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VelociRaptor 600GB

Zotac  
H55-ITX WiFi

Evgar GeForce GTX  
470 SuperClocked



# cpu®

COMPUTER POWER USER



INTEL CORE I7-875K  
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ITUNES MEDIA RECOVERY:  
HOW TO GET YOUR GROOVE BACK  
PAGE 74

## MAXIMIZE YOUR PC'S PERFORMANCE

YOUR SKILLS + OUR KNOWLEDGE =  
FASTER, COOLER, STABLER  
PAGE 46



LUMIÈRE NOIRE:  
A DARK LIGHT SHINING  
IN THE DARKNESS  
PAGE 36

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# MAXIMIZE YOUR PC'S PERFORMANCE

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## EDITOR'S NOTE

Computex has come and gone again, and although I did not attend the uber-show in Taipei this year, I almost feel like I did. Not in a literal way, of course—it's not sweltering and humid enough here in the CPU offices to make the dye in my tie bleed into my shirt collar—but in a vicarious sort of way.

For a few days, every time I picked up my phone or sat down at my desk, I'd been buried in an avalanche of new show-related email press releases. These didn't exactly replicate the experience of meeting the companies' reps in person and peeping the gear firsthand, but it was still pretty exciting stuff. Every couple hours or so I became aware of some new PC part that I will covet throughout the coming months: components that put mine to shame and that call out to me from the press photos, invoking daydreams about how they'd look bolted into my case.

In the meantime, though, what can we do to squeeze a few more frames per second from our systems? How should we go about tightening up that overclock, or bringing ambient and core temps down a few degrees for more stability? What sort of tools do we need to fine-tune, ramp up, and lock down?

You already hold the answers to those questions and a few others like them in your hands; our PC experts sought out still other experts and plumbed the depths of their knowledge so that we could bring that intel to you. Enjoy our performance-boosting feature starting on page 46, and while you're here, check out our looks at new CPUs from Intel (page 26) and AMD (page 31), take a look at AMD's 890FX chipset up close and personal (page 42), and take in the rest of the sights that we've lovingly compiled and created between this page and the last one.





Chris Trumble, Publication Editor, CPU



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Gotcha.  
Here it is.



## Hauppauge Takes Live TV Mobile

Reuters reported May 14 that shares of Hauppauge Digital rocketed by as much as 55% for the day. Why? The day previous, Hauppauge announced that owners of its WinTV-HVR tuner boards could beam live TV from their homes to PCs; various Apple gear, including Safari-running iPads, iPhones, and iPod touches; and Mac systems (Safari recommended) via Internet and Wi-Fi connections. The ability relies on the new WinTV Extend, "a built-in Internet video server" for WinTV v7.2 software (\$9.95 at Hauppauge's Web store). Beyond displaying live TV, the app displays accompanying channel listing on the larger-screened iPads and Macs. iPhone and touch users must switch between live TV and channel screens. ▲



## Is Your Mobile Web Browser Up To Snuff?

Meet Rightware (www.rightware.com), a Finnish startup spun off from Futuremark that bought Futuremark's mobile and embedded business back in early January. More recently the company released BrowserMark, a benchmark aimed at measuring the JavaScript and HTML Web browsing prowess of various mobile and embedded devices available in free and corporate versions. CEO Tero Sarkkinen stated that due to the massive increase in Internet-related usage by mobile devices, "we knew that the world needed an objective performance comparison tool." Thus, if you've been dying to know how the browsing performance on your shiny new iPad stacks up against a Wii, PS3, or NexusOne, you now have the means. ▲

## Do You Suffer From Poster's Remorse?

With age comes wisdom. Such would appear the case in a recent survey of 1,000-plus U.S. residents that Retrevo conducted. Although nearly a third of all those surveyed admitted to "poster's remorse," or dropping some kind of tidbit online that they later regretted, 54% of respondents age 25 and under copped to posting something they regretted vs. 27% age 25 and older. Interestingly, iPhone users (59%) were more likely to post a regret-laden item than owners of other smartphones (54%). As for the "aftermath," Retrevo says nearly 33% of people with poster's remorse indicated their actions resulted in a marriage or relationship going south or headaches popping up at work or home. ▲

## SITE SEEING

### Best Of History Web Sites

Whether you're looking to do some light reading this summer, keep your budding students on their toes during vacation, or write a term paper on the Cold War for a summer class, the Best Of History Web Sites is the place to turn. Soon to celebrate its 11th anniversary, the portal touts annotated links to more than 1,200 Web sites drenched in details of days gone. Categories span Prehistory to Medieval History to American History to World War II History. Each category is teeming with numerous subcategories, and you'll also find sections devoted to Art, Military, and Oral History; Maps; General Resources; and Research. Visually, the text-heavy pages aren't much to look at. Detail-wise, you'll be smarter for just having browsed. ▲



## For It's One, Two, Three Strikes ...

Some people avoid the energy-sapping dog days of summer by any means necessary. Others welcome them with open arms for one reason only: baseball. Sure, you can turn to MLB.com to get the lowdown on your favorite big league players and teams. For our money, though, it's the minor leagues where you'll get the best bang for your ticket dollar. To that end, MiLB.com is your source for all things Minor League Baseball, including the excellent Road Trip series documenting the travels that the very lucky Benjamin Hill makes from minor league ballpark to ballpark. Trips include the Civil Rights Tour stretching from Montgomery to Birmingham to Memphis and the Crossroads of America trip that takes you from Indianapolis to Fort Wayne to South Bend. Better, the site will even show you the best dates to make the jaunts yourself. Play ball! ▲





Fritz Sennheiser

## A Time For Respect

It's said you can't know where you're headed unless you know where you've been. To that end, we pay respect to Fritz Sennheiser and John Shepherd-Barron, two pioneers no longer with us. Sennheiser (1912-2010) founded Sennheiser Electronics in 1945 and was a giant in the audio field having overseen development of the first shotgun mic and first open-air headphones, among other achievements. Shepherd-Barron (1925-2010), meanwhile, we have to thank every time we pull up to an ATM, pull out a bank card, and grab a quick \$20. As the story goes, Shepherd-Barron beat several inventors to the proverbial punch by creating an ATM that was installed at a Barclays bank near London in 1967. Today, the ATM Industry Association states there are 1.7 million ATMs worldwide. ▲

## Eating + Keyboards = Mice (& Not A Peripheral)

Because we know many of you spend countless hours at your desk plugging away, we bring you this public service announcement that, while unsavory, will save you some potential unpleasantness. According to the Royal Society of Chemistry, mice that reside in offices "like dancing and pressing on computer keys so they can reach food crumbs in between." The RSC stated that one London office cleaning company reported an employee at one of its clients "wondered why, given that she did not eat bread at her desk, seeds were coming out of the QWERTYUIOP line" when she pressed them. Turns out, the seeds were really mice droppings. To bring attention to unhygienic keyboards, the RSC plans to publish photos of user-submitted, filth-ridden keyboards online and award a cash prize to the "most awful image." ▲

## The Battle For Home Digital Convergence

It's no secret companies are waging war to gain dominance over the living room via their Internet-connected gear. That gaming consoles "have emerged as the largest category of Internet-enabled platforms" (other than PCs) is a little surprising. According to iSuppli, consoles last year made up 52% of all living room-centric CE devices that ship with embedded broadband ability. Hand-held game units finished a distant second (44%), followed by set-top boxes, DVD players and recorders, and LCD TVs. Because consoles are no longer just gaming devices, stated iSuppli's

Pamela Tufegdizic, they "no longer are just competing among themselves." Tufegdizic says "the unique nature of video game consoles could give them a strong chance of winning the battle for the connected home." To do so, however, Sony, Microsoft, and Nintendo have to stay current on digital content trends, continually beef up storage capabilities, and gift their consoles with DVR abilities, iSuppli suggests. ▲

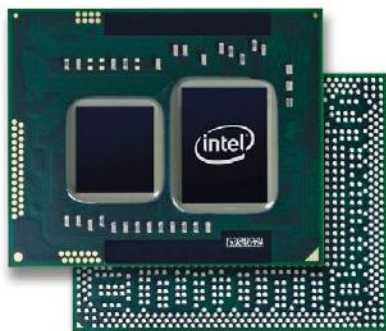




# HARDWARE MOLE

## Intel & Nvidia Debut Mobile Chips

Within a 24-hour span, Intel and Nvidia each debuted new chips in late May aimed at mobile users. Intel expanded its Core family with a second generation of i3, i5, and i7 ULV chips for ultra-thin laptops (measuring less than 1 inch thick and weighing 2 to 5 pounds), stating the 32nm CPUs offer 32% better performance (Core i5-430UM vs. mobile Core Duo SU7300) and cut battery consumption 15% (vs. standard-voltage Core i3, i5, and i7 chips). Look for 40-plus designs from Acer, Asus, Lenovo, MSI, and others in June. Nvidia, meanwhile, announced the Fermi-based GeForce GTX 480M GPU (2GB GDDR5; 850MHz processor; 1.2GHz memory) for laptops, calling it the “world’s fastest notebook GPU.” Nvidia also claims the 480M is a “true tessellation monster” for the laptop platform, offers nearly three times more CUDA cores (352) than older notebook GPU generations, and delivers the world’s best gaming frame rates along with 3D Vision and PhysX technologies. ▲



## Slacker Put Forth Caching Effort

What’s so special about version 2.0.56 of the iPhone app that Slacker has submitted to Apple for approval? Various outlets that received the app for preview report it can cache up to 25 stations on the iPhone or iPod touch for offline listening. Thus far, caching is handled via Wi-Fi and not 3G, with blog Zatz Not Funny! stating caching six stations took 15 to 20 minutes. Additionally, refreshing stations is a manual vs. scheduled chore. For the privilege to cache, you’ll need a Slacker Radio Plus subscription, which runs \$4.99 a month (or \$3.99 per month if you pop for a year subscription). In late April, Rhapsody updated its own iPhone app with the ability to cache playlists. ▲



## Seagate Eyes 3TB Hard Drives Later This Year

Thinkq.co.uk reported in mid-May that Seagate’s Senior Product Manager Barbara Craig confirmed that the company will announce a 3TB hard drive later this year, although accomplishing the feat will require considerable work on Seagate’s part. Specifically, a primary obstacle has been a cap put in place with the original DOS standard back in 1980 that’s left many current PCs unable to take on hard drives topping 2.1TB in capacity due to the original LBA standard. Circumventing the problem, Craig states, means extending the standard to Long LBA, which only 64-bit versions of Windows 7 and Vista and modified Linux OSes support—not Windows XP. Further, there’s a chance WinXP wouldn’t be able to even recognize 2.1TB of a 3TB drive. Seagate expects to release enterprise drives topping 2.1TB by year’s end. ▲



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i5-650K 3.20GHz \$ 749  
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i3-540 3.06GHz \$ 675  
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### Gamer Xtreme 1000

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Genuine Windows 7 Home Premium 64 Bit Edition

**MB** Intel® H55 Chipset Mainboard  
**RAM** Corsair® 4GB DDR3-1333 Dual Channel Memory  
**HD** 1TB SATA-II 3.0 7200 RPM HD 16mb Cache  
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**CASE** Raidmax Typhoon Gaming case 450 Watt  
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## Gamer Infinity 8800 Pro SE

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i7-960 3.20GHz \$ 1359  
i7-930 2.80GHz \$ 1039

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i7-960 3.20GHz \$ 1499  
i7-930 2.80GHz \$ 1199

## Gamer Xtreme XT

Intel® Core™ i7-930 Processor  
Genuine Windows 7 Home Premium 64 Bit Edition

MB	Intel X58 Chipset Mainboard
RAM	Corsair® 6GB DDR3-1333 Tri Channel Memory
HD	1TB 7200RPM SATA-II 3.0Gb/s 16MB Cache Ultra Fast HD
VGA	Nvidia® GeForce® GTX 465 1GB Video Card
CASE	ThermalTake Element T Tower Case 600 Watt Power

Asetek Liquid Cooling System



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7200M 6MB 1.60GHz \$ 1409

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Intel® PM55 Chipset  
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500GB SATA150 Hard Drive  
17" WSXGA TFT Display 1680x1050 pixels  
8x DVD+/-RW Drive  
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## App Developers Want A Bigger Payday

If you're an app developer and think the customary 70/30 revenue split you're abiding by for the privilege to sell your creations in app stores isn't fair, you're not alone. In a survey that Evans Data conducted in April of 400 North American developers, more than 80% believe they should get a bigger slice of the pie. Additionally, only 15% prefer distributing their apps in app stores; more than half would rather sell directly to users and enterprises.

Elsewhere, more than 70% indicate they're in favor of price restrictions, and one-third find content restrictions acceptable vs. nearly 50% who favor no restrictions. Evans

Data also found 10% of developers use Objective C, though that number is expected to increase to 12% next year. ▲



## AppCon 2010: Calling All Mobile Developers

Speaking of apps, AppCon 2010, billed as the “first and only mobile app-centric expo that will cover all platforms,” is hitting the Vegas Strip Aug. 24 to 26 with 40-plus sessions for independent and enterprise developers. Experts on tap include Adobe's Renaun Erickson leading a “Using Adobe Technologies To Build Applications For Multiple Platforms” session; Jon Manning and Paris Buttfield-Addison of Australia's Secret Lab heading up “2D Games Tips & Tricks” and “Designing For Multi-Touch” sessions; Mobile Trax's J. Gerry Purdy discussing how to finance startups; and Jon Fletcher of SNL Kagan leading a session centered on entrepreneur success stories. The conference's keynote speaker, meanwhile, is to be none other than Penn Jillette, half of Penn & Teller and developer of the Penn & Teller Chat Magic Trick. ▲

## Mac Users Take To Steam

It took Valve a week after turning loose its new full release of Steam for Intel-based Macs to declare the event a “huge success.”

Valve also released several early stats related to the launch, including that the company recorded 1.5 million downloads of Portal, which Valve made available free through May 24. Arguably the most interesting number, however, was that Portal featuring the same code across platforms is “one-fifth as likely to crash on a Mac than on Windows.” Elsewhere, Valve reported about two-thirds of Mac-based Steam users used notebooks, and more than 11% of all Steam purchases in the seven days following the launch were for Macs. ▲





## SOFTWARE SHORTS

## 13 & Counting For LifeLock CEO

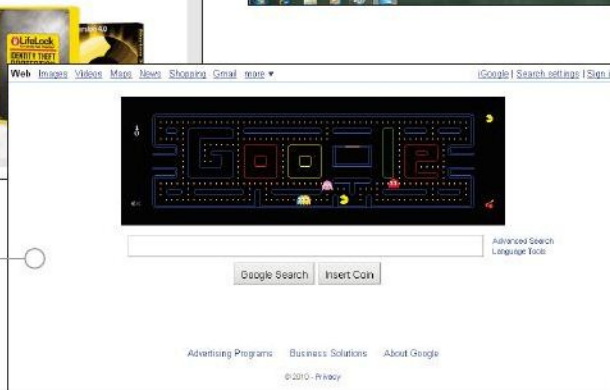
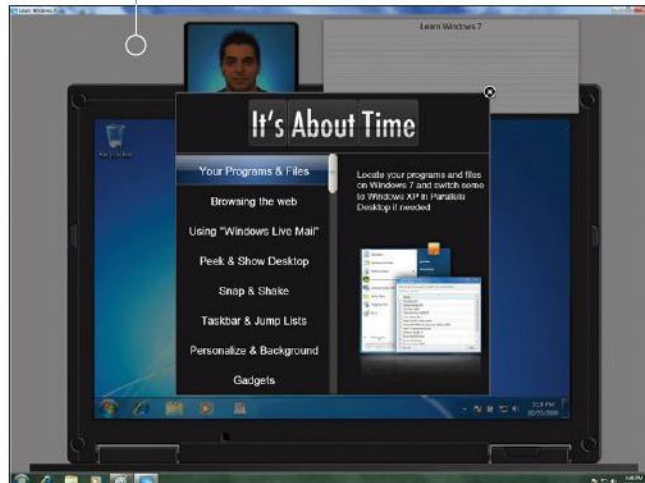
457-55-5462. These are the digits that make up Todd Davis' Social Security number. For years, the LifeLock CEO has expressed such confidence in his company's security software that he's splashed his SSN seemingly everywhere to prove the point. Bad move, according to the *Phoenix New Times*, which recently reported that beyond the FTC fining the company \$12 million in March for deceptive advertising, Davis has been a victim of identity fraud at least 13 times since 2007, including by crooks using his identity to grab a \$500 loan, mounting \$2,390 in wireless phone charges, and accumulating numerous charges from collection agencies. As for LifeLock's notorious \$1 million guarantee to subscribers of its \$10-per-month service, FTC Chairman Jon Leibowitz told *Wired* that the protection the guarantee covers "left such a large hole" that "you could drive that truck through it." ▲

## You Loved It; Your Boss, Not So Much

There's a fair chance the only people on the planet not delighted to find a playable version of Pac-Man on Google's home page May 21 in honor of the all-time classic's 30th anniversary were bosses. That's because, according to productivity firm RescueTime, the distraction resulted in 4,819,352 hours of lost time. Based on the average visitor making \$25 per hour (with benefits), that translates into \$120 million in lost productivity. Typically, people hit Google for roughly 22 searches lasting about 11 seconds each. On May 21, however, the average jumped to 36 seconds, which RescueTime says actually falls on the conservative side. RescueTime stated on its blog, "For that same cost, you could hire all 19,835 Google employees, from Larry and Sergey down to their janitors, and get six weeks of their time." Yikes. ▲

## Parallels Eases Migrations To Windows 7

Among other reasons, you know Parallels for its software that lets users run Windows on Macs. With the recent release of Parallels Desktop Upgrade to Windows 7, however, the company is helping those using any Windows XP or Vista version migrate to Win7 via USB cable, network connection, or external hard drive while keeping and using programs already in place, even if they are not Win7-compatible. The software costs \$49.99 (cable included) for users moving files, settings, programs, and other goods to a new Win7 PC. You'll pay \$39.99 for the software if you only need to upgrade an existing PC. ▲





# Job Of The Month

Mid-summer heat have you wilting? If you like running IT services in brisk (let's say cool) weather and like penguins (lots of penguins), then you might try a stint with Raytheon Polar Services. The company needs IT Supervisors to work at the famous McMurdo Antarctic Research Station. You would oversee an IT department behind McMurdo's ongoing research. As the IT guy to a science lab working on biological, earth science, and atmospheric projects, you supervise a group that supports a specific area of operation in the IT division. You determine staffing and resource allocation and ensure that tech projects are delivered on time. Technical certification in the requisite fields will be required, as will good managerial chops. And a tolerance for penguins might be in order. The wildlife surrounding the station includes King, Emperor, and Adelie Penguins, as well as Weddell Seals.

[http://www.rayjobs.com/index.cfm?NavID=119&ANTARCTICA\\_JOBS](http://www.rayjobs.com/index.cfm?NavID=119&ANTARCTICA_JOBS)

# Raw Numbers

7%

Percent of Americans who actively use Twitter  
Edison research

90 trillion

Number of emails sent on the Internet in 2009  
pingdom

23%

Percent of U.S. adults who have gone online to see how federal stimulus money is being spent  
Pew Internet & American Life Project

15.87%

Share of North American PCs running the Windows 7 operating system as of May 2010  
StatCounter

1 trillion

Number of display ads served to U.S. Internet users in Q1 2010  
comScore

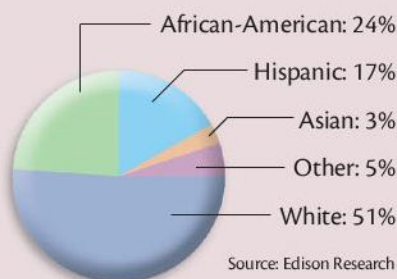
## Employers Take To The Web For New Hires

As the job market rebounds in slow motion this year, employers now consider the Web the go-to place for prospects. According to a Monster.com "2010 State of the College Workplace" report, 91% of companies now post jobs on the Web, while only 19% now use the newspaper. But job hunters shouldn't restrict themselves to the usual suspects among jobs sites, because corporate America has also gotten hip to social networking. The study found that 26% of companies now rely on sites such as Twitter and Facebook to find candidates. Which should serve as yet another reminder to watch your step on social networks—your next boss may be watching.



## Twitter Is A Multi-Cultural Nation

African-American users are substantially overrepresented among Twitter users compared to their share of the general population. In fact, African-Americans comprise just 13.5% of the U.S. Internet population but 24% of Twitter Nation.



## Samsung, Motorola & LG In A Dead Mobile Heat

In the first quarter of 2010, Motorola, LG, and Samsung had almost exactly the same share of U.S. mobile subscribers.



Manufacturer	December 2009	March 2010	Point Change
Samsung	21.2%	21.9%	0.7
Motorola	23.5%	21.9%	-1.6
LG	21.9%	21.8%	-.1
RIM	7.0%	8.3%	1.3
Nokia	9.2%	8.3%	-0.9

Source: comScore



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# DREAM HARDWARE

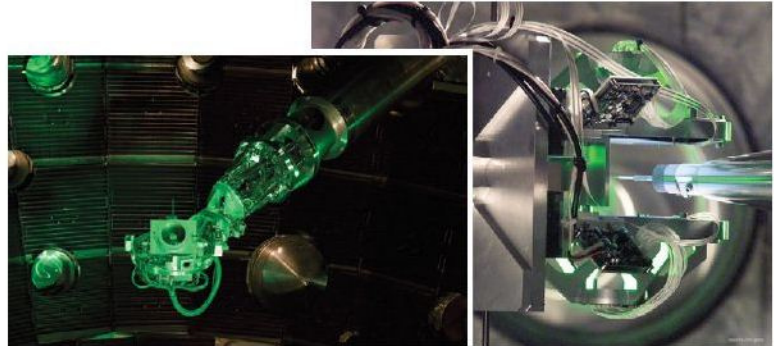
**P**aper airplanes. Lego Mindstorms. Laser pointers. Never, ever let your mom tell you that screwing around with these is a waste of time.

by Marty Sems

## National Ignition Facility

What do you need to jumpstart nuclear fusion? Frickin' "lasers," that's what. The NIF ([lasers.llnl.gov](http://lasers.llnl.gov)) in Livermore, Calif., is a trillion-watt blaster all set to blow a few hapless hydrogen atoms to kingdom come. National Nuclear Security Administration researchers, many of whom spend their workday making juvenile sound effects, hope that bringing 192 UV laser beams to bear on a pellet of hydrogen will slam its nuclei with enough heat and pressure to make them fuse together. Their much-bootlegged copy of "Here Comes Science" assures them that this elusive fusion process is what makes the sun shine, which sounded pretty cool when they were thinking this thing up one day after school. Another payoff is the expected release of more energy

than they're putting into it—and that includes the "Real Genius" DVD continuously playing in the cafeteria. ▲



## Husqvarna DXR 140

After lasers, our thoughts inexorably slide toward robots, and the more destructive, the better. Hence, this new demolition bot from a company whose name only the late hyperelocutionary Paul Harvey could pronounce. Husqvarna's DXR 140 (\$78,282; [www.husqvarnacp.com](http://www.husqvarnacp.com)) seems to be straight out of cyberpunk writer William Gibson's anxiety closet. With a telescoping reach of 12 feet and the ability to walk up stairs, this Bluetooth-controlled menace can be outfitted with a variety of tools to take down a building. Terrifying as it is, the DXR 140 is actually the baby of a family of rubble-renderers. Its big brother, the DXR 310, weighs in at more than two tons. ▲



## Falcon HTV-2

Internet progenitor and general skunk works DARPA (Defense Advanced Research Projects Agency; [www.darpa.mil](http://www.darpa.mil)) isn't about to cede all the fun to the laser fusion boys. They've turned their Scouting experiences with little wooden CO<sub>2</sub>-powered dragsters into a paying gig. With a little help from an Orbital Sciences Minotaur IV Lite rocket doing Mach 20 (no, that isn't a typo), DARPA's unpowered, unmanned Falcon HTV-2 can carve it up at the edge of space. The acronym stands for Hypersonic Technology Vehicle. In short, the HTV-2 is an extra-atmospheric 13,000mph glider made by Lockheed Martin. With it, the Agency is trying out materials, controls, communication, and maneuvers under extreme speed and re-entry conditions. The stated goal is a rapid response vehicle for national security stuff going down anywhere on the globe. When it absolutely, positively has to be there in a few minutes . . . ▲





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# Into The Lion's Den

## Leo Roars Onto The Scene

The chipset component of AMD's Leo platform is the foundation for the latest AM3 processors, but for enthusiasts who demand a lot of their systems, there's no substitute for the 890FX. AMD's latest high-end chipset includes all the standout features of the 800 series, including full socket compatibility for AM3 and AM2+ processors, HyperTransport 3.0 interconnects for up to 5,200MTps throughput, DDR3 memory, and PCI-E 2.0. The 890/SB850-based boards diverge from the more barebones 880G/SB710- and 870/SB710-based boards in their support for ATI CrossFireX, native 6Gbps SATA, FIS-based (Frame Information Structure) switching, and integrated Gigabit Ethernet. The 890FX shines above the rest for its generally superior ability to handle amped voltages and overclocked frequencies, and support for nearly double the PCI-E lanes (42 lanes vs. 26 lanes) and AMD Black Edition Memory Profiles.

The 890FX, like previous boards based on FX chipsets, is built for discrete graphics, and plenty of it. The 890FX-based boards we tested feature no fewer than three and up to six PCI-E 2.0 x16 slots for quad-CrossFireX gaming. And although USB 3.0 has yet to make it into AMD's chipset (to be fair, Intel's ICH10R is in the same SuperSpeed-less boat), all but one of the boards we tested comes with at least a couple of the next-gen ports by way of third-party controllers. Pair ATI's Radeon HD 5000 series graphics with one of AMD's latest Phenom II hexa-core processors, and you have one screaming rig. Read on to see which motherboard is the perfect fit for your next build.

### ASRock 890FX Deluxe3

ASRock generally makes value-oriented parts to compete with OEM suppliers

such as Foxconn and ECS while its parent company, Asus, mops up in the high-margin enthusiast sector. But as unlocked processors have grown cheaper, so, too, have the overclockable motherboards that support them. This is the niche ASRock is aiming to fill with its 890FX Deluxe3.

For one of the more affordable boards in our roundup, the 890FX Deluxe3 has

get full bandwidth, but a third graphics card will be limited to an x4 speed. Other standouts include a POST display; physical power and reset buttons; and onboard support for one 6Gbps eSATA device, eight 6Gbps SATA devices, and four USB 3.0 ports, which is twice as many as the other boards we tested. ASRock's BIOS-based EZ OC feature also lets enthusiasts tweak frequencies and voltages with ease.



### 890FX Deluxe3

\$179.99

ASRock

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



an impressive number of features, including the latest AMD enthusiast board must-have, UCC (Unlock CPU Core). This feature lets you unlock the disabled core(s) of certain AMD dual-, tri-, and quad-core processors, mindless of the stability issues that may ensue. The board uses what ASRock calls DuraCaps, which are high-quality Japanese capacitors. A passive heatsink adorns the 890FX chip, but the VRM gets a high-profile, actively cooled heatsink, which butted up against our Noctua NH-D12 CPU cooler. We were still able to secure the cooler, but this may not be true for all vertically oriented CPU coolers.

You can run this with two ATI Radeon HD graphics cards in CrossFireX and still

For its relatively modest price, the 890FX Deluxe3 performs well and offers plenty of features, especially for storage-heavy systems.

### Asus Crosshair IV Formula

Asus is a juggernaut in the motherboard business, and gamers and enthusiasts know that when the company brings a board to market, it's going to be unique in a number of ways. That's certainly true of the Crosshair IV Formula, the follow-up to the 790FX-based Crosshair III Formula.

As you'd expect, this board has one of the more thorough BIOS overclocking menus of the bunch, which lets beginners



and experts overclock to their abilities. Expert OCers will appreciate a slew of extras the board affords, including marked multitester detection points, 8+2-phase VRM, external monitoring and tweaking via ROG Connect, voltage status lights for the major chips, and the Turbo Key II physical overclocking button. Other physical buttons you'll find here include the core unlocker, power, and reset.

The black PCB and red and black components along with the passive heatsinks for the chipset and VRM present an attractive aesthetic, and we like that there're a lot of graphics options available on this board (two cards at x16 or three at x16/x8/x8). The SupremeFX X-Fi 8-channel audio chip is also a step up from most integrated options, supporting EAX Advanced HD 4.0 and Blu-ray audio layer content protection, so you can fully appreciate the best sound Blu-ray movies have to offer. If you're still holding onto a legacy optical or hard drive, then Asus is here to tell you to upgrade; there's no IDE channel on this board.

The Crosshair IV Formula is one of the pricier boards we tested, but extreme overclockers will appreciate the plethora of extras and options. A solid performance and a flexible layout make this a fine choice for the 890FX adopter.

## Biostar TA890FXE

Biostar was the brain behind the board we used in the July 2009 issue of *CPU* in which we successfully unlocked the tri-core Phenom II X3 710, the TA790GX 128M. (See "Tri-Core Transformer" on page 40.) Although there were quirks with that board (Master and Slave x16 slots that require a shadow card when running one graphics card), we were impressed with its overall stability and performance. This generation, Biostar's back with a much more conventional layout, AMD CPU unlocking, and several extras enthusiasts will dig.

Biostar's TA890FXE offers some nice troubleshooting features, including a POST display that also shows temperatures in hexadecimal format. (Consult the manual for translation.) The BIOS also offers a range of manual and automatic overclocking options in the form of the

AOS (Automatic Overclock System), which lets you run successively more aggressive overclocks using V6, V8, and V12 presets.

The TA890FXE takes a passive heat-piped route to chipset and VRM cooling. Biostar's Tweak Tech technology consists of solid-state capacitors on the CPU and memory, which provides added stability under high temperatures and heavy loads. There are four PCI-E x16 slots here, two of which can support dual-slot graphics cards at full speed, but like the ASRock board, a third card only runs at an x4 speed. Other features we like include onboard power and reset buttons and power phase indicator LEDs. Things we didn't like as much include just five 6Gbps SATA ports (the eSATA port is just 3Gbps), and nary a USB 3.0 port to speak of.

Although not as flexible in regard to future upgrades as others we tested, the TA890FXE should satisfy cost-conscious consumers looking for a good-performing, no-nonsense platform for their next system.

## Gigabyte 890FXA-UD5

In many areas, Gigabyte has been setting the bar for enthusiast features on motherboards, and the first 890FX-based

## Crosshair IV Formula

\$229

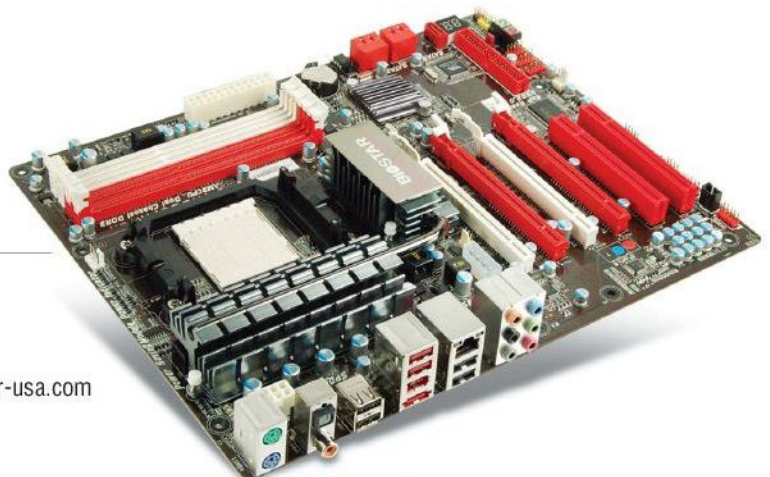
Asus

usa.asus.com



board from Gigabyte we got our hands on carries on the tradition. This board sports Gigabyte's Ultra Durable 3 design, which combines a 2-ounce copper layer in the PBC to conduct heat away from hot spots and utilizes Japanese solid-state capacitors, ferrite core chokes, and low on-state resistance MOSFETs to maintain temperatures, stability, and reliability. Speaking of stability, Gigabyte equipped this board with an 8+2-phase VRM.

Overclockers will appreciate the granular BIOS controls here that let you take manual control over voltages and frequencies, or you can use EasyTune6 to let the system do the overclocking for you. Like others, this board supports the ability to unlock the disabled core(s) of certain AMD CPUs using a feature Gigabyte calls Auto Unlock.



## TA890FXE

\$149

Biostar

www.biostar-usa.com







**890FXA-UD5**  
\$189.99  
Gigabyte  
www.gigabyte.us  
●●●●●



**GA-890FXA-UD7**  
\$245.99  
Gigabyte  
www.gigabyte.us  
●●●●●

The GA-890FXA-UD5 includes four PCI-E x16 slots, but only two graphics cards will run at full x16 speeds while three graphics cards will run at x16/x8/x8 speeds. Other onboard features we like include two Gigabit Ethernet ports, two eSATA/USB combo ports, two USB 3.0 ports, and dual BIOS chips for added convenience. For a motherboard so loaded with new features, we were kind of surprised that Gigabyte made room for a floppy connector.

This board performed well in our tests and is priced within a reasonable range for an enthusiast motherboard, especially considering the number of features that come with it.

### Gigabyte 890FXA-UD7

Gigabyte apparently likes the 890FX enough to introduce two motherboards based on it. But if the UD5 version seeks to strike a balance between features and price, the UD7 version is all about throwing everything but the kitchen sink into the mix, price be darned. This board is the only one of the bunch that uses the XL-ATX form factor, which is 12.8 x 9.6 inches (HxW). The 890FXA-UD7 doesn't use the extra space for more components, though; it used the top expansion slot for a very large passive heatsink module that you can use in place of the

removable chipset waterblock that comes preinstalled on the board.

Overclockers who like Gigabyte's range of BIOS-based expert and novice overclocking options won't be disappointed in the 890FXA-UD7. Manual controls are here for the old-school overclockers, but Gigabyte also includes its EasyTune6 for those fresh to the scene. This board also features the same 8+2-phase VRM that characterizes the UD5. Other features that make an appearance here include Ultra Durable 3, DualBIOS, SATA 6Gbps, USB 3.0, dual Gigabit LAN ports, and a pair of eSATA/USB combo ports.

For the most part, aside from the unique chipset heatsink, the UD7's layout is very similar to the UD5 (even down to the floppy connector). But the devil's in the details. This board features a few elements left off the UD5, such as a POST display and six PCI-E x16 slots. Two graphics cards will run at x16; three at x16/x8/x8; and four graphics cards will each run at x8. Of the boards we tested, this one offers some of the best expansion flexibility.

If you like what this motherboard could bring to your system, make sure to visit [bit.ly/c5CSa2](http://bit.ly/c5CSa2) to determine which cases have been certified to support such a large motherboard. You won't get much

performance-wise if you spring for the UD7 instead of the UD5, but the extra features are all about making life easier for enthusiasts.

### MSI 890FXA-GD70

In the November 2009 issue of CPU, MSI's 790FX-GD70 really impressed us (see "AM3 Motherboard Bonanza" on page 20), and for its 890FX entrant, MSI appears to have taken the "if it ain't broke, don't fix it" approach. We approve.

MSI makes stability and durability the priority for this board, using the same military-class components used on NASA satellites. MSI touts its cool-running ferrite core Icy Chokes and solid-state capacitors that are rated for a 10-year lifespan under full load. MSI's DrMOS also outperforms standard MOSFETs for more stable overclocking, lower temperatures, and improved power efficiency. The durable platform also makes this an overclocking-friendly board, and MSI's Auto OC Genie and Core unlocking feature can deliver some serious performance improvements without much fuss. If you're more of a manual overclocker, there are plenty of options in the BIOS, too.

This board supports up to four-way CrossFireX, and the x16 slot layout is such that you could install up to three

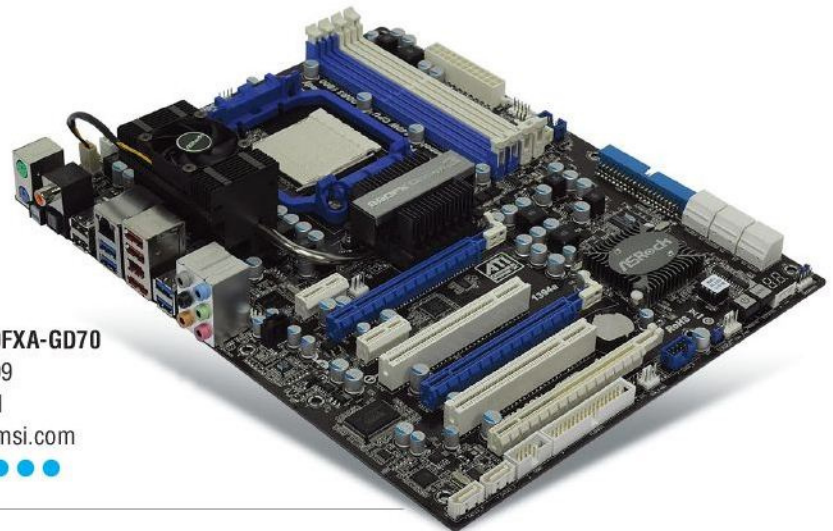


dual-slot graphics cards and still leave an open PCI-E slot. One or two graphics cards installed will operate at x16; three will run at x16/x8/x8; and four will run at x8 each. Other onboard features we liked include blue APS (Active Phase Switching) LEDs on the CPU, memory, and southbridge VRM; POST display; a physical OC Dial potentiometer; and onboard touch-sensitive power and reset switches. Like most others here, MSI includes a dose of USB 3.0 (two ports) and 6Gbps SATA (six ports).

The MSI 890FXA-GD70 performs well against some stiff competition and provides lots of goodies for novice and expert users alike. And it strikes an excellent balance between features and price.

