

Intel  
DX58SO Extreme

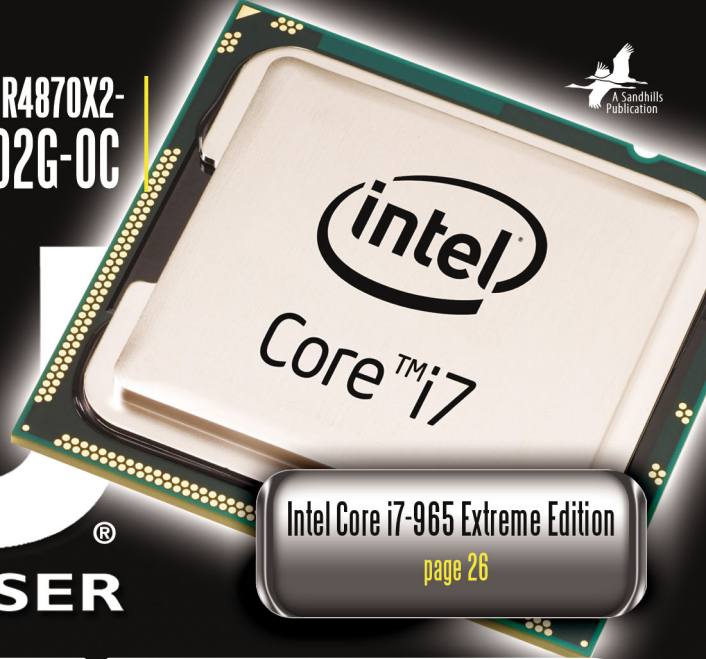
Sony BWU-300S

MSI R4870X2-  
T2D2G-OC

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# CPU

COMPUTER POWER USER



Intel Core i7-965 Extreme Edition

page 26

Ride The Lightning:  
PSU Roundup  
page 22

Under The Hood Of The Future:  
Chevy Volt  
page 50

PDF Unchained:  
Adobe Acrobat 9 Pro Extended  
page 78

## WHAT'S BEST WHAT'S NEXT

CPU's Annual Best-Of Awards & A Look At The Tech Horizon

PAGE 56



You Oughtta Be In Pictures:  
Cinematograph HD

page 44

Q&A With  
Ian Drew

ARM Marketing  
VP On Tiny Chips,  
Atom & Windows  
page 110



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## The Best Of What's Next

## Spotlight

56 **The Tech We Respect**  
Our Choices Of 2008's Best & Beyond

58 **Components**  
This Year's System Cornerstones

63 **Peripherals**  
Extraordinary Inputs & Outputs

67 **Software**  
2008's Head-Of-The-Class Code

72 **The Best Of What's Next**  
Our Early Bets For 2009's Top Picks

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### Frontside

8 **What's Happening**  
15 **Digital Economy**  
18 **The Saint**  
Spore2K

### The Experts



Anand Lal Shimpi  
**Anand's Corner**  
Page 37



Alex St. John  
**The Saint**  
Page 18



Alex "Sharky" Ross  
**The Shark Tank**  
Page 38



Barry Brenesal  
**The Cutting Edge**  
Page 94



Rob "CmdrTaco" Malda  
**The Department Of Stuff**  
Page 84



Mike Magee  
**Shavings From The Rumour Mill**  
Page 100



Rahul Sood  
**Wagging The Dog**  
Page 102



Peter Loshin  
**Open Sauce**  
Page 83



Chris Pirillo  
**Dialogue Box**  
Page 82





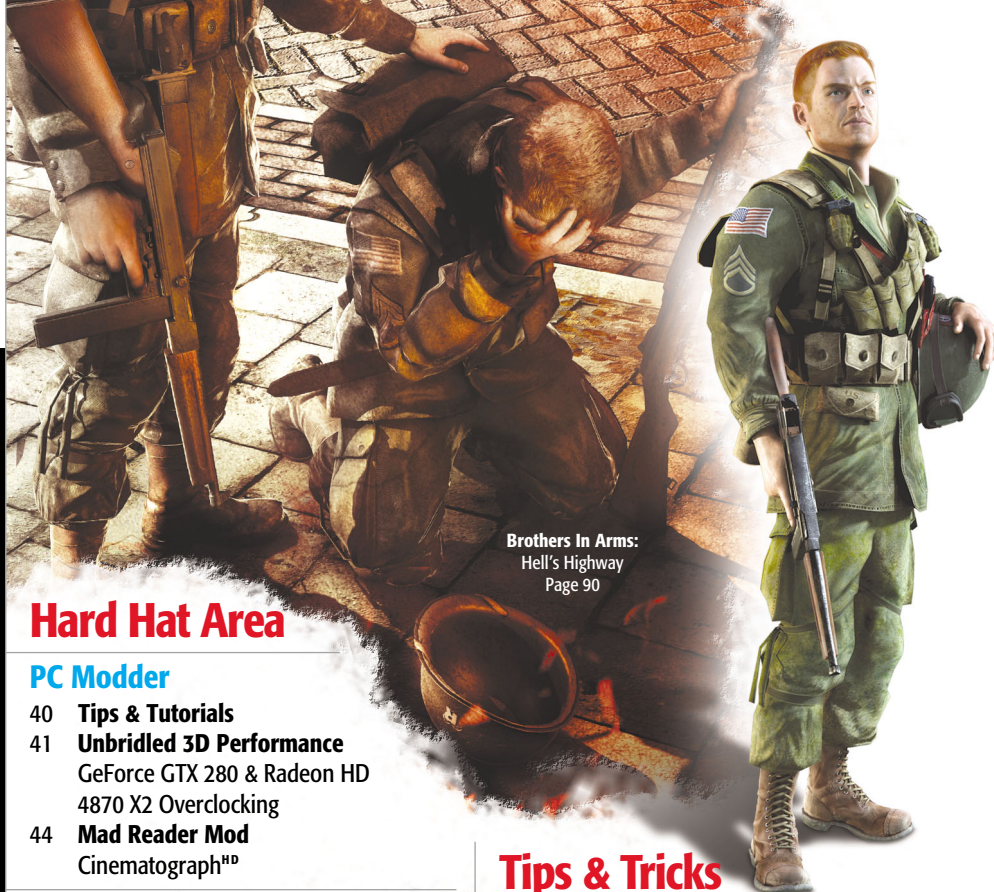
Page 23

## Heavy Gear

- 20 **Dream Hardware**
- 22 **The Power Struggle**  
Six PSUs Jump In The Ring
- 26 Intel Core i7 965 Extreme
- 27 Intel DX58SO
- 28 MSI R4870X2-T2D2G-OC  
PowerColor PCS+ HD 4870 1GB GDDR5
- 29 MSI GX720  
ATI Radeon HD 4550
- 30 ATI Radeon HD 4670  
Gigabyte GA-EP45T-Extreme
- 32 BFG 9600 GT OCX  
SteelSeries 7G Keyboard
- 33 Sony BWU-300S  
Corsair Flash Voyager 64GB
- 34 Cooler Master V8  
HTC Touch Diamond
- 36 Smooth Creations Pyro
- 37 **Anand's Corner**  
The New MacBook & MacBook Pro
- 38 **The Shark Tank**  
Inside Nvidia's GeForce 9x00



Page 34



Brothers In Arms:  
Hell's Highway  
Page 90

## Hard Hat Area

### PC Modder

- 40 **Tips & Tutorials**
- 41 **Unbridled 3D Performance**  
GeForce GTX 280 & Radeon HD 4870 X2 Overclocking
- 44 **Mad Reader Mod**  
Cinematograph<sup>HD</sup>
- 46 **Advanced Q&A Corner**
- 50 **White Paper**  
Chevy Volt: Best Of Both Worlds?

## Loading Zone

- 75 **The Bleeding Edge Of Software**  
Inside The World Of Betas
- 76 **Up To Speed**  
Upgrades That'll Keep You Humming Along
- 78 **Adobe Acrobat 9 Pro Extended**  
Make Interactive, Media-Rich PDF Presentations
- 82 **Dialogue Box**  
The Best Creative Software Doesn't Need To Be Installed
- 83 **Open Sauce**  
The Mobile Revolution According To Android

## Caught In The Web

- 84 **The Department Of Stuff**  
deeplink.txt

## Digital Living

- 85 **Road Warrior**  
Electronics Go Waterproof, Opera Mobile 9.5 Beta, New HP Tablet & More
- 88 **At Your Leisure**  
Games, Gear, Movies & Music
- 94 **The Cutting Edge**  
Thanks For The Memory

## Tips & Tricks

- 95 **Software Tips & Projects**  
Quick & Easy Surrealism
- 98 **Warm Up To Penguins**  
Managing Disks With Linux, Part I

## What's Cooking

- 100 **Shavings From The Rumour Mill**  
Goodbye Panasonic, Goodbye To Sony Vista
- 102 **Wagging The Dog**  
Finding A Good Job In A Tough Economy
- 103 **Technically Speaking**  
An Interview With Vinny Lingham, CEO Of SynthaSite
- 106 **Under Development**  
A Peek At What's Brewing In The Laboratory

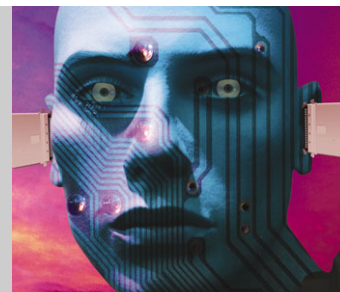
## Back Door

- 110 **Q&A With Ian Drew**  
ARM Marketing VP On Tiny Chips, Atom & Windows

## Infinite Loops

Strange stats and other oddball items from computing's periphery

96, 99





## EDITOR'S NOTE

As one year draws to a close and yet another begins, we often take time out to reflect upon various aspects of our lives, either for the sake of idle rumination or in order to help us chart a course for change in the months to come.

Here at *CPU*, we go through a process each year that's roughly the same except that we consider how the PC landscape changed over the year and what hardware and software played the biggest role in affecting that change. The results of our annual good stuff inventory are presented within these pages, broken into easy-to-digest sections that boldly declare our favorite components, peripherals, and software from 2008. We also offer up our take as to what items and technologies you should keep your eyes on in the coming year, because planning your next build (or your brother's, or your boss', etc.) will be that much easier if you know in advance which way to turn for the best PC technology the industry has to offer.

All of that, and no silly resolutions that are sure to be broken in less than 48 hours, anyway.

Elsewhere in the issue, be sure and check out our look at Intel's new Core i7 965 Extreme, see how Marco fared in overclocking the latest graphics card titans, and get an inside look at what makes the Chevy Volt tick.

Enjoy, and if you are so moved, drop us a line and let us know where we hit and where we missed in 2008. We can't answer all your emails/posts/letters, but we will take them all to heart as we dive into 2009.



Chris Trumble, Publication Editor, *CPU*



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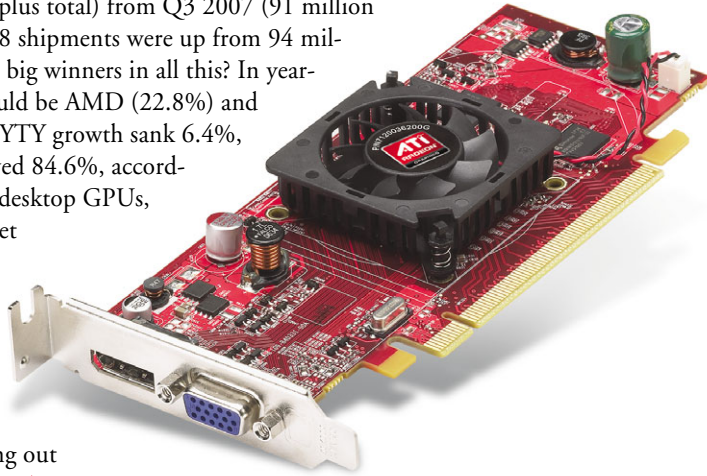
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## Graphics Market Moves Full Steam Ahead

Not all news from the tech sector is dark these days. According to John Peddie Research, the graphics market is blazing hot. GPU shipments in Q3 2008 increased by 22.5% (111 million-plus total) from Q3 2007 (91 million units). Further, Q3 2008 shipments were up from 94 million over Q2 2008. The big winners in all this? In year-to-year growth, that would be AMD (22.8%) and Intel (81.4%). Nvidia's YTY growth sank 6.4%, while VIA/S3's nose-dived 84.6%, according to JPR. Among Q3 desktop GPUs, Intel had a 49.3% market share to Nvidia's 32.6% and AMD's 20.3%. Notebook GPU shipments, meanwhile, skyrocketed 40% (49.4 million units) during Q3, carving out 44% of the GPU market. ▲



## Aleratec's RoboRacer Does It All

Throw 100 discs into Aleratec's new DVD/CD RoboRacer LS Duplex, walk away, and this baby automatically copies data to each disc, flips it over, and prints a LightScribe label on the opposite side—all without adult supervision. (Aleratec's Disc Publishing Suite is included.) Aleratec's CEO, Perry Solomon, stated in a release that rather than manually flipping each disc, the RoboRacer "completes the disc loading, unloading, and flipping process automatically with only six moving parts." Not bad. For \$1,049, you get two Aleratec-designed 20X DVD-RW drives with 20X DVD/48X CD write speeds. ▲

## Hardcore Computer Submerges A PC

"Introducing Reactor, the world's first patented total liquid-submersion personal computer." That from Hardcore Computer's lips to your ears. Daren Klum and Chad Attlessey, two obviously intelligent gamers, founded Hardcore Computer after heat-related system issues had them fed up. From the misery, the pair believes they've solved every enthusiast's worst nightmare by submerging "all of the heat-producing components—the CPU, motherboard, video card, memory, and power supplies—in a custom dielectric fluid [Core Coolant]." Pricing for a submerged rig starts at \$4,549. In exchange, HC says you're buying longer component life and "no instability, no overheating, no drama." Want proof? HC's Web site states liquid submersion "cools up to three Nvidia graphics cards down to unprecedented low temperatures, even at maximum load, letting you smash traditional performance limits." Straight to your ears. ▲





## Super Talent Offers 64GB Of Super USB

October was a big month for Super Talent, the California maker of flash-based goods. First, the company released the customized mini PCI-E SSD card, which boosts the Asus Eee PC's wee bit of storage by sizes ranging from 8 to 64GB (\$53 to \$149). For those who covet style, the Luxio (up to 64GB for \$149) is a sleek looker with a UV-coated case that comes in a black, silver, or wood finish to match the included leather case. The Luxio works at 300MBps speeds and has AES-256 encryption. Finally, when only the best will do, set your eyes on the custom-made 18-karat gold 8GB Pico\_C. As Super Talent puts it, this beauty "makes an eloquent corporate gift." That will be \$599, please. ▲



## HARDWARE MOLE

### Intel & Asus Seek To Innovate; Your Help Is Requested

Asus and Intel are now partnering on the recently released WEPC.com. Part techy, part social network, the site encourages users to toss around ideas about the ultimate PC. Toss something particularly good, and Asus might work it into an actual design. Asus Chairman Jonney Shih, meanwhile, evidently thinks enough of current designs to have recently stated that Asus is focused on ballooning its notebook output by 77% in 2009 (up to 20 million units shipped). That would put Asus among the world's top four laptop makers. Asus President Jerry Shen, meanwhile, was later quoted as saying that figure was for internal use. Still, with a \$200 Eee PC set for 2009 in America, Asus might have a fighter's chance. ▲

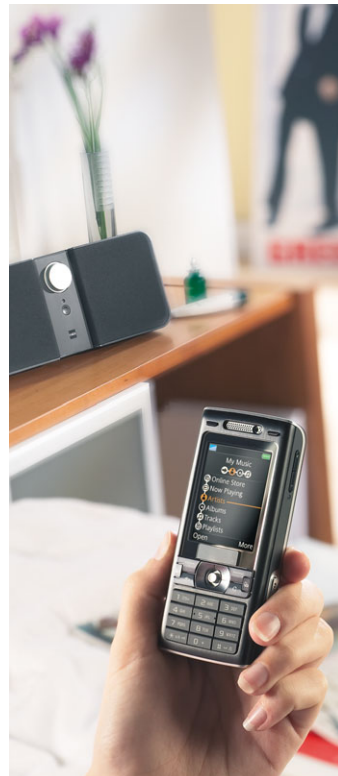


### Guaranteed Buyback= Fair Trade-In Value

Hard on your electronics? Tend to buy on impulse? Regret it months later? Concerned about the environment? If you answered yes to any of those questions, check out TechForward's Guaranteed Buyback. In a nutshell, for a fee, the service locks you in on fair trade-in value for, say, a new desktop PC at the point of purchase. Trade-ins are good for up to two years. Send that PC back to TechForward within six months, for example, and you'll get 50% on the purchase price back. The return depreciates incrementally based on time and the device's condition. Guaranteed Buyback is now at CompUSA, TigerDirect, Amazon.com, and other locations starting at around \$30 for a digicam plan up to about \$300 for flat-screen TVs over \$2,000. ▲

### Acoustic Energy Brings British Bluetooth Noise

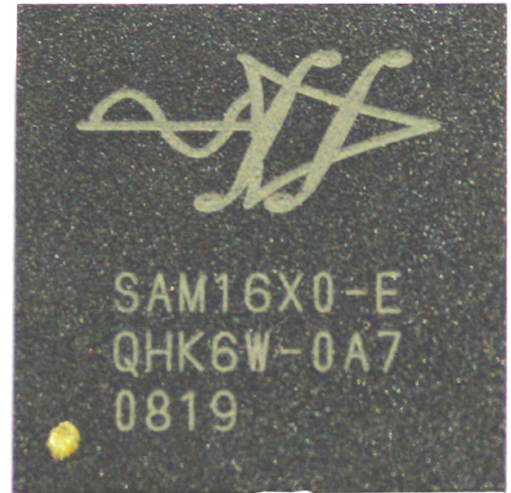
Just hearing "Acoustic Energy" is heaven to some audiophiles' ears. Still, Acoustic Energy's presence stateside has been stagnant of late. That's apparently changing, though. In November, the esteemed British speaker builder released a three-piece AE-29 (\$219) Bluetooth-based system. If you stow MP3s away on your mobile phone, the 20-watt system's audio quality shouldn't disappoint. Down the road, Acoustic Energy reportedly is also seeking to work more closely with North American specialty dealers and custom installers, with the goal ultimately being to market audio gear to both audiophiles and first-time buyers who want top-shelf stuff. As our esteemed colleague put it, "British high-end sound, dude." ▲





## Samplify Systems Launches Data Converters With Compression On A Shoestring Budget

It takes a lot of money to get a chip company off the ground. But Samplify Systems has managed to launch a new chip with just 16 employees and \$11 million in capital. The Santa Clara, Calif.-based company has made a mixed-signal data converter chip. Lots of people can do that. But Samplify has integrated digital data compression technology onto the same chip as the analog converter. Normally, it's hard to get such technologies working together on the same chip without having signal interference. But by doing this, Samplify can knock a lot of cost out of a system and reduce the amount of bandwidth needed by more efficiently compressing analog data and sending it in digital form to other parts of a system. Look for it next year in CAT-scan, ultrasound, and wireless infrastructure equipment. ▲



## Intel Shows Off Its Moorestown Platform For Mobile Internet Devices

MIDs (mobile Internet devices) are just getting off the ground, but Intel plans to introduce a second-generation technology next year so that the devices can make a big leap forward in power and performance. Dubbed Moorestown, the new platform will include an Ericsson 3G mobile HSPA data solution, a range of I/O ports for storage and wireless connectivity, and a new version of the Atom microprocessor. The Moorestown platform promises to be much more power-friendly for low-power devices compared to the Menlow platform, which uses the first version of the Atom, previously code-named Silverthorne. ▲

### Watching The Chips Fall

Here is pricing information for AMD and Intel CPUs.

\*Retail price  
\*\* Manufacturer's price per 1,000 units  
Other current prices, if indicated, are lowest OEM prices available through Pricegrabber.com

CPU	Released	Original price	Last month's price	Current price
AMD Phenom X3 Triple-Core 8750 2.4GHz	3/27/2008	\$195**	\$154	\$149
AMD Phenom X3 Triple-Core 8650 2.3GHz	3/27/2008	\$165**	\$119	\$119
AMD Phenom X3 Triple-Core 8450 2.1GHz	3/27/2008	\$145**	\$106	\$102
AMD Phenom 9500	11/19/2007	\$251**	\$163	\$163
AMD Phenom 9550	3/27/2008	\$195**	\$144	\$144
AMD Phenom 9600	11/19/2007	\$283**	\$119	\$119
AMD Phenom 9600 Black Edition	12/23/2007	\$251**	\$179	\$179
AMD Phenom 9750	3/27/2008	\$215**	\$164	\$164
AMD Phenom 9850 Black Edition	3/27/2008	\$235**	\$182	\$179
AMD Phenom 9950 Black Edition	7/3/2008	\$235**	\$196	\$159
Intel Core 2 Duo E6750	7/16/2007	\$183**	\$197	\$159
Intel Core 2 Duo E6850	7/16/2007	\$266**	\$210	\$183
Intel Core 2 Duo E8190 45nm	1/7/2008	\$163**	\$219	\$163**
Intel Core 2 Duo E8200 45nm	1/7/2008	\$163**	\$181	\$159
Intel Core 2 Duo E8400 45nm	1/7/2008	\$183**	\$164	\$169
Intel Core 2 Duo E8500 45nm	1/7/2008	\$266**	\$185	\$205
Intel Core 2 Duo E8600 45nm	8/10/2008	\$266**	\$269	\$269
Intel Core 2 Quad Q6600	1/8/2007	\$851**	\$189	\$189
Intel Core 2 Quad Q6700	7/16/2007	\$530**	\$296	\$267
Intel Core 2 Quad Q9300 45nm	1/7/2008	\$266**	\$259	\$259
Intel Core 2 Quad Q9400 45nm	8/10/2008	\$266**	\$269	\$269
Intel Core 2 Quad Q9450 45nm	1/7/2008	\$316**	\$362	\$342
Intel Core 2 Quad Q9550 45nm	1/7/2008	\$530**	\$346	\$327
Intel Core 2 Quad Q9650 45nm	8/10/2008	\$530**	\$560	\$542
Intel Core 2 Extreme QX6800	7/16/2007	\$999**	\$1,005	\$1,048
Intel Core 2 Extreme QX6850 3GHz 8MB cache 1,333MHz FSB 65nm	7/16/2007	\$999**	\$699	\$849
Intel Core 2 Extreme Quad QX9650 3GHz 12MB cache 1,333MHz FSB 45nm	11/12/2007	\$999**	\$1,040	\$1,052
Intel Core 2 Extreme Quad QX9770 3.2GHz 12MB cache 1,600MHz FSB 45nm	2/19/2008	\$1,399**	\$1,404	\$1,450
Intel Core 2 Extreme Quad QX9775 3.2GHz 12MB cache 1,600MHz FSB 45nm	2/19/2008	\$1,499**	\$1,637	\$1,549



## Nvidia Seeks To Knock Intel Out Of Low-End Chipsets

Nvidia is going after Intel in the low-end chipset market by raising the bar on integrated graphics performance. Nvidia's new GeForce 9 Series motherboard GPUs promise to run circles around Intel's G45 integrated graphics chipsets. Nvidia says its graphics performance is five times better and that Nvidia can play all of the top 30 PC games on its chipset while Intel can only play 14 of them. The new chipsets can shine in a \$500 computer and include features such as high-definition video playback, Blu-ray video playback, and support for Nvidia's CUDA programming language. Apple liked the technology enough to put the Nvidia chipsets into its line of MacBook laptops. ▲



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## Lala.com Takes Music To The Clouds

There's a new Internet siren on the scene, and her name is Lala.com. Well, she isn't exactly new; Lala has tried selling digital music before. Lala.com's new business model, however, forgoes throwing ads at listeners in favor of letting users stream any song from a 6 million-plus song database, free. A second listen to a track runs 10 cents, but Lala.com moves the song to an online locker stored on Lala's servers from where you can stream the tracks forever. (DRM-free MP3 downloads are 79 cents.) More brilliant is that Lala.com will also store mirrors of songs on your hard drive that it matches against its database. Songs that Lala.com can't match, you can upload manually. Lala, you really do have us on our knees. ▲

## CBS Offers Virtual Couches For Group Viewing

Oh, how many times we've longed to gather our pals around the tube, fire up an episode of "MacGyver," and proceed to marvel in unison at said crime fighter's prowess with a ball of twine and gum wrapper. Thank you, CBS Interactive, for making our dream a reality. With backing from Intel, CBS is outfitting "social viewing rooms" at [CBS.com/socialroom](http://CBS.com/socialroom) to let groups simultaneously watch synchronized playbacks of CBS programs. You can chat, take quizzes, and more while you watch the primetime, daytime, and classic selections now available. ▲



## He's Not Just A Scottevest Client ...

If you're of the belief that there's no such thing as a bad "Star Wars" spoof, head to Scott Jordan's Scottevest, renowned retailer of TEC (technology enabled clothing). Amidst the site's apparel, you'll find Steve Wozniak starring as Dirth Wozniak. That's right, Apple's co-founder and Scottevest board of advisors member works his dark magic in the nearly 90-second video "The Return Of The Wozniak," constructing the evil TEC STAR to rule the Scottevests and the Galaxy. Yikes. Other "Woz-i-sodes" include "A Fish Story" and the upcoming "The Wizard of Woz," "Evolution of the Woz," "Enter The Woz," and "ClubWoz." ▲



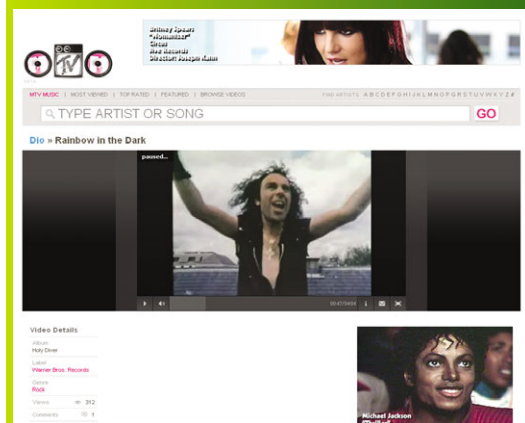
## SIGHT SEEING

### FreeShipping.org=Free Shipping

The holidays are fast approaching as we head to press, and the slacker bug has bit us yet again. Instead of pouting and shouting about it, though, we're heading to FreeShipping.org, which Luke and Maisie Knowles launched in December 2007 to provide buyers the lowdown on more than 800 top online retailers offering free shipping on packages and gift cards. FreeShipping.org also has the scoop on retailers that do free overnight shipping, as well as info on drop-dead shipping dates so Little Johnny isn't twiddling his thumbs instead of a Wiimote on Christmas morning. ▲

### I Want My MTV Music

Way, way back in the day, we wanted our MTV and "120 Minutes," "Yo! MTV Raps," and "Headbanger's Ball." Then along came "The Real World" and its inglorious disciples to ruin everything. Well, MTV has turned back the clock to those glory days, sort of. Though MTV.com has hosted videos for years, its recently launched MTV Music ([www.mtvmusic.com](http://www.mtvmusic.com)) is a much friendlier experience thanks largely to an interface born very much in the image of Hulu. No matter the vid you're jonesing to see, MTV Music probably has it within the Most Viewed, Top Rated, Vintage Videos, Staff Picks, TheShred-List, and other categories. Now, cue up Ronnie James Dio, please. ▲



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



## Microsoft Teases With Windows 7 & Azure

Microsoft has put its name in the news more than usual lately, thanks largely to handing out alpha copies of the upcoming Windows 7 at the recent Professional Developers Conference (one early criticism is W7 doesn't stray far enough from Vista). Unfortunately for MS, pirated copies reportedly hit the Web just a day later. Public betas are expected in 2009, with a release date possible for later in 2009 or 2010. Further press clippings came when Microsoft chief software guru Ray Ozzie spilled the beans at PDC on Windows Azure, Microsoft's new cross-platform cloud-based approach for hosting online services. Azure will compete with offerings from IBM, Amazon.com, and others, and developers will get their hands dirty with Azure through 2009. An official release date is still to come. ▲



## Now Serving: Ubuntu 8.10 Desktop & Server Editions

Ubuntu Linux offered current and would-be users what it called major new features with its recent release of the 8.10 Desktop Edition in late October. Canonical states it designed this edition for the "pervasively connected digital lifestyle." That means support for 3G networks (wired to Wi-Fi to 3G coverage, nice), as well as default media players that broadcast BBC programming. Outside the digital realm, you can also now move modified versions of Ubuntu to a USB memory drive vs. CD/DVD for external installations. The free download is available at Ubuntu, as well as the simultaneously released 8.10 Server Edition. ▲



## Russian Cyber Thieves Make Large Bank

With a little persistence, not to mention unscrupulous morals, a top cybercriminal could bank as much as \$5 million a year by sticking bogus security apps on computers and then nagging users with enough fake warnings to eventually give up credit card digits, according to Joe Stewart, SecureWorks director of malware research. Stewart's recent research into a Russian-based criminal operation named Bakasoftware indicated criminals use Antivirus XP 2008 as bait. One affiliate reportedly managed to install nearly 155,000 copies of the mostly ineffective software in 10 days, sold 2,772 copies, and earned roughly \$146,500. Yikes. "At that rate, the affiliate could be expected to earn over \$5 million . . . a year, simply by maintaining a large botnet and forcing AV XP 08 installs on 10,000 to 20,000 computers a day," Stewart stated. ▲

Страна	Сайт/адрес	Дата	Продукт	Уникал.	Визит	Загрузка	Ссылки	Посетков	Пополнение	Мониторинг	Итого
Все	Все	2008-08-28	Все продукты	508	508	7	8	298	4889.13	-886.34	0.00
Все	Все	2008-08-27	Все продукты	1023	1023	8	6	848	31886.82	-4068.87	0.00
Все	Все	2008-08-26	Все продукты	1019	1020	8	6	796	29649.07	-3970.27	0.00
Все	Все	2008-08-25	Все продукты	1061	1061	10	7	243	8640.59	-105.13	0.00
Все	Все	2008-08-24	Все продукты	1072	1073	6	5	82	2090.02	-273.11	0.00
Все	Все	2008-08-23	Все продукты	772	775	9	7	71	2515.20	-511.60	0.00
Итого				5455	5460	48	41	2237	81388.61	8915.32	0.00



## SOFTWARE SHORTS

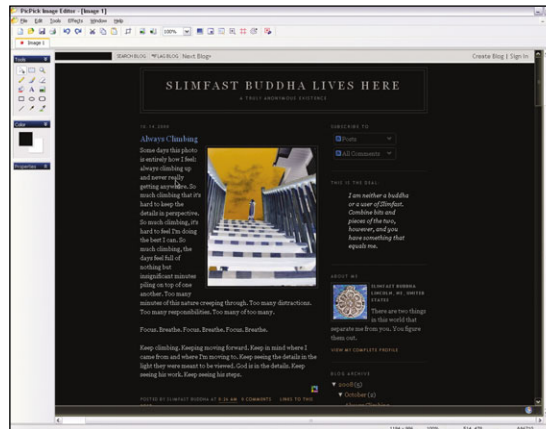
## ThinkFree Goes Mobile With Netbook, MID Editions

If you scored a new netbook or smart-phone over the holidays, your choices of portable office suites are actually fairly numerous, with the likes of ZoHo, Google Docs, and OpenOffice.org included. Add ThinkFree's recently released Mobile suite (word processor, spreadsheet, and presenter) in Netbook and MID editions to the list. The Netbook edition (designed for Intel Atom-fueled mininotebooks) runs on Windows, Linux, and Mac OSes; taps into ThinkFree's online sync and collaboration abilities; and is friendly with Microsoft Office 2007. ▲



## PicPick Does Double Duty

We did a fair amount of research into Wizple.NET's PicPick after first reading about the program and its recent (and minor) 1.8.0.1 update in late October. The more we read, the more it seemed PicPick was too good to be true. Although free, PicPick gives you not only a full-fledged screen capturer (user defined, full screen, etc.) but it's also a decent image editor for less-taxing chores. PicPick has a whiteboard for those who need it. The download is barely 1MB, runs from the System Tray, and is great for office workers racing to be the first that grabs, illustrates, and pastes a snappy visual reply to a group email. ▲



## Ways A Recession Can Help Software

Is there anything to look forward to during a recession? Tech-wise, yes, according to recent, interesting predictions from O'Reilly's Nat Torkington, who says, "A recession means technologists cease to be paid vast amounts to duplicate the work of others." No argument there. He also expects free and open-source software to have a great 2009 because cash will be in short demand. "Last recession saw the mainstream legitimization of open-source operating systems (Youngsters, take note: There was a time when it wasn't automatically OK for an IT department to use Linux) because it was clear and away the most cost-effective choice." So there, cheer up. ▲

## BIOS Upgrades Available Online

Compiled by Steve Smith

Before you send another motherboard to the landfill, consider upgrading the BIOS and giving your PC a new lease on life. Here are a few recently released upgrades. Readers can check out [www.cpumag.com/cpujan09/bios](http://www.cpumag.com/cpujan09/bios) to see our entire upgrade list.

Manufacturer	Model	Version	Date	Description	URL
AOpen	MP45-D	1.06	10/9/2008	Adds AC PWR Auto Recovery function; updates onboard LAN PXE Boot ROM	<a href="http://download.aopen.com.tw/Download.aspx?RecNo=11770&amp;Model=2662&amp;Section=8&amp;DL=yes">download.aopen.com.tw/Download.aspx?RecNo=11770&amp;Model=2662&amp;Section=8&amp;DL=yes</a>
ASRock	X48TurboTwins	1.20	9/26/2008	Modifies code for "DRAM Frequency"	<a href="http://download.asrock.com/bios/775/X48TurboTwins(1.20)Win.zip">download.asrock.com/bios/775/X48TurboTwins(1.20)Win.zip</a>
ASUS	P5Q3 Deluxe/WiFi-AP	1406	10/6/2008	Enhances CPU compatibility with certain Yorkfield CPUs	<a href="http://support.asus.com/download/download.aspx?SLanguage=en-us&amp;model=P5Q3%20Deluxe/WiFi-AP%20atn">support.asus.com/download/download.aspx?SLanguage=en-us&amp;model=P5Q3%20Deluxe/WiFi-AP%20atn</a>
DFI	LANPARTY JR P45-T2RS	J245D812	8/12/2008	Adds DRAM fine tune function; adjusts WDT for AC shutdown free	<a href="http://us.dfi.com.tw/Upload/BIOS/J245D812.zip">us.dfi.com.tw/Upload/BIOS/J245D812.zip</a>





## Job Of The Month

It's the dead of winter in most parts of the United States, and even techies like us could use a drop of warm sunshine right about now. At Sunkist, you can exercise those mad engineering skills and get all the vitamin C you need to fight off winter doldrums. The legendary produce brand needs an experienced electronics engineer to develop hardware and software that manages fresh fruit handling and inspection challenges. You will design

circuit boards and program DSPs for smarter automated inspection and packaging. Preventing robotic packagers from bruising oranges takes more finesse than you may suppose. You will need five years of experience and familiarity with digital signal processors, PCB board layout, and C. That's C the programming language, not the vitamin.

