logon screen, waiting for you to select which user account you want, even if there's only one user? Until you click that account

icon, none of your background apps will load, which means that instead of getting to work when you sit down, you get to wait *longer* for Windows to do its loading. So long as you're the only user on your PC, and your system stays in a safe place relatively safe from theft, do this:

Perform a Start bar search for **control userpasswords2**, clear the Users Must Enter A Username And Password To Use This Computer checkbox, and click Apply. A box called Automatically Log On will pop up. Enter the username you want to automatically load along with its password, then click OK twice.

**Ignore unneeded hardware.** One of the things that consumes time (and system resources) when loading Windows is hardware drivers. However, many systems load drivers for components that aren't actually used every time. This is especially true of notebooks. Use the Device Manager to disable these extra-neous items. The quickest way to the Device Manager is to go onto the search bar of the Start menu and type `devmgmt.msc`. Now, browse through your list of hardware devices and look for items you don't need. For example, our notebook had a Bluetooth adapter, fingerprint scanner, WiMAX link, and a modem loading, none of which were currently being used. Disabling these devices may not yield miracles in system acceleration, but every little bit helps. Other likely targets for disabling might include FireWire ports, PCMCIA slots, TPM chips, and extra network adapters.

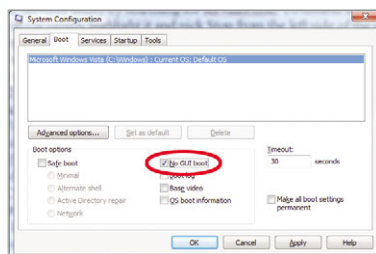


All that Vista eye candy adds pounds around Windows' waist. Consider a more retro look for faster performance.



The service here is a bit excessive. As with hardware drivers, Windows loads several dozen services when it boots, many of which you probably don't need or want. Before we start twiddling with services, though, set a System Restore point, just in case you disable something you actually need. Go into the System area in Control Panel. In the Tasks pane, click System Protection, and, if requested, continue through the password or confirmation prompt. In the System Protection tab, make sure that your Windows disk volume is checked, then click the Create button. Give the restore point a name and click the Create button.

Now, bring up the Services utility by searching for services.msc. To disable a service, right-click it and click Stop (or simply highlight it and pick Stop from the left side of the window). Then, right-click the stopped service and select Properties. In the General tab, go to the Startup type pull-down menu and select Disabled. Do some Web searching on Windows services to see which you might want to disable. When in doubt, err on the side of leaving services active. That said, here's our Top 12 list of candidates for getting shut off: 1) Block Level Backup Engine Service (most desktop backups are file-level, not block-level); 2) Certificate Propagation (used with smart cards); 3) Fax (unnecessary if you don't do PC-based faxing); 4) ICS (Internet Connection Sharing; unnecessary if other systems on your LAN connect directly to your switch/router); 5) Media Center Receiver (handles radio and TV



The Windows Welcome screen may be pretty, but it's just one more thing taking unnecessary seconds away from your computing.

reception in Media Center); 6) Media Center Scheduler (for scheduling when to start and stop recordings); 7) Microsoft iSCSI Initiator (only used for connecting to iSCSI network targets); 8) Parental Controls (unless you filter content for your kids); 9) Peer Networking Grouping (provides peer-to-peer networking); 10) Smart Card (pretty obvious); 11) Telephony (for voice apps using the modem); and 12) Windows Backup (unnecessary if you use a third-party backup app).

**Halt those auto-starts.** This must be the single most common Windows acceleration tip of all time, but we'll offer it again simply because loads of people (including us) do it once, then forget to do it again for months or years at a stretch. In the process of installing software, you rack up a long list of applications that automatically load when Windows starts. If you wonder why Windows takes so long to load today when it seemed fairly quick when it was a fresh installation, here's your main culprit.

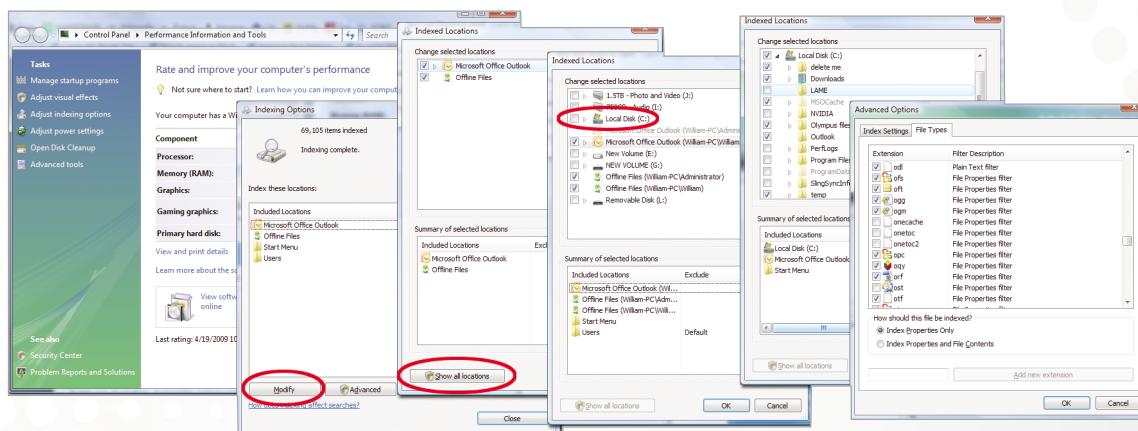
From the Start button, type `msconfig` in the Search bar and press ENTER. In the System Configuration window, go to the Startup tab and browse through your list of startup apps. Compared to other Windows file lists, the Startup list is pretty self-apparent, and you should be able to take a decent stab at unchecking items you know you don't need present whenever Windows is on.

## Cache & Index Tricks

Much as Windows might try to be organized about how it deals with files, stuff still tends to spread around, not just within the operating system but also with applications and user data outside of it. You can improve Windows performance by helping it to better know how and where it finds information.

**Put your thumb drive to better use.** Virtually all of us now have USB flash drives in our pockets, which is a far less useful place for them than plugged into your Vista machine helping to accelerate Windows. The ReadyBoost functionality built into Vista picks up where SuperFetch left off in WinXP, learning to anticipate which data and files you use most, prefetching them, and storing them on an attached flash drive. (For small random writes, modern flash drives can be up to 100 times faster than a hard disk.) This frees up system memory and reduces the hard drive load.

ReadyBoost will provide the most benefit in systems with less RAM. You'll also want a larger flash drive and to be running Vista SP1. To access it, insert your flash



Radically improve the usability of Windows Search by changing where it monitors and the types of files it tracks.

drive, select Speed Up My System when the AutoPlay window comes up, and use the maximum amount of flash capacity for ReadyBoost that you're comfortable with.

**Searching a bit less far and wide.** One day, Microsoft realized that Google Desktop was a massively better search tool than what was baked into WinXP. Thus was born Windows Vista's enhanced Search, which relies on the Windows indexing service, a database that monitors whatever file types and locations it's charged with cataloging. With this, Windows only needs to consult its database when you want to find something, not perform a fresh search of your entire drive. The trouble is that sometimes Search is too exhaustive. You can improve performance by tweaking what locations and which file types are indexed.

In the Start menu's Search bar, type **Performance Information** and press ENTER. Now, click Adjust Indexing Options in the Tasks bar. If you see a Global Settings button (for multiple user accounts), press that, then click Modify. Otherwise, just click the Modify button. Now, click the Show All Locations button. We were confused for a while as to why Google Desktop continued to return better results than Windows Search, and the answer was here: In the Indexed Locations window, the C: volume was unchecked. Search was only tracking Outlook and offline files, and we weren't even using offline files. So we checked the C: box but expanded its tree and unchecked every folder that only contained data we knew wouldn't be needed. In a sense, adding the C: volume increased our performance.

Back in the main Indexing Options window, click the Advanced button and go to the File Types tab. Here, you'll find a very long list of file extensions that the indexer tracks. The more of these you can prudently uncheck, the better the indexing performance will be.

**One indexer is enough.** If you've properly configured Windows Search, you probably don't need another search indexer running, too. Indexing can consume significant amounts of time, including when the system is

idle, and this puts extra wear on the hard drive. (Vista in general is notorious for continually keeping hard drives busy around the clock.) If you'd rather use Google Desktop than Windows Search,

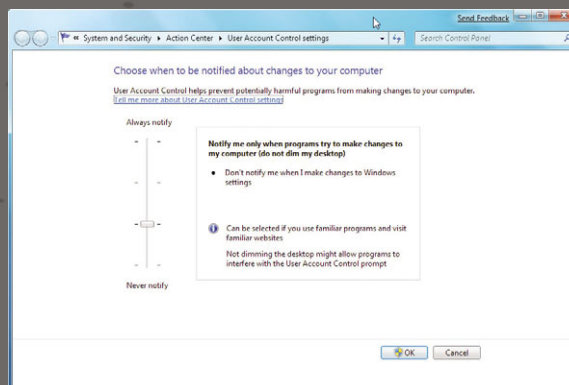
you can disable the Windows Search service. There's little point in running both. ▲

by William Van Winkle

## Windows 7

Are you already running Windows 7 beta? There's a lot to love in the OS, and unlike the usual service pack update, we actually get a whole new batch of things that can be tweaked and tuned. We're only just getting our feet wet with Windows 7, but already we have a Top 5 items list for you to improve in the new operating system:

1. For the first time in over a decade, you can now uninstall Internet Explorer. The core IE rendering files used by other apps will remain, but the application itself can be snuffed. The quickest way to do this is to go to the Start menu's Search bar and type **turn windows features on or off**. This will bring up the Windows Features box. Scroll down to Internet Explorer 8, uncheck it, and click OK.



**Tired of those permission pop-ups in Windows Vista? Windows 7 gives you an easy way to keep them to a minimum.**

2. If you do want to run Internet Explorer 8, you may find that new browser tabs exhibit problems, especially with slow load times. So far, this seems to be the result of an upgrade process glitch. While running with administrator rights, go to a command prompt (type **cmd** at the Search bar) and type **regsvr32 actxprxy.dll**. Reboot, and the problem should be fixed.
3. Few, if any, features in Windows Vista were more maligned than UAC pop-ups, which ask if you're really sure you want to do the thing you just went through several clicks to do. Rejoice, friends. Type **UAC** at the Search bar to bring up the UAC settings window. The vertical slider has four settings. We recommend the third, just above **Never Notify**. This will still give you a permissions prompt in case of a really odd request, but otherwise, Windows will leave you alone.
4. Windows 7 changes the Start Menu's power button from Hibernate to the more common sense Shut Down function. However, this can be changed to suit your taste. Right-click the Taskbar and select Properties. In the Start Menu tab, use the pull-down menu for Power button action and take your pick of power functions. While you're there, click the Customize button and look for ways to fine-tune Start menu operations. For example, you can speed up searches by changing the Search Other Files And Libraries item to Search Without Public Folders. If you do a lot of video viewing, perhaps displaying videos (look under Videos) as a link or a menu off of the Start menu will save more time than going through Computer.
5. For some people, every fraction of a second counts. You may have noticed in Vista that when you mouseover a Taskbar application, its preview thumbnail waits 0.4 second before appearing. In Windows 7, you can change this delay period. Go into the Registry Editor (type **regedit** in the Search bar) and navigate into this folder: **HKEY\_CURRENT\_USER\Control Panel\Mouse**. Right-click MouseHoverTime and pick Modify. The default is 400 milliseconds. If you crank this down to 100 or even 50, over the course of a year, you will have saved enough time to have at least two extra thoughts while staring at your screen. Make 'em count. ▲



# BIOS MASTERY

## Tweaks That Make The Difference

Getting the best performance out of your machine requires a lot more power user intervention than simply buying fast hardware. Sure, the latest components are going to help, but the way of the enthusiast has never been governed by throwing an exorbitant amount of money at the horsepower issue. After all, anyone can spend themselves silly. It takes a true technologist to get everything dialed in just right.

We're going to fast-forward through buying hardware, putting it together, and loading up an operating environment. Those steps are child's play compared to the configuration tasks in front of us. Our goal: take two separate systems—one Intel Core i7-based and one AMD Phenom II-based—and improve performance through a combination of BIOS tweaks and tuning utilities.

We'll evaluate our results by testing each system using its default BIOS configuration and then again after a bit of tool time under the hood. Hopefully, when it's all said and done, we'll have a reason to pat ourselves on the back, and you'll have a blueprint for tackling your own tune-up.

### Getting The Most From X58

When Intel's Core i7 launched, X58-based motherboards were ridiculously expensive. After a gradual trimming of features, though, you can now find a number of X58 platforms priced in the \$200 to \$300 range. Asus' P6T is one of those boards, making it a worthy complement to Intel's entry-level Core i7-920.

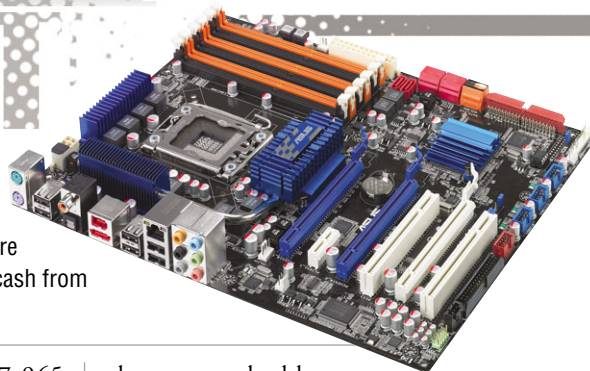
Before we jump into the modding, we wanted to take a couple of baseline numbers to gauge the P6T's performance right

Asus' P6T provides an excellent example of how you can extract top-notch performance from your Core i7 CPU without extracting too much cash from your checking account.

out of the box, using a Core i7-965 Extreme, 6GB of Corsair DDR3-1600 with 8-8-8-24 timings, a Zotac GeForce GTX 260 Core 216, and Western Digital 300GB VelociRaptor hard drive. From the time the board's power button is pressed, the Windows desktop takes 1:31 (minutes:seconds) to pop up. SiSoftware's Sandra 2009 reports 23GBps of memory bandwidth from our triple-channel kit. And a real-world rendering project in 3ds Max 2009 64-bit takes 24 seconds to complete. Now, let's see where we can improve.

The P6T's first BIOS screen lets you set the time/date and storage configuration. If you don't have a floppy drive attached, you can disable that setting here, as well. Take a moment to check out the Storage Configuration submenu, though. It's not turned on by default, but you'll want to enable AHCI (Advanced Host Controller Interface) if you're using Windows Vista or Linux with a kernel version 2.6.19 and up, both of which include native driver support. All other X58 boards are going to have this feature available, and while it might not be in the same place, turning it on adds support for SATA features such as hot-plugging and NCQ (native command queuing; a potential performance-enhancer).

Asus calls the next tab over its AI Tweaker, and this is where much of the overclocking magic happens. From manipulating voltages to cranking clock speeds,



the most palpable speed-ups are going to come from the adjustments in this menu. And again, you'll find most of these options in every other X58-based board out there. Gigabyte calls its equivalent MIT (Motherboard Intelligent Tweaker). MSI calls its version the Cell Menu.

There are a number of different parameters used to take Core i7 processors further than their stock settings, including ratio multipliers, BCLK (base reference clock) frequency, QPI (QuickPath Interconnect) data rate, and, of course, gentle bumps in voltage. Because our Core i7-965 Extreme is unlocked and accepts higher clock ratios, we nudged the 24X default (24 x 133MHz = 3.2GHz) multiplier to 27X, yielding a clock speed close to 3.6GHz. We also changed the Auto memory setting to a manually defined DDR3-1600. After specifying a 1.64V DRAM bus voltage (Intel doesn't recommend overvolting beyond 1.65V), we went in and set lower latencies in the DRAM Timing Control submenu, hopefully paying dividends in our memory bandwidth benchmark. By default, the P6T was using 9-9-9 settings. But we know from Corsair's specifications that these modules will run faster.

A quick glance reveals an expansive list of memory-related options—far more than we've employed here. Most are used to fine-tune aggressive overclocks, where additional voltage and cooling are needed

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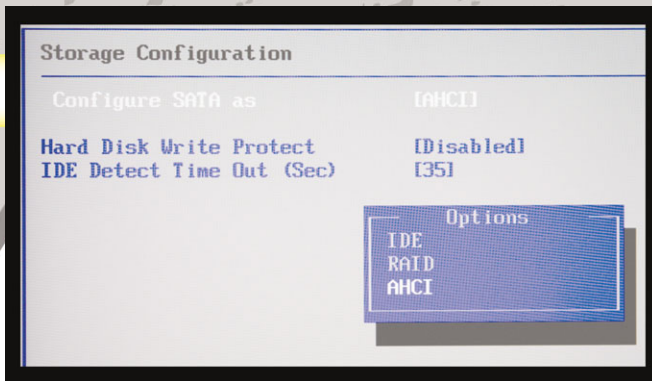


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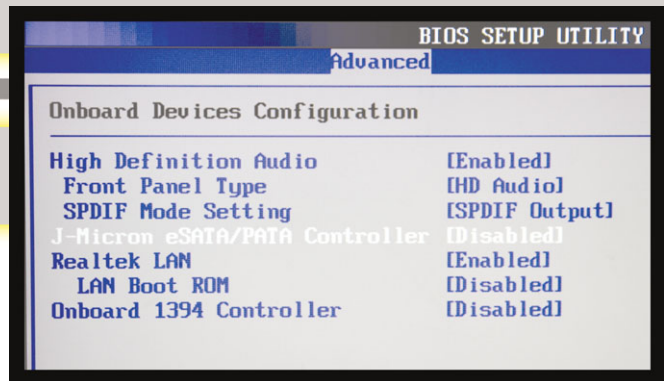


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Turning on AHCI will enable support for your SATA hard drive's hot-plug and NCQ functionality.



Disable any onboard extras you don't need in order to free up resources and accelerate the boot process.

in order to maintain stability. In contrast, we're using a more modest arrangement, yielding a bit of free performance as we further optimize the P6T's BIOS.

Moving on, we see the configuration's Advanced tab. The first submenu, titled CPU Configuration, plays host to a number of Core i7's power-saving technologies, such as C1E support and EIST (Enhanced Intel SpeedStep). BIOS optimizations don't have to center only on performance: Maximizing efficiency is equally important. In addition to turning on C1E, we also enabled Intel C-State Tech, leaving the package limit setting at Auto. Interestingly, neither Intel's Turbo Mode nor SpeedStep were configurable options, an artifact of manually adjusting the processor's knobs and dials.

Dropping down to the Onboard Devices Configuration submenu, we disabled the integrated J-Micron eSATA and VIA FireWire controllers, which weren't being used and had been consuming system resources while left on. With only a couple of BIOS menus left to navigate, we continued to the Boot tab.

Most motherboards are able to boot from a number of different devices and media. And, by default, Asus' P6T will look to CD/DVD-ROM drives and removable media before it tries booting from your hard drive, unnecessarily extending the boot process. We disabled all boot devices other than the system's VelociRaptor and made sure that the Quick Boot, which skips a number of POST tests, setting was enabled (On).

Finally, under the Tools tab, we turned off the Asus Express Gate feature, an "instant boot" operating environment that also adds precious seconds to the boot process.

With all of our BIOS changes saved, we restarted the system to measure the effects of our tweaks. Right away, we registered a boot time of 1:21, a 10-second reduction. Sandra 2009 reported an almost 20% speed up to 27.5GBps of memory bandwidth, and our 3ds Max project shed nearly 10% of its render time, dropping to 22 seconds. Clearly, there are some very real gains to be had through simple BIOS-based optimizations. Best of all, the list of tweaks is incredibly tame. We didn't even have to experiment with risky voltage settings.

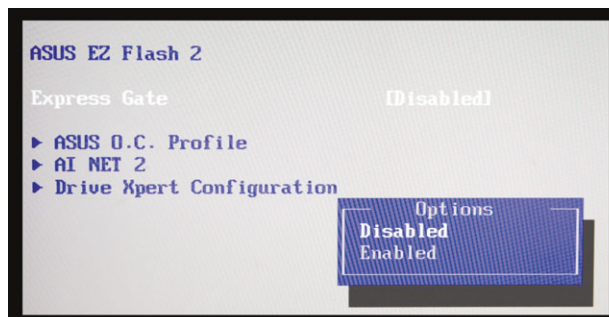
### 790GX Goes Under The Knife

Regardless of whether you're using an Intel X58-based motherboard or a platform designed for AMD's Phenom II, a number of BIOS features are going to be the same. Hardware monitoring, boot priority, integrated peripheral configuration—it's all fairly similar from one board to the next. But there are also some

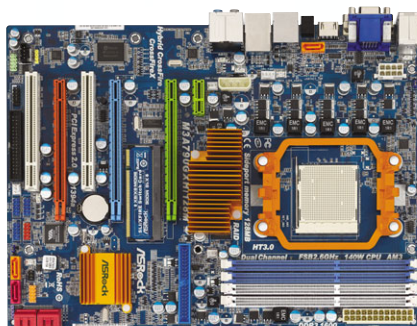
features completely unique to AMD boards that are sure to speed up the boot process, improve memory bandwidth, and inject a little extra "free" performance.

We used ASRock's budget-oriented M3A790GXH/128M as our reference platform, and again ran baseline figures to determine the scores to beat. Armed with a Phenom II X4 810, 4GB of Corsair DDR3-1600, the same Zotac GeForce GTX 260 Core 216 and VelociRaptor hard drive, we were able to register a 1:11 boot time, 11GBps of memory bandwidth, and a 46-second render time on our 3ds Max 2009 project.

ASRock's AMI BIOS looks very similar to Asus' at first glance. However, the M3A790GXH/128M's relevant options are much more concentrated. There's really nothing of value in the default Main Menu, which simply relays system information. The next tab over, labeled Smart, facilitates a handful of preset performance and power-saving defaults, making wringing out a bit of extra performance easy for the mainstream user who wants a one-button solution. But it's of little interest to us, as we'd rather go option by option.



If you don't need proprietary extras, such as Asus' Express Gate instant-on environment, turn them off to avoid waiting on features you aren't using.



The ASRock M3A790GXH/128M has plenty of options to make your Phenom phenomenal.

The third tab, Advanced, is where you'll find most of the board's performance-enhancing functionality. The CPU submenu hosts the longest list of settings, including control over all of the board's memory timings, performance options, and power-saving features. As we did with the Core i7, we first sought modest performance gains through a simple overclock. Our Phenom II X4 isn't a Black Edition part, so its multiplier is locked. Thus, we were forced to rely on a reference clock tweak (operating frequency being the product of reference clock and ratio multiplier), which saw the 200MHz default speed rise to 215MHz. Multiplied by 13, the 2.6GHz chip settled in at 2.8GHz without any additional voltage applied.

We also specified DDR3-1333 memory operation rather than letting the BIOS configure our modules automatically. The reference clock boost affects Phenom II's integrated memory controller, pushing the modules 66MHz faster. This is a particularly important point, because it means spending a little extra money on memory with headroom built-in. Here, we're using DDR3-1600 RAM to support a DDR3-1333 setting getting overclocked to DDR3-1466. AMD mixes in power-saving functionality, so we set Cool'n'Quiet

and Enhanced Halt State to Enable in the CPU Configuration menu, as well.

Drop to the Chipset Settings submenu for another page of tweakable options. Because the 790GX includes an integrated graphics processor (whereas Intel's X58 chipset doesn't), you see several GPU-related fields. We're using a discrete graphics card here. But to the 790GX's credit, its Radeon HD 3300 engine actually performs admirably in a mainstream desktop environment. If you were to lean on the chipset's GPU, the BIOS lets you set aside a fixed amount of system memory for graphics and overclock the core for better performance.

Also available is a setting called ACC (Advanced Clock Calibration), which you'll probably remember as a feature that helped AMD extend the overclocking headroom of its first-generation Phenom processors. ACC doesn't make Phenom II any more overclockable, but it can unlock disabled parts on a new Phenom II CPU. For example, we tested a pair of X4 810s (4MB of L3 cache) and two X3 720s (three cores). In all four cases, ACC gave the 810s access to the microarchitecture's full 6MB L3 and switched on the 720's disabled fourth core, in essence creating Phenom II X4 900-series processors. Of course, there is a number of caveats here. ASRock doesn't guarantee this will work with all 700- and 800-series Phenom IIs, and AMD won't tell us how to determine if a given CPU can be unlocked. However, we give you the scoop on this unbelievable exploit in "Tri-Core Transformer" on page 40 of this issue.