### What're You Waiting For?

If you skipped AMD's 700 series chipset when it launched because DDR3 was disproportionately expensive, we wouldn't blame you. But AMD's 890FX/SB850 is



#### 890FXA-GD70

\$199

MSI

us.msi.com



the second-generation chipset to support AM3 processors and DDR3 memory for running a hexa-core Thuban-based Phenom II and loads of cheap and fast memory. Couple that with universal support for 6Gbps SATA and plenty of models that support USB 3.0 and you can't help but admit that an 890FX-based

system easily outclasses your "current" processor, memory, peripherals, and storage. Yeah, it's time to upgrade, and we're happy to report that any of these motherboards makes a good foundation for your next benchmark buster. ▲

by Andrew Leibman

## Our Set Of 890FX Specs

	Asrock 890FX Deluxe3	Asus Crosshair IV Formula	Biostar TA890FXE	Gigabyte GA-890FXA-UD5	Gigabyte GA-890FXA-UD7	MSI 890FXA-GD70
Chipset	AMD 890FX/SB850	AMD 890FX/SB850	AMD 890FX/SB850	AMD 890FX/SB850	AMD 890FX/SB850	AMD 890FX/SB850
Form Factor	ATX	ATX	ATX	ATX	XL-ATX	ATX
PEG Slots	2 PCI-E x16	2 PCI-E x16; 1 PCI-E x8	2 PCI-E x16	2 PCI-E x16; 1 PCI-E x8	2 PCI-E x16; 2 PCI-E x8	2 PCI-E x16; 2 PCI-E x8
PCI-E x1/x4 Slots	2 PCI-E x1; 1 PCI-E x4	1 PCI-E x4	1 PCI-E x1; 1 PCI-E x4	2 PCI-E x1; 1 PCI-E x4	2 PCI-E x4	1 PCI-E x1; 1 PCI-E x4
PCI Slots	2	2	2	1	1	1
SATA Ports	9 (8 SATA 6Gbps; 1 eSATA 6Gbps)	8 (6 SATA 6Gbps; 1 SATA 3Gbps; 1 eSATA 3Gbps)	6 (5 SATA 6Gbps; 1 eSATA 3Gbps)	10 (6 SATA 6Gbps; 4 SATA 3Gbps; 2 eSATA 3Gbps /USB Combo)	10 (6 SATA 6Gbps; 4 SATA 3Gbps; 2 eSATA 3Gbps /USB Combo)	8 (6 SATA 6Gbps; 1 SATA 3Gbps; 1 eSATA 3Gbps/USB Combo)
USB 3.0 Ports	4	2	N/A	2	2	2
IDE Channels	1	N/A	1	1	1	1
RAID Support	0, 1, 5, 0+1	0, 1, 5, 10	0, 1, 5, 10	0, 1, 5, 10	0, 1, 5, 10	0, 1, 10, 5
Multi-GPU Support	CrossFireX	CrossFireX	CrossFireX	CrossFireX	CrossFireX	CrossFireX
Chipset/VRM Cooling	Passive/Active	Passive/Passive	Passive/Passive	Passive/Passive	Liquid (optional)/Passive	Passive/Passive
Price	\$179.99	\$229	\$149	\$189.99	\$245.99	\$199
CPU's	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●

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



# 890FX In Full Effect

To show you what AMD's 890FX-based motherboards are capable of, we equipped each one with the 3.2GHz AMD Phenom II X6 1090T Black Edition processor, 4GB of Crucial DDR3-1600 memory, an ATI Radeon HD 5870, and juiced them up with a PC Power & Cooling Turbo-Cool 1KW SR. We installed Windows 7 Enterprise on a Patriot Zephyr 128GB SSD, and used the latest drivers available online as we went to press for each motherboard and the graphics card.

	ASRock M3A890FX Deluxe	Asus Crosshair IV Formula	Biostar TA890FXE	Gigabyte GA-890FXA- UD5	Gigabyte GA-890FXA- UD7	MSI 890FXA- GD70
<b>3DMark Vantage 1.0.3.1</b>						
Overall	P16539	P16817	P16411	P16656	P16691	P16350
GPU Score	16591	16979	16459	16762	16788	16361
GPU1	50.74fps	51.96fps	50.7fps	51.45fps	51.5fps	50.32fps
GPU2	46.38fps	47.44fps	45.64fps	46.67fps	46.77fps	45.45fps
CPU Score	16384	16349	16269	16348	16407	16317
CPU1 (Plans/s)	2111.75	2114.4	2106.54	2112.79	2111.92	2106.95
CPU2 (Steps/s)	25.62	25.39	25.2	25.42	25.73	25.42
<b>PCMark Vantage Pro 1.0.2</b>						
Overall	11170	11846	11973	12249	10281	11523
Memories	7920	8148	8154	6906	8541	8671
TV And Movies	5073	5377	5494	5272	5705	5526
Gaming	13291	13401	13302	12674	11869	13383
Music	8324	13564	10567	6129	8910	9525
Communications	8225	8921	8755	7647	9001	8436
Productivity	13106	13692	13820	13210	13374	13566
HDD	17501	18228	17243	15370	19037	18725
<b>Cinebench 11.5</b>						
CPU Score	5.64pts	5.69pts	5.63pts	5.61pts	5.68pts	5.6pts
POV-Ray 3.7 Beta (pixels/s)	4563.87	4597.4	4528.94	4572.47	4597.16	4559.18
<b>SiSoftware Sandra Lite 2010.SP1d</b>						
<b>Processor Arithmetic</b>						
Dhrystone (GIPS)	66.67	67.8	68	66.23	67.60	65.88
Whetstone iSSE3 (GFLOPS)	55.16	55.5	55.32	55.5	55.63	55
<b>Processor Multi-Media</b>						
Integer x16 aSSE2 (Mpixels/s)	222.46	222.87	221.8	222.82	223.00	222
Floating Point x8 iSSE2 (Mpixels/s)	136.90	136.78	135.33	137	136.62	136.78
Double x4 iSSE2 (Mpixels/s)	74.72	74.8	74.52	74.7	74.75	74.39
<b>Memory Bandwidth</b>						
Integer Buffered iSSE2 (GBps)	12.62	13.38	13.33	13.3	13.35	13.3
Floating Point Buffered iSSE2 (GBps)	12.63	13.33	13.34	13.3	13.36	13.3
Dr. DivX 2.0.1b7 (min:sec)	4:14	4:09	4:21	4:14	4:10	4:21
WinRAR 3.93 (min:sec)	1:34	1:27	1:42	1:45	1:37	1:33
<b>Games</b>						
Dirt 2 (8XAA)	51	52.4	51.4	51.5	51	46
S.T.A.L.K.E.R.: Call Of Pripyat (4XAA)	14.9	15.7	16.05	15	16.2	14.6

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





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# Western Digital VelociRaptor 600GB

Even hard drives are going multicore these days. WD's latest 10,000rpm enthusiast/low-end enterprise drive has a dual-core processor onboard. Put that in your pipe and smoke it, Moore's Law.

The 600GB VelociRaptor is moderately swifter than the last gen's 300GB, according to our testing. Its sequential advantage is approximately 20 to 22% in reads and 3 to 8% in writes. The new drive barely warmed to the touch throughout our thrashing.

Also, its seek noise was no more objectionable than previous VelociRaptors' as it eked out 0.2ms faster random accesses.

But does the 10K VelociRaptor still have a niche in the age of NAND? Its random access advantage over 7,200rpm and slower hard drives used to be more impressive back before sub-0.1ms SSDs changed the game. And as for sequential read/write



**VelociRaptor 600GB**  
\$329  
Western Digital  
www.wdc.com  
●●●●

speeds, lesser drives tend to catch up in a generation or two thanks to advances in areal density.

On the other hand, pricing still seems to favor the Raptor when you factor in capacity. The WD6000HLHX costs about \$0.47 per GB (\$279.99 Newegg price). Compare that to OCZ's 100GB Vertex 2 SSD, at \$4.19 per GB (\$419). In other words, this drive's dollar premium corresponds nicely to its relative benefits.

The new VelociRaptor further redeems itself with its enterprise-class reliability technology—it can theoretically withstand about 12 times more power cycles now. Really, if you need to add a mass storage unit to a rig with an SSD boot drive, especially for video editing, a VelociRaptor (or two) should be on your short list. ▲

by Marty Sems

**Specs:** 6Gbps SATA; 32MB cache; 30 to 37dBA noise rating; 300G shock tolerance (non-operating, 2ms); 0.7 to 6.2W power consumption; 5-year warranty

## Benchmark Numbers

	WD VelociRaptor 600GB
Spindle speed (rpm)	10,000
Interface	SATA 6Gbps
<b>Iometer</b>	
4K Random Writes (I/Ops)	293
Workstation (I/Ops)	186
<b>HD Tach RW</b>	
Read, avg/max (MBps)	130/158
Write, avg/max (MBps)	110/140
Random access (ms)	6.9
Burst read (MBps)	295.6
<b>PCMark Vantage</b>	
HDD score (points)	7589
Defender (MBps)	38
Gaming (MBps)	22
Photo Gallery (MBps)	80
Vista startup (MBps)	27
Movie Maker edit (MBps)	68
Win Media Ctr (MBps)	173
WMP music add (MBps)	16
App loading (MBps)	7

**Test specs:** CPU: Phenom II X6 1090T; RAM: 4GB DDR3 (1,333MHz); Motherboard: ASRock True333 890FX; OS: Windows 7 Enterprise 64-bit

## Intel DP55WG

One of the biggest things going for the Intel DP55WG (Warrensburg) motherboard is the chipset. The P55 is Intel's single-chip mainstream platform that combines the I/O controller and the clock buffer and connects to Intel's increasingly capable Core i7-800 and Core i5-700 series processors by way of a 2Gbps DMI (Desktop Management Interface) interconnect.

In a bid to keep this board's pricing as middle-of-the-road as possible, Intel left

off a lot of the goodies that currently feature heavily on Intel's partners' offerings, such as USB 3.0 and 6Gbps SATA. Other extras that failed to make the cut include the 6-phase VRM (there's a 4-phase VRM here), a Bluetooth module, and any eSATA ports, which all appear on Intel's Kingsberg motherboard, the DP55KG. The PCI-E subsystem supports ATI CrossFireX and Nvidia SLI technologies, but both PCI-E x16 slots will run at x8 speeds in a dual-graphics setup.

The board does feature enthusiast-friendly add-ons including a POST code display and Intel's Back-to-BIOS switch.

The DP55WG won't blow you away in the performance, value, or features departments, but it is a reliable platform for Intel's latest chips. ▲

by Andrew Leibman

For bonus performance data, subscribers can go to [www.cpubmag.com/cpujul10/dp55wg](http://www.cpubmag.com/cpujul10/dp55wg).



**DP55WG**  
\$140  
Intel  
www.intel.com  
●●●●

**Specs:** Chipset: Intel P55 Express; Socket LGA1156; Max memory: 16GB DDR3-1600 (DDR3-1333 default); Ports: 1 Gigabit Ethernet, 6 SATA 3Gbps (RAID 0, 1, 0+1, 10, 5), 12 USB 2.0 (8 external, 4 internal), FireWire; Slots: 1 PCI-E x16, 2 PCI-E x1, 1 PCI-E x8, 1 PCI-E x4, 2 PCI; Back-To-BIOS button; S/PDIF I/O, 8-channel Audio

**Test system specs:** CPU: Intel Core i7-875K; Memory: Crucial DDR3-1600; Graphics: ATI Radeon HD 5870; Storage: 128GB Kingston SSDNow V+ Series; Hyper-Threading enabled; Turbo Boost enabled

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



# Evga GeForce GTX 470 SuperClocked

With Fermi's launch still looming large in our rearview mirror, it's about time we took a look at the GF100's little brother, the GeForce GTX 470.

## Under The Hood

Evga's SuperClocked GTX 470 features a modest overclock compared to Nvidia's factory settings—a 625MHz core clock (from 607MHz in the stock GTX 470), a 1,250MHz shader clock (from 1,215MHz), and an 850MHz memory clock (from 837MHz). Physically, there's nothing else worth noting; the board layout and heat-sink fan are both based on Nvidia's reference design, but Evga's extras do make this card stand out compared to other reference cards (more on that later).

The GeForce GTX 470 features 14 of the GF100's streaming multiprocessors active, which gives the card 448 CUDA cores, 56 texture units, and 40 ROPs. Compared to the flagship Fermi, the stock GTX 470 has a narrower memory bus by 64 bits (320-bit) for a total memory bandwidth of up to 133.9GBps. The card gets power via two 6-pin PCI-E connectors and sports a 215-watt TDP, and Evga recommends you pair it with a 550-watt power supply with at least one 38-amp 12V rail. The backplane features two DVI ports and a mini HDMI port. Evga ships the card with a mini HDMI-to-HDMI adapter, DVI-to-VGA adapter, two PCI-E power adapters, and a software and driver disc.

## DIY OC & More

Evga includes its Precision overclocking software and OC Scanner benchmarking

utility, which combine to let you tweak this card's performance for even higher frame rates and faster CUDA crunching. We managed to push the core clock to 683MHz and the shader clock to 1,366MHz with very little fuss. That boosted our high-resolution Left 4 Dead, Far Cry 2, Dirt 2, and Call Of Pripayat scores to 61.24fps, 55.5fps, 37.2fps, and 17.2fps, respectively, which amounts to gains of 5%, 6%, 4%, and 8%.

Another bonus Evga throws in is the 90-Day Step-Up program, which lets you upgrade your GTX 470 to a GTX 480 within 90 days of purchase by just paying the difference. Evga includes its limited lifetime warranty for some added peace of mind.

## Final Word

If you read last month's review of the GeForce GTX 480 (see page 24), then you know that we weren't exactly bowled over by Fermi. Having said that, we believe the GTX 470 is a much better value. With this card, you get a cooler, quieter Fermi that plays modern games like nobody's business. It trades blows with the Radeon HD 5870, which costs the same . . . in theory. Most 5870s for sale as we went to

press were selling for more than \$400, so if you can find Evga's model for the MSRP and overclock it yourself, you can come out ahead of ATT's flagship. Now that's a pretty sweet deal. ▲

by Andrew Leibman

Benchmark Numbers	Windows 7		
	Radeon HD 5870	GeForce GTX 480	Evga GeForce GTX 470 SuperClocked
Price	\$379	\$499	\$379
Core Clock	850MHz	700MHz	625MHz
Memory Clock	1,200MHz	924MHz	850MHz
Memory	1GB GDDR5	1.5GB GDDR5	1.28GB GDDR5
3DMark Vantage Performance (1,280 x 1,024)			
Overall	19896	19434	16218
GPU Score	17792	17315	14010
GPU1 (fps)	55.46	54.86	45.34
GPU2 (fps)	48.66	46.44	36.59
CPU Score	30829	30705	30759
CPU1 (Plans/s)	4312.58	4317.66	4317.82
CPU2 (Steps/s)	39.69	38.97	39.23
3DMark Vantage Extreme (1,920 x 1,200)			
Overall	9039	9219	7431
GPU Score	8715	8891	7145
GPU1 (fps)	29.17	28.99	23.4
GPU2 (fps)	21.76	23	18.38
CPU Score	30832	30786	30747
CPU1 (Plans/s)	4330.27	4319.22	4317.87
CPU2 (Steps/s)	39.27	39.32	39.17
Games   1,280 x 1,024			
Left 4 Dead (8XAA, 16XAF)	176.33	177.29	144.25
Far Cry 2 (4XAA)	89.07	129.89	108.88
Dirt 2 (8XAA)	86.90	110.7	92.3
S.T.A.L.K.E.R.: CoP (4XAA)	44.50	47.1	38.4
1,920 x 1,200			
Left 4 Dead (8XAA, 16XAF)	121.81	116.6	93.19
Far Cry 2 (4XAA)	67.76	95.30	77.6
Dirt 2 (8XAA)	68.50	78.8	64.5
S.T.A.L.K.E.R.: CoP (4XAA)	27.70	31.1	25.2
2,560 x 1,600			
Left 4 Dead (8XAA, 16XAF)	80.09	73.22	58.24
Far Cry 2 (4XAA)	48.00	64.65	52.18
Dirt 2 (8XAA)	49.80	51.4	30.3
S.T.A.L.K.E.R.: CoP (4XAA)	15.60	20.4	16
Driver: Catalyst 10.3 Beta Driver: ForceWare 197.41			



**GeForce GTX 470 SuperClocked**  
\$379.99  
Evga  
www.evga.com



**Specs:** GPU: GF100; Core clock: 625MHz; Memory: 320-bit bus, 1.28GB GDDR5 (850MHz); 448 CUDA cores; 56 texture units; 40 ROPs  
**Test system specs:** CPU: 3.33GHz Intel Core i7-980X Extreme Edition; Motherboard: Intel DX58SO; RAM: 6GB Crucial DDR3; Hard drive: 1TB Western Digital Caviar Black; Topower 1,100W PSU

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



# Intel Core i5-655K & Core i7-875K



## Core i5-655K

\$216

Intel

www.intel.com



## Core i7-875K

\$342

Intel

www.intel.com



The Intel Core i5-655K and Core i7-875K processors don't share too many features at first glance, aside from the "K" suffix. But Intel is doing more with these two processors than filling pricing gaps and refresh-

ing its lineup. Read on to see what makes the latest processors from Intel worth checking out.

The Core i5-655K is a high-clocked, lower-power, 32nm Clarkdale chip based on the Westmere architecture, which utilizes Intel's second-generation Hi-K+ metal gate technology. It features an 81mm<sup>2</sup> processor die as well as a 45nm, 114mm<sup>2</sup> graphics die on the same package. The 3.2GHz dual-core chip features 4MB of Intel Smart Cache and supports Hyper-Threading, Turbo Boost (up to 3.46GHz), and two channels of DDR3-1333 memory.

The Core i7-875K is a lower-clocked, quad-core, 45nm Lynnfield chip based on the Nehalem architecture. The much larger 296mm<sup>2</sup> die includes the memory, DMI, and PCI-E controllers, and you'll need discrete graphics to run this in your system. The memory controller handles two channels of DDR3-1333 memory, and the Core i7-875K supports Hyper-Threading for processing up to eight threads simultaneously, a rather hefty Turbo Boost (up to 3.6GHz), and 8MB of Smart Cache.

In the benchmarks, these two chips perform very similarly in applications that don't scale well beyond two cores or four threads, such as the games, Dr. DivX, and 3DMark's gaming tests. In tests that isolate the CPU, such as Cinebench, POV-Ray, WinRAR, and 3DMark's CPU test, the Core i7 really justifies its considerably higher price tag.

The feature these chips share, the one that makes them stand apart from the non-Extreme Edition processors Intel has launched to date, and the one that should pique enthusiast interest is the unlocked core, memory, and power settings, which let you independently adjust them all to your heart's content.

Although nothing to write home about architecturally, Intel is making a play for AMD's favorite audience, the cost-conscious overclocker crowd. Enthusiasts, meet Intel's latest take on fast and affordable. ▲

by Andrew Leibman

## Benchmark Numbers

	Core i5-655K	Core i7-875K
<b>3DMark Vantage 1.0.3.1</b>		
Overall	P11972	P13555
GPU Score	12721	12482
GPU1 (fps)	39.38	38.48
GPU2 (fps)	35.07	34.58
CPU Score	10175	18269
CPU1 (Plans/s)	1395.4	2546.19
CPU2 (Steps/s)	13.8	23.76
<b>PCMark Vantage Pro 1.0.2</b>		
Overall	13132	12798
Memories	8428	8602
TV And Movies	3999	4890
Gaming	14818	17158
Music	13634	14366
Communications	13814	9154
Productivity	15722	16603
HDD	18691	18154
<b>Cinebench 11.5</b>		
CPU Score	2.87pts	4.97pts
POV-Ray 3.7 Beta (pixels/s)	2292.31	3832.46
<b>SiSoftware Sandra Lite 2010.SP1d</b>		
<b>Processor Arithmetic</b>		
Dhrystone iSSE4.2 (GIPS)	51.00	86.38
Whetstone iSSE3 (GFLOPS)	35.88	56.00
<b>Processor Multi-Media</b>		
Integer x16 iSSE4.1 (Mpixels/s)	92.80	159.53
Floating Point x8 iSSE2 (Mpixels/s)	70.00	118.60
Double x4 iSSE2 (Mpixels/s)	37.87	64.38
<b>Memory Bandwidth</b>		
Integer Buffered iSSE2 (GBps)	12.00	16.70
Floating Point Buffered iSSE2 (GBps)	12.00	16.70
DR. DivX 2.0.1 (min:sec)	3:39	3:47
WinRAR 3.93 (min:sec)	1:30	1:05
<b>Games</b>		
Dirt 2 (8XAA)	32	32
S.T.A.L.K.E.R.: Call Of Pripyat (4XAA)	10.97	10.5

**Specs (Core i5-655K):** Socket LGA1156; Clock speed: 3.2GHz; 2/4 Cores/Threads; 8MB L3 Cache; Integrated Intel HD Graphics (45nm); DDR3-1333; 32nm process; 73W max TDP

**Specs (Core i7-875K):** Socket LGA1156; Clock speed: 2.93GHz; 4/8 Cores/Threads; 4MB L3 Cache; DDR3-1333; 45nm process; 95W max TDP

**Test system specs:** Motherboard: Intel DP55WG; RAM: Crucial DDR3-1600; Graphics: ATI Radeon HD 5830; Storage: 128GB Kingston SSDNow V+ Series; Hyper-Threading enabled; Turbo Boost enabled





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## Gamer Paladin D865

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|--|--------|
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| • Intel® Core™ i7-940 Processor                  | \$1414 |
| • Intel® Core™ i7-930 Processor                  | \$1209 |



**\$1209**

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- ATI® Radeon™ HD 5770 1GB Video Card - DirectX 11 Support
- NZXT® Guardian 921 Gaming Case + 700W Power Supply
- Kingston® 30GB SSD (Boot) + 1TB HDD (Data)
- Liquid CPU Cooling System with 120mm Radiator
- High Definition Surround 3D Premium Sound



Components included with system

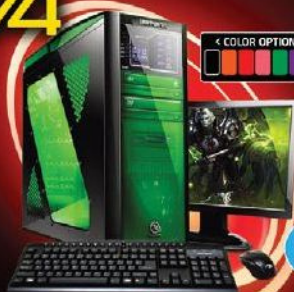
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- Asus® P6T SE Intel® X58 Chipset Motherboard
- NVIDIA® GeForce™ GTX470 1280MB Video Card - DirectX 11 Support
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## Zotac H55-ITX WiFi

Few motherboard manufacturers have embraced the Mini-ITX form factor as decisively as Zotac. The company has a broad array of Mini-ITX motherboards in its current lineup, but the latest addition to the lineup, however, the H55-ITX WiFi, may just be the best yet.

As its name implies, the Zotac H55-ITX WiFi is built around Intel's H55 chipset for Socket 1156 Core i3 and i5 processors. The Mini-ITX board supports dual-channel memory configuration at speeds up to DDR3-1333, and there's a full-sized PCI-E x16 expansion slot for users who want to equip an ultra-small form factor system with a more powerful graphics card. Keep in mind, however, the H55 chipset supports the Intel HD graphics integrated into Intel Clarkdale-based processors, which is plenty powerful enough for multimedia duties.

Despite its small size, the H55-ITX WiFi performs just as a full-sized board would.

**H55-ITX WiFi**  
\$164.99  
Zotac  
[www.zotac.com](http://www.zotac.com)



With a Core i5-661 installed, the H55-ITX WiFi put up scores right in line with Asus' P7H57D-V EVO, and stability was excellent throughout testing. Performance was especially good in the PCMark Vantage Communications test, thanks to the Core i5's support for hardware-accelerated AES.

The H55-ITX WiFi seems to have all of the bases covered: It's loaded with features, fast, and stable. Anyone looking to build a powerful HTPC or extremely portable LAN box should give this board serious consideration. ▲

by Marco Chiappetta

Benchmark Numbers	Zotac H55-ITX WiFi
PCMark Vantage	8054
Memories	4447
TV and Movies	4326
Gaming	4703
Music	7716
Communications	11781
Productivity	7185
3DMark Vantage	
3DMarks	P481
LAME MT*	
Multi-Threaded*	0:25
x264 HD Encoding**	
First Pass	57.79
Second Pass	16.04
Crysis	
800 x 600, low quality	34.16
*minutes:seconds	
**fps	
<b>Specs:</b> Socket LGA1156; Chipset: Intel H55; Max memory: 8GB DDR3-1333; Slots: 1 PCI-E 2.0 x16; Ports: 6 SATA 3Gbps, Gigabit Ethernet, DVI, HDMI, 10 USB, 1 eSATA, S/PDIF Out; 802.11n; Lifetime warranty	

## NZXT Vulcan

Building a microATX-based system used to mean sacrificing a number of features and, often, performance. But lately a myriad of microATX motherboards have been released that have every feature you'd find in their full-sized counterparts (sans a few expansion slots, of course). A number of case manufacturers have followed suit, jumping on the microATX bandwagon with enthusiast-class enclosures that accommodate the more diminutive motherboard form factor.

Take the newly released NZXT Vulcan. A quick glance at its spec sheet reveals a number of features targeted squarely at power users. It sports a heavily perforated mesh design for increased airflow, and has support for two top-mounted 120mm fans (one included), a front-mounted 120mm fan, a side-mounted 200mm fan, and a built-in 8W per channel fan controller. The Vulcan also features cutouts for liquid-cooling kits and is spacious enough to accommodate



**Vulcan**  
\$69  
NZXT  
[www.nzxt.com](http://www.nzxt.com)

**Specs:** Materials: Steel; Dimensions: 16.6 x 7 x 16 inches (HxWxD, with handle); Weight: 12.8 lbs.; Bays: 2 5.25-inch external, 2 3.5-inch external, 2 3.5-inch internal; Expansion slots: Fans: 1 120mm front, 1 120mm top (LED), 1 200mm side; Fan mounts: 1 92/80mm rear, 1 120mm top; Front-panel ports: 2 USB 2.0, eSATA, audio I/O

two monstrous graphics cards, such as AMD's ATI Radeon HD 5970. It has antivibration supports for the PSU and a motherboard tray with a large cutout for installing and accessing custom CPU coolers. LAN warriors will surely appreciate the Vulcan's built-in carrying handle, which makes hauling your rig around a much less taxing proposition.

Although assembling a system inside a smaller form factor enclosure such as the Vulcan is obviously more cramped than a typical full-sized ATX case, I found the Vulcan to be a breeze to work with. However, the overall dimensions of the Vulcan are somewhat larger than some other microATX cases. This case is more like a full-sized case with one 5.25-inch bay lopped off the top than a true SFF enclosure.

Regardless, if you're in the market for an enthusiast-class microATX case and don't mind NZXT's aggressive, angular aesthetics, the Vulcan delivers. And it does so without breaking the bank. ▲

by Marco Chiappetta



# AMD Athlon II X4 640 & Athlon II X4 610e



## Athlon II X4 640

\$122

AMD

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



## Athlon II X4 610e

\$143

AMD

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



If trying to make sense of the features vs. pricing of AMD's and Intel's respective lines of new CPUs makes your brain hurt, you're not alone. It's as if they're locked in a competition with one another to confuse every prospective buyer, and comparing two of AMD's latest quad-cores, the

Athlon II X4 640 and Athlon II X4 610e, is a great microcosm of this problem.

The two chips differ in exactly the following ways, and no more: The 640 is clocked at 3GHz, has a max temp of 71 degrees Celsius, a nominal voltage of 1.05 to 1.4V, and a max TDP of 95W. The

610e is clocked at 2.4GHz, has a max temp of 72 C, a nominal voltage of 0.775 to 1.25V, and a max TDP of 45W. The 640 is clocked higher but has a higher TDP. It's also \$21 cheaper than the 610e.

So, if having a quieter CPU fan is paramount for you, the 610e is a better buy, I guess, as the lower wattage will help reduce the heat generated. The less expensive but slightly better-performing 640 is the option for you if you place a higher value on performance than on fan noise and also want to save a few bucks.

Further clouding the picture is that the 640 is simply a 100MHz clock boost over the Athlon II X4 635. The 635 is \$99.99 (which is a phenomenal deal for a quad-core chip, incidentally), so, technically, if you bought the 640, you'd be paying 22 bucks for a 100MHz bump in clock speed. Oddly, the 610e appears to merely be a 100MHz speed bump from the 605e (2.4GHz and 2.3GHz, respectively), yet they're currently priced the same at \$143.

Why either of these processors exists is a bit of a mystery. It appears as though AMD wants to offer CPUs at every conceivable price point, even though there are plenty of perfectly good new AMD chips on the market already.

All that said, I can't say anything negative about the 640 or 610e in and of themselves. They performed well in benchmark testing and are delightfully inexpensive for quad-core CPUs. ▲

## Benchmark Numbers

	Athlon II X4 640	Athlon II X2 610e
<b>3DMark Vantage</b>		
Overall	P8163	P7729
GPU	7727	7624
GPU Test 1	23.85	23.63
GPU Test 2	21.38	20.99
CPU	9830	8063
CPU Test 1	1258.16	1035.16
CPU Test 2	15.6	12.71
<b>PCMark Vantage Pro</b>		
Overall	5851	5313
Memories	4916	4355
TV And Movies	4137	3757
Gaming	5710	5236
Music	6204	5439
Communications	5446	4504
Productivity	4870	4448
HDD	3963	3982
POV-Ray 3.7*	2585.65pps	2064.65pps
<b>Cinebench 10</b>		
Multi-threaded (min:sec)	1:36	1:56
Multi-threaded (score)	9181	7619
<b>World in Conflict</b>		
1,280 x 1,024	37fps	35fps

\* pixels per second

**Athlon II X4 640 specs:** Socket AM3; Clock speed: 3GHz; HyperTransport 3.0 Link: 4GHz full duplex; 45nm process; Cache: 2MB shared L2 cache; 95W max TDP

**Athlon II X4 610e specs:** Socket AM3; Clock speed: 2.4GHz; HyperTransport 3.0 Link: 4GHz full duplex; 45nm process; Cache: 2MB shared L2 cache; 45W max TDP

**Test system specs:** Motherboard: Gigabyte 890GPA-UD3H; RAM: 2GB OCZ DDR3-1333; Graphics: ATI Radeon HD 5750; Hard Drive: 150GB Western Digital Raptor 1500

by Seth Colaner



# Silverstone HDDBoost

Categorized as Silverstone's only "turbo device," the HDDBoost is engineered to use an SSD to mirror hard drive front-end data. By performing a single sequential writing at every bootup, the Silverstone HDDBoost effectively minimizes the normal deterioration that a system drive would experience and consistently clones data to take advantage of SSD read speeds.

The HDDBoost consists of an SSD backplane (storage drives not included), a single SATA cable, and a small package of screws. The circuit board interface requires SATA connections to the PSU, motherboard, and system drive, so that the SSD is given read priority.

We installed an 80GB Intel SSD in our HDDBoost board and piggybacked it onto a 150GB Western Digital Raptor. You'll want to defrag the hard drive (but not the SSD) prior to installation,

## HDDBoost

\$49

Silverstone

www.silverstonetek.com



so the copied data is properly prepared for transfer.

With the goal of determining how well the HDDBoost maintains consistent performance, we ran the PC Mark Vantage HDD benchmark (and deactivated the other tests) three times—one round with the HDDBoost copying and cloning from the HDD and one round without the HDDBoost installed. The HDDBoost showed well, delivering scores of 10171, 9826, and 10299, respectively, without a reboot. The lone Raptor lagged behind, fluctuating between 3907, 4027, and 4030.

The HDDBoost Utility, accessible on Silverstone's site, is purposed for

upgrading firmware and displaying the disk syncing process. Although the utility is nothing too advanced, it monitors what each drive is doing at any given time. You can manually update firmware from the HDDBoost Utility, as well.

The obvious advantages of the HDDBoost are the uptick in system performance and expanded and improved storage drive functionality. The downloadable HDDBoost Utility is basic in its capabilities, but there's no reason the HDDBoost should require more software. So, without any initial expectations, the HDDBoost didn't disappoint. ▲

by Joanna Safford

**Specs:** 2.5-inch internal hard drive bay (1.0mm SPCC with nickel plating); 2.5-inch SATA interface

# Zalman VF3000A

The VF3000A is compatible with just three graphics cards—the ATI Radeon HD 5870, HD 5850, and HD 5830—and it occupies a whopping three PCI slots when installed. But otherwise, there's nothing to complain about. (It's worth noting that the reference Radeon HD 5850 I tested took up two slots already.)

The gnarliest part of the whole process was removing the old heatsink, but just as I once took apart my Game Boy as a child, I started removing screws and hoped for the best. Once the old heatsink was off, adding the eight tiny Zalman heat spreaders and the dual 92mm fan assembly was fairly easy. The VF3000A also includes an external fan controller

with a simple knob for an extra performance boost.

Made of mostly copper with aluminum fins, the VF3000A runs fairly quietly; although it's far from silent, I couldn't detect a noticeable difference in noise between it and the factory-installed heatsink and fan.

Sometimes when evaluating a product, the numbers speak for themselves: The reference ATI Radeon HD 5850 idled at 61 degrees Celsius in my test system and hit 71 C under load. With the Zalman VF3000A VGA Cooler installed

in place of the old heatsink, the same graphics card hit 43/53 C idle/load. In other words, it works pretty well. ▲

by Seth Colaner

(Editors note: Graphics card not included.)



## VF3000A

\$59.90

Zalman

www.zalman.com

**Specs:** Dimensions: 51 x 239 x 98 millimeters (HxWxD); Weight: 430g; Graphics card compatibility: Radeon HD 5870/5850/5830; Acoustics (w/ Fan mate 2): 18 to 32dBA; Fan speed: 1,300 to 2,500rpm; Materials: Copper (base and heatpipes), aluminum (fins)

**Test system specs:** CPU: AMD Phenom II X2 55; Motherboard: Gigabyte 890FXA-UD5; RAM: 2GB OCZ DDR3-1333; Graphics: ATI Radeon HD 5850; Hard Drive: 150GB Western Digital Raptor 1500

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





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## Trendnet TEW-673GRU

Not long ago, we reviewed Trendnet's 300Mbps Concurrent Dual Band Wireless N Router TEW-671BR (see page 39 of the November 2009 issue) and found that it offered plenty of practical features. This month, we took a look at the TEW-671BR's successor, the 300Mbps Concurrent Dual Band Wireless N Gigabit Router TEW-673GRU.

Like its predecessor, the TEW-673GRU uses both 2.4GHz and 5GHz bands to create two separate 802.11n networks, ideal for splitting bandwidth usage between video streaming and typical Web browsing over a home network. Unlike other Trendnet routers, the TEW-673GRU features a color LCD, where users can view the router's status and performance and change settings using four control buttons. The LCD was bright and easy to read, but the button navigation seemed a little clunky at first. Once we got ahold of the process, though, the router's options were easy to alter.

The TEW-673GRU also features Trendnet's Greenet power-saving technology, which, according to Trendnet's

Web site, can reduce power consumption up to 70% by limiting the amount of power going to each port and by putting the router in standby when not in use.

Setting up the TEW-673GRU was simple. The included guide walked us through the process, and the installation wizard was intuitive and quick. Before we knew it, our separate networks were up and ready to use.

In order to test the TEW-673GRU's throughput, we used NetStatLive to

monitor transfer speeds while we moved a 500MB file from our notebook, using Trendnet's TEW-664UB Dual Band Wireless N USB adapter, to our PC. The speeds for the 2.4GHz and 5GHz networks were similar, averaging about 54Mbps and maxing out at about 95Mbps for either network. Due to the presence of additional wireless networks in the area, however, we're certain our results should have been 10 to 15Mbps higher.

Overall, the TEW-673GRU's easy setup, power-saving potential, and dual network capabilities make it especially ideal for home networks with multiple, high-bandwidth users. ▲

by Kris Glaser Brambila



### TEW-673GRU

\$159.99

Trendnet

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

**Specs:** IEEE 802.11a/b/g/n (draft 2.0) with MIMO; Encryption protocols: WPA/WPA2-RADIUS, WPA-PSK/WPA2-PSK, WEP; Dimensions: 1.5 x 7.6 x 4.6 inches (HxWxD)

## Thermaltake Armor A90

When it comes to spending money on hardware, I'd rather sink big bucks into high-performance gear before breaking the budget on cosmetic fare. Cases fall somewhere in between. Thermaltake's Armor A90 strikes a good balance. There's plenty of practicality at work, and the sub-\$100 price tag is certainly reasonable.

Externally, the all-black A90 incorporates steel panels and lots of angular plastic, intended to look like armor. On the front and top of the chassis, these actually serve to block some airflow through the 120mm and 200mm fans, respectively. A quartet of front-mounted USB 2.0 ports, one eSATA port, and audio I/O are positive additions, though, as is the magnetic front door panel.

Despite the fact that Thermaltake's Armor A90 is classified as a midtower design, there's plenty of room to work inside the enclosure. Emphasis is definitely

placed on space for 3.5-inch drives (the A90 accommodates six), with a seventh spot for a 2.5-inch hard drive or SSD. Sadly, there are no cable management openings through the motherboard tray. And although much of the case is tool-free (the aforementioned internal drive bays, for example), add-in cards are screwed in and don't include convenient thumbscrews.



### A90

\$99.99

Thermaltake

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

To Thermaltake's credit, installing hardware into the Armor A90 is pleasant. Edges are rounded, and all of the front-panel connectors are long enough to reach the bottom edge of any ATX motherboard. The Armor A90 features a bottom-mounted PSU design, which many enthusiasts favor. Just be sure your power cables can reach the top of your motherboard.