[seeker.dice.com/jobsearch/servlet/JobSearch?op=302&dockey=xml/7/8/78d6cbe10540a1fd2358c982a9aa2b69@endecaindex&source=3](http://seeker.dice.com/jobsearch/servlet/JobSearch?op=302&dockey=xml/7/8/78d6cbe10540a1fd2358c982a9aa2b69@endecaindex&source=3)

## Raw Numbers

**474%** September 2007 to September 2008 audience growth at liberal political site HuffingtonPost (comScore)

[www.comscore.com/press/release.asp?press=2525](http://www.comscore.com/press/release.asp?press=2525)

**514%** September 2007 to September 2008 audience growth at conservative political site RedState.com (comScore)

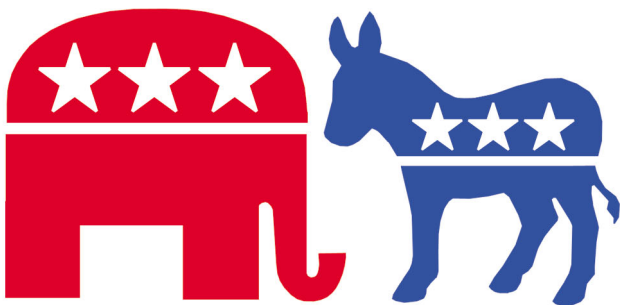
[www.comscore.com/press/release.asp?press=2525](http://www.comscore.com/press/release.asp?press=2525)

**222%** JohnMcCain.com traffic growth from August to October 2008 (Alexa)

[www.alexa.com/data/details/traffic\\_details/johnmccain.com](http://www.alexa.com/data/details/traffic_details/johnmccain.com)

**69%** BarackObama.com traffic growth from August to October 2008 (Alexa)

[www.alexa.com/data/details/traffic\\_details/barackobama.com](http://www.alexa.com/data/details/traffic_details/barackobama.com)



## Monthly Consumer Internet Traffic Worldwide By Segment (in petabytes)

Since 2006, video streaming bandwidth use has increased fivefold, and it will more than triple by 2012, according to Cisco Systems estimates.

	2008	2010	2012
P2P	2,361	3,981	6,741
Online Video (PC)	1,346	3,215	6,216
Online Video (to TV)	330	1,422	3,529
Web, Email, Data	999	1,785	3,087
Gaming	187	324	490
Video Communications	37	70	154
VoIP	56	87	114

Source: Cisco Systems (via eMarketer)  
[www.emarketer.com/Article.aspx?id=1006601](http://www.emarketer.com/Article.aspx?id=1006601)

## R.I.P.: Good Times

The economic crisis is about to hit the digital world hard, Sequoia Capital warned the companies it funds. One of the most respected VC firms in the tech world gathered its portfolio companies together in October for an emergency meeting called ominously "R.I.P.: Good Times." Startups that do not cut costs, cut heads, and go cash flow positive now will suffer what Sequoia calls a "death spiral" into failure. Additional funding and even buyouts from larger firms will be hard to come by during the protracted recession and recovery cycle the company predicts. In the last of a thoroughly depressing 56-slide PowerPoint presentation of doom, startups were advised bluntly to "Get Real or Go Home."

[www.techcrunch.com/2008/10/10/sequoia-capitals-56-slide-powerpoint-presentation-of-doom](http://www.techcrunch.com/2008/10/10/sequoia-capitals-56-slide-powerpoint-presentation-of-doom)





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Quad Q8200 2.40GHz	\$ 759
(6MB Cache, 1333MHz FSB)	
E6600 3.16GHz	\$ 845
E6500 3.16GHz	\$ 759
E6400 2.83GHz	\$ 735
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X-Jupiter Jr. Mid-Tower Case w/680 Watt SLI™ Power  
Asetek Liquid Cooling System  
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Quad Q9650 3.0GHz	\$ 1325
Quad Q9550 2.83GHz	\$ 1089
Quad Q9400 2.66GHz	\$ 1035
(8MB Cache, 1066MHz FSB)	
Quad Q8200 2.40GHz	\$ 955
(6MB Cache, 1333MHz FSB)	
E6600 3.16GHz	\$ 1035
E6500 3.16GHz	\$ 945
E6400 2.83GHz	\$ 925

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High Definition 7.1 Surround Sound & 600 Watt Subwoofer Speaker System  
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High Definition 7.1 Surround Sound & 600 Watt Subwoofer Speaker System  
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Quad Q9550 2.83GHz \$1315  
Quad Q9400 2.66GHz \$1265  
(8MB Cache, 1066MHz FSB)  
Quad Q8200 2.40GHz \$1169  
(6MB Cache, 1333MHz FSB)  
E8600 3.16GHz \$1255  
E8500 3.00GHz \$1169  
E8400 2.83GHz \$1139  
E7400 2.50GHz \$1089

Intel® P45 Chipset MB Supporting CrossFireX™

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(2) ATI Radeon™ HD4850 512MB in CrossFireX™ mode  
LG® 22x DVD+-RW Drive & 16 DVD ROM  
High Definition 7.1 Surround Sound & 600 Watt Subwoofer Speaker System  
Logitech® 104 Keyboard & Optical Wheel Mouse  
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Quad Q9400 2.66GHz \$845  
(8MB Cache, 1066MHz FSB)  
Quad Q8200 2.40GHz \$749  
(6MB Cache, 1333MHz FSB)  
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LG® 22x DVD+-RW Drive  
High Definition 7.1 Surround Sound & 600 Watt Subwoofer Speaker System  
Logitech® 104 Keyboard and Optical Wheel Mouse  
Sigma Gaming Orca Case 400 Watt with See Through Windows  
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P9500 6MB L2 Cache, 2.53GHz \$1195  
T9400 6MB L2 Cache, 2.53GHz \$1149  
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• Intel® PM45 Chipset  
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P9500 6MB L2 Cache, 2.53GHz \$1495  
T9400 6MB L2 Cache, 2.53GHz \$1455  
P8600 3MB L2 Cache, 2.40GHz \$1379  
P8400 3MB L2 Cache, 2.26GHz \$1335

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## Spore2K

Is everybody sick of PC game DRM yet? Nobody complains about console DRM, largely because it is essentially invisible to the consumer. Games are locked on CDs in a proprietary format that nobody else can read or write, and the illusion of a “zero installation” process includes not having to enter a security key or connect to a network to validate your game. Pirating console games is so difficult that virtually nobody has the expectation that it is even possible to get them for free from somewhere. As a result, most consumers don’t notice console game DRM. DRM on the PC, however, is another matter altogether. Everything is open and insecure; games use standard file formats that are easy to read and write, and of course the PC architecture is open. Trying to prevent game piracy in such an environment is nearly impossible. The average time to pirate a modern PC game secured with the most advanced DRM solutions in the market is around 23 days. Hot games are often pirated the day they are released, if not before they reach store shelves, as was the case for EA’s *Spore*.

A recent Nielson study reported that the average console gamer spends 4.5 more hours per month playing PC games than console games but spends almost three times as much money on console games. Why? Because PC games are basically free these days. They are so easily and ubiquitously pirated that nobody makes them anymore unless they are MMOGs tied to online communities or low-quality free flash games supported by advertising. This phenomenon has led many publishers and market analysts to the wrong conclusion—that PC gaming is dead. In reality, as I have pointed out previously, very much the opposite is true. The PC game market is bigger than all next-generation consoles combined, it has simply transformed away from being a \$50 boxed retail business into an online business supported by myriad online business models. *World of Warcraft*, the most profitable video game in history, is of course exclusively a PC game secured not by DRM but by its dependence on connectivity with an online community. *WoW* is so successful that it has basically purchased the world’s second-largest console game publisher, Activision.

Unfortunately, the big PC game publishers are learning all the wrong lessons from this change in the market. Like the music guys before them, companies like EA have decided that instead of openly embracing the market shift to online business models, they’re going to try to have their cake and eat it too by mixing models. EA has encountered bad PR from

its aggressive PC DRM solutions in the past, but nothing like the howl that has arisen from the release of *Spore*, the publisher’s most ambitious game project ever ([tinyurl.com/3t8g98](http://tinyurl.com/3t8g98)).

*Spore* is a community-based game that should therefore benefit immensely from rampant piracy of the client, assuming that it is actually a good game. EA has mandated internally that all of its PC-based titles use Sony’s SecurROM DRM solution. SecurROM is widely regarded by gamers as spyware. Despite being so labeled, the extreme measures Sony takes to secure PC games are absolutely necessary to achieve even minimal security in the PC’s highly open environment. Even these invasive and widely reviled measures are only minimally effective, as SecurROM DRM gets pried off new PC games within days of their release.

Traditional game publishers have been too slow to recognize the inevitable; that the days of selling boxed games in retail are just as dead as buying music on physical media. The PC game business is bigger than it has ever been in history, but it has moved online. The days of selling a cardboard box at a premium and forcing the user to type in a long security code are gone.

What remains are traditional big publishers struggling to figure out how to transition their multibillion-dollar retail boxed game businesses into online business models without cannibalizing the physical channels their current business depends on.

That struggle can be seen clearly in several major false starts EA

has had over the years. Some of you may recall that EA had a *Spore*-like scandal over serving in-game ads into *Battlefield 2142*. This provoked a “spyware” scandal because consumers aren’t accustomed to seeing advertising and having their usage tracked in games they have purchased. Of course, nobody screams “Spyware!” when they see ads on *Miniclip.com* or *Shockwave.com* because the games are free. Trying to mix purchased retail games with in-game ads was a disaster because the two business models just don’t blend.

The spyware scandal surrounding *Spore* DRM is based on a similarly misguided attempt to blend the traditional boxed retail game business with an online model. EA hopes that consumers will both pay for the *Spore* box and spend lots of money buying in-game microcurrency. If they couldn’t sell the box, then no retailer would carry it, but of course demanding money for a game you can’t really enjoy until you additionally subscribe to it is a big risk. If the game is great, the retail price will unnecessarily exclude







Content-based games like Spore are expensive to create, “fat” to deliver online, and often trade addictive replay value for pretty graphics.

millions of potential players who will never know how great it is because of the cost of finding out. On the other hand, if the game sucks, then it has little hope of generating much in-game revenue because people will bail on it quickly. This leads me to question why EA put such a premium on preventing piracy of the Spore game client if it was confident that the game was good. Everybody knows WoW is the biggest success in video game history, but nobody knows if that success would have been bigger or smaller if the game client could have been given away instead of sold. Runescape, a free, light WoW-like MMOG has more players than WoW and generates millions in revenues without a retail box.

I carry a number of free microcurrency-based games in my online game network, and the best ones generate an average of \$150 in online currency purchases per subscriber. Why would I sacrifice that kind of monthly income by refusing to let people try the game without paying me \$40 bucks up front before they even know if they like the game? The answer, of course, is that retailers wouldn't carry Spore if they couldn't get a piece of the game sale. Spore is so big that it would cost EA \$2 to \$3 per free user in bandwidth to let people download it to try it, so the compromise is to try to demand retail dollars for a game that is designed to generate its profits from having such addictive play that people can't resist upgrading their creatures with microcurrency purchases. This is a clear conflict of



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

business models and an error similar to the one EA made with Will Wright's last MMOG, Sims Online.

With a 35 million-dollar budget and years of development, EA basically bet on the game's brand marketing and box value instead of its addictive play to monetize it. Content-based games like Spore are expensive to create, “fat” to deliver online, and often trade addictive replay value for pretty graphics. The result is that although the game may sell a lot of boxes in retail—a type of success EA is familiar with—it may fail to retain paying subscribers because it's not addictive in the end. EA's aggressive use of SecurROM DRM is a clear indication of EA's bias toward the physical retail channel, even if it means compromising the game's online revenue potential and ability to virally market itself.

EA's struggles with making the leap to online game publishing also serves to illustrate how exciting the opportunities are for new game publishers and developers to compete with the big guys, because they are free to develop purely online games without being encumbered with the institutional need to protect a fading retail channel while trying to innovate. EA's DRM woes stem from the failure to recognize that the era of selling games for 50 bucks sight-unseen is ending, and the most successful PC games of tomorrow will be free, distributed electronically, tied to online communities (which can't be pirated), and supported by a blend of advertising and microcurrency models. ▲

**Send your feedback to**  
**[thesaint@cpumag.com](mailto:thesaint@cpumag.com)**



# DREAM HARDWARE

These Gizmos Don't Sing It, They Bring It



Aspiration. It inspires a builder to build the biggest, a man to soar with the eagles. And should Mother Nature strike back, aspiration can help you piece your world back together—starting with your network, of course.

by Marty Sems

## FusionMan

Like any other lad born under the gentle shadow of Sputnik, Swissman Yves “FusionMan” Rossy ([www.jet-man.com](http://www.jet-man.com)) has always wanted to strap on a jet pack and fly around. And after 15 years of tinkering, the pilot and thrillseeker became the first to fly across the English Channel this way. His fly ride is a 121-pound carbon composite wing with four kerosene JetCat turbine engines from Germany. FusionMan don't need no stinkin' control mechanisms, neither—he steers with his body and navigates by sight. He jumps out of a plane, unfolds his wing, cruises along at 118mph, and then parachutes down when he espies unattended chocolate or a potential financial client.

## AWARE Project

“Release the drones.” When the so-called “good guy” singlehandedly wipes out your landline sensor network—not to mention the odd dozen of your sharply outfitted henchmen—it's time to get AWARE ([www.aware-project.net](http://www.aware-project.net)). Unmanned helicopters swarm out of your hidden fortress, intelligently deploying new network nodes to get you back in the game. The European 3.4-million-Euro project is actually about disaster management and film-making, but trust us: It's more fun our way. Its full name is the Platform for Autonomous self-deploying and operation of Wireless sensor-actuator networks cooperating with AeRial objEcts, and thus the AWARE acronym demonstrates as much bloody-minded verbal contortionism as the name of a typical bill headed for Congress.



## Podium

If you caught the opening ceremonies of the Beijing Olympics (hopefully in high-def), you know all about the shock and awe of a large-scale LED display. As ever, someone in Dubai is building the biggest something-or-other, and this time it's the facade of the 35-story Podium tower in whimsical Dubailand ([www.tameer.net](http://www.tameer.net)). More than 300 feet tall, the glossy, tinted fascia will be the world's tallest LED screen. When the building is finished in late 2011, the display should be visible from a mile away. That wheezing hiss you hear is the sound of Arabian Peninsula ad salesmen going “Yessss.” ▲







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# The Power Struggle

## Six PSUs Jump In The Ring

Although PC components have as diverse functions as the appendages on your own body, every moving part (both inside your chassis and a human) has an important common denominator: a power source. For you and me, it's our heart, pumping blood to all our extremities. For a PC, it's the continuous supply of wattage keeping your PC well-oiled and working.

Although the exterior of many PSUs may not be very exciting traditionally, the majority of the units we reviewed buck this trend, thanks to professional-looking finishes and smart design. Our selection might seem a bit willy-nilly due to the varying wattages, but hopefully this broad range will give you some options in terms of PSU enclosures, cable management, and performance.

### How We Tested

We started a system originally assembled by one of *CPU*'s well-respected contributors, and then we tweaked it just a bit to amp things for the competition. For all our power supplies we utilized the following configuration: Intel Core 2 Quad CPU Q6700 at 2.67GHz, Nvidia GeForce 9600 GT, three SATA hard drives, one optical drive, Nvidia nForce 790i Ultra SLI motherboard, 1GB Crucial Ballistix DDR3-1,333, and a Dell 3007WFP 30-inch display, all running on Windows Vista. For our single 1,000W+ PSU, the Topower PowerBird 1100 B1, we added an additional GForce 9600 GT.

We placed everything inside the Thermaltake Armor+ Super Tower. This model comes equipped with clear side panels and features a monstrous 230mm fan opposite the motherboard. There wasn't an overwhelming amount of room for uncomplicated cable management, but we welcomed the challenge during each installation.



**Silencer 500**  
\$99.99 | PC Power & Cooling  
www.pcpower.com



**APS-600C**  
\$119.95 | Chieftec  
www.chieftec.com



To stress the four cores, we simultaneously ran four trials of Prime95 for two consecutive hours. We also looped 3D Mark06 at 1,920 x 1,440 (the highest the system could sustain) for the same stretch of time while playing a CD on repeat.

### PC Power & Cooling Silencer 500

In May 2007, we reviewed three PSUs from PCP&C: the Silencer 750 EPS12V

Quad, Turbo-Cool 1KW SR, and Silencer 610 EPS12V. (See "High-End PSUs" on page 66 for reviews of the Silencer 750 EPS12V Quad and Turbo-Cool 1KW SR; see "Baring The Midrange" on page 71 for a review of the Silencer 610 EPS12V.) In our April 2008 issue, we tested two more of their units: the Turbo-Cool 1200 and Turbo-Cool 860. (See "PSU Showdown" on page 19.) All of these garnered a *CPU* rating of 4 or better; as far as we're concerned, there's no reason to give the Silencer 500 anything less. The Silencer 500 mimics the design of the Silencer 610, appropriately, with ventilation on the sides and an 80mm fan at the rear. However, it's quite a bit shorter in length.

The 500 heated things up on the inside but never buckled during its two-hour test run. Further, the efficiency rating clocks in at 82%. PC&C claims that its low-turbulence circuitry cuts down on the noise by up to 90%, in contrast to the Turbo-Cool 860.

The black matte finish is utilitarian enough to mask any scratches it may have acquired during installation. The malleable sleeving never restricted us from manipulating cables within the chassis. If you want stability without too much flash, you can consider the Silencer 500 your next power investment. (The five-year warranty is a plus, too.)

### Chieftec APS-600C

Chieftec's extensive A135 series, touting "efficient energy," offers eight power supplies ranging from 500 to 850W. We received the midrange APS-600C, characterized by a modest coal-colored finish and a ginormous 140mm fan. Appropriately, this unit stayed relatively cool during its test run. After we shut down Prime95, the CPU temp remained





**PowerBird 1100 B1**  
\$269 | Topower  
www.topower.com



unusually low, comparatively. We recorded the power factor at 0.979; the max wattage topped out at 270W.

The APS-600C comes with a bundled modular cable set. Compared to the modularization on the PowerBird 1100 B1, the connectors are less densely packed, but you're sacrificing some watts, naturally. Each molex connector features "annoyance-free tabs" for squeeze-and-pull functionality (for more details, see the Everest 900, later). You'll want to follow the connectors chart to properly insert the modular cables.

Although it comes with a short two-year warranty, the APS-600C proves to be a reliable, affordable, and well-designed PSU in the middle of the A135 line.

### Topower PowerBird 1100 B1

On multiple occasions, I've called the PowerBird 1100 B1 a "beast" because of its obvious dominance in size and cabling options, not to mention the classy

mirrored coating. Topower says the casing also incorporates nanotechnology to shield EMI. Our Topower rep says that the PowerBird's construction is better than pure-grade metal and produces less interference.

This PSU makes you pay attention to its modular cable organization. No leads are hardwired. Using the Connector Definition chart next to the modular interface helps you pair each lead with the right cable. There's a mix and match of cables. Five are sleeved in rubber, while the other seven sport a stretchable nylon weave. The cables were easy to move about the case, although it was quite cramped around the leads.

With six sets of 12V rails, the PowerBird is both SLI- and CrossFire-certified. Specifically, the PowerBird can support two GeForce GTX 260 GPUs. Like we mentioned earlier, we changed to a dual-GPU configuration by adding the Nvidia 9600 GT. The PowerBird passed the standard torture test with a solid performance. In light of our analysis, it should be capable of handling a more substantial system.

### Antec EarthWatts 500

Antec has gone green with its line of efficient PSUs, which includes 380-, 430-, 500-, and 650-watt units. The EarthWatts 500 is basic because it wants to be that way; it's designed to provide ecofriendly power for your system. The casing is essentially a gray metal box, equipped with a sleeved motherboard

## Mighty Morphin' Power Booster

OK, the FSP Booster X5 doesn't exactly have morphing capabilities, but it may prompt you to shout, "Go, go, power booster!" If your current PSU no longer supports the powerful system you've pieced together, you can take advantage of a supplemental PSU such as the Booster X5 450W Plus. For starters, the X5 rates at 85% efficiency with a lifespan of 50,000 hours.

Like its sister model, the 300W Booster X3, the X5 can supply extra power to up to two graphics cards.

The two 6+2 pin connectors deliver wattage to compatible cards. Since this component isn't self-sufficient, there's one molex port designed for the primary PSU. Cooling relies on dual 40mm, self-contained fans that operate on each side of the large LED "X" emblazoned on the front. If you want to match this feature to the color of your chassis, you can choose from a few fluorescent colors to complement the "X".

A power booster is an efficient addition to any PC with lackluster performance. The X5 is no exception. And to that we say, "Mastodon!"



**Booster X5 450W Plus**  
\$99.99  
FSP  
www.fspgroupusa.com



**EarthWatts 500**  
\$89.99 | Antec  
www.antec.com



## Everest 900

\$219.99

FSP

www.fspgroupusa.com



lead, standard cabling, and an 80mm fan. Although this architecture is all about saving on construction, we stretched some connectors to the max inside our tower.

Antec is really pushing the 80 Plus certification. This efficiency rating covers

any conditions between 20 and 100% of load so as to reduce heat and extend the life of the PSU. Suffice to say, the EarthWatts 500 is durable and delivers in terms of power regulation. We didn't detect any noise pollution, either.

Overall, this model is about function over form. If you don't mind sacrificing aesthetic appeal (and some wattage) for green power, you won't even have to drop a Benjamin for this one.

## FSP Everest 900

The FSP Everest 900 will really excite you if you're a fan of accessories and a variety of colors. At first glance (once you've inserted all the modular cables), you'll notice the detail in the selection of red and blue mesh sheathing around the PCI-E cables. Additionally, the clear fan lets you see almost every interior component.

Because removing Molex connectors from the case can be a real pain sometimes, we appreciate that FSP includes what's called "Smart Molex" tabs on the ends of each molex connector. When you

## Specs Showdown

We've compiled this chart to help you compare the performance of each PSU side-by-side. You'll also note other features and pricing at the bottom. Any information labeled as "N/A" was submitted by manufacturers as such, or no specification was made available.

"Cable side" denotes from which side the primary cable channel protrudes. PSU location assumes mounting in a standard tower case; "fan" indicates that the cables are nearest to the panel opposite the motherboard, and "plug" means cables reside closest to

	PC Power & Cooling Silencer 500 EPS 12V	Chieftec APS-600C	Topower PowerBird 1100 B1
Rated continuous (W)	500W (40 C)	600W (40 C)	900W (50 C)
Rated Peak (W)	550W (40 C)	720W (40C)	1,100W (40 C)
12V rails	1	2	6
(+) 12V continuous (per rail, A)	35	25	20
(+) 5V continuous (A)	24	25	30
(+) 3.3V continuous (A)	24	25	30
Manufacturer (per UL File #)	PC Power & Cooling	Chieftec	Topower
SLI-certified	yes	2x 8800 GTX	yes
CrossFire-certified	N/A	2x X1950/X1900	yes
Efficiency rating (as advertised)	82%	>80%	>80%
Modular cables	no	yes	yes
Cable side	fan	plug	fan
Fan(s) location	front	top	bottom
Fans	80mm, 20-34dB	135mm, 20.2-37.5dB	120mm<30dB
Miscellaneous	ATX12V (2.2), EPS12V, UL/cUL/CE/CB/RoHS	Active PFC, ATX 12V 2.2, EPS12V 2.92, RoHS	Active PFC, ATX 12V 2.2, EPS12V 2.91, RoHS
PCI-E 8-pin	1	1 (6+2)	3
PCI-E 6-pin	1	1	6
Main 12V	20/24	24	20+4
8-pin EPS12V	1	1	1 (4+4)
4-pin 12V	1	1	2
SATA	6, 1 mini	6	6
Molex 4-pin peripheral	6	4	6
Floppy 4-pin	1	2	2
Finish	Matte Black	Black with silver powder	Titanium black
Length, including cable bend (in inches)	8.5	8	9
Warranty	5 years	3 years	3 years
Price	\$99.99	\$119.95	\$269
CPU Rating	●●●●	●●●●●	●●●●●

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



press both tabs, you can yank it out of its socket with only a little leverage.

Being CrossFire- and SLI-certified, the Everest 900 is certified for two Radeon HD X2900s (or better) or 8800 Ultras/GTXes. It's compliant with Intel Core 2 and AMD Athlon 64 CPUs. The Everest also boasts quad 4-Channel 12V rails.

We mentioned accessories because the Everest 900 includes a carrying pouch for unused connectors, Velcro bundling straps, and extra screws. Aside from this bonus, the unit stands out as a great "showcase" PSU to add to your already impressive (and colorful) rig.

### FSP Blue Storm II 500

The Blue Storm II 500 also claims to be good for the environment, owing to its efficiency rating of 80 to 85% (maximum). With a full-range, active

### Blue Storm II 500

\$89.99

FSP

www.fspgroupusa.com



PFC, this PSU is intended to be highly effective in terms of energy savings.

According to FSP, the Blue Storm switches to energy-saving mode when in standby. In addition, the casing is thermal coated, and the fan features heat

moderation control. FSP also added a mesh grille for even more airflow.

If you're really into modular PSUs, you probably won't appreciate the Blue Storm's simple design. Even so, you will find the Smart Molex mechanisms on the Blue Storm's power connectors. You could consider this model a bargain at \$89.99; it has less flash but should appeal to the eco-conscious.

### Keeping It Real

Choosing a PSU should be based on how the unit can handle real-world conditions. We took this fact into consideration when deciding on components. Consequently, all of our systems were consistently stable and didn't randomly reboot. No components failed because of heat-related issues, though a couple of PSUs did heat up (as expected).

If you're enthused about PSUs, you've probably already decided which unit you prefer. Even so, keep in mind that green power is springing up everywhere. Although you'll ultimately burn less juice in the end, this feature seems to be characteristic of midrange models currently, such as the EarthWatts 500 and the BlueStorm II 500. Modular is becoming much more convenient, as well, so we recommend power supplies with detachable leads, including the PowerBird 1100 and the Chieftec APS-600C, if you'd like to avoid untangling the traditional bundle. ▲

by Joanna Safford

the motherboard tray. When measuring the cable length, we folded the cable harness against the side of the PSU and determined its length by how much the cable still extended after it was restricted (simulating a typical, cramped case). Manufacturer (per UL File #) is the original manufacturer name.

Antec EarthWatts 500	FSP Everest 900	FSP Blue Storm II 500
500W (25 C)	900W (30 C)	500W (30 C)
500W	900W (30 C)	525W (25 C)
2	4	2
34	20	18
24	30	30
24	30	30
Antec	FSP Group	FSP Group
no	2x GeForce 8800 ULTRA	N/A
no	2x Radeon HD X2900 or better	N/A
>80%	>80%	>80%
no	yes	no
fan	plug	fan
Front	bottom	bottom
80mm, <30dB	120mm, <30dB	120mm, <28dB
Active PFC, ATX 12V 2.2, EPS 12V 2.91, RoHS	Active PFC, ATX 12V 2.2, RoHS, thermal sensor	ACTIVE PFC, ATX 12V 2.2, RoHS, Meshed cable, thermal sensor
0	2	1
2	2	1
1 (20+4)	20+4	20+4
1	1 (4+4)	N/A
1	1	1
4	9	4
6	6	6
1	1	1
Steel	Metallic blue	Metallic blue
7	8	7
3 years	3 years	2 years
\$89.99	\$219.99	\$89.99
● ● ● ●	● ● ● ●	● ● ● ●

# Intel Core i7-965 Extreme Edition

## Behold, Nehalem

Perhaps you were expecting the next generation of Intel processors to come in a different package; maybe you were hoping for eight cores or something equally huge and were disappointed to see a quad-core clocked at a generous but not extraordinary 3.2GHz. But don't be deceived—the next big thing has indeed arrived.

The Core i7 demonstrates smart engineering; you have to hand it to Intel for making a CPU that uses its power efficiently to get faster performance. Rather than cramming in more cores, they've created a quad-core CPU that's faster because it's *better*.

First of all, Hyper-Threading is back. By appearing to the system to have twice the actual cores, Hyper-Threading gives the CPU a big performance boost in multithreaded, media, and productivity applications. With the quad-core i7, the technology gives you eight total threads, or eight logical cores.

Turbo Mode is one of the most direct ways the Core i7 has upped its performance over previous processors. This feature distributes power more efficiently when one or more cores are idle. Because not every core is used all the time, if one core needs a boost, the system can ration power from an idle core to the active one. It's a sort of automatic overclock for a single core.

Speaking of overclocking, one major wrinkle in the Core i7 is the way you have to do it. For starters, the frontside bus is gone, replaced by a much faster data path, QuickPath Interconnect. From now on, think of the FSB fondly as you recall computer technologies you once thought were

### Core i7-965 Extreme Edition

\$999

Intel

www.intel.com



incredible, such as the first time your eyes beheld a Commodore 64.

By moving the memory controller to the CPU itself, it can work much faster as it has its own bus and no longer shares bandwidth with I/O. Why it took Intel so long to get around to doing this is a mystery.

Without a FSB, overclocking is quite a different affair. There is much greater flexibility for tweaking individual components, but it's also more complicated. For example, each core has its own multiplier. In any case, there is plenty of headroom on the Core i7-965. I got a score of 0:48 (minutes:seconds)/18266 in Cinebench 10 with an overclock of just under 3.9GHz.

Although it's exciting that Intel has introduced QPI, a much faster and more efficient way to transfer data than the FSB it replaced, the real boost in performance it affords won't be as obvious unless (and until) you're using a multiprocessor setup. (Skulltrail, anyone?) QPI connects the processor to other system functions, but it will also connect CPUs to each other. The result is a high-bandwidth data path between multiple CPUs, allowing them to communicate efficiently and quickly. Perhaps we may soon see a plethora of enthusiast-class boards with more sockets.

With the release of the Nehalem CPUs, the stage is set for some major developments from Intel; the new Socket 1366 and QPI will no doubt greatly enhance performance in both consumer

computers and servers. Stay tuned as these developments unfold. ▲

by Seth Colaneri



## Intel Core i7-965

### 3DMark Vantage

Overall (1,280 x 1,024)	P12465
GPU	10030
GPU1 (fps)	29.53
GPU2 (fps)	29.23
CPU	45858
CPU1 (plans/s)	2868.68
CPU2 (steps/s)	148.09

### PCMark Vantage Pro

Overall	6726
Memories	5602
TV And Movies	4788
Gaming	8591
Music	5672
Communications	5524
Productivity	5539
HDD	3977

WinRAR 3.71\* 1:25

### Cinebench 10\*

Multithreaded (min:sec)	0:56
Multithreaded (score)	15627

POV-Ray 3.7 Beta\*\* 4181.79pps

### Crysis 1.1

1,280 x 1,024, low quality 156.93fps

\* minutes:seconds

\*\* pixels per second

**Test system specs:** Processor: 3.2GHz Intel Core i7-965 Extreme Edition; RAM: 3GB Qimonda DDR3-1067 CL7; Graphics: Nvidia GeForce GTX 280; Hard drive: 150GB Western Digital Raptor 1500; Hyper-Threading enabled

**Specs:** Socket LGA 1366; Clock speed: 3.2GHz; QPI (25.6Gbps); 45nm process; 130W max TDP



# Intel DX58SO Extreme

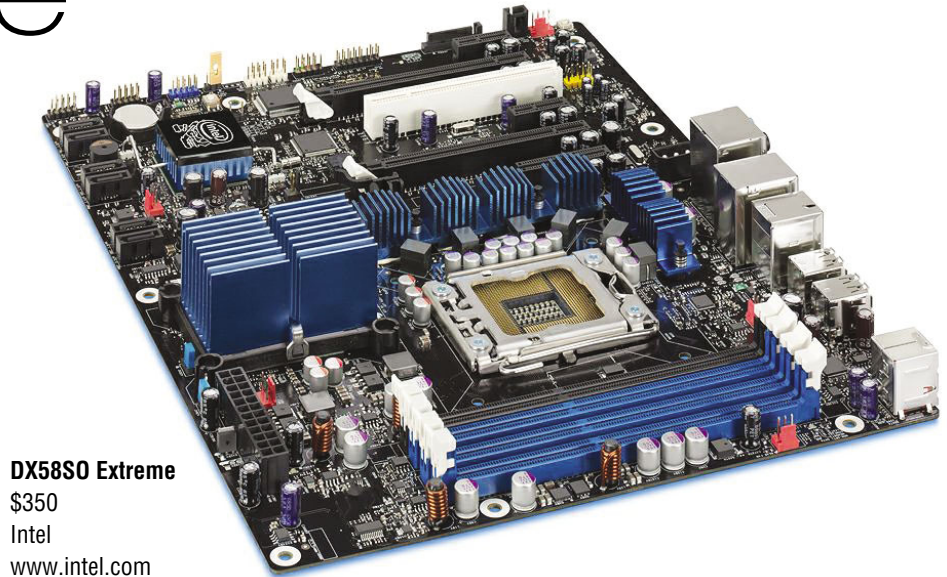
If the new Core i7-965 processor is the engine for Nehalem, then the single-socket, ATX form-factor DX58SO Extreme is the chassis it goes in. Together, they form the backbone of the fastest enthusiast-class system you can currently get your hands on.

The most notable feature of the DX58SO board is the sudden disappearance of the frontside bus. That's right overclockers: no more boasting about how far you pushed your system's FSB. From now on, you can brag instead about your QPI (QuickPath Interconnect).