Much noise has been made about

Your biggest performance gains will come from modest overclocking efforts. Our 2.6GHz Phenom II X4 810 hit 2.8GHz with little more than a 15MHz reference frequency increase.

AMD's poor AHCI implementation in chipsets past. However, we had no problem switching the onboard SATA controller from IDE to AHCI under the IDE Configuration submenu. Windows restarted a couple of times after detecting new devices and then continued on its merry way with the storage standard enabled.

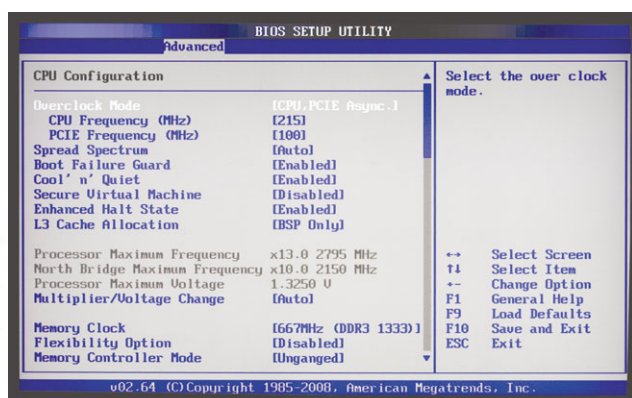
Moving on the M3A790GXH/128M's Boot tab, we disabled all devices except the VelociRaptor, minimizing the number of components that'd be checked prior to Windows firing up. ASRock arms its BIOS with the ability to save a handful of configurations as profiles. So, if you'd like to preserve your settings before restarting, the Exit menu gives you that option.

So, what do you get for your 10 minutes of BIOS optimization on an AMD configuration like this one? We shaved seven seconds off of the Windows Vista boot time, bringing the process down to 1:04. SiSoftware's Sandra 2009 reported 13.2GBps of memory bandwidth. And our 3ds Max 2009 rendering project dropped to 42 seconds, shaving roughly 10% off of the initial test.

### Will Your Mileage Vary?

We've covered two motherboards from two vendors running on two different chipsets. Surely, this can't be representative of the hundreds of boards out there spanning entry-level to high-end, right? To a point, sure. But the high-level techniques we've used to coax extra speed from our systems here are generally applicable to all motherboards, even those supporting Intel's Core 2-series chips. In the event that your board was manufactured by a different company or is based on a chipset not discussed here, there are a few overarching themes to derive from our examples.

First, you want to minimize the number of devices getting in the way of you and your operating system's boot process. If you don't have a floppy drive, use the BIOS to disable the floppy controller. If you've already set up an operating system, you don't need to search an optical drive or the network for boot media before hitting the hard drive. Rearrange your boot order accordingly. And if you have unused onboard peripherals, such as SATA or





FireWire controllers, disable those components. They consume resources and often lengthen the boot process. Those three strategies are what helped us to shave seconds from the time it took both of our example boards to fire up.

Next, take advantage of headroom built into your motherboard and CPU with a modest BIOS-based overclock. Both Intel and AMD sell certain CPUs with unlocked clock multipliers, which is the easiest variable to change for a quick overclock because it only affects processor speed. If your CPU isn't an Extreme or Black Edition, you'll need to adjust the reference

clock, the other setting used to determine clock speed. Be aware, though, that making reference clock changes will also affect other components, such as memory. Nevertheless, successfully overclocking our two processors is what cut down our 3ds Max 2009 render job. If you want to improve performance once Windows is up and running, overclocking is your solution.

The final approach we used in both examples was taking control away from the BIOS. As a convenience, all motherboards are able to read the SPD (serial presence detect) chip on each memory module and set up speed and timing automatically. But

enthusiasts often buy higher-end memory able to run faster than those conservative defaults. Using the specifications of your modules, key in memory frequency, DRAM voltage, and timings to match. As you can see from our results, user-defined settings can make a difference in real-world bandwidth. The same goes for enabling features such as AHCI, which are often turned off by the factory for compatibility reasons.

Take the reins, get your BIOS dialed-in, and you could see double-digit performance gains . . . absolutely free. ▲

by Paul Cross

## Tuning Utilities Explored

Enthusiasts still prefer BIOS-based tweaking over Windows apps written to do the same job. A modification in the BIOS just seems more permanent. It takes effect immediately rather than after Windows boot-up (and by a piece of software running in the background). But we're not going to denounce tuning utilities entirely. There's a lot of value in the latest apps, which offer tons of knobs and switches, plus the tests needed to ensure stability before locking in those modded settings.

### AMD OverDrive [www.amd.com](http://www.amd.com)

The last time we looked at AMD's OverDrive tool, it was still in beta form. Now at version 2.1.6, it's a much more mature tool able to adjust multipliers, bus speeds, voltages, and a slew of memory timings. Though still only compatible with 7-series chipsets on Windows XP and Vista, we expect that most enthusiasts with AMD processors are moving in the direction of that hardware/software environment anyway; they'll be well-served by OverDrive.

Even if you're a die-hard BIOS tweeker, this app is a great way to zero in on an optimal configuration without having to restart your system over and over. Make your tweaks in OverDrive and run a series of stress tests, such as Prime95. Once you have a solid balance between speed and stability, add those same settings into your BIOS.

### Nvidia System Tools [www.nvidia.com](http://www.nvidia.com)

Formerly referred to as nTune, Nvidia's

platform-wide tweaking utility consists of three parts: Nvidia Performance Group, System Monitor, and System Update. The performance and update components are integrated with the same Nvidia Control Panel you'd use to adjust the 3D settings of a GeForce card, so they're easy to find and use.

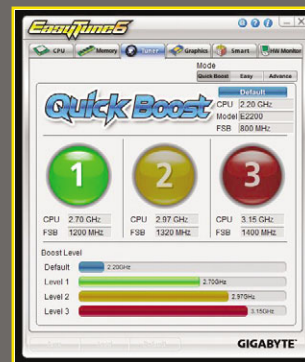
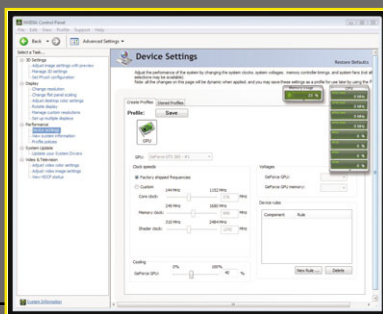
Performance Group is the most relevant to enthusiasts because it lets you tune the same clocks, voltages, timings, and fans as AMD's OverDrive. Additionally, it enables control over clocks, voltages, and fan speeds of GeForce graphics cards. Of course, CPU clocks and voltages can only be set if you're using a motherboard based on an nForce MCP. Otherwise, you'll only get detailed system information from the software.

The strategy here is also going to be similar for BIOS aficionados. Tinker with the best possible setup in Windows and then lock those settings in through the BIOS.

### Gigabyte Easy Tune 6 [www.gigabyte.com.us](http://www.gigabyte.com.us)

AMD has its bases covered, as does Nvidia. But what if you're using a motherboard based on an Intel chipset, such as the X58 or P45? Intel offers its own tuning utility called Desktop Control Center; however, it only works on a handful of Intel's own motherboards. Third-party vendors have to write their own tuning apps to make their boards more tweakable in Windows.

We got our hands on Easy Tune 6, Gigabyte's software-based utility, and used it with an EP45-UD3P motherboard and Pentium E2200 dual-core CPU. The latest version of Easy Tune certainly doesn't feel as complete as OverDrive or System Tools. However, its Quick Boost mode does make overclocking easy for mainstream users. With the push of a button and a restart, our 2.2GHz CPU was running smoothly at 2.7GHz, although that doesn't really help fans of BIOS overclocking gradually test the upper limits of their processors or memory. ▲





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# GEAR SHIFT

## Inexpensive Hardware Mods That Produce Big Benefits

Of course you want to drop \$5,000 on a monster box—four CPUs, 9-way graphics, and all the disk storage you can fork-lift. That's a nice dream. The reality is you've got what you've got. Maybe it's new(ish), but odds are it's getting a bit long in the tooth. How do you perk up that silverback's hardware with a downsized budget?

### Mod Your Motherboard

A volt mod is a method for increasing voltage to chips through means other than drivers and BIOS tweaking. Usually, it means grabbing a solder gun, keeping a very steady hand, and having a ton of background knowledge at your disposal. With motherboards, knowing where and how to apply a volt mod typically requires the deepest information, the sort of thing that only a manufacturer would know and probably would never publish for public viewing. Yet occasionally, this information does slip out.

If you've done any overclocking in the last five years, you know that today's desktop motherboards, even mainstream models, usually come with some degree of voltage tweaking available in the BIOS. Before this was the case, motherboard volt-modding was more common. Today, the need is diminished but not erased.

So, when would you volt-mod a motherboard? Let's say you have a motherboard that predates a lot of the more recent BIOS improvements that allow for more extensive voltage adjustment. Or maybe you happened to be walking down the street and discover a workstation motherboard, sort of like the Intel WX58BP we stumbled into one day—great board, tons of engineering overhead, but no BIOS options for playing

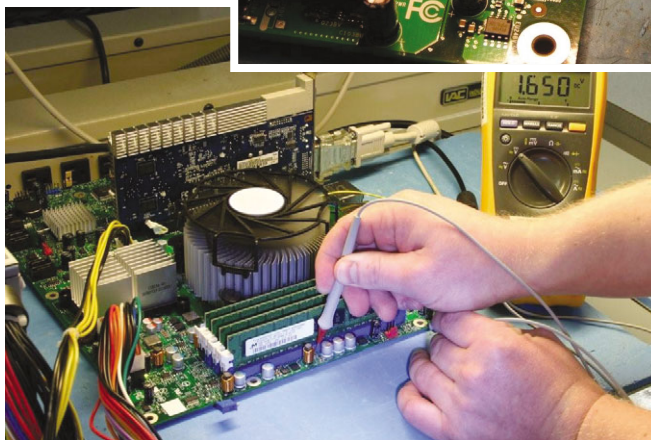
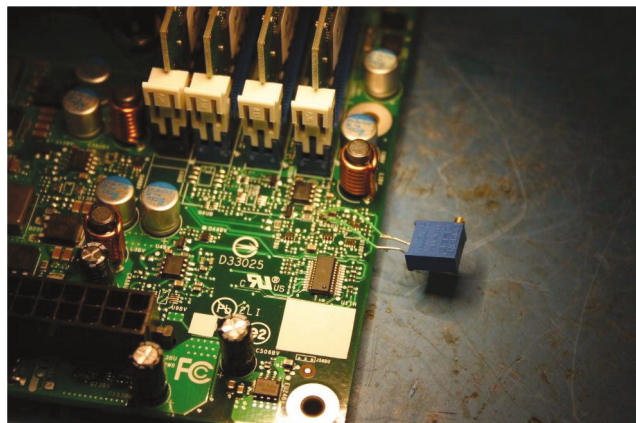
with voltage. So off you go to score a \$1 potentiometer from the corner electronics store, grab a multimeter and your soldering rig, and magically obtain the incredibly elusive plans for this board. If you're new to volt modding and want an in-depth look at procedures, the best guide we found online is at [www.ocforums.com/showthread.php?t=264512](http://www.ocforums.com/showthread.php?t=264512).

Now, in practicing this fantasy (and with a little help from our R&D friends at Intel), we learned that this board needs a 10K ohm potentiometer. Others might need something like a 1K or 5K unit. The purpose of the potentiometer, as one

engineer described it, is to "alter the voltage feedback in the VSM [system memory voltage] regulator by replacing the voltage divider with a potentiometer, and then we dial up the voltage to whatever we want. This is done by decreasing the resistance in the lower leg of the voltage divider."

To start, we took a reading from the board in its native state: 1.537V. One multimeter probe goes to ground, and the other might go to system memory voltage. This is located next to the memory and an output inductor, that post with the copper coil wrapped around it. There are multiple possible locations, but you may spend a lot of

Out of the box, our workstation board tested at 1.536V. Then, using Intel's schematics, we soldered on a \$1 potentiometer.



A couple of taps with the multimeter reveal that our two-minute mod has increased our supposedly fixed memory bus to 1.65V.

time doing trial and error without board plans to guide you. The target will almost always be a switching buck regulator, meaning it will have some switching FETs and both an input and an output inductor.

With the aid of board schematics, a magnifying glass, and a bit of solder, we attached the potentiometer to the motherboard. Returning to the multimeter, we now observed a voltage of 1.650V—a 7.3% increase. Not bad for a mod priced straight off the value menu!

This was a fun experiment, but now back to reality. There are two kinds of motherboards that would accommodate such a hack. The first is really cheap stuff: \$50 boards meant to run \$50 processors. These are going to be four-layer PCBs, light on copper, with no adjustments possible in the BIOS and very little to no threshold for voltage increases. As voltage rises, temperatures go up, and it's all too easy to fry a cheap board. The other possibility is a well-engineered motherboard able to take some tweaking yet doesn't carry onboard tweaking tools. Our WX58BP is a perfect example, but it also sells for \$250+.

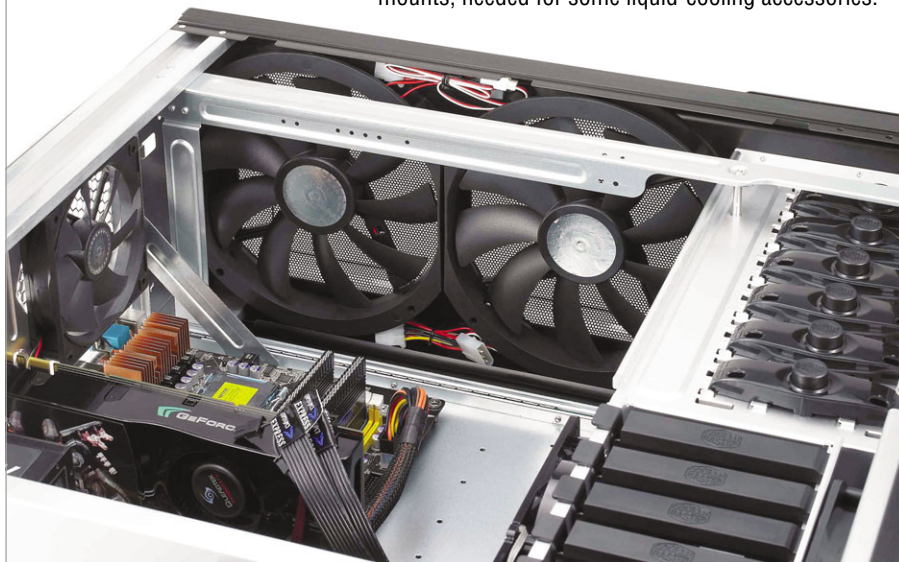
### Talk About Hot!

However you go about increasing voltages and frequencies, whether through a mod or more orthodox means, you're as good as toast if you don't stay focused on your system's thermals. If you're picking up temperature readings in excess of 100 degrees Celsius from the motherboard, you're running too hot and risk getting into an escalating feedback loop that could potentially destroy components on the board.

As Brian Forbes, director of engineering, performance, and product development at Intel, says, "We throw up a big red flag if we see it exceeding 100 C. It hurts like hell if you touch it and is well on its way to doing catastrophic damage." For example, the reason Intel implemented a special duct and fan on its Skulltrail (D5400XS) board is because the nForce 100 chips average between 100 and 105 degrees Celsius.

Divide your motherboard into zones, such as memory, CPU, graphics, power circuitry, etc., and keep records on each

Cases such as this Cooler Master RC-840, beyond being well-designed for airflow and cooling, are relatively rare in that they have twin, side-by-side 120mm case fan mounts, needed for some liquid-cooling accessories.



area. Use a thermometer, even a cheap noncontact unit, such as Scythe's Kama Thermo Wireless (\$19.90; [www.scythe-usa.com](http://www.scythe-usa.com)). For something a bit more precise with a laser sight, try the pistol-grip MT-EXP or MT-PRO from MicroTemp, starting at about \$55.

The obvious problem with these thermometers is that they require the case to be open, which could drop your reading by many degrees. You'll likely get more accurate readings from probes dropped right into the hot zones, which then wire back to a 5.25-inch bay device with a LCD or VFD readout. Because these probes are flat, you can also slip them under heatsinks, but be aware that this could impact the heat transfer efficiency between chip and thermal plate.

There are plenty of 4-probe, alarm-equipped bay devices on the market. For a good example, check out Thermalright's Hardcano 12 SE (\$59.99; [www.thermalrightusa.com](http://www.thermalrightusa.com)). If nothing else, PC Power & Cooling has its 110 Alert (\$10; [www.pcpower.com](http://www.pcpower.com)), an alarm speaker and thermometer on a board barely bigger than the Molex connector it plugs into.

### Shoot The Breeze

The key to stopping this nasty heat loop is proper airflow. Many people think that

just stuffing a case with fans will resolve all cooling issues, but there's definitely a method to the madness of fan placement. The object is to fix problems, not create a hovercraft. Fan quality obviously matters, with dual ball-bearing designs generally considered the best option. But the relationship between air intake and exhaust is arguably even more important.

"You want positive air pressure," says Mark Friga Jr., president and founder of FrozenCPU.com. "You want more air blowing into the system than is coming out. This will get rid of warmer air faster. Watch your fans' CFM. You want front fans bringing in more air than the rear fans are blowing out."

Most vendors will state the CFM specs for their fans, and it's simply a matter of arithmetic to find out if yours flow positive or negative. Our favorite method of assessing net flow is with a match. Find a fanless vent on the top or bottom of the chassis, blow out a match right next to it, and see if the smoke gets sucked into or blown away from the vent. If needed, adjust your fans accordingly.

"One of the simplest ways to get more air onto the CPU is to turn the fans around, so they're blowing in," says Intel's Forbes. "Air normally flows in from the front and the bottom [of the





Four-probe temperature monitoring meets bay-mounted bling in this Thermaltake Hardcano device, complete with alarm capabilities.

case], past the hard drives and memory, past the GPU area. By the time it gets to your CPU, it's warmed up by five or 10 degrees. Your CPU is designed to work in that environment, but if you want to get a little more out of it, get cold air to it.

"Instead of relying on air from the front, take the air out of the back. That'll give you up to 10 degrees more headroom," Forbes says.

Also consider adding some ducting. A standard 5-inch, 120mm fan duct runs \$5 or \$6, but you might be better off to take some cardboard and duct tape and build yourself a duct from scratch. The object is to route air where you want it to go. You might choose to direct hot air off of hot heatsinks straight to external vents so the heat doesn't get a chance to circulate inside the case. Alternatively, you might place ducts behind intake fans and channel cool air to the parts that need it most, such as past the memory or into a lateral CPU fan. For a less DIY approach, we like using Thermalright's HR-01 120mm flexible fan ducts (\$7; [www.thermalright.com](http://www.thermalright.com)).

Just keep in mind that ducting can change the airflow dynamic within the case, perhaps causing one problem while fixing another. If you install ducting, be sure to get fresh temperature and pressure readings to confirm all is well.

If you need more ventilation and simply can't afford a new case to replace your hermetically sealed heat trap, consider drilling some holes in the top. We spoke with an engineer who did this, describing it as

"ghetto but effective." For a more in-depth look, see "Thar She Blows!" on page 43 of the January 2006 issue of *CPU*.

Just remember: The more air you move, the more assiduous you need to be in guarding against dust accumulation. Get filters on those vents. Blow the system out with a can of compressed air every once in a while. Because cables tend to accumulate dust, be extra careful in your cable management. Bundle what can be bundled and route it under the motherboard tray. This will also help keep airflow smooth across the board. (Just be sure to keep cables away from the underside of the CPU area, which can get very hot, especially if the system uses a heatsink backplate.) You can never use enough spiral wrap, Velcro, and zip ties. And enthusiast outlets will usually have UV-reactive versions for only a few bucks.

### Heatsinks

Few minor hardware upgrades can have the performance impact and physical beauty of a new heatsink. Practically any of today's premium CPU coolers is going to give you a major improvement over a stock HSF (heatsink fan). In the enthusiast world, watercooling is still held to be the standard for serious cooling, but traditional watercooling is both expensive and time-intensive. When you're on a tight budget, getting 80% of the benefit for 20% of the price makes sense.

"You definitely don't need watercooling, especially with the introduction of heatsinks using heatpipe methods," says

Friga. "Air-cooling is getting pretty low temperatures today, right up there with low- to midrange water kits."

Which CPU or GPU cooler should you pick? The sky and physical constraints of your case and nearby components are the limit, but decent HSFs tend to start around \$30, and \$60 should get you something genuinely wicked. If you really are counting pennies, the extra benefits of fins made from copper (a better heat conductor) over aluminum probably won't be worth the added expense. Pay more attention to finding a good balance between CFM and decibels.

There are a few interesting exceptions to our budget-based bias against watercooling. Probably our favorite is Asetek's LCLC CPU cooler (\$65 without fan and mount; [www.asetek.com](http://www.asetek.com)). This is a compact, pre-sealed liquid-cooler system that integrates the pump and waterblock into a single CPU-mounted housing smaller than most high-end HSFs. Two tubes pipe out to a 120mm radiator fan that mounts to the case wall.

"You can run a Core i7-920 CPU [2.66MHz], and with a stock cooler, you're not going to get any overclocking out of it," says Jon Bach, president of reseller Puget Systems. "With the Asetek LCLC, we can just about get 4GHz."

According to Bach, the single 120mm implementation isn't sufficient for daisy-chaining the CPU and GPU in the cooling loop, but a dual-120mm radiator and fan setup is. The trick here is finding a case that can mount side-by-side 120mm fans. Cooler Master's ATCS 840 is one good example.

Most coolers ship with a small packet of thermal grease. This is sort of like the ketchup packets you get from a drive-thru. It might not be your favorite brand, but it's probably good enough for your \$5.99 burger and fries. Then again, if you're pushing for perfection on pennies, demand the brand. Consider grabbing a tube of Arctic Cooling MX-2 (\$5.60; [www.arctic-cooling.com](http://www.arctic-cooling.com)) or OCZ Freeze (\$6; [www.ocztechnology.com](http://www.ocztechnology.com)). Although you'll

see the most benefit replacing your CPU heatsink's stock TIM, it's also true that virtually every primary component with a heatsink could benefit from high-quality thermal grease, if you're so inclined.

### The Other Heatsinks

The same heatsinking attention you give your CPU cooler can also be applied to the chipset, GPU, and MOSFET power circuitry. Thermalright, Thermalright, and every other thermal vendor you can name probably have a complete line of heatsinks for everything in your PC that gets above body temperature. It's a given that a GPU cooler can help with your graphics overclocking, especially if you're dealing with a stock cooler on a mainstream card. (Top-end cards from the likes of Asus, BFG, and Evga will tend to already come overclocked and feature upgraded cooling.) Similarly, you can upgrade the northbridge's cooling once you start cranking up system-wide frequencies.

Eventually, you'll hit a point of diminishing returns for your applications. Do you really need a hard drive cooler if you have proper airflow? Probably not. What about MOSFETs?

"For the most part, MOSFETs don't limit your overclock," says Danger Den President Jeremy Burnett. "Cooling them doesn't necessarily give you more headroom . . . most of the time. Typically, those MOSFET blocks will run you \$50 or \$100. Companies like Intel already overdesign their MOSFETs, so they can take quite a bit of load from the overclock side. And popping those off is a challenge because they use pretty good epoxy."

Just about every performance memory module being sold today comes with an attached heatspreader. You could go nuts and get something liquid-ready like OCZ's Flex EX, but this is probably overkill. At the same time, trying to upgrade a factory heatsink with an aftermarket one or with individual "RAM sinks" is probably an exercise in tiny returns. Assuming you paid a few bucks more for good overclockable memory, you're going to get the most bang for your

Typical airflow in a tower case looks a lot like this, but you can fine-tune your airflow with customized ducting and by altering fan direction.

buck with a little direct-attach fan, such as OCZ's XTC (\$18).

"Memory runs about as hot today as it did 10 years ago," says Michael Schuette, vice president of technology development at OCZ. "Back then, with an open or well-ventilated case, the temperature on modules was about 60 to 65 C, up to about 80 under load, which is not unreasonable for current high-speed memory. You can even go above that with high-speed DDR3. But when you have four or six modules together, all slots populated, they're tightly packed, and the air can get very stagnant. If you just have a fan that blows down between those slots, you'll drop the temperature down to about 25 to 30 C—let's say five degrees above case temperature. It makes a huge, huge difference. You should see temperatures with current high-speed memory of 40 to 60 C under load with a dedicated fan."