A solid value overall, Thermaltake's Armor A90 is an attractive gaming case. There won't be a consensus on its angular design or copious use of plastic. But I think we can all agree that saving money on a well-built chassis means more is available for faster hardware. And that's a good thing. ▲

by Paul Cross

**Specs:** Materials: Steel, Plastic; Motherboard compatibility: ATX, microATX; Bays: 4 5.25-inch external, 1 3.5-inch external (via adapter), 6 3.5-inch internal, 1 2.5-inch internal; Fans: 1 120mm front, 1 120mm rear, 1 200mm top; Fan mounts: 1 120/200mm front, 1 120mm side; Front-panel ports: 4 USB, 1 eSATA, audio I/O; Dimensions: 19.8 x 8.3 x 20.3 inches (HxWxD)

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



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# Mad Reader *MOD*

## Lumière Noire

Jeremy “E.E.L. Ambience” Birch isn’t afraid to explore the space a bit where choosing themes and colors for his many mod projects is concerned; he works with a variety of materials and colors. But when it comes to his personal rigs, Jeremy has a couple traditions that we heartily endorse: He names each of his rigs “Lumière Noire” (loosely translated: “dark light”), and he marks each of them with his adopted sigil, the Eye of Ra (see Lumière Noire’s right side panel), a symbol from Egyptian antiquity relating specifically to several deities and to royalty in general.

Speaking of royalty, Birch has some pretty serious fans in the modding community, including one Bill “Overkill Bill” Owen of Mnpctech.com, whose mods have graced several CPU covers (2005 special “PC Modder” issue, July 2006, August 2008, and December 2009). Owen calls Birch “the king of acrylic,” and while Birch himself modestly refutes the title, it’s not hard to see why Owen appreciates Birch’s work.

Lumière Noire (the current one, that is) was born in Birch’s garage over a period of about 40 hours, and despite a few changes along the way due to unforeseen challenges (Birch refers to these as “dynamic variables”), the case turned out more or less the way he’d

planned. He began the project with a Lian Li PC-A70B, for a couple reasons: “I tend to go for Lian Li cases most of the time for a new ‘canvas’ because they’re just a joy to cut.” Birch also points out that Lian Li’s full-tower cases provide plenty of room for watercooling gear, and this is key as he was looking to provide a “profuse amount of cooling headroom.”

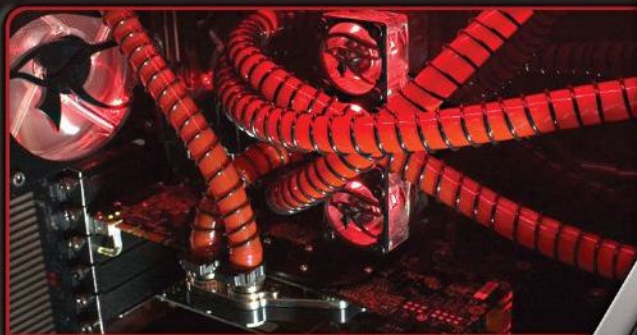
Birch heavily customized the front panel (dual radiator, custom switches, Matrix Orbital control panel, Eye of Ra) and created a new top panel to accommodate Thermochill’s PA 120.3 triple radiator and dual fill ports. He powder-coated the case in gorgeous gloss black, cut custom acrylic shrouds for the motherboard and drive bay caddies, and built a custom top for the waterblock cooling the X38 chipset.

As you can see, there’s quite a bit more we could discuss, but we’d rather use the space showing off Birch’s handiwork. Birch is currently working on a design for an ITX ION 2 HTPC system and wants to thank everyone who stopped by his Lumière Noire work log and provided feedback:

“It’s an honor being a part of such a large, global community of talent and creativity. We modders stick together!” ▲



The front panel is both attractive and highly functional, which fits perfectly with Birch’s design goals and perfectionist standards.



The interior of Lumière Noire is an extension of its outside. Meticulous black finish, extensive cooling adaptations, and Birch’s signature Eye of Ra are everywhere you look.





On some cases, the left panel gets all the attention and the right side becomes flyover land; Lumière Noire's right side panel is one of its best angles.



Birch's attention to detail is quickly apparent; even a watercooling fill port plate becomes a cohesive part of his theme and adds to the overall look of the mod.



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*Each month we dig deep into the CPU mailbag 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.*

**Len David J. asked:** I have built about 40 computers for friends, family, and co-workers over the last six or seven years, and a few of them have asked for me to install UV case lighting. I have refused to do this on the basis that I know the UV rays radiating from our Sun are damaging to just about everything. Plastics dry out, fade, and crumble. Rubber-type materials do the same thing.

What I do not know is this: Does the UV produced by LED, cold cathode, and case lighting in general have any ill effects on the internals of today's computer components?

**A:** Good question, Len. With all that we know of the harmful effects of ultraviolet radiation, we could see why some users are concerned with the potential effects UV case lighting may have on a system's components. Thankfully, there's nothing to worry about.

As its name suggests, ultraviolet is a spectrum of light with electromagnetic wavelengths that are higher than what the

human eye perceives as the color violet. The entire UV spectrum ranges from 10 to 400nm with energies from about 3eV (electron volts) to 124eV. The ultraviolet spectrum further breaks down into the specific subcategories UVA, UVB, and UVC. The UVA range consists of wavelengths from 315 to 400nm, UVB from 280 to 315nm, and UVC from 100 to 280nm.

UVA wavelengths from about 315 to 345nm are commonly used for sun-tanning beds, but it's the UVB range that is mostly responsible for sunburns caused by natural sunlight. UVC rays, however, and more specifically those in the 210 to 275nm range, are most damaging to exposed cells. In fact, shorter UVC wavelengths are often used by germ killing equipment.

According to UVLamp.com, the UV LED and cold cathode case lighting available today usually uses wavelengths in the UVA 345 to 400nm range, because UV light in this range causes many objects to fluoresce or glow, like black lights do. But the UV rays emitted from the case lighting lack the intensity or power to do any real damage, even if it's left on 24/7. Although it's safe, we wouldn't stare directly at UV case lighting for any length of time, but it's not going to damage any components within a system (at least not in its usable lifetime).

**Keith T. asked:** I have been doing some research for my upcoming dream PC build and have a question about video cards. I want to go with AMD/ATI because I feel I can get the most bang for my buck that way. I have it narrowed down to two video cards that fit my budget: the Radeon HD 5770 or the Radeon HD 4870. While both cards have 800 stream processing units and 1GB of GDDR5, the 5770 has a faster core clock and a much higher effective memory clock and would appear to be the superior of the two because of that. However, the 4870's [memory interface] is 256-bit, and the 5770's is only 128-bit. Is this why the 4870 benchmarks higher? After looking at price and benchmarks, the 4870 seems to have the better performance and is just a bit cheaper, but I wonder if it is truly the better card.

I'd like to eventually have two video cards in a CrossFire configuration, 8GB RAM, an AMD Phenom II X4 965 Black Edition CPU, an Asus M4A89GTD Pro 890GX motherboard, and an OCZ Vertex 30GB SSD for the boot drive.

**A:** Keith, you're looking at two relatively powerful graphics cards, so we'll assume that you intend to do a fair bit of gaming on this rig, as well. With that in mind, there are definitely some pros and cons to weigh between the two GPUs you're considering. From a purely price/performance perspective, the Radeon HD 4870, at least currently, is the better choice. On the other hand, this is sort of a surface-level assessment, and we should definitely dig a bit



Ultraviolet case lighting is perfectly safe to use and won't damage internal components. The intensity is too low, and the wavelength of the UV rays emitted from the bulbs is harmless.





The ATI Radeon HD 5770, though a little slower in some current titles than AMD's older Radeon HD 4870, consumes a lot less power and is compatible in support of the latest game engine technologies and effects.

deeper into the details for you because the Radeon HD 5770 has a lot more going for it beyond performance numbers.

The Radeon HD 4870 in general will be a faster card, especially in current generation titles where memory bandwidth affects performance significantly. With its 115GBps of memory bandwidth vs. the 5770's 76.8GBps, the 4870 also has a wider 256-bit memory interface for texturing, filtering, antialiasing operations. Although the 4870's memory interface speed is over 1GHz slower (4.8GHz GDDR5 for the 5770 vs. 3.6GHz GDDR5 for the 4870), its memory bus width is twice as wide, as you mentioned. However, the Radeon HD 5770 has a higher core pixel fill rate at 13.6Gpps vs. the 4870's 12Gpps, due primarily to its higher

850MHz GPU core frequency. As a result, the bottom line is the Radeon HD 4870 is faster in most titles, except for shader-intensive situations such as Far Cry 2, for example (where the two cards tend to be more on par performance-wise). But again, there is more to the picture here than just raw speeds and feeds.

One fact to consider is the fact that the Radeon HD 5770 is based on AMD's new ATI GPU architecture, a DirectX 11-capable engine, while the 4870 supports up to DX10.1 only. As a result, the 5770 is much more "futureproof," if you will. It will support DX11 rendering effects found in current and next-gen game titles, while the 4870 will not. Also, the Radeon HD 5770 consumes less power and generates less heat than the Radeon HD 4870. In fact, the 5770 draws on average about 50 to 80 watts less than a 4870, depending on workload. As such, if you're looking to go with CrossFire eventually, the Radeon HD 5770 will be a lot less taxing on your PSU, and the ambient temperature in your case should be lower, too. And if you drop in a second 5770, you'll ramp up performance well beyond a single 4870 and still maintain DX11 compatibility. ▲

by Dave Altavilla and Marco Chiappetta,  
the experts over at [HotHardware.com](http://HotHardware.com).

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# X-ray Vision: QuantumFilm

New Technology To Improve Cell Phone Cameras

Digital photography has been one of the most successful and dramatic technological shifts in modern history. It has simplified the process of storing, sharing, and viewing the photos we take, making photography more accessible and affordable for millions of people. It does involve some trade-offs, however; if you want a small camera, you usually have to choose a point-and-shoot model and sacrifice some resolution and some performance. If you want to emphasize resolution and performance, you can turn to D-SLR cameras, but the larger D-SLR models aren't always easy to carry.

The camera in your cell phone might be the biggest example of the need for a trade-off. The size of cell phone cameras is great—after all, you always are carrying your cell phone—but the resolution and performance usually disappoint. Cell phone cameras are good for taking quick pictures you want to place on the Web, but they aren't going to provide large, sharp, well-exposed photos for prints. They especially struggle with low-light photos.

Researchers at InVisage Technologies hope their work with a new technology called QuantumFilm will obviate the need for those trade-offs by greatly improving

the performance of the tiny cameras that are embedded in so many cell phones.

"The market itself is clearly quite large," says Michael Hepp, director of marketing, InVisage. "The cell phone camera is the one that everyone carries around all of the time."

## QuantumFilm vs. Image Sensors

The new InVisage technology includes the word "film" in its name, and QuantumFilm does share a couple of characteristics with film. QuantumFilm suspends particles (quantum dots, to be more precise) in a polymer, much like photographic film uses

## QuantumFilm Technology Introduced

QuantumFilm claims to offer greatly improved performance over CCD and CMOS silicon image sensors, in part by moving the sensor level upward in the device, allowing it to be closer to the light source with fewer obstacles. With a traditional image sensor (at lower left), the light must travel through two metal layers before striking the silicon, which senses and measures the light. The illustration shows some of the light particles being absorbed in the two metal layers, leaving a limited number of particles to actually strike the silicon. Because the silicon both absorbs the light and converts it to an electrical signal, the silicon needs wires and transistors. These items, shown in the illustration as the metal layers, block some of the light particles from reaching the silicon.

QuantumFilm, meanwhile, requires the same metal layers—wires and transistors—above its silicon layer for the conversion of the light to an electrical signal. However, QuantumFilm's light-absorbing layer is above the metal layers, allowing much more light to strike it (shown at lower right). According to InVisage, this arrangement makes QuantumFilm twice as sensitive to light as a traditional image sensor.

In addition, the QuantumFilm's quantum dots are about twice as efficient in absorbing light as silicon, Hepp says, which gives QuantumFilm a light-sensing advantage of about four times over silicon image sensors.

The color filter works just as it does with a traditional image sensor.

"The color filter sits on top of the block," Hepp says. "It's a traditional silicon Bayer pattern."

The polymer layer that contains the quantum dots measures between 500nm and 1,000nm (1 micron) in thickness after it dries. Manufacturers can spray the polymer layer directly over the other layers of the chip, and they can spray the polymer as the silicon wafer is being made at the fab. The metal layers measure 4 to 5 microns in thickness.

Each pixel in QuantumFilm contains millions of quantum dots. Each particle is a few nanometers in size, Hepp says.

"We don't reveal the exact size," Hepp says. "We tune them by changing the size of the dots. When you hit the [different-sized] dots with different energies, you receive different colors."

When the light photons hit the quantum dots, they absorb the light's energy, similar to when the silicon absorbs light photons, but with greater efficiency. Because the quantum dots are so small and so tightly packed, the electrons don't behave quite like they do in silicon.

In silicon, only photons of a certain wavelength have enough energy to "excite" the electron to jump to a new level and allow the light to be measured.

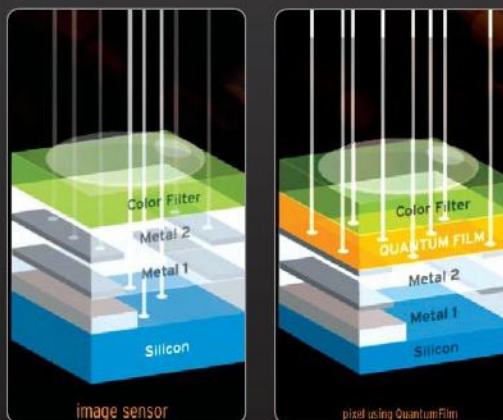
The small size and compacted nature of the quantum dots in QuantumFilm allows them to measure photons of more wavelengths than silicon can measure. This allows QuantumFilm's quantum dots to be about twice as sensitive to the photons as silicon.

Once the quantum dots absorb the photons, they convert the light energy to an exciton. (An exciton is a quasiparticle consisting of an electron and an imaginary particle—an electron hole.)

The electron is negatively charged, while the electron hole is positively charged. An electrical field below the quantum dots separates the two particles, and the electrons are moved to the circuitry in the metal layers. At this point, the silicon acts the same as it does in a traditional image sensor, measuring the electrical signal and converting it to a digital signal.

"One of the key things is that once the light is read out, QuantumFilm acts like a photodiode in silicon," Hepp says. "The readout is in the same format as is used now." ▲

Source: InVisage





## InVisage's Research

The research into QuantumFilm began with the CTO and founder of InVisage, Ted Sargent, who is a professor at the University of Toronto. Sargent's research began eight to 10 years ago, and InVisage was founded in 2006.

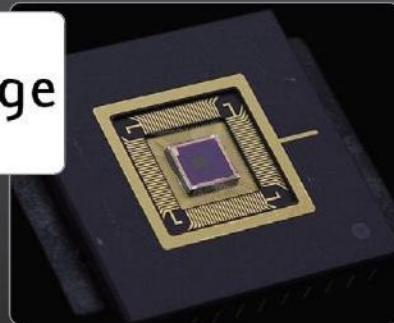
Sargent proved the technology works during his research phase. InVisage has spent much of the past three years determining the best methods for mass manufacturing the QuantumFilm chips in a cost-effective manner.

Hepp says for QuantumFilm to become commercially successful, the company needed to develop a process for manufacturing QuantumFilm sensors (shown here) in a traditional chip-making fab. Using existing fabs and chip technologies for manufacturing would make the manufacturing of QuantumFilm sensors a less expensive process.

TSMC (Taiwan Semiconductor Manufacturing Company) is handling the manufacturing process and the process of making the QuantumFilm work within a standard silicon chip-making process.



InVisage



"We integrate our own material to allow it to work in the silicon manufacturing process, so it can be mass produced," Hepp says.

InVisage has 30 employees, and Hepp says about half of them are material scientists and about half are chip designers. The company has had two rounds of investment funding, totaling about \$30 million. ▲

Source: InVisage

silver particles embedded in film. It even looks a little like film, as QuantumFilm consists of an opaque black material placed on the top layer of the image chip.

Even with some visual similarities to film, though, QuantumFilm is an all-digital technology and represents significant change from the CCD and CMOS image sensors that exist in today's digital cameras. InVisage estimates its QuantumFilm sensors will offer about four times the light-absorbing capability over traditional image sensors.

Hepp says QuantumFilm's technology allows for two usage options in cameras. First, camera manufacturers using QuantumFilm could choose to maintain the same pixel size and resolution as in traditional image sensors, but because each QuantumFilm pixel can measure four times the light, the result would be especially strong performance in low light. Secondly, manufacturers could implement QuantumFilm sensors that offer the same physical size and performance level as today's image sensors, but with four times the number of pixels for much greater resolution.

"For a traditional silicon pixel, lots of changes in design are required to shrink the pixel size," Hepp says. "For us, it's very easy to do."

### Using QuantumFilm

Hepp says cell phone cameras should be the first products to use QuantumFilm. Look for the first QuantumFilm sample camera sensors near the end of 2010, and it's possible the first high-end smartphones and

mobile handsets incorporating QuantumFilm will appear in Q4 2011.

"This is the first [image sensor] product targeted at the mobile space," Hepp says.

He says QuantumFilm eventually could appear in more traditional digital cameras, both point-and-shoot models and D-SLR models, but InVisage won't aim at the traditional camera market initially.

"We definitely have an interest in going there," Hepp says. "That's a little bit of a challenge. They're using their own sensors, or using someone's sensors who has a strong hold on the market."

The company is hoping digicam manufacturers will see the high-quality images possible in cell phone cameras using QuantumFilm and realize that building the tech into their cameras could eliminate the aforementioned trade-off problems.

"A D-SLR camera offers great resolution and performance, but it's not an easy size to carry," he says. "They have to make some sort of trade-off when they're doing this design. With silicon, you can't have all three things. We call it, 'Pick two.'"

"What we've done with QuantumFilm, we've done all three of those things."

### QuantumFilm's Future

QuantumFilm's potential goes far beyond cameras. By using a material that, unlike silicon, is designed specifically to absorb light, Hepp says the company envisions an opportunity for QuantumFilm to appear in a variety of products that use silicon now, such as solar energy cells.

Besides working in the visible spectrum, QuantumFilm can measure wavelengths in the shortwave infrared and near-infrared bands, which means night vision goggles and mid-range to high-end security cams represent a likely future use, Hepp says.

Interactive gaming in 3D could be a possibility for QuantumFilm, too, as the game interface could monitor the player's location in the room using infrared measurements. In-vehicle cameras could make use of QuantumFilm's ability to combine infrared and visible spectrum performance.

Hepp says QuantumFilm is versatile enough to fit into a variety of markets and products, but InVisage will start small—literally—in targeting cell phone cameras.

"With imaging, there's a bigger need there, that's why we chose that as our first focus," Hepp says.

Hepp says those in the imaging industry know the importance of finding a replacement for silicon. He says intense research and design work has only been able to achieve minimal gains in performance in the last few years for silicon image sensors.

"We decided to start fresh," Hepp says. "Silicon was never truly designed to absorb light, and its capability was almost discovered by accident. We wanted to create a totally different material designed to absorb light."

"We were working really hard [with silicon] and getting only a 10% improvement," Hepp says. "The imaging industry really needed a new material." ▲

by Kyle Schurman



# White Paper: AMD 890FX

## Meet The New Enthusiast Chipset On The Block

If you're considering purchasing an entire desktop platform—one of those configurations of related computing components with the cool names that combines a processor, graphics card, and chipset for improved performance—it's no surprise which component is the least glamorous.

The processor receives plenty of attention, thanks to easy-to-measure benchmarks, such as clock speed and number of cores. The graphics card is an exciting component, too, bringing cutting-edge technologies and massive parallel processing power and image rendering muscle.

And who doesn't love overclocking both of these components?

It's the chipset that many people ignore in the desktop platform. The chipset does most of its work in the background, connecting more exciting components to each other and passing data between chips.

## Inside The 890FX

All of the features and components in the 890FX chipset from AMD are showcased in this block diagram. The CPU is at the top of the diagram (gray chip, labeled "AM3 Socket"), the northbridge of the chipset is in the middle (green chip, labeled "890FX"), and the southbridge is at the bottom of the diagram (green chip, labeled "850SB").

**A)** The DDR3 memory operates at 1,333MHz. Unlike the 7-Series of AMD chipsets, the 890FX does not support DDR2 memory.

**B)** The 890FX chipset includes 42 PCI-E 2.0 lanes and 11 engines on the northbridge. (Each device that you attach to the chipset through PCI Express 2.0 requires its own engine.)

With 32 PCI-E 2.0 lanes dedicated to graphics cards attached to the northbridge, the motherboard designers can choose from a variety of graphics configurations, including those shown here. As has been the case for several years, multiple graphics cards will use ATI's CrossFireX technology. For example, the motherboard manufacturer could include four graphics card slots with eight lanes each. For a three-slot configuration, you could have a 1x16 and 2x8 configuration. With two slots, you'd have a pair of x16 configurations (as indicated by the red dotted lines). One graphics card slot is technically possible, too, although highly unlikely in an enthusiast 890FX motherboard.

"You'll see a lot of the boards will have more than two graphics slots," AMD client platform marketing manager Adam Kozak says. "They'll pretty much all be three, four, five, or even six slots."

Beyond the 32 lanes dedicated to graphics cards, AMD has included an additional 10 PCI-E 2.0 lanes with the northbridge. These additional lanes (marked with "GPP" in this graphic) are grouped as one set of four lanes (left side, 1 x4) and six single lanes (right side, 6 x1). For the most part, audio devices and networking controllers will use these 10 additional PCI-E 2.0 lanes.

In addition, USB 3.0 controllers could access the northbridge through these additional 10 PCI-E 2.0 lanes, offering a maximum throughput of up to 500MBps. The 890FX does not have native USB 3.0 support built into the chipset, meaning

USB 3.0 devices would have to operate through these additional PCI-E 2.0 lanes.

"USB 3.0 is external on this board," Kozak says.

**C)** With 14 USB 2.0 ports available, motherboard manufacturers have plenty of options for creating flexibility for USB connections.

**D)** As with the 790FX, the southbridge in the 890FX chipset supports both HD audio and its own PCI interface.

**E)** With the AM3 socket, AMD has included plenty of flexibility for motherboard manufacturers. Motherboards built around the 890FX chipset will offer compatibility with any current AMD processor, which makes it possible for users to place AM2+ socket processors on these motherboards. 890FX-based motherboards will be compatible with the six-core AMD Phenom II X6 processor.

**F)** The northbridge and processor can send data across the Hyper Transport 3.0 link at speeds up to 5.2GTps (gigatransfers per second), or a maximum clock speed of 2.6GHz.

"HT3 has been tweaked," Kozak says. "All that really means is you can hit higher rates now. You can hit 2.6GHz quite easily on this board."

**G)** In addition to its support for DDR3-1333, the 890FX northbridge acts as the controller hub for many of the motherboard's PCI-E 2.0 lanes. The northbridge also passes data and communications between the southbridge and the processor.

**H)** The chipset interconnect, called ALink Express III, provides bandwidth equal to 4GBps. With the 890FX chipset's support for SATA 6Gbps and Gigabit Ethernet, and with the addition of USB 3.0 external support, a high-speed connection between the northbridge and southbridge is important for moving a lot of data as quickly as possible.

**I)** The southbridge of the 890FX chipset, called the SB850, now includes support for 6Gbps SATA.

**J)** AMD has included two more PCI-E 2.0 lanes for the southbridge, and they will be used for expansion devices at a rate of up to 5GTps.



However, overclockers and computing enthusiasts in general know the importance of the chipset for driving overall system performance. With that in mind, AMD's recent announcement of its 890FX for the enthusiast desktop market is an important piece of AMD's Leo platform . . . no matter how much the chipset might appear to be the ugly duckling to some.

## Introducing 890FX

AMD officially announced the 890FX chipset in late April, along with the Phenom II X6 hexa-core processor. Both components are part of the Leo platform,

along with AMD's ATI Radeon HD 5800 series GPUs.

"890FX is our premium enthusiast product," says Adam Kozak, client platform marketing manager at AMD. "The OEMs who are building these 890FX boards will put in the best of the best [components]."

The 890FX chipset is a replacement for last year's 790FX chipset in the enthusiast market. The 890FX is one of four chipsets AMD has announced among its 8-Series family of chipsets. The 890GX is more of a mainstream chipset, using integrated graphics. The 880G chipset is an

entry-level unit that includes a less powerful onboard GPU than is found with the 890GX. (The 880G chipset includes an integrated Radeon HD 4250, while the 890GX pushes pixels with a Radeon HD 4290.) The 870 chipset can use a single graphics card configuration and is much less expensive than the 890FX.

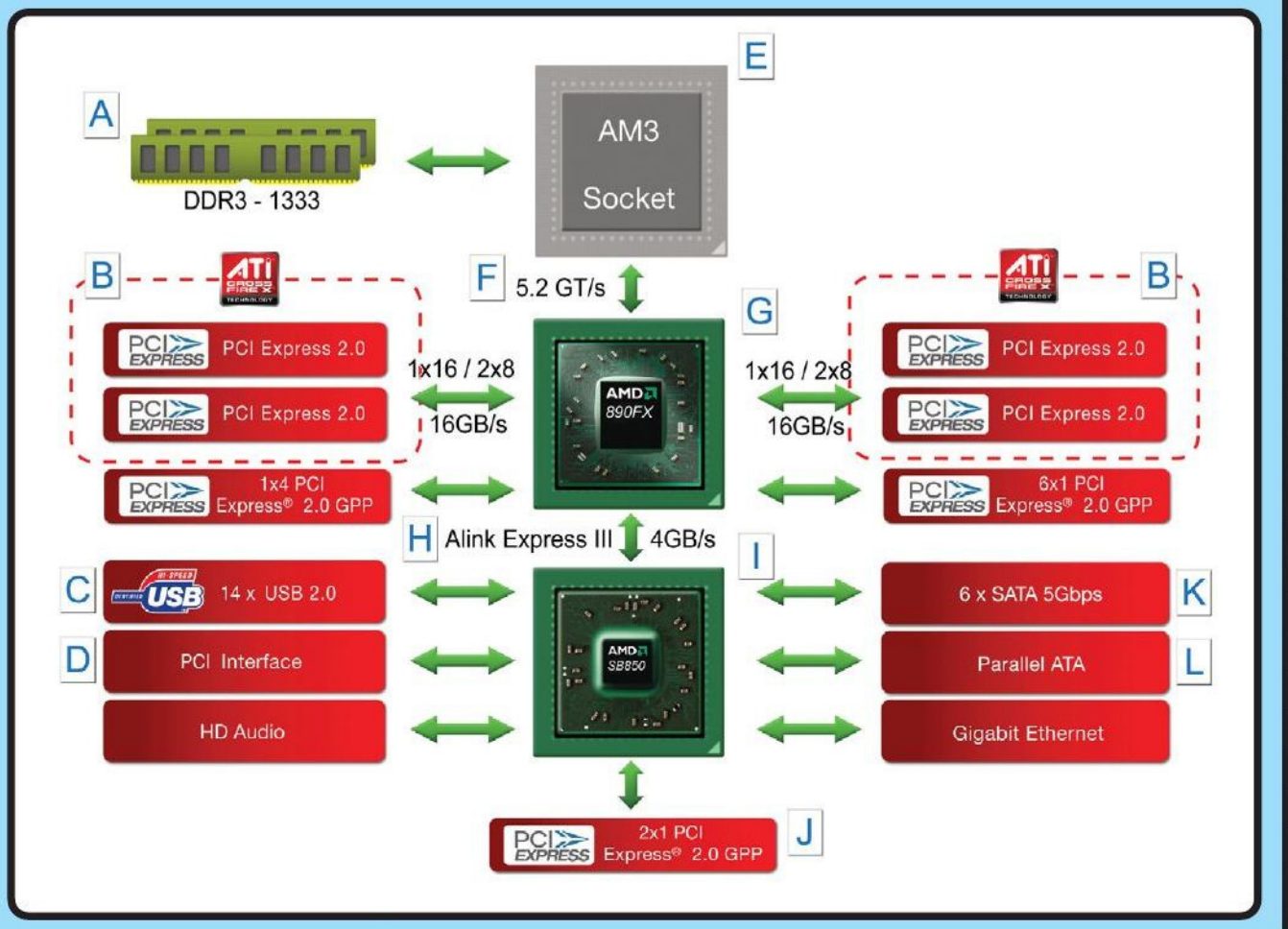
"The 890FX is for the guy who wants it all, who wants the best upgrade path for his system," Kozak says. "It has a nice heatsink design for overclocking. You get a whole bunch of different options."

The 890GX, formally announced in early March, preceded the 890FX by

**K)** The 890FX chipset is ready for cutting-edge storage devices and their high-speed needs with its six SATA 6GBps lanes. These SATA 6GBps lanes can combine to handle data transfers up to about 3.6GBps (about 600MBps each). The six SATA ports will support both AHCI 1.2 and software RAID 0/1/5/10.

**L)** Support for parallel ATA and Gigabit Ethernet both are included with the 890FX, which is typical for any recent chipset. ▲

Source: AMD





almost two months. AMD is aiming the 890GX chipset at consumers looking for a more midrange motherboard that includes integrated graphics. The 890FX chipset, meanwhile, supports multiple graphics cards, as AMD has aimed it specifically at the high-end user market. Motherboards at the top of OEMs' Socket AM3 stack will carry the 890FX.

"The 890GX is good for gaming," Kozak says. "The 890FX has more expandability than the 890GX."

### Super-Fast SATA

When considering some of the new features built into the 890FX, a couple of them stand out, led by the 890FX's support for SATA 6Gbps in hard drives. The theoretical transfer rates of 6Gbps translate to maximum read speeds from each drive buffer of almost 600MBps, and the 890FX has six SATA 6Gbps ports.

"The [890FX's SB850] southbridge is the first one to have SATA 6Gbps support," Kozak says. "We can support up to six hard drives at SATA 6Gbps. Having it natively allows us to have all of that bandwidth inside the chip."

SATA 6Gbps represents a new disk interface specification, and it will eventually replace the SATA 3Gbps specification. The SATA 6Gbps specification is backward-compatible with previous SATA 3Gbps and 1.5Gbps disk interface specifications.

New specifications for hard disks typically are released well before products appear; storage drives of both varieties—traditional platter-based and upstart NAND drives—have already trickled into general availability. So, by building the 890FX with support for the new specification, the 890FX is well prepared for the future. With the new interface, the 890FX is well equipped to avoid potential storage drive bottlenecks.

### Other 890FX Features

Some of the other features built into the 890FX chipset include:

- Memory configurations with the 890FX will be limited to DDR3. Previous generation chipsets supported both DDR2 and DDR3 memory configurations.
- Of the 42 PCI-E 2.0 lanes connected to the northbridge of the 890FX chipset, AMD reserves 32 lanes for add-in graphics cards.

One feature you won't find on the SB850 is native USB 3.0 support. However, many motherboard manufacturers such as Gigabyte and MSI have already included USB 3.0 ports by incorporating third-party controllers into their 890FX motherboards.

The 890FX's TDP (thermal design power) measurement will be about 19.8W, compared to about 10W for TDP in the 790FX chipset. However, the 890FX chipset makes use of an IOMMU (input/output memory management unit), which benefits virtualization and accounts for the large increase in TDP over the 790FX.

The chipset configuration is one area where AMD and Intel differ a bit. With the 890FX, AMD is continuing to make use of a traditional two-chip setup, with separate northbridge (890FX) and southbridge (SB850) chips. Intel, meanwhile, is beginning to use a single-chip configuration. AMD hasn't made a formal announcement addressing whether its future chipsets will continue the

## IOMMU Benefits

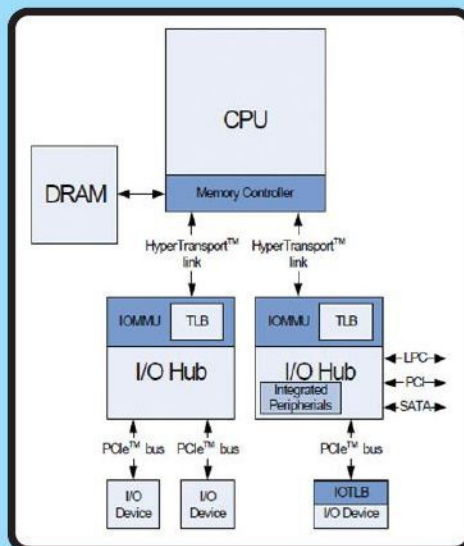
The IOMMU (input/output memory management unit) included with the 890FX chipset is a function of a chipset that enables enhancements to system-level software and that prevents illegal access of memory by I/O devices. By preventing illegal access of memory, the IOMMU can prevent problems with latency.

An IOMMU can map device memory addresses to physical memory addresses, but in a manner that is transparent to the device hardware. The IOMMU automates the translation between the physical address of the I/O device and the host system.

AMD's IOMMU is similar to Intel's VT-d technology. The other AMD 8-Series chipsets do not include the IOMMU. In fact, AMD has typically only offered the IOMMU on server chipsets in the past.

IOMMU enables system-level software support for the following:

- Legacy 32-bit I/O devices on 64-bit systems
- Access protection on DMA (direct memory access) transfers by peripheral devices
- Virtual machine guest operating system access to certain I/O devices



When an I/O device wants to read or write data to the system memory, the IOMMU intercepts the command. The IOMMU determines whether access should be permitted to the device and the exact location in system memory that the device may access.

As you can see in this graphic, the IOMMU sits between any I/O devices and the memory controller. The IOMMU makes use of a TLB (translation lookaside buffer), which is a cache in the processor that the memory management hardware uses to increase the speeds of virtual address translations. ▲

Source: AMD



two-chip configuration or move to a single-chip chipset, so it will be interesting to watch how future chipsets develop.

### 890FX & Overclocking

As with AMD's past enthusiast platforms and chipsets, the 890FX chipset is made for overclocking. Simon Solotko, senior advanced marketing manager at

AMD, works extensively with overclockers and says the 890FX has already proven itself to be a strong overclocking chipset.

AMD hosted a live Web streaming event in late April that showcased extreme overclocking efforts from around the world using the Phenom II X6 and the 890FX. (To see the results of the event and some

photos of the cooling systems the enthusiasts put together, visit [bit.ly/cXWvnO](http://bit.ly/cXWvnO).)

"It's the number of attributes built into that class of board that make [the 890FX] great for the enthusiast," says Solotko. "The platform is already proving itself as an outstanding enthusiast platform." ▲

by Kyle Schurman

## AMD's Leo Platform

At the same time as AMD's 890FX chipset announcement in late April, the company introduced the Phenom II X6 processors. These processors are six-core units, and AMD optimized them for 3D performance.

When AMD pairs the 890FX chipset and the Phenom II X6 processors with the Radeon HD 5800 series GPUs, it creates a high-performance enthusiast platform, called Leo. AMD hasn't officially announced the Leo platform, although it did list Leo in its roadmap for processors and platforms during its Financial Analysts Day in late 2009. The chart shown here was released during Financial Analysts Day, listing the components that will make up each platform. (In the Leo square in the graph, RD890 was AMD's code name for the northbridge of the 890FX chipset, Thuban was the code name for the Phenom II X6 processor, and the Radeon HD 5800 GPU is AMD's DirectX 11-capable graphics card.)

In recent years, AMD has offered its Dragon and Spider platforms. Spider, announced late in 2007, combined a Phenom quad-core processor, a Radeon HD 3800 series graphics card, and a 7-Series chipset. Dragon, which AMD announced in early 2009, harnessed the collective might of a Phenom II quad-core processor, AMD's 790FX chipset, and a Radeon HD 4800 graphics card.

Beyond the primary components, AMD has plans to include a few other features in its Leo platform, including:

AMD Fusion. Through the Fusion interface, users can control overclocking and power management. Fusion offers limited control over the system, and enthusiasts will want to use other methods for serious overclocking. AMD Fusion is aimed at users who want to try to increase performance with as little hassle as possible.

AMD OverDrive. The OverDrive utility lets users tweak their systems through a Windows-based interface for overclocking.

Black Edition Memory Profiles (BEMP). AMD has offered BEMP with the 890FX chipset, which gives the user the ability to make use of pre-defined memory values for a variety of usage options and

scenarios. Through the BEMP values, users can increase the memory frequency, lower the timings, and increase the frequency found with the northbridge.

"The 890FX is the lead platform for Black Edition Memory Profiles," AMD client platform marketing manager Adam Kozak says. "The profiles really enable you to go beyond [standard] memory speeds."

"DDR3 has too many settings to be manually tuned," AMD senior advanced marketing manager Simon Solotko adds.

Turbo Core Technology. The Turbo Core technology in the Phenom II X6 processors essentially provides for a performance boost in applications that don't support multiple threads. In those applications, Turbo Core places half of the six cores in an idle state and boosts the clock speeds of the other three cores to provide additional performance. ▲

Source: AMD



Segment	2009	2010	2011
Enthusiast	<b>"Dragon" Platform</b> AMD Phenom™ II CPUs Up to 4 CPU Cores DDR2/DDR3 AMD 790FX/GX chipset ATI Radeon™ HD 4000 Series discrete graphics	<b>"Leo" Platform</b> "Thuban" CPUs Up to 6 CPU Cores DDR3 RD890+SB850 chipset DX® 11 discrete graphics	<b>"Scorpius" Platform</b> "Zambezi" CPU 4/8 CPU "Bulldozer" Cores DDR3 AM3 Socket Next-Gen ATI discrete graphics
	<b>"Pisces" / "Kodiak" Platform</b> AMD Athlon™ II CPUs Up to 4 CPU Cores DDR2/DDR3 AMD 785G chipset DX®10.1 IGP	<b>"Dorado" Platform</b> AMD Athlon II CPUs Up to 4 CPU Cores DDR3 RS880P+SB810 chipset with DX® 10.1 IGP	<b>"Lynx" Platform</b> "Llano" APU Up to 4 CPU Cores DX® 11 GPU DDR3





# MATTERS OF PERFORMANCE

TIPS, TWEAKS & TOOLS YOUR SYSTEM NEEDS



**T**his time last year, the economy was still tanking hard. In other words, the summer of 2009, and the entire year for that matter, wasn't exactly the ideal time for most of us to trick out our PCs with topflight, state-of-the-art components and software in an effort to up performance levels. Priorities dictated otherwise.