Overclocking, therefore, has also drastically changed. Instead of the FSB regulating data flow from the CPU to the rest of the system, there is a base clock that controls the processor, IOH, and ICH independently of one another. Thus, each of these components has its own voltage regulation and other factors to manipulate. For example, each processor core has its own multiplier. The memory controller, which is conveniently located on the CPU (it's about time), has its own multipliers that are tied to the ICH multiplier.

You can also tweak the base clock, although at press time there is not yet consensus (not even from Intel) on what exactly would happen if you did so. I determined firsthand that the system will not explode if you up the base clock, but the performance gains compared to the other methods of overclocking are minimal at best.

It was somewhat counterintuitive to leave the base clock unaltered when overclocking, but I hit the best scores when I



## DX58SO Extreme

\$350

Intel

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



left it alone. I changed the multipliers for each core from 25 to 29; the base clock of 133MHz with an average core multiplier of 29 produces a CPU clock of 3.87GHz. I also upped the voltage to the memory and bumped up the memory and UCLK (uncore) multipliers (which must be at least twice that of the memory multiplier).

At stock speeds, the QPI runs at 6.4GTps (25.6GBps), although with some clever overclocking, the minds at Intel claim it can reach as high as 7.2GTps (28.8GBps). As tantalizing as that data rate may be, this board can't truly take full advantage of it. You will have to wait for multiprocessor boards before you see the real boost in performance.

The DX58SO includes triple-channel memory (three slots, up to 2GB per DIMM) with an additional slot available for a little extra boost. Beware that fourth slot, though. The three other DIMMs

will come in a kit, which when paired with a lone stick of odd-man-out RAM could cause you headaches, especially when overclocking.

Another significant development is that this mobo supports CrossFireX instead of SLI. You can also disable certain SATA and USB ports from the BIOS.

A problem with ever-shrinking die processes is power leakage. At 45nm, the Nehalem chips present a potential leakage problem, but Intel addressed the issue with Power Gate technology. The Power Gates work in tandem with Turbo Mode to reduce power leakage and use power more efficiently overall. Basically, Turbo Mode disables inactive cores while not in use and redistributes that power to active ones. Power Gates block switching power and prevent power leakage.

The DX58SO is part of a new and very exciting generation of products from Intel. If you want in on the ground floor, get this board immediately. ▲

by Seth Colaneri

**Specs:** Socket LGA 1366; Chipset: Intel X58 Express; QPI (25.6GBps); Max memory: 16GB DDR3-1600; Audio: Intel High Definition Audio 7.1; Slots: 2 PCI-E 2.0 x16 (or 4 x8) with CrossFire support, 1 PCI-E, 1 PCI; Ports: 6 SATA, 2 eSATA, 12 USB 2.0, 2 FireWire, 1 Gigabit Ethernet

# MSI R4870X2-T2D2G-OC

Factory-overclocked Radeon HD 4870 X2 cards have begun hitting retail shelves recently, with MSI's R4870X2-T2D2G-OC being one of the first. MSI's overclocked spin on the Radeon HD 4870 X2 features 2GB of onboard GDDR5, 1GB per GPU, and a pair of RV770 GPUs.

Unlike reference 4870 X2s, MSI gooses the frequency on each of the card's GPUs to a speedy 780MHz, 30MHz higher than stock. The extra 30MHz gives MSI's offering a slight boost in performance, where its 1,600 stream processors can crunch through complex shaders quicker than lower-clocked 4870 X2 cards. MSI doesn't tweak the memory frequency though.

Other than its slightly higher GPU clock, the MSI R4870X2-T2D2G-OC differs from other Radeon HD 4870 X2 cards only by the custom decal affixed to

its fan shroud. The actual fan, cooler, PCB, and outputs match AMD's reference design.

As you probably expect, given the Radeon HD 4870 X2's reputation, the higher-clocked MSI card performed very well in the benchmarks. Except for one instance where the test system was CPU-bound (3DMark06), it outperformed a reference Radeon HD 4870 X2 in every test. Considering the card's performance and the fact that MSI doesn't charge a premium for the factory overclock, I can't help but like the R4870X2-T2D2G-OC. If its accessory bundle was a little better and included a current game, this card would be tough to beat. ▲

by Marco Chiappetta

**Specs:** GPU: Radeon HD 4870 X2; Core clock: 780MHz; Memory: 2GB GDDR5 (900MHz); 1,600 stream processors; Interface: PCI-E 2.0



**R4870X2-T2D2G-OC**

\$549

MSI

www.msicomputer.com



## Benchmark Numbers

3DMark06	MSI R4870X2-T2D2G-OC
Overall Score	15908
Shader Model 2.0 Test	5785
Shader Model 3.0 / HDR Test	8160

3DMark Vantage (Enthusiast Preset)	
Overall Score	7423
GPU Test 1	23.74
GPU Test 2	18.51

1,920 x 1,200	
Half Life 2: Episode 2 (4XAA, 16XAF)	170.16
Enemy Territory:	
Quake Wars (4XAA, 16XAF)	109.5
Unreal Tournament	396.87
Crysis	46.68

2,560 x 1,600	
Half Life 2: Episode 2 (4XAA, 16XAF)	119.81
Enemy Territory:	
Quake Wars (4XAA, 16XAF)	88.9
Unreal Tournament 3	387.45

# PowerColor PCS+ HD 4870 1GB GDDR5

When the Radeon HD 4870 first hit the scene, it was universally praised as a great performer and excellent value. But one major concern among many users of Radeon HD 4870 cards was heat. Although outfitted with a beefy two-slot cooler, reference Radeon HD 4870 cards ran quite hot.

By tweaking fan profiles, manufacturers (and users) were able to address the 4870's heat output somewhat, but PowerColor took a different approach and simply replaced AMD's reference cooler. The PowerColor PCS+ HD 4870 1GB GDDR5 features a custom cooler with a large center-mounted fan, four heatpipes, and a densely packed array of aluminum heatsink fins. The cooler's design looks relatively simple and elegant, and it's far lighter than AMD's reference cooler.

During testing, I actually found the cooler performed better than PowerColor's claims. Whereas our reference Radeon HD 4870 idled at around 75 degrees Celsius and peaked at about 90 C, PowerColor's offering with the PCS+ cooler ran at

roughly 60 C and 80 C under idle and load conditions, respectively. And PowerColor's card also had a higher-clocked GPU and a 1GB frame buffer.

One issue with the PCS+ cooler is noise, however. At idle, this card is a bit louder than reference cards. Under load, noise output is about the same. All in all, the PowerColor PCS+ HD 4870 1GB is an attractive product. ▲

by Marco Chiappetta



**PCS+ HD 4870 1GB GDDR5**

\$299

PowerColor

www.powercolor.com



**Specs:** GPU: Radeon HD 4870; Core clock: 800MHz; Memory: 1GB GDDR5 (925MHz); 800 stream processors; Interface: PCI-E 2.0

## Benchmark Numbers

3DMark06	PowerColor PCS+ HD 4870 1GB
Overall Score	14667
Shader Model 2.0 Test	5527
Shader Model 3.0 / HDR Test	6846

3DMark Vantage (Enthusiast Preset)	
Overall Score	4117
GPU Test 1	12.88
GPU Test 2	10.44

1,920 x 1,200	
Half Life 2:	
Episode 2 (4XAA, 16XAF)	120.46
Enemy Territory:	
Quake Wars (4XAA, 16XAF)	90.6
Unreal Tournament 3	91.64
Crysis	37.36

2,560 x 1,600	
Half Life 2:	
Episode 2 (4XAA, 16XAF)	74.21
Enemy Territory:	
Quake Wars (4XAA, 16XAF)	58.1
Unreal Tournament 3	68.43



# MSI GX720

MSI is getting serious about its gaming series. In addition to its other models, the GX720 is ready and able to meet your performance needs. The GX720 offers the Penryn-based, 2.53GHz Intel Core Duo CPU. Overclockers will appreciate the Turbo Drive Engine button—they can give the processor a 16% jolt with the press of a finger.

Right away, I was impressed with the GX720's multimedia features, and more specifically, the audio capabilities. The speaker system on this notebook is worth noting; it will appease your eardrums thanks to the virtual Dolby 4.1 surround sound (four speakers and a subwoofer). The audio was crystal clear, even when I listened from across the room.

As for the 17-inch widescreen display, MSI has added the Eco Power Management



## MSI GX720

\$1,799 (as tested)

MSI

www.msimobile.com



System, which lets you adjust your power settings according to five

preset modes: gaming, movie, presentation, office, and turbo battery. The Eco Power UI is convenient, especially since it includes a playback pad, Web cam (2MP) launcher, and Bluetooth activator.

The GX720 features a full-numeric keypad to the right of the standard QWERTY board. Further, I liked the uniquely marked WASD buttons that provide an at-a-glance directional reference. And, for the aesthetically minded, the deep red casing and black brushed aluminum do the GX720 justice. ▲

by Joanna Safford

**Specs:** CPU: 2.5GHz Intel Core 2 Duo; Memory: 4GB DDR2-800; HDD: 320GB SATA; GPU: Nvidia GeForce 9600M GT (512MB DDR2); 17-inch LCD (1,680 x 1,050); OS: Windows Vista Home Premium (32-bit)

## Benchmark Results

### 3DMark Vantage 1.0.0\*

Overall	P1636
3DMark GPU Score	1397
GPU1 (fps)	3.62
GPU2 (fps)	4.58
3DMark CPU Score	3356
CPU1 (Plans/s)	449.83
CPU2 (Steps/s)	4.82

### Cinebench 10

Multithreaded (min:sec)	5:14
Multithreaded (score)	2812

### Dr. DivX 2.0.1\*\*

Score	5:30
-------	------

### PCMark Vantage Pro 1.0

Overall	3908
Memories	2867
TV And Movies	2875
Gaming	3550
Music	4107
Communications	3958
Productivity	3052
HDD	3030

### POV-Ray 3.7 Beta\*\*\*

Score	1141.89
-------	---------

### WinRAR 3.71\*\*

Score	2:51
-------	------

### S.T.A.L.K.E.R.

Score	21.942
-------	--------

### World In Conflict

Score	9
-------	---

\*Tested at default resolution

\*\*minutes:seconds \*\*\*pixels per second

\*\*\*\*Games tested at notebook's native resolution: 1,680 x 1,050.

# AMD ATI Radeon HD 4550

The ATI Radeon HD 4550 is being billed as AMD's low-cost option and the competition for the Nvidia GeForce 9400 GT. Price-wise, both cards are comparable, which should make for an interesting battle as the two battle at the bottom rung of the graphics ladder.

Entry-level graphics cards rarely blow us away with their benchmark scores, so we weren't expecting above-average performance from the HD 4550 at high-quality settings. We were still a bit surprised, however, that it produced less-than-playable frame rates in Company of Heroes, World in Conflict, and Crysis at medium-quality. What it can do, though, the 4550 does in cool silence, thanks to its passive cooling.

## AMD ATI Radeon HD 4550

\$55

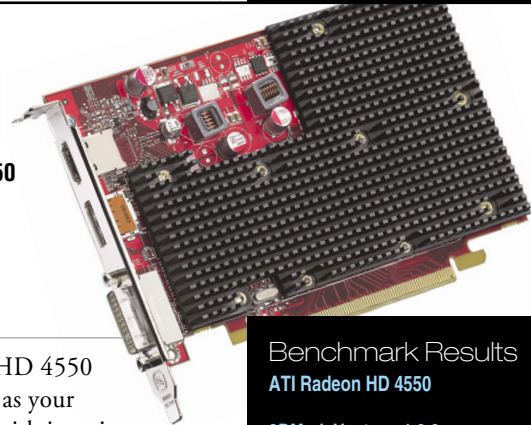
AMD

ati.amd.com



Overall, the Radeon HD 4550 isn't a bad card, so long as your expectations are in line with its price tag. But when you consider the ongoing improvement of integrated graphics, it becomes apparent that IGP could easily catch up to this card in no time. In other words, the 4550 needs to work a little harder to impress us. ▲

by Joanna Safford



## Benchmark Results

### ATI Radeon HD 4550

### 3DMark Vantage 1.0.0

Overall	E6221/P1164
GPU	896/5422
CPU	11200/11159

### Crysis 1.1

1,280 x 1,024 (Medium quality)	18
1,280 x 1,024 (High quality)	8
1,600 x 1,200 (Medium quality)	13
1,600 x 1,200 (High quality)	7

### Company of Heroes (4XAA)

1,280 x 1,024	12
1,600 x 1,200	9

### World in Conflict

1,280 x 1,024	11
1,600 x 1,200	9

**Test system specs:** Processor: 3GHz Intel Core 2 Extreme X9650; RAM: OCZ DDR3 PC3-10666; Hard Drive: 150GB Western Digital Raptor 1500

**Specs:** GPU: Radeon HD 4550; Core clock: 600MHz; Memory: 512MB DDR3 (800MHz); 80 stream processors; HDMI port

# ATI Radeon HD 4670

List this one in the “Didn’t see that one coming” category. The ATI Radeon HD 4670 is a surprisingly good graphics card for the \$79 price tag. I tested the vanilla version of the 4670 and was pleased to discover that it produced decent frame rates in gaming benchmarks. In 3DMark Vantage, it cranked out an impressive E7054.

The claim by ATI that this is a card that offers the same performance as some higher-end cards is perhaps stretching it a bit, however (props to the PR folks for a nice effort, though). Sure, it can handle DX10 gaming, so long as the game’s quality settings and resolution are set low.

As far as ports go, our unit had one DVI port and two DisplayPort outputs.

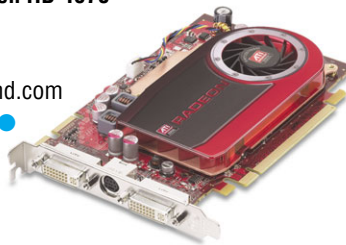
For serious gamers, the 4670 isn’t going to cut it. But if you grab a pair of them to use in a CrossFire configuration, you may find that you can squeeze out some high-quality gaming performance. ▲

## Radeon HD 4670

\$79

ATI

ati.amd.com



by Seth Colaner

**Test system specs:** Processor: Intel Core 2 Extreme X9650, 3GHz; RAM: OCZ DDR3 PC3-10666; Hard Drive: 150GB Western Digital Raptor 1500

**Specs:** GPU: Radeon HD 4670; Core clock: 750MHz; Memory: 512MB GDDR3 (1,000MHz); 320 stream processing units

## Benchmark Results

### 3DMark Vantage

Overall	E7054
GPU	6290
CPU	11100

### 1,280 x 1,024

#### Crysis 1.1

Medium quality	25.36
High quality	12.98
Company of Heroes (4xAA)	13.3
World In Conflict	14

### 1,600 x 1,200

#### Crysis 1.1

Medium quality	18.49
High quality	9.45
Company of Heroes (4XAA)	9.9
World In Conflict	10

# Gigabyte GA-EP45T-Extreme

Gigabyte keeps the hits coming with the GA-EP45T-Extreme, the latest in a series of boards based on Intel’s P45 chipset.

This particular board came with the Hybrid Silent-Pipe, a large copper passive cooler that aids in keeping temperature down. Gigabyte also included DES (Dynamic Energy Saver) on this board, a function that throttles power when the CPU doesn’t need to work as hard.

The EP45T-Extreme is designed for overclocking. Indeed, there are plenty of options in the BIOS for OC tweaking—enough to keep any overclocking junkie happy for hours. If you prefer to do your overclocking in a Windows environment, the board includes Gigabyte’s EasyTune 6 interface.

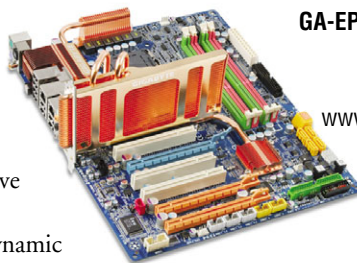
The EP45T-Extreme has plenty of headroom: I pushed the FSB to 500MHz with no trouble or signs of instability. If you like options—having a mobo that can be both an energy-efficient green machine and a powerful overclocker—buy the EP54T-Extreme. ▲

## GA-EP45T-Extreme

\$290

Gigabyte

www.gigabyte.us



## Benchmark Results

Overall	P5589
GPU	4790
GPU Test 1	13.33fps
GPU Test 2	14.78fps
CPU	11178
CPU Test 1 Plans/S	1503.33
CPU Test 2 Steps/S	15.91

### PCMark Vantage Pro

Overall	5520
Memories	4555
TV And Movies	4278
Gaming	5727
Music	5037
Communications	5112
Productivity	4996
HDD	4250

### Dr. DivX 2.0.1\*

4:40

### WinRAR 3.71\*

2:30

### Cinebench 10

Multithreaded (min:sec)	1:24
Multithreaded (score)	10491

### POV-Ray 3.7 Beta\*\*

1669.23pps\*\*

### Crysis 1.1

at 1280 x 1024, Low quality 121.88fps

\* minutes:seconds

\*\* pixels per second

\*\*\* Games tested at 1,280 x 1,024

by Seth Colaner

**Test system specs:** Processor: 3GHz Intel Core 2 Extreme X9650; RAM: 2GB Crucial Ballistix DDR3-2000; Graphics: Nvidia GeForce 8800 GT; Hard drive: 150GB Western Digital Raptor 1500

**Specs:** Socket 775; Chipset: Intel P45 Express; 1,600MHz FSB; Max memory: 16GB DDR3-1600; Audio: Realtek ALC889A 7.1; Slots: 2 PCI-E 2.0 (x16 or dual-x8), 1 PCI-E x4, 1 PCI-E x1, 3 PCI; Ports: 6 SATA, 12 USB 2.0, 3 FireWire, 2 Gigabit Ethernet



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## The **XILENCE** XQ Cooler Series

- the next generation of ultra-quiet coolers for high-performance CPUs!

The XQ 775 is characterized by an extremely compact design with optimum cooling performance and virtually silent operation. This is made possible due to the new XQ design - the frameless XQ fan is powered by the XQ micro engine which probably has the world's smallest PWM control installed.

The XQ technology reduces air turbulences to a minimum and offers an improved air flow due to the increased wing area. The XQ Cooler fan is produced using only 30% of the material usage from conventional coolers!

**Less noise. Higher efficiency. Less material. With XILENCE XQ technology you help protect the environment!**

**ENVIRON-  
MENTALLY  
FRIENDLY****70%  
LESS  
MATERIAL****JELLY  
PAD****ELIMINATES  
VIBRATIONS****HIGHER  
AIR FLOW****LESS  
NOISE****MICRO  
ENGINE****MORE  
WING AREA****FRAMELESS  
WINGS****NO AIR  
TURBU-  
LENCES****LONG  
LIFE****CF BEARING  
XQ TECHNOLOGY****SEVEN  
YEARS****XILENCE  
Guarantee****GREEN IT** by **XILENCE****XILENCE XQ**[www.xilence.us](http://www.xilence.us)



# BFG GeForce 9600 GT OCX 512MB PCIe 2.0

Check around a little, and you'll understand why both BFG's 9600 GT OCX and 8800 GT OCX (November 2008 *CPU*, page 28) have garnered good reputations in the enthusiast community based on performance and value. As with the 8800 GT OCX, the midrange 9600 GT OCX uses BFG's nonreference ThermoIntelligence cooling design. The approach consists of an aluminum heat-pipe, finned fansink, chrome-nickel plating, and green LED lighting emitting through clear fan blades. The card's memory and voltage regulators also get the heatsink treatment. BFG claims the setup lets the 9600 GT OCX run up to 18 degrees Celsius cooler than a stock card.

BFG ships the 9600 GT OCX running at factory "highest stable" overclocks of 725MHz vs. 650MHz core, 1,850MHz vs. 1,625MHz shader, and 1,950MHz vs. 1,800MHz memory. Not shabby considering the card was hovering around \$150 online at press time. You will need two slots to accommodate the custom cooling.

Compared to a stock-cooled Gigabyte 9600 GT, the overclocked BFG 9600 GT

OCX expectedly pulled away in every bench, although not by leaps and bounds



**GeForce 9600 GT  
OCX 512MB PCIe 2.0**

\$219.99

BFG

www.bfgtech.com



in two gaming benches and in 3DMark Vantage GPU scores. Compared to a stock-cooled Gigabyte 9800 GT I found similarly priced online, the BFG card was right on pace across the board. If you're looking for a shot in performance at a fair price, BFG's 9600 GT OCX is a "cool" option. ▲

by Blaine Flamig

	BFG 9600 GT OCX	Gigabyte 9600 GT	Gigabyte 9800 GT
3DMark Vantage Overall	P5505	P4702	P5932
3DMark GPU Score	4360	3709	4714
GPU1 (fps)	12.04	10.3	13.82
GPU2 (fps)	13.54	11.44	13.95
3DMark CPU Score	25940	23955	24084
CPU1 (Plans/s)	1319.47	1311.19	1312.79
CPU2 (Steps/s)	91.38	82.06	82.6
Company of Heroes (4XAA)	37.3	26.8	38.5
S.T.A.L.K.E.R.	54.41	50.486	40.6
Crysis	13.76	12.18	14.29
World in Conflict (4XAA, 4XAF)	25	13	21
Company of Heroes (4XAA)	16.6	14.8	15.6
S.T.A.L.K.E.R.	29.921	27.636	25.9
Crysis	6.35	5.59	1.67
World in Conflict (4XAA, 4XAF)	10	9	6
Driver: nForce 178.24			

**Test system specs:** 2.67GHz Intel Core 2 Quad Q6700, Evga nForce 790i Ultra SLI motherboard, 2GB of 1,333GHz DDR3, 74GB WD Raptor, Corsair HX1000W PSU

**Specs:** BFG GeForce 9600 GT OCX; GPU Clock: 725MHz; 512MB GDDR3 (1,950MHz); 64 stream processors; dual-link DVI (2), HDTV and TV out

# SteelSeries 7G Professional Gaming Keyboard

The SteelSeries 7G Pro Gaming Keyboard stands in contrast to many gaming keyboards you might expect to see on the market. Unlike showier models that include multicolor backlighting, removable keysets, and ergonomic features, the 7G presents a solid utilitarian design. Weighing in at just under 3 pounds (thanks to the iron-infused plastic), it could easily withstand aggressive keystrokes during the heat of a firefight.

For competitive gamers interested in the best antighosting technology, SteelSeries claims to outplay everyone else in terms of key commands. The 7G's PS/2 buffer system supports simultaneous commands from individual keys so that your actions aren't limited. We tested this feature by crouching, walking, jumping, strafing left, using a flash-light, switching weapons, selecting an

object, and checking a map simultaneously—all systems were go.

For users who desire continuity between their peripherals and tower, this keyboard won't look out of place with its black matte finish. The fully mechanical-style keyboard was a bit noisier due to some added key-clacking, but it allowed for smooth, tactile movement around the board, nonetheless. We noticed that the keys registered finger presses at half-throw, resulting in a rapid typing response.

SteelSeries certainly didn't overlook the cable construction: All cords are enclosed in a durable nylon weave. What's more, the connections include luxury 18k-gold plating that is supposed to provide increased actions per minute. We've already mentioned that this keyboard is highly responsive, so we can surmise that this



**SteelSeries 7G  
Professional  
Gaming Keyboard**

\$149.99

SteelSeries

www.steelseries.com



**Specs:** Full QWERTY keypad; removable handrest; PS/2 connector with USB adapter; USB hub; rear audio jacks

feature probably trims a few milliseconds off our keystrokes.

The 7G could easily be used by any PC enthusiast for standard computing or intense gaming. Before purchasing this keyboard, be sure ask yourself one question: Do I prefer function over flash? ▲

by Joanna Safford



# Sony BWU-300S

This is the third-generation BD burner from Sony, and it's built for speed. The drive can push 6X media to 8X (35.96MBps). Sony says you might start to see blank 6X BD-Rs and BD-R DLs early this year, but the company had to slip us some media pulled from the Japanese market for our testing.

Is the speed increase for real? Yeah, it is, compared to Sony's earlier efforts. The BWU-300S can nearly fill a 50GB BD-R DL faster than previous models could lase a 25GB, rewritable BD-RE. This Sony is on par with the competition when it comes to belting out DVDs, too. It's not

exactly a barnburner at ripping DVDs or CDs, however, although its CD burning speed is adequate.

In the retail box, there's a skinnier front panel for the disc tray, should the more attractive default fascia conflict with your case or artistic sensibilities. As for software, you'll get a CyberLink bundle for BD Profile 2.0 playback; BD-AV authoring, editing, and backup; along with a BD-Live-compatible copy of "Men In Black."

As ever, Sony is on the high side when it comes to price. Online prices should be more palatable than the \$399.99 MSRP,

but it's still a hefty chunk of change considering how long Blu-ray has been around. Perhaps the financial hit the company reportedly takes every time it sells a PlayStation 3 at a loss (partly in an effort to push Blu-ray adoption, ironically) has to be paid elsewhere. Like here.

What should worry Sony is the fact that a 6X drive from LG, the GBW-H20L, can write BDs nearly twice as fast as this 8X drive (according to test results on page 72 of our October 2008 issue) and retails for \$100 less. ▲

by Marty Sems



**BWU-300S**

\$399.99

Sony

www.sonymstyle.com



## Sony BWU-300S

(firm. 1.0a; 1X BD = 4.5MBps; hr:min:sec; Nero Express 8.3.2.1)

20.6GB BD-R	45.5GB BD-R DL	4GB DVD+R	4GB DVD-R
35:03 (6X Panasonic @ 8X)	1:16:17 (6X Panasonic @ 8X)	5:44 (16X Verb)	5:42 (16X Verb)
8.1GB DVD+R DL	8.2GB DVD Rip	CD-Audio Burn (58m, WMP 11)	CD Rip (58m, 128Kbps WMA)
16:42 (8X Verbatim)	21:15	2:56 (52X Mem)	5:03 (WMP11)

**Specs:** 1.5Gbps SATA; 8MB cache; 8X/2X/8X BD, 16X/8X/16X DVD+R, 16X/6X/16X DVD-R, 8X DVD±R DL, 5X DVD-RAM, 48X/24X/48X CD; one-year warranty

# Corsair Flash Voyager 64GB

If there's one tech company that rarely makes a misstep, it's Corsair. From cooled memory to stalwart power supplies to big, fast USB drives, the well-regarded company's reputation is one of innovation and quality.

Capacities double in the flash world, and hence this latest Flash Voyager packs twice as much storage space as its 32GB predecessor. Having reviewed a 16MB Q drive from ei, one of the first USB flash drives, we're still somewhat impressed that we're talking about double-digit gigabytes in the same form factor. Eight years ago, 64MB cost \$200. Today, you can get 1,000 times the capacity for just \$50 more.

Corsair calls the bootable Flash Voyager shockproof, thanks in large part to its fully rubber sheath. Even the cap is

rubber, although its ridged opening fits the drive's USB connector precisely enough to eliminate worries about it slipping off. Goodies include a tradeshow-caliber lanyard with a chromed thumb clip, a USB extension cable, and a branded drawstring bag. There's also a rubber cap retainer on a chain. The lanyard attachment point is rubber, too, but it seems tough enough.

The drive comes preformatted with FAT32, but that's easy enough to rectify. Our drive didn't come with any of the bundled software the press release mentioned. Still, its 10-year warranty is attractive.

It took 3:12 (min:sec; 0.52MBps) to copy 100MB to the Flash Voyager with write caching enabled, but then Vista seems to make even a quad-core with a

VelociRaptor ridiculously slow at file transfers. The Corsair did read the test folder back in a mere 11 seconds, or at 9.1MBps.

If you're into carrying around your own bootable desktop and apps, but you're frustrated by the limitations of a smaller drive, a 64GB Flash Voyager can let you have your cake and eat it, too. ▲

by Marty Sems



**Flash Voyager 64GB**

\$249.99

Corsair

www.corsairmicro.com



**Specs:** Capacity: 64GB; Compatibility: Windows Me/2000/XP/Vista, Linux 2.4, Mac OS 9/OS X; 10-year warranty

# Cooler Master V8

The Cooler Master V8 is a large CPU cooler. How large, you ask? Think the “this is a knife” scene from “Crocodile Dundee.” Its 158mm height may make it difficult to fit into your system, but we found that the V8 has plenty to offer those looking to overclock their processor with air cooling.

Under the V8’s hood, which is designed to resemble an engine cover, are eight copper heatpipes and four sets of aluminum fins. A 120mm fan sandwiched in the middle of the V8 blows cool air through the fins. There’s also a fan speed controller to let you adjust the fan from 800rpm to 1,800rpm. When operating at 800rpm, the V8 was nearly silent, and the 1,800rpm setting wasn’t too much louder.

The V8 includes mounting brackets for Intel Socket 775 and AMD 940/AM2/AM2+ sockets. To install the V8, you’ll need to remove the motherboard from your case, place the appropriate plate on the back of your motherboard, and screw the CPU cooler to the plate. Although we would have appreciated an easier installation process, we were certain the V8 was securely held in place.

We tested the V8 with an Intel Core 2 Extreme QX9650 and a Gigabyte GA-EP45T Extreme motherboard. We also



note the case featured a large wire mesh vent on the side panel. At the processor’s stock 3GHz speed, the processor temperature was 35 degrees Celsius at idle and 42 C during Prime 95’s

stress test. When we ramped up the QX9650 to 3.9GHz, idle temps ran at a cool 37 C and an impressive 50 C average (55 C high) during our overclocked Prime 95 stress test.

Considering the nearly 1GHz overclock, the V8’s results are noteworthy. The only downside to the V8 is its large size, so make sure you have room in your case before purchase. ▲

by Nathan Lake

**Specs:** Compatibility: Intel Socket LGA 775, AMD Sockets 940/AM2/AM2+; Dimensions: 158 x 120 x 120mm (HxWxD); Fan: 120mm diameter, 800 to 1,800rpm; Airflow: 69.69 cfm; Acoustics: 17 to 21dBA

**V8**  
\$69.99  
Cooler Master  
www.coolermaster.com  
●●●●●

# HTC Touch Diamond

In general, Windows Mobile doesn’t do a very good job at letting us control our smartphones with our fingers. Sure, we can use a stylus or even our fingernail, but for the most part, WM isn’t designed to be controlled by the pads of our fingers. However, HTC changes this with TouchFLO 3D, which adds touch controls to WM’s interface.

TouchFLO 3D lets you use flick gestures to scroll through lists. It also lets you zoom in and out of documents, pictures, and Web pages using clockwise and counterclockwise finger movements. The touchscreen and interface were very responsive to flicks with both the pad of my finger and my fingernail. Zooming on the scroll wheel was smooth and easy, as well. TouchFLO 3D brings a scrollable menu to the home screen that provides access to some of the

most commonly used applications: People, Messages, Mail, Photos and Videos, Internet, and Weather.

HTC includes the powerful Opera Web browser along with EVDO Rev. A and Wi-Fi 802.11b/g on the Touch Diamond. Overall, the Opera browser was easy to use, and I was pleased with its speed and rendering capabilities. In addition, Opera works well with the phone’s Motion G-Sensor, so when you rotate the phone, the display changes orientation. The Touch Diamond also supports Sprint Music and Sprint TV for portable entertainment.

The Touch Diamond lacks a standard headphone jack, which means you’ll have



to use the included USB headphones or the adapter dongle that has a 3.5mm headphone jack. The Touch Diamond omits a memory card expansion slot and instead provides 4GB of internal memory. The Touch Diamond’s glossy screen also tends to show smudges after use. These things aside, the Touch Diamond is a great phone with a lot of functionality and a fun user interface. ▲

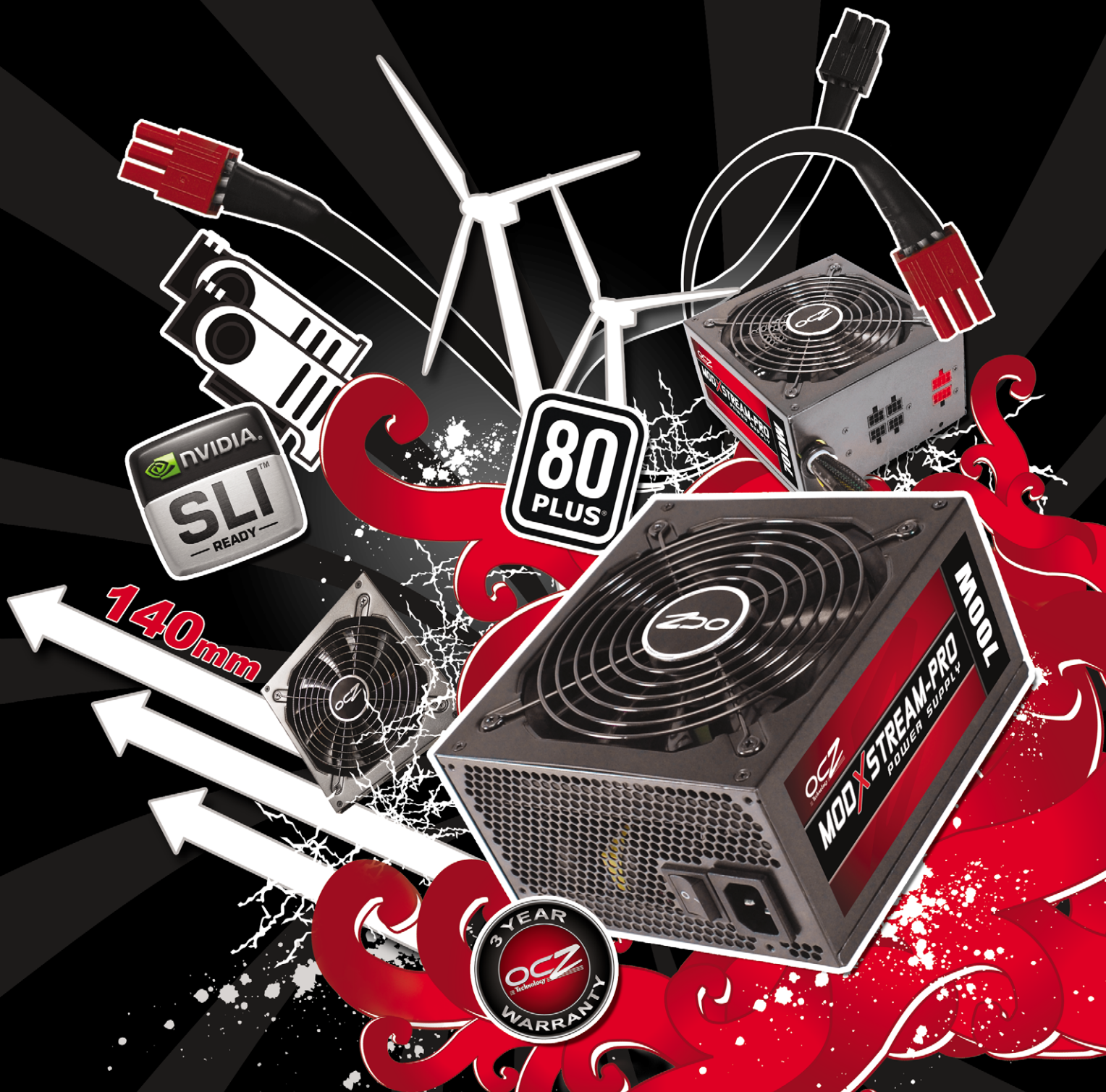
by Jennifer Johnson

**Specs:** 800/1,900MHz CDMA2000 1x EVDO Rev. A; Wi-Fi 802.11b/g; GPS; Bluetooth 2.0; Qualcomm 528MHz processor; Windows Mobile 6.1 Professional; 256MB ROM; 288MB DDR RAM; 4GB internal storage; 4 x 2.1 x 0.6 inches (HxWxD); 4 ounces (with battery); 2.8-inch TFT LCD (480 x 640); 3.2MP CMOS camera; G-Sensor accelerometer; up to 250 minutes of talk time

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# Smooth Creations Pyro

In the September 2008 issue (see page 30), we highlighted some of the dreamiest PCs available, including Smooth Creations' Neptune Xtreme Machine. To keep you dreaming, we spent some time with Neptune's counterpart, the Pyro. Overall, Pyro has quite a few impressive specs, great benchmark results, and a one-of-a-kind look. Annoyances, though present, were few and far between, and even those faded when set against Pyro's overall scorecard.