### Odds & Ends

There are other places to look for improvement, of course. Hard drives are a common target. Most power users know at least the fundamentals of proper disk care and that approaching capacity can dramatically hamper performance just as defragging can help it. Less known is the Hdparm command-line utility, which can alter internal hard drive settings. (Wikipedia actually has a decent entry on hdparm to get started.) As an example, with many drives, you can accelerate buffered disk read times by using DMA, 32-bit transfers with multiple sector modes initiated by a certain Hdparm command. Be sure to read the Hdparm manual, because although some commands can help performance, others can destroy your data. Note that some drives can also have their seek times adjusted. Accelerating the seek



time will improve performance but it will also make the drive louder.

What about the power supply? Although some PSUs have adjustable voltage rails, there's really no other feasible way to tweak a unit. You can, of course, replace a power supply, but don't assume that the biggest, baddest SLI beast is the answer to your dreams. You need quality for true performance, and you need to mind your dollars.

"Don't laugh at me, but in most of my systems, I'm running . . . 520W power supplies," says OCZ's Michael Schuette. "I have no problems running Radeon 4890s with two or three hard drives and a Core i7-965. But the problem is I'm running at the upper limit of that power supply, which means my efficiency also goes down. I see people with 1,000W, 1,500W, or whatever power supplies, and I honestly think it's better to go with high quality in a slightly lower total power rating than going for the 1,000W running at 20 or 30% load. At that point, you only get about 70% efficiency, and the power it outputs is pretty crappy. When you have a limited budget, go with a high-quality power supply and skimp a bit on your total power."

That should keep you busy for a while. So tweak away, keep your money in your pocket where it's most needed, and enjoy the fruits of faster performance! ▲

by William Van Winkle





# The Bleeding Edge Of Software

Inside The World Of Betas

## Network Assistant 4.5 Beta 1

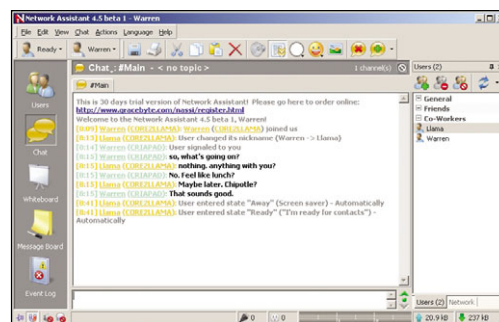
If you work in a small network spread across a small or medium-sized office, perhaps you've wished for some way to easily communicate with the group that's faster than email but isn't public like IM programs. The old WinPopup method of broadcasting short messages to everyone in the LAN is still an option, but a better one is Network Assistant, which has more features than a Swiss-army knife and is easy to use and configure.

Network Assistant doesn't require a centralized server to coordinate things: It just multicasts over IP or with UDP packets over your LAN, finding other instances of NA automatically. By default, NA users are identified by their Windows username, but custom names are available, too. Users on the LAN appear in a list, and by right-clicking a user, you can send a pop-up message, initiate a private chat, send a file, or even send a "beep" over his speaker.

Other communications options include an IRC-style group chat (complete with several channels), a shared whiteboard, and a more permanent message board.

There are some handy administration tools, too. Users can be divided into groups, making it easy to handle offices with dozens (or hundreds) of users. Operators can share screenshots of their desktops and make their Windows task-list visible, allowing for a basic kind of remote support option for an IS department. Certain features can be locked out with an administrator password, thereby forcing users to utilize certain options.

The pricing for Network Assistant boils down to \$30 a seat, and you can only buy licenses in groups of two or more. (There are discounts for bulk licenses.) If you're just looking for a cute way to chat with your wife in another



### Network Assistant 4.5

**Publisher and URL:** Gracebyte Software, [www.gracebyte.com](http://www.gracebyte.com)

**ETA:** Q3 2009

**Why You Should Care:** Add big-network communications to any small LAN with ease.

part of the house, this is probably a tad expensive, but this is actually a good price for small-office, groupware-type software. The 30-day trial should be enough time to figure out if the expense is worth it. ▲

by Warren Ernst

## PDFCreator 0.9.8

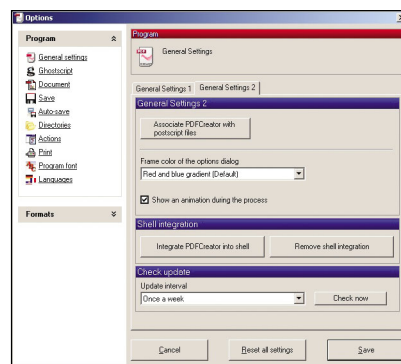
It's been a long time since Adobe Acrobat was the only way to generate PDF files, but the alternatives have normally had trade-offs. Some are merely cheaper than Adobe's (admittedly high-priced) offerings but still aren't free. Some free options are fairly complicated multistep processes, involving making a PostScript file and then converting it with GhostScript to a PDF. PDFCreator strikes a nice balance between cost (it's free), ease of use, ease of installation, and configurability.

Once you get past its only installation gotcha (be sure to uncheck the browser toolbar add-on if you normally avoid such things), installation is a snap. The installer adds GhostScript (an open-source PostScript interpreter), a Windows printer driver, and a print job manager quickly and painlessly, and it even includes a well-written and complete Help file. Like other

tools, making the PDF involves "printing" to the PDFCreator printer driver and specifying a filename for the resulting PDF file, and then within a few seconds, the PDF file appears in your default PDF viewer.

PDFCreator has a few nice tricks. There are individual settings for controlling the compression rates of different types of graphics, controls for embedding True Type fonts within your PDF files, and different pathways for directly emailing PDF files once they're created. If you're trying to add PDF creation to some sort of workflow, you can automatically execute scripts before or after the actual PDF file is created. There's even an option to create a network print driver, letting all the computers in a LAN create PDFs files without installing the program on multiple PCs.

PDFCreator is one of those projects that's been improving for years yet still refuses to breach the magic "1.0 Barrier," so we encountered what is basically a finished



### PDFCreator 0.9.8

**Publisher and URL:** Philip Chinery and Frank Heindörfer, [sourceforge.net/projects/pdfcreator](http://sourceforge.net/projects/pdfcreator)

**ETA:** Q4 2009

**Why You Should Care:** There's no better free PDF creator for Windows with this many options.

and polished product, free from the bugs normally associated with beta software. ▲

by Warren Ernst



**The gold is emerging**  
**Seasonic 80 PLUS® Gold power supply**

The Seasonic X Series is the world's first high power multiple-output PC power supply to receive the 80 PLUS® Gold certification. This raises the bar to the highest level for energy utilization efficiency, cost savings and environmental awareness. Now the Seasonic X Series is coming to you soon.



# UP TO SPEED

## Upgrades That'll Keep You Humming Along

Gamers get some treats for their summer of play with a PS3 update, a new Radeon driver, and improvements to Xfire. Meanwhile, Adobe fixes a hole in its ubiquitous Reader.

### Software Updates

#### Adobe Reader 8.1.4

Last month, we featured Adobe's response to a security vulnerability in version 9.1 of its standalone reader for Acrobat files with a critical update. The bug causes the program to crash, which opens up your PC to control by an intruder. For users of older versions who elect not to upgrade to the 9.X series, the version 8.1.4 fix is for them, Adobe says.

[www.adobe.com](http://www.adobe.com)

#### Bitcomet 1.10

The P2P torrent client adds a task search box in the toolbar and improves the file type-filter in the torrent task properties dialog. The auto shutdown feature is also improved.

[www.bitcomet.com](http://www.bitcomet.com)

#### Driver Magician 3.42

The driver updater, uninstaller, and back-up tool now has a multilanguage interface. The program can now find drivers for all operating systems, and Gold Solutions Software has updated Driver Magician's database of drivers, as well.

[www.drivermagician.com](http://www.drivermagician.com)

#### FeedDemon 2.7

The respected feed reader now gets a "Panic Button" that marks your overwhelming mountain of new items as "read," even if you haven't touched them. Performance has been substantially improved, and the newspaper interface has been redesigned. NewsGator has also revised offline reading, such as redesigned feed prefetching.

[www.newsgator.com](http://www.newsgator.com)

#### Foobar2000 0.9.6.5

The compact media player now has an online troubleshooting feature. The crash report system is also upgraded. Also, the built-in album art viewer can view artist images that are also in the same folder or embedded in tags.

[www.foobar2000.org](http://www.foobar2000.org)

#### iTunes 8.1.1

Apple updates its multimedia library, player, and store to allow HD movie rentals on the PC. Some bug fixes, such as problems with syncing and VoiceOver with the iPod touch and iPhone, were tossed in, too.

[www.apple.com](http://www.apple.com)

#### Process Lasso 3.54.7

This unique tool manages Windows process priorities in the background to optimize performance. This update adds to the core ProBalance handling of some processes. There is also an overall decrease in the sensitivity of the default ProBalance settings.

[www.bitsum.com](http://www.bitsum.com)

#### RemoveIT Pro V7 11.4.2009

The software removal tool redesigns the interface and runs under an updated core engine. A few helpful bug fixes are included, too.

[www.incodesolutions.com](http://www.incodesolutions.com)

#### Skype 4.0.0.224

The IP phone software has a new option to install to the Google Chrome browser. The update also fixes a bug that corrects video-scaling issues with the Skype client.

[www.skype.com](http://www.skype.com)

#### Tor Browser Bundle 1.1.12

The Tor tools help anonymize your Internet activities. The new version updates some of the bundle's core components: OpenSSL (to 0.9.8k) and Tor itself (to 0.2.1.14-rc).

[Torproject.org](http://Torproject.org)

#### Total Commander 7.5 Beta 2

The replacement file manager for Windows squashes some irritating bugs such as a tendency to delete the wrong file in a directory in rare cases. Problems with unpacking multivolume RAR compressed packages also get addressed.

[www.ghisler.com](http://www.ghisler.com)

#### Trillian Astra 4.0.0.103 Beta

The popular multinet network chat client gears up for a 4.1 release with a series of beta versions. In this one, the beta testing group is widened. The new software version addresses a bug involving the Facebook plugin and using Facebook Chat.

[www.ceruleanstudios.com](http://www.ceruleanstudios.com)

#### VLC 0.9.9

The beloved VideoLAN media player gets a bug fix that addresses issues with full-screen behavior on multiple displays. It also improves performance on Intel-based Macs.

[www.videolan.org](http://www.videolan.org)

#### Xfire 1.107

The in-game client receives another of its frequent updates. This time, the UI is updated to include a fresh status bar and simpler configuration. A system vulnerability involving deleting large numbers of screen shots has been resolved.

[www.xfire.com](http://www.xfire.com)

### Driver Bay

#### ATI Catalyst 9.4

New Radeon graphics drivers update the Overdrive overclocking tool (for the HD 4000 series) with an "auto-tuning" feature for finding the best values. World of Warcraft players should see better shadow rendering in Crossfire configurations.

[www.amd.com](http://www.amd.com)

# The State Of Security

“Suite” Isn’t A Dirty Word Anymore

Security software is something that most users liken to eating vegetables: We know they’re good for us, but they can leave a bad taste in our mouths. A few years ago, security software developers started adding extra layers of security to what they simply used to call their antivirus programs, generally adding so much bloat, complexity, and system slowness that users start swearing off particular vendors and their products. Believe it or not, we’re happy to report that the times have changed. The vegetables are tasting better.

Two developments account for these improvements. The first was massive user revolt: Users directed their rage at security software vendors, and the vendors have listened, spending serious manpower on performance optimizations to keep computers spry. The second basically boils down to the availability of fast, cheap hardware. A \$500 computer bought today is five or 10 times faster than a \$1,400 computer bought three or four years ago, and a \$1,500 computer bought today might as well be a 5-year-old supercomputer. In other words, the modern computers most *CPU* readers have are finally capable of good performance, even while running security software.

## How We Tested

We had several conversations on online gaming forums to get a sense of what power users’ concerns are with security software, and the results were intriguing. General slowness due to background tasks is always a concern, but scheduled background scans and update downloads occurring during gaming, movie viewing, or other periods when performance is important is a big problem, too, so we focused on these areas first. There was a general assumption

among the forum community that security effectiveness and ease of use were similar among competitors, so we checked them all out against viruses, spyware, legitimate servers, and illegitimate worms. Most users wanted simplicity, but some still wanted options and detailed controls, so we determined which software had what and how easy it was to use. We checked that bundled utilities performed as advertised.

Web-usage statistics, along with Valve’s Steam gaming engine statistics, show Windows XP still being used between two to four times as much as Vista. And because Windows 7 will soon be pushing Vista out of the marketplace, we tested with WinXP SP3. Valve shows more than 50% of users have CPUs ranging between 2.3GHz and 3.3GHz, and 70% have 2GB or more of RAM; instead of using a low-powered test system (which artificially highlights speed differences in the products), we chose a representative 3GHz Core 2 Duo-based computer with 4GB of RAM and two SATA hard drives to show the real-world effects of installing security software. If you’ve skipped ahead to the charts, you’ve seen that the test system was never overwhelmed by any security suite, though there were definitely measurable differences in speed with many tests. For the record, we also used slower systems and virtual machines for some threat testing and network compatibility.

*(Note: All prices listed are for a 3-PC license.)*

## About Malware Detection Rates

Although we’re including the results of our malware-detection and healing tests (performed against real malware collected with our own honeypot and mail servers), it’s time to mention something about statistics and sample size. Outfits such as AV

Comparatives ([www.av-comparatives.org](http://www.av-comparatives.org)) have teams of technicians spending months running most of our tested products against a malware “zoo” consisting of 1.3 million malware samples.

Having decidedly less resources, we selected 25 malware items and one infected thumb drive to test against. There’s no telling if our sample is a representative subsample of AV Comparatives’, or indeed, of the types of malware spreading about in the real world at any given time, so directly comparing our detection rates with AV Comparatives’, or anyone else’s (and there are others you can and should Google for), isn’t terribly meaningful.

## AVG Technologies AVG Internet Security 8.5



### AVG Internet Security 8.5

\$64.99

AVG Technologies  
[www.avg.com](http://www.avg.com)



AVG’s free antivirus program is among the most popular security products on the Internet, so you’ve probably seen it around. As such, AVG Internet Security feels very familiar, essentially adding a two-way firewall, spam filter, drive-by download and phishing shield, and antirootkit abilities to the traditional antivirus/antispyware engine. This is a model most of the security vendors have taken with their suites, but AVG’s interface feels more cluttered than most.



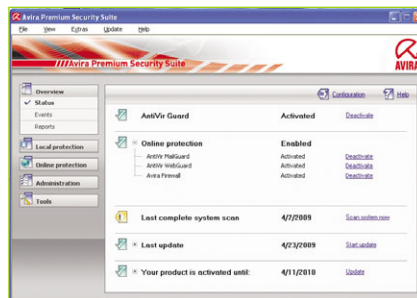
AVG also feels familiar because it essentially follows the security model of yesterday—deluge the user with security questions all the time, but don't always be clear about the best course of action. For example, when it detects malware in a download, a pop-up proclaims "Threat Detected" and identifies the infected file and the threat it contains, usually followed by a Close button. Nowhere does the dialog box actually say "threat deleted" or "don't worry, your computer is safe." On top of this, the dialog stays up indefinitely, requiring you to pause your work to click it. For some threats, you're given the option of Heal, Move To Vault, or Ignore with a Remove Threat As Power User checkbox; it seems sensible until you realize that many other products would automatically move the threat to the vault and not bother you with the details.

The firewall pops up similar dialogs about network access to most well-known programs and Internet games, even going as far as to jump to the Desktop so you can click Allow, although launched games resume where they are paused. Many other firewalls "automagically" know about thousands of "known-good" programs and just let them work.

Other noteworthy aspects include better-than-average spam filtering, the best 3DMark06 score (though they're all within .2% of each other), a default setting to scan within compressed files, and the identification of a well-known email password-recovery program as a "potentially dangerous hacking tool."

### Avira Premium Security Suite

Avira distributes what is generally the second-most-popular free antimalware program, and like AVG, Avira Premium Security Suite feels a lot like its free cousin, but with more features added. Also like AVG, APSS tends to annoy its user with a lot more pop-ups than necessary, and they contain options likely to confuse. Upon detecting our infected USB flash drive, for example, it popped up a warning identifying the offending file and the infection but made the user



### Avira Premium Security Suite

\$78

Avira GmbH

www.avira.com



select one of the following options: Move to Quarantine, Delete, Overwrite And Delete, Rename, Deny Access (default), and Ignore. If you're a virus researcher, such options are nice to have, but in almost every other situation it should automatically move the malware into quarantine.

Pop-ups are the standard operating mode for the firewall, which even managed to freeze Counter-Strike: Source in its tracks until we ALT-TABbed to the Desktop to view the firewall permission dialog box, clicked the Allow button, and ALT-TABbed back. And then we had to do it again for another component in CS: Source that wanted to get online. It also popped up warnings about the occasional ICMP packet being detected from the Internet—something no other security suite did.

On the positive side, APSS tied Eset for the fastest PCMark05 score, and its Web scanner proxy actually sped up large downloads from our test server on the LAN. Its AV Comparatives detection rates were the best. Its interface offered the right combination of ease and access to technical details.

We'd be more willing to overlook Avira's (and AVG's) issues if these products were free or inexpensive, but the competition has it beat here too, with some being half the price.

### BitDefender Internet Security 2009

BitDefender Internet Security 2009 feels like the most flexible suite from the moment you fire up its installer, because



### BitDefender Internet Security 2009

\$39.95

BitDefender

www.bitdefender.com



it peppers you with question after question about your home network, parental and identity control, and so forth. Most other utilities make you dive into the interface to configure these options, or they just turn them all on by default and assume you'll figure out how to disable them if you need to.

Most of the utilities aced at least one of our performance or security tests, but not BitDefender, although this is forgivable given its low price. Its pop-ups are very straightforward and make it clear that it's on the job and taking care of problems as it finds them. The firewall doesn't seem to know much about good and bad applications, as it asked us about almost every Internet-accessing program we had, except for obvious programs such as Web browsers, emailers, and WinZip. One unique option is a removable disc scanner, which asks to run a scan whenever a new disc or flash drive is inserted—very handy in this era of infected thumbdrives.

Most of the utilities have a game mode, which tells the software not to display any pop-ups that would interfere with fullscreen games, movies, etc. Some of the better utilities enter game mode automatically, but BitDefender requires you to enter game mode manually. Background updates sometimes require a reboot, which interrupted us more than once.

BitDefender's main interface has two modes, Simple and Advanced, and it's a good way to minimize confusion for most

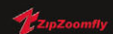
Powering your imagination.



## Toughpower XT

There may be other choices to power your PC, but look no further when you are powering the machine that drives your imagination. The all-new Toughpower XT comes standard with top-of-the-line Japanese caps to ensure the system runs smoothly when you are fragging away through the night. Advanced circuitry design delivers clean, stable and more efficient power to where it is needed and where it is needed with the most cutting-edge technologies such as S.P.T. LED Alarm, Fan-Delay Cool and 80PLUS® certification.

For more detail information, please visit us at [www.thermaltake.com](http://www.thermaltake.com)





users. Simple mode basically lets you enable or disable various areas of protection in a broad stroke, while the Advanced mode opens up all the options and fine details. We love all the tools available in Advanced mode, but Basic is a little too busy, considering the options you can't select there.

### Eset Smart Security 4

Eset's security programs are known for being light on resources, and Eset Smart Security doesn't disappoint. It added the least amount of time to a reboot (just three extra seconds!) and tied for the best



PCMark05 score. We were pleasantly surprised by its high level of "smarts." (But then again, "smart" is in its name, so we shouldn't have been.)

### Eset Smart Security 4

\$89.99

Eset

[www.eset.com](http://www.eset.com)



Better than almost any other suite, ESS knew what to say and when to say it. When it detects a downloaded virus, for example, it pops up a small red alert dialog box, which identifies the infection, the infected file, and simply says "Connection Terminated—Quarantined." Its game mode fires up automatically when it detects programs running fullscreen. The firewall immediately

## Security At A Cost

With only a few exceptions, all of the suites we tested were quite effective at stamping out malware, so the question becomes: How much do you pay in terms of system resources to have that security? We ran each suite through a gauntlet of tests to determine the efficiency of each. Most times are in (min:sec).

	<b>3DMark06:</b> Average of at least three runs at default settings	<b>PCMark05:</b> Average of at least three runs at default settings	<b>Counter-Strike: Source Benchmark Frame Rate:</b> Average of at least three runs at default settings of Video Stress Test	<b>Boot Time:</b> From first appearance of Windows Logo to beginning of a 15-second period of less than 10% CPU activity, averaged over at least three runs (min:sec)	<b>Web Page Load:</b> Cumulative time to load a complex iGoogle page 10 times, as measured with Firebug extension	<b>Copy Files:</b> Time to copy 18GB of files from one SATA drive to another, including 1GB of office files, 7GB of photos, and 11GB of MP3/AAC files, averaged over at least three runs	<b>Zip Files:</b> Time to zip up 1GB of office files, averaged over at least three runs	<b>Unzip Files:</b> Time to unzip 1GB of office files, averaged over at least three runs	<b>Download Speed:</b> Time to download 798MB ISO file from local Web server over 100Mbps LAN connection	<b>Scan Speed, All:</b> Time to scan a 5.8GB static Windows folder and 2.6GB static Program Files folder with software set to scan all files, copied from a 4-year-old system (46,087 files)
Clean System	11752	8969	279.24	0:32	00:28.0	4:44	2:10	0:34	2:04	n/a
AVG Internet Security 8.5	11755	8926	279.02	0:51	00:46.1	5:01	2:19	0:57	1:53	32:01:00
Avira Premium Security Suite	11735	8992	277.92	0:39	00:37.0	5:05	2:19	1:02	1:39	5:13
BitDefender Internet Security 2009	11736	8740	277.06	0:42	00:46.8	5:33	2:22	1:05	4:30	12:10
Eset Smart Security 4	11753	8992	277.97	0:35	00:36.9	5:16	2:15	0:58	36:15:00	7:43
Kaspersky Internet Security 2009	11731	8930	276.43	0:41	00:28.9	5:39	2:18	1:03	1:58	6:54
McAfee Internet Security	11748	8920	278.79	0:40	00:43.7	5:33	2:15	1:10	2:10	11:39
Norton Internet Security 2009	11747	8953	278.2	0:41	00:42.2	5:51	2:39	1:02	1:41	6:44
Panda Internet Security 2009	11744	8953	278.82	0:47	00:49.6	5:02	2:13	1:04	1:54	8:55
Trend Micro Internet Security Pro	11734	8832	279.99	0:49	00:35.1	5:47	2:35	1:26	1:40	10:32

Columns Q and R come from [http://www.av-comparatives.org/images/stories/test/ondret/avc\\_report21.pdf](http://www.av-comparatives.org/images/stories/test/ondret/avc_report21.pdf)

Column S comes from <http://www.virusbtn.com/vb100/archive/2009/04>

Column T comes from <http://www.westcoastlabs.com/checkmark/vendorList/?techGroupID=27>

Column comes from <http://www.icsalabs.com/icsa/product.php?tid=dfgdfsgdhkjkj-kkkk>

**CPU RANKING** ○ 0 = ABSOLUTELY WORTHLESS | ●●● 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

recognized almost every Internet program, remote-control applet, and online game in our arsenal and let them communicate with the Internet without prompting us, yet it was smart enough to just block our firewall-leaktest program. Although our leaktest program wasn't really malicious (which is important when considering Norton's actions), we think ESS made the smart call on this.

The ESS interface has two modes, Standard and Advanced. Standard has the bare minimum of commands, but they are the right ones a beginner really needs. Advanced adds a few more options front and center but makes the Setup menu available with direct access to configuration options. Some options that are typical in other products are either slightly

hard to locate or simply absent, forcing the user to rely on ESS to make the smart choice automatically.

The only glitch we encountered was with our download speed test. Between two LAN machines, speeds slowed to a crawl (slower than DSL rates), yet we saw no slowdown on downloads from the Internet.

Eset Smart Security's smarts and speed make it the most expensive choice here, but if you don't want to be bothered by your security suite, the cost is worth it.