We recognized as much in our July 2009 issue by focusing the content that appeared in the "Make Your Rig Scream (Not Your Wallet)" spotlight on providing practical tips that put a heavy emphasis on improving performance without having to bankrupt your immediate future in other areas. In fact, some of the tips we presented didn't cost users a cent to implement.

Fortunately, although the economy has yet to entirely trudge its way out of the proverbial woods, by most accounts it is on the upswing. And for a fair portion of power users, spending disposal income to invigorate their systems with speed, efficiency, and added ability doesn't seem an endeavor nearly as folly as months prior.

Another significant (and arguably universally applauded) change that's taken place during the past 12 months has been Windows 7 unseating Vista as the official OS of tomorrow. And while some users will undoubtedly clutch onto WinXP until Microsoft rips the beloved OS from their grasp once and for all, it's apparent to anyone paying attention that Win7 is where the immediate future resides for most people, power users included.

Those points duly noted, the performance tips and tweaks that we've amassed for your consideration this year in the following articles have a decidedly Win7 flavor to them. We've also devoted space to gear and tools that might put a dent in your wallet but are ones we feel you need and should obtain to raise the performance bar of your rig. That doesn't mean we completely abandoned the notion that improving performance necessitates spending gobs of dollars. We've done our due diligence in this regard, as well, by detailing tweaks available via utilities and tools you may already possess.

For your convenience, we've divvied up our performance-boosting advice into three articles. First, we put the screws to Win7 by addressing new features that the OS contains that can not only assist in churning out better performance but also gift you with more control over said performance. Additionally, you'll find Win7-related tweaks you can enact running the gamut from the basic (altering visual effects, for example) to the complex (digging into the Registry and Resource Monitor). Further, we've detailed a handful of third-party utilities geared to tweaking Win7 performance that developers have created or updated specifically for the OS.

Leaving Win7 behind, we next explore the growing field of software tools that Asus, Biostar, Gigabyte, MSI, Nvidia, and the like are increasingly packaging with their respective hardware to make the chore of adjusting and fine-tuning voltage, clock speeds, memory timings, and other settings less complex. On the BIOS front, we also address what recent versions from Phoenix and AMI have to offer in respect to improved performance.

Finally, we present a variety of accessories and tools that, in our opinion, you should strongly consider finding a place for on your power user utility belt, including temperature and decibel sensors, power-gauging meters, cooling products new to the scene, sound dampening gear, and more.

No matter your current OS of choice or financial standing, you're sure to find at least a tip or two within the following pages that's applicable to your situation to get more oomph from your present setup. Now roll up your sleeves and get busy. ▲

by Blaine Flamig



WINDOWS 7:

# POWER USER EDITION

HIGH-OCTANE OS TWEAKS

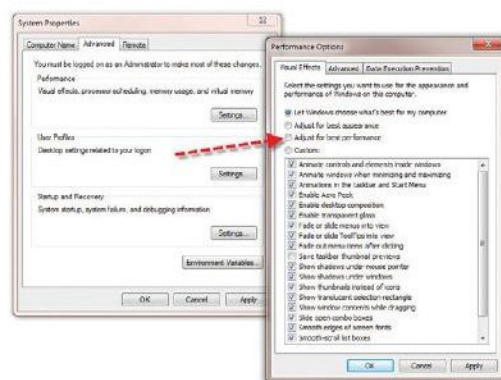
**B**y now you know that Windows 7 is everything that Vista should have been—faster, more efficient, packed with more features, and better tuned for an era of online existence and distributed storage. Whether you're buying a new system or looking to breathe new life into an old (but not too old) machine, version 7 is clearly today's must-have Windows.

Of course, we can't expect miracles. Like prior Windows versions, this one starts off promising and then slowly grows fat and sluggish over time. Additionally, Win7 arrives "out of the box" with a bunch of default values that may not be exactly optimal when it comes to performance. We know how much you like optimal. So let's dive into tweaking and tuning and making sure your Win7 installation is running fast and furiously.

Many of the tips that have applied to improving performance in prior Windows versions carry over with Win7. However, because some users need gentle reminders, and also because sometimes the details change from version to version, we've updated several of these for Win7 while including some new tweaks specific to the new OS.

## Pick The Right Components

Microsoft has a long and infamous history of drastically understating its Windows hardware requirements. For



example, Microsoft begins by requiring a 1GHz processor (at [windows.microsoft.com/systemrequirements](http://windows.microsoft.com/systemrequirements)). Now, that might be fine with a quad-core CPU, but we sure wouldn't want to try anything beyond WinXP with a single-core 1GHz chip. As for memory, Microsoft's 2GB recommendation (for Win7 64-bit; 1GB is the minimum requirement for Win7 32-bit) is low even for most novice users. If you're running the 64-bit version of Win7 (which you probably should these days, all other things being equal), you want *at least* 4GB of memory, if not 6GB or 8GB. This is doubly true if you need to run WinXP Mode ([www.microsoft.com/windows/virtual-pc](http://www.microsoft.com/windows/virtual-pc)) or any other virtualized environment. We run WinXP Mode under Win7 Ultimate 64-bit on a Phenom II X4 955 (3.2GHz) with 6GB of RAM, and it *still* runs agonizingly slow.

Perhaps most of all, try to score an SSD (solid-state drive) as your boot volume. This is doubly appropriate for Win7, given that the OS has been redesigned to

Eye candy can add pounds to Windows 7 and make it sluggish. Slim down some of the pretty-pretty effects and regain a bit of performance.

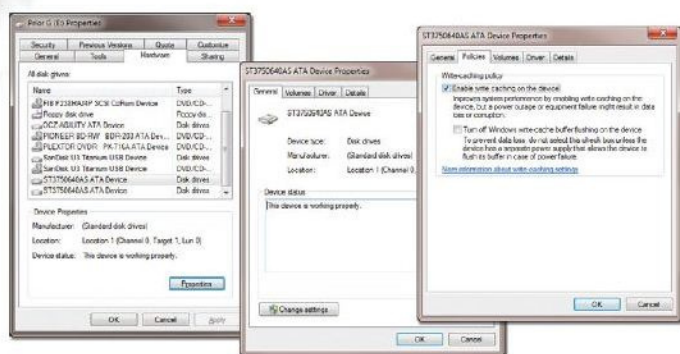
minimize writes and flushes, which favors SSDs, and now offers native TRIM command support. Low-capacity SSDs are now widely available for less than \$150, and all but the cheapest and worst

should rampantly outperform hard drives on basic Windows tasks, such as boot, hibernation, and application loading. Get an SSD for Windows and store all of your data on a big, cheap, ordinary hard drive. The performance benefit can be massive.

## Clean It Up

How long have we been suggesting this? Probably so long that many users now take the advice for granted and ignore it. After all, why worry about the size of your temp file collection when you have hundreds of spare gigabytes lying around? But what if you don't have hundreds of empty gigs on your C: drive? What if you did as we just suggested and got yourself a 32 to 64GB SSD as your primary drive? Suddenly 4GB or 5GB of garbage sitting in your Windows folder becomes 10% of your total boot drive capacity and puts you a lot closer to being pinched for spare blocks with which to perform your write/erase processes. If you value your write times, revisit the old days and clean that





Write caching lets a hard drive tell the system it has completed a write process when the on-drive cache receives the data, which will soon be written to the platters. This makes sure the system spends extra time waiting for the platter process to finish.

clutter out. In the Start search field, type **Disk Cleanup**. Choose your target drive, then, under the Disk Cleanup tab, go through and pick all of the file types to delete. This is doubly important because you don't want to defrag an SSD (or subject it to unnecessary writes of any kind).

## Adjust For "Best Performance"

For many years, Microsoft has tried to make Windows look as silky and smooth as possible. Along the way, we've all known that looking good soaks up system resources. If you can live without some of the visual bells and whistles, you can regain a bit of lost performance. Dig into Control Panel>System And Security>System>Advanced System Settings. Click the Settings button under Performance. In the Performance Options pop-up window, you'll see a long list of visual elements and effects within Win7, most of which are enabled by default as part of the Let Windows Choose What's Best For My Computer option. You can select Custom, then pick and choose which items to disable. For a fast, slash-and-burn approach, pick Adjust For Best Performance to turn off all effects. This will result in a blander interface but better response times, particularly if you're saddled with integrated graphics or a trailing-edge graphics card.

## Use Write Caching On SATA Drives

ReadyBoost (using USB flash drives as a secondary memory cache for Windows)

turned out to be a joke for systems with at least 1GB of RAM, but write caching can still be beneficial. In some situations, write caching for a given drive can yield drive performance improvements of 5 to 10%. In Computer, right-click the volume you want to cache and select Properties. Go to the Hardware tab, highlight your desired drive, and click the Properties button. Under the resulting General tab, click Change Settings. Next, under the Policies tab, make sure that the Enable Write-Caching On The Device box is checked.

## Shut Down . . . Now!

Had enough of instructing Windows to restart, walking away, and then returning later only to find that some app refused to close and you're still waiting for a reboot? This Windows glitch has driven us nuts for years. Fortunately, there's a Registry hack you can apply to shorten the process kill time. This hack also existed under WinXP/Vista but has been altered and simplified under Win7. Click Start and type

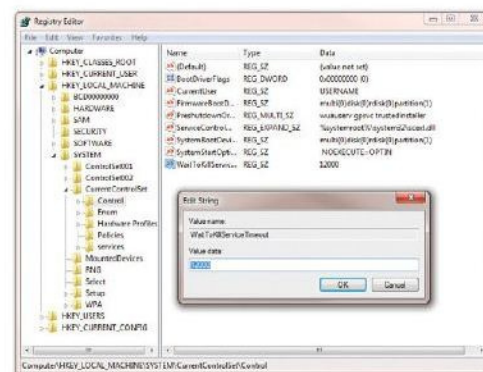
**regedit** in the Start search field. Click the Regedit.exe link and click Yes at the UAC prompt. Within the Registry, navigate to `HKEY_LOCAL_MACHINE\SYSTEM\CONTROLSET001\Control`. Right-click the `WaitToKillServiceTimeout` item and select Modify... Our Win7 installation defaults to a value of 12000, which is 12 seconds. You can dial this down all the way to 2000, or two seconds. Close the Registry Editor; the changes will take effect when you reboot.

## Selective Startup

You know how Windows bogs down over time, burdened with all of those background crapplets that load during startup? Some of those you need, but some just take up unnecessary boot seconds and are never used during an average Windows session. Type **msconfig** in the Start search field, select `Msconfig.exe`, and go to the System Configuration window's Startup tab. Uncheck anything that doesn't look useful or necessary. Some entries are pretty cryptic and require Web searching to figure out. (For example, would you know that "SBSV 2010/02/19-11:02:07" by Adobe Systems is actually a SwitchBoard process and that SwitchBoard is now a retired project? We didn't. Why on earth does CS5 load this?)

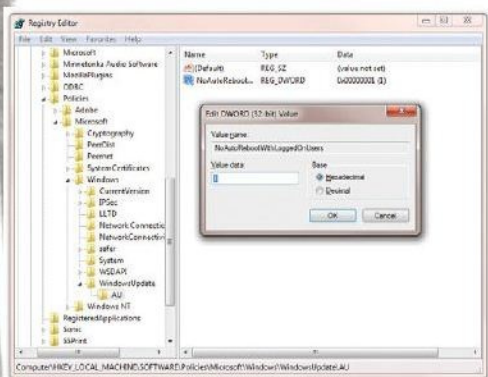
## Take Back Your Reboots

Nothing irks us more than walking into the office in the morning and discovering that Windows has downloaded a patch during the night and unilaterally decided to issue an "automatic restart" regardless of



Ever wonder why Windows sits around waiting to kill services during a shutdown? Put an end to this leniency and shorten the `WaitToKillServiceTimeout` period in the Registry.





whether all open work was saved.  
Whose system is this, anyway?

Well, no more. Rerun the Registry Editor and browse to HKEY\_LOCAL\_MACHINE\SOFTWARE\POLICIES\MICROSOFT\Windows. Right-click Windows, point to New, and select Key. Name the new key "Windows Update." Now create a new subkey under Windows Update called "NoAutoRebootWithLoggedOnUsers." Create a new DWORD value for the new key called "NoAutoRebootWithLoggedOnUsers." Right-click this DWORD, select

Possibly the best productivity hack of all time, this gem will prohibit Windows from auto-rebooting and taking out your open files in the process. Just remember to reboot on your own occasionally.

Modify, and give it a value of 1. After you reboot, you will no more face the morning restart surprise.

## Smarter Searching

Data can be like sand. Try as you might to gather it into neat piles, it has a tendency to spill and leak through your fingers. This is why Windows Search is often so useful, especially with the relatively recent indexing functions added by Microsoft to combat Google Desktop. The trouble is that because data changes over time, particularly through the addition of new files, your old searches are no longer valid, so you have to burn time running them again and again . . . unless you create a saved search. Say you have a thing for Beluga caviar and you collect

recipes, photos, PowerPoint files, and who knows what else about Beluga. To search your Win7 system for all things Beluga, you would press WinKey+F and type **Beluga**. To narrow your search down to only JPEG images, you could click in the search field and select Kind from the list of four search filters (Kind, Date Modified, Size, and Name). Your string in the search field to find all Beluga JPEGs between 1 and 16MB would be “size:large type:=.jpg Beluga.” Just keep adding filters until you’ve narrowed as far as you want. Assume this string returns 74 Beluga JPEGs. Having to create this search string every time you want to find those pictures is a time-waster, so save the search by clicking the Save Search link. By default, this saves in your *User Account*>Searches area, but you can change this to be wherever you like. Note that the saved search also appears in the Explorer Navigation pane under Favorites. Just open the saved item to automatically run the search again.

Keep in mind that Win7 searches only span across indexed locations. By default,

## Some Outside Optimization Help

Of course, you can fiddle with fine-tuning Windows 7 until Windows 8 arrives in (supposedly) 2012. Sometimes you just want a utility or two to do the heavy lifting on your behalf. Whether you're lacking time or confidence, give these third-party tools a try.

## SSD Tweak Utility 1.3

Free  
Ashley Maple  
[bit.ly/a6d7QY](http://bit.ly/a6d7QY)



Win7 may be optimized for SSDs, but there are still plenty of ways to tweak how the OS handles those drives—both for better and worse. You can burn a lot of time looking for advice on these points, or you could just run SSD Tweak Utility. This little tool packs all of the main SSD twists, including killing the Windows Indexing Service and Date Stamping, into a single UI. The Auto Tweak Settings button makes it all ridiculously easy.

## Win7Zilla

**\$9.99**  
**Sagitos**

[www.win7zilla.com](http://www.win7zilla.com)



We'll warn you right now. More than half of everything you'll find

in Win7Zilla will have you rolling your eyes and thinking, "Are you kidding? I paid for *this*?" Is it worth \$10 for a shortcut to change the taskbar settings? No. To see your system's hardware components? No. To see your applications' registration keys? Not likely. When it comes to optimization, Win7Zilla does have some nifty routines for tweaking system memory (with both Quick and Extreme options), cleaning the Registry, and "boosting gaming performance." Did we benchmark the difference? No. The point is that while any one of these functions alone isn't worth the time it takes to download the utility, all of these functions together, combined with a clean, effective UI, might make Win7Zilla worth the price of admission. Try it for 15 days and see. If nothing else, the program's constant encouragement to set restore points before making system changes just might save your bacon.

## Glary Utilities

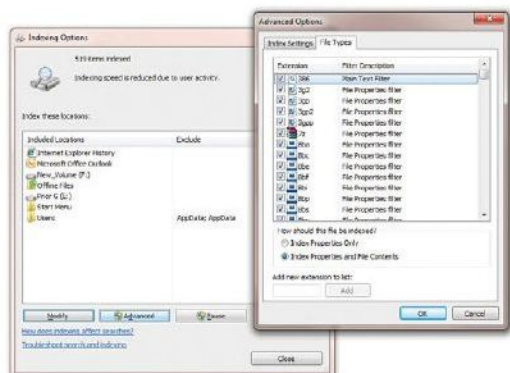
Free  
Glarysoft

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

Before you run off and pay for Win7Zilla, make sure you check out the free version of Glary Utilities first. This is without a doubt one of the best freeware Windows optimizers we've had the pleasure of using. Again, there's a lot of stuff here that's easy enough to find in Windows







these include locations such as the Documents, Pictures, and Music libraries. If you keep most of your data off of your C: drive, your searching with these defaults won't be very effective. Click Start, then type **indexing options** in the search field. Within the Indexing Options window, click Modify to add additional indexing locations. Click Advanced and use the File Types tab to make sure you're including the file extension types you want, as well as including file contents by selecting the Index Properties And File Contents radio button. For example, we had thousands

The Windows indexing service runs at lightning speed by default because it hardly indexes anything, so searches for anything beyond the My Documents/Videos/Etc. have to be done manually. Expanding your indexing locations and file types will ultimately save you a lot of time.

of old WordPerfect files that weren't generating search hits because not only had we failed to include the drive on which those files were located, but we also weren't indexing the file contents of our WPD files. Note that the more files you index, the slower your Windows indexing will run. It's a trade-off, but one that is more palatable if your index is located on an SSD.

## Use The Reliability Monitor

Buried within the Control Panel's Action Center is the Reliability Monitor. (While in the Action Center, expand Maintenance and click View Reliability

History.) As the name implies, the monitor itself won't improve Windows performance, but it will give you clues to help troubleshoot Windows application problems and find a remedy so Windows can perform better in the future. Windows ranks overall reliability on a scale from 1 (lowest reliability) to 10. Take a picture of the 10 rating after your clean Windows 7 installation, because it's probably the last time you'll see it. The line graph and numerical ratings don't give you much information, apart from confirming your worst fears. ("I *knew* this system was falling apart!") More useful is being able to corroborate informational events, shown with an "i" in a blue circle with subsequent increases in application failures. For instance, if you see that Windows installed a security update on Monday followed by a significant increase in app crashes, you can probably guess that the update is to blame and then roll back the software change.

## Tweak The Virtual Memory

Remember virtual memory, that large swap file on your hard drive used for

without an add-on utility, but having it all in one place helps. You get disk and Registry cleaners, startup manager, memory optimizer, and Registry defragger—all free.

Some of the other features may not speed up your system a great deal, but they can help you save time in doing common tasks. For example, the Tracks Eraser gives you a one-click capability to kill your temp and history files throughout Windows, IE, IE plug-ins, Firefox, and Chrome. There's a Department of Defense spec (5220.22-M) tool for wiping/shredding files. We really like the Duplicate Files Finder function as a way to locate (and then manually delete) redundant files, although we wish that consolidation of these duplicates could be automated, as found in enterprise storage apps.

Glary also occasionally improves on Windows' native tools, such as the rating applied to each service in the Startup Manager. (More red means more reason to exclude that service.) Regardless, Glary Utilities is a must-have for any Win7 power user.

## SyncToy 2.1

Free  
Microsoft  
[bit.ly/sZmi](http://bit.ly/sZmi)

Offline files have their drawbacks. Windows Live Sync does, too. Backup can take a long time



and still not provide direct file access. We just wanted a quick, easy, hands-off way to sync several specific folders to our NAS box. Enter Microsoft's own SyncToy, a much-evolved former PowerToy for Windows XP.

SyncToy couldn't be simpler. You pick source and target folder locations, then associate the two for either two-way synchronization or one-way echoing. Create as many such pairs as you like. The one glaring omission in the program is a scheduler. Thankfully, there's a workaround. If you go to Start>All Programs>Accessories>System Tools>Task Scheduler, you can run the Create Task wizard and schedule SyncToy to run whenever and however often you like. We run it daily at a time when it won't impact other running applications. Be sure to use an execution command formatted like so: "C:\Program Files\SyncToy 2.1\SyncToyCmd.exe" -R, including the quotation marks and the -R switch. ▲



overflow needs when your system didn't have enough RAM for the jobs at hand? Maybe you haven't thought about virtual memory in years—probably since memory got cheap enough to buy by the handful. Well, Win7 is a memory pig, and some older systems might be stuck with a mere 2GB. This is a recipe for paging file performance problems, because Windows must constantly work to resize the paging, a performance-sapping process. As a rule of thumb, it's good to have a swap file that's 2.5 times the size of your system memory. (Win7 defaults to recommending a 1.5X value.) So for 2GB of RAM, you'd have a 5,120KB swap file, and you'd keep that size constant so Windows won't have to work at dynamically resizing it. In the Start search bar, type **adjust perf.** In the resulting Performance Options window, click the Advanced tab, then click the Change button, and uncheck Automatically Manage Paging File For All Drives. Select a custom size and make sure the initial and maximum sizes are identical to prevent any resizing. Click Set and OK.

Because drive performance is so key to virtual memory performance, this is part of why SSDs can deliver such a massive performance boost on netbooks, which tend to be relatively low on system memory.

## Allocate More RAM For Windows XP Mode

Remember when we said that WinXP Mode was slow as drying paint in January? Well, no wonder! As you might be able to see in our screen shot, WinXP Mode defaults to only using 512MB of our system's 6GB of system memory.

Let's fix that. First, make sure your virtual machine is closed down. When it is, open Computer and navigate to C:\Users\User Name\Virtual Machines. Right-click the virtual machine that needs more memory (chances are you only have one option called Windows XP Mode.vmcx) and select Settings. Click the Memory setting and apply whatever size value you like. Just make sure you leave plenty of memory for Win7 running outside of XP Mode.

## Try Accelerators

You probably know that increasing the size of your browser's temp file space can improve browser performance by having more content already precached on your system. (In IE8, go to Tools, Internet Options, General tab, Browsing History Settings button, and change the disk space to use.) Assuming you're not strapped for disk capacity, this is probably a good idea.

You can also save time when surfing by using IE8's Accelerators. The first time you ran IE8, the browser probably prompted you to look at Accelerators, whereupon you blew the request off as another frivolous timesink. Look again. Accelerators are browsing shortcuts available through a right-click menu when you highlight a block of text within the browser window. While search Accelerators are the most common, options span from blogging to weather tools. If you find yourself constantly doing copy-and-pasting into different Web services, look into Accelerators to cut down your work. Right-click a selection and pick All

Accelerators, Find More Accelerators, and see what you find.

## Improve Your Image

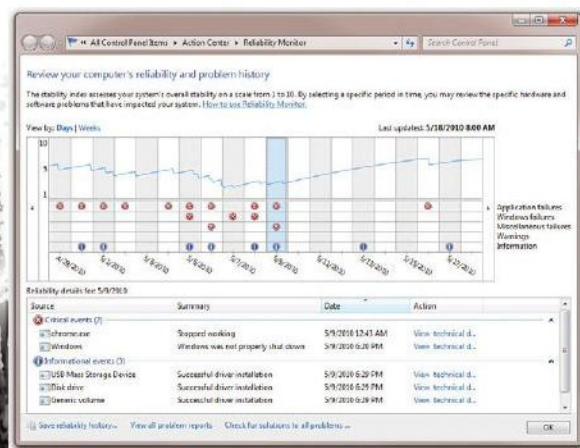
If you really want to kill your Windows performance, try having a drive crash and then reinstall your system. We sit here worrying about saving seconds while rebuilding a system image can take days. First you install the OS, then the drivers, apps, updates, and patches. Then you redo all of your preferences, cookies, and so on. Finally, you bring back your (hopefully) backed up data. It's a nightmare. In the business world, "bare metal backup" options solved this problem by backing up every bit of the system image, OS files and settings included.

Win7 delivers the same functionality in its Backup And Restore routine, located in the Control Panel. Find an NTFS-formatted drive target with plenty of capacity and use the Change Settings link to create your backup set. Be sure to check the box next to Include A System Image Of Drives: (C:). We recommend scheduling at least a weekly system image backup, perhaps on Friday night. To restore an image, you may need to create a system repair disc, and you'll find a link for this process on the left navigation bar.

## Like Fine Wine

Give credit where it's due. It's actually getting harder to write these tuning tips stories as the years go by because, much as we may like to grumble otherwise, Windows is getting better over time. Add to this the relative improvement in hardware components, especially when jumping from hard disks to SSDs, and what it does for OS performance. There's still a lot of value to be had in optimizing Windows 7—you will save minutes and hours over time. But the bang you get for your tweaking time seems to be eroding. Honestly, we wouldn't want it any other way. ▲

by William Van Winkle



If you're seeing an unexpected rise in Windows instability, use the Reliability Monitor to backtrack your system changes and see if they correlate to a rise in Windows and application crashes.



# PSU MYTHS

# BUSTED

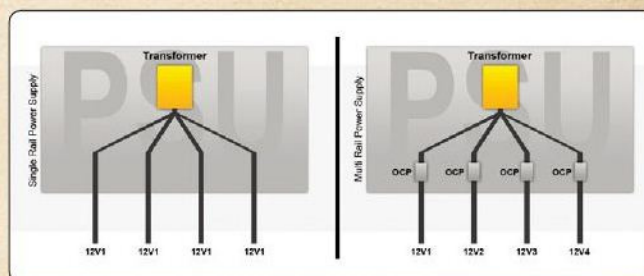
## MYTH 1: Only Single Rail Power Supplies Can Power Up High-end Graphics Cards!

# NO!

Some forum users and even some major companies are spreading the idea that single-rail power supplies power graphics cards in some better way. They'd have you believe that high-power graphics cards will use too much power from one rail in a multi-rail power supply, causing overcurrent protection (OCP) to kick in and shut down the power supply. An in-depth examination, with modern Antec multi-rail power supplies, shows that this is *total nonsense*. Time to bust this myth.

In an Antec multi-rail PSU, power is distributed in a manner that virtually guarantees that there is no way to overload one of the different +12V rails. Antec multi-rail power supplies do indeed have separate OCP-protected +12V rails – but depending on the power supply and its highest rated output, the OCP set point – the point at which overcurrent protection activates and shuts down the power supply – is set differently. Antec's high-performance PSUs have OCP set points that exceed, sometimes by as much as double, the ATX specification of 20A per +12V rail – each rail is enough, by itself, to power even a high-end modern graphics card with power left over, and certainly enough for any multi-graphics card setup available on the market once an additional +12V rail is used. There is no advantage to single-rail power supplies when it comes to powering up graphics cards. Total Continuous Power rating has significantly more impact on graphics card compatibility than single- or multi-rail design.

To be fair, there is one big difference – more like an advantage – to multi-rail power supplies when it comes to powering graphics cards: **Safety**. Single-rail power supplies, even today, achieve high power output levels by removing the OCP function altogether, allowing their PSUs to reach high output levels, but seriously endangering users – one short circuit and that non-OCP-protected PSU could easily destroy some serious gear! In contrast, every single high-power, multi-rail Antec power PSU comes with OCP on every single rail (*not* just on the 3.3V and 5V rails like some manufacturers do just so that they can say they have OCP). With Antec multi-rail power supplies, you have the comfort of knowing you have secure rails that will power the latest equipment while ensuring that it won't destroy your PC components in the event of a short circuit. Power, with safety – why are you buying anything else? ■



Here's an example with the +12V rails. As you can see, in an Antec multi-rail PSU, every +12V line comes over current-protected for maximum safety.



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### TPQ-1200 / TRUEPOWER QUATTRO SERIES 1200W Continuous Power

- **PowerCache™**: A high-performance capacitor delivers an extra power reserve where you need it, when you need it most
- **NVIDIA™ SLI™-Ready and ATI Crossfire certified**
- **80 PLUS® Silver certified** -- 85% or more efficiency at 20%, 50%, and 100% loads
- Designed to support the latest GPU and CPU technologies including quad-GPUs, Core i7/i5/i3, Phenom II and other quad-core/six-core CPUs
- Six + 12V output circuits and DC to DC Voltage Regulator Modules ensure supreme system stability

**Antec**  
Believe it.



# AWESOME NOT FOUND

PLEASE INSERT BUNDLED DISC INTO DRIVE D:



Most of us remember spending hours poring over advanced BIOS settings, tweaking core clocks and voltages step by step, fervently pursuing that elusive optimal overclock. Fortunately, overclocking capabilities have become such a key factor with power users that motherboard and graphics card vendors have invested considerable effort into developing tools that let you perform these adjustments right from the operating system's GUI—sometimes with just the click of a single “auto-tune” button.

How easy are these tools to use? What kind of capabilities do they offer? There are scores, maybe even hundreds of overclocking apps available for download today. But figuring that the hardware vendors know best what to do with their own gear, we focused here on the kinds of bundled utilities you can expect to arrive with some of today's leading products.

## Motherboards

Intel DX58SO/Intel Desktop Control Center. The DX58SO may be getting old in motherboard years, but Smackover still remains Intel's flagship and, like all X58 boards, is 100% compatible with the Core i7-980X chip we used for LGA1366 testing. Unlike many of today's other high-end boards, the DX58SO lacks an assortment of on-PCB overclocking features, but Intel offers its Intel Desktop Control Center as a free download for

Extreme Series boards. Version 5.5, which we examined, now supports Windows 7 and auto-tuning.

IDCC gives you all of the essential data on your CPU, buses, memory, and temps at a glance. Click the Plus (+) symbol in each IDCC section to open a fly-out window with more sliders and pull-downs for that particular function. For example, the Processor fly-out shows pull-down menus for the CPU multiplier, host clock frequency, and CPU voltage, along with checkboxes to disable Enhanced Intel Speed Step Technology and CPU throttling.

The bad news is that pretty much every change except fan speed adjustments requires a reboot. The good news is that the Tests link in the main UI ties to Passmark BurnInTest and PerformanceTest, both also available as free downloads from Intel, so you can give your settings a healthy shake before going “live” with them. IDCC lets you save three overclocking

profiles, and a click of the D button takes you back to default settings.

Given the choice between auto-tuning and manual control, we opted for more granularity and precision and tried the fly-out window options. Leaving the multiplier at 25X and nudging up to a CPU voltage of 1.25V, we found that a 170MHz clock crashed the system but 160MHz worked like a champ on stock air cooling. A quick before-and-after with the CPU tests in 3DMark Vantage showed a 13% performance gain just from this quick adjustment.

**Gigabyte X58A-UD7/EasyTune6.** Although Gigabyte consistently delivers impressive boards with excellent overclocking capabilities, the company's EasyTune utility has traditionally been disappointing. The latest version changes this. Now we have a compact interface with the following six tabs: CPU, Memory, Tuner, Graphics, Smart, and HW Monitor. The



Asus' TurboV EVO considerably informs you where your system is in the “flow-chart” of auto-tuning your system. Within the Auto Tuning module, you can opt for Fast, Extreme, or Custom profiles.



CPU tab looks like a clone of CPU-Z, and it reveals that Gigabyte obtains a multiplier of 26X straight from boot-up rather than the default 25X and a BCLK (base clock) of 135MHz instead of 133.3MHz, yielding 3,511MHz.

In EasyTune6's Tuner tab, you'll find a Quick Boost mode with three suggested settings. We pushed the infamous red button, No. 3, for the highest overclock profile at 160MHz. Why not? This speed was fine on the DX58SO. But despite EasyTune raising the Vcore to 1.36V, the X58A-UD7 locked on the second 3DMark Vantage CPU test. On the first test, however, EasyTune delivered a 17% jump over the already-overclocked default settings. Had we gone into the advanced mode and started playing with voltage and frequency sliders for the CPU, DRAM, and chipset, we might have seen better results.

Going from simplified to oversimplified, the Smart tab offers six predefined profiles: Disable, Cruise, Sports, Racing, Turbo, and Full Thrust. With these novice-level options, you close your eyes, throw up your hands, and hope that Gigabyte knows best.

With SATA 6Gbps, USB 3.0, CrossFireX, SLI, and dual-GbE, the Gigabyte X58A-UD7 is an excellent enthusiast-class board. EasyTune6 is a good match for this product, delivering all of the bells and whistles in a clean, intuitive interface.

**MSI P55-GD85/OC Genie.** Questionable genie puns aside (and there are several), MSI's tuning package is a dream if you want easy overclocking tools. Yes, we said we were going to focus on apps, but with OC Genie, all you have to do is press a button on the motherboard (or enable the feature in the BIOS). That's it. When you power up, the automatic overclocking for this P55 platform is already up and running. When we tested with a Core i7-870 (2.93GHz, 22X multiplier), CPU-Z reported that OC Genie had lifted the processor to 3,398MHz on a 24X multiplier. On our quick CPU performance test, this yielded a 12.4% improvement.

Magic button aside, MSI includes its Control Center software, which offers three main sections for monitoring,



overclocking, and power tuning. Within the overclocking area, the Advanced section provides sliders for altering DRAM timings, while the Basic section covers memory voltages, fan speeds, and CPU characteristics. Along the top, you'll also find four preset buttons: Cooling, Default, Cinema, and Game. The latter two entail a 3% and 6% overclock, respectively. Interestingly, our test with the Control Center's Game setting actually *underperformed* our default system settings (3,124MHz at idle) by 0.7%. Once again, you can't always trust vendor preset profiles.

Still, the Control Center provides every slider you could wish for, from tRAS timing to CPU PLL voltage (which you may want to undervolt while overclocking). When you finally settle on a set of optimized values, use the Basic area's Save button to save the profile. MSI didn't include a "return to default" type of function, but you can use the Load button and select the default.oc file. This is all great fun, but if you don't have the hours to kill, simply go into Control Center's OC Genie area and click the OC Genie icon at the top of the screen so it reads Enable instead of Disable. Simply reboot and you're done.



If you have AMD's ATI Catalyst driver suite installed, then you already have a graphics overclocking tool ready to run. ATI Overdrive gives you control over GPU and memory clock settings, plus there's an Auto-Tune feature.

**Asus Crosshair IV Formula/TurboV EVO.** We've talked before about the outstanding overclocking capabilities of AMD's Black Edition processors, so we decided to put the new king of this group, the Phenom II X6 1090T, to work on Asus' 890FX-based Crosshair IV Formula. For full coverage of the many mind-blowing features of this beast, turn to "Into The Lion's Den" on page 18. Here, we'll jump straight to two of the buttons next to the Crosshair IV's fourth PCI-E x16 slot. As with MSI, Asus here offers a couple of one-touch performance boosters on the board. The first is the Core Unlocker. This isn't an overclocking function *per se*, but if you could press a button and suddenly have a latent core or two, as on many of the X2 and X3 chips, appear out of nowhere, it'd sure *feel* like an overclock, right? (Whether AMD disabled those cores for a good technical reason or not is a different discussion. And do plenty of homework before buying an X2 or X3 in hopes of turning it into an overclocked quad-core chip.) The other button is the Turbo Key II switch, and it looks and acts like MSI's OC Genie button. CPU-Z confirmed that a simple button press took our 3.2GHz 1090T clear up to 3,724.3MHz.

The main overclocking attraction here is Asus' TurboV EVO application, which divides into three areas: Manual, Easy Mode, and Auto Tuning. Always interested in the straightest path between start and

Biostar's Toverclocker is one example of how good overclocking tools will offer a summary view of your system components' key specs.



finish, we went right to the Auto Tuning tab and found options for Fast Tuning, Extreme Tuning, and Custom Tuning. We picked the first choice and pressed the UI's red Start button. Asus shows you a flowchart of the tuning process and warns you that two or three restarts may be necessary. Our run-through only took one and concluded with a BCLK speed of 232MHz, which was almost identical to what pressing the Turbo Key II button had delivered. Unfortunately, this setting crashed in our benchmark testing, while simply pressing the Turbo Key II button produced stable results. We then jumped over to Easy Mode and used the slider for altering CPU frequency to nudge back to 230MHz. This left the system stable, yielding CPU test scores 14.9% higher than default settings.

The Manual area gives you sliders for controlling CPU frequency and a range of processor, chipset, and memory voltages. Note that there are no options here for adjusting memory timings. For that, you'll need to visit the BIOS. At the top of the UI, there's a Turbo Key link for saving overclocking profiles and creating hotkey combinations for activating them.

When Asus warns that changing the frequency settings can make your system unstable, listen, and not just when increasing speeds. We found one instance when sliding back from a perfectly working 230MHz BCLK to 200MHz saw the clock speed change back to 3,200MHz in CPU-Z, then the system locked up tight. Stepping backward in 10MHz increments fixed this problem and didn't require rebooting.

**Biostar TA890FXE/Toverclocker.** Biostar has Asus squarely in its sights with the TA890FXE, right down to the "BIO-unlockING" feature that allows you to press either the F3 or F4 keys during POST and thus unlock the third or fourth core on certain AMD CPUs. BIO-unlockING "not only gives you amazing overclocking capability in CPU frequency (3.2GHz up to 6.6GHz)," alleges Biostar, "it also provides a stable and smooth system environment." After our first TA890FXE tapped out midway through the process, we might add "your mileage may vary."



Evga may not produce ATI Radeon-based cards, but the company's Precision overclocking tool freely supports both graphics camps. As you can see here, the utility also gives control over multiple installed GPUs.

Biostar's bundled Toverclocker utility looked like a CPU-Z clone even at the end of 2009. But with the TA890FXE, we have a much more approachable and consolidated UI, even if the content remains very similar. Of the four tabs (CPU, Memory, OC Tweaker, and H/W Monitor), CPU simply shows the current specs and settings of your processor. Memory lets you know all about the sticks sitting in each slot. OC Tweaker offers the following three tabs of its own: Frequency, Voltage, and Mode. The first two offer the full bevy of now-familiar sliders. Mode lets you opt for any of five profiles or an Auto setting. The second of



Many overclocking tools let you pick from auto-tuning profiles without telling you what they're going to change. Gigabyte's EasyTune6 offers three quick presets, each showing how the CPU frequency and base clocks will be modified.

these, V6, gave us about a 5% boost. Our first crack at the Auto setting produced a long string of crashes and failed boots, leaving us unable to recover even after using a fresh Windows image. However, we experienced no such problems after we dropped in a fresh TA890FXE. The Auto settings gave our 3DMark Vantage CPU scores a 6 to 8% lift.