Smooth Creations is known for its mind-blowing designs, and the builder doesn't hold back with Pyro. The Pyro's acrylic case is custom-painted with flames dancing along the front and side panels. All corners are rounded and polished, giving Pyro a sleek, seamless feel. Several of Pyro's components are customized to fit the theme, including the PSU, drive cage, and watercooling reservoir. Even the cooling liquid is a blood-red.

On the subject of watercooling, Pyro is equipped with a Danger Den system that includes an eye-catching cylindrical reservoir, a CPU block, two GPU blocks, and a radiator (encased in a gold and flame design). The radiator's four 120mm fans hide behind fan grilles that are custom-cut into Smooth Creations' logo and adorned with flames. This cooling capability is essential, because Pyro comes with an Intel Core 2 Quad QX9770 processor, overclocked to 4GHz and covered by a one-year parts and labor warranty.

Pyro did relatively well during the most CPU-intensive tests, completing Cinebench in just under a minute, with an overall score of 15,261.

The SiSoft Sandra Lite tests also came with strong results. I expected the times for both WinRAR (1:37 [minutes:seconds]) and Dr. DivX (3:04) to be slightly lower, but neither score is close to disappointing.

My most exciting moment came when evaluating how well Pyro's dual Diamond Radeon HD 4870 X2 graphics cards handled our gaming benchmarks. I wasn't disappointed, as the Pyro's four GPUs yielded

a whopping 34.5fps in

Crysis, higher than even our best Dream PC, which reached only 25.66fps.

One thing I found slightly annoying was the lack of any easy-access USB, FireWire, or audio I/O ports on the front, side, or top of the case. Another frustration came when I slid the Pyro on its rubber feet (interestingly enough, to access the back USB ports), and one of the supporting rubber feet tore nearly in two. There will be no sliding for this case: You'll have to pick it up to avoid losing rubber feet.

The Pyro has a few other nice touches, such as the inclusion of both a Blu-ray drive and LightScribe-enabled DVD drive, a lifetime warranty on the paint job, and the option to customize the system to your liking. All-in-all, Pyro is a great-looking machine that performs right

on target with the caliber of hardware found inside. ▲

by Kris Glaser

## Pyro

\$7,040 (as tested)

Smooth Creations

www.smoothcreations.com



## Benchmark Numbers Smooth Creations Pyro

### 3DMark Vantage

Overall	P20297
GPU	22066
CPU	16363

### Cinebench 10

Multithreaded (score)	15261
Multithreaded (min:sec)	0:57

### Dr. Divx 2.0.1\*

	3:04
--	------

### POV-Ray 3.7 Beta\*\*

	3570.03
--	---------

### PCMark Vantage Pro 1.0

Overall	8113
Memories	6307
TV And Movies	5472
Gaming	6754
Music	7894
Communications	7547
Productivity	7222
HDD	6494

### SiSoft Sandra Lite XII SP1

#### Processor Arithmetic

Dhrystone ALU (MIPS)	68,726
Whetstone iSSE3 (MFLOPS)	58,786

#### Processor Multi-Media

Integer x8 iSSE3 (itps)	520,998
Floating Point x8 iSSE2 (itps)	236,067

#### Memory Bandwidth

Integer Buffered iSSE2 (GBps)	8.16
Floating-Point Buffered iSSE2 (GBps)	8.06

### WinRAR 3.71\*

	1:37
--	------

### Crysis 1.1

	34.5
--	------

### Company of Heroes 2.1.0.2 (4XAA)

	82.3
--	------

### World in Conflict 1.005 (4XAA, 16XAF)

	50
--	----

\* minutes: seconds

\*\* pixels per second

Games tested at 2,560 x 1,600.

**Specs:** CPU: Intel Core 2 Quad QX9770 @ 4GHz; Motherboard: ASUS P5E3 Premium; RAM: 4GB Kingston HyperX DDR3-1066; HDD: 300GB Western Digital VelociRaptor 10,000rpm; 1TB Western Digital 7200rpm; GPU: 2x Diamond Radeon HD 4870 X2; PSU: Silverstone Zeus 1200W

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



# Anand's Corner

by Anand Lal Shimpi

## The New MacBook & MacBook Pro

Every couple of years, Apple redesigns its hardware, maintaining the aesthetic advantage over the competition that it needs in order to help justify higher prices for hardware similar to what other OEMs are shipping. Obviously there's a value associated with OS X itself, but for the many Apple converts who have never used the OS before, it's the sleek, modern design that pulls them in.

Apple's MacBook and MacBook Pro were in need of a redesign, and with this latest update that's exactly what they got. The

\$1,299-and-up MacBook, as well as the 15-inch MacBook Pro, are now built with a manufacturing process very similar to that used for the MacBook Air. If you've ever used a MacBook Air, you'll know that despite its lightweight construction, the Air feels reassuringly solid. More solid, in fact, than most notebooks that are larger and heavier.

The trick largely boils down to how Apple molds the aluminum. While it used to build the "system part" of the MacBook Pro by sandwiching two pieces of aluminum together, one making up the base of the unit and one making up the keyboard lid, Apple builds the new MacBook and Pro in reverse. The first piece of aluminum is home to the keyboard and is curved downward; the second piece screws into the bottom of the case.

The subtle difference in assembly means that the part of the notebook you come into contact with the most is built out of a single piece of aluminum and thus feels incredibly well built. This good, modern construction is really the first thing you notice when getting to know these notebooks. While you can get entry-level notebooks for much less, the build quality of the \$1,299 MacBook actually makes it feel worth the entry fee.

Apple went even further to make these things look good. The displays are now thinner and covered with a layer of glass, adding to the modern look of the whole thing. Unfortunately, like a plasma TV, the glass reflects a lot of light, which makes them nearly impossible to use in direct sunlight. There is no longer a matte screen option for the MacBook Pro, so everyone is stuck with the new glossy screens, which admittedly are pretty nice indoors if you can control the light.

Performance-wise, the new MacBook and MacBook Pro aren't really any faster than their predecessors. They use 1,066MHz FSB Core 2 Duo processors (up from 800MHz in the previous generation), but the faster FSB doesn't do much for performance. Apple ditched Intel's integrated graphics in favor of Nvidia's GeForce 9400M chipset, which does offer improved gaming and 3D performance in general. The 9400M is also a lower-power chipset, which enabled Apple to use lower-capacity batteries, the end result

being that the new notebooks last about as long as the ones they replaced.

My biggest complaint is the new trackpad, which for all intents is now kinda buttonless. The entire trackpad functions as one large button; push it down and it'll physically click. Press down near the bottom of the trackpad, and it feels just like the previous MacBook Pro's single trackpad button, so there are no complaints there. The problems arise when your clicks stop registering, and it seems to have to do with how you go about clicking. If you move your cursor to where you want to click and then immediately press down on the pad, there's a chance that your click won't register. Lift your finger off, then put it back on the pad and click and you'll have a much higher success rate.

Think, for a moment, about what it is I'm saying. I'm saying that there are situations where the mouse doesn't work properly. If this were the 1980s, I could maybe allow for that.

The trackpad problems appear to be largely software issues (it's far worse under Vista, unfortunately), and there are workarounds (simply enable tapping instead of button presses to register clicks), but I'd like a real solution.

The new notebooks from Apple are interesting, but in the balance probably not worth the upgrade. If you can hold off, I'd wait until next year when the design is a bit more polished, Apple has worked out some of the quirks, and the MacBook has mobile Nehalem under the hood. If you need an Apple notebook today, just be well aware that you're an early adopter of a platform with known issues. ▲



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

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

# The Shark Tank

by Alex "Sharky" Ross

## Inside Nvidia's GeForce 9x00

Let's face it, onboard graphics has never been on top of the list for any hardcore gamer. We're not especially fond of the budget-conscious motherboards with IGP's (integrated graphics products), are we? Then again, with PCs moving into the living room and other areas of the house, having a tightly cased and slightly less noisy, less inefficient, and less power-hungry platform makes for a nice HTPC.

Intel would have you think that all you ever really need is its G45 Express, which, as expected, didn't produce the shock and awe the company had hoped for, even though sales remain very strong (outnumbering AMD and Nvidia's haul together). AMD's stout 780G (now 790GX), and its HD/Blu-ray content decode capabilities, has been out for a while now and is still the basis for many an HTPC setup. So what about Nvidia? The GeForce 8200/8300 are getting very long in the tooth, and you may have heard or even read about the recent rumors pointing toward Nvidia getting out of the chipset business. For now, think nothing of it since the company has continued to stride forward with the release of the GeForce 9300 and 9400 motherboard GPUs for the Intel Socket 775 market.

The new GeForce 9300/9400 chipset is built upon a 65nm manufacturing process and actually supports any Core 2, Pentium, and Celeron CPUs. It uses a single-chip design that makes the layout much more compact and appropriate for some of the HTPC and other small form-factor applications. The new graphics core (mGPU) doubles up on stream processors, from 8 to 16, and brings forward full DX10 support, as well as features like Hybrid SLI, PhysX, CUDA, and, more importantly, PureVideo HD. The 9400's 580/1,400MHz core/shader clock speeds are slightly quicker than the 9300's 450/1,200MHz, giving it a slight edge in performance with 3D games.

Even with very respectable gaming performance, you still need to remember that what we're dealing with here is an IGP and not a discrete card with 90+ stream processors. At best, you're going to have to turn some of the detail down a notch, as well as the resolution to 800 x 600, in order to get

a steady 35 to 40fps. In Call of Duty 4 and Enemy Territory: Quake Wars, the 8400 streaks ahead of any AMD 790GX and absolutely obliterates Intel's G45 Express (in some cases four to five times faster). AMD's 790GX comes closer in Enemy Territory, but to date there is no better-performing IGP solution for games—assuming that actually matters to you. If you're stuck with a G45-based board, it's debatable as to whether any of today's games are

actually even playable. What really matters is that the GeForce 8300/8400's Blu-ray playback is not only bug-free but also leaps and bounds better than the experience you get with Intel's G45. CPU utilization is significantly less, as well, for those into power/load savings.

Display options are plentiful with DVI, VGA, and HDMI, although it doesn't look like any of the board manufacturers are going to open up the available Dual-Link DV, sadly. It doesn't stop there, as Nvidia also had to beef up its integrated memory controller in the form of a dual-channel setup with support for DDR2 and DDR3 up to 1333MHz FSB speeds. There are also now 20 lanes of second generation PCI-Express allowing for a full-speed x16 slot, as well. As with the outgoing GeForce 8300 chipset, Nvidia has squeezed in support for 12

USB 2.0 ports, Gigabit Ethernet, and six SATA 3Gbps ports (with RAID), making for a very flavorful I/O panel. Especially worthy of note for HTPCers is the inclusion of HDMI multichannel lossless LPCM audio capabilities (only Intel's G45 supported this feature until now). In fact, Apple was so enthralled with the 9400 that it'll soon be shoving units into MacBooks, MacBook Pros, and Mac-Book Airs instead of Intel's G45. Motherboards are currently available from Asus, MSI, Zotac, and others around the \$150 range. So if you're starting a shopping list for an HTPC, a GeForce 8400 (or cheaper 8300) should really be at the top for the platform choice. If you already have a 790GX, then there's no real reason to switch, and if you have an Intel G45, all you can do is hope for fewer bugs and better drivers. ▲



*Disrupting Reuters' newswire with a cheery Christmas greeting at age six, Alex "Sharky" Ross became an avid computer user/labuser, eventually founding popular hardware testing/review Web site SharkyExtreme.com. Exposing shoddy manufacturing practices and rubbish-spouting marketing weasels while championing innovative products, illuminating new technology, and pioneering real-world testing methods was just a front for playing with the best toys. The site acquired, he left in 2001. A London native and London School of Economics graduate, Alex currently overlocks/tunes Porsche 996 Turbos with www.sharkwerks.com when he's not tweaking PCs.*

Email me at [sharky@cpumag.com](mailto:sharky@cpumag.com)





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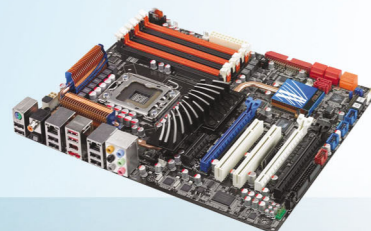
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# PC Modder

## Tips & Tutorials

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

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

### Mods & Ends

#### Razer Lycosa Mirror Special Edition

The original Razer Lycosa gaming keyboard was a popular product amongst hardcore gamers. The Lycosa has been lauded for its unique aesthetics, antighosting technology, and programmable keys with macro capabilities. Its rubberized keytops, however, didn't appeal to everyone. To remedy the situation, Razer has released an updated version of the Lycosa gaming keyboard, complete with glossy mirror-finish keytops.

The new Razer Lycosa Mirror Special Edition (\$79.99; [www.razerzone.com](http://www.razerzone.com)) has all of the features that made the original Lycosa a hit, including "Hyperresponse" low-latency keys, 1,000Hz polling, and a gaming mode option that deactivates the



Razer's newest version of its popular Lycosa gaming keyboard, the aptly named Lycosa Mirror Special Edition, features durable, high-gloss mirror-finish keytops.

Windows key. The big change is that the Mirror Special Edition's keys are as smooth as glass, as opposed to the higher-friction rubber of the original. Other features of the Lycosa Mirror include backlit keys (with a WASD cluster lighting option), earphone and mic jacks, a detachable wrist rest, and an integrated USB port.

#### Koolance SPL-XUF5B

The liquid-cooling specialists at Koolance have released a new product to give users of the company's multisensor systems more accurate information regarding the temperature of the cooling loops. Specifically, the Koolance SPL-XUF5B temperature sensor (\$16.99; [www.koolance.com](http://www.koolance.com)) lets users monitor the temperature of the liquid coolant itself. The SPL-XUF5B is compatible with Koolance's PC4-1000, PC3-700, Exos-2, TMS, and RP-1000 cooling kits.

Designed to take thermal readings directly from the coolant anywhere in the loop, the SPL-XUF5B connects in-line to any hose (the only requirement is picking the right barb size for your system). A thermal probe in the device sends data back to the multisensor controller.



The Koolance SPL-XUF5B temperature sensor can be placed in-line on any hose to take thermal readings directly from the coolant in a liquid-cooling system.

#### Xilence HP Duo

As you know, if you want to overclock any component to its upper limit, adequate cooling is an absolute must. To aid in cooling your RAM while seriously overclocked, (and add some bling to a tricked-out windowed system in the process), Xilence offers the HP Duo (\$19.95; [www.performance-pcs.com](http://www.performance-pcs.com)) RAM cooler.

The HP Duo replaces the flat heat spreaders included on most performance memory kits with a heavier set of aluminum heat plates, which are linked to two arrays of copper cooling fins by a pair of curved heatpipes. The thicker heat plates and added surface area of the heatsinks on the HP Duo offer increased performance over the stock heat spreaders of many current memory kits. And once you've removed your memory's stock heat plates (if it even had them), they're easy to install, too—all you need is a screwdriver.

### Fashionably Fresh Firmware

#### Synology Disk Station DS207+ (v2.0-0722)

The latest firmware update for the Synology Disk Station DS207+ improves a number of the unit's existing features, including its backup utility and photo station, and adds support for NFS, batch user creation, and SSL certifications.

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

#### Plextor PX-B910SA (v1.01)

A recent update for the Plextor PX-B910SA internal SATA Blu-ray burner introduces support for BD-R LTH (low-to-high) media.

[www.plextor.jp](http://www.plextor.jp)

#### D-Link DIR-855 Wireless Broadband Router

An update for the D-Link DIR-855 Wireless Broadband Router adds support for D-Link's SharePoint USB over TCP/IP technology.

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

by Marco Chiappetta



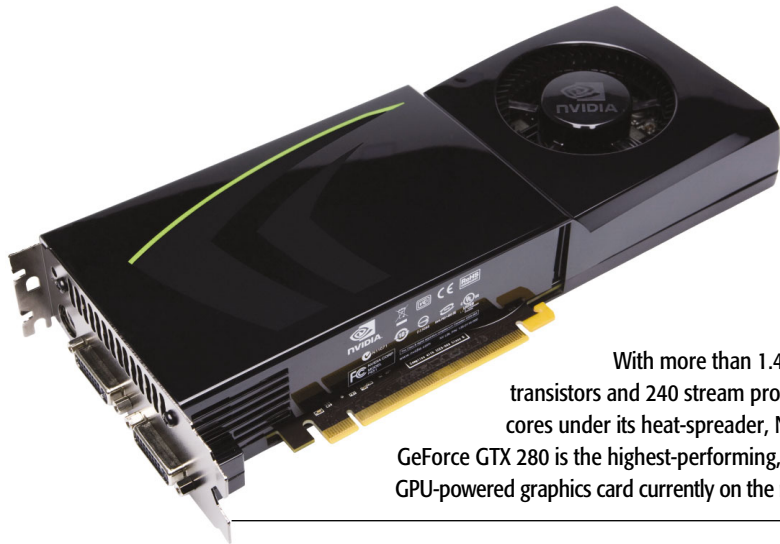
# Unbridled 3D Performance

## GeForce GTX 280 & Radeon HD 4870 X2 Overclocking

Everyone loves high-end graphics cards. Well, maybe not everyone, but PC gamers certainly do. We love them because they churn out excellent frame rates in our favorite games while running at high resolutions with many, if not all, of the in-game graphics options cranked up. Gaming on a high-end graphics card is akin to driving a Ferrari: You could have driven to your destination in a Volkswagen, but the Ferrari will get you there as fast as possible. (And you'll look good in it, too.)

We PC enthusiasts have a dirty little secret, though. Just as Ferraris aren't fast enough for some car nuts, even the high-end graphics cards just don't cut the mustard for many of us. But if the best graphics cards aren't fast enough, what do we do? Overclock them of course!

For this issue, we've decided to take Nvidia's and AMD's best of the best—currently the GeForce GTX 280 and Radeon HD 4870 X2, respectively—and overclock them as far as possible to see what kind of untapped additional performance is lying in wait for courageous modders.



With more than 1.4 billion transistors and 240 stream processing cores under its heat-spreader, Nvidia's GeForce GTX 280 is the highest-performing, single-GPU-powered graphics card currently on the market.

### Ch-Ch-Changes

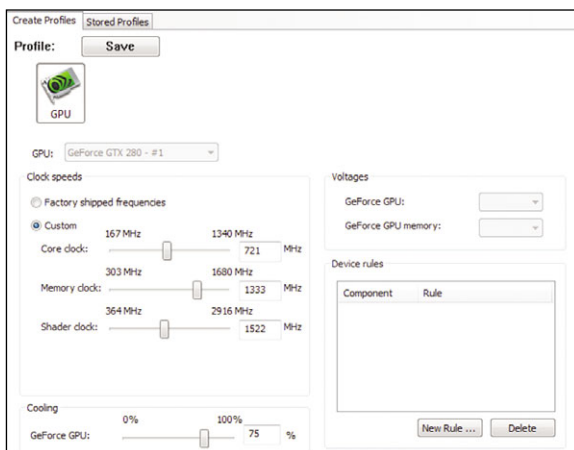
Since we last ventured into the graphics card overclocking arena, both Nvidia and AMD have made some significant changes to their drivers, which gives users more control over their hardware. Nvidia still requires GeForce owners to download an additional suite of utilities, dubbed Nvidia System Tools, which unlocks the overclocking options within the driver

control panels, but the extra effort is well worthwhile. With recent GeForce driver releases, in addition to the traditional GPU core and memory frequency sliders, you can now also alter the shader processor frequency and cooling fan speed. This welcome change allows for finer performance tuning, but it does add another layer of complexity.

AMD's GPU architecture doesn't let you adjust the shader or stream processor frequency independent of other parts of the GPU like Nvidia's, but with the Catalyst v8.10 driver release, AMD has incorporated manual cooling fan speed controls into the Control Center.

Before we continue, we have to make the standard disclaimer: As is always the case when overclocking—whether it be a CPU, GPU, or memory—your mileage will vary. Just because one product can hit certain clock speeds, it doesn't mean another similar one can, as well. And be aware that overclocking may void your warranty. Consider yourself warned.

Recent Nvidia driver and System Tools updates have ushered in a few new features for GeForce modders. With the latest ForceWare drivers and Nvidia System Tools (v180.43 and v6.03, respectively, as of this writing) modders now have the ability to save profiles and alter the following: fan speeds, GPU core, shader, and memory clocks.



## The GeForce Express

To overclock our GeForce GTX 280, we first downloaded and installed the latest set of graphics drivers available (v180.43 as of this writing) and downloaded a copy of Nvidia System Tools. With the graphics drivers alone, the overclocking tools necessary to tweak the GTX 280's various frequencies are not available. Installing the System Tools utility, however, unlocks a Performance option. Access it by opening the driver control panel and clicking the Performance entry. Then click the device

settings option. You must agree to a disclaimer before the overclocking options will be available.

Stock GeForce GTX 280 cards have a core GPU frequency of 602MHz, with 1,107MHz RAM (2,214MHz DDR) and 1,296MHz shader clocks. Factory overclocked cards will have somewhat higher frequencies, but we wanted to push things even further. Now that manual fan speed controls are available, our first move was to crank the GPU fan speed up to reduce temperatures. Keep in mind that increasing the fan speed also increases noise output. We found the 75% mark

offered great cooling for a moderate increase in noise.

With the fan speed increased, we started by overclocking the GPU core frequency. We ratcheted up the frequency a few megahertz at a time and tested for stability with 3DMark Vantage until we hit the card's peak. We then returned the core frequency back to stock and followed the same procedure to overclock the shaders and the memory. By overclocking each aspect separately, we found our card topped out with 726MHz core, 1,340MHz memory, and 1,530MHz shader frequencies. But, we couldn't run these frequencies this high

## Performance: Before & After The Mods

**O**verclocking high-end graphics cards isn't always effective, because there are a number of potential performance bottlenecks to consider, including the speed of the CPU, the maximum monitor resolution, and even the game engine being tested. To see what kind of performance gains we realized by overclocking our GeForce GTX 280 and

Radeon HD 4870 X2 cards, we ran each through a number of benchmarks while they operated at their stock and overclocked speeds, using a test system powered by a fast quad-core CPU connected to a 30-inch LCD.

To clearly demonstrate how much each card's performance was affected by overclocking, we have also included data

that shows the percent improvement over the stock scores. As the data illustrates, in more CPU-bound applications, such as 3DMark06 and Unreal Tournament 3, the amount of performance gained by overclocking was relatively small. This happens because the system is limited in performance by the processor when running these applications and

the graphics cards aren't being fully utilized at all times. With more graphically taxing applications, such as Crysis and 3DMark Vantage, however, the performance increases were more pronounced. Because the graphics cards are the bottleneck, any performance improvements offered by overclocking are more pronounced.

**Test System Specs:** 3GHz Core 2 Extreme QX6850, Asus P5E3 Premium (X48 chipset), 2GB DDR3-1333, Windows Vista Ultimate SP1 (32-bit)  
Drivers: AMD Catalyst v8.10, Nvidia ForceWare v180.43 (w/ DirectX Aug. 2008 Redist)

3DMark06 (Default Benchmark)	Stock Radeon HD 4870 X2 (750MHz GPU, 900MHz Memory)	Overclocked Radeon HD 4870 X2 (845MHz GPU, 970MHz Memory)	Percent (%) Improvement
Overall Score	16096	16716	3.9%
Shader Model 2.0 Test	5964	6154	3.2%
Shader Model 3.0 / HDR Test	8142	8314	2.1%
3DMark Vantage (Enthusiast Preset)			
Overall Score	6628	7598	14.6%
GPU Test 1	20.41	24.47	19.9%
GPU Test 2	17.62	19.93	13.1%
1,920 x 1,200			
Half Life 2: Episode 2 (4XAA, 16XAF)	169.11	186.42	10.2%
Enemy Territory: Quake Wars (4XAA, 16XAF)	109.2	120.5	10.3%
Unreal Tournament 3	92.29	99.73	8.1%
Crysis	45.96	51.67	12.4%
2,560 x 1,600			
Half Life 2: Episode 2 (4XAA, 16XAF)	119.21	132.21	10.9%
Enemy Territory: Quake Wars (4XAA, 16XAF)	88.4	98.9	11.9%
Unreal Tournament 3	84.24	95.12	12.9%



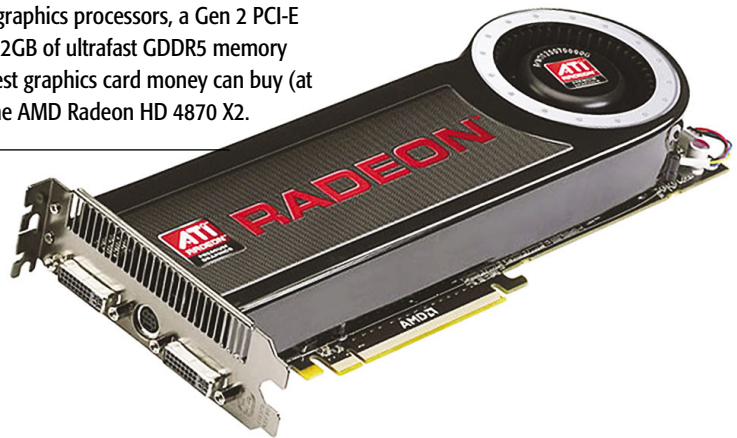
simultaneously and keep the system stable, so we had to drop things back a bit, to 721MHz (core), 1,333MHz (memory), and 1,522MHz (shader). Should you follow this procedure, you'll likely find the same thing. The card's peak GPU, shader, and memory frequencies will be higher when altered independently than when tweaked together.

### Rapid-Fire Radeon

We followed a similar procedure to overclock the Radeon HD 4870 X2 card. With the Catalyst v8.10 drivers installed, all you have to do is open the Catalyst Control Center software and select the Overdrive menu option, which is available in the Graphics Setting field on the left. With the Overdrive tab visible, click the Unlock icon to enable Overdrive functionality. Then you'll have access to sliders that adjust the fan speed and frequencies for the GPU and memory.

Like the GTX 280, we started out by increasing the 4870 X2's cooling fan speed. It seemed that the v8.10 drivers don't offer as fine-tuned control over fan speeds as Nvidia's drivers do, however. We found that any fan speed above 70% seemed to run the fan at full power, which produced quite a bit of noise. Ultimately, we settled on a fan speed of 65%, which dropped temperatures nicely and increased noise output moderately. With the fan

A pair of RV770 graphics processors, a Gen 2 PCI-E bridge chip, and 2GB of ultrafast GDDR5 memory result in the fastest graphics card money can buy (at least for now), the AMD Radeon HD 4870 X2.



speed set to 65%, it was much louder than stock, but the noise output was tolerable when playing games.

We then set out to find the card's peak GPU and memory frequencies, following the same procedure outlined above. We should note, however, with AMD's drivers, users must click the Test Custom Clocks button to check that an overclock is stable before applying a change. The problem we found with the Test Custom Clocks button is that the card passed the check at frequencies much higher than were actually stable in real-world conditions (gaming, benchmarks, etc.). AMD's drivers reported stable GPU and memory frequencies of 890MHz and 990MHz, respectively. Those are increases of 140MHz and 90MHz from a stock Radeon HD 4870 X2 card's

750MHz GPU and 900MHz memory. In reality, we couldn't stabilize the card until we backed the GPU down to 845MHz and the memory to 970MHz—still respectable overclocks, but not quite what the drivers reported as stable.

### Pixels Pronto

As you'll see in the performance sidebar, overclocking our Radeon HD 4870 X2 and GeForce GTX 280 cards had a profound impact on performance. Despite the fact that in their stock forms these two cards are already the most powerful products currently offered by AMD and Nvidia, ratcheting up their clock speeds still resulted in increased performance, particularly at higher resolutions using antialiasing and anisotropic filtering.

Should you decide to overclock your high-end graphics card(s), keep in mind that the effects of overclocking will be less pronounced if the card is teamed with a slower CPU or if your monitor doesn't support high resolutions. If, for example, you have a midrange dual-core processor and a 19- or 20-inch LCD that can only display resolutions below 1,600 x 1,200, overclocking a high-end card like a Radeon HD 4870 X2 or GeForce GTX 280 may yield little to no performance improvement.

So, what's the moral of the story? Tread lightly. Don't overclock them just for the sake of overclocking. If you've got the high-end hardware and a monitor that can tax them, however, there is performance to be gained. ▲

by Marco Chiappetta

Stock GeForce GTX 280 (602MHz GPU, 1,296MHz Shaders, 1,107MHz Memory)	Overclocked GeForce GTX 280 (721MHz GPU, 1,522MHz Shaders, 1,333MHz Memory)	Percent (%) Improvement
15424	16427	6.5%
6187	6294	1.7%
7221	7856	8.8%
5287	5943	12.4%
16.41	19.01	15.8%
12.16	14.34	17.9%
146.91	163.59	11.4%
102.4	115.04	12.3%
96.54	99.87	3.4%
44.63	52.06	16.6%
95.63	108.64	13.6%
68.8	77.6	12.8%
78.23	87.21	11.5%

# Mad Reader **MOD**



## Cinematograph<sup>HD</sup>

You caught a glimpse of William Urbina's Cinematograph<sup>HD</sup> mod in the November 2008 issue of *CPU*, as part of our Nvision 2008 coverage. We liked it so much that we've decided to feature it here, in all its HD glory.

The mod's name was inspired by a device called the cinematograph, a camera and projector invented in the 1890s. Urbina is serious about video editing and needed to build a serious video-editing machine. He wanted a video-editing monster that, while still very powerful, would be somewhat portable, as he travels frequently. So Urbina decided to build a system that could house two 22-inch LCDs, full-sized PC components, and a keyboard, *and* a mouse, all within one case. The case opens to display both monitors at once, and the only external connection is the plug for the power cord. The case's aluminum diamond plate skin gives the PC a very rugged look.

Such a system required some serious building skills, but Urbina was up to the challenge. He's a self-taught modder and welder and

had plenty of room to work on his project in his parents' garage. Urbina was able to finish most of the work in about a month. Unlike many modders, he didn't need to write out elaborate sketches or take pages of notes to plan his mod. Urbina simply started cutting, welding, and building until the mod was done.

Inside that diamond plate skin, the PC consists of an Abit IP35Pro XD motherboard, an Intel Core 2 Quad Q6600 CPU, 4GB of OCZ PC6400 RAM, a Radeon X1900 XTX video card, a Cooler Master GeminII with a pair of 120mm fans, five hard drives (four WD 400GB data drives in RAID 0 and a 160GB Seagate Windows drive), a pair of 22-inch monitors, a Lite-On Blu-ray burner, and a Logitech diNovo keyboard and mouse.

We're pretty impressed with Urbina's dual-monitor setup, and it's clear he put a lot of work into building a custom frame for his PC. So, what's next for this modder? Currently Urbina has no plans for another mod, as he's done four already, although it's possible that there's a gaming rig in his future. ▲

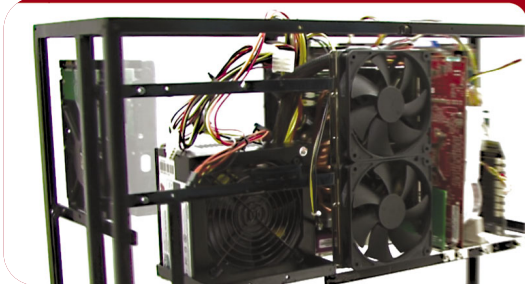




A GOOD VIDEO-EDITING SYSTEM NEEDS A SET OF SPEAKERS. URBINA TOOK THESE SPEAKERS APART AND INTEGRATED THEM INTO THE CASE PANELS.



URBINA BUILT HIS CASE FROM SCRATCH, WHICH REQUIRED A LOT OF WELDING.



THE CINEMATOGRAPH<sup>HD</sup>'S FRAME IS LARGE ENOUGH TO HOLD ALL THE FULL-SIZED COMPONENTS THAT A SERIOUS VIDEO-EDITING SYSTEM NEEDS.



URBINA HAD TO MAKE ROOM INSIDE THE FRAME FOR THE HARD DRIVES AND FISTFULS OF WIRES SNAKING THROUGH THE INSIDE OF THE CASE.



THE CINEMATOGRAPH<sup>HD</sup> HAS AN ALUMINUM DIAMOND PLATE SKIN THAT JUST SCREAMS THIS MACHINE WAS MADE FOR HARD WORK.



NO NEED TO PACK UP A SEPARATE KEYBOARD AND MOUSE. THIS RIG MAKES ROOM FOR BOTH IN THE BOTTOM OF THE CASE.