### Kaspersky Lab Kaspersky Internet Security 2009

Kaspersky's security products are generally thought of as the preferred tool for experts, and we can see why. It



### Kaspersky Internet Security 2009

\$79.99

Kaspersky Lab

www.kaspersky.com



combines excellent detection rates with very clear on-screen messages, but makes no attempt to simplify the process of keeping your system secure. All the settings and

Time To Open Interface: Elapsed time from double-clicking Tray icon until the GUI becomes usable (Splash screens don't count)	Memory Consumption/Number Of Processes: The amount of RAM consumed when the product is idle, in KB	Number Of Processes: The number of processes associated with the product when idle	Downloaded Infected Executables: Blocked or Deleted, from sample of 15	Downloaded Infected Zip Files: Blocked or Deleted, from sample of 11	AV Comparatives Feb 09 On-Demand Scan Detection Results (1.3 million malware samples)	AV Comparatives Feb 09 On-Demand Scan False Positive Results	VB100 Pass/Fail (April 2009 Test)	West Coast Labs' Checkmark Certification	ICSA Labs Certification	Price For 3-PC License: Price includes "discounts" or "specials" with no foreseeable end-date offered from vendors' online stores	CPU
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
0:02	49,736	12	100%	100%	93%	17	Pass	Certified	Certified	\$74.99	●●●●
00:01.5	63,212	6	93%	91%	99.70%	24	Pass	Not Issued	Not Issued	\$78.19	●●●●●
instant	9,924	4	93%	91%	98%	25	Pass	Certified	Certified	\$39.95	●●●●●
instant	55,696	2	93%	91%	97.60%	13	Pass	Certified	Certified	\$89.99	●●●●●●
instant	30,096	2	100%	100%	97.10%	14	Pass	Certified	Certified	\$79.99	●●●●●
:04	75,112	9	87%	82%	99.10%	13	Pass	Certified	Certified	\$44.99	●●●●●
instant	4,461	3	100%	100%	98.70%	7	Pass	Certified	Certified	\$59.99	●●●●●●
:02.5	158,416	15	100%	100%	Not Tested	Not Tested	Not Issued	Certified	Certified	\$79.95	●●●●●
:4.5	53,923	9	100%	100%	Not Tested	Not Tested	Not Issued	Certified	Not Issued	\$69.95	●●●●●



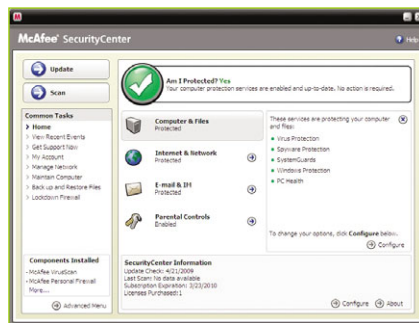
configuration options are sort of hanging off the interface every which way (there's no basic mode), and current protection statistics and live graphs and charts line every screen in its tabbed interface.

If you like being asked about almost every program your security suite encounters, you'll love KIS. For example, it identified our gaming keypad's driver as "a potentially hazardous program," asking if we wanted KIS to run it, delete it, or assign it to a restricted group. Run and Delete are obvious, but the Restricted group is something different. KIS can selectively prohibit apps from having access to the network, the file system, or the Registry, sort of like "sandboxing" them. None of the tested products identified clean-but-not-legal keygen applets as malware (years ago they used to), but KIS was the only one to offer to run them in a restricted mode, preventing them from doing anything untoward. Even the excellent spam filter is expert-oriented: It divides messages into "definitely spam" and "probably spam," minimizing the messages you need to double-check once the system is trained.

KIS is not without drawbacks. It generated the slowest CS: Source and 3DMark06 benchmarks, and, in fact, we had to disable it before 3DMark06 and PCMark05 would even start. (We manually re-enabled it after starting the benchmark programs.) Its firewall was slow to react to a port scan, stealthing many ports only after a scan commenced.

### McAfee Internet Security

McAfee Internet Security is the surprise low-price leader among the major vendors, with a per-computer price of only \$15. And although it did relatively poorly with our relatively small malware zoo, it has the second-highest detection rate in AV Comparatives' more statistically significant test. It receives definition updates almost constantly and will even update itself to next year's version automatically if your subscription is active when McAfee performs the



### McAfee Internet Security 2009

\$44.99

McAfee

www.mcafee.com



switchover, making it an even better deal.

MIS automatically enters game mode when fullscreen applications are running, suppressing the pop-ups that would kick you to the Desktop, but it doesn't stop it from performing scheduled tasks or getting updates, which can slow things down occasionally. Many of the suites now duplicate McAfee's Site Advisor, a pioneering service that shows you how malware-free a Web site is from the results of a search engine search, though we found it a tad more sensitive than the competition. It is easily disabled if you're not with the "better safe than sorry" crowd and doesn't take up a lot of browser space.

MIS does a good job of clearly explaining what it's doing. It quickly dispatches viruses with a clear "McAfee has automatically blocked and removed a Virus," and the firewall messages are similarly clear, although we encountered them more than we would have expected with popular network applications. With virtually no training, the spam filter was right 99% of the time, obviously benefiting from McAfee's server-side training based on all its users' input.

Our biggest problem with MIS was a general level of sluggishness. It took a good 4 seconds from Tray icon double-click to being able to work with the GUI, whereas a lot of other suites are instantaneous. Navigating to certain sub-screens takes a moment, too, discouraging experimentation.

### Symantec Norton Internet Security 2009

In the recent past, Symantec was justly targeted by angry users for bloated versions of NIS that slowed computers down, sometimes dramatically. NIS 2009 is a whole new ballgame.

The main NIS interface has two CPU bars—one showing overall CPU usage and another showing how much CPU time NIS is consuming, obviously attempting to prove that your slow computer isn't Symantec's fault. Other speed-boosting tricks include never performing a background scan or downloading an update unless the CPU is idle, actively freeing RAM when the program is idle (its idle RAM footprint is an almost unbelievable 4.5MB), and taking inventory of known-good executables on your hard drive (and recording their checksums) and then skipping them during system scans to make scans faster. The main GUI appears instantly upon double-clicking its Tray icon, and sub-screens open instantly, too.



### Norton Internet Security 2009

\$59.99

Symantec

www.symantec.com

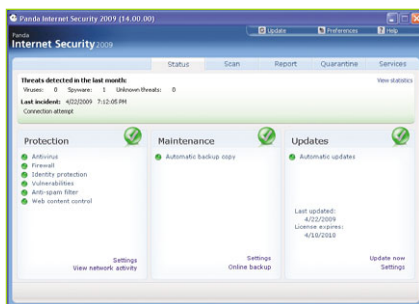


NIS has just one mode (no basic and advanced modes here). Instead, the relatively simple GUI has multiple Settings links that delve deeper into more options. It takes up too much on-screen space but works well. You may not need to get to detailed configuration settings often because NIS is just about as smart as Eset, almost always making the right choices about what to block (and telling you so unambiguously), what to quarantine, and what to leave alone. It let our

leaktest program open ports unopposed, but this, debatably, isn't a dangerous program *per se*, and NIS' heuristics accurately detected this.

Although NIS 2009 is a spry application, it's worth noting that benchmarks were generally average, and the antispam filter needed a lot of training before it approached the effectiveness of the competition's untrained filters. Still, NIS is an excellent combination of price, speed, and features and worth a second look if you've been burned by Symantec before.

### Panda Internet Security 2009



#### Panda Internet Security 2009

\$79.95

Panda Security

[www.pandasecurity.com](http://www.pandasecurity.com)



Panda Internet Security is a very attractive, easy-to-use security program that just needs slightly better pricing, a little more smarts when dealing with nasties (or, in our case, a false positive), and a bit of a diet.

We have only slight qualms with PIS' detection model. When we tried downloading test malware, Panda's concise message of "This file was infected with this virus and was deleted" appears directly in the content area of the Web browser window and clearly says what it does, which is great. Infected compressed files, on the other hand, generated no message and actually downloaded and saved, but the ZIP files themselves were empty. PIS silently took care of the problem. Viruses in ZIP files detected with heuristics were renamed with a .VIR extension, which is important to note since our legitimate password-detecting program was renamed in its

ZIP file. When we extracted it and renamed it back to an EXE file, it worked fine. A manual scan of it resulted in its being quarantined, meaning the background scanner plays by different rules than the on-demand scanner.

PIS isn't especially well suited to gamers. There's no game mode (it started downloading an update during a CS: Source benchmark; we threw out that test result), and it consumes a whopping 158MB of RAM when idle. The firewall didn't recognize some popular Internet applications and games that other security suites simply allowed without a pop-up.

That said, it makes a good security suite for the general populace. The clear interface invites exploration, and it comes with the most well-written Help file. The spam filter's only mistake was marking a few newsletters that had imbedded ads as spam before training, and PIS' rescue CD (like Norton's) makes recovering a thoroughly infested Windows installation possible.

### Trend Micro Internet Security Pro



#### Internet Security Pro

\$69.95

Trend Micro

[us.trendmicro.com](http://us.trendmicro.com)



We haven't looked at a Trend Micro security product for a while and are pleasantly surprised at the innovative features tucked into the current version of TMISP. However, a general slowness in opening the interface, along with a fairly dramatic increase in most file-related benchmarks, has us hoping the engineers at Trend can give TMISP a NIS2009-like speed boost in the future. Additionally, its lack of inclusion in the

AV Comparatives' (and other large-sample) tests has us wondering about its overall efficacy against malware, though it aced our limited tests.

TMISP clearly announces when it blocks malware and confirms your system is safe, so there are no decisions you need to make to stay malware-free. It also wisely decides which applications to automatically grant network access to and which to block, though manually overriding the built-in smarts is simple. All the products in this roundup come with some sort of Web filter or phishing filter, but TMISP's Web site safety filter actively blocked our malware test server on our test machine after only about eight virus detections. Our other test machines were blocked from their first visit to our malware test server only a few days later. You can't get infected from a site you can't connect to, right? An additional button on the browser toolbar evaluates the security of your wireless connection, handy in coffee shops and other hotspots.

Although it lacks either an automatic or manual game mode, some interesting features include a keystroke encrypter to foil keyloggers, a remote file vault to back up important files, and an Internet filter that monitors and optionally prevents the transmission of information such as credit card numbers, telephone numbers, and so forth.

### Recommendations

Each of the suites has its strengths and weaknesses, but we're pleased to report that none of the suites we tested will slow down a reasonably modern computer. For those seeking a lightweight suite that doesn't deluge you with questions and pop-ups, we recommend Eset Smart Security and Norton Internet Security, depending on whether you want the utmost speed in benchmarks or merely very good speed with more security features, respectively. Control freaks and techies who like lots of options should consider Kaspersky Internet Security. ▲

by Warren Ernst

Subscribers can go to [www.cpumag.com/cpujul09/security](http://www.cpumag.com/cpujul09/security) for additional test data.



# Application As Service

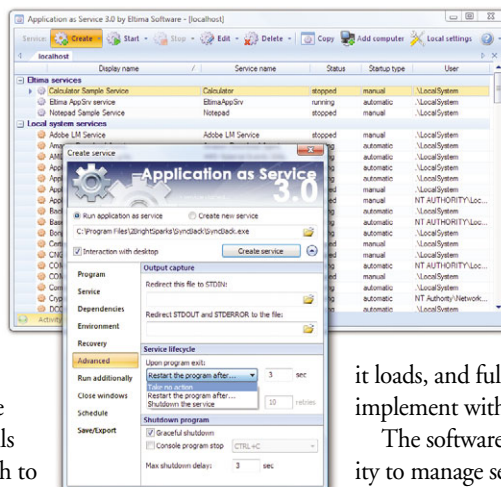
There are plenty of ways to make programs start automatically when Windows loads, but most of them offer no control beyond that. Application As Service changes that by letting you treat any program as a Windows system service, providing all of the advanced configurability and other features that system services enjoy.

As an example, say you use a backup program that you want to run on a regular basis, but other people use your computer and often shut it down accidentally. Using AaS, you can set up the program so it launches automatically when Windows loads, runs when you want it to run, and automatically restarts itself if some bonehead tries to kill it. And those are just some of the things this useful software allows.

Launching the software displays all of your Windows system services, as well as a separate list of Eltima Services you can add to manually. Clicking the Create button lets you establish a new service for any

program installed on the PC, and you don't have to navigate to the executable. Select the program's shortcut, and the software automatically fills in the entire path to the .EXE.

Once AaS creates a service, the GUI provides access to a staggering number of options, and even more are available via the command line interface. You can easily bind the service to a particular CPU or core, assign dependencies so it starts in the proper order if it relies on another service, establish environmental variables, and determine how the service reacts when the computer loses power or is rebooted. It's



**Application As Service**  
\$79.95  
Eltima Software  
www.eltima.com



even possible to close pop-up windows the service

may generate when

it loads, and full scheduling is easy to implement with the GUI.

The software also has functionality to manage services on other PCs remotely, and you can password-protect the software itself so nobody can modify your settings or remove a program from the service list. The price is a bit steep for casual users, but if you manage a lot of PCs or certain programs that run on your machine are critical, AaS provides a convenient, powerful way to manage them that goes well beyond the Startup folder. ▲

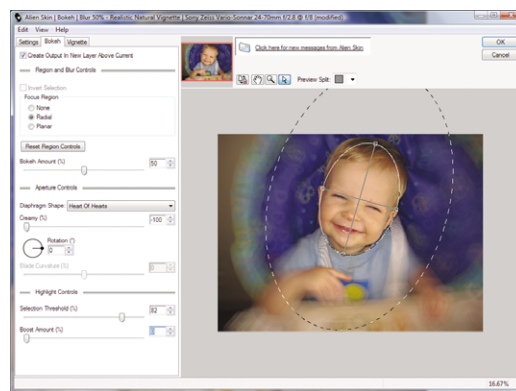
by Tracy Baker

# Alien Skin Bokeh

One of the main differences between an amateur photographer and a pro is that the latter has the equipment and expertise needed to make photos really pop by using an extremely shallow depth of field. If you've ever seen a picture where objects in the foreground are in sharp focus while the background is a dreamy haze, you've seen this trick, called bokeh, in action.

The two main problems with achieving pro-quality shots that use this technique is that it requires expensive lenses, and you must get your depth-of-field setting just right when the actual photo is taken. Neither of these is viable for amateurs (or even pros on a budget), but that's where Alien Skin's Bokeh comes in.

This plug-in simulates a wide variety of real-life lenses to let you load any picture into a supported photo editor, apply the focus precisely where you want it, and blur the background in a variety of ways. It works best if you are already good at masking foreground objects from background objects (or have another tool to



do so), but is even useful for raw beginners who just want to highlight faces for professional-looking portrait shots.

We tested it in Photoshop CS4 (provided courtesy of Adobe) and found it to be very stable and easy enough to use that we were manipulating shots in interesting ways within minutes. The interface is dominated by a large preview window on the right-hand side that responds quickly to adjustments made from a tabbed pane on the left-hand side.

A Settings tab provides access to a variety of preset blur types, with each type subdivided into settings for various real-world

**Bokeh**  
\$199  
Alien Skin  
www.alienskin.com



commercial lenses, along with generic lens types, such as Hollow Heart and Hollow Star. Once the main blur type is established, you can move on to the Bokeh tab for fine-tuning settings such as Creaminess (which adjusts how

highlights appear within the blur), the simulated camera diaphragm shape you wish to use, and whether you want to use a radial or planar focus region, among others.

All said, Bokeh is easy to grasp, highly responsive, and, in the hands of someone who knows her way around a photo editor, can help quickly achieve results that would otherwise require a lot of tedious work. Highly recommended, and a demo along with video tutorials are available at the Alien Skin Web site. ▲

by Tracy Baker

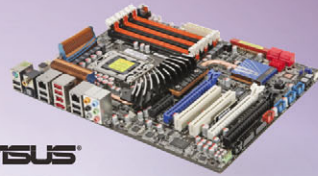


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# Dialogue Box

by Chris Pirillo

## Why Microsoft Continues To Bleed Mindshare

Nobody likes to watch commercials, unless, of course, they're on YouTube.

By now, you may have already seen some commercials that Microsoft has recently commissioned, aimed to get people excited about Windows. However, at no point during these commercials is Windows *actually mentioned*. I'm not referring to the short-lived (and bewildering) Seinfeld series, mind you.

First up was Lauren. She was looking for "these": "a comfortable keyboard and a 17-inch screen . . . for under \$1,000." Comfort is always relative, which leaves us wondering how she'd find a 17-inch notebook computer for under a grand. She drives by an Apple store, making a snide remark that she wasn't "cool enough" to own a Mac. Right, she's not "cool enough" because Apple doesn't produce something that she wants at a price she's willing to pay. Fail.

Lauren could have artfully compared a \$1,000 PC against a starter MacBook and still made the PC look like a better deal (even though no mention of support was made, what kind of software the system came with, or the actual resolution of the 17-inch screen). But no, Microsoft decided to play on perception instead of reality. Their tactics reek of desperation.

I've seen hundreds, if not thousands, of produced screencasts or discussions from people who are absolutely in love with Windows and the world of PCs. I get emails from them every day, and more than a few hang out in our respective communities on a daily basis. They're your real salespeople, Microsoft. They're who you should enlist to help you get the message across. Why? Because they're not hired actors. They're real people who really care about you and your brand.

Even if you know a PC is going to "win" by the end of a commercial, at least make it as fair a comparison as possible. No need to stack the deck, man. Play this fair and square, and you'll win the respect of your detractors. The community could have done, and likely will do, better for Microsoft Windows. Let them evangelize a product in ways you can't begin to imagine.

The Windows 7 beta videos and tutorials I've recorded on my own volition have been very well received, even by Mac users.

No more of this "I'm a PC" nonsense. Macs are PCs, too, so that slogan doesn't even make sense in the first place.

What else could Microsoft do to drive affinity and sales across the board? What about a "WinHeist"? For the uninitiated, MacHeist.com is an online event that happens once a year wherein

the community gathers together, solves various puzzles, and gets registered software in return. How much software? Well, the third and most recent MacHeist gauntlet yielded close to \$500 worth of software per person for free. And it didn't cost anybody a thing, other than time and attention. Better yet, at the end of this year's game, everybody in the world was given an opportunity to buy \$1,000 worth of software for \$40.

Microsoft could easily find amazing shareware titles to promote, throw them together into a single bundle, and let 'er loose. No adware, no spyware, no nagware, just full versions of killer programs. They'd be selling the message that Windows is a great platform, promoting a vibrant ecosystem in the process. Developers gain revenue and followers, users get one hell of a bargain, and the message comes across loud and clear.

Lastly, I wish Microsoft would bring in someone who really, truly understands Windows and its role in social media. As it stands, these two particular videos represent a total failure of understanding of not just the marketplace but the better-informed consumer. This wasn't anything close to a conversation: It was a blatant marketing message. Why was it, then, published to a YouTube channel that was linked back to the Microsoft Windows Twitter team? I'm all for the idea of Microsoft doing more with the community, but not like this.

They could turn this ship around, but it's gonna take some really smart (really transparent) people at the helm. ▲



*Chris Pirillo is an avid computer user, be that computer a PC or a Mac. He appreciates software for what it is, no matter the platform. Granted, he likes software that looks as good as it runs, which limits his choices somewhat. You can find all of Chris' picks on his blog at [chris.pirillo.com](http://chris.pirillo.com) or read reviews from his community at [geeks.pirillo.com](http://geeks.pirillo.com). He posts tech videos regularly on YouTube, having recorded them in front of a virtual audience at [live.pirillo.com](http://live.pirillo.com). The network of bloggers continues to expand through [lockergnome.com](http://lockergnome.com), and if we have to put one more URL in this byline, we're going to force him to write an article on how wicked awesome Config.sys was back in the day.*

You can dialogue with Chris at  
[chris@cpumag.com](mailto:chris@cpumag.com)

## Open Source: Beat Them Or Join Them? (Part I)

How can kitchen-table commercial software developers compete with open-source software? Is it even possible to get paying customers when open-source developers are giving comparable software away for free? The answer is a resounding “Yes” if you ask Patrick McKenzie, creator of Bingo Card Creator ([www.bingocardcreator.com](http://www.bingocardcreator.com)) and author of the recent article “How To Successfully Compete With Open Source Software” (at [www.kalzumeus.com](http://www.kalzumeus.com)).

McKenzie, a software developer working in central Japan, makes a good case for six areas commercial developers can outdo open-source projects: marketing, design, user experience, “speaking the users’ language,” support, and technical superiority. McKenzie’s case is good, but not great, because nothing stops open-source developers from reading McKenzie’s article and applying all the lessons to promoting and improving their own products—nothing but their own inclinations, that is.

According to McKenzie, a fan and user of open-source software himself, open-source developers “concentrate on the software, not the problems the software can solve,” with the result that they assume their audience consists of their peers—software developers—rather than nontechnical users who just want to solve a problem. McKenzie’s software solves a straightforward problem, creating random and unique bingo cards with customized content for educators. It’s very difficult to do with the “standard” desktop software most people have, such as Microsoft Office, and expensive to do with printing services that exist to create the cards.

Two open-source bingo card-making programs McKenzie sees as competition, BingoCardMaker ([www.bingocardmaker.sourceforge.net](http://www.bingocardmaker.sourceforge.net)) and bingo-cards ([www.bingo-cards.sourceforge.net](http://www.bingo-cards.sourceforge.net)), get the job done, but neither has been updated in years. And McKenzie knows his customers. His most requested feature, picture bingo cards, is a feature he will not implement. He told me, “I won’t add picture bingo cards because I doubt that it is possible to make the process of making them comprehensible to my users, who skew too nontechnical.”

McKenzie said that supporting such a feature means he would “literally have to teach ‘Photoshop for Beginners’ to people who, on average, have difficulty locating the Start Menu.”

However, BingoCardMaker does support picture cards, and it really wasn’t so bad. But then I’m comfortable downloading Java programs as JAR files and opening them with OpenJDK Java 6 Runtime.

If open-source developers polished their programs to make them

trivially easy to use for the most technophobic and offered tech support, they could easily compete with commercial software. And, being open source, their customers could survive if the developer decides to move on to another project.

But the big difference between the many thousands of one-person open-source projects and one-person commercial software projects is that most open-source projects just *are*. Someone wrote a program to solve a problem and then shared the source code with the world, but no one is actively marketing them. Commercial software developers can easily “beat” open source.

And that’s the whole thing. If you’re commercial, you’re competing. If you’re open source, you’re writing code. Most of it sits, some gets used, and a very few attract a following, not just of users but also of developers and other contributors.

Those are the projects, such as Apache, Firefox, and Linux, that get big. Deep down, though, most people who write open-source software can’t be bothered with marketing or documentation or customer support, or even with figuring out how to collect for the software they create. They just want to code.

To the extent they compete at all, open-source software creators compete for an entirely different audience. Open-source developers who aspire to build a community need to attract more than just users or even customers: They need contributors willing to work on the project, too.

Next month, we’ll see how a commercial developer is going about that task by opening up formerly proprietary source code. ▲



*Peter Loshin publishes LinuxCookbook.com, a place to learn even more about Linux. And don't forget to check out the new Ninitata.com, Peter's family-friendly fun and learning site.*

**You can get saucy with Pete at [pete@cpumag.com](mailto:pete@cpumag.com)**



# Privacy 2.0

When Anonymous Doesn't Mean Unidentifiable

Don't think for a second that cleaning out your browser cookies, hoisting that firewall, and installing identity theft software makes a dent in protecting your privacy in the new digital world.

Every time we activate our cell phone, swipe a credit card, or use EZ-Pass to sail through toll booths, we leave a record of our whereabouts and clues to our behavior for others to tap that never even existed 20 years ago. All that Web browsing you do on your Android or iPhone device, all the weather updates you may get via that connected GPS unit—these things not only tell someone somewhere what data matters to you but also reveal where you accessed it. As the Web moves off the desktop and into every niche of the physical world, with it goes all of the privacy concerns that still aren't resolved online. Clean out those Firefox cookies if you like, but Web privacy is only the beginning. At the same time the privacy front evolves, experts in the field are also rethinking the ramifications of these mountains of data. In the future, they warn, governments and corporations may be able to violate your privacy without even having to identify who you are.

"It has grown by orders of magnitude since the birth of the Internet and our use of cell phones," says Stephen Baker, *BusinessWeek* journalist and author of a new book on digital data gatherers, "The Numerati." From email replacing letters to downloading music from iTunes instead of purchasing CDs, our habits, tastes, and movements now are recorded in ways that can be connected.

"Almost all of the information of our lives now moves through computers and networks," Baker says. "As it does, it all creates data about our behaviors, our interests. And it is only the beginning. It



will grow exponentially in the coming years, along with Moore's Law."