## Graphics Utilities

**ATITool.** As you've seen with motherboards, overclocking utilities tend to be like people. They might look different on the surface, but inside they're remarkably similar. In general, graphics overclocking can easily get an extra 10 to 15% from your card, so it's important to find an app you like. Until Vista, TechPowerUp's ATITool ([www.techpowerup.com/atitool](http://www.techpowerup.com/atitool)) was one of the most popular graphics overclocking utilities for both ATI- and Nvidia-based products, but there hasn't been an update since December 2006.

**RivaTuner.** Another great agnostic program is Alexey Nicolaychuk's RivaTuner ([bit.ly/bPtTCO](http://bit.ly/bPtTCO)), which works up through Win7 with any desktop GeForce or ATI Radeon card. RivaTuner now supports multiple monitors, profile saving, and independent overclocking of both the GPU core and memory clocks.

**ATI Overdrive.** AMD continues to keep ATI Overdrive as part of the Catalyst driver set. This is a good thing if you just don't want to hassle with finding and trying out overclocking tools. You only want to boost the GPU core and memory clocks? Fine, Overdrive will do it. The interface is simple, and you won't get any voltage tweaking controls. The little monitor readouts for temperature, activity level, and fan speed may be useful, but the unadorned Auto-Tune button is probably this app's best feature.

**Nvidia System Tools.** For those of you who prefer the green side of the aisle, Nvidia's System Tools will help you handle tuning your GeForce-based graphics card(s) in the event you opt out of using your OEM's bundled utility (or if one wasn't included). With System Tools 6.06, a separate download from Nvidia's graphics drivers that bolts onto the





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Great Cooling



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Nvidia Control Panel, you'll have slider control over GPU, memory, and shader clocks, as well as fan speed and voltages. You can also save multiple profiles, and Nvidia recently added support for the GeForce GTX 480 and GTX 470.

**Evga Precision.** Evga's Precision tool ([www.evga.com/precision](http://www.evga.com/precision)) has become a favorite with many Nvidia overclockers for good reason. The app gives exactly what you need—sliders for core, shader, and memory clocks; a fan speed slider; and monitor readouts for those four items—all in a simple, intuitive UI able to control multiple GPUs. Core and shader clocks can be linked, and we recommend leaving the fan speed set to Auto unless you're frequently faced with having a hair dryer for a graphics card. Programmable profile shortcuts emerge from a fly-out along the bottom of the UI. Precision shares many similarities with RivaTuner, and although it's positioned as being for Evga cards, it ironically works with others' cards (a Sparkle GeForce GTX 480 in this case) while failing to run properly with Evga's own GTX 280.

**MSI Afterburner.** Given a choice of the field, though, we'd probably pick MSI's Afterburner ([bit.ly/3f5il3](http://bit.ly/3f5il3)), even



The Intel Desktop Control Center has loads of options in fly-out windows to fine-tune your CPU. With these windows turned off, you're left with an attractive, informative monitoring app.

though it lacks an auto-tune feature. Honestly, it's very similar to Precision and RivaTuner (from which it was co-developed), but Afterburner adds a slider for Core Voltage that will appeal to the detail-oriented. We also prefer the sleeker look, as well as the integrated OpenGL and FurMark benchmarking tools.

We did find that not all features are supported across all cards. For instance, the

core voltage and shader clock sliders are disabled with our Radeon HD 5870 card, but this is par for the course with graphics overclocking utilities. You just try different tools until one agrees with your card. For example, when we couldn't use Precision with our GTX 280, we flipped back to the old but reliable Nvidia Control Panel. In any case, you'll save time and frustration by getting utility recommendations from your card vendor or other users.

## Prepackaged Greatness

Your mileage may vary, but it now seems abundantly clear to us that the majority of overclockers, and certainly the casual ones not prone to using sub-zero chillers, can now use Windows utilities to achieve over 80% of their OC ambitions with less than 20% of the effort required in years past. The BIOS is still there if you need it, and some vendors are still piling fresh overclocking tools into the CMOS for enthusiasts. But for those of us who just want to get to business and start kicking butt, having tools that can give your hardware a keener edge in seconds, especially free, seems irresistible. ▲

by William Van Winkle

## A Better BIOS

We often think about performance gains coming from the components or chipset, but the reality is that updates at the BIOS level are just as critical. For example, when AMI (American Megatrends) implemented Fast POST in its latest AMIBIOS8, the company stated that, when used with a 7,200rpm hard drive, it could drop boot times to under 10 seconds.

"Generally speaking, faster boot time is the No. 1 concern with all of the OEMs, so we are focusing much of our effort there," notes Chris Menosky, marketing communications manager with AMI. "Power management and smaller footprint of the BIOS are probably the next two on the list, so we have made some strides here recently, as well. AMI's other area of focus has been on debug tools and utilities that make it easier for developers to work with our BIOS products."

After the BIOS manufacturer, it falls to OEMs, the companies designing the motherboards on which the BIOS chips get planted, to enhance the source BIOS to their own ends. This is why you might have an Intel motherboard and a Gigabyte motherboard using the same original BIOS but delivering very different performance options through the CMOS interface.

"For example, our OC Stepping feature provides a way to overclock in increments, meaning that you can force the system to load the settings after a certain time," says MSI technical marketing manager Rajiv

Kothari. "You might want to wait until after the Windows boot, which is notorious for being the sole reason for most OC crashes. This provides an extremely efficient way to get the best scores without worrying about a big data load, which only happens once. Of course, our new AMD models provide a BIOS option, OC Genie, to overclock instantly or unlock any additional CPU cores. Most other manufacturers require a chip for this, but our BIOS is robust enough to provide it without one."

Sometimes, getting the best performance means having the right BIOS options for *disabling* certain features. Asus technical marketing specialist Juan Jose Guerrero III points out that recent Asus BIOS options for Intel platforms let users disable C1E support, CPU TM function, EIST (Enhance Intel SpeedStep Technology), and Intel C-state technology. Depending on the user's exact setup, each of these could impair high performance.

Similarly, recently implemented, more granular controls over memory timings and voltages, such as loadline calibration and voltage offset, can help improve overclocking and undervolting. In this article, we've focused mostly on convenient software that exposes these features, but if you want maximum control and performance, you'll want to scrutinize how vendors have improved their BIOS implementations at the CMOS setup level. ▲





# POWER COOLING

Anyway, besides its great looks, differing from the tower coolers based on the tower design, the CNPS10X Performance claims for attention at LAN parties in a computer with a transparent side window. The green glow of the fan is weak but is also a



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# TOOLS OF THE TRADE

## METERS, SENSORS & MORE FOR TOP PERFORMANCE

**E**nthusiasts are drawn to PCs for the same reason that gearheads gravitate toward some of the most notable classic cars: They're relatively easy to break down and put back together. With a couple hours of research and online shopping, even an adventurous neophyte can build a cutting-edge machine without ever leaving the house. What then separates that relatively generic collection of components from a more meticulously crafted box built by a true enthusiast?

In general, power users crave performance, which usually involves a healthy dose of overclocking. Acoustics are also of the utmost importance. Working with

aggressive cooling, big power supplies, and multiple graphics cards has the potential to generate lots of noise. Tempering that to a palatable hum is a real art. Of course, you can't talk about sound without mentioning thermal output. It isn't easy to tune the fastest hardware available without generating tons of heat.

When you get right down to it, enthusiasts are challenged by the drive to procure more speed than run-of-the-mill PCs, while at the same time building machines that run as cool and quietly as possible. The good news is that tuning your own system to crank out plenty of horsepower without waking the neighbors is easy enough.

Practice makes perfect, though, and the right tools can help.

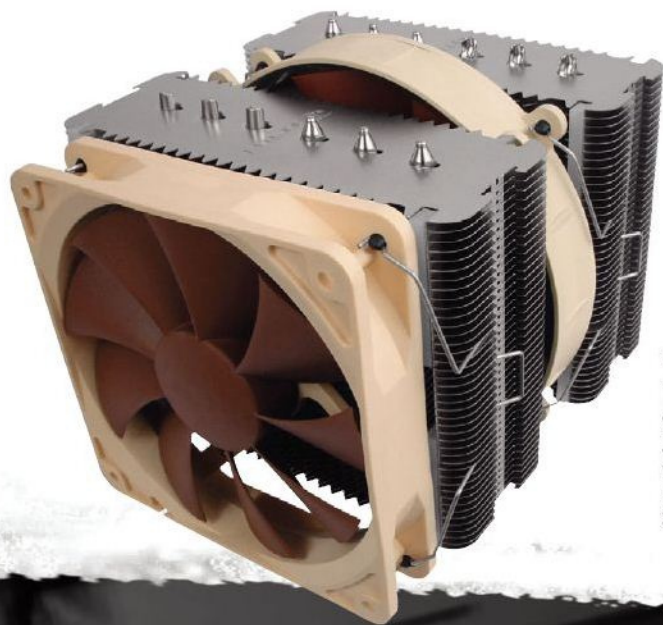
### Grab Go-Fast Hardware

Before we dive too deeply into accessorizing your beastly setup, understand that the success you achieve in cooling, silencing, and overclocking is largely dependent on the components you take on this journey.

Read up on the most scalable processors. CPUs such as Intel's Core i5-750 and i7-930, for example, are notorious for achieving 1GHz+ overlocks with minimal voltage modification. Lower voltages translate to less heat, letting you get away with more conservative heatsinks and fans.

Consider a nonreference graphics card, too. Companies such as MSI have made it their business to modify PCB layouts and attach aftermarket coolers, more effectively dealing with the heat typical of today's 200W+ graphics processors. A card with a more aggressively designed heatsink and fan stands a better chance of hitting higher clocks. MSI's Afterburner (see page 58, by the way) software even facilitates voltage adjustments—invaluable if you're hoping to maximize core and memory frequencies.

The list of must-haves goes on and on and includes system memory with ample headroom for overclocked data rates, a high-performance storage subsystem (to avoid bottlenecking the rest of your gear), flexible motherboard, and a right-sized



Noctua's NH-D14 is as high-end as you can get when it comes to cooling your Intel or AMD CPU. Its only weakness is a \$90 price tag.



power supply. You get the point, though. Start with the right components and you have a better chance of finishing with an optimized gem.

## It's All About Capable Cooling

Enemy No. 1 in any PC—high-end or otherwise—is heat. Now, if every piece of hardware is running at its stock speed, the heatsinks that AMD and Intel bundle with their CPUs are ample, as are the coolers on reference graphics cards and fans that come with most cases. As you start ascending the performance ladder, however, cooling components able to dissipate more heat should be some of the first accessories you consider.

Take CPU overclocking, for example. A processor's dynamic power is a function of capacitance, voltage, and frequency. Increasing any of these three variables results in greater dissipation and, consequently, more heat. So, the aim of accessorizing here is to integrate a heatsink capable of conducting heat away from the processor faster and a fan that moves more air volume over the sink's fins.

If you compare a high-end aftermarket cooler, such as Noctua's NH-D14, to a less expensive unit, such as Arctic Cooling's Freezer 7 Pro, you'll see a delta of up to 9 degrees Celsius as your overclocked CPU idles (in our case, a Core i7-920 at 4GHz) and as much as 28 C during periods of heavy load. The question to answer is whether those performance figures justify a price tag of \$90, in the case of the NH-D14, vs. just over \$30 for the Freezer 7 Pro. For most enthusiasts, the middle ground is more realistic. Thermaltake's Frio delivers comparable thermal capacity at \$60, for example, yielding a similarly stable 4GHz overclock.

Many vendors market direct-contact heatpipes as a conductivity-enhancing feature, but we've found that the highest-performance heatsinks employ a copper heat spreader between the processor surface and heatpipe array. That's something to look out for as you shop. Moreover, don't assume your aftermarket heatsink's bundled fan is the best. Although most coolers are optimized for fitment and



If you want a more reasonably priced option in the air-cooling space, Thermaltake's Frio is a great heatsink/fan combination for overclocking.

acoustics, it's always possible to add a higher-rpm fan (that'll make more noise) if you're willing to make the trade-off.

Case fans are also easily replaceable if your chassis of choice didn't come well-equipped. The idea is that once heat is drawn away from your CPU, motherboard-based VRM, and graphics card, it is ventilated out of your system by means of an intake at the bottom-front of your case and an exhaust at the rear. The ATX specification was designed this way deliberately, so maximizing that airflow channel is the key to getting performance-inhibiting heat out and away.

As a general rule, large case fans can move the same volume of air as a smaller

fan while spinning at a slower speed. Thus, spending a bit more on 140mm and 120mm coolers is a good way to improve circulation and minimize noise. Again, Noctua is a favorite in this field. Its 140mm NF-P14 is a particularly attractive option. Or, for roughly the same price, and assuming you have a case with room, consider an oversized 250mm fan such as 1st PC's FN-250BL, which moves 105cfm at a staggeringly low 820rpm.

## Take Control Of Noise

Most CPU cooling fans are controlled by pulse-width modulation, which adjusts fan speed in response to the processor's digital thermal sensor. As a result, enthusiasts don't have to worry about tuning fan speed up or down—it's taken care of dynamically. Case fans, on the other hand, are frequently dialed-in manually.

Noisy case fans are especially bothersome. If you already have airflow to spare, adding a fan controller is one way to get a handle on coolers spinning at static speeds. SilenX's 4-Channel Fan Controller is actually powered externally, via 120V outlet, so it doesn't depend on motherboard-based connectors and won't add any additional load to your power supply. A quartet of three-pin connectors and a shared four-pin connector drive up to four fans, and you're able to adjust rotational



Replacing your case fans with Noctua's NF-P14 is a great way to improve airflow and cut back on fan noise.





There aren't many cases capable of accommodating a 250mm fan, but if yours does, this sub-1,000rpm cooler presents a good way to displace copious air without making much noise.

speed independently for each using rheostats, a variable resistor that increases or decreases voltage to cooling fans, in turn affecting their rotational speed.

Of course, turning down the speed of your fans to help minimize noise involves compromising cooling performance. Alternatively, you could put more of an emphasis on simply dampening the acoustic impact of your louder components. A company called Acousti Products sells sound-dampened server rack cabinets but also makes dampening material available to the DIY community's PC projects. Foam blocks, for example, easily populate empty 5.25-inch drive bays, simultaneously absorbing sound energy and reducing internal air volume. The company's AcoustiPack sheeting is available in 4mm two-layer and 7mm three-layer composite used to line case walls. One sheet of 7mm composite sells for about \$22 online.

Naturally, the effectiveness of sound dampening depends largely on the construction of your case. Cooler Master's HAF 932, for instance, is a very airy chassis, which employs a lot of mesh screening to promote airflow. On the other hand, Lian-Li's PC-B10 is enclosed all the way around, leaving lots of room for the AcoustiPack sheets.

### The Liquid Variable

Now, there's another direction we can go. Some risk-averse enthusiasts cringe at the idea; however, liquid-cooling is very

much a viable option. Not only can you achieve better thermal performance than what you'd otherwise see with air cooling, but most liquid kits are also quieter.

The premise is fairly simple. Instead of mounting heatsinks to your processor, graphics cards, and chipset, you use waterblocks—pieces of metal with hollowed-out channels running through them. The blocks sit on each of those components like a heatsink would, absorbing thermal energy. Water flows through the blocks, transferring heat at a higher rate than air, and dissipating more of it. A pump keeps the liquid flowing from the waterblocks and into a radiator. One or more fans blow across the radiator, ultimately dissipating the circuit's heat into surrounding air. The radiator can be inside your chassis in an out-of-the-way spot or outside the case. Either way, large, slowly spinning fans and a meaty array of fins



Sure, you could play mix-and-match to assemble a liquid-cooling setup, or you could invest in a complete kit, such as Swiftech's H20-220 Ultima XT.

play key roles in keeping noise to a minimum as heat is dealt with more efficiently.

There are a number of individual water-cooling-oriented components out there, but we're frankly satisfied with a handful of well-built kits that combine matched waterblocks, tubing, a pump, radiator, fans, and all of the matching installation hardware. Swiftech's H20-220 Ultima XT (\$299.95) is a favorite. It incorporates all of the pieces needed to get started with watercooling (using any Intel- or AMD-based platform), performs like a champ, and generates very little noise, thanks to the 120mm fans cooling its radiator.

Watercooling isn't for everyone. After all, even a small leak has the potential to wreak havoc on an expertly built PC. If you're ready to take the step beyond conventional heatsinks and fans, though, expect watercooling to take your overlocks further than air.

### Basic Needs

Before we dive into the intricacies of measuring the thermal load, acoustic output, and power consumption of your machine, let's talk about a few necessities in any power user's toolbox.

A basic toolkit should be at the top of your list. Included, you'll want a selection of slotted and Philips screwdrivers, wire cutters/strippers, needle-nose pliers, a set of hex keys, and cable ties. The economy is picking up, so if you're feeling a little more extravagant (and adventurous), a soldering iron, solder, and an IC extractor are also occasionally useful additions. Consider at least one can of gas duster a must-have in your arsenal, as well. Over time, grime clogs critical air passages, reducing cooling performance. In overclocked configurations, that could mean instability as temperatures increase.

It's also a good idea to keep a 2.5-inch drive adapter handy. Enthusiasts are gobbling up solid-state storage en masse, but even the leading case manufacturers are only slowly incorporating 2.5-inch adapters into their cases. An adapter makes it easy to slide a slim SSD into a standard 3.5-inch drive bay, rather than letting it hang loosely in the chassis.





***Sometimes, to do it right, you have to do it yourself...***



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## Keep Tabs On Performance

You know what it takes to overclock, you're well-aware of the accessories involved, and you're ready to gauge your success by comparing your system's vital statistics to any number of systems built by other enthusiasts in the community. If you want to generate test results similar to those you see us present, you'll want a power meter, a thermal probe, and a sound level meter.

The purpose of the power meter, naturally, is to measure consumption. Several of us use Extech's 380803 Power Analyzer, a very nice datalogger that simultaneously displays wattage, power factor, voltage, and amperage. The logger plugs straight into the wall, sitting between the system you're testing and its power source. Thus, measurements from the 380803 reflect total power use rather than letting you isolate components, but that's really the most relevant result, after all.

We generally report two power-related figures: idle and load consumption. Measuring the idle figure is easy. Let your PC sit, untouched, for 15 minutes. A quick glance at the meter yields the number you need there. Generating load results is a bit trickier. If you want to emphasize processor power, for example, Prime95 ([www.mersenne.org](http://www.mersenne.org)) is the way to go. Select Torture Test from the Options menu, choose the In-place Large FFTs radio button, and make sure the load is applied to as many threads as your CPU can address (eight in the case of a Core i7, four in the case of a Phenom II X4, for

Those who are extremely interested in achieving tuning nirvana may add tools such as Extech's 380803 power level meter to their arsenal.

instance). Generating a worst-case scenario requires taxing graphics, too, though. A word of warning here: The latest-generation cards include thermal protections that make FurMark (a favorite app for taxing graphics) nearly useless for gauging power. Instead, we're using a lot more of 3DMark Vantage's Perlin noise test, which yields consistent results. Running Prime95 and 3DMark Vantage together is the combination used to report load power. Use the figures from Extech's datalogger to determine if your power supply is ample—and whether your overclocking efforts are really worth the extra energy consumption.

We look to Extech again for sound measurements. The company's 407768 Sound Level Meter is good for readings from 30 to 130dB. We use A-weighting with a slow sampling rate, both settings configurable on the meter. But more important than the equipment you use (you don't need a \$300 meter like ours) is the way you use it. As they say in real estate, location is everything. Test from a fixed distance in an absolutely silent room, using the exact same position for every piece of comparison data you record. Anything less and your results will suffer a very large margin of error. Generally, we set the Extech 407768 up one meter away, facing head-on, and elevated to the middle when we're testing a fully built machine.

Temperature is the other vital statistic you'll want to monitor closely. Fortunately, it's often possible to get accurate, real-time readings from hardware already included with your processor, motherboard, and graphics card. Because heat has

such an influence on the health of your PC, CPUs and GPUs include built-in sensors. Software applications such as CoreTemp ([www.alcpu.com/CoreTemp](http://www.alcpu.com/CoreTemp)) and GPU-Z ([www.techpowerup.com/gpuz](http://www.techpowerup.com/gpuz)) can read those sensors and report back the data needed to determine if a particular overclock is simply running too hot, for instance.

If you need the pulse on a component not as easily monitored, though, a digital thermometer may be in order. We use Extech's TM200 Type K Dual Input unit, which has since been replaced in Extech's catalog by the EA10. Nevertheless, a range between -328 and 2,501 F, and simultaneous readings from both inputs, make this \$100 unit more than ample for evaluating ambient case temperatures or measuring the surface of a GeForce GTX 480's exposed heatsink.

## Build The Enthusiast's Toolbox

Most accessories, by their very nature, are nonessential extras. You can overclock using AMD's and Intel's reference coolers. Stock case fans do a fine job of keeping air moving. Measuring power consumption and acoustic output provides interesting feedback about your build, but those stats won't inherently improve your computing experience.

Truth be told, it takes years and a true passion for technology for most enthusiasts to amass a list of accessories akin to the one we have here. We're talking about thousands of dollars' worth of gear. Start from the top of our list, though, and work your way down. Without question, you'll get the most value out of capable cooling, followed by the products that promote a quiet environment. Once you have all of the screwdrivers, hex keys, and cable ties you need to operate on your machine, consider looking into the pricier monitoring gear that'll help you measure the effect of every little change you make to your supercharged PC. ▲

by Paul Cross





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<sup>1</sup>AMD PowerNow!™ 3.0 Technology is comprised of a broad set of hardware and software technologies present in AMD processors. Not all processor models have all features or full enablement of these technologies and specific software drivers are required. <sup>2</sup>ATI Eyefinity technology works with games that support non-standard aspect ratios, which is required for panning across multiple displays. To enable more than two displays, additional panels with native DisplayPort™ connections, and/or certified DisplayPort™ adapters to convert your monitor's native input to your cards' DisplayPort™ or Mini-DisplayPort™ connector(s) are required. ©2010 Advanced Micro Devices, Inc. All rights reserved. AMD, the AMD Arrow logo, ATI, the ATI logo, AMD Phenom, AMD PowerNow!, Radeon, and combinations thereof are trademarks of Advanced Micro Devices, Inc. HyperTransport is a trademark of the HyperTransport Technology Consortium. Other names are for informational purposes only and may be trademarks of their respective owners. Battlefield™ Bad Company 2 is a trademark of Digital Illusions CE AB. EA and the EA logo are trademarks or registered trademarks of Electronic Arts Inc. in the U.S. and/or other countries. PID #48272A.

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# The Bleeding Edge Of Software

## Inside The World Of Betas

### DOSBox 0.74

With products like VMWare, VirtualBox, Parallels, and even Microsoft's own Windows XP Mode (which is automatically installed in some versions of Windows 7), it seems like emulating an operating system within another operating system is pretty straightforward. Of course, emulating WinXP is actually pretty complicated, but as it turns out, emulating relatively simple operating systems isn't always any easier. In the case of DOS, emulating the basic system calls and file system isn't the problem; the whole rest of the 1990s-era hardware computer that you probably want to emulate along with DOS is the tricky part. Thankfully, there's DOSBox.

DOSBox emulates a fairly old PC running what looks and feels like DOS 5.0, along with a VESA-VGA video adapter and a Sound Blaster 16-style sound card, with CPU speeds ranging from a fast 286

to a Pentium III, depending on the speed of your host system. If this sounds like the gaming system you had for playing Wing Commander in 1991, then you've hit upon DOSBox's reason for existing: It turns out using VMWare to re-create the gaming platforms of yestercenury is tricky-to-impossible, but it works by default with DOSBox.

CPU speeds today are, of course, orders of magnitude faster than they were back then, and DOSBox has simple ways to throttle the emulated CPU down to double-digit megahertz speeds so as to allow those old games to run at their intended speeds.

DOSBox relies on command-line parameters to function, which you generally type into a second window that accompanies the actual DOS window, but there are quite a few graphical front ends that make configuring the environment and selecting programs to run relatively simple. *True DOS*

masters, however, would simply learn the commands and then bang away at the DOS command line in order to revive their old games. We're just saying . . . ▲

by Warren Ernst



### DOSBox 0.74

**Publisher and URL:** The DOSBox Team, [www.dosbox.com](http://www.dosbox.com)

**ETA:** 2011 or beyond

**Why You Should Care:** How else are you going to play Lemmings on a Core i7 computer with Windows 7?

### BurnAware Free 3.0 Beta 11

Although flash drives and broadband are starting to kill burnable media the same way burnable media killed floppy drives years ago, we aren't there yet. So, we still need disc burning software. To be sure, most add-on optical drives come with some sort of bundled software for basic burning tasks, and Windows XP/Vista/7 also include some rudimentary tools. But what if you only need a little more functionality? And what if you don't need all the power that \$100 disc burning suites offer? BurnAware 3.0 might be the perfect answer, even in beta form.

In an age where nearly all the big burner suites need huge, complex "dashboards" to help users sort through which module among 30 performs a specific task, BurnAware's main GUI is refreshingly simple. There's a single small window with 14 simply labeled icons, each

organized into one of the following four simple groups: Data, Multimedia, Disc Images, and Utilities. Clicking an icon pops up a new window, where you usually either drag and drop files or use a standard Open dialog box to pick the content you want to commit to disc. A big, friendly red "Burn" or "Make" button in the lower-right corner of each window starts the desired job.

BurnAware offers a few basic options, such as verifying files after burning or changing default disc labels, but it still offers more than most bundled or free utilities. If you truly need more options, such as the ability to copy whole discs, use multiple drives, or use BurnAware commercially, then a mere \$40 gets you the Professional version. (The \$30 Home version merely adds disc copying functionality, which is otherwise a two-step process with the free version.)

The beta version is a little crash prone when making audio CDs but is otherwise rock-solid and fun to use. We look forward to the finished product. ▲

by Warren Ernst



### BurnAware Free 3.0 Beta 11

**Publisher and URL:** Burnaware Technologies, [www.burnaware.com](http://www.burnaware.com)

**ETA:** Q3 2010

**Why You Should Care:** Yet another viable option for simple disc-burning tasks at a price that can't be beat.



# Dragon Slayer

one of it's kind



USB 3.0



CABLE ROUTING SYSTEM



EXCELLENT THERMAL SOLUTION



EXPANDABILITY



IN WIN

CONTEMPORARY & INNOVATIVE

WWW.INWIN-STYLE.COM

Dragon Slayer, the new **mATX** chassis from In Win is small in size but powerful as a giant, capable to accommodate **two full-length graphic cards up to 320mm**. Extreme ventilation and a cable routing system make this chassis a great knight to fight by your side during any gaming battle. Equipped with anti-vibration pads aside of side panel and water-cooling holes, Dragon Slayer is ready to satisfy the strictest enthusiast.





# UP TO SPEED

## Upgrades That'll Keep You Humming Along

Boxee marches onward toward a 1.0 release with its next beta build. But other prominent apps—Google Chrome, AIM, and iTunes, to name a few—also add notable new features in their upgrades.

### Software Updates

#### ACD Systems ACDSee Pro 3 Update 2

A classic photo-management tool adjusts to a world of netbooks by offering interface options and dialog boxes that work at 1,024 x 600 and higher. ACD improved RAW processing to leverage more of the background task engine. View mode now can access the original unedited image. This update enhances workflow options so users can attach specific Develop and Edit adjustments to individual images.

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

#### AOL AIM 7.3 For Windows Beta 7.3.3.6

The venerable instant messenger from AOL integrates with Facebook, so new users can log in through their Facebook ID. Existing AIM users can easily use the client to chat with their Facebook friends. First and last names now can be added to AIM listings, making it easier for you and your friends to find each other on your Buddy Lists.

[beta.aol.com](http://beta.aol.com)

#### Apple iTunes 9.1.1

Apple has addressed some stability problems involving VoiceOver in this upgrade to its media library and player. There are also fixes for problems encountered when converting songs to 128Kbps AAC while also syncing.

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

#### Boxee Beta 0.9.21.11487

The video aggregation and playback platform most notably adds Facebook and Twitter functionality, so you can push recommendations across your social network. A new feed interface makes finding and subscribing to RSS feeds easier. The

improved media library function now gives you more details about how Boxee is scanning and identifying files on your network.

[www.boxee.tv](http://www.boxee.tv)

#### foobar2000 1.0.3

The light and simple media player bolsters compatibility with ASX files from Windows Media Player. Specific bug fixes include bugs in the notification area icon, difficulties encoding long Ogg Vorbis audio streams, and a sporadic crash issue associated with the Media Library preferences page.

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

#### Google Chrome Beta 5.0.375.29

This iteration of the increasingly popular browser now will synchronize browser preferences, including home pages and themes, across PCs. You can also now install extensions even when using Incognito mode. New HTML5 features include geolocation APIs for developers, drag and drop capabilities, and Web sockets. This is also the first build to add Adobe's Flash Player plug-in.

[www.google.com/landing/chrome/beta](http://www.google.com/landing/chrome/beta)

#### Hyperionics HyperSnap 6.81.02

The widely used screen capture tool fixes an issue associated with pasting images with fewer than 32 bits per pixel. This update adds to the larger, more significant 6.80.01 release, which added toolbars for Internet Explorer and Firefox to access screen grabs (with or without scrolling) more easily.

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

#### Intel Turbo Boost Technology Monitor 1.04

The Windows Sidebar Gadget monitors and displays when Intel Turbo Boost

Technology is active on Intel Core i5, i7, and i7 Extreme CPUs. Version 1.04 corrects the base CPU frequency display to match Intel's specs. The software will no longer install itself on systems that don't use a supported CPU, and multiple installations (overinstall, uninstall/reinstall) of the tool now cease to produce multiple instances of the Sidebar app.

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

#### Microsoft Windows 7 Touch Pack

This free download, included by default on multitouch PCs running Win7, from Microsoft adds touchscreen support to Win7 as well as a pack of new software. Programs such as Surface Globe (2D/3D earth exploration), Surface Collage (photo management), and Blackboard (a physics-based game) make exclusive use of touch commands. As you might expect, Touch Pack requires a display that supports multitouch.

[windows.microsoft.com](http://windows.microsoft.com)

#### Mozilla Thunderbird 3.0.4

The open-source email client receives bug fixes to increase stability and plug security holes. This is an iterative release to the major upgrade released late last year. If you haven't seen it yet, Thunderbird 3 added advanced filtering tools for better sorting, as well as setup wizards that look up common ISPs' email settings.

[www.mozillamessaging.com/thunderbird](http://www.mozillamessaging.com/thunderbird)

### Driver Bay

#### AMD ATI Catalyst 10.4

For most HD 2000 to 5000 series GPUs, ATI's latest graphics drivers add H.264 Level 5.1 support. For video transcoding, there is now an option for disabling GPU acceleration and support for MTS and WMV9 Complex file formats. With Catalyst 10.4, S.T.A.L.K.E.R. – Clear Sky now runs 3 to 6% faster on select 5000 series cards.

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

by Steve Smith



# Calendaring Apps Blowout

## Mod Your Time Management

Almost everyone could use a little organization in their lives. And for those of you who need a lot of organization, we've rounded up a slew of Web-based calendaring applications that are designed to do just that. Profiled here are six Web sites that help you get your life together, with an eye turned toward sites that do more than just replicate what you'd find in your average dead-tree day planner. The more creative or inspired, the better, so we've paid particular attention to sites that do more than just give you a calendar and a things-to-do list.

### Cozi

"Family-oriented" is one of those buzzwords that's often thrown around rather thoughtlessly. That said, Cozi, a household calendaring and scheduling service, takes its family-friendly claims pretty seriously. This isn't simply something you'll find in Cozi's use of icons; the family focus is built into the way everything runs.

When you create a Cozi account, you can designate up to two adults to manage the account and up to 10 members of the household, who can be listed with or without email addresses. The basic interface is a little like a digital version of a calendar on the fridge: There's a place to send and receive messages between family members, a daily agenda, and an at-a-glance shopping list.

The calendar's about on par with the other sites discussed here; the auxiliary features are the real eye-catchers. Take the shopping list, for instance: You start typing the name of something in a list ("cat"), and Cozi provides common suggestions (cat litter, cat food). You can

even dial a 1-800 number to have your current shopping list sent to you. Cozi calendars can be synced with Outlook or any iCal-format Internet calendar.

One possible downside of Cozi is the prevalence of advertising on the site. That said, it's all relevant to foci of the site—household goods, grocery coupons, and so forth. Finally, there's a plethora of add-ons: Windows Sidebar and Google Desktop gadgets and, of course, an iPhone app. There's no Android app yet, but the

Calendar uses two basic kinds of entries—events and tasks. Events are one-time or recurring instances, which can have dates assigned, guests invited, and options (reminders, availability, repetition, and privacy) set. Reminders for events can be popped up in a window (even offline, if you use Calendar in conjunction with Google Gears) or emailed to you, the latter probably being the more useful of the two, as it's not likely you'll keep Calendar open all the time.

Tasks have a completion date assigned to them. They don't, however, have specific times assigned and can't be marked as "available/busy." They're mainly for one-off, checklist-style

items. Those familiar with, for instance, Outlook's scheduling options will be at home with both of these behaviors and won't miss much from that program.

**Cozi**  
Free  
Cozi Group  
[www.cozi.com](http://www.cozi.com)



mobile version of the site ([m.cozi.com](http://m.cozi.com)) worked fine on my Motorola Cliq XT.

Cozi doesn't have the breadth or flexibility of some of the other services discussed here, but its specific focus makes it stand out from the others.

### Google Calendar

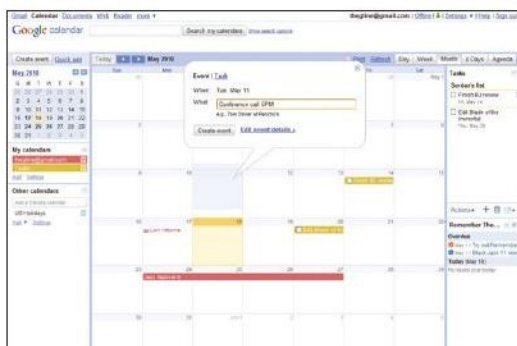
As the name implies, Google Calendar is patterned most directly after a conventional calendaring application but has enough flexibility in its presentation to be useful as a to-do list and a collaborative scheduling system, too. It's a natural adjunct to those who already use Google's gaggle of tools but also works well as a standalone.

(Most of the other calendars in this review use the same event/task scheme, as well.)

One key thing that Google Calendar provides is the ability to separate events and tasks across multiple lists, which can all be displayed on your calendar and color-coded to distinguish them. (One such auxiliary list, auto-generated for the user, is the list of regional holidays.) You can toggle visibility of each list or show only events from a given list, so it's relatively easy to drill down through the clutter and find things.

Calendar also includes a gallery of beta-tester add-ons, the Google Labs extras. These include features such as automatically declining invites to events and





## Google Calendar

Free

Google

[www.google.com/calendar](http://www.google.com/calendar)



Web site, and the Android app makes good use of the phone's native interface. RTM apps are available for users of other devices, too: the iPhone, BlackBerry, and Windows Mobile. Note that most

of the device-based apps for RTM require a pro-level account (which is \$25 a year), although you can try out the pro-level features for 15 days by simply installing and running one of the client apps.

RTM add-ons also exist for Google Calendar users, which is a great way to either transition from one to the other or combine their functionality. The process of adding the gadget is dead simple. Click a button on RTM's site, and you'll be bounced to your Google Calendar page. One downside is that the RTM gadget doesn't list RTM tasks in context with other Google Calendar tasks. They're confined to the gadget, which makes them slightly less useful. Other add-ons are available for Gmail and as browser plug-ins for Firefox and Chrome. It's even possible to work with RTM (albeit a bit clumsily) through nothing more than a conventional email client.

One major omission is direct integration with Outlook's task lists, but a third-party plug-in ([bit.ly/aRsAe4](http://bit.ly/aRsAe4)) is available.

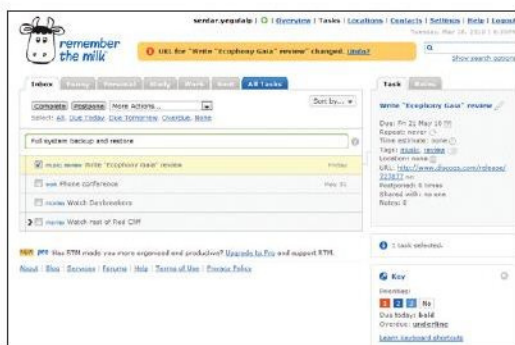
reminders that don't use modal dialogs. (I love this, personally.) Be aware, though, that these add-ons may change or disappear at any time. Try them for flavor and also look into the way Google integrates with desktop tools such as Microsoft Outlook ([bit.ly/X6gn](http://bit.ly/X6gn)).

## Remember The Milk

The beauty of Remember The Milk (RTM for short) is encapsulated by its name. It's a glorified to-do list, but RTM is organized and presented in such a straightforward way that it works because it's simple, not in spite of it.

The basic unit of storage in RTM is the task, which can be organized in one of a few basic pregenerated lists: Inbox, Personal, Study, and Work, although you can create new lists. You can take various actions with existing items, such as add tags, attach URLs, assign locations via Google's geotagging service, share items with others, assign priorities, and annotate items with freeform text. Common sense behaviors abound: If you type "today," "tomorrow," or even "next Monday" in the Due Date field for an item, RTM knows what you mean. Overdue items show up with an underline and stay on your list of today's tasks until they are reassigned or marked as complete.