## Give Us Your Mod

Have a computer mod that will bring tears to our eyes? Email photos and a description to [madreadmod@cpumag.com](mailto:madreadmod@cpumag.com).

We're looking for rigs that are recognizable as PCs: your Wookiee mod won't find a home here.

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“ Another method of flashing your BIOS would be to use Asus' AsusUpdate software that came bundled with your motherboard. ”

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

**Wil S. asked:** I have been reading *CPU* for quite a while now and really enjoy the magazine. In some recent issues, I've read about a couple of modding projects where relays were used to either trip a second power supply unit or switch on a system, and then a light bulb went on in my head. I am an electrician by trade and have some customers who want to do some basic home automation, but they don't want to spend crazy amounts of money for the control centers and special switches that are part of most commercially available systems. Because relays are so cheap, I was wondering if there was any way to use my customers' current computers and some relays to do some basic home automation, like switch on lights or heating/cooling systems at certain times or maybe disable a garage door opener while they're away.

**A:** Well, the short answer to your question is yes; relays can technically be used to do all of those things, but there are some major hurdles you'd have to overcome. You see, a relay is really nothing more than an elaborate switch. If we disregard the multitude of different relay types available and break things down to their most basic elements, the only difference between a manual switch and a relay is that the relay is engaged or disengaged by an electrical signal and not a human flipping a lever.

If you were to replace (or supplement) the on/off switch on a lamp or garage door opener with a simple relay, you'd understand the difficulty right away. The relay would immediately be tripped the moment it received a signal from the computer's power supply, and you'd have no control over the process. If you want the aforementioned light to come on or go off at a certain time, you need some sort of software to set the parameters and a circuit bridge that can manage the electrical signals that need to be sent to the relays. This is why commercial home automation systems almost always incorporate some sort of control center.

That's not to say you have to spend big bucks on a custom, integrated home-automation system. There are plenty of relatively inexpensive computer-controlled basic home-automation systems available from companies such as Leviton, Smarthome, X10 and others. You could even check out your local home repair superstores or hardware stores for other alternatives. A basic computer-controlled home-automation setup that can handle a couple of lights or switches can likely be purchased for less than \$100. If your customers aren't looking for flashy control





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panels or home-theater/alarm system integration and only want the ability to easily switch some appliances on or off using their computers as the control center, one of the relatively inexpensive systems we've mentioned should do the trick.

**Ian asked:** I recently built my first PC, and it was a thoroughly enjoyable learning experience. I'm pretty new with all of the technology, but with the help of a friend and a few hours of light reading in all of the various install manuals, I was able to pull off what I think is a pretty snappy rig build. I'm a bit of a gamer, but I also work on my machine quite a bit, so I need performance and stability. I don't overclock at all but want everything running tip-top at the system's stock speeds. I recently went to my motherboard manufacturer's Web site and found out that there are two newer versions of the BIOS available for my motherboard. I was wondering whether or not I should update it. I've read it can be risky, but I really don't know, so I figured I'd call upon some professional help on this one. Also, do I need to download the F6, F7, and F8 versions of the file or just the F8? Are these things incremental or do they come all wrapped up with previous fixes?

My system specs:

Intel Core 2 Quad Q6600

4GB (4 x 1GB) Corsair DDR3 1333MHz RAM

Asus P5N-T Deluxe

OCZ GameXStream 700W PSU

Creative Sound Blaster X-Fi

2x74GB WD Raptor Hard Drives

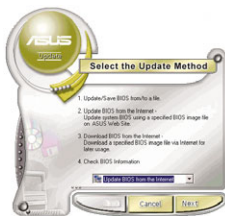
Windows XP Professional

**A:** Nice work Ian, and welcome to the brotherhood of the DIYer! There's no question, updating a system BIOS can be pretty risky for the first timer. After all, if for some reason your flash process fails in the middle of reprogramming your motherboard's EPROM, you could very well end up with a dead motherboard that either needs to be serviced by Asus or rescued through a BIOS recovery utility, if one exists for your particular model of motherboard. That said, motherboard manufacturers have been pretty good at automating the flash process for the end user.

Regardless, you technically only need to update your system BIOS if you're actually having a problem. You didn't indicate that your system was under-performing in any way or that there was an anomaly of any sort, so we would offer that a flash upgrade, if all is well, may not be worth the effort. And so, with that disclaimer out of the way, here's how you can get a flash upgrade done on that Asus 780i board.

Before you proceed, you'll want to make sure your system is set up such that you ensure the most stable environment for the flash process. Since you indicated that you are not overclocking in any way and that your system is currently running well, you should be all set. However, if you are overclocking anything at all, even just slightly out of spec, we'd recommend setting all timings back to their default specification. From there you have two paths you can take. Asus offers a bootable floppy-based utility that works from the command line. You can simply follow the instructions that Asus provides in the readme file of the utility, and within a few minutes, you'll have the latest BIOS revision flashed over. Just

remember, at no time should you power down or reset the machine until the utility tells you specifically to do so.



Asus' AsusUpdate utility makes quick work of BIOS flash updates from the comfort of a Windows Desktop. Just make sure your system is fully stable and preferably not overclocked before you attempt to flash your board.

Another method of flashing your BIOS would be to use Asus' AsusUpdate software that came bundled with your motherboard. Simply boot Windows, pop in the included driver and utility CD that came with your board, and install the program. It will likely want to connect to the 'Net and auto-update itself. Then fire up AsusUpdater, and point it to the BIOS file that you downloaded from the Asus site. Make sure you get the version of the BIOS that is intended for the AsusUpdate program, as sometimes there are different versions for the bootable floppy method. Also remember that the latest version of the BIOS is all you'll need. ▲

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

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# Chevy Volt: Best Of Both Worlds?



Despite what sappy, formulaic Hollywood movies might lead you to believe, second chances aren't all that common in real life.

Second chances are even less common in the business world. When you bring a product or idea to the marketplace, you'd better have a great design, great reliability, and great timing. If you miss the timing window for your product, you probably won't succeed, even if it's a great product.

Keeping that in mind, Andrew Farah, GM's Vehicle Chief Engineer for the forthcoming Chevy Volt, knows how fortunate he is. Farah was heavily involved in GM's effort a decade ago at creating an electric vehicle—the EV1. When GM

canceled that project after a few years, Farah didn't expect to have a second chance at creating an electric vehicle.

Yet here he is working on the Volt, which GM calls an E-REV (Extended-Range Electric Vehicle) and which should be available for sale in late 2010. The Volt propels its wheels completely from electrical power, either provided by an onboard battery (with a 40-mile range) or by a gas-powered engine working with an onboard generator (to travel beyond 40 miles). It differs from hybrid vehicles currently on the road, such as the Toyota Prius, which mainly generate power from a gas engine with electrical power from a battery helping to maximize gas mileage.

Farah's excited about the possibilities of the Volt.

"We have the best of both worlds," he says. "We're petroleum-free for 40 miles, but we still have the range of several hundred miles. In the industry, more people are talking in this direction."

## Learning From The Past

Honestly, Farah says, he never expected a second chance at building an EV. Nor did he really want one.

"With [the Volt], my first response was, 'I'm not really interested in working on it,'" Farah says. "I loved that dream [of EV1], and I wasn't sure the company was committed to [the Volt]. I did some

## The Volt's Battery

Volt owners in the United States will be able to charge the battery using either a standard 120-volt household outlet or a 240-volt outlet. For a full charge, GM estimates eight hours for a 120-volt outlet and three hours for a 240-volt outlet. Charge times would be shorter if the battery is not fully depleted.

"The energy [from gasoline] in a gas tank is equal to megawatts of power," Global Insight's Phil Gott says. "You can't do that with an electric vehicle in five minutes."

Developing reliable battery technology is the key to making Volt a realistic option.

"We started with a standard car, with a whole group of additional things we needed to do," GM's Andrew Farah says. "Most of them have to do with electrical power—a lot of it—and controlling it in an efficient way. . . . My job is mostly about that part."

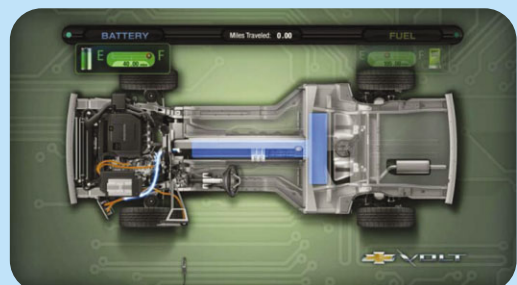
GM has contracted with two companies to create Lithium-ion battery technologies for the Volt: Compact Power (with parent company LG Chemical) and Continental Automotive Systems (with A123Systems).

"We've had phenomenal success with both," GM's Farah says.



"Eventually, we want to narrow it down and get on to the business of production."

GM is hoping for the batteries that appear in the first version of the Volt to have a 10-year, 150,000-mile lifespan. ▲



Source: GM, Photos courtesy: GM



investigating into it, and then I said, 'Quick, I'll sign up.' Four weeks later . . . I was in the office."

GM introduced the first modern electric vehicle, EV1, in 1996, only in California and Arizona and only as a lease. The EV1 ran completely from energy stored in a battery, with no gasoline motor or generator. In developing the EV1, GM introduced several technologies, including a vehicle charging interface, battery pack, charging system, electric drive system, electric steering system, electric air-conditioning system, electrically actuated brakes, and regenerative braking system.

The EV1 did not become a big success, in part because battery technology didn't advance as rapidly as expected. GM terminated production in 1999, removing all EV1s from the roads by 2003, officially canceling the program.

When GM decided to create the Volt, it applied lessons it learned from the EV1. One of the biggest concerns EV1 owners

had involved what GM calls **range anxiety**, which is the fear of becoming stranded away from a power source when the battery is exhausted. The EV1, depending on the type of battery installed, had a typical range of between 55 and 100 miles between charges.

"How do we gain the most bang for the buck in the area of freedom, or independence, from petroleum?" Farah asks. "Pure battery vehicles have a problem. They can run out of batteries, and people get stranded. When the battery gauge is at halfway, people get range anxiety: 'Am I going to make it home, or am I going to get stranded?' Imagine having that feeling every day. That's not what we wanted to do."

Other customers didn't like the EV1's two-seat limitation and lack of cargo room, as the large battery occupied a lot of the vehicle's available space. With the Volt, GM also has improved the interaction between the vehicle and the driver during the charging process.

## Developing The Volt

Farah says GM has done a good job learning from the EV1's problems when designing the Volt.

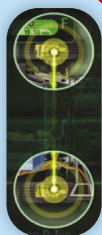
"Many of the fundamental concepts are the same," Farah says. "Many of the technologies have evolved, batteries, motor technology. Interestingly, many of the same [GM] people are working on the Volt. . . . The good thing is we still have the knowledge from the EV1. With the technology, almost none is the same. None of it existed when we started the EV1."

After GM discontinued the EV1 in 1999, the impetus behind the Volt began a few years later when Bob Lutz joined GM after working for Exide Technologies, a battery company. Lutz saw the possibility of using lithium-ion batteries in vehicles. (EV1 models had used lead-acid batteries or nickel metal hydride batteries.) Li-Ion battery technology appears in laptops and cell phones.

GM unveiled plans for the Volt early in 2007 at the Detroit Auto Show, and

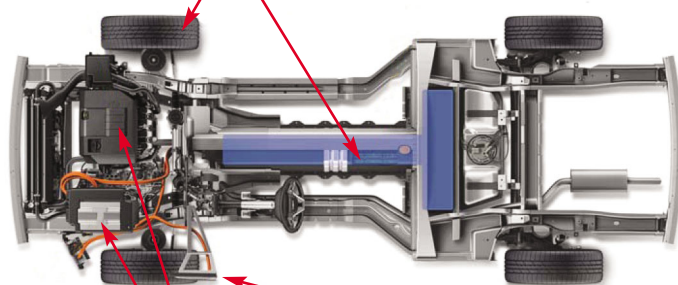
### Regenerative Braking

The Volt will convert some of the kinetic energy created when the vehicle brakes and slows, storing it in the battery.



### Lithium-Ion Battery

After charging, the Volt's battery provides power to the electric drive unit. As you can see here, the top of the T-shape will fit under the rear seats, in the location where a powertrain would reside in a rear-wheel vehicle. (The positioning of the battery prevents a middle seat in the back, leaving the Volt's seating capacity at four.) By placing the battery in the center of the vehicle, GM designers made it part of the vehicle's structure with better protection. The battery pack will aid in weight distribution, giving the Volt good handling capabilities..



### Electric Drive Unit

The electric drive unit propels the Volt at all times, whether it's pulling electrical power from the battery or from the gas range extender and generator.

### Engine Generator

When battery power is depleted, the engine generator creates electrical power for the electric drive unit, extending the range of the Volt.

### Charge Port

Charging the Volt's battery is an easy process; just connect the charge port to a standard outlet in your home. You can control the charging process through LCD screens in the Volt's interior.

The Volt battery pack is shown below, at right. It's smaller than the original battery pack (at left) for the GM's all-electric EV1 vehicle from a decade ago.

The Volt's battery pack is a T-shaped lithium-ion pack, containing 16kWh (kilo-watt hours) of energy. GM has not released many details on its battery pack, but the Volt's pack contains more than 220 Li-Ion cells. The battery pack measures about 6 feet in length and weighs about 400 pounds. ▲



the buzz from media and the public began immediately.

“With the EV1, we did that as sort of a skunk works project,” Farah says. “We rented church halls to hold meetings. We wanted to stay out of the limelight. This project is the exact opposite. We’re sharing the journey as we go. . . . What is good is we get some good feedback before it’s too late to do something about it.”

### Development Concerns

GM expects to begin selling the Volt in the United States in late 2010. Manufacturing will take place at GM’s Detroit-Hamtramck Assembly plant. GM showcased the first production version of the Volt on Sept. 16, 2008, the 100th birthday of GM as a company. The design of the Volt’s exterior in September was a bit different from the concept designs initially shown in 2007, causing some complaints from potential

customers who didn’t like the less sporty look of the production version. However, GM designers found that, during wind-tunnel testing, the early design wasn’t aerodynamic enough to allow the Volt to deliver its 40 miles of travel from the battery.

Batteries remain the primary roadblock to GM meeting its late 2010 goal for the Volt. GM currently continues testing various Li-Ion battery technologies, making sure they meet the safety, reliability, and longevity needs of the Volt. Early tests indicate the battery pack can provide the power needed to operate the vehicle, but cooling and transferring power efficiently to the wheels are a couple of problems encountered so far. Farah says the development of the battery technology remains on schedule for the 2010 goal, however.

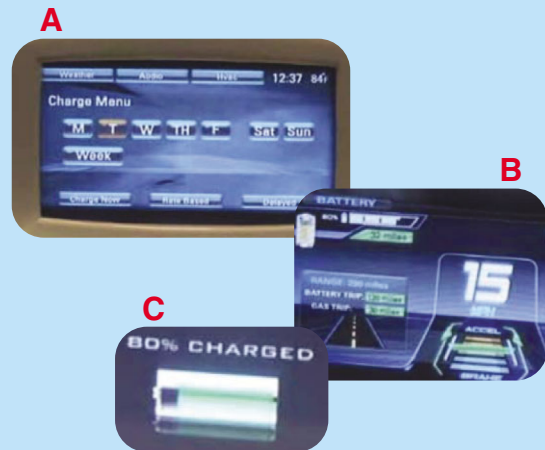
“The battery was a big challenge,” Farah says. “There’s so much to it.

Monitoring and controlling the battery is very important. The battery management system has evolved in the last 15 years. Originally, it was all centralized and self-contained. Now it’s a distributed system. It has to do with the amount of energy you’re trying to manage.”

Farah says GM is running numerous tests on the vehicle’s range extender gas engine, too, trying to determine whether the quality of gasoline in the tanks might deteriorate if the driver doesn’t make use of the gas engine for a few months or whether the engine will have problems if it doesn’t run regularly. However, Farah thinks such problems would be rare.

“What if you drive only 30 miles a day and never use the gas engine?” Farah says. “We think most people probably will take a [40-plus-mile] trip in there. They’ll have an opportunity in there where that engine will probably start.”

## Interacting With The Volt



The interior of the Volt looks similar to most vehicles. It offers four-passenger seating and some cargo room in the trunk.

The Volt will include a pair of 7-inch LCDs. One is in the console between the driver and passenger seats, and the second is behind the steering wheel in the dashboard. The driver can configure the LCDs to show a variety of information. Because of the various systems in the vehicle, GM designers decided against a conventional dashboard configuration, which couldn’t provide enough data. The LCDs provide a high-tech look while delivering necessary information.

The LCDs are touchscreens. The driver can:

- Set up the vehicle’s charging schedule for certain days of the week or certain times of the day, such as off-peak electrical hours (**photo A**)
- See standard dashboard information, such as vehicular speed and electrical charge or gasoline remaining while driving (**photo B**)
- Find data about the battery level during a charging procedure (**photo C**)
- Control the vehicle’s interior climate
- Control the vehicle’s entertainment features
- Control the vehicle’s navigation system, including loading maps from the system’s hard drive
- Control USB capabilities for music streaming
- Control Bluetooth capabilities for cellular phone or music streaming ▲

Source: GM, Photos courtesy: GM





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## Volting The Market

GM has not announced pricing for the Volt, although industry estimates are around \$40,000. GM has told the federal government that it doesn't expect to manufacture Volt models in large volume (100,000 or more annually) until at least 2012.

"Volt is expected to be a low-volume vehicle," says Phil Gott, director of automobile consulting for Global Insight. "It's a very significant car. . . . At its price, it's certainly aimed at early adopters. It'll certainly pave the way for others."

It's not difficult to understand the importance of the Volt and vehicles like

it. Carbon dioxide emissions into the atmosphere from gasoline-powered vehicles affect the planet. Gasoline prices are bouncing back and forth like a pinball, straining family budgets. A struggling U.S. economy probably could improve its standing if America wasn't sending several hundred billion each year overseas for oil.

"It's one of the first giant steps toward an electric consumer vehicle," Gott says. "We need to think about making the transportation system more efficient and clean, and moving toward electric vehicles is a way to do that."

The U.S. Department of Transportation in 2003 determined that 76% of drivers

commute 40 miles or less per day. GM guesses that those who commute around 40 miles per day could save 500 gallons of gas each year driving the Volt versus a typical gas-powered vehicle.

"Paying 2 to 5 cents per mile, during off-peak electrical hours, as opposed to 10 to 40 cents per mile [for gasoline], that's the appeal," Gott says. "Consumers are rapidly increasing their interest in the environmental impact of the car. Consumers want security, and the extended range says this vehicle won't abandon you." ▲

by Kyle Schurman

## Driving The Volt

**1** With plenty of power stored in the battery, the Volt electric drivetrain pulls all of the electrical power it needs from battery storage.

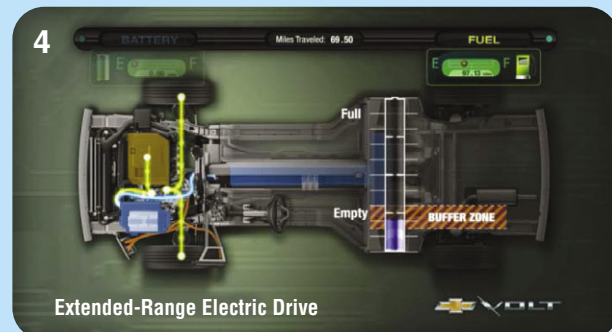
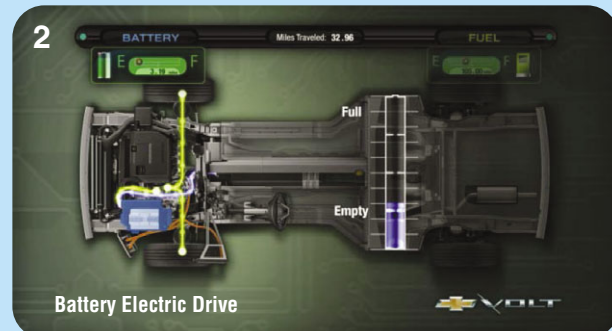
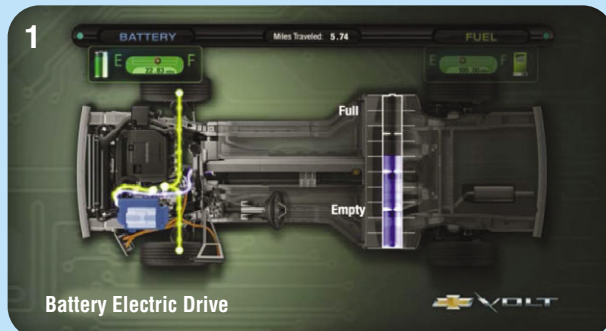
**2** As the battery nears the empty position (after almost 40 miles of travel, based on the EPA's city cycle measurement), the Volt continues to pull

power solely from battery storage. There is no drop in performance as the battery nears empty.

**3** Once the battery is empty, the Volt begins generating power from its gasoline engine. The process will be automatic; the driver does not need to perform any manual changes to the vehicle.

**4** The gas range extender engine works with the generator to send the power to the electric drive unit. The drive unit does not run directly from gasoline at any point. The gas engine also does not recharge the battery at any point; it simply generates electrical power to put the

vehicle in motion. To recharge the battery, a driver still needs to plug the Volt into an outlet. You can fill the engine at any point to continue driving the Volt until you can recharge the battery . . . the Volt has no "range anxiety" problems for the owner. ▲



Source: GM, Photos courtesy: GM



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# THE TECH WEAR



**58** **COMPONENTS**  
This Year's System Cornerstones

**63** **PERIPHERALS**  
Extraordinary Inputs & Outputs

**67** **SOFTWARE**  
2008's Head-Of-The-Class Code

**72** **THE BEST OF WHAT'S NEXT**  
Our Early Bets For 2009's Top Picks



# RESPECT

## OUR CHOICES OF 2008'S BEST & BEYOND

### IT'S FUNNY HOW A LITTLE THING

like an economic downturn can cloud a man's ability to think clearly. As we head to press, the calendar has yet to reach December, but already, it's impossible to think back on the events that shaped the year that was 2008 technology-wise without words such as financial bailout, recession, employee layoffs, downsizing, takeover, buyout, weak earning report, acquisition, boom, bust, and plummeting tech stocks jumping to the forefront. Hell, it's not inconceivable that before 2008's hourglass runs completely dry, Yahoo! may still wind up property of Microsoft. More companies may be forced to follow the leads of Micron, Xerox, and AMD and cut executive salaries, lay off employees, or seek investments from outside backers to stay above water. Not to go all doom

and gloom on you, but times are tough, and they'll probably get worse before they get better.

For the average tech buyer, these days of financial darkness mean there's arguably never been a time when it's paid to be especially choosy about the product you're plunking your money down on. With every penny actually meaning something, now isn't the time to saddle yourself with a lemon or take a ride on the wrong bandwagon. Case in point: Suppose the Blu-ray vs. HD DVD battle had managed to rage on throughout 2008. If you were to sink your dough into an HD DVD player this holiday season, you'd be the owner of a glorified boat anchor by this time next year.

That said, is there a collection of like-minded buyers that is more discerning about their purchase options than power users? We're hard-pressed to think of a group that surpasses die-hard geeks when it comes to putting in as much research, energy, communication, and effort to get the best return on their dollar. That's why we're guessing you'll like what's in store for you on the following pages, which form what is now our third annual look at the best products of the past year. Like you, we put a strong premium on getting as much value, performance, innovation, usefulness, and longevity as possible out of the components, software, and technologies we use.

Our look at 2008's best begins with what we know is most dear to your hearts: CPUs, motherboards, graphics cards, memory, and storage devices. Although no small task considering the range of releases turned loose this year, we've selected an overall favorite product in each category, as well as two runner-ups we think highly

of. Further, when applicable, we detailed the trends, obstacles, breakthroughs, and failures we found especially compelling as related to each category, as well as what we considered the most disappointing release of the year in each group, whether it was due to poor performance, too little bang for the buck, or too much hype vs. results.

We've taken the same approach in selecting winners for monitors, keyboards, mice, networking devices, and printers. On the software front, we've tabbed winners in categories including system and hard drive utilities, security applications and suites, and media file programs. Finally, as in previous years—but perhaps never as important as with this year—we've gone the Local Weather Guy route and made predictions about the most important releases coming in 2009 for CPUs, motherboards, video cards and GPUs, storage products, and memory kits.

Fortunately, not all tech news stemming from 2008 was colored green. Google shaded its new Web browser in Chrome and finally made good on Android. More people than ever now own Macs, stats tell us. Comcast squeezed the pipeline, computing reached the clouds, and Navigator sailed away. Flip Video made camcorders ultra-affordable and pocket-friendly, Asus Eee PC followers came out of the woodwork, and Sony tuned us in to TV's future via OLED. On that note, meet you here next year to do it all again, same time, same place. ▲

by Blaine Flamig



# COMPONENTS

## THIS YEAR'S SYSTEM CORNERSTONES

**THE TECHNOLOGY PRESS HAS IT EASY. WHEN** you're talking hardware, the last 12 months are always going to be more exciting than the 12 that came before. Power users aren't going to get nostalgic about their old Pentium 133s when Core i7 is staring them straight in the face. If you're writing about cars, on the other hand, you'd get sacked for trying to claim this year's Jaguar XJ is more of a looker than an old classic like the '50 XK120. In our business, "classic" means "old and busted."

But just because we saw truckloads of sexy new hardware in 2008 doesn't mean it was all good stuff. In fact, we took time to highlight the devices that took off like a bag of bricks. There were also a great number of gems, though. We went month by month through as many components as possible and picked our favorite processor, platform, graphics card, hard drive, and memory technology from the last year. Then we nominated two runners-up for each category.

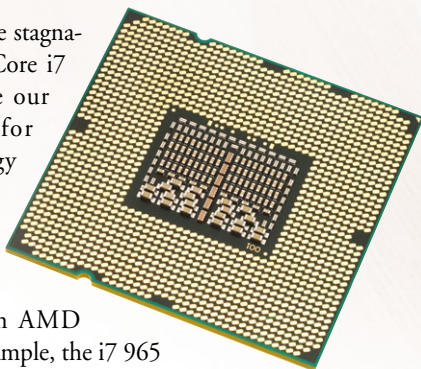
### Processors

Talk about a ho-hum beginning to the year in processors. AMD started off 2008 by fixing the TLB bug black-eye that dogged its quad-core Phenom X4 processors; from there, the company's only real appeal to power users was an extra bit of clock speed. Intel held off on releasing faster versions of the Core 2 Duo and Quad processors in preparation for Nehalem.

#### Winner: Intel Core i7 965 Extreme

\$999; [www.intel.com](http://www.intel.com)

As a result of relative stagnation, Intel's 3.2GHz Core i7 965 Extreme became our favorite processor for 2008. The technology rolled into the CPU is truly revolutionary for Intel, even if some of its features seem borrowed from AMD and souped up. For example, the i7 965



boasts an integrated DDR3 memory controller with support for up to three channels of memory. Should you install a trio of 1,600MHz modules, you'd have 38.4GBps of theoretical memory bandwidth available to the chip's four cores.

There's also the QPI (QuickPath Interconnect) to consider—Intel's point-to-point HyperTransport equivalent. QPI replaces the traditional frontside bus, which has quickly become a significant bottleneck, especially in dual- and quad-processor configurations. The Core i7 965 supports a single QPI link that is 20 bits wide and capable of bi-directional data transfer. In theory, QPI can consequently deliver twice the bandwidth of a 1,600MHz FSB.

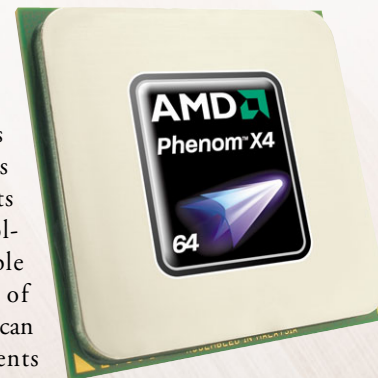
And then there's the cache architecture. Gone is the large L2 cache found on Core 2 models. The Core i7 965 employs 32KB each of instruction and data L1 cache per core, 256KB of L2 per core, and a large 8MB inclusive L3 cache.

Budget-conscious enthusiasts are going to have a tough time making friends with the 965 Extreme at its \$999 price, especially when you consider the need for a new motherboard and memory. But for those who can pay to play with Intel's latest creation, the new Core i7 really does represent Intel's most significant platform shift in years.

#### First Runner-Up: AMD Phenom X4 9350e

\$174; [www.amd.com](http://www.amd.com)

Our first runner-up delivers quad-core performance for a much more mainstream price. AMD's Phenom X4 9350e operates at a conservative 2GHz. Its integrated memory controller supports ultra-affordable DDR2-1066. And 65W of heat dissipation means you can use the chip in environments sensitive to fan noise, because it doesn't need much cooling. In all, the X4 9350e and its accompanying platform are a recipe for cool, quiet, and responsive computing. The sub-\$200 chip is hardly a trophy, but in an





HTPC or desktop workstation, it's one of this year's best choices.

#### Second Runner-Up: VIA Nano L2100

Price not yet available; [www.via.com.tw](http://www.via.com.tw)



The last processor deserving recognition for its impact in 2008 is VIA's Nano L2100. Yes, we were there for the hyped Intel Atom launch. We know that there's a lot of intelligent engineering in the little 4W wonder. But hands-on testing with the chip (and its accompanying 945GC chipset) suggested it was simply too slow to handle much multitasking or media playback. The 25W Nano, on the other hand, is much better suited to a life of low-power crunching. A 1.8GHz core clock, 800MHz FSB, and 1MB L2 cache seem to be enough for basic day-to-day functions. Given the PCI-E x16 slot on VIA's own EPIA SN mini-ITX board and availability of inexpensive graphics cards with video acceleration, we see the makings of a compact multimedia platform.

#### Biggest Disappointment: AMD Phenom X3 8600

What do you get when you mix three cores and an over-publicized hardware erratum? A 2.3GHz Phenom X3 that had a hard time fitting in between AMD's Athlon 64 X2 and Phenom X4 families. There were a handful of apps that didn't recognize the odd number of cores and would only utilize two of them. Thankfully for DIY buyers, only OEMs received the hardware revision B2 chips.

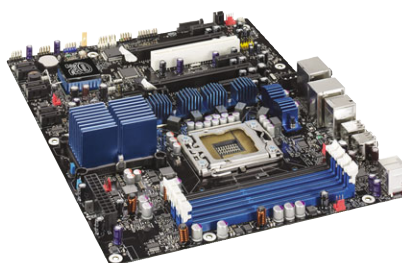
#### Chipsets

When 2008 began, Intel chipsets came loaded down with critical functionality.

The G35 northbridge, for instance, boasted DDR2 and DDR3 memory controllers, support for FSB speeds as high as 1,333MHz, and an integrated GMA X3500 graphics processor. And AMD responded with a feisty integrated graphics chip of its own, the 780G.

#### Winner: Intel X58

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



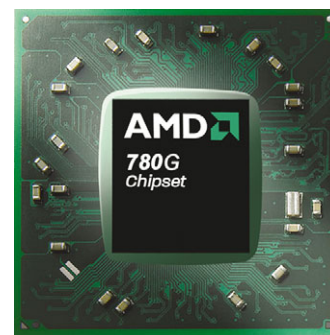
With the Core i7 taking the CPU crown, it makes sense that Intel's X58 became our go-to core logic. The chipset actually consists of two components: the X58 I/O hub and ICH10R I/O controller. A quick glance at the hub's block diagram makes it look deceptively simple. There's a QPI link connecting X58 to a Core i7 processor, Intel's standard DMI interface used to daisy chain the ICH10-R and 32 lanes of PCI-E 2.0 connectivity just like the X38 and X48. But whereas its two predecessors only supported AMD's CrossFire, X58 opens the door to Nvidia's SLI, as well.

Of course, X58's accompanying ICH10R remains an attractive I/O controller. It adds six more PCI-E 2.0 links to the chipset's suite of expansion slots, in addition to a legacy PCI bus. Six SATA 3Gbps ports replace the parallel ATA capability of older ICHs entirely. The inclusion of Gigabit Ethernet, six USB 2.0 controllers, and HD Audio round out the chipset's features.

#### First Runner-Up: AMD 780G

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

The least expensive processor you can drop into an X58 motherboard is Intel's Core i7 920, priced close to \$300. Our first platform runner-up goes to AMD's 780G chipset, which made it possible to



get a motherboard with DirectX 10 graphics, a quad-core CPU, and 4GB of memory for the price of that "entry-level" Core i7. Although 780G wasn't designed to support CrossFire in its conventional dual-card mode, it does offer a Hybrid CrossFire capability, which lets you drop in one entry-level discrete card and team it to the integrated RV610 graphics processor. The combined efforts of two low-end GPUs aren't enough to make up for one solid midrange board, but the pair is stout enough for a bit of World of Warcraft.

#### Second Runner-Up: Intel P45



Should you need additional graphics flexibility, our second runner-up—Intel's P45 chipset—makes for a solid performer at a reasonable price. P45 includes a single PCI-E 2.0 x16 slot. But it's divisible into two x16 slots running at x8 transfer rates. And because P45 supports AMD's CrossFire technology, the door is wide open to anything from a pair of \$90 Radeon HD 4670s to side-by-side Radeon HD 4870 X2s clobbering the latest fps title. The northbridge also sports DDR2 and DDR3 memory controllers, (although you'll need to choose your preferred technology before buying a board, because most only accommodate one).

**Biggest Disappointment: Intel G45**

Integrated chipsets are bound to catch a cold reception from power users. However, Intel's G45 was a particular disappointment, and it wasn't even the hardware's fault. The company's driver team is notorious for dragging its feet to support certain features. And while the G45 advertised DirectX 10 support right out of the gate, performance and compatibility remain lackluster to this day. When Nvidia launched its GeForce 9300 platform for Intel processors, the G45 looked even less attractive.

**Graphics Cards**

More so than any other product category, graphics was a wild ride in 2008. Nvidia charged into the year with its GeForce 8800 series cards swinging away. AMD couldn't touch the high-end GeForce, even after launching its own Radeon HD 3800 series family late in 2007. But then, halfway through the year, AMD surprised the press, enthusiasts, and even Nvidia by pulling the curtain from its RV770 graphics processor. AMD made the jump to 55nm manufacturing eight months prior, so the company couldn't count on a new lithography node in designing RV770. Rather, the chip's architects focused entirely on efficiency—milking the maximum performance from each component.