## Domestic Privacy

In the United States especially, laws protecting this data and applying standard rules for disclosure and obtaining consumer consent to use that information trail far behind the technology. While data centers fill with information about our whereabouts (from mobile phones) or our buying habits (debit and loyalty cards, etc.), the Federal Trade Commission is still debating whether simple online behavioral targeting needs to be regulated by government or industry. After a year of consultations, the FTC released an update this winter in its ongoing policy debate over how online companies track us with browser cookies. The new statement, "Self-Regulatory

Principles for Online Behavioral Advertising" basically reiterates earlier positions that the online publishers and marketers should come up with their own guidelines, although the FTC did imply this time that the failure to do so risked government regulation.

Thus far, the only hard laws governing online privacy protection are COPPA (Children's Online Privacy Protection Act) regulations restricting companies from gathering personal information about children under 13 without parental consent. But even with this law in place, violations occur. Last December, Sony BMG agreed to pay \$1 million in fines for collecting personally identifiable information from children at music fan sites.

But according to Touro Law Center Professor Jonathan Ezor, new technologies such as SMS texting will only make it harder to enforce the few laws in place here. How can companies know the age of an SMS contest entrant, for instance? "The [United States] is much behind the rest of the world in data protection," he says. "In most of the world, any kind of data collection must be registered with the government and is much more clearly disclosed."

The U.S. online industry generally has taken an opt-out approach to online privacy, in that the user has to consciously and proactively go to a Web site or an ad network and instruct them not to track his online behaviors. Users can go to the Network Advertising Initiative ([networkadvertising.org](http://networkadvertising.org)) to see which major networks have cookies in their browser and opt out of one (or all). Google, which recently announced it will track the behaviors of users across the many sites that serve "Ads by Google" contextual ads, just launched its Ad Preferences page. Here, users can opt out of the program or refine their profiles.

Privacy advocates continue to argue that industry self-regulation in the United States not only fails to address the simplest of online tracking but also fails to recognize the extent of the data gathering that goes on. “For too long [the FTC] has buried its mandate in the digital sand,” says Jeff Chester, director, Center for Digital Democracy, in response to the latest rulings. “The Commission embraced a narrow intellectual framework. . . . Unknown to many members of the public, a vast commercial surveillance system is at the core of most search engines, online video channels, video games, mobile services, and social networks. We are being digitally shadowed across the online medium, our actions monitored and analyzed.” Chester’s organization, along with the USPIRG (U.S. Public Interest Research Group) filed a complaint with the FTC to demand investigation on the data gathering and usage practices among mobile phone carriers and their marketing partners. The CDC and USPIRG claim that companies like Acuity Mobile are planning to leverage the geo-location tracking possible with most phones to target users with ads based on their proximity to retail stores and even to specific store racks.

“Cell phone users should have the option of shielding their travels from the prying eyes of mobile marketers,” the groups say in their statements.

### The Myth Of Anonymity

Curiously, for all of the data we consumers now leave behind, being followed digitally is not a chief concern. In a recent Forrester survey, the majority of PC users were concerned about computer viruses (54%) and identity theft (52%), while only 13% cited tracking of Web behaviors, and a mere 7% cited government or corporate surveillance.

But as our data trails overlap and converge, and data miners become more sophisticated in their use of this information, consumers may find that tracking has some dire consequences. Until now, privacy advocates and businesses bickered over the use of so-called PII (personally identifiable information), which could tie a data trail to a specific name and address or even an IP address. But increasingly,

simply based on fuzzy presumptions about their status.

If an insurance company knows that an interested consumer has visited liquor-related sites or run searches on specific ailments, it might refuse coverage or quote higher rates. Baker warns that in a world of interconnected data, “there are all kinds of correlations that can be drawn, but an important thing to note here is that they aren’t always right.

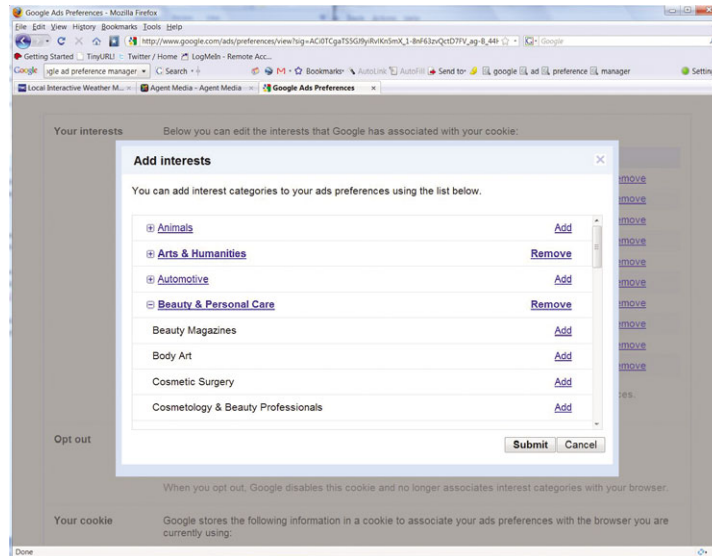
“The calculations are statistical probabilities based on the behavior of a group. [Calculations] do not understand the individual. You could have the profile of a drunk driver and not be one.”

Kuneva worries that even without invading a person’s privacy as we usually define it (associating actions with a specific person), the new data miners could exercise what she calls “commercial discrimination.” Information can be “personal” without being personally identifiable and still be used against you. She told the European Commission that great harm could be done to individuals and commerce.

“If this personal information is used to extract the maximum prices possible from you or to block your access to some services altogether, then commercial discrimination can damage the confidence in digital trade and services.”

“It’s important to understand that personal and anonymous are not black and white,” says Jules Polonetsky, director of the Future of Privacy Forum in Washington, D.C. “Any time there are a number of pieces of data about one user, there is an increasing potential they can be identified.”

In fact, two University of Texas researchers recently published a paper titled “De-anonymizing Social Networks” in which they try to show how easily one can overlay anonymized data from multiple social networks in a way that ultimately



At the same time Google announced recently it would be tracking users across Web sites to deliver them more targeted advertising, the search company also opened an Ad Preferences tool where users could opt out or manage the profile Google uses for this targeting.

experts worry that cloaking a person’s PII is not enough.

In a keynote speech in March to the European Commission, Consumer Commissioner Meglena Kuneva warned that “consumer policy needs to go beyond that and address the fact that users have a profile and can be commercially targeted based on that profile, even if no one knows their actual name.” The latest argument among watchdogs is that the web of data on us has become so complex and potentially interconnected, so dense with actionable detail, that digital anonymity does not protect us from intrusive practices. Kuneva asks whether knowledge of an anonymous user’s financial status or health condition could trigger predatory advertisers or unfairly cut people off from other discounts or offers



can reveal identities. The aim of the research was to extract sensitive information about individuals (or “re-identify” them) by cross-referencing thousands of Twitter users’ social graphs (the people they were linked with) against similar social graphs among Flickr users. All a user needs to do is identify him or herself once along the way with an email or name, and algorithms these researchers created can not only track them on other social networks on which they think they are anonymous but also get on the trail of all their linked acquaintances on the network.

Even the FTC recognized this year that old privacy distinctions surrounding PII and supposedly nonidentifiable information are outmoded, simply because, in one way or another, the technology can likely track an anonymous data trail back to an identifiable user. Whatever principles of privacy industry self-regulation devises, the Commission said in its report, it “should apply to data that could reasonably be associated with a particular consumer or computer or device, regardless of whether the data is ‘personally identifiable’ in the traditional sense.” The FTC goes on to conclude, strikingly, that “rapidly changing technologies and other factors have made the line between personally identifiable and nonpersonally identifiable information increasingly unclear.” In fact, as the researchers at University of Texas indicate in their research, users don’t need to be personally identified in order to be affected by digital technology encroaching on their personal privacy. The line between anonymity and privacy is a “false dichotomy,” they say.

“Any aspect of an individual’s online personality can be used for de-anonymizing, and this reality should be recognized by the relevant legislation and corporate privacy policies.” But even legislators and interactive marketers agree: We are still years away from understanding the true ramifications of a digitized world on our privacy, let alone seeing regulations or policies to address them. ▲

by Steve Smith

## Stephen Baker: The “Numerati” Are Watching

The new world of digitized commerce is grounded in GPS devices and data that will track our movements in stores and in neighborhoods, says *BusinessWeek* journalist Stephen Baker, author of “The Numerati.” For good or ill, get used to the fact that we are being watched.



**CPU:** One of the things you show in your book is that there is a massive amount of data about ourselves coming from our cell phone usage, shopping loyalty cards, and our Web browsing that we give up with consent; no one even knows what to do with it yet.

**Baker:** A lot of us don’t realize we have agreed to share this data about ourselves, and a lot of the companies receiving this data are only now coming to terms with the fact that they have something valuable piling up in their data centers. The people I have talked to in researching the book, “data miners,” say companies come to them and say ‘Will you help us figure out what to do with all of this data?’ Supermarkets have been gathering our data for decades but don’t use it when it is really important, which is when we come to the store. They are going to try to figure out how to hook us up to some smart card or consumer loyalty card that has an RFID chip in it. They want to figure out that we are walking in the store so they can hit us with ads and bargains.

**CPU:** Is data such as our grocery store records actually available to someone now? Is this digital trail we leave behind being organized by someone?

**Baker:** They have been so careless with this, according to people I have talked to, that it would be hard to find the one shopper and go back 10 years and have unified records of that one shopper. A lot of our behavior exists in fragments in various databases, and it’s not brought together. It would be like bringing together bits of water in an ocean.

**CPU:** How accessible is our data to third parties?

**Baker:** There are companies that amass data about us. I don’t think a lot of people realize that anybody can go to one of these companies and pay them \$15 or \$25 and get a dossier on their next door neighbor and that marketing companies and political campaigns are using this data to try to predict our behavior as shoppers and voters.

**CPU:** Is there a real risk of governments leveraging such data in oppressive ways?

**Baker:** It can be used by an authoritarian government to create a big brother state, to monitor our activities, to define us in certain ways, and channel our behavior. I don’t think it is going to happen here. There is a real risk it can happen in other countries.

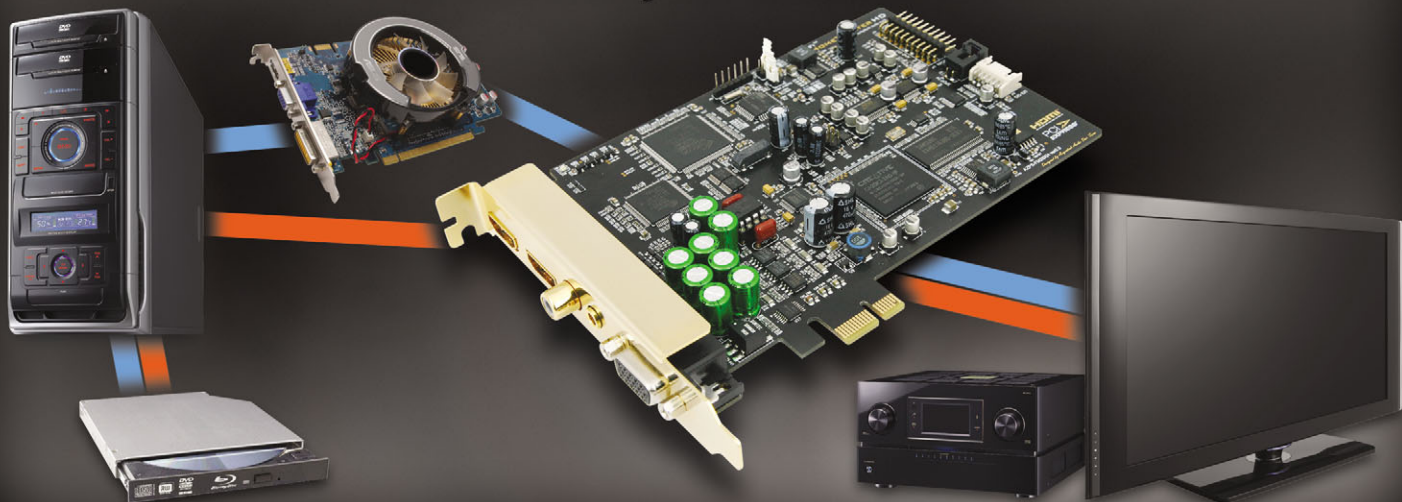
AUDIO

# Auzentech X-Fi HOMETHEATER HD

HDMI 1.3a compliant Audio Card | Carte Son HDMI 1.3a

VIDEO

## Lossless Blu-ray Audio On Your PC



advertisement

Due to storage limitations of DVDs, they were never able to deliver lossless audio (nor 7.1 channels of sound); that has changed with the advent of Blu-ray discs, which can transfer audio data up to 24.5 Mbps using Dolby® TrueHD or DTS-HD™ Master Audio, a rate 16-times greater than the maximum DVD-rate of 1.5 Mbps. Blu-ray discs use Dolby® TrueHD or DTS-HD™ Master Audio, which are lossless audio codes that support audio in 7.1.

Watching movies on Blu-ray disc with full 7.1-channel sound is a tantalizing prospect, yet users who want to watch (and listen) via their PCs have historically been hamstrung because of all the protections embedded on the discs. Initially, there was an issue with the Protected Video path, which was finally solved with the advent of HDCP. Now, all you need to enjoy Blu-ray movies on your PC is software to decode the video, such as CyberLink's PowerDVD, and an HDCP-compliant Graphics Processing Unit (GPU) and monitor. Problem solved.

Getting at the Protected Audio path, however, has been a different animal. Currently, no graphics cards support a Protected Audio path, so you're limited to either Dolby® or DTS™ audio (which are lossy and also only support 5.1 audio), or in a pinch you can output a lossy version of Dolby® TrueHD or DTS-HD™ Master Audio. These two formats support 7.1 audio, but because they're

lossy versions, the audio quality will suffer. Yet none of these solutions gives us what we want: lossless 7.1-channel surround sound.

**In addition to giving you the freedom to watch Blu-ray movies on your PC in their full audio glory, the Auzen X-Fi HomeTheater HD sound card has a host of attractive features to sweeten the package.**

- HDMI v1.3a compliant
- Supports PCM 8 Channel, 24-bit/192 kHz
- Support for 24p True Cinema output
- Support for Blu-ray discs via CyberLink's latest PowerDVD application
- Support for Non-downsampled Blu-ray Audio
- Support for high bit-rate audio such as Dolby® TrueHD, DTS-HD™ Master Audio bitstream
- Developed around Creative X-Fi native PCI Express audio processor
- Support for Dolby Digital Live for Windows XP and Vista, and DTS Neo: PC & DTS Interactive for Vista
- Integrated Headphone Amp and Professional Mic Pre-Amp
- Connectors:
  - HDMI Input
  - HDMI Output
  - Digital Output
  - Headphone Output
  - Analog I/O Multi Connector

But there's a wrinkle: You can send uncompressed Linear Pulse Code Modulation (LPCM) audio via HDMI from your PC. Thus, technically, you can decode the audio with your software and send it out as uncompressed LPCM, by-passing the GPU (and the need for the Protected Audio path) altogether. All you need is the right hardware support.

Enter the Auzen X-Fi HomeTheater HD sound card. Not only will this device route uncompressed LPCM audio up to 8 channel 24bit/192kHz to your speakers, it will also receive the HDCP-encrypted video signal from the GPU and repeat it through the X-Fi HomeTheater HD sound card, combine it with the uncompressed audio signal, and output the two together through a single HDMI cable.

With the Auzen X-Fi HomeTheater HD sound card, you can finally enjoy beautiful, bit-by-bit lossless 7.1-channel surround sound, precisely as the original sound engineer mixed it. It's the perfect accompaniment to your Blu-ray movie-viewing experience.

Problem Solved.

The Auzen X-Fi HomeTheater HD sound card is coming soon to **Micro Center®**, **Newegg.com®**, **NCIX.com™**, **Canada Computers**, and **Memory Express™**.



# The Department Of Stuff

by Rob "CmdrTaco" Malda

## cloudfs.txt

A few years ago, I wrote a column on these very pages discussing the limitations of using a browser as a replacement for the application. My principal problem revolved around the fact that modern tabbed Web browsers act as containers of many pages, some of which mirror regular applications (such as Gmail or Google Docs). Applications should have things such as Taskbar icons, launcher icons, and key bindings to auto-select them. Finding that one Gmail tab amidst a sea of Slashdot tabs is a pain. Sure, I can put it first, but once you add three or four more applications, it all gets very messy.

In the months that followed, several people went down different paths and got me what I needed. Best among them was a nifty Mac program called Fluid. This application is a mini Safari browser you can wrap around a URL. It takes seconds, and then you have the illusion of a regular application. It has its own window, its own location. You can launch it when you boot and hide superfluous browser chrome that doesn't apply to an "application." Google's Chrome Web browser has gone so far as to build this in!

But now I come to you again with a related problem. You see, I have many, *many* documents in the cloud. I have many more on my local file system. I have a directory containing countless Excel or Word docs sent to me by co-workers, as well as a slew of Google docs. Keeping them all straight is getting increasingly annoying. I simply want a document; I shouldn't have to worry about where it is and what tool I need to get to it.

What I want is a single file system to access all my contents. My Mac does an excellent job of having folders and subfolders with various documents. They are easily searchable. They have pretty preview icons. I can create whatever hierarchy suits my purposes. No offense to Google Docs, but the list of document types presented by its interface is sorely lacking in a mixed environment.

Now there are many tools that could string these systems together. MacFUSE is an amazing application that makes it possible to create loadable file systems on a Mac

based on anything. Several interesting file systems have come along, starting with an SSH file system that saves tons of effort for people who like to muck around on systems behind firewalls. Another engineer made an iTunes FS so you could navigate your MP3s within a file system. Alternatively, WebDAV allows any public HTTP service to simply export a file system mountable by any desktop.

Next-generation Web applications need to become transparent

members of your file system. If I drag a .DOC file to my Google Docs directory, I should upload this file to the cloud, and it should seamlessly import. I can already label my documents, so it seems only fair that Google export a file system with these labels so I can search for my files alongside my local files.

This all gets much more interesting when you combine this file system with Fluid. Now I can create a special container Fluid application to a Google Doc that knows how to handle the document on the cloud FS. I can navigate to the file using my machine and then open it in Word or Google Docs itself.

The hooks already exist to do most of these things. Google Docs can import and export .DOC and .XLS files. All we need is a way to map the files to our local file systems. Eventually, YouTube and Picasa can follow suit, and your shared videos and pictures will seamlessly become files on this file system. You might still elect to have a private file system that you don't export to the cloud, but the interface you use to access either data set would be the same.

Countless public file system services have come and gone over the years. Google itself has long been rumored to be building one. But the real goal of such a system isn't just to store your data on the cloud; it's to make the distinction between your local system and the cloud so transparent that where you store your data is no longer important in terms of everyday use. You manipulate it using the tool you like and store it in the place you like. ▲



*Rob "CmdrTaco" Malda is the creator and director of the popular News for Nerds Web site Slashdot.org. He spends his time fiddling with electronic gizmos, wandering the 'Net, watching anime, and trying to think of clever lies to put in his bio so that he seems cooler than he actually is.*

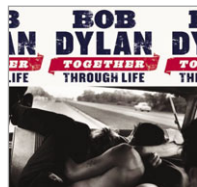
Contact me at [malda@cpumag.com](mailto:malda@cpumag.com)

# At Your Leisure

The entertainment world, at least where it pertains to technology, morphs, twists, turns, and fires so fast it's hard to keep up. But that's exactly why we love it. For the lowdown on the latest and most interesting releases in PC entertainment, consoles, DVDs, CDs, and just leisure and lifestyle stuff we (for the most part) love and recommend, read on.

## Audio Video Corner

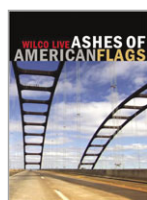
by Blaine A. Flamig



\$18.97  
Columbia Records  
[www.bobdylan.com](http://www.bobdylan.com)

### Bob Dylan—"Together Through Life"

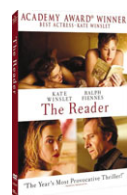
Optimistic hope or realistic pessimism: It's difficult to discern which way Bob Dylan is leaning on "Together Through Life," a remarkable work drenched in Mexican-border blues, Southern swampy seduction, and romance rotting at the core. Weathered, cracked, and tormented as to how to self-heal in a world seemingly devoid of any wonder he hasn't already experienced, Dylan croons, bemoans, warns, and recollects as only a troubadour as traveled, experienced, and wise as he can pull off. With his flawless touring band steaming underneath, Dylan turns Willie Dixon's classic "I Just Want To Make Love To You" on its head in "My Wife's Hometown," breathes fire on "Shake Shake Mama," and mocks the masses on "It's All Good."



\$19.98  
Nonesuch  
[www.wilcoworld.net](http://www.wilcoworld.net)

### Wilco—"Ashes of American Flags"

Arguably America's best working band, Wilco does its flat-out best to prove this point on this live concert DVD, which finds the six-piece band touring small clubs, concert halls, and theaters in Nashville, New Orleans, Mobile, Tulsa, and Washington, D.C. "Ashes" is as much a road movie as musical recounting, mixing portraits of small-town and urban decay with America's progress as witnessed through a tour bus window. At the core, though, "Ashes" is a sonically stunning depiction of what comes about when modern-day musicians embrace America's musical past but add their own spice. Grounded, pleasingly simplistic, and fueled on amazingly tight performances, "Ashes of American Flags" isn't a typical concert DVD—and that's a good thing.



\$29.95  
The Weinstein Company  
[www.thereader-movie.com](http://www.thereader-movie.com)

### The Reader

Are there sins that are never forgivable, even if the sinner is one we love undyingly and without question? That's one of the many weighty questions director Stephen Daldry ("The Hours") poses in "The Reader," a slow-burning but hard-hitting story of an unlikely love affair that Hanna Schmitz (Kate Winslet) and Michael Berg (David Kross as a teen; Ralph Fiennes as an adult) share in post-World War II Berlin. A teenage Michael and 30ish Hanna share a torrid summer affair until Hanna unexpectedly disappears. Years later, while observing a war crimes trial as a law student, Michael discovers that Hanna was, in fact, an SS guard at Auschwitz. Michael has knowledge that could lessen the life sentence she ultimately receives, but his shame prevents him from divulging it. "The Reader" will challenge your ethics, judicial beliefs, and notions on love's limitations.



\$24.96  
Sony Pictures  
[www.whatdoesntkillyoumovie.com](http://www.whatdoesntkillyoumovie.com)

### What Doesn't Kill You

Sadly overlooked upon release, "What Doesn't Kill You" tells the gritty, true story of two lifelong friends raised in South Boston who grow up to squeak out livings as glorified errand boys for neighborhood crime boss Sully (Will Lyman). Though first-time director Brian Goodman doesn't break new ground in terms of depicting the unsavory life of small-time criminals, he deftly manages to present familiar plotlines in an entirely new light. As Brian and Paulie, Mark Ruffalo and Ethan Hawke masterfully show on their faces the hopelessness that's inherent to those born into nothing with nothing to look forward to. For Brian, the hopelessness is especially ominous due to his responsibilities to his wife (Amanda Peet) and two young sons. When Paulie, Sully, and drug and alcohol addictions all fail to provide relief, Brian ultimately finds light in his family. Tragically uplifting, "What Doesn't Kill You" just may make you stronger.

## DVD Byte

7/7

Kath & Kim:  
Season 1  
Mystery Science  
Theater 3000: XV  
John Barrymore  
Collection

7/14

Eldorado  
Mad Men: Season 2

7/21

The Great Buck  
Howard

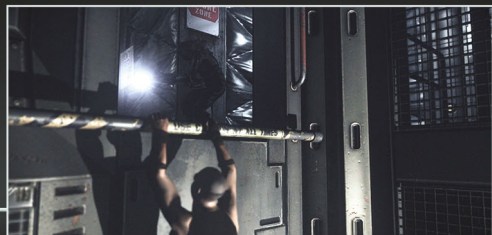


Pushing Daises:  
The Complete  
Second Season  
G.I. Joe A Real  
American Hero:  
Season 1.1

7/28

Dollhouse:  
Season One  
Life On Mars:  
Series 1 (UK)  
Repulsion





**CPU**  
Game Of The Month

## Vin Dieselathon — *by Dr. Malaprop*

\$59.99 (X360, PS3), \$49.99 (PC) • ESRB: (M)ature • Atari Games • [riddickgame.com](http://riddickgame.com)

The last few months have brought us a smorgasbord of Vin Diesel: The Wheelman and The Chronicles Of Riddick: Assault On Dark Athena games in addition to "Fast & Furious" at the cinema. That's a lot of Diesel in a short time span.