A great thing about RTM is the amount of integration available from third parties—not just devices or desktop programs, but other services, as well. I used RTM's newly released Android app on my Motorola Cliq without problems; lists synced automatically between the app and RTM's



## Remember The Milk

Free (basic), \$25 (pro)

Remember The Milk Team

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



All your lists can also be exported as iCalendar service feeds or Atom feeds, so they can be consumed by any compatible program or service. The sheer number of ways you can work with RTM guarantees you'll find it useful.

## 83 Degrees 30 Boxes

So named for the, well, boxes on a calendar page, 30 Boxes has a homespun charm to it that a lot of the other organize-your-life sites don't have.

One thing 30 Boxes gets right is the interface, which by default looks like an everyday wall calendar. Click on a day, and it will present you with a pop-up panel, into which you can type details for a new event. I was impressed with how the site intelligently detects the details of an event from its description. For example, if you type "Lunch Friday 1PM (the mall)" as the subject line for an event, 30 Boxes automatically deduces the time and location from the text. If you're in doubt, you can set everything manually. Locations for an appointment aren't geotagged, though; they're listed along with the item as a freeform text field. Click Agenda for a handy task-list version of everything you have scheduled.

One feature I don't think any of the other sites have is the multi-date picker. You can assign an event to take place on a whole slew of different dates that aren't easily represented by the date repeater function. A minor drawback is the multi-date picker doesn't let you choose a different time for each recurrence of the same event. But there is a ton of sharing options, including a MySpace profile integration badge, TypePad widget, and, of course, iCalendar and RSS feeds. The mobile iteration of 30 Boxes ([i30boxes.com](http://i30boxes.com)) works well on Android-based phones.

Another feature, though more of a novelty than wholly useful, is the Webtop view. It's a sort of desktop-in-browser that lets you embed everything from a day planner (culled from your 30 Boxes calendar) to a mini Web browser. It's more of a novelty than anything else, because most everything you can do with it is either on your real desktop or can be fired up in a separate browser tab.

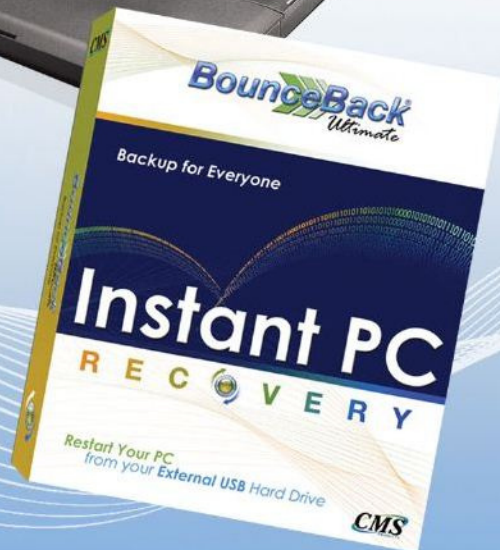


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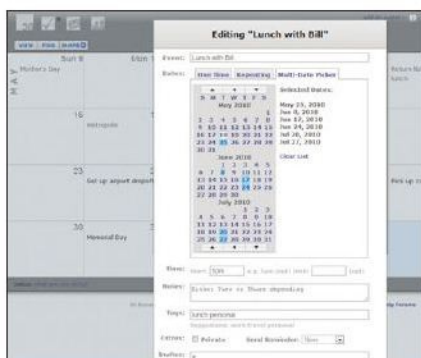
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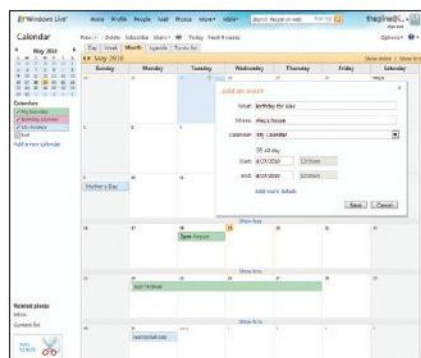
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### 30 Boxes

Free  
83 Degrees  
www.83degrees.com



### Windows Live Calendar

Free  
Microsoft  
calendar.live.com



### Zoho Planner

Free  
Zoho  
www.zoho.com



What's best about 30 Boxes is that it has the feel of something made by hand, not churned out on a corporate assembly line. The little features, such as that date picker, are evidence of that.

## Microsoft Windows Live Calendar

Windows Live Calendar works both as a standalone app and as an adjunct to the new Mail application in Windows (the replacement for Outlook Express); you'll need a Windows Live ID to use either flavor, however. That said, odds are there are far more people who will want to use it as a standalone app than there are people running Windows Mail.

Live Calendar is most directly reminiscent of Google Calendar, both in its layout and features. Like Google Calendar, you can set up multiple subcalendars, each color-coded and able to be toggled on or off with a click. Sadly, it's not as flexible as other calendars in the way it handles appointment data. You have to select dates from a specific field, and they can't be specified as part of the name for an event (e.g., "Dinner 8PM next Tuesday"). Setting recurring dates is pretty flexible, though. You can not only set recurrences for an event but also have them automatically stop after a given number of recurrences.

Calendar lets you see all events in daily, weekly, monthly, or agenda format overviews. You can maintain a separate to-do list, too. To-do items have a due

date and a priority, rather than start/end dates and an availability (busy/tentative/free) marker. One useful feature is Show More/Show Less views, where you can hide or reveal appointments that otherwise take up too much space. It's also possible to share your calendar or import others via iCalendar.

Live Calendar isn't a flawed product, but other people are already creating more innovative work in the same space.

## Zoho Planner

Zoho Planner is only one piece of the much larger galaxy of Zoho offerings, which compete most directly with Google Docs. It uses a task-oriented layout, so everything—appointments, tasks, notes—shows up as itemized lists, not in a calendar view.

In fact, there's no full-page calendar display like Google Calendar or 30 Boxes. The closest thing to this is a minicalendar that appears as a sidebar item, so you'll be disappointed if you prefer a "classic" calendar view. Calendar items themselves have decent option sets. You can have reminders emailed to you, and appointments are repeatable (although not with as much flexibility as with 30 Boxes). Calendars can also be shared out or imported via iCalendar.

The rest of Zoho Planner's design is also that much more rudimentary, but with touches of smart design. With to-do lists, for instance, it's very easy to add multiple

items in quick succession. Press ENTER when typing a list item, and you not only add the item to the list but also bring up a blank entry with the cursor already on it.

Zoho Planner has a particularly convenient feature that makes it most useful for groups of people: Any Zoho Planner page can be shared. The page is accessed via a special URL, so no Zoho account is needed to read it. An account is needed to perform collaborative actions (add notes to a calendar entry, for example), but for creating public agendas, it's just about perfect. You can share pages to a select group, and changes to shared pages can be published to an RSS feed for up-to-the-minute, at-a-glance consumption.

Obviously you'll get the most out of Planner if you're using other Zoho applications or connecting with other Zoho users, but there's still plenty here that lets you use Planner in a standalone fashion.

## Conclusions

The most striking service of the bunch, Remember The Milk, works so well by making its simplicity a virtue and not a limitation. Google Calendar and 30 Boxes take the basic calendar concept and do it well, while Cozi offers something specifically for families. Finally, Zoho Planner and Microsoft Live Calendar aren't bad, but their features are better implemented elsewhere, and with more original elements added. ▲

by Serdar Yegulalp

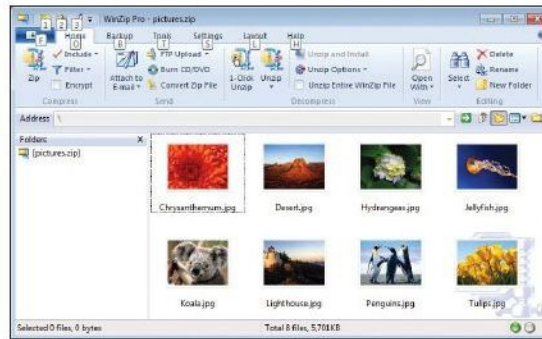


## WinZip Pro 14.5

WinZip has been a frequent whipping boy of ours for the past few years, mostly because new versions don't seem to add much more to earlier versions other than a new bundled Web browser toolbar or Registry cleaner. There are also several high-quality free alternatives to WinZip out there, not to mention that Windows itself does a fairly good job of uncompressing .ZIP files. Add it all together, and we just couldn't make a compelling case to blow \$50 on an upgrade from WinZip 11 to WinZip >11.

That said, if you're a Windows Vista or Windows 7 user, WinZip 14.5's new GUI represents the biggest reason to upgrade in a long time, because it dramatically simplifies the program yet makes its powerful features more readily available.

WinZip's new interface is basically a tweaked version of the Ribbon, made popular with Microsoft Office 2007 and 2010. If you can't stand the Ribbon



### WinZip Pro 14.5

\$49.95

Corel

www.winzip.com



use the identical tired-but-consistent interface WinZip has had for years. Everyone else has figured this out; why

(and we know a significant portion of Windows users can't), then you can stop reading and stick with your old version. Most of us at CPU like the Ribbon, however, and Corel has done a fine job putting easy zipping tasks on the Home ribbon while dumping more esoteric tools and options on the Backup, Tools, Settings, and Layout tabs in a way that makes them way more accessible. Quite simply, there's never been an easier version of WinZip. WinZip's ribbon inexplicably doesn't work under Windows XP, sadly, forcing WinXP hangers-on to

hasn't Corel?

There are a few neat new features. You can resize images within a .ZIP file before emailing them. You can select files with Win7-style dialog boxes, and they now recognize Win7 Libraries in addition to the usual My Documents folder. Still, WinZip is no faster than previous versions, unable to take advantage of multi-core CPUs like 7-Zip.

Is WinZip 14.5 a "must-have" utility? You'll have to judge that for yourself. ▲

by Warren Ernst

## Syncing.NET Professional 2.8

There are a lot of tools that sort of accomplish what Syncing.NET manages to do, which is to keep folders full of files as well as Outlook items (emails, notes, and calendar events) synchronized between multiple computers in two directions. Some of them are even a lot less expensive than Syncing.NET Professional's price of \$119.90 per computer. However, we aren't aware of anything that manages to duplicate Syncing.NET's functionality so completely or manages to do it so seamlessly or quickly in the background.

Dropbox popularized the idea of having a collection of files that are always synchronized between all of your computers via the Internet, but Dropbox works by storing a copy of all your files on its servers and letting them filter down. Syncing.NET's arrangement works peer-to-peer without a centralized storage server. Its servers merely coordinate the transfer, sort of like a BitTorrent tracker. This means

there's no real limit to the number of files that stay synced (though the limit to the number of computers that can sync files within a sharing group is 25). Our initial test of 1GB of mixed files took 12 minutes to initially sync over 802.11g (which occurred almost unnoticed in the background), with two-way updates happening almost immediately. Syncing.NET uses 256-bit AES encrypted data transfers and only updates new files or the changed sections of large files.

Outlook synchronization works similarly quickly. Once you designate what folders you want synced, their contents just

magically appear on multiple computers. This means small workgroups can share calendars and contacts without a costly Exchange server, or your notebook can have an up-to-date copy of your office computer's Inbox and calendar. Note that this setup would require purchasing two licenses.

A seven-minute YouTube video illustrates setup, configuration, and operations linked to from the main Syncing.NET Web site, and don't let the German company's somewhat halting English and occasional typo fool you: Syncing.NET Pro is polished, slick, and wonderfully functional, solving what may be a big problem for certain users. ▲

by Warren Ernst



### Syncing.NET Professional 2.8

\$119.90 (single license)

Syncing.NET Technologies

www.syncing.net





# Get Your Stuff Back

## Easy Steps To Retrieving Stranded iTunes Content

Apple's iTunes may be the most popular media application in the world, and for good reason: It's sleek, robust, and eminently useable. If you need to get content onto your computer and from there onto your iPod or iPhone, iTunes takes care of the process with typical Apple style and elegance.

But sometimes you need to move content the other direction, from your iPod back to your computer. Maybe your hard drive died and went to peripheral heaven. Perhaps you finally went out and bought or built that dream machine you've been wanting. Or maybe you simply want a way to move ripped iTunes content from your mobile device to multiple machines—after all, they're your computers, right? (They are, right?) And it's legally your content, isn't it? (It is, isn't it?)

### Blame It On Steve-O

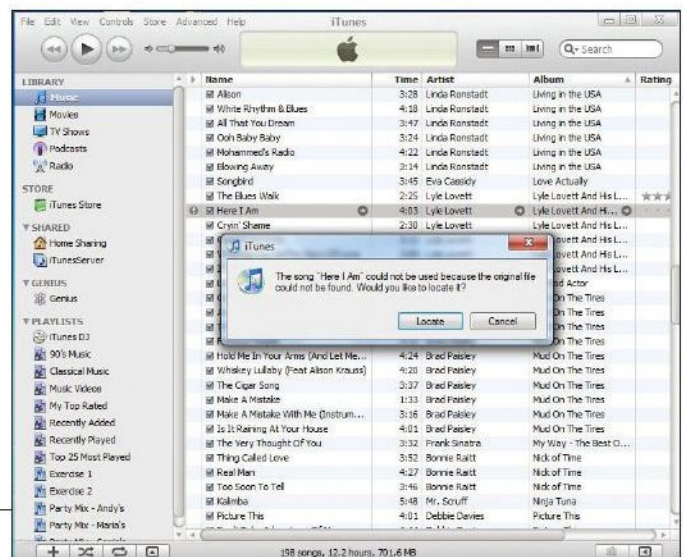
Sorry, but this is where things get dicey. For several reasons, mostly having to do with DRM and copyright issues, iTunes is not nearly as helpful in that situation. The software does allow you to recover tracks you purchased via the iTunes Store or—since the release of V8.x—any music or video you remembered to back up with the app's built-in Back Up To Disc feature. But as for those tracks bought elsewhere or that you painstakingly ripped from your massive collection of CDs and never got around to backing up? Sorry, you're on your own.

Because of a couple design quirks, this can get ugly, fast. Let's say that your hard drive suddenly gives up the ghost or your iTunes database becomes corrupted. In theory, you now have no way to move your music collection, currently stranded on your iPod, back to iTunes. But wait, there's more! If you do get iTunes running and attempt to sync, it's entirely possible

that iTunes will move the now-empty iTunes database to your iPod, leaving you with no music in iTunes and no music on your iPod. See what we mean? Ugly.

This was not a mistake on the part of Apple; Steve Jobs makes very few mistakes. It was a conscious decision that the team made to ensure that the company

This is a sign that your iTunes library is corrupted: Enough metadata is accessible for the system to know the song titles and artists, but the music files themselves—or pointers to them—have been trashed. This Lyle Lovett song is listed, but will not play.



could successfully build and maintain relationships with music publishers. And let's be honest, it was a smart decision: iTunes now generates about \$4 billion (yes, that's billion with a B) in revenue per year, largely because the publishers can deal with Apple and know that their intellectual property rights are protected. Of course, that doesn't help the poor schmoe who needs to restore several gigabytes' worth of content to a computer.

There is hope, though. If you understand a bit about iTunes' file structure and database mechanisms, or if you're willing to spring for a third-party utility, we can show you how to recover your music library and move it from your iPod back to iTunes.

### Manual Sync: The iPod's "Safe Mode"

First things first: Let's be safe. In order to make absolutely sure that you don't end up erasing your iPod, be sure to follow Golden Rule No. 1: When attempting to use iTunes to recover content that's

stranded on your mobile device, always work in Manual Sync mode.

By default, iTunes is often set to sync automatically as soon as you've connected an iPod to your computer. This is exactly what you do not want your device to do, because an unintended auto-sync is a great way to copy an empty or corrupted iTunes database over your iPod music library, thus erasing your tunes forever.

In Manual Sync mode, nothing will sync until you tell it to do so, regardless of the Sync setting listed in Preferences. To make sure that you're in Manual Sync mode when you connect your device, press and hold the SHIFT-CTRL (in Windows) or CMD-OPT (in Mac





# VOLCANUS

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**TRANSPARENT BLACK ACRYL AND BLACK INTERIOR  
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 **ENERMAX**

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



OS) keys when connecting the device to your computer. (Be sure to wait until the device shows up in iTunes' Devices list in the navigation pane on the left before releasing the keys. If you don't wait long enough, iTunes may go ahead and attempt to sync.)



Normally a helpful feature, iTunes' auto-sync can be dangerous when it's attempting to sync an empty or corrupted database over to your iPod.

## iPod File & Folder Structures

The iPod file and folder structures are a bit obscure, and file-naming conventions are downright cryptic. On the iPod, your songs live in a folder named iPod\_Control, which normally contains a Music folder. (In Windows the iPod\_Control folder is normally hidden, so you may need to unhide it.) The Music folder will itself contain cryptically named folders and files in which reside your actual songs and much of the metadata associated with them.

## A Manual Recovery Method For The Classic iPod

In Windows, you can often recover manually, if you can find and drag the appropriate folders from your iPod back over to the PC. Use My Computer to examine your attached devices. If you have an iPod connected, it will be listed there, with whatever name you used when you set it up: George's iPod, My iPod, Zaphod's iPod, etc. On the iPod, find the Music folder inside the iPod\_Control folder. Your actual tunes live in the Music folder; now that you've found it, you can, in theory, copy the entire Music folder over to your computer and then use iTunes' Add Folder

option to add to your iTunes Library the folder you just dragged back to the PC.

It's a little clunky, but this method often works if you intend to replace an entire library, if you don't mind possibly losing some metadata, and if you're using one of the classic iPods.

## Restoring Individual Songs

That's a lotta "ifs." If you'd prefer to place content directly into iTunes without using the Add Folder option; if you need to replace specific items; or if you're using an iPad, iPhone, or iPod touch, things can get messy.

In spite of the nonsensical file and subfolder names within the Music folder, it's possible to drill down into the folders to find a specific song: Try doing a search for the song title, since it will be contained somewhere within the aforementioned cryptically named files. If necessary, rename the folder containing that song, calling it something that makes sense to you. When you're finished, drag the renamed folders into another folder on your computer. At that point, you can use iTunes' Add Folder option to add the songs back to your library.

## Shortcomings Of Manual Recovery

On the classic iPod, a manual recovery is clunky but possible. With an iPod touch, an iPad, or an iPhone, things get more complicated. Because Windows and OS X see these devices simply as digital

cameras (both OSes will happily display the contents of the devices' DCIM image folders), you may not be able to get at the appropriate folder at all—at least not by using these rudimentary methods. If that's the case, you're better off using one of the third-party recovery apps discussed in this article, rather than trying to do a manual recovery. (Of course, even when using the third-party utilities, it sometimes helps to know something about the folder and file structures used by iTunes.)

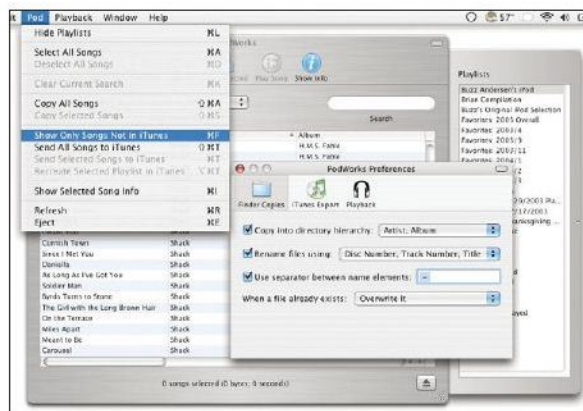
Finally, even under the best of circumstances, the manual method may not successfully recover all of your metadata. Yeah, we know that it's mainly the songs themselves that we're after, but we also know that metadata can be important: You may have spent hours compiling special playlists, building party mixes, or rating various songs. Or you may, for some inexplicable reason, be keeping tabs on how often certain songs or videos get played. With any manual method, recovery of such information can be iffy. The third-party utilities are easy to use, not very expensive (some are free), and most of them do a decent job of retaining the ID3 tags and other structures that contain your metadata.

## Third-Party Tools To The Rescue

There's no shortage of commercial utilities designed to help you recover your stranded tunes. (See the "Third-Party Recovery Tools" sidebar in this article.) They all tend to work in a similar fashion on both Mac and Windows machines. Once you've downloaded and installed the

program on your PC (you shouldn't have to install anything on your iPod/iPad/iPhone), recovery generally follows a fairly predictable pattern. Also,

Sci-Fi Hi-Fi's Mac-only PodWorks is typical of commercial recovery utilities: It's easy to use and can recover music, video, and metadata from your iPod. At \$8, it's also a steal.





## Third-Party Recovery Tools

There are dozens of useful tools out there to help you move content from your iPod, iPhone, or other device back to iTunes. Here are a few of our favorites.

Product	URL	Operating System	Free Trial?	Price
CopyTrans	<a href="http://www.copytrans.net">www.copytrans.net</a>	WinXP/Vista/7	Yes	\$19.99
iPod Access	<a href="http://www.findleydesigns.com/ipodaccess">www.findleydesigns.com/ipodaccess</a>	Win XP/Vista/7; OS X	Yes	\$19.99
iRip	<a href="http://thelittleappfactory.com/irip">thelittleappfactory.com/irip</a>	Win XP/Vista/7; OS X	Yes	\$19.95
PodWorks	<a href="http://www.scifihihi.com/podworks">www.scifihihi.com/podworks</a>	OS X	Yes	\$8
Senuti	<a href="http://www.fadingred.com/senuti">www.fadingred.com/senuti</a>	OS X	Yes	\$18
YamiPod	<a href="http://www.yamipod.com/main/modules/home">www.yamipod.com/main/modules/home</a>	Win XP/Vista/7; Linux; OS X	n/a	Free*

\* Donation requested

note that many utilities of this type offer a limited-function demo mode that you can try and see whether you like the app.

Plug your device into your system; be sure to press and hold the SHIFT-CTRL (Windows) or CMD-OPT (Apple) keys when connecting to ensure that you're in Manual Sync mode. If iTunes pops up and asks whether you'd like to sync or copy anything, say no. Launch the utility; most will ask you to close iTunes if it's open. At this point, the utility will spend some time building a database of the contents of your iPod. (This may take several minutes.)

When the program finishes its examination of your device, it will display the items it found. Select the media assets (songs, podcasts, videos, etc.) you'd like to restore. There's normally a Select All button of some sort. The utility will usually be able to tell where your iTunes data should reside on your computer. If not, you may need to point it to the target folder.

If you're running in demo mode, keep in mind that there's probably a limit to how many items the utility will recover. Some may only allow recovery of 25 items; many will allow 100 or more. Once you select the items and the utility knows where to put the recovered media, just click the button and stand back. Again, this can take several minutes.

If it's a shareware utility (and assuming that it works), do the right thing—pony up some bucks for the developer. He or she just saved your butt.

### A Specific Example: CopyTrans

WindSolutions' CopyTrans is a good example of the sort of recovery utility we're talking about here. Although CopyTrans (\$19.99; [www.copytrans.net](http://www.copytrans.net)) is a Windows app (compatible with WinXP/Vista/7), it can read and recover data from a Mac-formatted iPod. It can also recover an iTunes library from just about any Apple device, including the iPhone and iPad. We've used CopyTrans to resolve real-world iPod-related data disasters (don't ask) and had good luck with it, but it's not your only viable third-party option. We'll run through the (very few) steps required to use CopyTrans to recover your iTunes library.

After installing and running CopyTrans, the utility will tell you that you can go ahead and connect your iPod, iPhone, or other device. When you do, your device will appear in the utility's Select iPod drop-down. If you have more than one device connected, they will appear in the drop-down and you can select the one from which you intend to recover your media.

CopyTrans will examine your device and list its contents, including such metadata as Artist, Year, Rating, Date Last Played, etc. By default, all the songs and videos will be selected. If you wish to recover only a subset of the media, you can instead select individual titles.

You can select either Smart Backup or Manual Backup. In general, we recommend using Smart Backup, but if you'd

like to control every aspect of the recovery, you wish to back up your iPod to a folder, or if you want to control which track info gets transferred, use Manual Backup.

Once you've made your choice, click the Start Backup button. The utility will initialize and then begin copying your songs and videos back to iTunes.

Running on a Core2 Duo Win7 desktop machine at 2.66 GHz with 4GB of RAM, CopyTrans will recover a library of about 1,000 songs in about 15 minutes. If you have a large collection of videos stored on your device, recovery may take considerably longer, of course.

When finished, CopyTrans will display a Backup Complete window that lists the number of songs and videos it recovered. When you start iTunes again, your music and metadata should now show up as before (unless you used the Manual Backup option to change the contents prior to recovery, in which case the recovered library will reflect those changes), and the media should play correctly.

### yourTunes, Recovered

See? That's why we recommend using a third-party utility. The process is much simpler, and you're more likely to recover all of your media, along with the attendant metadata. For \$20 or less, why be frustrated? Let the pros do the hard work; you just kick back and enjoy your (newly recovered) tunes. ▲

by Rod Scher



# Open Sores

## Linux Security: Myth & Reality

In any Mac vs. PC debate, security issues tend to surface rather quickly. We've heard the same condemnation of Windows' lax security and susceptibility to malware so many times that it's generally accepted as fact. It's one of the main arguments new Mac users give for switching platforms. But in all the back-and-forth between the PC and Mac camps regarding security, Linux is, for some reason, rarely mentioned.

The general consensus is that desktop Linux OSes provide a very safe computing environment, but there is some debate about just how protected you actually are and why. In part, looking at this subject also challenges popular notions about the inherent security of Windows and Macs.

### OS vs. OS vs. OS

One commonly stated reason why it's more difficult to infect a Linux (or Mac) machine with malware, such as a virus or worm, than it is a Windows machine is because of how root access is handled on the different operating systems. On Linux and Mac OSes, both of which are based on Unix, root access (like "administrator" access on Windows) is difficult to get to without the user deliberately doing so. Therefore, malware has a harder time making inroads on the system. Windows systems often run in administrator mode by default, so they're more vulnerable in that sense.

However, to think that your Linux system is safe just because of that one layer of protection is dangerously short-sighted. First of all, you can provide root access manually, and if you do so, you can inadvertently let in the baddies. Malware attacks aside, however, there are plenty of other exploits in programs and services that run

on Linux operating systems that are ripe for the cyber-picking by ne'er-do-wells.

Indeed, Linux users can sometimes be even smugger about security than Mac users, but that bravado is misplaced, according to Jack Wallen, engineer for Louisville Geek and writer for Linux.com, TechRepublic.com, and Ghacks.net. "Nothing is immune. Period. If a machine is connected to a network of any kind, it is vulnerable."

In fact, there may be very little difference in the vulnerability of the three

Desktop Linux operating systems are often touted as being more secure than other desktop OSes, but that may not be entirely accurate.



forementioned operating systems, despite popular belief to the contrary.

Jim O'Gorman, director of incident response and intrusion analysis (read: a white hat) with risk management company Continuum Worldwide, describes the OS security situation by citing an analogy that he first heard from Charlie Miller (the fellow who hacked Mac OS X in two minutes at CanSecWest): "Running Windows is like having a house in a densely populated city with a high crime rate; you have extra locks and bars on your windows to protect



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Term



against the constant threat of crime because threats are constant. Running a Mac is more like having a house out in the middle of nowhere, where there are few people and virtually no crime. You don't even lock your door out there, because attacks almost never happen."

In other words, the first house's security is far superior to that of the second house, but that's because you're far more likely to experience an attack on the first house. To expand the analogy, O'Gorman suggests that running Linux is akin to having a house in the suburbs with a standard lock on your front door—a slight bump in security from a Mac, but still nothing approaching what Windows does.

Interestingly, what O'Gorman is saying, partly through Miller's analogy, is that OS security isn't so much a matter of inherent security vs. vulnerability as much as it is about gaming the odds that you're likely to be attacked, and to what degree. O'Gorman went so far as to say, "The fact is that Windows 7 is probably the most secure desktop OS on the market. The problem is, it's also the most attacked, so it's the one you're actually most likely to be compromised on."

This touches on the issue of ROI (return on investment); many believe that the biggest reason that Linux and Mac OSes enjoy relative freedom from certain types of malware is that they're respective user bases are too small to bother with. Targeting Windows users with an attack is likely to snag many more victims than designing something for Linux or Macs.

Not everyone agrees with this idea, including Wallen, in part because although the desktop OS market is dominated by Windows, Linux has a firm presence in the enterprise, making them high-yield targets, if not numerous ones.

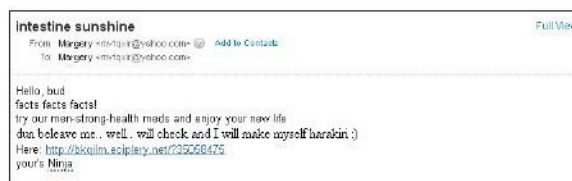
## Vulnerabilities & Protection

So what are the vulnerabilities of Linux, and what can be done about them?

Technically, Linux systems can fall victim to viruses and worms; it's just more difficult to do on Linux than it is on Windows. One aspect of Linux desktops that makes such a feat more

difficult, in addition to restricted root access, is the great diversity of Linux distributions.

"You might have an exploit that will work on, say, a Red Hat system but not work against Debian or Gentoo or Ubuntu," says O'Gorman. He notes that Windows somewhat benefits from this, as well, as there are several versions of the



Clicking links in emails such as this one or falling for phishing scams are more dangerous than a virus.

Windows operating system all currently in heavy use, while the operating system homogeneity of the Mac OS and the slightly larger user base leaves more openings for attacks.

Rootkits are a greater danger to Linux machines, as they grant root-level access to a cybercriminal who can then cover his tracks and control your machine, perhaps making it part of a botnet. Rootkits get planted onto a system through whatever exploit the evildoer can find.

Exploits are different than malware. The former is like a hole, and the latter is like a bomb you stick in the hole.

To help protect against attacks, make sure your software and operating system are up-to-date, use strong passwords, and don't run services that you don't need, as that serves only to increase your attack surface. (It's worth noting that these measures should be taken on any operating system.) You should also avoid logging in as the root user.

Wallen also suggests installing a program such as rkhunter to scan for rootkits as well as antivirus software (although some don't believe antivirus software does much for Linux other than opening you up to additional exploits).

## Social Engineering

Each of the three main desktop OSes can be hacked, infected, or exploited in various ways. But the biggest security threats

to computer users these days center on failures of the human brain more than holes in programming code. As O'Gorman says, "A lot of the modern attacks aren't really based on software vulnerabilities; they're based more on person vulnerabilities."

Social engineering attacks are on the rise, and they highlight a shift in the type of security threats users experience.

Whereas a few years ago most of us were worried about worms or viruses launched by anarchistic hackers that would kill our computers, today's cyber security threats are more likely to be well-organized scams run by teams of professional criminals. They're

less interested in anarchy than they are in simply making money.

If you fall victim to a social engineering scam, your system—and the rest of your digital life—may be totally compromised. There is no operating system that can employ common sense for you when you're out and about in the cold, hard world of the Internet. No operating system can advise you not to reply to that mysterious email and give the Irish National Lottery your banking information so you can collect your winnings.

That's why social engineering is so dangerous; there is no (or very little) hacking involved. You just hand your private and valuable information over to a cybercriminal because he found the right way to ask you for it.

It doesn't matter if a bank vault is indestructible if you can trick the guy with the combination into opening it for you.

The increase in social engineering scams, then, makes all the hullabaloo about operating system security almost moot, which is kind of funny if you like very, very dark humor. On the other hand, for many users, it's encouraging to know that you are responsible for your own security, and more or less in control of possible exploits. ▲

by Seth Colaner



# Flash Firefight

Apple & Adobe Fight For The Web

Most corporate CEO statements are business-speak fluff that the press rarely pays notice. But when Apple CEO Steve Jobs went to the Web in late April with his open letter, “Thoughts on Flash,” it suddenly became the blog post heard ’round the world.

On its iPhone, and now its iPad, mobile devices, Apple had been eschewing Adobe’s ubiquitous multimedia platform in evermore strenuous terms. Now, Jobs was reinforcing an earlier stand in no uncertain terms. The iPhone OS was not going to support Flash and instead would rely on the emerging HTML5 standard, an upcoming revision to the Web markup language that will embed multimedia and applications in a site’s basic code.

Unlike Flash, or even Apple’s own iPhone OS, HTML5 is an open standard that has been developed with the support of not only Apple but also Google and Microsoft. Any company can freely use this code, and, unlike proprietary systems, no single company can dictate its features.

The successful Flash platform was a relic of the “PC era,” Jobs proclaimed, suggesting Adobe just give up and move on: “Perhaps Adobe should focus more on creating great HTML5 tools for the future, and less on criticizing Apple for leaving the past behind,” Jobs said.

Ouch. Somehow a debate and disagreement about standards had become personal, in part perhaps because the stakes were so high and the power struggle between Adobe and Apple had become enormous.

“At times this is a lot like a battle of the titans,” says Dominique Jodoin, CEO of Bluestreak Technology, which



is one of the largest suppliers of embedded Flash solutions for devices such as set-top boxes. Millions of Web developers, tens of millions of Web sites, and billions of online video streams and ad units use the Flash platform. Arguably, Adobe has had a lock on multimedia development on the Web for years, with only deep-pocketed Microsoft having the technology and war chest to hope to compete, with its Silverlight platform.

Adobe achieved its titanic status for good reason, admits Michael Mullany, VP of Product and Marketing at Ext JS, which provides an alternative Web app development solution. “Web developers in the enterprise have had to deal with many browser versions. . . . They just want an app that allows rich behaviors and will act the same on multiple

platforms, and the few choices to do that are Flash or Adobe Flex or our own product.” But that Internet dominance ended for Adobe as the Web started moving off of the desktop and into the untamed mobile landscape.

Apple’s iPhone mobile OS on its iPhone/iPod touch/iPad hardware has become a wild hit with consumers and many developers, generating more than 200,000 applications in the iTunes App Store. Apple and Jobs are flexing their new muscles, and they have found the chink in Adobe’s armor—mobile. For years, Adobe has been trying to move the cross-platform compatibility of Flash onto smartphones, but with little traction.

“Apple is now in a position to start setting the playing field and rules for what plays on what device, and without much push back,” says Mullany.

At this early stage in the battle, it’s still unclear who has the upper hand as different major Web players hedge their bets in supporting one side or the other. As the iPad came to market, Google launched an HTML5, iPad-compatible version of its otherwise Flash-based YouTube portal, the largest source of video content on the Web. And yet Google is also adding Flash support to upcoming releases of its Android mobile OS, which may ultimately be used on Android-powered tablets. Meanwhile, the popular TV portal Hulu publicly declared it was not going to follow YouTube’s lead and would remain, for now, a Flash-based site. As such, Flash-reliant publishers and advertisers are concerned that dueling standards force them to develop their sites and ad campaigns for two platforms, which is costly.

“And Apple doesn’t care,” says Mullany.

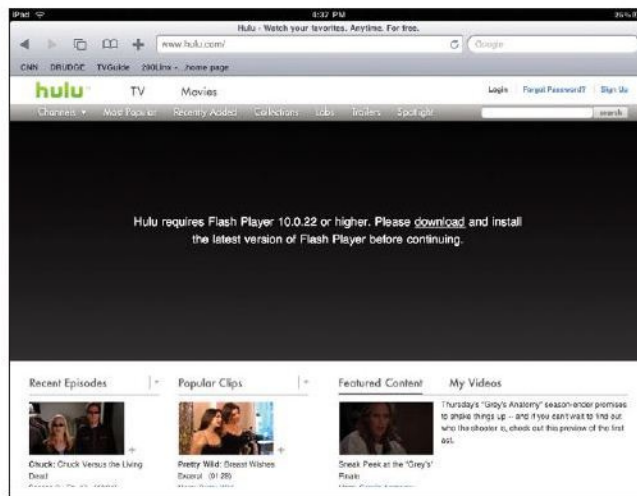


Despite the fight over Flash, the biggest battle will be waged on the smartphone front, where tens of millions of users now have full Web browsers that they expect to work on any Web site as well as a desktop browser. For now, this is not the case for any iPhone/iPod touch or for any Android that is not compatible with the latest version 2.2 upgrade.

### CEO Smackdown

In Jobs' now famous post, he argued that Flash was an outmoded approach to Web-based multimedia that was inappropriate to mobile devices. Flash allows rich interactivity and video playback with a Web site, but it is a "player-based" technology that requires users to download and keep updated client software, which plugs into the browser. It's a buggy client, Jobs said. It suffered from security holes, drained CPU resources and battery life, and was not conducive to touch interfaces. But worst of all, Jobs contended, Flash is a proprietary, closed platform that does not develop or adapt quickly to new devices, including mobiles, because its mission is to maintain compatibility across platforms. "It is not Adobe's goal to help developers write the best iPhone, iPod, and iPad apps," Jobs writes. "It is their goal to help developers write cross platform apps." In essence, Jobs says he does not want apps on his devices to be dependent on a third party for development.

In an extraordinary countermove, Adobe not only brought its own chief executives into the fray with public statements but also launched a Web ad campaign claiming that Apple's banning of Flash on its devices was an affront to users' "freedom of choice." Arguing that Apple is the company protecting proprietary closed interests, co-founders Chuck Geschke and John Warnock put out their own "Our



**Oops. No Hulu.** When Apple released its iPad without any current or intended support for Flash, Hulu stuck with Flash. Meanwhile, YouTube deployed an iPad-compatible HTML5 version.

Thoughts on Open Markets" declaration. "We believe that consumers should be able to freely access their favorite content and applications regardless of what computer they have, what browser they like, or what device suits their needs," they said, adding, "We believe that Apple, by taking the opposite approach, has taken a step that could undermine the next chapter of the Web.

"In the end, we believe the question is really this: Who controls the World Wide Web? And we believe the answer is: nobody – and everybody, but certainly not a single company."

### HTML5: Ready For Prime Time?

Although Apple's iPhone OS is itself a proprietary platform, Jobs is defending the spirit of "open" systems by throwing

its support behind the emerging HTML5 Web markup language. Currently being developed for ratification as a new standard by the W3C (World Wide Web Consortium), HTML5 is free, open-source, and a standard open to any developer. It was designed to embed application-like functionality into the basic code of a Web site. This functionality can be implemented directly from compatible browsers.