**Winner: AMD Radeon HD 4870 X2**

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



The culmination of those AMD's engineers' efforts, and the year's fastest video card, blasted its way onto the scene wielding a pair of RV770 GPUs on a single board. With the Radeon HD 4870 X2, AMD added a brand-new PCI-E 2.0

bridge to link the two chips, an improvement on its implementation of the Radeon HD 3870 X2 that allowed both GPUs to communicate over a pathway, moving twice as much data. Moreover, the company armed its Radeon HD 4870 with 2GB of GDDR5 memory.

Why the massive frame buffer? To begin, you should think of the X2 as two cards on a single PCB, each with 1GB of dedicated memory. Combine the powerful GPUs with plenty of fast graphics memory, and you're looking at a recipe for high resolutions with antialiasing and anisotropic filtering cranked up. Yes, the X2 requires a substantial investment in complementary hardware (you'll need a mighty power supply and high-end CPU, which, somewhat ironically, will likely be an Intel CPU, to help reach the card's potential), but for the time being, there isn't another card that'll let you game any faster.

**First Runner-Up: Nvidia GeForce GTX 260**

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



When AMD let loose its barrage of midrange, high-end, and flagship Radeon HD 4800-series cards, Nvidia was forced to slash the prices on its own recently released GeForce GTX 200 series. The GTX 260 in particular dropped from \$400 down to \$250. But it wasn't enough for Nvidia to simply make its boards more affordable. The Radeon HD 4870 was still a formidable adversary and had won significant mind share from enthusiasts rooting for the underdog.

So, Nvidia snuck in a model between its GTX 260 and 280. Instead of disabling two of GT200's shader processor clusters (yielding a standard GTX 260), it only turned off one. Curiously, Nvidia

also stuck with the GeForce GTX 260 name, though the higher-end version is often called GeForce GTX 260 Core 216 in a meager attempt at differentiation. Nevertheless, you can find the supercharged enthusiast card for less than \$300 online, and we think that's worthy of runner-up consideration if you're a power user reluctant to spend more than \$500 on a Radeon HD 4870 X2.

**Second Runner-Up: AMD Radeon HD 4670**

Our second runner-up is an even more compelling play on value, though going that route also means giving up quite a bit in the way of performance. Launched in September of 2008, the Radeon HD 4670 centers on the RV730 graphics core with 320 shader processors, the same number as AMD's old flagship, the Radeon HD 3870.

That doesn't mean this small wonder is as fast, though. AMD made some adjustments to the chip's architecture in an effort to optimize. Manufactured using the same 55nm process, RV730 is 146mm<sup>2</sup> (vs. the 3870's 190) and made up of 514 million transistors (vs. the 3870's 666 million). Where did the extra circuitry go? The Radeon HD 4650 has two times as many texture units as last-generation's board (32), but only half as many ROPs. On top of that architectural handicap, the 4670 communicates over a narrower 128-bit memory bus, cutting its available bandwidth in half. But the positives outweigh the negatives, which is why AMD's mainstream effort still registers as a favorite.

**Biggest Disappointment: Nvidia GeForce 9800 GTX**

What do you do when you're already selling the fastest video cards on the



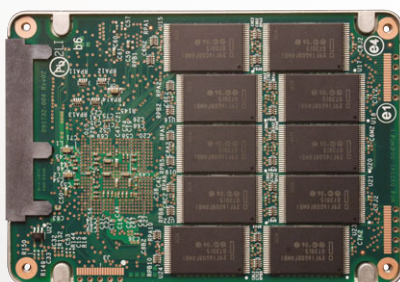
market but need something to show your customers what you've been up to for the past 12 months? If you're Nvidia, you launch the GeForce 9800 GTX, based on the same architecture as its predecessor and offering similar performance. The 9800 GTX did offer 3-way SLI support, but it was hardly enough of an improvement to warrant a name from a different generation's product family.

## Storage

Our processors got faster; our graphics cards got faster, and our memory got faster. Our hard drives only seemed to get bigger. But capacity isn't everything when your I/O subsystem is slowing everything else down. Although we saw 1.5TB drives launch in 2008, the most exciting thing to happen to storage was a flood of SSDs that promised to improve the performance outlook of high-capacity storage, cut back on power consumption, eliminate noise, and bring down temperatures. As it turned out, only some of the drives delivered on those lofty claims.

### Winner: Intel X25-M

\$595; [www.intel.com](http://www.intel.com)



As the year progressed, SSDs continued improving, culminating in our favorite high-performance offering, Intel's X25-M. Despite the benefits of SLC storage, Intel's X25-M is still a remarkable step up from the spinning magnetic hard drives that have dominated for years. The key to the X-25M's success is a custom-designed memory controller and highly optimized firmware, according to Intel reps. Write speeds plod along at a fairly pedestrian 70MBps, but the drive's real strength is in its reads, rated at a sustained 250MBps.

### First Runner-Up: Seagate Barracuda 7200.11 1.5TB

\$155; [www.seagate.com](http://www.seagate.com)



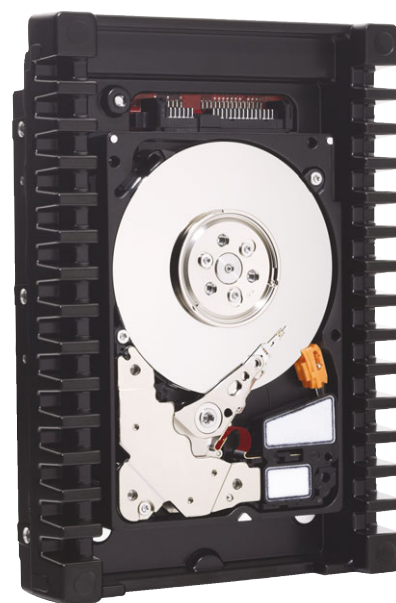
Performance aficionados, take note: Upgrading to an SSD will give you the most noticeable system performance boost you've ever experienced. But with an 80GB capacity, Intel's X25-M fills up way too fast. That's why our first runner-up is a capacity king. Seagate became the first hard drive vendor to launch a 1.5TB product late in 2008, cramming four platters with 375GB each into a standard 3.5-inch desktop form factor. The formidable Barracuda 7200.11 can't read as fast as Intel's X25-M, but its writes are at least competitive.

Seagate rates the 7,200rpm drive with a 750,000-hour MTBF and protects it with a five-year warranty—two more years than Intel's X25-M. Sure, the SSD might consume less energy and move data around quicker. But the Barracuda is your go-to when it comes time to build an HTPC, a closet NAS box, or a desktop machine with plenty of room for music and movies.

### Second Runner-Up: Western Digital VelociRaptor

\$300; [www.wdc.com](http://www.wdc.com)

Launched in April 2008, WD's VelociRaptor became the company's second-generation 10,000rpm SATA hard drive aimed at the enterprise and



performance-hungry power users. Its 300GB capacity was a big step up from the WD's previous Raptor drive, which topped out at 150GB. The VelociRaptor also incorporated a native SATA 3Gbps interface and shrank from a 3.5-inch to 2.5-inch form factor. Priced around half the cost of Intel's SSD and protected with a confidence-inspiring five-year warranty, Western Digital's newest bird of prey served up true balance, despite the onslaught of SSDs challenging its performance.

### Biggest Disappointment: The First Round Of SSDs

The laptop folks were the first ones to get amped up about solid-state storage. Flash technology was supposed to be fast, cool, and energy-efficient. Plus, with the capacities of 7,200rpm notebook drives topping out at 320GB, the fact that SSD couldn't hold much information wasn't as big of a deal compared to massive 3.5-inch desktop disks. But the initial batch of flash-based drives didn't live up to those expectations. Worse, they also cost a mint. Fortunately, SSDs have come a long way in just one year.

## System Memory

Several different memory technologies were in play throughout 2008. DDR2

and DDR3 accounted for the most prevalent desktop upgrade modules, while GDDR5 gave graphics cards the extreme throughput needed to support increasingly-powerful GPUs.

As the year came to a close, we made it a resolution to stop being so critical of DDR3 memory (that is, after giving the DDR3-2000 kits one last spanking). Even if DDR3 wasn't a particularly pivotal technology in 2008, it will be in 2009, as Intel's X58 platform employs DDR3 exclusively and AMD's Socket AM3 finally adds support for the 240-pin modules, giving its Phenom processors access to more potential bandwidth. There's good reason to make the move, too. The DDR3 specification accounts for densities of up to 8GB, which will eventually pave the way for 16GB memory modules.

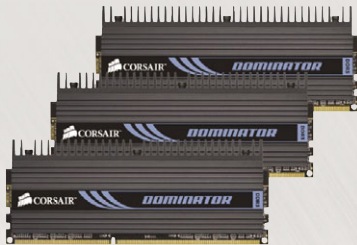
**Winner: Tie: OCZ PC3-10666  
Platinum Low-Voltage Triple Channel**

\$299; [www.ocztechnology.com](http://www.ocztechnology.com)



**Corsair Dominator TR3X6G1600C8D**

\$275; [www.corsair.com](http://www.corsair.com)



In our search for a favorite DDR3 kit, we set our sights on two triple-channel kits that launched alongside the Core i7 processor. The first comes from OCZ's Platinum series. Running at 1,333MHz with 7-7-7 timings, this is the more conservative option. Yet, in a triple-channel configuration, it's still

able to serve more than 30GBps of theoretical throughput. That's nothing short of amazing when you consider these are dense 2GB modules, yielding a 6GB kit. Also, Core i7's memory controller is very sensitive to voltage. While many older DDR3 kits needed super-aggressive settings, Intel's CPU just can't handle the 1.9V some of them required. It's all the more impressive that OCZ pulls these modules down to 1.65V, a much safer setting, according to Intel.

The other kit belongs to Corsair's Dominator family, made up of DIMMs sandwiched by black aluminum heat spreaders. Tagged with an obscurely long model number (TR3X6G1600C8D), each memory stick screams along at 1,600MHz using CAS 8 latencies. Remarkably, Corsair also gets its offering in at 1.65V, despite even faster memory speeds and dense 2GB modules.

**First Runner-Up: Corsair Dominator  
TWIN2X4096-8500C5DF**

\$120



You cannot deny DDR2's allure to power users who were looking for value, which is why it's our runner-up. If you'd like a kit that exemplifies what we are talking about, check out Corsair's TWIN2X4096-8500C5DF Dominator, running at 1,066MHz with CAS 5 timings. Comprising of two 2GB modules, the 4GB combo can be had for well under \$100 after Corsair's own rebates—talk about a fantastic upgrade in a 64-bit platform.

**Second Runner-Up: Super Talent Pico\_C**

\$20; [www.supertalent.com](http://www.supertalent.com)



Last on the list is Super Talent's Pico\_C USB flash drive. The unassuming keychain device doesn't blow past any performance records or capacity landmarks. And yet it's still incredibly cool, given its ability to hold 8GB of data, a price around \$20, and its miniature dimensions. There's a good chance you've never had 11 CDs worth of information so inconspicuously mixed in with your keys before.

**Biggest Disappointment: DDR3-2000.**

Nice round numbers impress a lot of people. So, in theory, DDR3-2000 memory should have been a real stunner at 2GHz. The premium speed bin just didn't seem to make good on its promises of gratuitous bandwidth, though. Again, in theory, two channels of DDR3-2000 would be able to move up to 32GBps. But real-world numbers were usually less than a third of that peak. Adding insult to injury, prices on 2GHz memory were through the roof, far in excess of modules running slower clocks (and more attractive timings). Hopefully, with the arrival of Intel's X58 chipset and AMD's Socket AM3 supporting DDR3, we'll see an effort to improve DDR3-2000 in 2009. ▲

by Paul Cross



# PERIPHERALS

## EXTRAORDINARY INPUTS & OUTPUTS

**NOTHING RUINS THE COOL FAC-**tor of your custom-built PC faster than surrounding it with a low-quality monitor, crummy keyboard, or a printer that looks like it's from the '90s. Fortunately, many of 2008's top peripherals delivered innovations in both functionality and style that match the quality of enthusiast-level PCs. We've compiled the top computer accessories from the past year to help you select upgrades for your PC's inputs and outputs.

### Keyboards/Mice

Rather than adding a handful of features that may or may not be practical, many mice and keyboards in 2008 offered a basic design with a few simple, useful twists. As such, the common theme among our 2008 list of input devices is that all the products were able to improve the mouse or keyboard's functionality as well as its usability.

#### Winner: Movea Gyration Air Mouse

\$99.99; [www.gyration.com](http://www.gyration.com)



Gyroscopic mice have been around for a while, but traditionally, we found that the 3D mice didn't accurately track all mouse movements or integrate perfectly with every application. Gyration's Air Mouse, which features Movea's MotionSense technology, provided more precise in-air tracking than the other gyroscopic mice we've tested, and the Air Mouse also comes with Movea's GyroTools software to improve the mouse's functionality for presentations and multimedia playback.

Another novelty of the Gyration Air Mouse is that it automatically switches to a regular mouse mode when you set the mouse on a flat surface. In our tests, the Air Mouse quickly determined the difference between 3D and flat surfaces. The Gyration Air Mouse's RF receiver slides into an opening at the back of the mouse, which comes in handy if you plan on using the mouse away from home.

#### First Runner-Up: Microsoft Explorer Mouse

\$99.99; [www.microsoft.com](http://www.microsoft.com)



If you need a mouse for your laptop that can work on any surface, Microsoft's Explorer Mouse is ideal. The

Explorer Mouse features Microsoft's BlueTrack Technology that combines the power of an optical beam with the precision of a laser to allow the mouse to function well on nearly any surface—with the obvious exception of glass and mirrors. The Explorer Mouse uses the 2.4GHz frequency and has a range of 30 feet. We like that the Explorer Mouse features a battery status indicator, so you can see when you'll need to put the mouse back on the charger. Although comfort is a matter of personal opinion, we felt the Air Mouse, which features a wide palm rest with a rubber matte finish, was comfortable to use for long periods of time.

**Second Runner-Up:**  
**Logitech Illuminated Keyboard**

\$79.99; [www.logitech.com](http://www.logitech.com)



This ultra-thin (9.3mm) keyboard provides exceptionally responsive keys, plenty of media controls, and backlit keys with illuminated characters. You can configure the brightness of the backlight, which let us increase the visibility of the characters in bright environments and tone down the backlighting in dark lighting.

Media controls are available for audio volume, email, browser, disc eject, and system shutdown. Due to the power requirements, Logitech doesn't offer a wireless model, but how often are you using the keyboard away from your desk, anyway?

**Disappointment:**  
**Art Lebedev Studio Optimus Maximus**

\$1,681.77; [www.artlebedev.com/everything/optimus](http://www.artlebedev.com/everything/optimus)

With its OLED keys and seemingly endless configuration options, the

Optimus Maximus is a unique keyboard. That being said, our typing experience was not good. The slick and stiff keys will cause even the most accurate typist to produce typos. For more than \$1,500, responsive, comfortable keys should be a given.

**Monitors**

The prices on monitors have now fallen to a point where you can routinely find a 20-inch LCD for less than \$200. And while there are still only a few monitors that support the 2,560 x 1,600 resolution, we saw a significant increase in the availability of 24-inch LCDs with HDMI inputs. Additionally, most LCDs now offer a 5ms or less response time, and many monitors provide a contrast ratio of 1000:1 or greater.

**Winner: BenQ E2200HD**

\$289; [www.benq.us](http://www.benq.us)



What's not to like about a 22-inch monitor that offers a 1,920 x 1,080 native resolution, HDMI 1.3 and DVI inputs, and a 5ms (2ms gray-to-gray) response time. The E2200HD's HDMI interface supports HDCP and a 5Gbps digital transit connection, so content played directly from game consoles, BD/DVD, and other digital media sources appears smooth. To automatically enhance image quality, the E2200HD features BenQ's Senseye image processor, which optimizes the contrast and sharpness of video to avoid image distortion. For instance, Senseye will automatically fine-tune blurred images and brighten dark video.

BenQ boasts that the E2200HD produces a 10,000:1 dynamic contrast ratio

and a static contrast ratio of 1000:1 for crisp images. The 300cd/m<sup>2</sup> brightness level will do for most computing environments. We also like the solid stand, which can be tilted up or down, as well as the bezel's glossy black finish.

**First Runner-Up: Acer G24**

\$400; [us.acer.com](http://us.acer.com)



Although we're not quite sure we entirely believe that the G24 offers a 50,000:1 dynamic contrast ratio, Acer's G24 is an impressive monitor. The orange-metallic-clad, 24-inch display features a glossy screen that adds to G24's sharp image quality and color saturation claims. Gamers will also appreciate the monitor's 2ms gray-to-gray response time. The G24 includes VGA, DVI, and HDMI, so you have plenty of connectivity options. Both DVI and HDMI inputs support HDCP.

Like many other 24-inch monitors, the G24 has a 1,920 x 1,200 native resolution and a 16:10 aspect ratio. The 400cd/m<sup>2</sup> is decent for a 24-inch monitor. Acer includes a variety of preset modes, such as Work, Graphics, and Movies, and the toggle buttons on the monitor allow you to quickly jump between the visual presets. We know that the glossy screen and bright orange bezel may be deal breakers for some, but if you're looking for a monitor that will stand out, the Acer G24 certainly fills the bill.

**Second Runner-Up:**  
**ViewSonic VA2626wm**

\$695; [www.viewsonic.com](http://www.viewsonic.com)

Although ViewSonic lists an MSRP of \$695 for the VA2626wm, we've found





this 26-inch LCD for well under \$500 online. The VA2626wm, which weighs in at only 16.3 pounds, features a 450 cd/m<sup>2</sup> brightness level, an 800:1 static contrast ratio, and a native resolution of 1,920 x 1,200. Those who watch movies and TV on their PC will appreciate the inclusion of HDMI and DVI inputs with HDCP compatibility. The integrated 2.5-watt dual stereo speakers provide enough kick that you won't need to distort the volume on your PC to hear the speakers across the room.

#### Disappointment: Dell Crystal

\$1,199; [www.dell.com](http://www.dell.com)

The Crystal got a lot of press at CES in 2008, but its \$1,200 price tag doesn't really match up with its specifications. We won't deny that the Crystal has an elegant exterior, but the 1,680 x 1,050 native resolution seems a little low, and the integrated speakers lack range. We like to see innovative design, but the performance should match the price.

#### Printers

The ability to print photos, even in cheaper consumer inkjets, was a big marketing tool in 2008. Looking into the near future, you can probably expect nearly every inkjet printer to boast about its photo printing quality. Most camera enthusiasts will find that high-end (six- to 10-cartridge) photo printers are still needed to create lab-quality prints. Still, many inkjets less than \$100 can now produce photos with decent color gradation and accurate color tones.

#### Winner: Epson Stylus NX400

\$99.99; [www.epson.com](http://www.epson.com)



The Stylus NX400 is an affordable all-in-one inkjet printer that impressed us with its printing, scanning, and copying quality. The NX400 printed clear text with small fonts in documents, and the detail in our photos was excellent. The printer features a 48-bit, 1,200dpi scanner that delivered good color depth, and we felt the scanner did a particularly good job with photo reproduction. There are four separate ink cartridges, and it uses Epson's DuraBrite ink, which won't run if you spill on the paper. Some printers that use dye-sublimation processes offer the same resistance to smears and smudges, but we think the DuraBrite inks produce more accurate color than dye-sub prints.

There's a bright 2.5-inch LCD and memory card slots for SD, xD, MS Pro, and CF cards. The integrated photo- and scan-editing tools allow you to perform all the basic image adjustments, such as cropping and straightening. With its shiny black exterior and slide-out, fold-in trays, the Stylus NX400 also offers a sleek design that will fit into small desk spaces.

#### First Runner-Up: Kodak ESP 7

\$199.99; [www.kodak.com](http://www.kodak.com)



Like the Stylus NX400, the Kodak ESP 7 is a feature-packed, all-in-one printer. Besides the ability to print, scan, and copy, the ESP 7 includes Wi-Fi and Ethernet connectivity, a built-in duplexer, and a dedicated photo paper tray. We also like that the ESP 7 uses Kodak's low-cost (\$9.99 and \$14.99 for black and color ink cartridges, respectively) inks. The per-page costs average at around two cents per black text document and 10 cents per 4x6 photo. The ESP 7 includes a 3-inch LCD and memory card slots for SD, MMC, xD, MS, MS Pro, and CF memory cards. The front USB port provides PictBridge compatibility and allows you to print JPEG images from a flash drive, which is a surprisingly uncommon feature in photo printers.

For wireless connectivity, the ESP 7 supports 802.11b/g, and you can add a Bluetooth dongle to the printer if you want to print photos from your mobile phone and other Bluetooth-equipped devices. The ESP 7 produced crisp text documents and photo prints with sharp color and good detail. We also like that the printer features an intelligent tray system that automatically detects the type, such as document or photo, and width of the paper in the tray.

#### Second Runner-Up: Canon Pixma iP4600

\$99.99; [www.usa.canon.com](http://www.usa.canon.com)



There are a lot of top-notch photo printers available, but you won't find many photo printers in the \$100 price range that can produce the kind of image quality generated by Canon's Pixma iP4600. With five ink tanks, (dye-based magenta, cyan, black, and yellow, as well as a pigment-based black ink for improved dark color contrast), the Pixma iP4600 delivered vibrant, accurate color. Detail was also good, because

Canon offers a maximum resolution of 9,600 x 2,400 dpi on the iP4600.

To handle regular printing needs, the Pixma iP4600 features a document print speed of 26ppm, and there are two paper trays with a 300-sheet (standard paper) capacity. We like the inclusion of two paper trays, because you can place your photo paper in one tray and standard paper in another tray. With its automatic duplexer, a feature not commonly found in printers under \$100, this inkjet can also help you save on paper costs.

### Networking Devices

802.11n was all the rage in 2008, and based on how long we have to wait for the IEEE to finalize the standard (July 2009), we're sure you'll hear a lot more about 802.11n in 2009. 2008 also saw an increase in the selection of NAS appliances and media extenders. As the price of storage continues to drop, we imagine there will be plenty of new options for those with a networked home to share media.

#### Winner: Buffalo LinkStation Pro Duo

**\$320 (1TB), \$550 (2TB);**  
[www.buffalotech.com](http://www.buffalotech.com)



You don't have to look very hard to find NAS devices these days. However, we've found that NAS appliances are often split

into two categories: models that offer only basic file sharing options and devices with a complicated set of features but very little instruction. Buffalo's LinkStation Pro Duo provides plenty of features as well as helpful configuration software. It offers support for RAID 0 or 1, functions as an FTP and print server, provides an integrated Web server with free remote access, and includes software for automatically backing up your data. In addition, Buffalo includes Web-based configuration software that made it simple to integrate the NAS among the PCs on a home network.

Since we last saw the LinkStation Pro Duo in April, Buffalo has also integrated a DLNA (Digital Living Network Alliance) Certified server, so the NAS can easily share files and functionality with other consumer electronics that feature DLNA technology. We also like that the LinkStation Pro Duo can be configured to automatically turn on or shut down to match the power status of the PCs on your network.

#### First Runner-Up: Netgear WNHDEB111

**\$199.99; [www.netgear.com](http://www.netgear.com)**



If you're looking to stream video over your home network or reduce wireless network lag while playing online games, the Netgear HD/Gaming 5GHz Wireless-N Networking Kit (WNHDEB111) is ideal. The kit consists of a Draft N access point and wireless bridge that utilize the 5GHz wireless spectrum to avoid the typical interference you see in the 2.4GHz band. We also like that the Wireless-N

Networking Kit offers automatic QoS (Quality of Service) to avoid packet loss and jitter that can interrupt audio/video playback and gaming sessions.

The wireless bridge provides two Ethernet ports, so you can add devices without Wi-Fi connectivity, such as an Xbox 360 or DVR. Of course, because the access points use the 5GHz spectrum, the devices you want to wirelessly connect must have a dual-band, Draft N network adapter. For security, Netgear preconfigured the SSID and WPS security, and there's a one-touch button to bridge the access points.

#### Second Runner-Up: Linksys WRT610N

**\$199.99; [www.linksys.com](http://www.linksys.com)**



The Linksys WRT610N is a hand-sized wireless N router that can use both the 2.4GHz and 5GHz spectrum, which lets the WRT610N work with 802.11a/b/g devices and use twice as much radio bandwidth when linking to wireless N devices. Additionally, there are four Gigabit Ethernet ports to let your wired devices transfer data at full-duplex speeds. Like many 802.11n routers, the WRT610N includes MIMO technology to increase the router's range and reduce the amount of poor or dead coverage areas. We also like that there's a built-in media server that lets you stream media from attached storage devices on your network to devices with an UPnP-compatible media adapter.

With the WRT610N's Storage Link feature, you can connect an external hard drive or USB flash drive and share your files over the home network. The WRT610N also offers 256-bit encryption for wireless transmission to protect your data from Wi-Fi snoopers. ▲

by Nathan Lake



# SOFTWARE

## 2008'S HEAD-OF-THE-CLASS CODE

**ALTHOUGH WE ALWAYS ENJOY CHECKING OUT** what's new, we really love using what's best; they aren't always the same thing. Sometimes software developers take missteps or can't match the older technology a competitor has developed. Perhaps the stars were just aligned properly one night for that perfect combination of ease, power, usability, and functionality wrapped into an unbeatable program or suite.

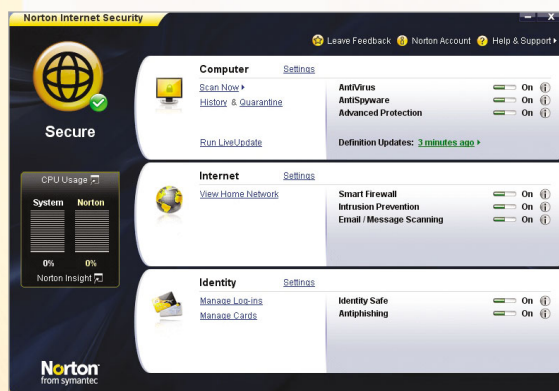
This year, we're giving the "This Stuff is the Best" nod to 12 Windows programs in four categories: System/Drive Utilities, Security Apps/Suites, Media File Apps, and the ever-popular category of Miscellaneous.

### Security Apps/Suites

Clearing a system of malware and keeping it clear is a surprisingly hard job. It's a fine balancing act between protecting a system thoroughly yet not bothering the user with details and questions or crippling system performance. This year's best security programs manage to thread the needle, though as a whole, it seems most vendors with software in this category are trying hard to keep system drag to a minimum.

#### Winner: Symantec Norton Internet Security 2009

\$69.95 (up to three PCs); [www.symantec.com](http://www.symantec.com)



Power users have traditionally had a love-hate relationship with security suites: They offer lots of security utilities within

one streamlined interface, but bloat and sloth tended to drag down system performance significantly. For the past two years, Symantec has been on a debloating crusade with its security products, and the 2009 editions are not only significantly faster but also take steps to show you how little drag the programs impose on your system. We think NIS 2009 hits the sweet spot between speed and functionality, and though we can understand if you've been burned by Symantec products in the past and are now a little gun-shy, it warrants serious consideration now.

NIS combines antivirus, antispware, antiphishing, a two-way firewall, parental controls, and antispam as its major features. And if each isn't the very top-of-the-line, they are all very close to it. Minor features include a secure password locker, a drive-by download blocker, and bot/worm protection. All these features share a common interface and unified configuration panel that's truly a pleasure to work with, which invites exploration and experimentation.

Scans, updates, and other CPU-intensive activity only occur during idle periods (which you can configure), and a "Silent Mode" forces NIS to shut up, stay idle, and perform default protections for between one and six hours for your gaming sessions. A big CPU meter displays both general system activity as well as how much of that activity you can attribute to NIS 2009 (probably Symantec's hoping to dispel the myth that NIS is to blame for slow systems). Factor in protection for three PCs for the price, and NIS 2009 is a good value, too.

#### First Runner-Up: PC Tools Spyware Doctor 6

\$29.95 (up to three PCs); [www.pctools.com](http://www.pctools.com)



Every year the antispyware utilities jockey for position, and thanks to the fierce competition, the top tools keep getting better. For 2008, we give Spyware Doctor 6 the nod for its ruthless persecution of hard-to-kill spyware, ease of use, relatively minor impact on system speed while active, and low price (especially when legally installed on multiple PCs). We especially like how its antivirus module (which may be fine; we've never rigorously tested it) is entirely optional, saving you \$10 if you already have an antivirus program you like.

Although its conventional scanning is excellent, the latest version has BehaviorGuard, which uses the outstanding ThreatFire ([www.threatfire.com](http://www.threatfire.com)) behavior-based detection engine, as a no-cost add-in. It manages to stop zero-day malware threats without bulky definition file lookups. Based on our experiences with truly infested systems this year, Spyware Doctor 6 has the best chance of cleaning the mess up properly and giving you a fresh start.

### Second Runner-Up: Comodo Firewall Pro 3.5

Free; [www.comodo.com](http://www.comodo.com)



Some programs are great because they manage to condense dozens of complex options and commands into simple checkboxes. Others, like Comodo Firewall Pro, are great because they leave all those options alone and let true power users have the ultimate flexibility. If you need to run various servers, P2P programs, and other remote access software on your PC, but you still want solid firewalling, Comodo is a better choice than bundled-in firewalling modules offered in various security suites. Comodo lets you lock out specific ports

and addresses, scan active connections to let you look for patterns, and much, much more. Yet with all this, Comodo still has a clear (if complex) GUI, outstanding protection, and a low, low price of free.

### System/Drive Utilities

Once a system is cleaned up, there are still hardware and software problems that can keep a Windows system from running properly. There's a lot of chaff to separate from the wheat in this category, but these programs haven't let us down when it comes to system maintenance. Generally, most vendors have taken the opportunity to apply Vista's Aero theming cues to their own interfaces, which has generally been a vast improvement in usability.

### Winner: Avanquest Software Fix-It Utilities 9 Professional

\$49.95; [www.avanquest.com](http://www.avanquest.com)



There are two ways of thinking when it comes to system/disk utilities: Either get a bunch of individual utilities to each handle very specific problems or go with the "everything and the kitchen sink" approach and use a utility suite that covers everything. There are merits for each approach, but if you're keen on the latter, then Fix-It Utilities 9 Professional gets the nod for the best overall utility suite. To be fair, Version 8 was actually our choice, but Avanquest released version 9 as we were writing this. So, while we haven't quite given it the "full CPU treatment," we like what we see.

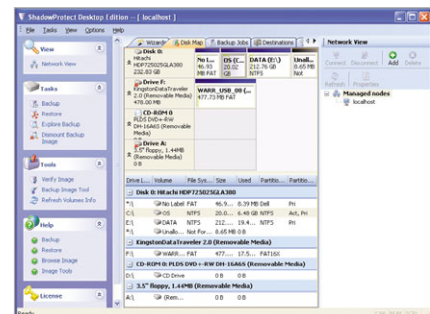
FIU 9 is packed with nearly 100 diagnostic tests and utilities, ranging from S.M.A.R.T. drive monitors, Registry cleanup, file undeleters and secure shredders, disk surface testers and defraggers, temporary file cleaners, etc.

New for version 9 is a TCP/IP and browser optimizer, a memory booster utility (although we found its improvements dubious at best), and an improved anti-virus/antispyware engine based on Trend Micro's antimalware technology. Blessedly, you can disable the AV and AS easily if you already have your own anti-malware setup in place, and we found no conflicts with other security programs.

As before, the key to FIU 9's success is integration, with the various utilities all sharing a similar look and feel and benefiting from a master "undo and restore" feature. Also welcome is an excellent set of instructions—both for general use and for emergency system restoration—which should ease anyone's concerns about what the suite is doing.

### First Runner-Up: ShadowProtect Desktop 3.3

\$79.95; [www.storagecraft.com](http://www.storagecraft.com)



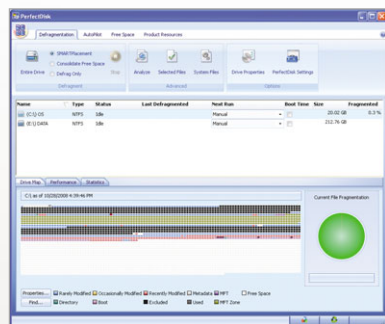
Fans of disk-image-based backups looking to replace their DOS-rooted copies of Norton Ghost 2003 should look hard at ShadowProtect Desktop 3.3. Aside from being unbelievably fast at making disk images; being able to write images to hard disks, network stores, and optical discs; and sporting a modern GUI that is slick yet doesn't hide technical details, ShadowProtect has lots of welcome surprises. Its bootable restoration CD is based on Windows Vista PE (preboot environment), is much more tolerant of complex hardware than competitors' Linux-based discs, and it accepts Windows drivers. You can mount writeable backup images to add items after the fact or segment them for later burning. You can restore a disk image to VMware or VirtualPC and immediately use it; you



can even restore it to a different computer, where it will at least boot with only minor driver problems. In short, it's the modern successor to Ghost 2003 that we've all been searching for.

### Second Runner-Up: PerfectDisk 2008 Professional

\$39.99; [www.raxco.com](http://www.raxco.com)



Sometimes when you have a specific medical problem, you want to see a specialist. For disk defragmenting needs, we think a specialist, in the form of PerfectDisk 2008 Professional, is a better choice than the defragmenter that comes with Windows or any utility suite. PerfectDisk is wicked fast, has plenty of options for background or screen saver optimizing, and sports an attractive interface that encourages exploration. It also includes a handy "folder-size" utility that helps you track down where all your free space disappeared to. Its "SmartPlacement" of files helps resist file fragmentation in the future, meaning you have to fragment less often, which is a win-win in our book.

### Media File Apps

2008's batch of best media file apps all have new or expanded features to get you your media wherever you are, provided you have some sort of digital device with you (and, ideally, provided that digital device has some sort of Internet connectivity).