We did play the new port of 2004's The Chronicles Of Riddick: Escape From Butcher Bay. Graphically, Butcher Bay was one of the best-looking original Xbox games, with graphics that bordered on an early Xbox 360 title. Butcher Bay's release came at the end of the original Xbox life cycle and ended up getting lost in the shuffle. It was followed by a PC release later that year. The game was released alongside "The Chronicles Of Riddick" film and

stands out as being a movie tie-in video game that didn't suck. The Chronicles Of Riddick: Assault On Dark Athena contains two games in one package. First is the visually updated Escape From Butcher Bay port, and second is the all-new Assault On Dark Athena "sequel."

That Butcher Bay is fun to play more than five years after its original release is testament to Starbreeze Studios' strong game design that seamlessly combines stealth, FPS, fighting, and platforming genres. The graphics still look good but are no longer groundbreaking. Animation is clunky compared to

the newest A-listers. Audio effects and voice acting of all characters, including Riddick (voiced by Vin Diesel) fit the game perfectly for the story arc and atmosphere. The story takes place before 2000's "Pitch Black" as



# THE CHRONICLES OF RIDDICK ASSAULT ON DARK ATHENA

Riddick is incarcerated at Butcher Bay, an off-world maximum-security prison. During the course of the game, Riddick gains the eyeshine ability that gives him night vision, which you see used to great effect in "Pitch Black." The bloody gameplay remains unchanged, and we enjoyed getting Achievements on the Xbox 360 version.

After your escape from Butcher Bay, your craft is pulled aboard a mercenary ship, Dark Athena. Assault On Dark Athena is all-new and independent to Butcher Bay. It also feels like an expansion pack. It controls identically

to the first game, but the narrative is flat, characters are one-dimensional, and game design is neutered. The multigenre benefits of the original are painfully absent, and the action feels tediously repetitive. This part of the package holds steady at average but never excels.

One of the biggest complaints about the original Xbox release was the lack of multiplayer. Multiplayer debuts on this version, but most of the modes are nothing to write

home about. The one exception is the Pitch Black mode, which places one player in the game as Riddick and the rest as mercenaries hunting him down in darkness with a flashlight. Not only does this mode create a strong sense of

tension, but it also provides numerous jump-out-of-your-seat moments.

If you already completed the original Butcher Bay on Xbox or PC, it will be a stretch to pay full cost to play it again. Dark Athena left us flat and lacks the panache of Butcher Bay. Our recommendation would be to take a breather after finishing Butcher Bay before delving into Dark Athena. For a first-time entrant that has never played Butcher Bay, this package provides a satisfying single-player experience, but returning players should tread more cautiously. ▲





# DEMIGOD™

## Frustratingly Good — by Chris Trumble

\$39.99 (PC) • ESRB: (T)een • Stardock • [www.demigodthegame.com](http://www.demigodthegame.com)

Gas Powered Games and Stardock were really onto something special when they put together the core concept for the new RTS-RPG Demigod. Unfortunately, everything they came up with to add to that fantastic, gooey center was disjointed and/or broken.

Demigod is a real-time action/strategy game that boils down to a rush to control key strategic points on a simple map and destroy your enemies' base. Your avatar is one of the titular demigods, creatures of immense power who are competing for the ultimate prize, the right to ascend and replace a fallen god. That's pretty much all the game has in the way of a story, so don't be surprised when the silly monologue

at the outset of the game ends and you're left on your own in this regard. (You can spend an hour or more reading backstory on the Demigod Web site, which seems a further insult.)

After you figure out how to play Demigod—which primarily involves

trial and error—the game is really quite fun. In order to grab resources and grow in power, you have to combat your fellow Demigods (you are divided into even teams, representing light and darkness) and upgrade your abilities, equipment, and minions (melee, ranged, and healers) on the

fly. Each Demigod has a unique, interesting collection of abilities and attacks that you can power up using a talent tree as you gain levels in-game. The gear you can buy includes armor upgrades (which don't affect your appearance on-screen, by the way) and items such as health

potions, mana potions, and trinkets that do all manner of interesting things. But don't get too attached: The time and money you spend upgrading your character only benefits you until the end of your current game because you start each game at Level 1 and with only the clothes on your quasi-divine back.

The single-player game is little more than a practice mode for multiplayer games, which is especially vexing because multiplayer barely works. I didn't try playing Demigod on a LAN, which could be quite good under the right circumstances, but of the various Internet modes of play, I was only ever able to play in a few Custom games, and the process of collecting enough players to begin was pretty cumbersome. Once we got started, the games were great, though, so if you are patient, you can have a good time with Demigod, and hopefully over time, Stardock and Gas Powered will iron out the technical issues hampering online play. ▲



# EMPIRE TOTAL WAR

## Epic-Scale Strategic Warfare — by Dr. Malaprop

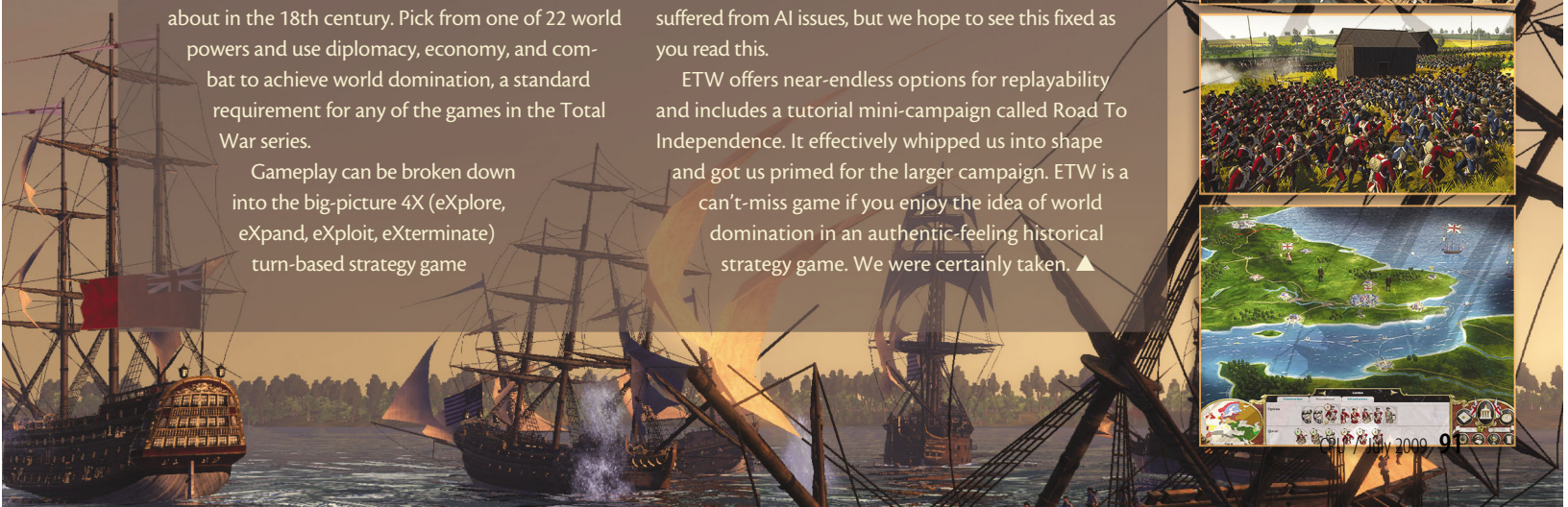
\$49.99 (PC) • ESRB: (T)een • Sega • [totalwar.com/empire](http://totalwar.com/empire)

We were impressed with how accessible Firaxis Games made Sid Meier's Civilization Revolution in 2008. We're equally impressed at Creative Assembly's unapologetically complex strategy game design for Empire: Total War. This time around, you'll be tooling about in the 18th century. Pick from one of 22 world powers and use diplomacy, economy, and combat to achieve world domination, a standard requirement for any of the games in the Total War series.

Gameplay can be broken down into the big-picture 4X (eXplore, eXpand, eXploit, eXterminate) turn-based strategy game

and the more granular real-time strategy battles. In addition to the land-based combat options, ETW introduces stunning up-close naval warfare. You may also auto-resolve the granular RTS portion of the game if managing armies hands-on is not your cup of tea. Our launch title suffered from AI issues, but we hope to see this fixed as you read this.

ETW offers near-endless options for replayability and includes a tutorial mini-campaign called Road To Independence. It effectively whipped us into shape and got us primed for the larger campaign. ETW is a can't-miss game if you enjoy the idea of world domination in an authentic-feeling historical strategy game. We were certainly taken. ▲





# The Cutting Edge

by Barry Brenesal

## Far More Than Disney, Part 1

They're not just Saturday morning fare for kids, you see. Animated films at their best offer a blend of film technique, vision, and personal artistry put to imaginative ends. We're going to take a brief glance back this month and next at some of their cutting-edge highlights.

Animated films first appeared at roughly the same time as the earliest motion pictures. They were a subset of the latter using state-of-the-art trick photography: levitating objects, furniture moving itself into an empty house, gleeful demons appearing out of thin air, and so on.

Georges Méliès gave a boisterously creative and satiric tone to this kind of thing, turning out more than 500 shorts (many of them hand-colored) from 1896 through 1913. His biggest success came with his 1902 "A Trip To The Moon," with a host of exuberant, pontificating, bearded academician-space travelers, leggy beauties (who do all the grunt work), hopping lunar demons, and a spaceship landing directly in one of the Man in the Moon's eyes. It was widely pirated and released without credit by foreign companies, including Edison's. The film was shot with a single camera, fixed as though viewing a staged play—not surprising, given that prior to his film career, Méliès made a living as a stage magician. Though now regarded as an important artist and brilliant special effects pioneer, many of his films were melted down during World War I to help furnish boot heels for the French Army.

The other side of primitive film animation, using drawn or painted images projected or created on the screen, is best experienced in Windsor McCay's "Gertie The Dinosaur" series and in the surrealistic efforts of the sadly forgotten Émile Cohl. The latter's early work (nearly 80 films made before 1910, most of it long missing) owes much to the short-lived Incoherent Movement. Deceptively crude white line drawings on black backgrounds evoked a wealth of originality. The movement largely abandoned storytelling, with dreamlike visual images changing into one another rapidly. In a typical example, a pair of people meet, their heads become avian, the "camera" moves in on the eye of one that enlarges into a blacksmith's bellows, etc. That gradual shift from a long shot to a close-up in itself marks Cohl as cutting edge, for this piece of now standard

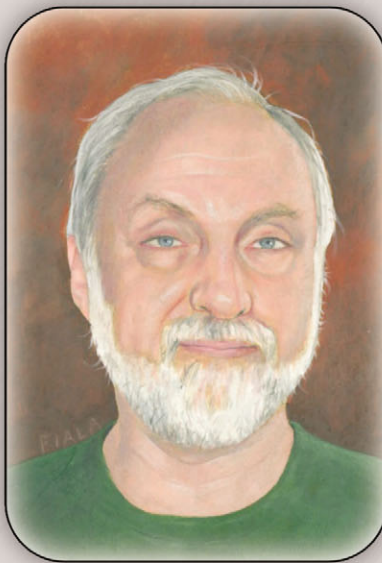
film grammar was first deployed in his films. (It was done for artistic rather than narrative purposes, which may explain why nobody else was quick to snatch it up.) I think I can see the effects of his work as recently as the '70s and '80s in Sally Cruikshank's brilliant cartoons, especially "Make Me Psychic" and "Face Like A Frog," but I could be off base.

Another of the most interesting pioneers of animated film was Ladislav Starevich. During the teens in Russia, he turned out satiric comedies of domestic behavior using stop-motion photography, with

insects in place of people. Their detailed movements and extraordinarily human gestures made the perceptive cartoonist a hit with audiences and critics alike. His most popular film, "The Cameraman's Revenge," depicts the philandering Mr. Beetle and the comeuppance he receives from a very angry spouse after he's caught on film at a cabaret assignation with a dragonfly. Starevich moved to France after the Bolshevik Revolution, set up a studio, and produced many fine, at times oddly lyrical, cartoons using more standard techniques into the 1960s.

At roughly the same time, another great animator was developing complex shadow puppet techniques on film, using segmented models. Lotte Reiniger's intricate, art nouveau cutouts provided both the actors and backgrounds for her feature-length masterpiece, "Adventures Of Prince Achmed." It was an Arabian Nights extravaganza, filmed between 1923 and 1926, and premiered at Paris' prestigious Comédie des Champs-Élysées. Achmed was only made possible by an incredible stroke of luck: A banker friend had invested in a huge quantity of expensive raw film stock as a hedge against rampant inflation, but the bet hadn't paid off. He gave it all to Reiniger. Achmed can still pack a wallop today, especially with its original score, and despite recent decades of expensive, computerized special effects films.

With the exception of Cohl's work, you can usually find these animators' films in well-restored condition on DVDs. Get them yourself or give them as a gift—the kind that, almost a century after their creation, keeps on giving. ▲



*Barry Brenesal has written more than 1,000 published articles and reviews on electronic technology since 1987. His first personal computer was a Radio Shack TRS-80 model 100.*

*It was last seen functioning as a boat anchor.*

Wax nostalgic with Barry  
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# Software

## Tips & Projects

### Enter The Age Of Twitter

Love it or hate it (or even if you just hate the hype surrounding it), Twitter is going to be an inevitable part of your online experience this year. Traffic to the site more than doubled in March 2009 alone to over 9 million unique visitors in just the United States. Even if you aren't "tweeting," some of your friends and colleagues are, so you might as well learn some of the rules of the road and shortcuts to effective microblogging. To celebrate summer, this month we have some fun with Twitter.

#### Phone It In

Once your Twitter account is set up, you can ditch the Twitter interface pretty quickly and move to one of the many third-party clients out there. (We'll get to that.) For now, keep in mind that the easiest way to tweet is from your phone. While logged in, go to the Settings section and into the Devices tab. Here you will be prompted to add a cell phone. Once you register the number with Twitter, you can start updating Tweets by sending your messages directly to the 40404 short code. Twitter recognizes the incoming phone number and posts your SMS tweet almost immediately.

You can also use the phone account to send command line parameters that direct messages properly. For instance, typing **d username message** into your phone's SMS interface sends a private, direct message from your Twitter account to another user. Also, you can use the basic **@** command on your phone to send a public message to a person you are following.

Other cool commands you can use via SMS include:

- **WHOIS + username:** This command will retrieve basic profile information on a user.
- **STATS:** Returns the number of people following you that you are following.
- **GET + username:** Retrieves the most recent Tweet from that person you are following.

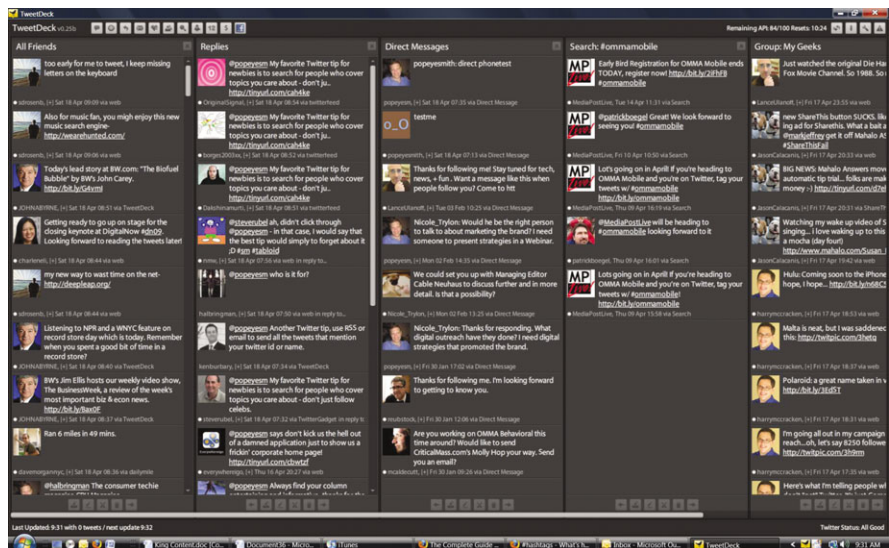
#### Manage The Madness

We're not sure if some of the habitual Twitterholics actually have day jobs, but most of us using the service need help managing the massive flow of messages and updates that flow through the system.

If you use multiple Twitter accounts and need to send the same message to two or more of them, we strongly suggest a service such as Splitweet ([www.splittweet.com](http://www.splittweet.com)). This free tool lets you register multiple Twitter accounts so you can post one message and check off the accounts to which you want it to post. It's also an easy way to combine the incoming feeds to multiple accounts, although not as elegant as some other standalone clients.

Power Twitter users will want to get a sophisticated client, such as TweetDeck ([www.tweetdeck.com](http://www.tweetdeck.com)), which is currently in beta. Among the more popular managers of Tweet feeds, TweetDeck is an Adobe AIR app that divides your account into multiple columns and filters. Once you have installed the program and tied it to your Twitter account, the default screen shows posts from All Friends, Replies, and Direct Messages.

Now to the good stuff. To filter posts from select groups, use the Group icon. You will be presented with all of the people you follow so that you can check the ones you want to filter in and then name a group. This is a great way to track specific subgroups in a more manageable way. Finally, TweetDeck is a superb way to track searches. Use the Search icon to search for a specific term. TweetDeck will create a new column for that term that will update frequently.



Even casual Twitter users can do much better than Twitter.com's primitive interface. TweetDeck arranges all of your message types, feeds, groups, and even real-time search updates in neat columns.

## Save Your Friends

If you want to back up your list of the people you are following or just keep that list for reference, here's a clever way to do it, courtesy of software enthusiast Vince Koser at Kosertech.com.

First, go to [twitter.com/statuses/friends.xml](http://twitter.com/statuses/friends.xml). This is a direct call to the Twitter API, so it will ask you to log in with your account's username and password. The landing page will be an XML-formatted page containing all of the people you follow, as well as their basic profile information. Simply save this page as a document, retaining the XML file extension. Now, go into Excel and open that file. In the next dialog box, tell Excel to open the file "As An XML Table." The next dialog will tell you that the XML source "does not refer to a scheme." Simply click OK to let Excel apply its own scheme. The result is a spreadsheet that gives your friend's name, screen name, location and profile description, and much more detail in a long line of columns.

For those who are following you, use the URL [twitter.com/statuses/followers.xml](http://twitter.com/statuses/followers.xml).

The tips above only work for the first 100 people in either list. You need to access the next hundred with the URLs [twitter.com/statuses/friends.xml?page=2](http://twitter.com/statuses/friends.xml?page=2)

or [twitter.com/statuses/followers.xml?page=2](http://twitter.com/statuses/followers.xml?page=2) respectively. For even more followers or friends, just change the page=2 portion of the address to page=3, etc. You will need to save each page as a separate XML page and then merge the pages into a single spreadsheet.

## Search With Power

The new [search.twitter.com](http://search.twitter.com) site is much more powerful than it seems on the surface. In fact, you can use it to create a near-real-time feed of highly targeted information from across the Twitter universe. Click Advanced Search to access this functionality. You can use these tools to search within a specific "hashtag." For the uninitiated, a hashtag (*#phrase*) is the way users can create an ongoing conversation around a topic in Twitter, whether they follow one another or not. Groups at an event such as the famous SXSW (South by Southwest) show agree to start all of their tweets with #sxsw, and they become easily searchable on the Twitter search engine by searching against that hashtag.

To make a real-time feed from a granular search within a hashtag, go to the Advanced Search screen and enter the hashtag you want to search in the This Hashtag box. Now, enter the specific phrase you want to search. For instance, we heard on Twitter that an iPhone app for Hulu

([www.hulu.com](http://www.hulu.com)) was coming soon. We wanted to make sure we kept apprised of any news surrounding its release. We entered "iphone" as the hashtag and "hulu" in the main search box. The results are all the instances of "hulu" occurring within the #iphone group of posts. The search results page offers you a button in the upper-right, Feed For This Query. Click it to get an address you can put into your feed reader so that the latest posts for this topic stream to your reader.

Finally, a very cool way to go local with Twitter is to search for terms by city or ZIP code in the Advanced Search engine. It is a great way to track local news or a hot political topic. Just add a ZIP code or city name to the Places section of Advanced Search and determine what radius you want the search to cover. Again, the results can be converted into a real-time RSS for constant monitoring of new posts.

As Twitter evolves, there will be new ways of leveraging this real-time microblogging juggernaut into a genuine resource. For the time being, however, the community itself and Twitter engineers are trying to figure out what kind of power millions of ongoing conversations represent. ▲

by Steve Smith

## Windows Tip Of The Month

If you are a command line kind of power user who wants quick access to certain Control Panel applets, here is a way to keep your hands on your keyboard. Use the WIN+R key combo to bring up the Run command window. To open the Display Properties window, type **desk.cpl** and press ENTER. For System Properties, use "sysdm.cpl." For Mouse Properties, use "main.cpl." Not all versions of Windows have the same Control Panel applets, so check out the "Registry Tip Of The Month" below for another hint about what commands you can use with this trick.

The beauty of using the Run box is that it memorizes your recent entries. Once you have entered one of the .cpl app shortcuts, you can call up the Run box again and just use the Down arrow to navigate previously entered commands. Again, no mouse required. Of course, once you call up the specific CP app itself, you likely will need to reach for the mouse to navigate it, so we can't help you there.

## Registry Tip Of The Month

So where can you find a listing of the most commonly used Control Panel apps that you can access using the Run command tip above? In the Registry Editor, go to HKEY\_LOCAL\_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Control Panel\Cpls. The subkeys in this folder will show you most (not all) the .cpl files you can access directly by calling them up in the Run command line. "TabletPC.cpl," for instance, will bring up the Pen and Stylus Input box.

## Infinite Loop

### 1% Market Share Is A Big Deal

Such a tiny market share would certainly spell doom for any company, but if you're a Linux supporter, having the open-source OS on one out of every 100 desktops or notebooks is a major milestone. A new report from Net Applications shows Linux eking out a 1.2% market share; if that's not impressive, consider this: Linux use has essentially tripled since 2005.



Source: [marketshare.hitslink.com/report.aspx?qprid=8](http://marketshare.hitslink.com/report.aspx?qprid=8)





# Warm Up To Penguins

## How Linux Boots

**M**ost people don't understand the basics behind how their computers boot up when they first turn them on. Most Windows users think that when you start up your system, it runs NTLDR, which in turn reads the BOOT.INI configuration file. While this is the most obvious and observable way most of us understand the PC startup process, there's a lot more going on underneath. And it's in the nuts and bolts that Linux differs significantly from Windows when a system starts up.

### What Everybody Does

When you press the power button on your system, it initializes all hardware devices and goes through a series of tests, commonly known as POST. These tests naturally run before any operating system is loaded. Once the POST is finished, the hardware looks for the first available bootable device on the available hardware. Systems today let you boot from a CD, hard removable device, or even network devices.

A bootable device is something where the first 512 bytes contain boot information about the actual device itself. This is known as the boot sector of the device; for hard drives, it resides in the MBR (master boot record), which is before the partition information. Once the system finishes its POST, it reads the data in the MBR and then executes the code. Up until this point the Windows and Linux boot up procedures are identical.

What happens next depends not only on what operating system you use, but also, in the case of Linux, which boot loader you use. With recent Windows installations, the MBR code will load NTLDR, which reads the BOOT.INI configuration file. This file contains information for different installations of Windows, as well as parameters to be passed to those installations.