"The promise of HTML5 is that it claims to give you this seamless experience," says Ron Rogowski, principal analyst at Forrester Research, "so that you don't have to download third-

party players to look at video or interact with rich Internet applications." Rogowski recently studied Flash and HTML5 from a user's perspective and found that when implemented well, HTML5 can perform faster than Flash. The platform can help publishers because its content is more easily indexed by search engines, he says.

Mullany argues that HTML5 will support many of the features most developers are looking for from Flash now: rich animations, video playback, and the ability to run an app and store data on the local device even when disconnected from the Internet. "It's all about giving people a set of technologies that allows them to build native apps as Web sites," he says. "Apple is saying that most of the stuff you need Flash for

today you can build as next-generation Web apps in HTML5. And HTML5 is already here for mobile."

Not so fast, warns Rogowski. "HTML5 is not ready for designing rich functionality." He finds that HTML5 apps underperform player-based options when handling graphics-heavy formats. When Hulu opted

### Thoughts on Flash

Apple has a long relationship with Adobe. In fact, we met Adobe's founders when they were in their proverbial garage. Apple was their first big customer, adopting their Postscript language for our new Laserwriter printer. Apple invested in Adobe and owned around 20% of the company for many years. The two companies worked closely together to pioneer desktop publishing and there were many good times. Since that golden era, the companies have grown apart. Apple went through its near death experience, and Adobe was drawn to the corporate market with their Acrobat products. Today the two companies still work together to serve their joint creative customers – Mac users buy around half of Adobe's Creative Suite products – but beyond that there are few joint interests.

I wanted to jot down some of our thoughts on Adobe's Flash products so that customers and critics may better understand why we do not allow Flash on iPhones, iPods and iPads. Adobe has characterized our decision as being primarily business driven – they say we want to protect our App Store – but in reality it is based on technology issues. Adobe claims that we are a closed system, and that Flash is open, but in fact the opposite is true. Let me explain.

First, there's "Open".

Adobe's Flash products are 100% proprietary. They are only available from Adobe, and Adobe has sole authority as to their future enhancement, pricing, etc. While Adobe's Flash products are widely available, this does not mean they are open, since they are controlled entirely by Adobe and available only from Adobe. By almost any definition, Flash is a closed system.

**The Jobs Manifesto.** Apple CEO Steve Jobs issued an unusual point-by-point defense of his decision not to support Flash on iPhone OS devices.



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out of supporting HTML5 in its latest update, the company explained that the language was not yet able to handle the complex back-end rights management and tracking required for its business model.

Worse, the markup language is not yet a ratified standard. The W3C may be years away from declaring it a formal Web standard. Major browsers are in various stages of supporting HTML5. Microsoft is promising support in its forthcoming Internet Explorer 9 release. But, as Rogowski says, “[Microsoft is] still trying to sunset IE6; many corporate environments have enterprise apps that don’t work in higher version of IE.”

And Adobe certainly has its defenders. “If you are working with a very complex program, then developers will work with Flash for now,” says Jodoin. Many companies are heavily invested in Adobe’s integrated technologies and workflows. Adobe itself had tried to offer a translation layer in its new Creative Suite 5 to let publishers port their Flash programs into iPhone-compatible apps. But in a recent release of the iPhone SDK for developers, Apple banned the use of such tools. “That was clearly aimed at Adobe,” says Mullany. “There was a sharp intake of breath when I saw that.”

The Federal Trade Commission is taking a breath, as well. The iPhone SDK prohibition on third-party development tools has prompted an inquiry by the FTC and Department of Justice over whether Apple has violated antitrust laws.

## A Fragmented Future

What is the big fight all about, really? Everyone has their guesses. Some say Jobs still feels spurned when Adobe (which originally developed software exclusively for Apple) started supporting Windows in the mid 1990s. Other say it’s all about money. Adobe wants Flash everywhere so it can sell its development tools and make good on its write-once-distribute-everywhere promise. Apple, of course, doesn’t want to cede power or influence to a third-party software developer. But no one we consulted

seems to feel that this battle will have a clear winner. The Web is too big now, and the forces driving Flash, HTML5, and Silverlight make it hard for one to vanquish all others.

As Jodoin suggests, the war may remain unsettled because it is too dangerous to let any one company call the shots for something as vast as the Internet.

“Adobe will make up the lion’s share, but this will be eroded by Apple and Microsoft. I think you will have an oligopoly. At the end of the day, operators and device manufacturers in this ecosystem will not enable any company to become a monopoly.” ▲

by Steve Smith

## “It Is Going To Be Complicated”: Dominique Jodoin, CEO Of Bluestreak Technology

**D**ominique Jodoin’s Bluestreak Technology certainly has a stake in Apple and Adobe’s war of words. His company’s MachBlue product is a Flash-based application environment that runs apps on mobile phones for companies such as Orange in Europe and on digital TV set-top boxes for Time Warner cable. The company is developing an HTML5 version, too, because Jodoin believes this tussle will usher in a period when several technologies will thrive.

**CPU:** Has this argument between Adobe and Flash caused a lot of disruption in the development world?

**Jodoin:** There are many companies that don’t even know how to use HTML5. So far, it has not had an impact. For the moment, you have a very thriving Flash community. I think Adobe estimates that there are between 2 and 3 million Flash developers around the world. I would add that there are companies out there developing only Flash for advertisements on the Web or online gaming. So, moving

forward, one would probably guess that you won’t have a domination of one technology vs. another.

**CPU:** What do you make of Apple’s technical claims that Flash is a battery hog?

**Jodoin:** When it comes to battery drain, I can assure you that this has nothing to do with whether it is Flash or HTML. It really has to do with the art of writing embedded software in general. You can take a very good language and, if you aren’t careful, have a very badly performing app that drains the batteries of your device. That is true of all languages—HTML, Flash, and Silverlight.

**CPU:** Do any of these languages really have an edge with developers?

**Jodoin:** There is no inherent advantage of one over another. Designers will say that HTML5 is just fine for some applications, but if you try to do something that is a little bit demanding . . . in terms of graphics, Flash still has an edge. Over time I think many of those shops doing just Flash will see Apple

platforms growing and develop a competence in HTML5. It is going to be complicated. There will be many platforms, and you need to make sure the software runs on everything. You will have to do it.

**CPU:** Is this battle about money, technology, or power?

**Jodoin:** It’s not about technology. It’s about control over the Web, really. Adobe has had a very good run at it, basically giving away the client and then selling the tools. That strategy didn’t work for them in mobile. And in the set-top box, too, it is still a very new market for them.

**CPU:** Then what is behind Apple’s strong tactics?

**Jodoin:** It’s not a technical reason. It’s not a business reason, because there are a lot of users out there asking Apple to change their mind and introduce Flash. Is it personal? History? Who knows? But Apple is the only company on the face of the earth to go their own way and have users follow.



# The Department Of Stuff

by Rob "CmdrTaco" Malda

## unique.txt

**Y**ou are a unique and beautiful snowflake, whether you like it or not.

Privacy on the Internet has dramatically eroded over the last couple of decades. Of course, in the earliest days, you didn't really have any privacy anyway: Everyone on the net basically knew everyone else. This is part of why even today in 2010, protocols that we depend on like SMTP are almost unauthenticatable, and accurately identifying most users is at best an educated guess. The early Internet was anonymous because getting online was actually quite difficult, typically requiring things like access to a very expensive computer science lab at a big college.

Facebook has gone out of its way to slowly erode your privacy. Over the last few years, it has risen from collegiate novelty toy to de facto profile on the Internet. Their executives know exactly what they have, and they are fighting to maintain it on two fronts. First, they refuse to cleanly export their data to anyone else. That's why systems like Twitter and Buzz easily export their contents by using open standards or easily accessible APIs . . . they are desperate to unseat Facebook from the center of the 'Net for most casual users.

Second, Facebook continuously attempts to expose more of your private data. This has been ongoing throughout the life of the site, but in the last few months it has toggled the bulk of most user information to be available to the world at large. Originally, almost every bit of data was private, visible only to your friends. But Facebook has continuously expanded this to networks and finally to strangers. And do you really want total strangers looking at pictures of your kids and reading a status message saying that you're out of town and missing them?

Of course, if you understand the problem and are willing to spend a significant amount of time reading and clicking dozens of buried options, you can restore your privacy to roughly the same place it was before. But the folks at Facebook know you won't, and you exposing yourself to the Internet means more potential revenue to them. They will probably apologize by the time this article

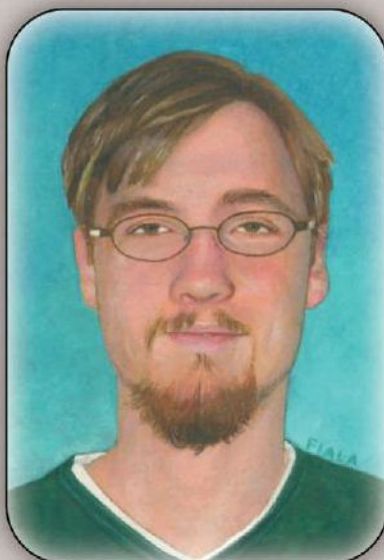
hits print, and maybe even provide an easier user interface for making your data less publicly available, but at some point they'll do it again. Your data is just too valuable to them.

In the early days of the Web, the greatest evil was the cookie, a tiny string that clung to your browser and allowed a Web page to remember who you were from one page load to the next. The privacy advocates fought it and ultimately lost. As JavaScript ascended, the situation worsened, and even more information could be reported back to the server. This has given rise to countless analytics packages that really wouldn't have been possible years ago. So, the security-minded Web user now has no choice but to disable cookies and JavaScript and perhaps even randomize his IP by visiting the 'Net through an anonymizing proxy service like Tor.

The EFF recently released fascinating information that proves just how little anonymity the Web affords today. By tracking every bit of information available to the Web service (including things like available plug-ins, screen resolution, time zone, and even installed fonts), the testing software at [panoptickick.eff.org](http://panoptickick.eff.org) can show you just how easy you are to identify online. My browser, for instance, was uniquely identified among nearly a million tested clients.

They might not know my address, but they can follow me in a crowd. That information in the hands of a less scrupulous owner could be dangerous. After all, it's only a matter of time before you enter some key piece of information that ties your browser fingerprint to your meatspace person.

Perhaps this is just old Internet thinking: maybe privacy really doesn't exist. This position has been trumpeted by several very powerful and rich tech executives over the years, going back to Sun Microsystems co-founder Scott McNealy's famous 1999 bombshell, "You have zero privacy anyway. Get over it." But I really hope that isn't the case: I fear a Web where every page I visit knows my name, address, and complete browsing history. You should, too. ▲



*Rob "CmdrTaco" Malda is the creator and director of the popular News for Nerds Web site [Slashdot.org](http://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)



Yeah, we know you have blogs to post, video to encode, reports to write, and code to compile. We do, too, but you have to take a break once in a while (and maybe blow some stuff up). That's why each month we give you the lowdown on what to expect from the latest interesting PC and console games.

**CPU**  
Game Of The Month

# ALAN WAKE

\$59.99 (X360)

ESRB: (T)een

Microsoft Game Studios

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

Some of my all-time favorites are survival-horror games. When properly executed, a survival-horror game presents opportunities to engage in frenetic combat, solve puzzles, piece together interesting stories, and, of course, to get a good scare now and again. But throughout the history of the genre, most SH games have fallen readily into one of two sub-types: Action games with over-the-top boss fights that frequently startle you, such as Resident Evil, and disturbing games such as Silent Hill that create palpable tension that occasionally gives way to genuine, primal fear.

Certainly there are instances where these sub-genres overlap, and I'm not prepared to certify that there have been no exceptions prior to now (even Resident Evil and Silent Hill contain some parallels), but Alan Wake is unique in that it combines most if not all elements of both types, and adds to that a truly engrossing story, solid voice acting, and high production values. It's the real deal, a full-tilt thriller that has taken a long time arriving but is well worth the wait.

Although they don't weigh it down, Alan Wake contains its fair share of horror fiction standbys: A young couple

## Return To The Light -by Chris Trumble

from the city (the titular character and his wife Alice) with past demons to exorcise takes a vacation in a small, remote town (Bright Falls) with a checkered history and more than a couple highly eccentric residents. The protagonist is a bestselling novelist who's currently crawling through the worst dry spell of his literary career, and who has of late been troubled by bizarre nightmares. You already know this vacation is headed south on the double time, don't you?

The opening sequence introduces you to Alan's tattered mental state, simultaneously providing a crash course on how the game's primary combat mechanics work. This game is all about finding and creating light in the darkness; light protects you and weakens your enemies, making them vulnerable to more conventional assaults. As such, Alan's flashlight

is literally as vital to his survival as are the weapons he'll have access to now and again throughout the game.

Soon after, the game's mind-bending story descends upon you like madness, leaving you in a fight to keep your character alive and to find out who or what is behind the uprooting of his life.

A story this good is enough to keep most players going, but you won't need a ton of incentive to play Alan Wake—the game is one of those rare gems that make it hard for you to put down the controller.

If I had to pick one thing to gripe about, I suppose I'd point out that the game is extremely linear in nature. This isn't really an issue, though, because the urgency of Wake's situation demands action and makes the kind of pokey, OCD-ish exploration some of us like to indulge in seem entirely out of place. Also, the feverish pace at which the game prompts you to play (you'll occasionally get a little "nudge" if you try to slow things down too much) ultimately adds to the sense of disorientation and desperation that makes Alan Wake the kind of game that's best played alone, with the lights out. ▲





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# TOM CLANCY'S SPLINTER CELL CONVICTION

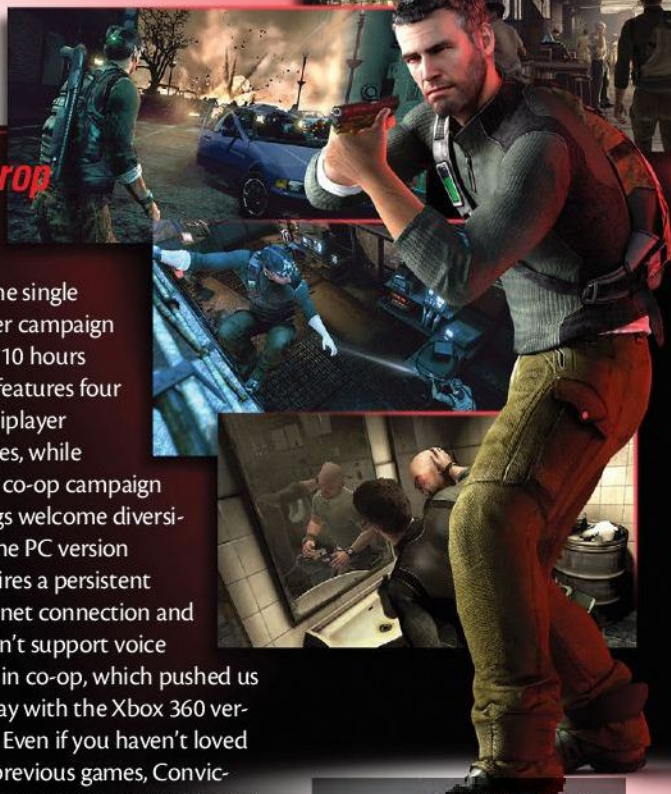
## Reinvention Of The Franchise—by Dr. Malaprop

We last saw Sam in Double Agent after the death of his only child, Sarah. Conviction picks up three years later with Sam searching for the truth behind his daughter's demise—and discovering a much larger conspiracy along the way. The 11 levels include scenarios in war zones from Sam's past to present-day locations, such as Washington, D.C., and the plot leans on Sam's history. We liked the in-game film projector effect used to seamlessly blend contextual plot point flashbacks and mission objectives into the environment.

This has traditionally been a difficult stealth series, so

veteran franchise players may cry heresy at the liberties taken to make Conviction accessible to a broader audience. Still, we liked the changes. You're not going to worry about lock picking and trial-and-error deaths. When a hostile sees you, your position is marked with your outline to denote it as your last known position. As they focus on this position, you can flank and take them out. Hands-on melee kills are rewarded with the ability to mark and execute up to four enemies. This new mark and execute feature lets Sam tag (mark) enemies from concealment and then drop in to take everyone out with a button press (execute).

The single player campaign lasts 10 hours and features four multiplayer modes, while brief co-op campaign brings welcome diversity. The PC version requires a persistent Internet connection and doesn't support voice chat in co-op, which pushed us to stay with the Xbox 360 version. Even if you haven't loved the previous games, Conviction is engaging, accessible, and the first Splinter Cell many will actually want to finish. ▲



\$59.99 (X360, PC)

ESRB: (M)ature • Ubisoft

splintercell.us.ubi.com/conviction

# 2010 FIFA WORLD CUP SOUTH AFRICA™

\$59.99 (X360, PS3); \$49.99 (Wii) • ESRB: (T)een  
Electronic Arts • fifa-world-cup.easports.com

## Football Everywhere Else—by Dr. Malaprop

Football/soccer is the biggest spectator sport in the world. Every four years, countries from around the globe compete for the coveted World Cup. It's heady, passionate stuff embraced by people everywhere from all walks of life. The World Cup will be well under way in South Africa as you read this, and EA captures its spirit beautifully.

Presentation is superb. Play feels authentic. Core move, pass, shoot, and tackle controls are streamlined, and the game is accessible without feeling dumbed

down. Milky smooth animations of the 22 players on the field brought the game home to us. You'd be forgiven for thinking it was an actual match on television. Even the referee can be hit by the ball as he trots back and forth. The ball itself animates in a very lifelike manner with dead-on physics.

The Captain Your Country mode lets you import your FIFA 10 Soccer player and fine-tunes the mechanics of that game's Be A Pro mode. You can also play the Online FIFA World Cup

tournament against real players in a virtual World Cup. Being able to have games with up to four players in co-op makes team play more entertaining than ever before.

Clear similarities exist with last year's FIFA 10 Soccer, but the noteworthy updates in this newest release have already driven that last version from our minds. The \$60 price is steep, but FIFA South Africa is the best soccer game you can buy, so perhaps it's justified. ▲





# ASSASSIN'S CREED II

## Excellent, But Flawed—by Dr. Malaprop

Assassin's Creed II released to consoles in late 2009 and has finally arrived on the PC. Our Assassin's Creed II review in the January 2010 issue of *CPU* holds true here except that controls are now fully customizable with a mouse and keyboard. That said, it plays best with an Xbox 360 controller on the PC. The PC game also includes two additional missions that were offered as optional content for the Xbox 360 and PS3.

This remains an excellent game and looks exquisite on the PC. Unfortunately, the higher-than-normal cost of entry for a PC game puts a damper on things. AC2 was priced at \$30 on Amazon as we went to press, but full MSRP was listed at other retailers. The real news is a DRM copy protection scheme that requires you to be constantly connected to the Internet (Ubisoft's *Splinter Cell: Conviction* requires the same). If your Internet connection drops—or you don't happen to be online—then you have no game to play. We recommend checking out the Xbox 360 version on sale if the PC DRM seems overly onerous. ▲



\$59.99 (PC) • \$39.99 (X360)

ESRB: (M)ature

Ubisoft

[assassinscreed.us.ubi.com/assassins-creed-2](http://assassinscreed.us.ubi.com/assassins-creed-2)



# STAR CRAFT II

WINGS OF LIBERTY™

## Readying For The Next Stage Of Spectator Sport

—by Dr. Malaprop



\$59.99 (PC) • ESRB: (T)een

Blizzard Entertainment • [us.starcraft2.com](http://us.starcraft2.com)

The intense level of RTS competition around StarCraft's multiplayer portion has kept it relevant since the game's 1998 release. In Korea, StarCraft is a national phenomenon, a spectator sport with dedicated TV channels and millions of fans. Blizzard has been using the SC2 multiplayer beta to fine-tune the competitive multiplayer design before releasing StarCraft II: Wings Of Liberty in late July 2010.

SC2 does not support LAN play, and the Battle.net 2.0 matchmaking service will become a multiplayer requirement. Version 2.0 matches players by skill, includes social hooks, and features a marketplace to sell maps. Unlike some modern RTSes that eschew base building and resource harvesting, these aspects remain crucial in SC2. There's a new spectator mode, heavier stat tracking, and a replay system to review matches. Obvious changes are 3D graphics that introduce random weather effects and destructible terrain. Finally, a pile of new unit and building types leaves room for new strategies. The same core game with its nuanced changes will likely keep SC2 relevant for the next decade. ▲





# SUPER STREET FIGHTER IV

## Excellence In Iteration—by Dr. Malaprop

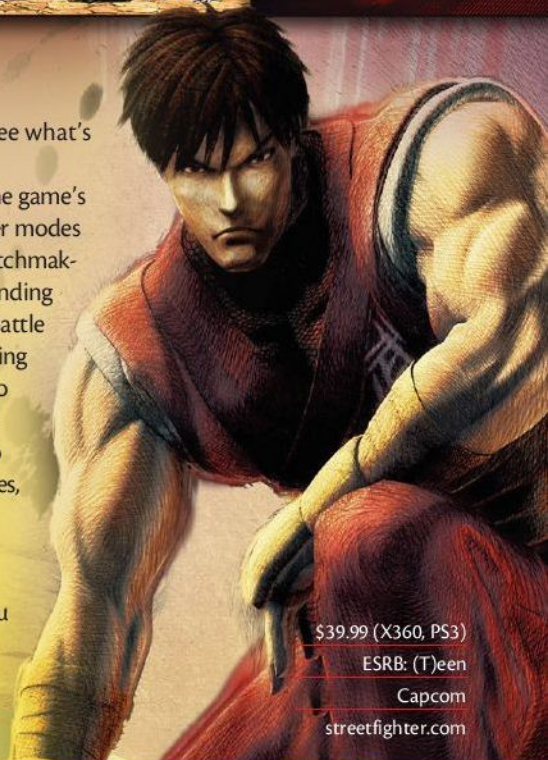
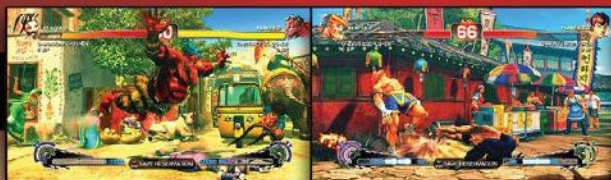
Capcom released Street Fighter IV in February 2009. Does adding the word “Super” mean this version has much more to offer? The answer is a resounding yes. SSFIV is still the classic 2D fighting game and stays true to the core combat mechanics, yet it does some slight rebalancing and adds new backgrounds and moves. The biggest update is the addition of 10 characters selected from the Street Fighter universe, bringing the total roster to 35 and adding a slew of new play styles for players to master.

You’ll have the option to play Arcade, Versus, Network Battle, Challenge, and Training modes. The Challenge mode cuts Survival and Time Trial challenge modes but adds the Car Crasher and Barrel Buster challenges. The Trial mode returns with 24 levels where each requires you to perform combos and moves. Unfortunately, many of these are fiendishly difficult to

complete without having a demo to see what’s being requested.

The other significant update lies in the game’s network code. SSFIV’s online multiplayer modes are significantly improved, better at matchmaking and accentuate the game’s long-standing arcade roots. For example, the Endless Battle mode keeps the winning fighter in the ring as contenders line up to fight. You get to watch the games being played ahead of you to plot out your strategy. You’ll also find online Team battles, ranked matches, and more.

The \$40 price makes Super Street Fighter IV a great value even if you already own the last game. And if you don’t own the previous release, the attractive price might encourage you into one of the genre’s best. ▲



\$39.99 (X360, PS3)

ESRB: (T)een

Capcom

streetfighter.com

# The Whispered World

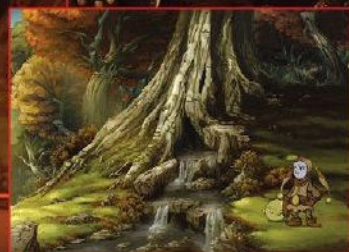
## Jest A Fairy Tale Adventure—by Dr. Malaprop

\$29.99 (PC) • ESRB: (E)veryone

Viva Media, Koch Media the-whispered-world.com

Regular readers of this section will recognize our passion for great games, including classics (and genres) from yesteryear. One such genre is point-and-click adventure gaming. We recently happened across a new title called The Whispered World in which you play as a gloomy clown called Sadwick. He’s got no love of jest and wants to be free from the trappings of his life, which leads him into a fairy tale adventure with his pet caterpillar, Spot. He’s really a pretty miserable character.

Fortunately, the game has an enjoyable story that contrasts the bleakness of Sadwick with plenty of humor, an above average script, and beautifully drawn backgrounds and characters. The Whispered World, however, suffers in two areas: the shoddy voice acting and several puzzles that don’t make sense within the game’s or the world’s contexts. You progress by searching your environments and solving puzzles, but the existence of nonsensical puzzles deters from what might otherwise have been a better adventure. We liked it, but the flaws may be too much for more casual adventurers. ▲







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# The Cutting Edge

by Barry Brenesal

## Torres' Computer

More than four years ago, the very first "Cutting Edge" column concerned itself with Charles Babbage's Analytical and Difference Engines. They were computers, designed in 1834 and 1847, respectively, which went unbuilt for lack of funds until recently when London's Science Museum built the simplest of them (weighing in at 2.6 tons) for the inventor's 200th birthday celebrations. (Sadly, he didn't attend.) But the first computer to actually make it beyond the design stage may well have been the one unveiled before a startled audience at a 1920 conference in Paris, celebrating the centenary of the Colmar calculating machine.

The inventor was Leonardo Torres y Quevedo. As early as 1893, he had presented a paper before the Spanish Royal Academy of Sciences, describing in detail a machine that could calculate the roots of algebraic equations up to eight terms, to a precision of thousandths. Twenty years later in his "Essays on Automatics," Torres discussed Babbage's computer engines and offered up a complete schematic design for one of his own that could calculate the value of a specific algebraic formula for a sequence of user-determined variables, employing electromagnetic switches instead of chips to store data (such as operations via built-in function tables), provisions for conditional branching, and the earliest known reference to floating-point arithmetic.

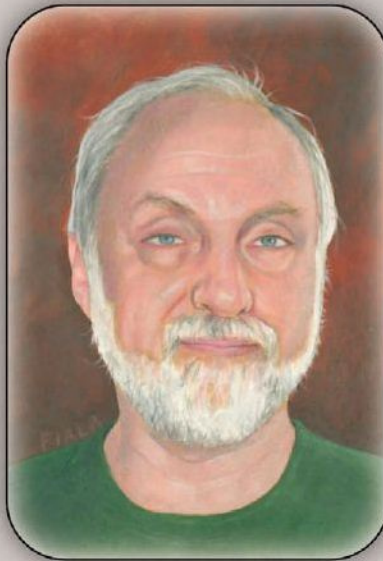
But these were never constructed. Torres' 1920 "electromagnetic arithmometer" was another matter. Not only could it perform arithmetic operations, but in a haunting pre-echo of Douglas Engelbart's 1968 "Mother of All Demos" with its multiple achievements, it did so remotely using a typewriter—which is to say, a keyboard input and output display device. For Torres, however, this wasn't a shot at a commercial venture. It was simply proof of concept, or as he put it, "I therefore believe we have grounds to say that we can automate any arbitrary mechanical operation."

If this remark sounds suspiciously like promotional copy for robotics, the inventor was active in that nascent field, as well. When he patented a new type of dirigible in 1896 but was understandably concerned about testing it with humans onboard (hydrogen was highly

inflammable, and the 1937 Hindenburg disaster would eventually put paid to commercial airship travel), Torres developed Telekine, primitive robotic circuitry that executed commands remotely, via telegraphy. He further adapted it in 1906 to demonstrate before the Spanish king and a huge crowd, bringing a dinghy with eight people aboard safely over a mile into port at Bilbao. Torres' plans to develop a remote-controlled torpedo were never funded, but that RC hotrod you used to send crashing into walls and your Aunt Edna's weak ankles when you were a kid started here.

Torres has another claim to computer fame in his automated chess player, the first of its kind. Unlike all previous incarnations of its kind—including the celebrated "mechanized" Turk, which played Benjamin Franklin, and won—Torres' version was the real thing rather than a clever fraud. Called *El Ajedrecista*, it was finished in 1911 and displayed at the Paris World of 1914 to great fanfare. It used algorithms to calculate endgames only, based on White (played by the computer) with a rook and king against Black (the human) with a king. It always delivered a checkmate and utilized a mechanical arm to move its pieces. (You might think a checkmate under such conditions was easy to achieve, but remember: This was the first time it was accomplished without human direction and by calculating not only a single path to success, but every possible success based on a range of inputted human moves.) Working under his father's supervision, Torres' son, Gonzalo, created a version with magnetized plates beneath the board in 1920 that automated movement.

Torres was highly regarded in his time, receiving numerous honors and preferment both at home and in France. The contrast with Babbage's obscurity is pronounced, but the latter had bad luck and exasperating eccentricities on his side, including an anti-hoop-rolling campaign and endless letters to newspapers on the evils of organ grinders. Torres, by contrast, had eight children and never engaged in aberrant social behavior, possibly because he had neither the time nor the energy. There's probably a moral in that, somewhere. ▲



*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.*

Contact Barry at [barry@cpumag.com](mailto:barry@cpumag.com)



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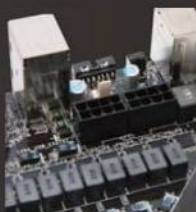
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# Software

## Tips & Projects

### Work Faster In Windows 7

**W**indows 7 may have garnered praise and millions of upgrades from users worldwide, but there's always room for tweaking. For power users, operating systems often impede efficiency rather than improve it, and all of us are looking for quicker ways to do the most common tasks. This month, we return to Win7. We'll focus first on streamlining file and folder management with some old and new tricks.

Some classic tweaks never go out of style, but sometimes we either forget or lose them in the upgrade process. Here are some of our favorite time-savers that still work in Win7.

#### Open With Notepad

Power users often prefer to open simple text files with Windows' Notepad program because it is quick and doesn't clutter a file with word processor code. You can always open a file with Notepad by right-clicking and going through the Open With pop-up menu, which usually forces you to scroll to Notepad.exe in order to open the document with this simple text editor. But you can bolt the option onto the top level of your context menu by opening the Registry Editor (type **regedit** in the Start box) and navigating to `HKEY_CLASSES_ROOT\*\SHELL`. Right-click `SHELL`, point to **New**, and choose **Key**. Name the new sub-key "Open with Notepad." Right-click this new sub-key, again add a new key, and name it "Command." Highlight the "Command" sub-key and double-click the Default

Value in the right pane. In the Value field, type **notepad.exe %1** and click OK to make the change to your context menu immediately—no reboot required.

#### Add File Skills To Context Menus

One of the handiest context menu modifications ever is adding Copy To and Move To commands. In the Registry Editor, go to `HKEY_CLASSES_ROOT\ALLFILESYSTEMOBJECTS\SHELL\CONTEXTMENUHANDLERS`. Right-click this sub-key to make a new key named "Copy To." Highlight this new sub-key and double-click the Default Value in the right-hand pane. In the Value Name box, type `{C2FBB630-2971-11D1-A18C-00C04FD75D13}`. (Note that this is case-sensitive.) Now your context menu will include a Copy To Folder option that will bring up a file tree window for you to copy a file into any folder.

For the Move To option, again right-click the `HKEY_CLASSES_ROOT\ALLFILESYSTEMOBJECTS\SHELL\CONTEXTMENUHANDLERS` and create a new key named "Move To." In

that new key's Value Data box, type `{C2FBB631-2971-11D1-A18C-00C04FD75D13}` (again, case-sensitive). By the way, these Copy To and Move To context commands will also work if you highlight multiple files.

While we're doing context menu tweaks, here's one that will add a specific custom destination to the Send To command. First, you need to tell Win7 to show the hidden system files if you haven't done so already.

On the drive where Windows is installed (assuming here it is C:), navigate to `C:\Users\username\AppData\Roaming\Microsoft\Windows\SendTo`. You will find in this folder the shortcuts to all of the destinations that pop up off of the Send To command on the context menu in Explorer. Right-click an open space in this window. Click **New** and **Shortcut**. The Create Shortcut dialog box will open, prompting you for a destination folder. You can either input the path or use the Browse button to find a deeply nested folder. Click **Next**, name the shortcut, and then click **Finish** to activate. The new target will appear in your Send To menu immediately.

#### Learning Libraries

Win7's Libraries is a new feature aimed at managing the mess of files that accumulates on our systems. Additionally, it's easy to confuse Libraries with the Favorites bookmarking feature that is held over from previous versions of Windows. Both are visible in the left-hand navigation pane of Explorer windows. But rather than serve as navigational shortcuts to folders on your system, Libraries actually aggregate files and sub-folders from multiple locations on your hard drive into a single view. To see how



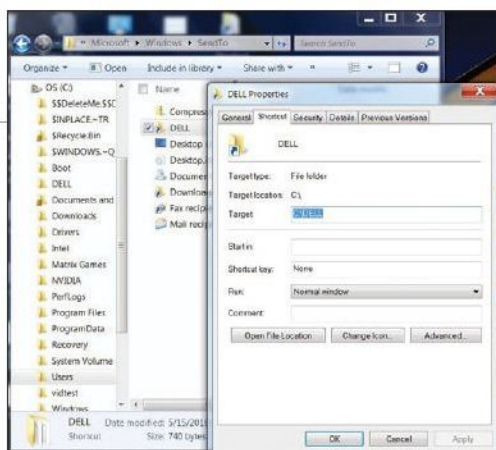
Many old Registry tricks still work in Windows 7, including new keys that add Copy To and Move To commands to your context menus.



You can add shortcuts to your Send To context menu by creating them in a hidden User folder.

this works, open an Explorer window, right-click the Music Library, and bring up its Properties window. The Library Locations pane at the top shows the locations that are aggregated in this Library. You can easily add locations to these prebuilt Libraries for Documents, Music, Pictures, and Videos by clicking the Include A Folder button and navigating to the destination you want to add. In this same window, you can also change the order in which the folders appear in the default Library view. Right-click any of the entries in the Library Locations pane, and you have the option to move the folder up or down in the order.

Libraries actually are a powerful way to organize disparate data and to view the files in ways that would have been difficult in previous versions of Windows. For instance, you can create your own Library by clicking the Libraries item in the Explorer navigation pane and using the New Library command from the Menu bar. For example, you could name it Taxes. Click the new Library, and the main pane will prompt you to add folders.



Let's say you keep all of your letters to the IRS and accountant in one folder, PDFs of relevant bank statements in another, and Excel spreadsheets of your deductions in a third. Adding all three to this Library will make them all accessible and searchable from a single window.

By default, the Library view shows you the content by folder, but you can use the drop-down Type menu to look across the contents of these multiple folders by date modified, file type, file name, and any tags you applied to the files.

If your needs are simpler than what Libraries provide and you just want quicker access to your often used folders, then try Favorites. Go into any folder in Explorer, then right-click the Favorites item in the left-hand task pane. Select

Add Current Location To Favorites, and a shortcut to the folder will become available in any Explorer window.

## Invoke File Copy Options

Here's another file management tip that many people are unaware of. As Windows veterans know, drag-and-drop operations on files behave differently according to their context. When you drag files to a different folder on the same partition, Windows automatically moves them, but when dragging and dropping across different partitions Windows makes a copy in the destination folder. And then there are the hard-to-recall keyboard-mouse combos that will force move and copy options when you drag and drop. That's a lot to remember. But to ensure you get the right operation, develop the habit of dragging and dropping files with the right mouse button. When using this method, Windows pops up a menu of options to move, copy, or make a shortcut to the files. You will get it right every time. ▲

by Steve Smith

## Windows Tip Of The Month

After years of being pestered by Windows' pop-up notification messages in the System Tray, we now have in Windows 7 more granular control over the warnings that really matter. In the Start search box, type Action Center to bring up this console. Click into the Action Center settings option to see options for toggling off or on different security and maintenance messages.

## Registry Tip Of The Month

Because we've dived into the Windows 7 Registry to reassert some classic advanced tweaks this month, it may be worthwhile to review essentials for working in this part of Windows. Regedit will always reopen itself precisely where you left off, sometimes burying you deep within the massive key branches of the Registry. The quick way to collapse the entire tree and return to the top of the tree is to keep the left arrow key depressed. Voila.

Also, before making a major change to a Registry key, protect yourself from errors by backing up the original state of that Key before modifying. Highlight the key just above the sub-key you want to change. Use the File>Export command to save that key as a .REG file (use a name that describes the key or change). If your Registry tweak goes awry, double-clicking a backed up Registry key will restore it to its original state.

## Infinite Loop

### If You Hype It, They Will Believe

When Apple's minions tell you that its devices are "magical" and "revolutionary," you *can* be skeptical. And if you know this, dear reader, please pass our advice along to your more suggestible buddies, because our British friends didn't appear to get the memo. Tesco Mobile asked 4,000 blokes aged 18 to 85 to rank the top 100 greatest inventions. The list makes pretty good sense until you see that the iPhone has captured the No. 8 spot—ahead of the internal combustion engine, refrigerators, and beds.



Source: tech.fortune.cnn.com/2010/05/20/britis-vote-iphone-8th-greatest-invention/





# Warm Up To Penguins

## Computer-Aided Design With Linux

A computer-aided design program is an application that helps people design objects, typically in 3D, without necessarily creating the objects. Because CAD programs are used to design objects, they can mean different things to different people. For example, a graphic artist working on a movie will use one CAD package, while an architect designing a building will use a completely different package. There are several commercial and open-source CAD programs available for Linux.