### Winner: Apple iTunes 8

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

Love 'em or hate 'em, there's no denying that Apple seems to have a lock on the portable media player market with its iPods and iPhones. For all of these devices,



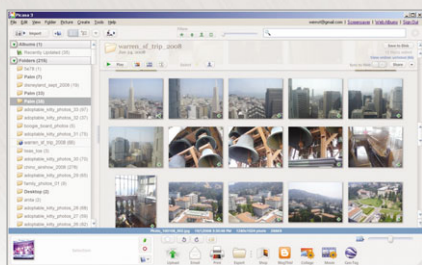
Apple's iTunes is the gateway, and Apple is to be commended for not resting on its laurels here. Instead, iTunes gains more features with every release while retaining its elegant interface and good stability.

iTunes 8 added a lot of desirable features, not the least of which is the App Store, where lucky iPod touch and iPhone users can buy, download, and install programs for their devices with a few simple clicks. The iTunes Store now restocks the formerly AWOL programs from NBC/Universal and offers HD programming for \$2.99 an episode (and tosses in a free, compressed, low-res version of those HD purchases intended for playback on an iPod).

A new feature, "humbly" called Genius, scans your music library and then creates playlists of songs that it thinks "go together." It phones home to Apple's own computers for the heavy lifting and to use data collected from other iTunes users. But if you have a large library, it does a remarkably interesting, if not outright good, job of presenting you with new listening options for stuff you already own. Add to this easier LAN sharing, new visualizations, a new "Grid View" of your library, and it's tough not to get sucked into the iTunes fold.

### First Runner-Up: Google Picasa 3 (beta)

Free; [www.google.com](http://www.google.com)



A lot of people will casually describe Picasa as a Windows version of Apple's iPhoto, but that's really selling Picasa

short. While Google has endowed Picasa with a healthy dose of Apple's GUI-slickness and intuitiveness, it really does so very much more than iPhoto. Of course, it still scans for photos on your hard drives, displays them in thumbnails, and organizes them by date. But now it offers better touch-up tools (removing facial blemishes, for example); better backup, slideshow, and screen saver functions; integration with your Web cam; and much tighter integration with Google's own online Photos features à la Flickr.

The online component now has a facial recognition feature that's intriguing: Start tagging faces in your photos, and before long Picasa will start identifying the people in your photos automatically. Plus, it's still the fastest way to print batches of photos to your photo printer.

### Second Runner-Up: Orb Networks Orb

Free; [www.orb.com](http://www.orb.com)



If you've ever wished you could have access to the multimedia files on your home PC from other PCs around the world, your Web-enabled smartphone, or the Internet-connected gaming console in your living room, then Orb is for you. Once installed on your PC and pointed to folders it can scan for your media, it makes them available and streams them to the aforementioned devices, provided you supply them with the right log-in and password. If your PC has a TV tuner, you can also watch live TV or recorded programs. You'll get the best streaming results on a high-powered notebook, but even our much-maligned Palm Centro managed great video streaming over a 3G wireless network connection in the middle of a park.

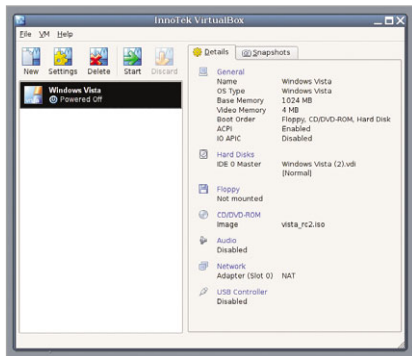
### Miscellaneous Software

There's some software that we rely on every day that doesn't readily fit into any

real category, so trends are elusive. Still, it's hard not to notice that there's lots of great software that is offered to us free.

### Winner: Sun Microsystems VirtualBox 2.0.4

Free; [www.virtualbox.org](http://www.virtualbox.org)



For years, if you wanted to run a virtual machine within your PC, your only real choice was from VMware—either in the form of the fantastically great and somewhat expensive VMware Workstation or the somewhat feature-lax yet free VMware Server. Sun's rebuilding and releasing of its free VirtualBox has rather changed the game in virtualization, making a powerful and flexible virtualization tool easily available to the masses.

In Windows, VirtualBox installs with a slim 32MB download, and it installs quickly without adding a lot of extra virtual hardware adapters to your host system. Its speeds are comparable to VMware's offerings, and it includes the most important options, such as snapshots and versioning. There are many virtual images available for download from the Internet and utilities for converting those from VMware. Some host OSes support a Seamless Mode, whereby windows from the guest OS appear on the main host's desktop, allowing for the appearance of running Windows programs directly on the Mac desktop or Linux desktop. For extra speed, VirtualBox has versions that run within 64-bit host operating systems.

### First Runner-Up: dotSyntax Digsby

Free; [www.digsby.com](http://www.digsby.com)

If you chat with a lot of friends and colleagues with different IM clients, then

you know how annoying it is to keep those different programs open. Add your social networking sites and your email accounts to the mix, and you've got the makings of a very cluttered desktop, and that's before you get to any real work. Digsby can condense many of these programs down to its single skinnable window. It's compatible with Yahoo!, MSN, AIM, ICQ, Google Talk, and Jabber IM clients; MySpace, Twitter, LinkedIn, and

## The Disappointments Of 2008

First, let's be clear: "bad software" and "disappointing software" are two different things. Bad software doesn't do its job or, even worse, is a ruse to slip spyware onto your system. Disappointing software is software that we expected great things from (or at least better things from), but those great things just didn't materialize.

The first is WinZip 12 ([www.winzip.com](http://www.winzip.com)), which works perfectly fine but offers what we think are extremely meager and limited additional features over version 11 and, to a certain extent, version 10. Some of the newer compression types version 12 offers aren't compatible with any other compression utilities—or even with older versions of WinZip. With all the free compression utilities breaking new ground every day, WinZip 12 should have offered more.

AVG AntiVirus 8 ([free.avg.com](http://free.avg.com)) is certainly a popular AV program, and it manages to catch many viruses acceptably well, but the latest version comes with a "link scanner" that prechecks hypertext links for malware before you click them, which wastes Internet traffic for everyone and slows down the systems it's installed on. Disabling the "feature" without reinstalling it is tricky at best.

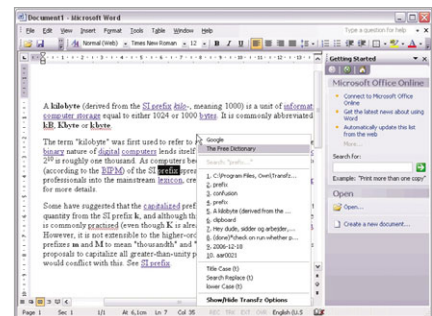
Finally, DriverMax 4.6 is a program we love in theory. It makes a backup of all your drivers and lets you reinstall them all in one fell swoop during an OS reinstallation. In practice, the system doesn't always work reliably, leaving you with a false belief that wiping your hard drive and reinstalling things will be a snap. When it works, it's wonderful; when it doesn't, you're stuck with a lot of work ahead of you. ▲



Facebook social networking accounts (and blasting out individual Twitters is a snap); and it can check several email accounts (Web mail, POP, and IMAP) for new messages, as well. Digsby is a tremendous time-saver.

### Second Runner-Up: Transfz

Free; [www.transfz.com](http://www.transfz.com)



If you've been around long enough to remember those helpful little TSR (terminate and stay resident) programs for DOS, then you'll probably love Transfz (pronounced "transfuse"). Running silently in the Taskbar tray, Transfz does three main things. It highlights a word in any program: Press a hotkey, and you get an instant Internet search for that word from almost any Web site that has a search field. It manages up to 10 Windows Clipboards at once, making bulk copying and pasting a snap. Finally, it performs all sorts of text manipulations. Programming extensions to Transfz is simple, so there are a lot of them available for free, as well. It conservatively calculates the time it saves you, and after a month, we bet you'll be surprised. ▲

by Warren Ernst





**MSI**  
MICRO-STAR INTERNATIONAL

innovation with style



# Eclipse series

## Catch a Glimpse



MSI Eclipse series motherboards feature the latest and fastest X58 Express Chipset platform from Intel®. The first and only platform to be CrossFireX™ and SLI™ capable; MSI Eclipse takes gamers and enthusiasts into the next generation of computing. Ready or not, the future is here



MSI GreenPower™



Hi-c CAP  
on PWM

MAX LIFESPAN!



DrMOS  
Expansion

IMPROVE EFFICIENCY



Split  
Thermal  
System

EFFICIENT COOLING



ATI  
CROSS  
FIRE X™  
TECHNOLOGY



NVIDIA  
SLI™  
— READY —



X-Fi  
XTREME  
FIDELITY

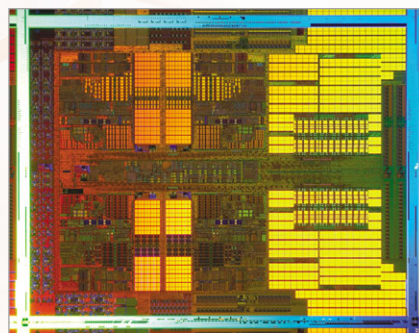
[www.msicomputer.com](http://www.msicomputer.com)



# The Best Of What's Next

OUR EARLY BETS FOR 2009'S TOP PICKS

**WE LIKE TO IMAGINE THAT COM-**pany roadmaps are stored in underground vaults protected by muscle-bound armed guards. But, every once in a while, the company prepares a big presentation. Those intimate secrets are pulled from their chilly catacombs and shown to strategic partners. En route to the meeting, a USB thumb drive falls to the floor without its entourage noticing. The valuable data lies on the floor, vulnerable, until someone picks it up. Sometimes, the finder is its handler. Other times, a less discreet source takes ownership and company secrets start leaking. At least that's the way it would go down in our cloak-and-dagger version of the story.



Not only is AMD's 45nm Deneb smaller than the Agena die but it also includes 6MB of L3 cache instead of 2MB.

In reality, even the most tight-lipped organizations have a difficult time covering their upcoming launches under a veil of secrecy. The fact that AMD managed to keep the details of its RV770 graphics core to itself right up until the Radeon HD 4850 hit store shelves is nothing short of unprecedented. At the other end of the spectrum is Intel's Nehalem architecture, with its design elements dissected in-depth well before the processor and platform were officially introduced.

Naturally, there are already tidbits of information floating around about the hardware you can expect to see in 2009. Some of the details are specific, gleaned from recent company roadmaps. Others are chaff from the rumor mill. But regardless of how concrete these predictions seem to be, remember that even the most detailed plans are merely forecasts until product actually ships.

## Processors: CPUs Evolve

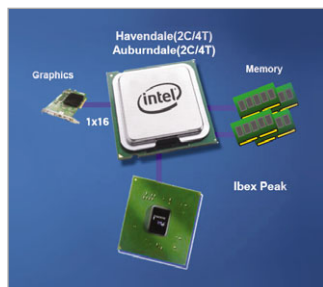
There are two big processor developments you should keep an eye out for in 2009—one from each of the major players in the chip industry.

From the outset of the new year, AMD plans to start selling CPUs based on its 45nm manufacturing process,

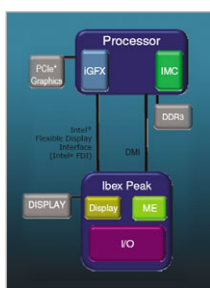
		Q3 '08	Q4 '08	Q1 '09	Q2 '09	Q3 '09
Essential	E2	E7300	E7400	E7xxx	E7xxx	Havendale! E7xxx
	E1	E7200	E7300	E7xxx	E7xxx	Havendale! E7xxx

This timeline, pulled straight from an Intel roadmap, indicates Havendale's launch in Q3 '09—just in time to complement the inexpensive Core 2 Duo E7000-series chips.





With its integrated graphics, built-in memory controller, and PCI-E 2.0 interface, core logic will become a single-chip affair with Havendale.



**ICH Meets Display Controller:** Ibex Peak includes all of the functionality found in an Intel ICH, plus display output and manageability engines.

beginning with the quad-core Deneb design. Architecturally, you probably won't see much difference between the existing Agena-based Phenoms. But AMD is claiming that miscellaneous optimizations will pave the way for a 20% performance increase per-clock vs. Agena. Additionally, a shift from 2MB of L3 cache to 6MB should also yield notable gains, as will the adoption of DDR3 memory support. Hopefully, the process shrink gives AMD the flexibility to run higher clock speeds.

Now, don't expect the move to 45nm to put AMD's CPUs at the same performance level as Intel's. Even if Deneb is able to match Intel's Core 2 Duo and Quad CPUs on a per-clock basis, Intel's more advanced Nehalem architecture should re-establish the company's commanding position. AMD will again rely on compelling prices in order to convince power users that its CPUs deliver a better value than anything on the top shelf of Intel's bar.

At least for the beginning of 2009, AMD's assertion might turn out to be true.



**Top Secret:** Graphics vendors are very protective of their technology, even after it has launched. You'll need to wait until AMD, Intel, and Nvidia are ready to talk shop before roadmaps and product shots become available.

However, Intel has a secret weapon being developed in its skunk works that could prove to be a thorn in the now-fabless processor designer's side. In the third quarter of 2009, Intel will unveil Havendale, a mainstream desktop processor based on the Nehalem microarchitecture. It'll include two cores, plus Hyper-Threading, giving it the power to work on four threads simultaneously. A 4MB repository of Smart Cache is actually a bit different from the similarly named feature in existing Core 2 CPUs. Instead of a large L2 cache, Havendale will mimic the high-end Bloomfield design to include a big 4MB of Smart Cache, shrinking the L2 cache to 256KB per core. The biggest shocker, however, will be its on-die composition.

Nehalem is already introducing some big changes in its very HyperTransport-like QuickPath Interconnect and integrated memory controller. Havendale will handle two channels at a time vs. Bloomfield's three—no surprise there, given Havendale's mainstream pedigree. But Havendale is also slated to include an integrated graphics component. There's no word yet on the graphics technology Intel will employ, but because this is slated to be an entry-level design, we're not expecting phenomenal gaming performance. Rather, this is a cost-saving measure: With Havendale, Intel will only need a single piece of silicon for its chipset.

### Chipsets: The Shoulders Processors Lean On

Both AMD and Intel will be introducing platforms that complement their respective processor lineups in 2009. Given the moderate changes AMD plans to introduce in Deneb, its core logic probably won't include any crazy architectural alterations. In fact, the company's roadmap

includes just two chipset launches based on new technology: RD890 and RS880D.

RD890 will be presented as RD790+, likely very similar to the 790FX chipset that AMD enthusiasts already use to enable CrossFireX configurations with up to four GPUs. What makes the discrete chipset so obscure is that it is slated to include enhanced CrossFire support, though there's no clarification regarding how AMD plans to improve its cooperative rendering technology. And, of course, RD890 will also accommodate the new Socket AM3 CPUs that'll be shipping when it debuts.

The RS880D looks to be a follow-up on 790GX. AMD's roadmap doesn't specify whether RS880 will include fresh graphics technology or recycle the RV610 core used in the 780G and 790GX chipsets. But it does say to expect faster clock speeds, new power-saving technologies, and enhancements to video playback support. Ideally, the northbridge will be the first of its kind to incorporate the UVD 2 technology found in Radeon HD 4800-series cards.

The two northbridges will be matched with a brand-new southbridge called SB800, which not only includes a handful of features AMD chipsets have been missing but also adds brand new technology that might help it achieve parity with more advanced Intel and Nvidia I/O controllers. For instance, a Gigabit Ethernet MAC and four second-gen PCI-E lanes catch the southbridge up to competing core logic, but support for 6Gbps SATA 6 will be one of those never-before-seen capabilities.

Still, Intel's plans are far more revolutionary. With the Havendale processor incorporating graphics capabilities, its own memory controller, and the interface needed for discrete PCI-E connectivity, there's no need for a conventional northbridge any more. Motherboards built to house

Havendale will consequently center on one chipset component, which Intel is calling Ibex Peak. The core logic will retain I/O functionality formerly found in Intel's ICH family and will add display output support and manageability features that were once native to the old graphics and memory controller hubs. No doubt these consolidation efforts will help Intel improve its position at entry-level levels. But there's also a fair chance that motherboards with a single piece of chipset silicon will also be less expensive, challenging AMD's compelling integrated graphics core logic.



Intel's advanced memory controller and firmware are the keys to its exceptional SSD performance. Don't expect much more in the way of capacity in 2009, though.

### Graphics: Not Just For Gaming Anymore

Competition between AMD and Intel is heated, sure. But the fast-paced back and forth between AMD and Nvidia for graphics supremacy is nothing short of intense. When it looked like Nvidia held an insurmountable performance advantage, AMD launched its Radeon HD 4850 and 4870 cards, showing that the engineers from ATI are still alive and well. Then came the Radeon HD 4870 X2, usurping the GeForce GTX 280 entirely. It only follows, then, that getting a roadmap from either of these ultra-discreet organizations is more difficult than pulling crocodile teeth. However, we do have a rough idea of what to expect for the next year, thanks to a couple of subtle leaks.

Nvidia will strike first in an effort to reaffirm itself in the enthusiast space. Its 55nm GT206 should have emerged late in 2008, according to a slide pulled from an Elsa ([www.elsa.com](http://www.elsa.com)) product roadmap. Intended as an upgrade to the existing GeForce GTX 260, it was expected to feature faster clock speeds, thanks to a smaller manufacturing process. Later in the

first quarter of 2009, Nvidia will unveil its GT212, currently thought to be a 45nm component.

There's a dark horse waiting in the wings, though, courtesy of Intel. A controlled flow of architectural detail on its upcoming Larrabee design has kept the project on everyone's mind, without giving away too many hints about planned product configurations. Intel appears confident that its first discrete graphics card since the maligned i740 will readily compete with AMD Radeon and Nvidia GeForce boards when it launches. Although the processor

giant is almost forthcoming about its CPU roadmaps, representatives do not speculate about the Larrabee's expected drop. But given the anticipation for the arrival of DirectX 11, Intel's efforts

may affect your holiday wish list in 2009.

In a presentation given in October, AMD told the press to expect Microsoft's next-generation graphics API and Windows 7 in 2009. That means enthusiasts should see brand-new architectures from both AMD and Nvidia this year supporting DirectX 11's updated graphics pipeline. This is going to be an exciting development, though not as disruptive as DX10. Version 11 emphasizes multithreading, taking better advantage of multicore processors than past development environments. It's also expected to make headway into standardizing general purpose graphics processing—similar to what Nvidia is trying to accomplish with its proprietary CUDA API. And then there are the graphics-oriented improvements, like an advanced form of hardware tessellation that goes beyond AMD's current implementation, better texture compression, and backward-compatibility with DirectX 10 hardware.

### Storage: Speeding Up The Slowest Subsystem

Even as processors, platforms, and graphics continue getting faster, the wily

world of storage seems to creep along at a snail's pace. Yes, capacities are always growing, but overall data throughput rises at a much slower clip. You can hardly blame interface transfer rates. At 3Gbps, SATA is theoretically able to move more than 300MBps, yet most 7,200rpm hard drives read and write less than 100MBps.

Currently, the fastest SSDs come from Intel. Its mainstream X25-M is able to read at up to 240MBps and write at 70MBps. The enterprise-class X25-E pushes the same 240MBps read speed and ups writes to 170MBps. It's no stretch of the imagination to have several X25-Es in a rack-mounted storage server utilizing full 6Gbps links. Discouragingly, Intel's 2009 SSD roadmap doesn't include any enterprise drives larger than 64GB. Intel will, however, be selling 2.5- and 1.8-inch mainstream drives as large as 160GB through 2009.

Intel will likely hold on to the performance crown, thanks to its optimized memory controller, but Samsung looks like it'll have the advantage in capacity. The company announced its 256GB MLC solid-state drives early in 2008 and is preparing to ship those drives at the time of this writing.

If SSDs simply aren't enough space, keep an eye out for Seagate's 2TB drive, based on traditional spinning magnetic media.

### Memory: Surprise! No Surprise Here

Without question, 2009 will be the year of DDR3. AMD's 45nm Socket AM3 CPUs support it, as do Intel's Nehalem-based offerings. DDR2 will persist, of course. All of AMD's quad-, tri-, and dual-core chips unveiled in 2009 will include the same DDR2/DDR3 memory controller. And with Nehalem starting out as an enthusiast platform, plenty of mainstream buyers will stick to Core 2 Quad processors on motherboards with DDR2 slots. But with prices on DDR3 falling precipitously, dual- and triple-channel kits ranging from 1,066 to 2,000MHz will be more popular.

Now, gently set your magazine down and back away. This message will self-destruct in five seconds. ▲

by Paul Cross





# The Bleeding Edge Of Software

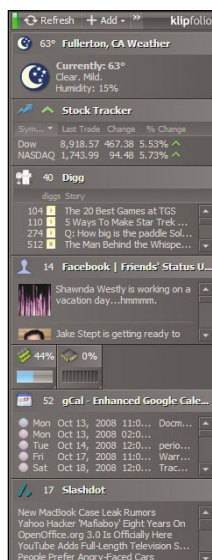
Inside The World Of Betas

## KlipFolio 5.0 Build 5900-14 Beta F

Sidebar programs are pretty common these days, and that's not even counting the one that comes with Windows Vista. A lot of them are starting to blend together in terms of their look and functionality, but KlipFolio's latest beta is really starting to stand out in both of these categories.

KlipFolio exists either as a sidebar (available for docking on any screen edge) or as a free-floating window with the usual Always On Top and Auto-hide options you've come to expect.

Living within the KlipFolio are widgets aptly named "Klips," and Klips are resizable and draggable within a KlipFolio window, allowing for easy customization. A super-neat trick is that each Klip expands into a



### KlipFolio 5.0

**Version # Previewed:** Build 5900-14 Beta F

**Publisher and URL:** Serence, [www.klipfolio.com](http://www.klipfolio.com)

**Why You Should Care:** Perhaps the best sidebar program gets better and better.

much larger window (that even expands outside the KlipFolio window's boundary) when you click its title bar, allowing you to see more information for a moment, and then the Klip shrinks back into its place. Its look is that of a monochromatic

wall in formation, but it's laid out attractively with smooth fonts, and it helps make colorful content really stand out.

Its greatest strength is its wide range of available Klips. There are thousands

available, ranging from Google Calendar viewers, Facebook updaters, weather blurbs and stock charts, email alerters, and much more. Creating clips is relatively easy, so new ones with amazing properties seem to pop-up all the time—you could make a career of keeping track of all the available Klips.

Besides Klips, KlipFolio makes for a spiffy RSS reader. You can instantly make a new clip display any RSS feed, which obviously refreshes automatically. Hovering your cursor over a line in the RSS feed displays its first few lines (or paragraphs) of content, while clicking the headline itself opens the source article in your default browser.

KlipFolio is free for personal use, though Serence, its creator, hopes you'll pony up for an Enterprise- or Branded-version of it for commercial purposes. If my multimillion dollar corporation required such a tool, based on the performance of the personal version, I'd look into it. ▲

by Warren Ernst

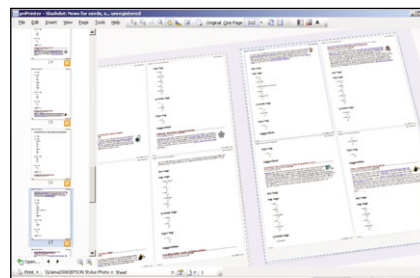
## priPrinter 1.5.0.581 Beta

Printing seems like a pretty straightforward task; you hit Print from the File menu and watch the pages roll out of the printer. There's not much to think about, right? Well, if you don't particularly care about wasted pages, screwed up margins, or editing printouts before they hit the page, then you'd be right. But if any of these things annoy you, or if you need to manipulate printouts as they print, then priPrinter is worth a hard look.

priPrinter acts as a virtual printer first: Just choose the priPrinter print driver instead of your normal printer when you print. priPrinter then grabs all printer output and creates virtual pages on-screen, rather like a PDF file. The virtual pages appear within the main priPrinter Window

where tools easily let you combine multiple virtual pages into single sheets of paper, drag and drop new margins, crop pages by any rectangle, remove headers and footers, remove any empty pages, and more. You can expand printouts into posters, reorient them into foldable booklets, or export pages as JPG and BMP files.

priPrinter has a whole range of Form tools. For example, you can create a paper form in virtually any tool, send it to priPrinter, and let priPrinter save it as a fillable form, sort of like a template. Later, when you need to fill out that form, you can either print a second document over the first (in other words, priPrinter overlays the second document on top of the first one), or use priPrinter itself to fill out the form and then send the form to a printer.



### priPrinter

**Version # Previewed:** 1.5.0.581 Beta

**Publisher and URL:** Pelikan Software KFT, [www.priprinter.com](http://www.priprinter.com)

**Why You Should Care:** Save a tree and your sanity: Work up your printouts first.

In some ways, priPrinter seems a lot like Adobe's Acrobat Pro, but it's a lot lighter and faster and a lot cheaper at less than \$40. ▲

by Warren Ernst

# SPEED

UP TO

Upgrades That'll Keep You Humming Along

It's a good month for multimedia, with Genius Playlists and HD support for iTunes, a major Google Picasa upgrade, and both nVidia and ATI issuing graphics card drivers that resolve issues and increase performance in a range of games. Play on.

## Adobe Reader Lite 9.0 Revision 2

This lighter, less bloated version of the ubiquitous PDF reader enables form filling with this release.

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

## Apple TV 2.2

Apple's set-top box now accesses the HD TV episode library directly. Film listings now have additional hot links that highlight other films by the same actor, director, or screenwriter in the iTunes library.

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

## Fedora Linux 10 Beta

The next major Fedora release will enable ad hoc network sharing, improved printer handling, and simplified local and remote virtualization. Linux fans can expect better Web cam and IR support, too.

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

## iTunes 8

The new Genius feature forms the core of the latest Apple media player/library release. Algorithms now match your tastes to songs both in your desktop library as well as related tracks in the iTunes store. Hi-def films and TV episodes are now available in the store and playable on the desktop . . . for an additional fee, of course.

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

## J. River Media Center 12

The venerable media organizer goes into its twelfth iteration with a smartlist editor for intelligent playlists. The new plug-in architecture for Theater View allows on-screen widgets. Major speedups of search,

sorting, and view switching tie the updates together for smoother overall operation.

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

## KlipFolio 5.0 Beta F

This veteran sidebar/dashboard pulls RSS feeds, stock and news headlines, Hotmail, and more to the Desktop. This beta of the next version adds the ability to drag and drop feeds, a revamped feed viewer, a redesigned toolbar, and new Debug settings. For newbies, the product tour has been upgraded substantially.

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

## Microsoft Malicious Software Removal Tool 2.2

The free virus and malware detection tool from Microsoft scans for select infections such as Blaster, Sasser, and Mydoom. The new version updates the profiles for recent malware.

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

## Picasa 3

This major upgrade to Google's image editor and library lets you sync edits among the main program and online Web albums. A new Retouch tool fixes common facial blemishes easily. A dedicated image preview program will view images in your Windows library without loading the full Picasa application. Screen and web cam capture functions appear in this edition, as well.

[picasa.google.com](http://picasa.google.com)

## SiSoftware Sandra 2009

This longtime favorite system diagnostics tool expands support for graphics and

GPGPU. New graphics benchmarks accommodate the latest generation of graphics chips. This version also adds measures for cryptographic performance. A customizable Favor-ites tab collects your most valued testing modules.

[www.sisoftware.net](http://www.sisoftware.net)

## SpeedFan 4.36 Beta 15

SpeedFan now will examine AMCC 3ware RAID controllers and supports new hardware. Also there are improvements in Nvidia, ARECA RAID controller, and ITE IT8720F support.

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

## vLite 1.2

This tool for removing unwanted Vista components gets a new network access protection agent and EAP (Extensible Authentication Protocol). This version fixes the WSearch 4.0 install.

[www.vlite.net](http://www.vlite.net)

## Driver Bay

## ATI Catalyst 8.9

The newest Radeon drivers now have additional 1080p@50Hz display mode support and OverDrive in QUAD CrossFireX configurations. The drivers also resolve Windows Vista issues with Company of Heroes, Quake 4, DiRT, Age of Conan, and other game titles. Issues with Spore and Oblivion have been resolved under Windows XP.

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

## Nvidia GeForce Release 178

WHQL-certified for most GeForce 6/7/8/9/200 series video cards. This release adds support for Nvidia PhysX acceleration on most recent Nvidia GPUs. It includes performance increases under single GPUs in Assassin's Creed and Bioshock in DX10, under 2-way SLI in Bioshock DX10, Company of Heroes: Opposing Fronts in DX10, and Enemy Territory.

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



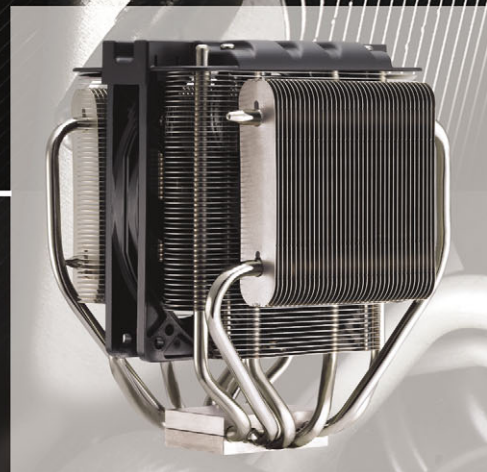


V8

V8

## Experience the Power of V8

Rev up to the latest in cooling technology. The new V8 engine is designed with enough horsepower to out perform any CPU suffering from even the most critical heat conditions. With its 4 sets of aluminum fins and 8 heat pipes, this engine is capable of cooling up to 180w of heat energy. From its stylish design to its top of the line performance, the V8 would out cool the competition. Cooler Master V8 cooler, experience the power of 8.



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

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

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

[COMPUSA](http://COMPUSA.com)  
We got it. We get it.

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

[Fry's](http://Fry's.com)

[J&R](http://J&R.com)

[MICRO CENTER](http://MICRO CENTER.com)

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

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

[Zip2.com](http://Zip2.com)



# Adobe Acrobat 9 Pro Extended

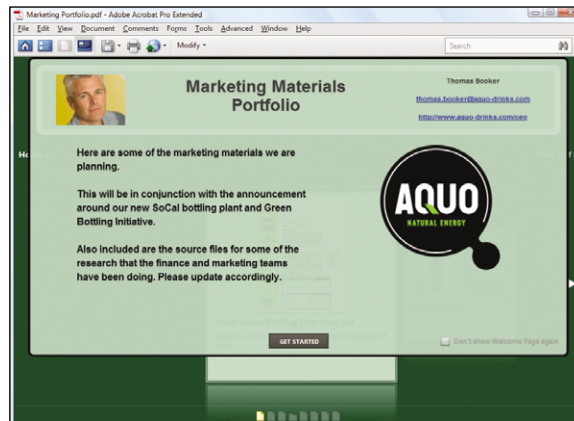
## Make Interactive, Media-Rich PDF Presentations

Adobe has brought us several programs, such as Adobe Creative Suite and Connect Pro, that help colleagues and students work together through innovative and productive means. Adobe's Acrobat 9 Pro Extended (\$699) builds off of the foundation and precedence set by these other programs to offer a new way to present information and improve communication between colleagues and clients.

Considering the new and enhanced features Acrobat 9 Pro Extended has to offer, it looks like Adobe has a real winner with this program. The goal of Acrobat 9 Pro Extended is to enable people to make more "engaging" and "interactive" PDFs, as well as develop new ways for people to cooperate on projects, whether they are just a few cubicles away or across the country from each other. Acrobat 9 Pro Extended lets you integrate media, such as Flash applications, video, and audio, into PDF documents, which can help both the presenter and recipient of information communicate on a higher level.

Acrobat 9 Pro Extended is part of the Acrobat 9 family, which includes the recently released Acrobat 9 Standard (free download) and Acrobat 9 Pro (\$449). For Acrobat 9 Pro Extended, you'll need to have an XP or Vista OS (Mac is not supported for the Pro Extended version) and at least Microsoft Office 2003. Buyers should really have Office 2007, though, because the Adobe Presenter add-in (which will be explained later) will work a lot better with Office 2007, and users can be more imaginative and creative with their work.

Also, if you (or your company) have not invested in some sort of heavy-duty design software (such as CS3, CS4, or Quark) you'll be limited in what you can create with Acrobat 9 Pro Extended. It's a very



The optional welcome page you can add to a portfolio introduces the content and the presenter.

professional way. Also, the portfolio feature in Acrobat 9 Pro Extended is one of the biggest selling points of the program.

Rather than sending an email with multiple attachments to clients or to your

pricey program that has clearly been designed to pull together masterful, media-rich creations, such as account budgets with embedded flash applications, examples of potential print ads, or a newly designed Web page for a client. You can still create attractive portfolios and projects with your standard Office files, but you won't have the type of possibilities you could have when you combine Acrobat 9 Pro Extended with design software.

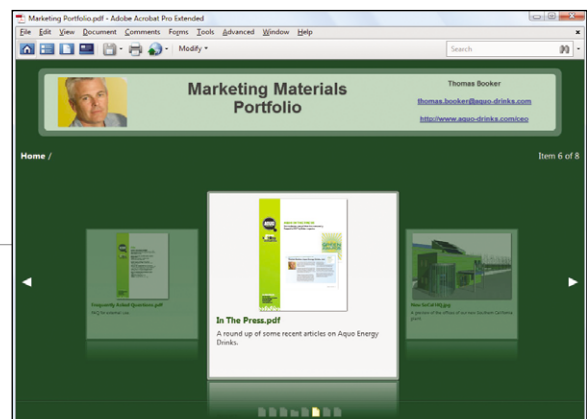
### New Ways To Present Your Work

**Portfolios.** One of the most notable new features in Acrobat 9 Pro Extended is the ability to create portfolios. Acrobat 8 Professional could bundle projects into collections of work, but the ability to create portfolios allows users to package projects in a much more

You can add a header to portfolios that reflects your personal or company brand, in addition to including it with a welcome page.

boss, you can combine all types of files, including video, audio, and interactive 3D models, into a single presentation. Portfolios in Acrobat 9 Pro Extended could also be used for personal use, however. Those looking for employment could use a portfolio to show a potential employer workmanship in areas such as advertising or graphic design.

With the portfolio feature, you have the option of including a welcome page that will appear when the portfolio file is first opened. By adding images and text, along with selecting a particular color scheme, the welcome page (along with





the entire portfolio) can be designed around your company's brand. For example, you can add a head shot of yourself or your CEO, or add your company's logo, along with contact information and a color scheme that fits your company or personal brand. Additionally, you can add main text that introduces the content of the portfolio.