A Linux user has two popular boot loaders available: LILO (Linux Loader) and GNU GRUB. LILO is one of the earliest Linux boot loaders and is rarely used in newer Linux installations. Most

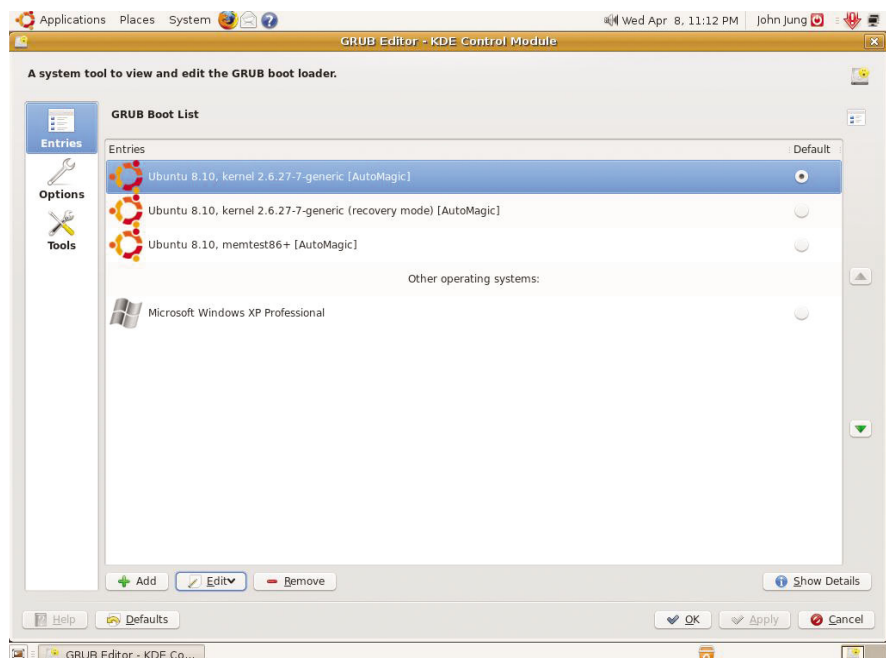
modern Linux distributions use GNU GRUB, or GRUB for short, as their boot loader, due to its ease of use and configurability.

### Boot From LILO

But let's go back to the beginning and cover how LILO works, because a lot of legacy systems still have it. As with most boot loaders, LILO is much too big to fit into 512 bytes and so is loaded in stages. The first stage is when the initial 512 bytes are loaded from the boot sector on the hard drive. The purpose of this stage is to get things started and to load the next stage. LILO gives you a status of what stage it's in based on how many letters in its name it's shown. The first "L" indicates that the first stage has loaded.

Just before LILO is ready to go onto the loader in the next stage, it displays an "L." If LILO hangs with just an "L," it typically means that the file that LILO is expecting can't be found. The disk might be damaged or perhaps the file has moved. But assuming everything's fine, the secondary loader is executed and the second "L" will appear.

The second stage boot loader for LILO is where the guts of the boot process occur. Here the secondary stage



GRUB's boot behavior can be controlled with KGRUBEditor.

loader reads in the `Lilo.conf` file, which tells LILO where its various parts are and different boot options. The second stage loader also reads in what is known as a map file. The map file contains a collection of locations for the bootable partitions, including each partition's respective disk. When LILO has successfully loaded the map file, it'll display the "O" in its name and you'll see a "boot:" prompt.

At the "boot:" prompt, simply type the name of the operating system you want to run and press ENTER. If you're not sure what OSes are on your system, press the TAB key. If you don't make a selection after a little while, it'll boot the first Linux OS it can find. If you want to change the display name of the available operating systems, or the timeout to boot the default OS, you'll need to modify LILO's configuration file, `/etc/lilo.conf`.

LILO depends very heavily on the configuration file for all of its bootup information, so any changes to `Lilo.conf` can potentially make it impossible to boot next time. But don't worry about making changes to `Lilo.conf`; there's a GUI utility to help you with those things.

If you're using the KDE window manager, click the KDE icon and then select Control Center. Expand the System Administration heading and then select Boot Manager (LILO). This will give you a handy graphical utility with which to manipulate the `Lilo.conf` file. You can add, delete, and edit entries in the `Lilo.conf` file, and it'll handle the grunt work of making it work.

### Get GRUBby

In 1995 the Free Software Foundation created a specification on how boot loaders should interact with operating systems. To demonstrate the specification in action, GNU GRUB, or simply GRUB for short, was created.

Like LILO, GRUB is too big to fit into 512 bytes and thus loads in stages. GRUB's stage 1 loader is functionally identical to the first stage of LILO boot loader: Its goal is to load the next stage. But what happens next with GRUB depends on what type of operating system the stage 2 loader sits on. Most Linux

flavors default to using the ext2 or ext3 file systems when laying out a disk. In these cases the GRUB stage 1 loader will load up the stage 2 loader without any problems.

If you have Linux loaded on some other file system, such as xfs, jfs, fat, or reiserfs, then the GRUB stage 1 loader will load the stage 1.5 loader. The only purpose of the stage 1.5 loader is to act as a bridge between the stage 1 and stage 2 loaders. That is, the GRUB stage 1.5 loader knows enough about the underlying file system to run the stage 2 loader. Once the GRUB stage 1.5 loader has run, it'll load the GRUB stage 2 loader.

The GRUB stage 2 loader is where most of the action happens with GRUB, and it's what most people think is GRUB. Here, the user is given a text menu with a list of available operating systems, and whichever one he chooses gets loaded.

GRUB offers a number of improvements over LILO, such as the ability to specify an unlimited number of operating systems and boot from a network device. But perhaps best of all is that, unlike LILO, you can easily modify the GRUB configuration file without having to reinstall GRUB or play around with the boot sector.

Because GRUB is newer, it has its own set of GUI tools to help modify its configuration file. A popular one is the KGRUBEditor, which requires the KDE 4 libraries to run. When you run it, all of the bootable entries in GRUB's initial text menu are shown. As with the KDE Boot Manager for LILO, you can add, delete, or edit entries, and it'll take care of the configuration files themselves.

### Still Not In Linux

So after we've run either LILO or GRUB through its paces to boot the operating system, the Linux kernel is loaded, right? Wrong. Linux is designed to try and run on as many different systems as possible. It does this by having a large library of modules to enable different features. But due to the sheer number and size of modules, they can't all be available at boot time.

Also, Linux has some special features

that require special work before they can be fully utilized, like booting off a network device.

To address these situations, after you've gone through all of the boot loaders, you haven't really loaded Linux yet. Instead, you will actually boot into a very small Linux kernel with just enough drivers to get the real Linux kernel started. This small Linux kernel is known as the initial ramdisk, or `initrd` for short. Once `initrd` has loaded, it moves itself out of the way, loads the real Linux kernel, and then deletes itself from memory. Only after `initrd` has freed itself from memory have you truly booted into Linux.

Most people have probably never thought about how Linux boots up, so they've been stuck if it doesn't boot. But after reading this, if your Linux box doesn't boot, you at least now know where to go looking to troubleshoot the problem. ▲

by John Jung

## Infinite Loop

### Bionic penguins swim through the water, hunt Sarah Connor

If we had our choice (and it's probably a good thing that we don't), we would've requested robotic sharks from German engineering company Festo, the group that made the mechanical aquatic avians. The bionic birds use 3D sonar to avoid smashing into walls (or other mechapenguins) and have a gripper than can omnidirectionally twist 90 degrees, making it ideal for underwater industrial applications or grabbing us another cold one as we're floating in the pool.



Source: [www.newsscientist.com/article/dm16996-bionic-penguins-take-to-the-water—and-the-skies.html](http://www.newsscientist.com/article/dm16996-bionic-penguins-take-to-the-water—and-the-skies.html)



# Shavings From The Rumour Mill

by Mike Magee

## The Future Is Bright & Shiny

I'm just casting my mind back four or five years ago and reflecting on how the PC industry has changed in that short period of time.

I was a regular at the Computex show in Taipei, Taiwan, and in those days, the number of companies making motherboards was legion. They'd each try and distinguish themselves by gimmicks, and it wasn't just motherboard manufacturers that were plentiful.

You could see countless small companies offering cases of every kind for the enthusiast. Fashioned from beautifully polished chrome and glass, the kind of bloke who'd want one of these would want the best of everything. Best graphics card, best sound system, best CPU, best and fastest memory with flashing LEDs or not, and of course, the fan had to be extra cool—cool-looking, that is—because if you had a glass PC case, you'd certainly want your friends to see just how super-cool you were.

Those days aren't quite gone. Last year, I judged one set of products for the "Best of Computex 2008" award, and I'm doing the same for this year's show. But the products I'm looking at now are very, very different from the flash bang wallop bright and shiny trinkets to attract the acquisitive magpies of the past.

The magpies got interested in other bling than motherboards. iPods became ubiquitous, and plasma screens became the norm for someone who wanted nothing better to do than gaze at a huge TV every time they were home and play some online game to boot.

Then, on the software side, we had and still have the Facebook fad, while Twitter made its twittish appearance and now is on the radar of even formerly august magazines such as *Business Week* in the United States and the staid *Daily Telegraph* in the UK.

Yes, techdom is ruled by fads, and the more gadgets vendors can throw at the appreciative crowd who are dedicated followers of fashion, the better. The phrase "eye candy" was formerly applied to software that looked

bright, shiny, and colourful on the glass, but the eyes are the mirror of the soul, connected directly to the brain. And if your first impression is that something is bright and shiny and, above all, new, you'll put your hand in your pocket and buy something before you've considered or reflected for a second whether you even want it.

This, I think, is why it's very hard for the chip vendors to make things exciting for enthusiasts anymore. I don't want to harp on endlessly about the Tower of Babel that now constitutes the chip ranges of Intel and AMD, but the marketers at semiconductor companies are getting increasingly desperate to find the blue-crystal factor that will excite enthusiasts about their products. Form used to precede function as far as microprocessors were concerned. We were all wowed by Intel code names, redolent of hidden vales in remote parts of California; wooed by Camino, by Woodcrest; and if we were in foreign parts, wished we knew what a Katmai was.

Dual-core and quad-core microprocessors fail to make our blood race and our hearts sing now. We want both function and form. However wonderful and, in fact, miraculous the ability of the engineers and architects is to shrink the die and include ever more transistors on a chip, a package with pins does not hold the allure it did when you could impress your friends with your raw overclocked megahertz in a glass and chromium case able to play the latest game faster and fiercer than any of your friends.

With technology as ubiquitous as it now is, we're always going to be impressed by something that looks good, but we'll always be on the side of a product that not only gleams and is colourful, but also works the first time, every time and doesn't need to be upgraded every six months or so. Good design is important, and Apple has proved that. But we want both, not either. ▲



*Mike Magee is an industry veteran. He cut his teeth on ancient products such as the Dragon and the Japanese PC platforms long before the IBM-PC won. He worked for a corporate reseller in the mid-'80s and saw the Compaq 386 sandwich box and every GUI known to humankind. Mike decided that the way to go was the Interweb around 1994 after editing PC mags in the late '80s and '90s. A co-founder of The Register, Mike started the chip-driven INQUIRER ([www.theinquirer.net](http://www.theinquirer.net)) in 2001. He has contacts from top to bottom in the business, spanning the entire chain, who help him root out interesting rumours and speculation.*

Send rumours to "Mad Mike" Magee at [mike@cpumag.com](mailto:mike@cpumag.com)



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# Wagging The Dog

by Rahul Sood

## The Various Ways Of Twitter

There are many reasons you should think about using Twitter as a productivity tool, no matter what business you're in. I will start by saying that Twitter is as simple or as complex a tool as you want it to be. The typical first-time Twitter user hears about it on the radio or on television or through a friend—they visit [www.twitter.com](http://www.twitter.com), register, and wonder “what next?” If I were to guess, I would say that a good chunk of the new Twitter accounts do not become active.

My wife is one of those people who barely uses Facebook, but she understands the need for it. She can't understand the purpose of Twitter, and I was the same way until I started to dig into it further. My Twitter account would have died had it not been for the constant flow of followers who followed me for whatever reason, but I imagine most first-time users don't get “automatic followers,” so they need to use the tool in a more proactive way.

### Getting Started On Twitter

The first thing I recommend is that you do not use [Twitter.com](http://Twitter.com) as your primary interface. Register on the site, customize your page, then close that browser window and download Tweetdeck. Tweetdeck is a desktop application that lets you view tweets from many different streams at once. You'll find as you get into Twitter that you'll use the Twitter Web site every now and then to modify your profile and follow recommended users.

### For Customer Feedback

You can set up custom search windows with specific terms. So, for example, if you want to be notified anytime someone says “motherboard,” you can click the search tool at the top and type **motherboard**, and a new column will open up. Now anytime someone types that word in a tweet, it will appear, and you can choose to follow them, reply, or pretty much monitor the situation. I use this as a great way to get live customer feedback on my products. It's a great way to get directly involved with your customer base without being too intrusive.

### For Stock Trading

I have never seen a more effective tool to research stocks in real time. First, go to

[www.stocktwits.com](http://www.stocktwits.com) and register your twitter account there. You need to follow @stocktwits, as well, if you want to be part of the stream. On Tweetdeck, you can click on the Stocktwits feed to see what everyone is talking about, and although it's an overwhelming stream, it will give you an idea of what people are trading. More importantly, you can set up searches for stocks that you're trading. So, when you click the search button, type **\$bac** to follow all tweets on Bank of America. (Always use a dollar sign [\$] in front of the symbol to be part of the stream.) As you will start to see, the information can be valuable, or not. Either way, it's the Internet; take it with a grain of salt.

### For Real-Time News

This is my favorite feature of Twitter. Click the Twitscoop button at the top of Tweetdeck, and you'll see a tag cloud of terms that people are talking about. The larger the word, the more people are talking about it. For example, if the word “earthquake” appears large, there is an earthquake happening somewhere in the world, and you can click on it to see what people are saying. Never before has there been a faster way to get news out than with Twitter.

### For Stalking Celebrities

It's safe to say Twitter has become a pop culture phenomenon, and when people such as Ashton Kutcher, Oprah Winfrey, and 50 Cent are using it to talk about whatever interests them, you can jump in and follow them and even respond directly to them.

There are many other things that Twitter allows you to do, from searching for specific keywords and sending messages automatically to people (spam could be cut out at some point) to finding a job in real time. I strongly urge you to try it, and dig deep into the tools that make Twitter a powerful tool rather than just a glorified chat room.

Oh yeah, feel free to follow me on Twitter @rahulsood. ▲



*Rahul Sood's love for computers started at the young age of 11. Much to the shock and dismay of his parents, he ripped apart his brand-new Apple IIc and painted it red before turning it on. His parents' dreams of having a doctor for a son were shattered when college dropout Rahul founded what is now one of the most respected high-end computer companies in the world, Voodoo Computers.*

Send your opinions to this opinionated guy at [rahul@cpumag.com](mailto:rahul@cpumag.com)



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945 CPU \$ 879  
920 CPU \$ 855  
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9950+ CPU \$ 815 (Black Edition)  
AMD Phenom™ II X3 Triple-Core processor  
720 CPU \$ 805  
AMD Athlon™ X2 Dual-Core Processor  
7850+ CPU \$ 735

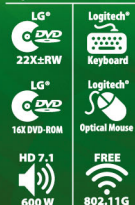
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NVIDIA® nForce® 750A SLI™ Chipset MB w/ Dual PCI-E  
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XG XtremeCool Silent & Overclocking Proof CPU Cooling System

System come with



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920 CPU \$ 875  
AMD Phenom™ X4 Quad-Core Processor  
9950+ CPU \$ 855 (Black Edition)  
9650+ CPU \$ 819  
AMD Phenom™ II X3 Triple-Core processor  
720 CPU \$ 849  
AMD Athlon™ X2 Dual-Core Processor  
7750+ CPU \$ 769

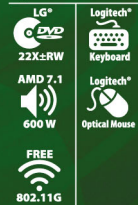
From **\$769**

## Gamer Ultra 7000 Elite



AMD 760G Chipset MB w/ Dual PCI-E  
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Corsair® 4GB PC-6400 DDR2-800 Dual Channel Memory  
500GB 7200RPM SATA-II 3.0Gb/s 16MB Cache Ultra Fast HD  
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System come with



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945 CPU \$ 679  
940 CPU \$ 659  
920 CPU \$ 629  
AMD Phenom™ X4 Quad-Core Processor  
9950+ CPU \$ 609 (Black Edition)  
AMD Phenom™ II X3 Triple-Core processor  
720 CPU \$ 599  
AMD Athlon™ X2 Dual-Core Processor  
7850+ CPU \$ 525

From **\$525**



# Technically Speaking

## An Interview With Troy Schneider, New America Foundation Director Of Media & Communications

Troy Schneider is director of media and communications for the New America Foundation. Prior to that, he was managing director for electronic publishing at the Atlantic Media Company and the founding editor of NationalJournal.com.

by Barry Brenesal



**CPU:** President Obama has commented several times that he is in favor of net neutrality, but there appear to be several different definitions being floated of the term. Could we start out with what you consider as an expert in the field to be an adequate definition of net neutrality?

**Schneider:** The basic idea is that, simply put, the providers of Internet connectivity should be providing a dumb pipe, an unbiased transmission system where they're not privileging content. They're running a toll gate, and it shouldn't matter what comes through it. If you have your DSL modem or cable line, you have the right to upload and download X amount of data—with different plans, at different terms of maximum throughput.

It goes back to the precedent of the Carterfone Decision, which forced Ma Bell to open the telephone system to any device for connection, provided it met certain standards. That opened the door to doing more than just renting black rotary phones. You could buy phones at your local department store; and, down the road, hook up a fax or answering machine, and then a modem. Advocates of net neutrality want that same common carrier arrangement for the Internet.

**CPU:** What do the people and/or companies who own the distribution network

stand to gain by maintaining the role of gatekeeper over content?

**Schneider:** Profit margins, certainly, though it's more complicated than that. There are absolutely reasonable arguments in favor of restricting content in certain ways, but even the staunchest opponents of net neutrality will be fairly candid about wanting to be in a value-added business. They don't just want to lease a dumb pipe, because then you're marketing a commodity. And if you're in a business where anyone can transmit data in whatever form they see fit, then the only way you can compete is on price and the amount of throughput you can provide for the dollar. That's good for consumers in a lot of ways, but it's not an ideal situation for the providers, who do have to spend a great deal of money to build out and maintain those networks.

**CPU:** How is this faring in Congress?

**Schneider:** This has been a long-running battle. It started with old line telephones and has progressed to the Internet and wireless issues and what should be done with the spectrum that the FCC is reallocating and auctioning off. The same very powerful interests, the big telcos, are lobbying this out, trying to convince Congress of the wisdom of their point of view. Verizon and Comcast are huge

players in this and have been for a long time. The advocates of net neutrality have gotten more clout in the last year or two, because at one time, it was mostly technologists and public interest advocates arguing their viewpoint. What has changed, I think, is that there are more commercial interests arraigned at their side—Google being first and foremost. And the Obama administration appears to be significantly more open to the idea of net neutrality than the Bush administration or, frankly, the Clinton administration was.

**CPU:** Do you have any idea how much money companies such as Verizon are spending on lobbying for net neutrality?

**Schneider:** Verizon itself spent more than \$18 million on lobbying in 2008, according to the Center for Responsive Politics, and gave another \$2.3 million in direct political contributions. I cite them because they are a huge factor in the Washington area both on the policy side and as a corporate presence.

And just to be clear: Verizon should absolutely be trying to stack the deck in their favor. Lobbying to me is not a pejorative word. But simply bringing in larger interests on the side of net neutrality makes a big difference, because while organizations like the New America Foundation, Electronic Freedom Forum,

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and Free Press can put their ideas out there, the money—the resources those groups can throw at this—are nothing more than a rounding error compared to what the big telecoms put forth on the other side. It is completely skewed when there's no chance for a fair fight. That's not in the public interest.

**CPU:** What, in your opinion, would make the debate fair and balanced?

**Schneider:** I think we're creeping in the right direction. The role that Google has played is hard to overestimate. Not that they placed tons of money into traditional lobbying by Washington standards, but they have such a high public profile. Suddenly, it's not consumers on one side and big corporations on the other; you have big corporations on both sides. The other thing that helps is that there are more channels for people to learn what is going on, to organize and make their views known on issues that matter to them—including net neutrality.

**CPU:** When we were discussing the economic advantages to net neutrality, we

whose value is that it democratizes access. You no longer require such a vested interest that you're willing to spend hundreds of thousands of dollars to get started organizing. But if you are one of those big vested interests, these tools are very helpful to you, as well. I think any sort of hesitation in the old guard about organizing on the other side is probably tempered by the knowledge that these same tools can be used in their own interest. It's more a race to see who can innovate with them.

**CPU:** You really don't think there are politicians on the national and state levels who feel that once they're elected, they're part of the elect and those who voted for them can now essentially retire until the next time they vote for them, as well?

**Schneider:** There are certainly people in Washington who will roll their eyes at the idea of citizen input. But most elected officials that I've dealt with want to know what a broad cross section of constituents has to say. It's either go to meetings with a select few that have privileged access or sift through hundreds of thousands of phone calls and emails. I think that's why

Congress. What are some of the other battlegrounds it will face in the near future? The FCC?

**Schneider:** I think the FCC is probably the primary battleground on this. As the different commissioner positions come open, the Obama administration will fill them with people who reflect its policy priorities. I think it is arguably at least as important as what's going to occur on Capitol Hill in the near term, because there are so many questions already out there that need to be addressed. Whether they are rules about how to interpret existing regulations or how to deal with various blocks of spectrum that are being auctioned off, the FCC is really where the net neutrality issue decisions will be made.

**CPU:** You mentioned the Carterfone Decision in such a way as to make it sound like the Big Bang, from which everything else in online followed. If the Decision never occurred, would we have the Internet today?

**Schneider:** Absolutely not. Without Carterfone, we wouldn't have been able to

Verizon itself spent more than \$18 million on lobbying in 2008,  
according to the Center for Responsive Politics,  
and gave another \$2.3 million in direct political contributions.  
—Troy Schneider

were also acknowledging the presence of people on the other side of the fence who felt it was in their best interests to continue the status quo. When you switch perspectives and consider instead issues of democratic involvement through a more open Internet, who's on the other side that stands to gain from keeping things the way they are?

**Schneider:** I suppose I'm being optimistic, but I don't think there are that many people who are really on the other side about this. All of the potential benefits to democracy and political discourse online are just that: potential. A tool,

we see a lot of members of Congress racing to join online chats and carving out their own space on the social networks. Granted, some are doing it because it's the flavor of the month, and they want to show that they're current, or because they see it as another way to get their message out. But I also think there's a sincere desire to engage in these conversations.

**CPU:** We've talked briefly about net neutrality issues in one potential battleground,

connect modems to our phone lines. Without modems, there'd have been no CompuServe, AOL, or dial-up Internet services, and so no critical mass for the World Wide Web to take off the way it did. Now, would the Internet have come along later in some different form? Quite possibly, but that initial requirement for openness was key to getting us to where we are today. And I think net neutrality is similarly vital to opening the doors for future growth and innovation. **CPU**



Subscribers can read bonus content with Troy Schneider at  
[www.cpumag.com/cpuly09/schneider](http://www.cpumag.com/cpuly09/schneider)

# Under Development

A Peek At What's Brewing In The Laboratory

## "Smart" Bridges Seek To Save Lives

According to Iowa State's NDT (Non-destructive Testing) Resource Center, the life expectancy of a highway bridge is 70 to 75 years. Current methods of bridge inspection are simple visual inspections of each bridge every two years, whether the bridge in question is brand new or decades

old. NDT also reports "it is not uncommon for a fisherman, canoeist, [or] other passerby to alert officials to major damage that may have occurred between inspections." Not exactly confidence-inspiring, is it?

University of Michigan's new development in "smart" bridges couldn't be better timed.

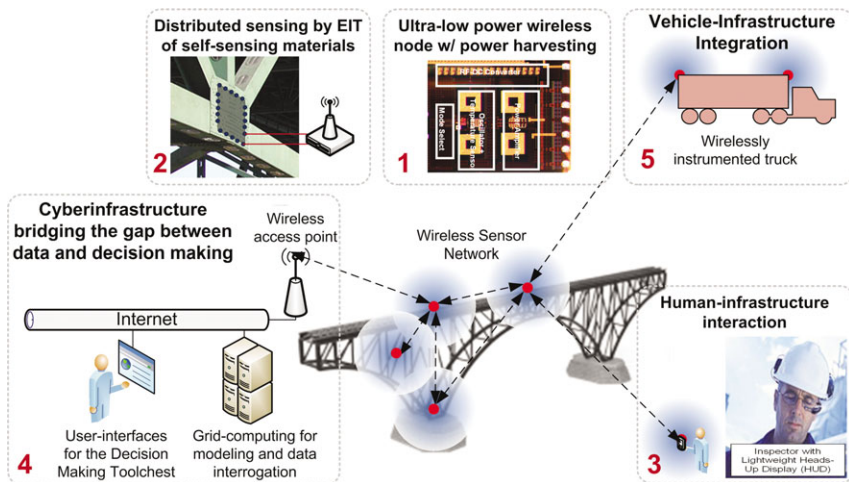
The \$19 million, five-year project (with funding from a federal grant, the private sector, and Michigan Department of Transportation) will focus on cutting-edge

"Smart" sensors capable of processing their own measurements will be able to alert engineers and bridge owners of unusual bridge behavior or measurements signifying the onset of damage immediately. This will then trigger inspection of bridges to investigate further the condition of the bridge," explains Lynch.