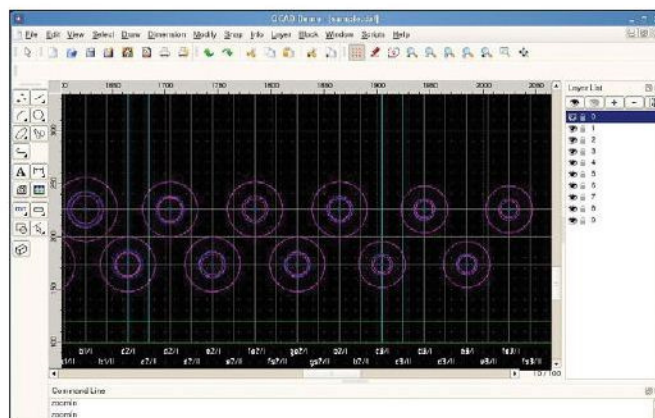
### CAD Before & After The “C”

Long before there were computers, engineers designed all sorts of things—buildings, machines, everyday goods—using nothing more than ink and paper. The designers would often draw the object in multiple views so that you could get an idea of what the actual object would look like.

Often the drawings would specify the dimensions, as well as front, back, left, right, top, and bottom views, of the object specified to make it easier to determine how to build it. This method of designing is known as drafting, because the original designs were created on drafting boards.

As computers started moving into the industrial and manufacturing world, CAD software followed, not far behind.

Because of the history of design, early versions of these programs were little more than electronic drafting boards that let people quickly, easily, and consistently make the above-mentioned drawings. Indeed, many 2D CAD systems to this day are essentially computerized drafting boards that simplify making precise geometric shapes without needing a ruler or compass. The idea of simply drawing out



QCAD is a simple 2D CAD package good for students or anyone interested in getting started with CAD software.

something from different views is so prevalent that even the most basic CAD programs have a drafting component. These types of 2D CAD systems are primarily targeted for beginners or students who want to get started in CAD.

But even though 2D CAD may appear to be limited in this day and age, there are a surprising number of areas where they are useful. For example, if you're thinking

about remodeling a room in your home, using a 2D CAD package could speed up the process. You could take some quick measurements of the furniture, windows, and doors in the room and then draw them in the CAD program. You can then try different configurations to see what objects can physically go where in the room without actually moving furniture around.

### The 2D World Of QCad

QCAD is a 2D CAD program developed by RibbonSoft that works with Linux, Mac, and Windows and is available in both paid and open-source versions. The open-source version of QCad, known as QCad Community Edition, lacks some functionality of the full commercial version and is not available for Windows. For example, the paid version, QCad Professional, has a scripting module that the Community Edition lacks. That means that you cannot automate creating repetitive drawings or parts of drawings. QCad Professional also provides much more comprehensive polyline support than the open-source version.

But because it is open source, if you're savvy with a compiler and open-source tools, you can probably roll your own binary. A trial version of QCad Pro is available if you want to kick the tires first.

### Another Dimension

As computer technology advanced and designers became more sophisticated, CAD programs adapted. The CAD programs started letting designers create parts in 3D. Designers could move objects around arbitrarily or relative to each other. Parts started having parameters beyond basic geometric values such as length, width, height, and having relationships to other parts. To illustrate, suppose you were designing a screw and a nut. With a 3D CAD program, you could tie the radius of one to the other. If you change the radius of one, the CAD program would necessarily update the other without requiring you to do any of the work. With basic 2D CAD programs, you





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would generally have to redraw several views to reflect the new radius.

Because the 3D CAD market is highly specialized, it's largely made up of commercial vendors catering to their specific market segment. And because of this highly specialized nature, it's hard to find open-source alternatives. This is quite different from the rest of the software industry, where an application's features are typically usable in a variety of disciplines. For example, the ability to add a fade-out effect to an audio file can be useful for almost any type of audio editing. However, CAD programs that can do stress analysis, for example, aren't nearly as widely applicable. This isn't to say, however, that finding open-source 3D CAD programs is impossible.

Blender ([www.blender.org](http://www.blender.org)) is an open-source, multiplatform, 3D CAD animation package. It lets you create an array of shapes and objects, from simple points, lines, circles, and triangles to more complex surfaces. Blender also includes basic video-editing capabilities to help you create your own animations. It has a number of features specifically designed for computer animation, including collision detection, morphing, and the ability to simulate hair and fur. Although Blender has yet to gain widespread acceptance, several projects have put the application to work, including the Oscar-nominated animated feature film "The Secret Of Kells."

Of the various 3D CAD markets, the manufacturing industry boasts some of the most advanced programs. This market is dominated by companies that make everything from cars and airplanes to home appliances and custom-made machinery. And the CAD programs developed to support this market have to be flexible enough to support all of these different uses. The requirement for CAD packages geared toward manufacturing is to provide a realistic representation of the objects created. Although this particular segment of the CAD market is dominated by commercial offerings, an open-source newcomer may one day prove to be a viable open alternative to its commercial counterparts.

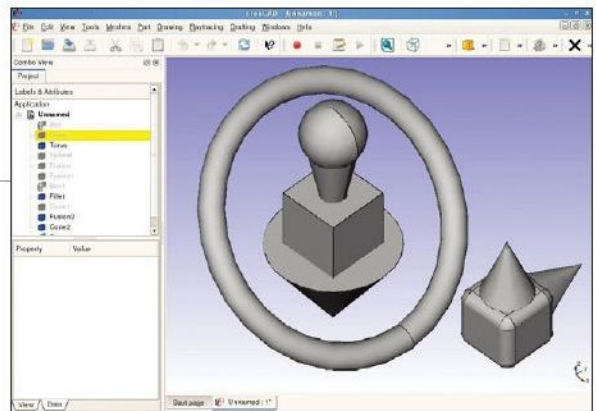
FreeCAD ([free-cad.sourceforge.net](http://free-cad.sourceforge.net)) is an open-source project aimed at creating a

**FreeCAD is an ambitious 3D CAD program that aims to provide an open-source, commercial-grade, high-end CAD system.**

general 3D CAD package suitable for engineering use. Don't confuse FreeCAD with freeCAD, another open-source CAD package that has since been retired by its developer.

FreeCAD is still very early in its development, and even its development team notes that it's not ready for end users. (Keep this in mind when using the software.) FreeCAD can be used to create 2D drawings, 3D models, and high-quality static images. Complex CAD packages have their own geometric modeling kernels to keep track of all the attributes of every object you create, and FreeCAD is no different. It uses the Open CASCADE kernel ([www.opencascade.org](http://www.opencascade.org)), which is based on the older EUCLID CAD program. FreeCAD has a modules framework and can be scripted with Python, so it's possible to extend and automate it.

Because FreeCAD is so early in its development cycle, its developers are currently only able to provide precompiled Windows binaries. However, its site does provide information on building it on a number of popular Linux flavors, as well as Mac. But don't worry if you're using a Linux distribution that isn't listed; it's really not that hard to build FreeCAD. Most of its prerequisites are available in most distributions, but there are some that are uncommon. In particular, you may run into the most problems with the Open CASCADE, Coin3D, and SoQt libraries, but they're all freely available. Once you've built FreeCAD and any missing libraries, you'll find that you have a stable CAD system. Although still clearly in development, FreeCAD nonetheless lets you get your feet wet with serious 3D CAD design.



Programs in the CAD field help animators create films and engineers design cars. Although there are a limited number of open-source CAD packages, those that are available span the gamut of the overall CAD market. ▲

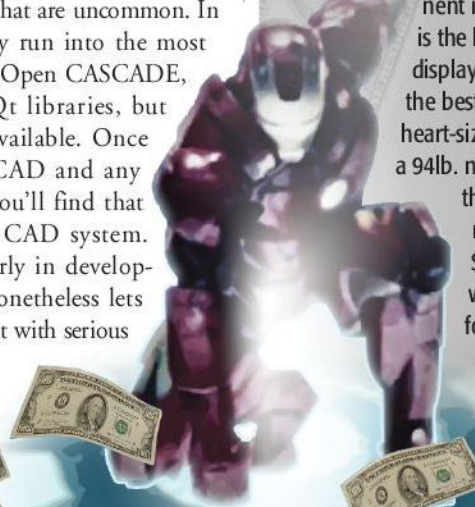
by John Jung

## Infinite Loop

### DIY Iron Man Suit, Just Add \$100 Million

Let's start by setting our Disbelief state to "Suspend," because io9 has cobbled together an Iron Man suit using (mostly) real-world technology. The finished product is more Mark I than Mark III, but it still shows you just how close you can come to flying the friendly skies, Tony Stark-style.

The priciest component in this menagerie is the head-mounted display (only because the best alternative to a heart-sized arc reactor is a 94lb. nuclear reactor that NASA estimates would cost \$36 million), which rings up for \$54.1 million.



Source: io9.com/5533077/how-much-would-it-cost-to-build-a-real-iron-man-suit



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# Shavings From The Rumour Mill

by Mike Magee

## Instant Computing Is Only A Few Years Away

I spent two days at the International Electronics Forum 2010 in Dresden. Man, the people from the semiconductor world who attend these types of events are high fliers.

Apart from executives from GlobalFoundries and TSMC—foundries that together make a lot of chips for the likes of AMD-ATI, Nvidia, Qualcomm, and the rest, there were also academics high up in the wireless world who have roadmaps for the comparatively near future that promise a technological feast to come.

A German academic at Dresden's Technical University outlined a vision of the future that is either exciting or alarming, depending on your point of view. While Intel and a number of Taiwanese manufacturers are pushing WiMAX as the fourth wireless generation, mobile operators think 4G is far more likely to be based on a standard called LTE (Long Term Evolution). Right now, big companies like Texas Instruments are making LTE support chips, and it's only a matter of time (perhaps a year or 18 months) before there's widespread support for the standard. LTE will be fast enough to support 3D graphics as well as faster broadband through cellular networks.

But that's not all. The good professor also told me that future cellular standards based on LTE and dubbed 5G will give 100Gbps or greater interconnects. While it's a fair way off, he predicted that by 2020, there could be as many as 100 billion connected devices; one example he gave was of an intelligent lightbulb, for example, which would give advance warning through a fast interconnect that it was failing. The other example was of a backplane with six boards all connected by fast wireless, with fast optoelectronics within each board making for a very speedy computer.

You might be wondering, "Why is any of this interesting?"

The professor I spoke with from the University of Dresden has influence reaching far beyond the academic world. His unit collaborates with Qualcomm, Alcatel-Lucent, Infineon, and dozens of other semiconductor companies. They have jointly developed a really tiny LTE chip that makes building communications devices into other small devices really rather straightforward.

We'll see devices using an ultra-high-rate communication that will allow, for example, very fast synchronisation of all sorts of peripherals to PCs. It will also make the much vaunted wireless home far more likely because communication speeds will be so high.

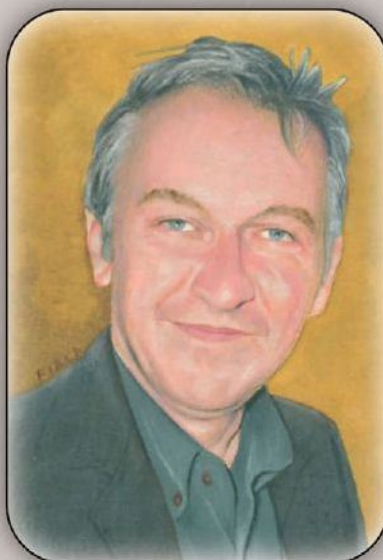
In conversations with other delegates at the conference, it's evident that Moore's Law, while it still has some life in it, doesn't have that far to run. The CTO of the world's biggest semiconductor foundry, Jack Sun,

believes that Moore's Law has some way to go and while the industry faces some serious challenges as process technology becomes ever smaller, its roadmap on the nanometre scale extends up to 2014 and conceivably to 2020.

Not that the semiconductor firms are too worried about the physical limits that Moore's Law poses; many believe that new technology in the shape of quantum computing and other nanotechnologies will ensure that processors will get smaller, and speeds will get higher. The vision is of near instantaneous computing, assisted by developments in communications technology and optoelectronics.

Of course, there will also be advances in display and battery technology, too, and it seems that we're not that far away from a time when we really will have a high-res, very light, very robust, and long-lasting notebook or tablet that will provide very fast computing at a very low cost.

But, of course, cost is a bit of a problem. All the big computing firms invest a great deal of money in research and development, but both GlobalFoundries and TSMC estimate the costs of a "gigafab" using 22- to 12-nanometer technology will be high. GlobalFoundries thinks that the R&D and process cost for a chip from 2012 onward will be well over \$1.3 billion. A state-of-the-art fab is likely to cost as much as \$6.5 billion after 2012. Somehow the manufacturers have to recoup those costs, and while they all seem convinced that the technology is more than doable, none of them had a very clear idea how they were ever going to recoup their investment in a world of always-connected, cheap devices. ▲



*Mike Magee is an industry veteran. He cut his teeth on ancient products like 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. Mike recently started his own Web site, [www.techeye.net](http://www.techeye.net). He continues to large it up for [tgdaily.com](http://tgdaily.com), too.*

Send rumours to "Mad Mike" Magee  
at [mike@cpumag.com](mailto:mike@cpumag.com)



# Technically Speaking

## An Interview With iYogi's Larry Gordon

Larry Gordon was founder and CEO of Clean Machine, a leader in premium consumer technology support, until the company was purchased in 2009 by iYogi. Gordon is currently iYogi's president of global channels.



by Barry Brenesal

**CPU:** Recently the CMO Council and Qualtrics conducted an online survey of 1,000 people in a blind test. What was the survey supposed to achieve?

**Gordon:** Sponsors of the survey, including my company, iYogi, care very much about customer experience and satisfaction. In a world where there are more electronic and CE devices and where the consumer cost for these is coming down dramatically, we're getting a lot more for our money. But one way to cut the manufacturing cost is to cut out service; and the survey sponsors wanted to look at data that could suggest new models for customer service to follow.

**CPU:** What were some of the conclusions that your survey uncovered?

**Gordon:** One was that 90% of the people interviewed are really dependent on their computers every day: life, work, home, leisure, and media. Another was that 65% of these people suffer stress and anxiety around maintaining their computers and running them properly. So we have a large, highly dependent group of people who have issues with their machines. The most prevalent of these issues was identified as security software: getting it running, conflicts with other software, and its failure in the face of spyware, adware, worms, etc. The next largest

cause of stress is wireless home networking, including lack of access, slow performance, slow boot up times, etc.

The other piece of data that I find most interesting is that people want low cost, ease of interaction, and high availability of a tech service: 24/7, 365 days a year. They want someone to take care of their problems, not necessarily talk them through those problems. They want their provider to immediately deal with the issue by phone, rather than being faced with bringing the computer to another site, or have someone visit. I think those are the strongest conclusions.

**CPU:** One of the figures that I read in the report was that 35% of your respondents suffered computer downtime of 24 hours or less in the last year due to technical failure. Another 25% experienced a total of one to five days downtime, total, while 26% experienced no down time at all. Aren't those figures pretty decent?

**Gordon:** I think they're pretty poor. This means that these people, at their computers, needed directions or needed to purchase something or find information. They weren't able to accomplish these goals immediately when they had problems. They had to wait some period of time in order to get these issues resolved; they had no one to immediately help them. They had to make an appointment

for a repair, or seek help from a friend. At least that's how I read that data.

**CPU:** According to the survey, the single most popular criterion used by people for choosing and keeping a tech support service (at 43%) was "cost of service." That's a pretty significant number, wouldn't you agree? It even ranks above "time taken to resolve an issue" and the "skill of support techs." What does that tell us?

**Gordon:** The majority of services out there are too expensive. You have a problem with your computer, and you may not be sure what it is. It could be a simple or complex one. You call one of the biggest players in this field, and they say, "We'll send someone out to your house tomorrow and it'll cost you \$250." This is for a machine that might have cost \$800. With peripherals, perhaps a little over \$1,000.

I think that's where a lot of this is coming from. People used to buy a computer when it was more expensive—\$1,500, 10 years ago—but they got everything they needed at the same time, including as much service as they wanted. Service after all is expensive, because you're paying for a person at the other end of the phone. Today you buy a computer for half that cost, and it's enormously more powerful and complex. But one of the things that got cut out was the service, in order to get



those prices down in a really cutthroat consumer electronics industry. Few people seem to have caught onto the fact that service has been unbundled from the hardware and the software purchase, and why.

**CPU:** Let's assume I run a company that manufactures computers. I provide tech support, but I do it by going through cheaper offshore tech service suppliers. This leaves me with a dilemma, one that I notice not just from your report, but from my own casual survey of my customers. They're concerned about tech support's limited language skills and long wait times: 10% and 14%, respectively, noted as major concerns by Qualtrics' numbers. Now, I can keep that supplier and continue to take flak for the same problems, or I can hire people in the U.S. to provide

work in the background. I think that's a model that might solve these frustrations computer users have in talking to techs who don't understand them or can't make themselves understood.

**CPU:** So what you propose is an inverse pyramid, if I understand correctly? Start with the person who really knows computers and speaks well, then after a few questions, pass off calls if their solutions are very simple to someone less skilled? Is that it?

**Gordon:** You're exactly right.

**CPU:** It sounds good, but as you've remarked, most computer issues are actually pretty easy to solve. They don't require going into elaborate configurations or looking for potential conflicts

handoff, in other words. It's a work process handoff.

The other side of it is that the more expensive tech knows what the 10 most common problems with his software or hardware are. For example, a big ISP just changed from McAfee to Symantec. Their customers are having a lot of problems with remnants of McAfee still on their machines. In this case, the expensive tech would see it's a customer at a specific ISP, and ask a couple of questions. Then he'd hand the call to his Security Software Level One tech—to the right Level One, who knows the issue, because some techs are more experienced with Microsoft, or security software, etc. Picking the right tech who is going to spend an hour working on your machine is part of the magic, as well. How many times have

The industry needs to turn the current model on its head.

—Larry Gordon

that same support but at a significantly higher rate whose charge I'll need to pass on at least in part to my customers. Damned if I do, damned if I don't.

**Gordon:** The industry needs to turn the current model on its head. I think there's a third way, one I call the triage process.

We've all gotten used to computer help from work and large enterprises where you call up and speak to someone. If the tech can't fix the problem, he or she passes you along to a more experienced—and more expensive—person. And if they can't fix it in turn, you finally end up with the most expensive help desk. That was grafted onto the consumer model, but I think we need to reconsider it. Start with that expert who possesses the best human interaction skills and tech skills. If it's a relatively simple issue, which most PC problems are, then he hands the ticket off to someone who works remotely. They may not have the language or people skills, but you have them doing the

with a dozen different applications. That being the case, aren't there going to be a lot more handoffs in your triage system than there would be when you start instead with the bottom tier tech, who pushes you further up the support ladder as required?

**Gordon:** I'm suggesting a seamless handoff where you don't actually get handed over to someone else on the phone and wait for them to speak to you. Instead, the work on your case gets handed off to the remote person, while you're still actually on the phone with the person who has the good language skills. The remote worker gets a good understanding of your problem while listening to the two of you speak, and then, finally, the one with the good language skills signs off, and leaves you to the remote support. It's not a voice

people gotten handed off to a tech who spends an hour and a half with them and then declares, "I can't fix it?"

**CPU:** This brings up a good point. One of the top sources of frustration according to your report is the inability of techs to fix problems. We're all aware of tech issues that may involve a multiplicity of apps or interactions with hardware. How does one company's tech support deal with all this?

**Gordon:** I think that the bigger the organization you have, and the more devices the techs are familiar with, the better the response you'll receive to actually fixing problems rather than pushing off the responsibility. Companies need a technology agnostic service that can fix anything that gets in their way. **CPU**



Subscribers can read bonus content with Larry Gordon at  
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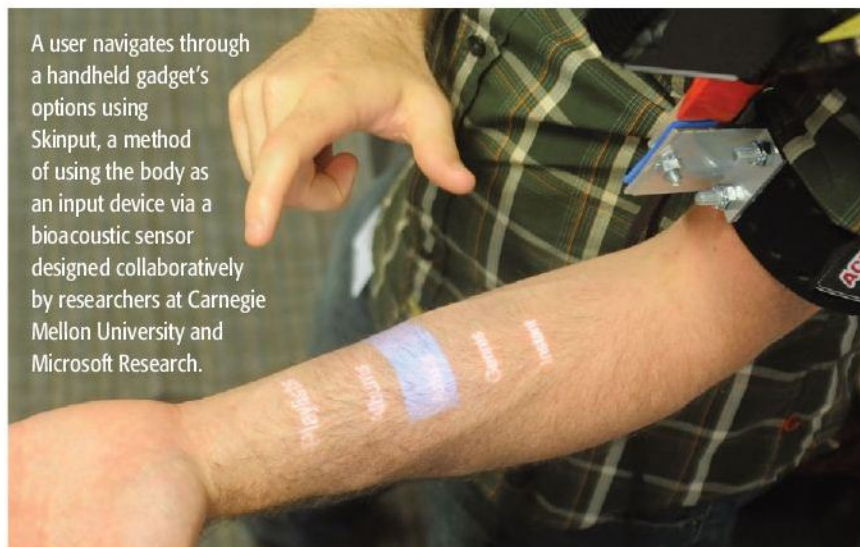


# Under Development

A Peek At What's Brewing In The Laboratory

## Skinput Makes The Touchscreen Ultra-Personal

A user navigates through a handheld gadget's options using Skinput, a method of using the body as an input device via a bioacoustic sensor designed collaboratively by researchers at Carnegie Mellon University and Microsoft Research.



Do you remember the first time you spied someone walking around a city, talking to herself animatedly? Though she looked sane, clearly, you decided, she was not. And do you remember then noticing the wire running to her ear and it dawning on you: a cell phone?! Small enough to fit in a pocket and equipped with a headset—would wonders never cease?

Hold onto your sanity assessments, because things are about to get weirder. Because of the efforts of Carnegie Mellon University's Chris Harrison and Microsoft Research's Dan Morris and Desney Tan, in the not too distant future, you'll be able to command your handheld devices by tapping your skin. The trio has developed Skinput, a system that beams any number of navigation and usage options onto a user's hand or forearm from a mini projector inside an armband. By touching these projections, users can control their devices.

"In short, we use very specialized microphones that listen inside the body," explains Harrison. "When a finger taps the skin, a unique sound is produced. Our system learns what different locations—your thumb, for example—sound like. Once the system has been trained on these sounds, those locations can be used like buttons."

Harrison notes that any application on current touchscreen devices could theoretically be developed for Skinput. "If you consider your hand alone provides more surface area than an iPhone screen, you might begin to wonder why we shouldn't just use that as the screen/touch surface. Then your hands could do everything an iPhone could do, but the device itself might be a small wristwatch. That sounds crazy but is a lot closer than you might think."

Skinput won't be hitting the market tomorrow, but the technology has been working quite well in lab trials. Noting that the concept and technology is quite "bleeding edge," Harrison says, "It's going to take a number of years before we see techniques like this appearing on consumer electronics. Fortunately, the sensor is inexpensive, and the processing required isn't particularly heavyweight, so it shouldn't add more than a few dollars to the cost of electronics." ▲

## e-Learning for the iPhone

The challenges of working in remote places reach far beyond the lack of first-world amenities. For example, many remote health-care workers have no access to training updates because of poor Internet access. Now, a collective of international developers led by researchers at the Institute of Tropical Medicine in Peru and Belgium have created an open-source virtual learning environment that works on mobile devices. Specifically developed on the Moodle learning platform for use with the iPhone and iPod, the inspiration for the research came from a variety of places, says Inge de Waard, one of the leads on the project.

"It was a collective aha moment, which sprung from the need we found to give learners—professional and academic—access to a mobile learning platform," de Waard says. "We already used the MLE platform, but because there were still minor hiccups, we got a community together (steadily growing and building on the goodwill of many volunteers) at [iphone.moodle.com.au](http://iphone.moodle.com.au). The improved mobile platform would offer us a way to see what learners could access, when they accessed it, and how much time they spent."

Community contributions let the researchers get direct feedback from users in order to improve both their content and the way it was packaged for mobile delivery.

"Our common objective was to make the complete iPhone/Moodle experience a really nice user experience," notes de Waard.

In a three-month program testing the application, healthcare workers serving HIV/AIDS patients in 20 clinics in Peru remotely utilized discussion groups, policy updates, multimedia presentations, 3D animations, and peer-reviewed documents. The team envisions a broad spectrum of mobile learning applications for their research that reaches beyond just remote locations. Because the code is open-source, nonprofit organizations, smaller companies, and academia can use the shell to pour in whatever content they want to deliver. ▲



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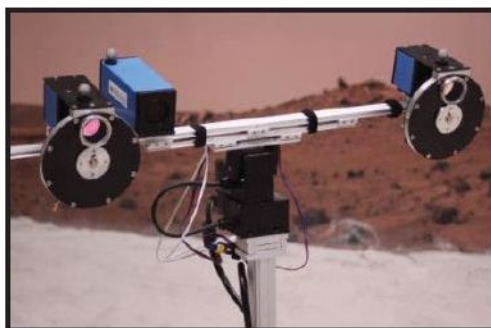




## Rover Uses Intelligent Cameras To Study Mars

When it comes to planetary exploration, we expect a lot from our modern robotic rovers. They have to survive landing on a potentially hostile planet and roam endlessly about without getting stuck. And because of costs, efficiency in data gathering, processing, and transmission is an absolute must. Dr. Stephen Medwyn Pugh of Aberystwyth University in Wales is working on this efficiency by providing a new piece in the rover puzzle: software that enables a rover's camera system to make intelligent decisions on what to record, explore, and sample.

"Primarily, we are currently working on the panoramic camera rig for the [European Space Agency and NASA's] ExoMars mission," says Pugh. "Our main focus is developing software to enable autonomous sample selection and acquisition. This means getting the rover to decide what is interesting."



Dr. Stephen Medwyn Pugh of Wales' Aberystwyth University has designed, with his team, software and a panoramic camera rig that will let robotic rovers make their own decisions on what to investigate during their next mission on Mars.

The panoramic camera, or PanCam, will be able to digitally map the terrain, and, according to the university's description, "provide multispectral geological imaging, color and stereo panoramic images, water vapor abundance, and dust optical depth

measurements." Additionally, the PanCam will be able to investigate hard-to-see places, such as crater walls, and record the rover's field samples with hi-res images before they are ground up into dust and analyzed in the rover's internal laboratory.

In addition, Pugh's team is providing a few bits of hardware in the form of a calibration target, which assists in sample collection, and a RIM (Rover Inspection Mirror) that can fill in blind spots (front, sides, and underside of the rover) that are not able to be imaged currently. The mirror, in conjunction with the PanCam, will "negate the addition of an extra camera (and thus extra mass, volume, and power) to provide the same imaging capability," Dr. Dave Barnes, Pugh's partner in crime, says.

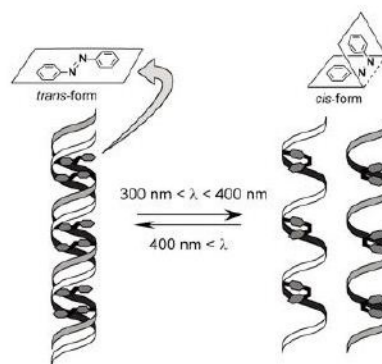
The ExoMars rover is due to be dropped on the Red Planet in 2018. ▲

## Nanobots Get Turned On By DNA

Dr. Hiroyuki Asanuma and his team at Nagoya University certainly know how to shed light on a problem, especially if the problem is creating an on/off switch for futuristic nanorobots and machines. Asanuma has designed a photoswitch for these machines using a hybrid of light-responsive DNA molded into a tweezers shape, the mechanism of which is controlled by either UV or visible light. In essence, the tweezers are made from double-stranded DNA that has been combined with chemical compounds called azobenzenes. The properties of the azobenzenes allow the double strands "to be converted into two single strands reversibly by photo-irradiation at a predetermined place and at a desired time," explains Asanuma.

Shining visible light on the "tweezers" pinches the strands together, or closes them. Applying UV light on the "tweezers" releases the bond and opens the channel up, or turns "on" the switch. The bonus is that no waste is created in the relatively simple process, because light is the only "fuel" involved.

Asanuma's research can be applied in many ways. "One of our purposes is to establish DNA nanorobotics that are mechanically operated not by chemical fuel but by photons, the cleanest energy that does not pollute [a] nano-environment," he explains. "Hence, our 'environment-friendly' nanorobotics are applicable to biotechnology, such as photo-regulation of gene-expression or photo-switchable cargo."



Double-strand DNA, combined with a chemical compound called azobenzene, becomes single strands while being irradiated by UV light and reverts back with visible light irradiation. This process makes up the mechanism for the on/off switches for nanomachinery which were invented by Hiroyuki Asanuma and his team at Nagoya University in Japan.

Future work for the team includes creating "nanopots"—DNA capsules with lids that contain cargo to be disbursed after the lid is opened via beams of light. "In the nanopot, either drugs, inhibitors,

proteins, or other molecules can be stored, Asanuma says. "When the UV light is irradiated at a pinpoint with a laser light source, the contents can be released out at the desired position." ▲





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lanlordz.net

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EPIC LAN - Big Lake, MN  
www.10w3roanler.com/lan/index.php  
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www.sadreadme.com  
LANapejoza 6 - Brampton, ON, Canada  
zeropingevents.com

MidWestLAN 12 - Darlen, WI  
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Catacombz 13.0 - Harrisburg, IL  
www.catacombz.com

Fan LAN! - Princeton, IL  
southprincetonlan.wordpress.com

Ham LAN - Hamilton, OH  
www.ham-lan.com

NGC's LAN-A-GEDDON - Greenville, TX  
www.networkgamingclub.com  
Oklahoma Gamers Group - Oklahoma City, OK  
www.okgg.org

SLAGG - Bradenton, FL  
www.slagg.org

WVG Gamers - Eugene, OR  
www.wvgamers.com

**06.25.10**

C-Toan LAN 7 - Maple Ridge, BC, Canada  
www.ctoanlan.com

Lower Main LAN - North Vancouver, BC, Canada  
caplan-bc.com

**06.26.10**

Central Illinois LAN Party - Champaign, IL  
www.cilp.welb.com

Intel Desertbash 9.0 - Arizona  
lanfest.intel.com

KILANFest ver. 10.0 - Louisville, KY  
www.kilanfest.com

LANCryption - Whittier, CA  
www.lancryption.com

Magic LAN - Morton, IL  
www.magic-lan.com

Meno Falls LAN - Pewaukee, WI  
www.menofallslan.com

Pyr Panda - Pompano Beach, FL  
www.pyrpanda.com

Spilled LAN - Statesville, NC  
www.spilledlan.com

**07.03.10**

LANManiac - Brea, CA  
www.lanmaniac.com

Rapid Response LAN party - Trenton, NJ  
www.lanaddict.com/lan/view.php?LANID=2237 and  
http://www.lanpartylist.com/list.php?cat\_id=34

**07.07.10**

Dexcon 13 - Morristown, NJ  
www.dexposure.com/dexcon13.html

**07.09.10**

Massive LAN - Hamburg, NY  
www.massivelan.com

MPCon 25 - Ypsilanti, MI  
mpcon.org

**07.10.10**

LAN Lordz - Wichita, KS  
lanlordz.net

MHOC 09 - Yankton, SD  
www.mhac.net

Peace, Love, and Rockets 18 - Arlington, TX  
www.peaceloveandrockets.org

**07.16.10**

GEEK - Salt Lake City, UT  
www.geek.com

PDXLAN 16 - Portland, OR  
www.pdxlan.net

SGQLAN - Jacksonville, FL  
www.sgqlan.com

**07.17.10**

NGC's LAN-A-GEDDON - Greenville, TX  
www.networkgamingclub.com

Oklahoma Gamers Group - Oklahoma City, OK  
www.okgg.org

SLAGG - Bradenton, FL  
www.slagg.org

**07.23.10**

eFrag-Fest - Fishersville, VA  
www.efragtv.com/lanparty

**07.28.10**

LAN(US) East 2010 - Upton, PA  
danuseat.com/lanuseat2010.asp

**08.05.10**

Big Bang - Ottumwa, IA  
www.warfactory.net

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**08.12.10**

QuekeCon 2010 - Dallas, TX  
quekecon.org

**08.13.10**

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DAMN LAN - Little Rock, WA  
damnlan.net

GBLAN's Big Of LAN Party - Green Bay, WI  
www.gblan.com

**08.14.10**

LAN Lordz - Wichita, KS  
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AWOLLAN - Eau Claire, WI  
www.awdian.com

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**08.27.10**

BeezLAN - Tacoma, WA  
www.beezlan.com

PWNSTOCK 2010 - Blue Lake, CA  
www.bluelakecasino.com/lan

**09.03.10**

Little Rock GameCon - Little Rock, AR  
littlerockgamecon.com

PAX West - Seattle, WA  
www.paxsite.com/paxprime/index.php

**09.04.10**

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**09.11.10**

LAN Lordz - Wichita, KS  
lanlordz.net

**09.18.10**

LANified 7: Down Right Rares - Calgary, Alberta, Canada  
www.lanified.com/events/details/4

NGC's LAN-A-GEDDON - Greenville, TX  
www.networkgamingclub.com

Oklahoma Gamers Group - Oklahoma City, OK  
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**10.02.10**

Rapid Response LAN party - Trenton, NJ  
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**10.09.10**

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TigerLAN 22 - Hays, KS  
tigerlan.net

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UberCon XII - Edison, NJ  
www.ubercon.com

**11.06.10**

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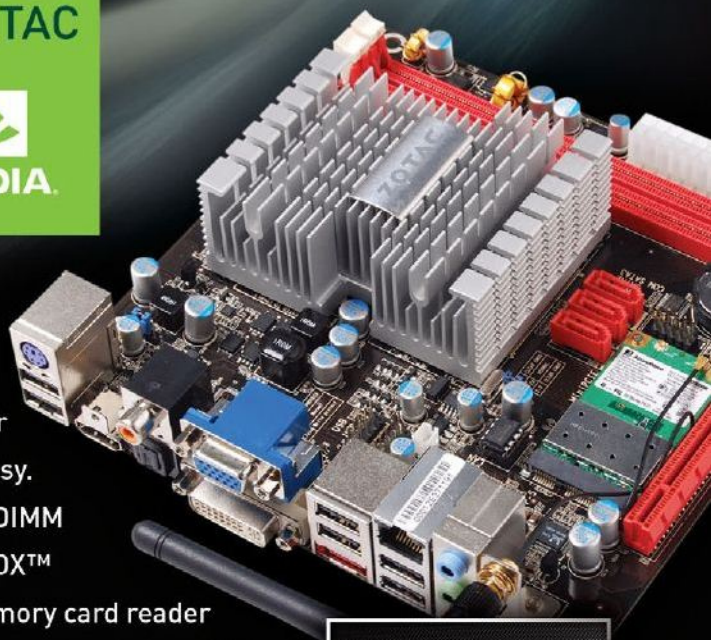
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## Q&A With Markus Appel

### Aava Mobile's CEO Opens Up

*Intel's new "Moorestown" Atom processor platform for smartphones and MIDs (mobile Internet devices) promises a significant leap in the amount of graphics and processing power your next ultraportable can deliver. However, when Intel launched Moorestown, it wasn't with big phone names such as Nokia, Research in Motion, or Apple. The showcase devices were a smartphone from Aava Mobile and a little tablet from Open Peak—two names you've probably never heard of. We've witnessed some of the never-before-seen-on-a-phone feats of 1080p video and 3D graphics the Aava Mobile phone can deliver, but we're even more excited by what the arrival of Moorestown and fresh manufacturers such as Aava Mobile will mean for the future of this increasingly important computing segment.*



**Q** You're one of the mystery makers behind the brands we recognize, but you're obviously stepping into an already-crowded market. We already have a huge spectrum of devices out there already meeting consumers' needs. Why do we need Aava Mobile?

**MA** For tier-one OEMs, it's about time to market. Shorter time to market means lower product development cost. But we're also seeing that a number of new players would like to enter the smartphone and convergence device market with the platform we have.

**Q** So we're going to have even more diversity in the ultramobile market, which we'd also expect to drive down pricing.

**MA** I think we're going to see a number of new players. Look at Apple. They were mainly in the computer space, unknown in mobile phones three to four years ago. If you would have told somebody [then] that Apple was going to be a dominant player in this space [today], everybody would have told you that you're crazy. But Apple did this and in a very quick and clever way. There will for sure be a number of other computer players that have similar ambitions and need an open platform to get started.

We see convergence coming to smartphones from the computer space. When we started our development, we looked

into the platforms out there and decided on x86. For us it's another key trend and another key element in our offering because the performance growth will be similar to the PC industry in the '90s. We see an overall advantage in supporting x86 on the software side because of all the software that has already been developed in the PC environment.

**Q** Linux has languished in the desktop PC world, so why is Linux-based MeeGo getting so much attention with this Moorestown launch?

**MA** MeeGo has the advantage of not only working with smartphones; it's also good for automotive, computers, and convergence devices. That means you can re-use the development work you do in smartphones.

**Q** But the platform itself is compatible with Android or anything else, right?

**MA** Correct.

**Q** With all of this computing and graphics capability evolving in handsets, will ultramobiles start replacing desktops in the mainstream?

**MA** I think the mobile device category will change by having these kinds of smartphone-type mobile

PCs available. Will it replace your desktop at home? I don't think so. Ultimately, I think you will have even more devices at home that connect you to the Internet.

**Q** Moorestown is bringing a lot of new capabilities to the device space. How is Moorestown and your implementation of it going to change my everyday life?

**MA** I think that a lot of the features you have on your desktop and other devices you also want on your phone. Remember when the first camera phones came out? People were saying, "Why do I need a camera in my mobile phone? If I want to take a picture, I'll bring my camera, which has much higher quality." The same thing happened when music playback came to phones. So I think people will appreciate all of this functionality, having a mobile PC with them rather than just a dumb phone. So much new stuff has come to phones—enough that we're now calling them smartphones because we couldn't find a better word to express all of that functionality. Moving forward, we may not call them smartphones anymore. Maybe they'll be the next "portable PC." This is our vision of how things will develop. ▲

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