Lynch's team has been working on new types of materials to house those sensors, as well as lowering the cost of production of the sensors themselves. Four sensors are in development. The first, super-durable concrete that conducts electricity, is fiber-reinforced and bendable. Sensors would measure electrical conductivity, and a change in it would signal issues with the bridge. Another sensor, a "sensing skin" of carbon nano-tubes that Lynch is developing, would be lined with electrodes and painted or glued on high-traffic areas in hopes of measuring small cracks and corrosion. A third sensor would be wireless nodes that would monitor strain and vibration fluctuations, and a fourth sensor would reside in automobiles using the bridge.

The biggest challenges for the team have been driving down the cost of the sensors to make them affordable for limited budgets and showing bridge owners that the technology will create cost savings overall.

Lynch's team hopes to have a working prototype, including "placing actual prototype sensors on bridges in Michigan and California," within two years. ▲



The new wireless sensor network for bridges being developed at the University of Michigan could offer bridge inspectors a wealth of information in bridge safety.

With nearly 600,000 bridges across the land needing regular safety inspections, the

damage detection and facilitating direct communication between the bridge and the bridge owners. Jerome Lynch, principal investigator and UM's assistant professor in the Department of Civil and Environmental Engineering, is excited about improving the inspection process and public safety.

## Hydra Middleware Speaks Smart Devices' Language

With our environments becoming "smarter," our homes and work places laced with embedded systems, the eventual impasse with potential technological bliss will be a failure to communicate. Networked systems and the wide range of devices available to interact with said systems do not currently all speak the same language. With an eye to serving system developers' needs, the European Hydra project has created the on-the-fly translators via its self-titled Hydra middleware.

"The main issues Hydra solves for hardware and software developers is that the middleware [will] address a broad range of heterogeneous devices on the service level instead of on lower software layers," explains Dr. Markus Eisenhauer, lead of the project and head of mobile knowledge at Fraunhofer Institute. "As long as a device can be addressed via IP and has some processing and memory capabilities, it can be Hydra-enabled. In the case of a simple sensor with no computing power, we can use a proxy that will be Hydra-enabled."



## New Hydrogel Display Lets Your Fingers "See" The Picture

**H**ydrogel, the matter used to create soft contact lenses, has recently been adapted by Georgi Paschew and Andreas Richter of the Technical University of Dresden to help those with more severe sight challenges.

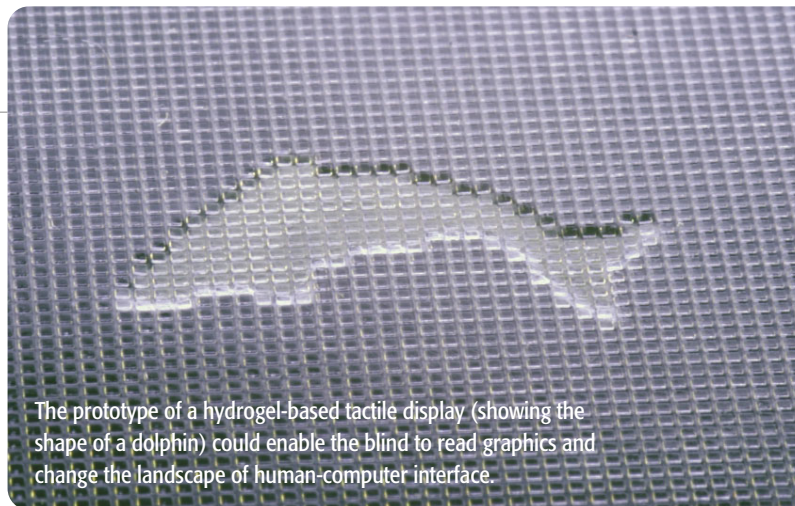
The team has created an innovative visual and tactile display using "smart" hydrogels—water-filled gel packets that respond to being warmed by beams of light by shrinking, hardening, and becoming opaque.

"The basic material for the actuators is called 'smart hydrogel' because it has the ability to perform a big change of its properties according to

small alterations in a certain parameter of its surrounding fluid medium," explains Paschew. "[It has an] amazing ability to double its length or height only within a temperature range of 6 degrees Celsius (43 degrees Fahrenheit)."

Paschew and Richter crafted a square display with 4,225 packets of evenly spaced, 300-micron-wide hydrogels. Every square centimeter of the display holds 297 hydrogel "pixels," or actuators. Backed by black polyester and sealed beneath a plastic membrane, the actuators can shrink and swell twice per second.

Paschew discusses the possible uses of their innovation.



The prototype of a hydrogel-based tactile display (showing the shape of a dolphin) could enable the blind to read graphics and change the landscape of human-computer interface.

"This . . . can be used as computer display for high-resolution tactile information and not only give blind people the access to graphic illustrations but also give you and me, the usual computer user, completely new possibilities to see, touch, and feel

[changing] shapes, forms, and structures," she says. "This is a new communication channel which can change the human-computer interaction because the tactile sense of humans is quite important but nevertheless still not used." ▲

## Micro-Fridges Help CPUs Chill Out

**A**s manufacturers rose to meet the demand for faster processors, chip performance was eventually hampered by extreme temperatures. The solution became multicore processors. Of course, we've developed our own cooling methods, using water, liquid nitrogen, or specialty coolants, to bring down their CPUs' temps.

Dr. Rama Venkatasubramanian, a senior researcher at RTI International, and a team of other researchers at Intel and Arizona State University, have stepped into this hot topic with a unique

answer: micro-refrigerators that target-cool the hot spots. The researchers are looking at the brink of those multicores potentially facing similar thermal issues as in days of yore, with traditional heatsinks and fans still lacking the oomph to bring down temps of densely packed circuitry.

"Our superlattice thin-film thermoelectric micro-refrigerators would help solve the problem of efficient thermal management of so-called hot spots on a high-performance chip," says Venkatasubramanian. "Typical chips have highly non-uniform

thermal maps, where some areas of intense computation run much hotter than others.

"We can selectively cool these hot spots with our active cooling while the rest of the area is managed with standard heat removal means."

The micro-fridges are nano-scale (roughly 10 microns) and can be mounted on chips. Remarkably efficient, the micro-fridges essentially cool on demand and only use 2 to 3W when in use.

Venkatasubramanian thinks a finished product could be available in 2011. ▲

In other words, plugging in the Hydra software (with open-source tools and libraries available) means developers won't have to create their own software to handle security, device discovery, and communication issues in their systems.

Eisenhauer asserts that the team has faced quite a few hurdles during the project's duration. "From a research perspective, there have been several challenges, like how to implement a level of security into a middleware across a plethora of devices; how to implement the

middleware or some of its components on resource-restricted devices; how to discover devices in unknown and dynamically changing environments; or how to store data persistently, even if the data-producing entity cannot provide enough reliable or secure storage."

However, the team has found success over the span of the 4-year project, which will be completed this year. An SDK is currently available, with a DDK (Device Developer Kit) expected to launch by the end of this year. ▲

**05.22.09**

LANageddon - Calgary, Alberta, Canada  
www.lanageddon.com

Traverse City Fragfest 15 - Traverse City, MI  
www.fragfest.cx

**05.23.09**

BYOC LAN - Bakersfield, CA  
www.byoclan.com

Gaming Northwest LAN: Part Deux - Vancouver, WA  
www.gamingnw.com

HyperGamez Grand Opening - Fort Worth, TX  
www.thetexangamer.com

Intel LAN Fest Colorado - Loveland, CO  
lanfest.intel.com

Lower Main LAN - North Vancouver, BC, Canada  
caplan-bc.com

NGC LAN Party - Groveton, NH  
www.electronicsthetics.com/LANParties.htm

WVG Gamers - Eugene, OR  
www.wvgamers.com

**05.29.09**

Maryland LAN Gamers - Greenbelt, MD  
www.marylandlangamers.net

**05.30.09**

Boro LAN Fest - Springboro, OH  
http://springboro.org/borolanfest

Catacombz 11.0 - Eldorado, IL  
www.catacombz.com

E-Town LAN - Emporia, KS  
www.ettownlan.com

ExtremesLAN KC - North Kansas City, MO  
www.extremeslankc.com

Krosswirz - Quincy, IL  
www.krosswirz.net

OnTargetLAN - Hot Springs, AR  
www.ontargetlan.com/news.php

Peace, Love, and Rockets - Keller, TX  
www.peaceloveandrockets.org

**06.01.09**

The(S/V)Clan-1v1 GunGame Tournament - Houston, TX  
the-sas-clan.com

ICT Gaming - Wichita, KS  
www.ictgaming.com

**06.05.09**

FireLANcaster - Lancaster, VA  
www.myspace.com/firelancaster

Panhandle Gamers LAN - Mobile, AL  
www.panhandlegamers.com

**06.06.09**

Atlanta LAN Fest - Atlanta, GA  
www.atlantalanfest.com

LANManiac - Brea, CA  
www.lanmaniac.com

NWLAN - Fayetteville, AR  
www.nwlan.com

PNP LAN - Largo, FL  
www.pnpplan.com

**06.12.09**

FGA LAN 2009 - Marion, IL  
www.clanfga.com

LAN Lordz - Wichita, KS  
www.lanlordz.net

Mainline Gaming Center Summer LAN - Zeeland, MI  
mainlinegamingcenter.com/summerlanparty2009.aspx

**06.13.09**

Gamers United-Showdown at Thunderdome - Gray, TN  
www.gamersunited.com

Intel LANFest Desertbush - Anthem, AZ  
lanfest.intel.com

MidWest FragFest v2 - Countryside, IL  
www.midwest-fragfest.com

**06.14.09**

Anime Evolution - North Vancouver, BC, Canada  
caplan-bc.com

**06.19.09**

MetroCon - Tampa, FL  
www.seads.org/LANParty/lanparty.htm

**06.20.09**

Bellingham LAN - Bellingham, WA  
www.bellinghamlan.com

FFAGility - Tiffin, IA  
www.fragfinity.com

Ghetto LAN party - Denton, TX  
www.ghettolanparty.com

KC Beatdown - Overland Park, KS  
www.kcbeatdown.com

Muncie Gamers - Muncie, IN  
www.munciegamers.com

NEXUS LAN - Dayton, OH  
www.nexuslan.org

NGC's LAN-A-GEDDON - Greenville, TX  
www.networkgamingclub.com

Whempy's LAN Party - Columbus, OH  
whempyslan.org

WVG Gamers - Eugene, OR  
www.wvgamers.com

**06.26.09**

Friday Night Frag Fest - Denver, CO  
www.fnff.net/news.php

**06.27.09**

NGC LAN Party - Groveton, NH  
www.electronicsthetics.com/LANParties.htm

PC-Gamers.net Frag-Fest - Fishersville, VA  
www.pcgamers.net/lanparty

**June or July 2009**

MegaCon - Jacksonville, FL  
www.seads.org/LANParty/lanparty.htm

**mid-July 2009**

Digital Storm LAN - Aldergrove, BC, Canada  
www.digitalstormlan.com

**July 2009**

KILANFest Ver 7.0 - Louisville, KY  
www.kilanfest.com

**July 2009**

theGXL - Millville, NJ

**07.01.09**

ICT Gaming - Wichita, KS  
www.ictgaming.com

**07.03.09**

Lannihilation - Calgary, Alberta, Canada  
www.lannihilation.ca

**07.04.09**

LANManiac - Brea, CA  
www.lanmaniac.com

**07.09.09**

Lanwar's MillionManLan 8 - Louisville, KY  
www.lanwar.com/News.asp?Process=DISPLAY

**07.10.09**

Massive LAN - Hamburg, NY  
www.massivelan.com

**07.11.09**

E-Town LAN - Emporia, KS  
www.ettownlan.com

LAN Lordz - Wichita, KS  
www.lanlordz.net

Peace, Love, and Rockets - Keller, TX  
www.peaceloveandrockets.org

**07.18.09**

Bellingham LAN - Bellingham, WA  
www.bellinghamlan.com

NGC's LAN-A-GEDDON - Greenville, TX  
www.networkgamingclub.com

**07.24.09**

LANapalooza - Aurora, Ontario, Canada  
www.zeropingevents.com

Super LAN 2009 - Fond du Lac, WI  
lan.kicks-ass.net

**07.25.09**

NGC LAN Party - Groveton, NH  
www.electronicsthetics.com/LANParties.htm

**August 2009**

DragonFire LAN - Erie, PA

**08.01.09**

KC Beatdown - Overland Park, KS  
www.kcbeatdown.com

LANManiac - Brea, CA  
www.lanmaniac.com

**08.06.09**

Fragapalooza - Alberta, Canada  
www.fragapalooza.com

**08.07.09**

AWOL LAN - Wisconsin  
www.awollan.com

**08.08.09**

Iron Storm 11 - Castle Shannon, PA  
www.pittco.org

LAN Lordz - Wichita, KS  
www.lanlordz.net

LANmonkeys - Naugatuck, CT  
www.lanmonkeys.com

**08.13.09**

QuakeCon - Dallas, TX  
www.quakecon.com

**08.14.09**

Carolina Armageddon - North Carolina  
www.carolinagaming.com

**08.15.09**

Bellingham LAN - Bellingham, WA  
www.bellinghamlan.com

NGC's LAN-A-GEDDON - Greenville, TX  
www.networkgamingclub.com

**08.16.09**

Whempy's LAN Party - Columbus, OH  
whempyslan.org

**08.22.09**

E-Town LAN - Emporia, KS  
www.ettownlan.com

**08.29.09**

NGC LAN Party - Groveton, NH  
www.electronicsthetics.com/LANParties.htm

**09.04.09**

Chibi-Pa LAN Party - West Palm Beach, FL  
www.seads.org/LANParty/lanparty.htm

**09.05.09**

LANManiac - Brea, CA  
www.lanmaniac.com

**09.12.09**

KC Beatdown - Overland Park, KS  
www.kcbeatdown.com

LAN Lordz - Wichita, KS  
www.lanlordz.net

**09.19.09**

Krosswirz - Quincy, IL  
www.krosswirz.net

NGC's LAN-A-GEDDON - Greenville, TX  
www.networkgamingclub.com

**09.20.09**

Whempy's LAN Party - Columbus, OH  
whempyslan.org

**09.26.09**

NGC LAN Party - Groveton, NH  
www.electronicsthetics.com/LANParties.htm

**October 2009**

Intel LANFest New Mexico - Rio Rancho, NM  
lanfest.intel.com

**10.03.09**

E-Town LAN - Emporia, KS  
www.ettownlan.com

LANManiac - Brea, CA  
www.lanmaniac.com

**10.09.09**

UWL LAN Computer Science Club - La Crosse, WI  
www.uwlax.edu/csclub

**10.10.09**

LAN Lordz - Wichita, KS  
www.lanlordz.net

**10.17.09**

Arkansas LAN - Arkansas  
www.arkansaslan.com

NGC's LAN-A-GEDDON - Greenville, TX  
www.networkgamingclub.com

TigerLAN - Hays, KS  
www.tigerlan.org

For our full list of upcoming events,  
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[www.computerpoweruser.com/LanYard](http://www.computerpoweruser.com/LanYard).

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to input your own information and see your LAN party name in our upcoming issues.

We'll be glad to consider your event!





## Intel LAN Fest InfernaLAN & Netwar 17.0

Zombies and raids were the order of the day (and night) at InfernaLAN, but it was Joshua Sniffen's Seraphim that bathed the Intel cafeteria in DuPont, Wash., in a heavenly light. Its beauty and craftsmanship smote the competition hip and thigh.

This 3.5GHz Core i7 mod started out as a Lian-Li PC-V351 micro-ATX cube. Even with the extra room this chassis afforded Joshua over the PC-V300, he still needed to make room for a dual-pump watercooling setup, cold cathodes, and an EVGA GeForce GTX 260 Core 216 Superclocked, not to mention a beautiful, custom Plexiglas GPU water block he created. Blessed with a Dremel, he proceeded to make the interior of the Lian-Li more holy. Still, Joshua needed the patience of Job to install everything.

He etched the amazing Armored Angel drawing by James Dies into his transparent GPU water block cover. To dress the tool marks around the edges of the block—or rather his third, as the first two blocks cracked—he touched them up with a pillar of propane fire. A custom LED harness gave this angel its halo.

Next, he mounted the graven image on a Koolance CPU-350 cooling block, which

necessitated the second pump. The copper radiator was a new, unreleased model from Koolance. (Hey, it pays to have connections with one of the Chosen.)

Joshua nearly had to strike a Faustian bargain to install the big pixel-pusher, and the integration of the cooling system proved so devilish that he had to snake some of the hoses into place using chopsticks.

Joshua customized and/or fabricated the wiring harnesses to be easily hidden and no longer than necessary. He took the same approach with the lengths of the coolant hoses. Another modification was to move the drive mounts ahead to allow an 80mm fan to fit flush with the rear panel. Rubber grommets keep the SATA drives from passing any vibrations to the chassis. Finally, a cunningly attached bay cover completely stealths the Blu-ray drive yet ejects the tray with the touch of a finger.

Joshua credits Christopher Jahosky and James Dies for the artwork on the outside of the case, which he lovingly rendered in vinyl. And we couldn't help but credit Joshua for hand-crafting the top mod in *CPU's* InfernaLAN competition. ▲

by Marty Sems

An impressive 291 attendees registered for an intense 26-hour gaming binge at the Omaha, Neb.-based Netwar 17, held on April 24 and 25. The venue is a large hangar-like building typically used for indoor volleyball, but remove the nets and install a 'Net, and you've got yourself one of the largest LAN events held in the Midwest, with enough space left over to keep Crucial's dodgeball tournament indoors during the rainy, gray afternoon. The stripped-down affair was for PC gaming only; if you want to attend Netwar, leave your gaming console and TV at home. Game tournaments were voted on by attendees prior to the event and included Call of Duty 4 and Left 4 Dead. Dedicated servers were also available for Team Fortress 2 and Counter-Strike: Source. Over \$6,000 in prizes was awarded to attendees.

On Saturday, *CPU* hosted the first-ever PC Build Challenge in which 26 DIY builders assembled a PC as fast as they could for a shot at one of 10 prizes. The four-hour event ran from 11:00 a.m. to 3:00 p.m. Saturday, and in that time, the builders blazed through our parts, shredded standoffs, and thoroughly impressed us with their screw-spinning skills. The assembled crowd also got into the act. Builders who managed a flawless build (each error cost the builder 30 seconds) often got a roaring cheer from bystanders. One builder had never built a PC before and said he now feels confident enough to try it on his own.

A user who goes by the handle "Bean" achieved the fastest build time at 4:45 (min:sec) and walked away with the "Best \$500 Family PC" from *CPU's* May issue, "PC Challenge," sponsored by Newegg. The top 10 all built PCs in less than 7 minutes: The second- and third-place builders place got Gigabyte motherboards, the fourth- and fifth-place builders got GeForce graphics cards, and the sixth- and seventh-place builders each got high-performance memory kits, courtesy of Crucial. The remaining top 10 didn't walk away empty-handed, either; they each got a free one-year subscription to *CPU*. We had a great time at Netwar, as usual, and you can bet we'll be there next time (with magnetic tip screwdrivers).

by Andrew Leibman



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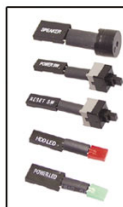
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# Q&A With David "Dadi" Perlmutter

## The Man Behind Mobility Looks Ahead

*David "Dadi" Perlmutter may be the most important man at Intel you've never heard of. From the Israel Development Center, he spearheaded the Pentium M and Centrino efforts and, through them, changed Intel's entire course of processor evolution. Today, as executive vice president and general manager of Intel's Mobility Group, Perlmutter is in charge of product and architecture development across Intel's entire microprocessor spectrum and thus is pivotal in laying the foundations on which so much of future computing will be built.*

**Q** Forbes described you as "a relentless arguer." Is this accurate?

**DP** My assistant nods her head (*laughs*). I hope I'm not argumentative in a disruptive manner. Call it more of a debate than argument. "Argument" is more of a negative. Debate is trying to get things sorted out and understood from multiple angles. It's the Jewish scholar way of learning. You have this opinion? OK, I'll use the other opinion. When you have been convinced by me, I'll argue the other way. That's a very good way to make sure you don't agree on things too soon.

**Q** Pentium M marked a sea change in the direction of PC processors. What was your role in its development?

**DP** I didn't come up with the idea. It was a few architects in my team. My role was to grasp the beauty and importance of it and push it forward. Pentium M was built on the ashes of a previous design we tried to do and basically failed. But we had some basic design ideas that we wanted to carry forward, and we found a new business model that we wanted to promote. And I don't think we could have articulated it well then, but it eventually turned out to focus on power and performance efficiency rather than frequency. It received a great deal of pushback throughout Intel. The only place that liked the idea at the time was the mobile group. This was the first time they had an optimized solution for their program other than squeezing and shoehorning a desktop CPU into a notebook.

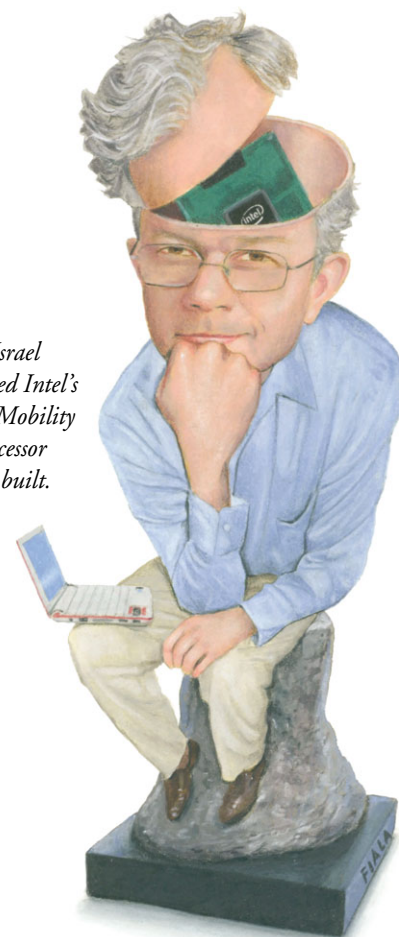
**Q** The old paradigm was performance. The current paradigm that replaced it is efficiency. Is there another paradigm coming up?

**DP** Phase one was to take a desktop product and convince people to buy not based on frequency but on what we call the four vectors of mobility: performance, form factor, battery, and wireless connections. We increased battery by 3X, performance increased significantly, and, within a year from the invention of Centrino, we moved the thickness from about 1.7 inches to 1.1 to 1.2 inches. Today, it's even thinner. We convinced Intel to use this paradigm not just on notebooks but also desktops and servers, which helped Intel double the pace on introducing new microprocessor architecture from four or five years to every two years.

Phase three, which we are now in the midst of, takes this notion all the way down to what you will call Internet in your pocket. The first instance of this product line is the Atom, which took power and power efficiency to way bigger extremes than the Pentium M. The first iteration of this is notebooks, but we have aspirations to really be big in handhelds and smartphones. We like to call it Mobile Internet Device because it's beyond a phone.

**Q** You've already shown an 80-core chip, but are there limits to the scaling of parallelism in processors?

**DP** This is a big debate. I think that how you power this stuff is going to be very much limited to very specific usage models. For the day-to-day things



that you do, applications do not tend to parallelize nicely. However, media or graphics or extremely high-performance computing doing linear equation solutions, this kind of thing does relatively well parallelized—things that rely heavily on visualization, voice recognition, and so on.

**Q** Look 10 or 20 years ahead. How will the everyday experience of computing differ from today?

**DP** I wish I knew. I do believe that within 10, 15, or 20 years, the human interface with computing is going to be more native and more pervasive. Computers are going to be in anything we do. Even if you're not operating them, they will guide us or do things for us, and the interface is going to be way more natural than it is today. Are we going to have computing as part of our bodies, replacing or helping in human vision or thinking or whatever? I don't know. I hope so. ▲

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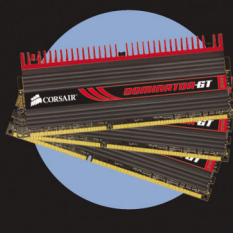
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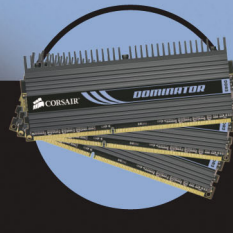
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