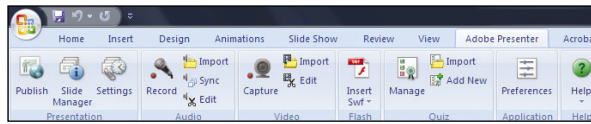
The documents included in the portfolio are all represented by a thumbnail image of the document, as well as a title and an introductory sentence or so that describes what the document is. These documents can be presented in a revolving wheel or a grid (for example) or through other means. Acrobat 9 Pro Extended offers templates you can choose from so you can present the documents you have in a way that best complements the work being presented. You can also choose to have your files laid out as a particular image, such as a logo, or an image that represents the main idea of an upcoming project.

**Adobe Presenter.** Adobe Presenter (formally known as Macromedia Breeze), an add-in to PowerPoint, is included in Acrobat 9 Pro Extended. Adobe Presenter offers an array of settings—some that are different from regular PowerPoint 2007 and some the same.

The add-in lets you create more interesting presentations by embedding Flash videos and animation into PowerPoints, along with the ability to implement interactive applications, such as a short quiz or a survey, at the end of a presentation. Adobe Presenter includes six types of surveys and questions, including multiple choice, true/false, fill in the blank, short answer, matching, or a rating scale.

With the Adobe Presenter add-in, you can capture voice recordings (which is helpful for creating a narration if you aren't actually going to be giving the presentation in person) and video right from the toolbar. These options are all useful for teachers instructing a Web-only or distance education course. It can also be used to train new employees from a remote location.

Additionally, you can choose custom themes for your presentations, which lets you implement your company's brand into the presentation. If you have a series of presentations (such as a compilation of online how-tos in regard to a product



The options in the Acrobat Presenter 7 add-in for PowerPoint can help you create much more than just another boring PowerPoint with bulleted talking points.

line, for example), you can create much more professional presentations if they all fall under your company brand and have a similar look and feel.

Once you're done creating your PowerPoint presentation, you can publish it as a Flash application, a PDF file, or as a new Adobe Presenter file. The add-in will also let you upload it to Adobe Connect Pro for an online Web conferencing presentation.

You can purchase Adobe Presenter on its own for \$500.

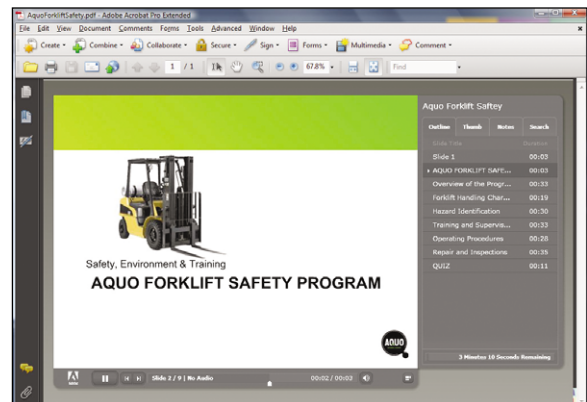
### Put Forth A Group Effort

Acrobat 9 Pro Extended has added live collaboration capabilities to PDF files so a small group of individuals can work together on a single PDF file. The ability to work on a project via Web conference had been included in Acrobat 8 Professional, but Acrobat 9 Pro Extended has expanded the collaboration features to make it easier for a small group of people to work together on a PDF project, in addition to retaining the Web conferencing abilities. Each person either needs to have an Acrobat.com ID (signup is free) to use the page synchronization and live collaboration features, or people can sign up as guests.

Page synchronization (a new feature) in live collaboration lets that same small

group of individuals view the same page of the same document in real time, with one person controlling the page view so nobody gets lost while edits are discussed either over the phone or in the included document chat application. This is not a Web conference, however, so participants will not have a conference call organized by Adobe, as they would with ConnectNow or Connect Pro Web conferencing software (which you can also use with Acrobat 9 Pro Extended). This is more like screen sharing.

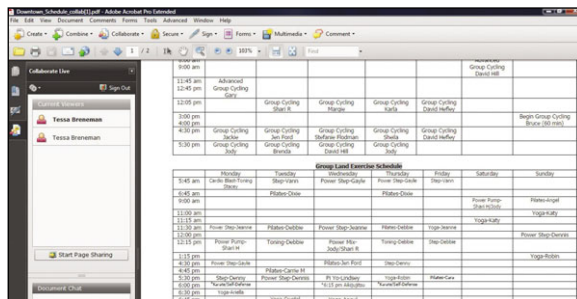
Because Acrobat 9 Pro Extended allows for group editing via Acrobat.com, the new document comparing capabilities prove to be very useful. This feature lets you compare and contrast different versions of the same document. So, after it's been in the hands of two editors (for example), those editors can compare each other's changes. This feature proves to be very valuable if you want to quickly compare budgets,



This is an example of a PowerPoint presentation after it has been published as an Adobe Presenter 7 presentation.

spreadsheets, or charts, because it will immediately identify the discrepancies between the two files.

Acrobat 9 Pro Extended makes it easy to tell which aspects of the document are different. Items are highlighted by different colors that indicate changes, such as text changes, image alterations (which is handy for charts and graphs), and places where pages were inserted or removed. You can change the color scheme to contrast with the document's color schemes—making edits more apparent.



## In Good Form

Acrobat 8 Professional introduced new ways to digitally fill out and collect forms, and Acrobat 9 Pro Extended enhanced many of the features that were already put into place. In addition to being able to send forms out and collect them via email and pool the data digitally, you can now track information, such as who has and has not responded, and it includes an option to send a reminder email to those who still need to fill out the form. Additionally, you can choose to add recipients, stop collecting data, and email all recipients.

The Response File interface includes other new functions, such as the ability to filter the data based on specific criteria, export results to a spreadsheet (such as an Excel file), archive results, add forms that weren't properly returned, or delete records.

## Other Notable Features & Enhancements

**PDF Maps.** PDF Maps got a facelift with the inception of Acrobat 9 Pro Extended, so users can more readily produce, view, and work with maps in PDF form. PDF maps keeps geospatial coordinates intact, so it's easier for users to locate positions on a map based on coordinates from more than just one system. Additionally, PDF Maps now enables users to mark and measure distances between positions on maps (in both miles and kilometers).

The enhancements made to the forms feature helps you keep track of the progress of forms and surveys, as well as the data they gather.

The page synchronization features lets up to three people review a PDF document in real time.

**Tighter Security.** Acrobat 9 Pro Extended has enhanced its redaction capabilities to provide you with the option of searching

for multiple words or phrases simultaneously, as well as numeric patterns. With this feature, you can go through and redact personal information, such as phone numbers, addresses, and Social Security numbers.

In addition to the redaction capabilities, Acrobat 9 Pro Extended has beefed up its security by adding support for 256-bit AES encryption. This prevents information from falling into the wrong hands if a document with sensitive information is being sent around for group collaboration.

## Not Something For Everybody

While Acrobat 9 Pro Extended is an impressive software program, not everyone needs it—especially at \$699. This program is going to be most helpful to professionals that often rely on creative presentations, such as interactive designers. College students could also benefit from this type of software, but the price tag would likely put it out of reach for most individuals in that category.

Acrobat 9 Pro Extended does, however, fill in the blanks left by Acrobat 8 Professional. The collaboration features, along with the presentation features, make this an attractive buy for professionals.

It's also important to note that in order to receive and interact with an Acrobat 9 Pro Extended file (including the portfolio,

# Integrating Acrobat.com

Acrobat.com provides a combination of free communication and collaboration services, allotting 5GB of storage space to each Acrobat.com user. It can act as a central spot for remote users who are working together on one or several projects together. Acrobat 9 Pro Extended has incorporated several features that mostly work in tandem with the Share and ConnectNow features.

**Adobe ConnectNow.** This is a free Web conferencing program that lets as many as three individuals to work together on an Adobe project. If you want to include more than three individuals, you will have to upgrade to Acrobat Connect Pro (prices vary). ConnectNow lets you display a presentation with Adobe Presentations 7 or collaborate on another type of project.

**Share.** You can share documents with colleagues so you won't have to send out large attachment emails with Acrobat .com' Share feature. This also makes it easier to edit and review documents with a group, because all of the edits can be made to the same document, rather than having separate documents with separate editing marks. With Share, you can restrict who can view which document, so your files are always safe.

the embedded media, and many of the collaboration features), users only need to have the free version of Acrobat, Acrobat 9 Standard. So don't worry about clients not being able to view your presentations after you spent a lot of time and money creating them. They will be able to view and interact with almost anything you can create with Acrobat 9 Pro Extended. ▲

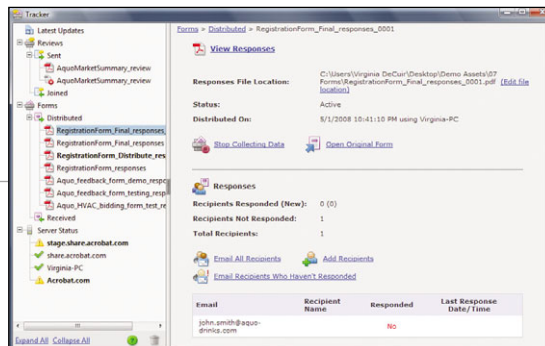
by Tessa Breneman

## Acrobat 9 Pro Extended

\$699

Adobe

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- Energy efficient; no more than 74W maximum mode.
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# Dialogue Box

by Chris Pirillo

## The Best Creative Software Doesn't Need To Be Installed

You know what it's like to get a new PC. You rush through the list of default apps, looking to see which ones are demos and which ones are absolutely worthless. It's not like you need the extra hard drive space anymore. (Certainly you don't watch it as much as you used to in the days when hard drive capacities were measured in megabytes.) Heck, maybe you opted for the option of getting a clean system with no third-party apps preinstalled? It's not like you hate software. You just hate useless software. Am I right?

You also don't want to spend hundreds (if not thousands) of dollars on products that provide very little return for you. And if you're the exception to that rule, understand that I'm referring to attaining bytes by legal means. What do you use to edit your photos? What do you use to edit your videos? What do you use to create video montages of your photos? How and where do you upload your digital photos? What other creative apps are in your array of wares? Yes, I'm actually going somewhere with this series of seemingly simple questions.

You're sitting at someone else's computer, needing to do a bit of image editing, and—gasp—Adobe Photoshop isn't there. Your first instinct is to open Microsoft Paint, and your second instinct is to lash yourself with a cat-o'-nine-tails for almost acting on that first instinct. Without further hesitation, you remember splashup ([www.splashup.com](http://www.splashup.com)) is there for you to use, without needing to register first. In a matter of seconds, you'll be sitting inside a full-fledged browser-based image editor. Layers, filters, and other tools are immediately at your disposal. No need for anything else, is there? Well, I suppose you could use picnic ([www.picnik.com](http://www.picnik.com)) if you wanted to style up your images a bit more.

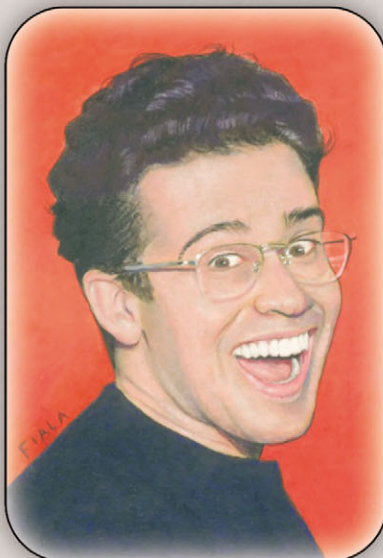
And what if you wanted to have a bit of fun with some of those photos? Say you wanted to place your friends in the middle of a crazy scene. You'd need to master a complex series of commands and scripts first, right? Not so fast. Forget about wasting time trying to impress friends with your

Photoshopping prowess. Browse over to PhotoFunia ([photo.funia.com](http://photo.funia.com)) and place faces (virtually seamlessly) inside preselected images. Select your favorite effect(s), upload a head shot, and never look back. Again, they'll wonder how you did it. If you don't want to share your secret, the least you could do is send them over to Cameroid ([www.cameroid.com](http://www.cameroid.com)) for a little live Web cam special effects fun.

Now that we've been able to edit or create images without installing anything, how are we going to share those images with everyone? Email is the easy answer, but it's not the complete answer. What about all your friends on Twitter, Facebook, Picasa Web Albums, Windows Live Spaces, Flickr, your blog, or any other site that allows you to upload digital photos? There's no way you're going to spend the time it takes to cast those photos across dozens of destinations. So, turn to Pixelpipe ([www.pixelpipe.com](http://www.pixelpipe.com)) and let them sneeze your snaps to the most popular photo networks today. Can't say that usability was the prime directive, but the service certainly works as well as you'd expect. Right now, I'm pushing my own photos out to 35 destinations simultaneously with Pixelpipe. Yeah, I'm all over the Internet.

Now your family is asking if you can work your magic and assemble a photo slideshow in video format (to upload to YouTube or burn to a DVD). Go to Animoto ([animoto.com](http://animoto.com)), sign up, upload some pictures, and select your music. In a matter of minutes, the service will crank out a professionally produced video slideshow. Sound too good to be true? Believe me; you'll never use anything else for this type of project again. Everyone will think it took you weeks to do when, in fact, the toughest part is waiting for all your images to transfer during the preproduction process.

I keep telling y'all: The best software these days doesn't have to be installed. Now maybe you'll believe me? ▲



*Chris Pirillo became a download junkie in 1992 when his binaries were unencoded and first required transfer to a local machine via zmodem before they could be executed. He began Lockergnome.com in 1996 with the express intent of sharing his finds with the world. He has subsequently funneled his passions into his personal blog at [chris.pirillo.com](http://chris.pirillo.com), where you might find recorded video experiences of live.pirillo.com or ruminations from fellow power users at [geeks.pirillo.com](http://geeks.pirillo.com). He hopes to one day find someone who will collaborate with him on the ultimate iPhone app for geeks. Until then, he remains content in hearing about your daily discoveries as possible fodder for future columns.*

You can dialogue with Chris at  
[chris@cpumag.com](mailto:chris@cpumag.com)



## The Mobile Revolution According To Android

October was memorable, not so much for the last weeks of a contentious presidential campaign nor even for the meltdown of the economy. Those events will undoubtedly prove as ephemeral as last year's "American Idol." The truly memorable event of October 2008 must surely be T-Mobile's release of the G1, the first Google Android-based mobile phone.

Sorry, I'm being a little sarcastic. Actually, a lot sarcastic. But Android really is important for the mobile OS world, which, until now, was mostly closed.

Android ([code.google.com/android](http://code.google.com/android)), based on Linux, is hardly news: Motorola, DoCoMo, NEC, PalmSource, and others are either already using or planning to incorporate Linux into their mobile OSes. Linux-based mobile OSes already have a footing in Chinese and Japanese markets, and with a 5% market share as of February 2008, expect Linux's presence in the mobile world to jump as more manufacturers adopt Android.

That Android is "a software stack for mobile devices that includes an operating system, middleware and key applications" is also exciting, but again, far from news. It's what any smartphone OS should do: connect to the Internet for Web, email, and other applications.

What makes Android so important is that it was developed as "the first complete, open, and free mobile platform." Never mind that Google retains some control over Android or that it may not be as completely open as you might expect. Android is the first OS that lets you do smartphones right.

Done right, a smartphone should be as powerful as a PC with an Internet connection. You should be able to develop applications like ZXing (Zebra Crossing), Google's barcode scanner that uses a phone's built-in camera to "scan" a barcode and check out online prices for the product. Android gives developers access to all device functions, so if you can get data from a phone's microphone, camera, or compass, you can use it in an app.

Mark Twain said, "History doesn't repeat itself, but it does rhyme." If that's the case, the mobile computing business can be clearly

heard humming along to the same tune that the networked computing business was singing 20 years ago. If each phone is a node on the global mobile Internet, the proprietary companies are dominating right now, each one maneuvering strategically to build their locked-in customer bases.

That's what Novell and Microsoft were doing when networking still meant file and printer sharing. And it's what CompuServe,

America Online, and others were doing when people started hooking up PCs to modems. The problem then was that if you used Microsoft networking software, you could only talk to other computers running Microsoft networking software. If you joined AOL, you could only get content from them.

Then along came the Internet, with its "complete, open, and free" platform for communication. When every user on every computer can interact with every other user and computer, independent of the vendor they've chosen for software or services, the entire market explodes. That's good for some, disastrous for others. It's good for consumers, who get more value from their online activities, and for vendors who sell unfettered access to the new and open online world. But it's bad for vendors who relied on proprietary products for lock-in and then fail to adapt to the new market.

How does this relate to today's mobile industry? I (almost) pity the wireless companies charging thousands per megabyte of SMS data because they may suffer once someone implements a mobile text chat client that works across mobile platforms. Wireless companies can lock up their phones so you can only use apps they approve; they can lock up their customers with early cancellation fees. But eventually they'll have to adapt or die.

And Apple might have to get to work on improving their iPhone Safari browser, not to mention offer more options for the rest of their apps, once users realize there are other choices—many other choices—on Android. ▲



*Peter Loshin publishes LinuxCookbook.com, a place to learn even more about Linux. And don't forget to check out the new Ninitata.com, Peter's family-friendly fun and learning site.*

You can get saucy with Peter at [pete@cpumag.com](mailto:pete@cpumag.com)

# The Department Of Stuff

by Rob "CmdrTaco" Malda

## deeplink.txt

Like the monster in any good zombie movie, the threats against the evil, nasty habit of deep linking just won't die. Of course, since these links are the skeleton of the whole Web, they can't die. In an Internet where you can't link something, we have serious problems.

This issue seems to resurface every year or so, and it gets me mad every time. This most recent case occurred in Sheboygan, Wis., where the city went after a blogger for linking a government agency Web site. The blogger's lawyer thinks it was retaliation for speaking out against government officials on her blog, but that doesn't make the cease and desist order any more legitimate.

Usually when I hear this song and dance, it's a content owner who's angry that some other Web site is deep-linking to some piece of valuable content, typically bypassing pesky things such as a banner ad-laden front page. How dare they! Some magazines do annoying things like not putting page numbers on ads and burying the index a dozen pages after the front cover, but they've never tried suing someone who tells you to read page 86 first.

You remember way back in the dark ages when there used to be a place called a "library" where ancient dusty tomes of knowledge were stored? Those books were indexed in giant filing cabinets with millions of little cards. A link on the Internet is exactly the same as one of those cards, photocopied and redistributed to anyone who will look.

In academia, you would call that photocopy a citation. In fact, this practice is a fundamental part of all research. Huge portions of research papers are dedicated to listing the cited resources. Include it, and you're a pro. Exclude it, and you are a plagiarizer. The line is clear.

But time and time again we see threats like this. Some businesses don't like those links because it lets the user control the way that you see their content. Of course, the TV industry hates TiVo just like the music industry hated the record a hundred years ago. But just because a legal practice

threatens your profit margin doesn't mean you can demand that they stop.

What makes me sad in this case is that the woman who was threatened took down the link. She probably didn't know any better. People are woefully uninformed on the subject. Ironically, it's particularly bad in academia: I routinely get requests from students asking for permission to link to my public Web site. I used to give

them a little speech explaining that the best part about the Internet is that everyone can link to everyone else, but it does no good. Many institutions tell their students that you need to ask permission to link something online.

Well, you don't need permission to say that page 38 of a book is good. You don't need permission to say that minute 42:12 of a movie has something really cool happen. And you certainly don't need permission to tell someone that some Web page addressed with that http:// string of random letters contains something that they might like.

It doesn't matter if the motivation of the removal request is to intimidate someone who speaks out against them, or simply to try to redirect the stream of users through a series of hoops containing countless banner ads before they get to the specific piece of content that has value. The World Wide Web is nothing but a seemingly infinite number of documents connected freely with hyperlinks.

No newspaper would attack someone for telling you that an article they read was on page 5. And no politician would get away with telling you that you weren't allowed to quote a law. It's important that we educate people to understand what their rights are so that the next generation has access to the same Internet that we do. A zombie like this never dies, so you need to make sure that everyone knows that you have to keep shooting it every once in a while so it stays down. ▲



*Rob "CmdrTaco" Malda is the creator and director of the popular News for Nerds Web site Slashdot.org. He spends his time fiddling with electronic gizmos, wandering the 'Net, watching anime, and trying to think of clever lies to put in his bio so that he seems cooler than he actually is.*

Contact me at [malda@cpumag.com](mailto:malda@cpumag.com)



## Waterproof Electronics On The Way?

What started as a way to protect accidentally washed cell phones has led to a project that could protect virtually any electronic device from the elements. The Northeast Maritime Institute in Fairhaven, Mass., is developing a new coating process that can make electronic devices waterproof. Dubbed the Golden Shellback, the process involves applying a clear film to a plastic and metal surface (among others) under a vacuum. The film is virtually undetectable yet is able to protect electronic devices from environmental hazards such as moisture, dust, and chemicals. The final product produces a coating that is inert, nonhazardous, and permanent. ▲

## Opera Mobile 9.5 Beta Hits Handhelds

The superb Web-browsing experience provided by Safari on the Apple iPhone/iPod touch may have given you a little Apple envy, even if you're otherwise pleased with your current mobile phone or PDA. If you'd like to upgrade your experience, you might want to try Opera Mobile 9.5 beta, which offers pan and zoom functionality, tabbed browsing, the ability to easily save images or entire Web pages to your phone or send to friends via MMS, and significantly faster browsing than Opera Mobile 8.65.

Developers can make use of the new Dragonfly tool in the desktop version of Opera to debug mobile sites with the Opera Mobile 9.5 debug menu. Future additions include Google Gears and support for Symbian devices. ▲



Opera Mobile 9.5 promises to significantly enhance the mobile Web browsing experience for PDAs and smartphones.

## Latest HP Tablet Packs A Punch

The latest introduction from HP is the EliteBook 2730p, a sleek convertible tablet PC with a 1.86GHz Intel Core 2 Duo ULV processor, a 12.1-inch Illumi-Lite WXGA ant glare screen, and up to 8GB of RAM. Windows Vista Business is standard, while buyers can choose between an 80GB or 120GB 5,400rpm hard drive. An optional 2MP Web cam is also available, which includes business-card-reader software designed to let users scan business cards while traveling instead of waiting to enter a large pile of information back at the office.

The 2730p has a magnesium alloy exterior chassis, and the display is protected by a layer of chemically strengthened glass, making the laptop "business rugged," according to HP, which means that it meets military standards for sand/dust, shock, vibration, humidity, and high temperatures. Additional features of the 3.74-pound machine include two USB ports, a FireWire port, Ethernet, one ExpressCard slot, and an SD card slot. Wireless networking includes Bluetooth and 802.11a/b/g/draft-n; mobile broadband is optional and is available from AT&T or Verizon Wireless. The HP 2730p convertible Tablet PC is available now, with prices starting at \$1,679. ▲

## Four Heads Are Better Than One

Mobile technology is a wonderful thing, helping to keep us entertained and productive no matter where we find ourselves. But if you have a mobile phone, an iPod, a digital camera, a GPS unit, and a portable video game console, you probably also have a drawer full of power adapters and cables, too. Gomadic aims to help you solve the problem with its new QuadCharger (\$19.95; [www.gomadic.com](http://www.gomadic.com)). It consists of a single power adapter with a split cord; each of the four connectors accepts one of the hundreds of interchangeable Gomadic power tips.

It can charge up to four devices at once, eliminating clutter and hassle, especially if you're a seasoned roadie looking to lighten the load. If you have more than four devices to charge, you can carry along a few extra power tips to make sure that all of your devices are covered. Additional TipExchange tips are \$5.95 each. ▲



## MSI R4670-2D512

\$86.99  
[www.msicomputer.com](http://www.msicomputer.com)

Better than your average budget GPU, the R4670-2D512 is a beast. With a memory clock of 2,000MHz GDDR3 and a core clock of 750MHz, this is one card that gets you more bang for your buck.

Gamers and home-theater enthusiasts alike will love the up to 2,560 x 1,600 display this

card supports, and with HDMI, Dual-link DVI, and VGA functionality, connectivity is a breeze. Enjoy watching your HD DVDs and Blu-ray Discs with unbelievable clarity.

With CrossFireX support, the R4670 can be one piece of a graphics arsenal that will have any gamer blasting through DirectX 10 games with

nary a stutter. Other powerful gaming features include Shader Model 4.0 geometry, antialiasing technology, and 32- and 64-bit floating point processing per component.

Shame your gaming competitors by torching them with an inexpensive yet powerful card; combine two or more for maximum gaming capabilities.

### SPECS:

- BUS technology: PCI Express 2.0
- Memory clock: 2,000MHz
- Memory: 512MB
- Memory interface: 128-bit
- Memory type: GDDR3
- Core clock: 750MHz
- Stream processors: 320
- RAMDAC: 400MHz

### FEATURES:

- Fully DirectX 10.1 compliant, including full speed 32-bit floating point per component operations
- Shader Model 4.0 geometry and pixel support in a unified shader architecture
- 32- and 64-bit floating point processing per component
- Support for OpenGL 2.1

- New vertex cache and vertex fetch design to increase vertex throughput from previous generations
- High-efficiency memory controller
- Full antialiasing on render surfaces up to and including 128-bit floating-point formats
- Temporal antialiasing
- HDR (high dynamic range) rendering with floating-point blending, texture

- filtering, and antialiasing support
- High-performance dynamic branching and flow control
- Supports up to 8K x 8K textures, including 128-bits per pixel textures
- 16- and 32-bit floating point components for high-dynamic range computations





## MSI R4870X2-T2D2G

\$559.99  
[www.msicomputer.com](http://www.msicomputer.com)

The R4870X2-T2D2G will, as the kids say, rock your face off. This bad boy is armed with 2GB of GDDR5 memory, a memory clock of 1,800MHz, and a core clock of 780MHz. Pair this with a twin using CrossFireX technology, and you've got a graphics processing tandem that'll blow the house down.

The card will stay cool thanks to the MSI high-efficiency fan radiator equipped with a heatpipe,

heatsink, and fans. And best of all, you'll never even know it's running.

ATI Avivo technology will mollify any home-theater enthusiast with its HD image quality, and the MSI Vivid image-enhancement technology offers home-theater junkies, hardcore gamers, and photography buffs alike the ability to easily adjust contrast, brightness, and more, all from a simple interface.

For gamers, this card packs in MSI Shader O.C. technology that enhances stream processing—quite a terror considering the R4870 sports 1,600 stream processing units. But it doesn't stop there; MSI DOT Express Technology offers beefy overclocking capabilities and cool and quiet performance.

Bottom line: This card's not backing down from any challenge.

### SPECS:

- BUS technology: PCI Express 2.0
- Memory clock: 1,800MHz
- Memory size: 2GB
- Memory interface: 512-bit
- Memory type: GDDR5
- Core clock: 780MHz
- Stream processors: 1,600
- RAMDAC: 400MHz

### FEATURES:

- MSI 3-in-1 High Efficiency Fan
- Quiet cooling
- PCI Express 2.0 support
- NVIDIA Unified architecture with Gigathread technology
- Dual-link DVI-I x2
- S-Video HDTV-out
- HDMI capability
- HDCP-capable
- Blu-ray and HD DVD
- HD video up to 1,920 x 1,080
- MSI Vivid Image Technology
- MSI Live Update
- Live Update 3
- RoHS-compliant
- 2.4 teraFLOPS of GPU power
- DirectX 10 support
- 2 x 256-bit memory interface
- 1,600 Stream processing units

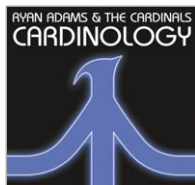
- Dynamic power management
- Unified video decoder
- Integrated DisplayPort

# At Your Leisure

The entertainment world, at least where it pertains to technology, morphs, twists, turns, and fires so fast it's hard to keep up. But that's exactly why we love it. For the lowdown on the latest and most interesting releases in PC entertainment, consoles, DVDs, CDs, and just leisure and lifestyle stuff we (for the most part) love and recommend, read on.

## Audio Video Corner

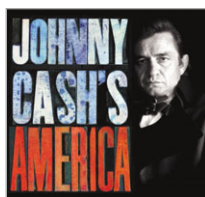
by Blaine A. Flamig



\$9.99  
Lost Highway  
[www.cardinology.com](http://www.cardinology.com)

### "Cardinology"—Ryan Adams & The Cardinals

Ryan Adams' reputation for being an ultra-prolific songwriter (during an arguably peak-and-valley career) is no secret. In 2005 alone, he completed three albums' worth of songs ranging from uncomfortably painful ballads to hard-charging, rootsy bombs of energy fueled brilliantly by The Cardinals. In other words, Adams' music has been a bit moody lately. If 2007's "Easy Tiger," which Adams reportedly recorded while sober, served as a ray of hope, then "Cardinology" is a full-blown spiritual awakening. Easy-paced, excellently played, and drowning in passion, "Cardinology" goes down like a long, engaging conversation with someone you've really missed. The closing "Stop," a chill-inducing, piano-only tale of Adams' walk toward sobriety, says it all: "There is a line that must be walked/If you want to make it stop/Then stop."



\$13.99  
Legacy Recordings  
[www.johnnycash.com](http://www.johnnycash.com)

### "Johnny Cash's America"—Johnny Cash

There's no such thing as too many Johnny Cash releases, if only because they're reminders that Cash still remains appreciated following his death in 2003. "Johnny Cash's America" goes a long way to proving just this. The CD/DVD set's real treasure is a documentary from rock-film vets Morgan Neville and Robert Gordon. The DVD explores Cash's faith, politics, justice, and other beliefs and is awash with interviews from Cash's immediate family and the likes of Bob Dylan, Al Gore, John Mellencamp, Loretta Lynn, Kris Kristofferson, and others. For collectors, there are unreleased tracks among the CD's 27 songs and never-before-seen footage from Cash's 1965 "Johnny Cash Show."



\$17.99  
Premise  
[www.expelledthemovie.com](http://www.expelledthemovie.com)

### Expelled—No Intelligence Allowed

From esteemed professor, author, lawyer, actor, and presidential speech writer (Presidents Richard Nixon and Gerald Ford) comes Ben Stein's sarcastically soaked, less-than-biased "Expelled—No Intelligence Allowed." More propaganda than documentary, "No Intelligence" explores the controversies, persecutions, and hits to America's educational and scientific communities as perceived by Stein and company due to American scientists holding dear to Darwinian principals vs. giving equal consideration to Intelligent Design theories. Directed by Nathan Frankowski and penned by Kevin Miller and Stein, "No Intelligence" is heavy-handed in favor of Intelligent Design (the film tries to make a connection between Hitler's actions and natural selection), yet convinces somewhat that America's educational system could use some revamping.



\$15.49  
New Line Home Video  
[www.journey3dmovie.com](http://www.journey3dmovie.com)

### Journey To The Center Of The Earth (2D/3D)

Two warnings concerning the 2D/3D DVD edition of "Journey To The Center Of The Earth": First, although "Journey's" 3D-enhanced action may have played well on the big screen, don't expect the same return on your investment when donning 3D glasses at home. The four pairs of glasses the package bundles are of the old red- and green-colored variety, which pretty much leaves the film a colorless, bland experience on the TV screen. Flip the DVD over and you'll find a standard 2D version (widescreen and full screen), but that leads to the second warning: Without the 3D in full force, it's debatable you'll want to sit through "Journey"—based on Jules Verne's famous novel and starring Brendan Fraser as a geologist looking for his long-lost brother—unless you're taking one for the kids. In that case, "Journey" packs enough family-oriented action involving prehistoric creatures and more to temporarily entertain.

## DVD Byte

1/6

Bangkok  
Dangerous  
Disaster Movie  
Pineapple  
Express



The Wackness

1/13

Mirrors  
Swing Vote

1/20

Chris Rock: Kill  
The Messenger  
This Is Spinal Tap  
(Blu-ray)

1/27

Vicky Cristina  
Barcelona  
Cheers: The  
Complete Series

See the full reviews from A/V Corner at [www.cpumag.com/cpujan09/AYL](http://www.cpumag.com/cpujan09/AYL)



Advanced Thinking.

750W/850W

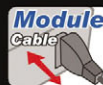
ATX 12V

**M12D**  
MODULAR GAMING SERIES

11. 2008 INITIATE.

The redesigned ultimate modular gaming power supply  
Seasonic M12D features with DC power conversion  
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# BROTHERS ★ IN ARMS ★ HELL'S HIGHWAY™

\$49.99 (PC-DVD); \$59.99 (360; PS3)

ESRB: (M)ature • Ubisoft

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

**CPU**  
Game Of The Month

## Gearbox Brings Gravitas To Operation Market Garden —by Dr. Malaprop

We've been big fans of the Brothers In Arms games since they debuted in 2005. We lavished plenty of praise on Brothers In Arms: Road to Hill 30 when we reviewed it in *CPU*. The sequel, Brothers In Arms: Earned In Blood continues closely on the heels of the original and features evolutionary improvements to the original, strong AI, and less-claustrophobic levels.

The ambiance and narrative of the third game in the series, Brothers In Arms: Hell's Highway, feels heavily moored by the likes of "Saving Private Ryan" and the HBO miniseries "Band Of Brothers." The storyline is respectful of the subject matter and does its best to be emotionally hard-hitting. It doesn't succeed all the time, but enough to be commendable. Hell's Highway returns to Staff Sergeant Matt Baker during Operation Market Garden. The game smartly begins with a montage to summarize the narrative of the first two games. Unfortunately, more than two years have passed since we played the last BIA title, so our take on the cryptic story highlights left us scratching our heads. For players new to the series, the narrative may be akin to jumping into the middle of "Band Of Brothers" with little to no context about the plot. Fortunately, you can come back to view the opening montage after completing the game, and it'll make better sense. Or purchase the two original titles and play through them in sequence for the most effective narrative punch. Hell's Highway would have benefited greatly from a voiceover narrative stepping through the key plot points of the previous two games to convey to players a narrative (through some lengthy cut scenes) the developers are so clearly passionate about.

The modified Unreal Engine 3 looks excellent, and occasional delays in the texture loading didn't detract from the experience. Level designs impressively portray the atmosphere of a much larger battlefield, which enhances your own squad-based efforts. You play in a first-person view until encountering enemies. Then it's time to take cover or "Dig In." Once you take cover, the camera smartly switches to a third-person perspective to let you better assess the terrain and make tactical decisions to keep you and your team alive.

You'll often have multiple squads under your command (for example, a bazooka team and an MG team). Enemies will feature red circles over their heads. The red circle indicates the enemy is waiting to separate your brain from your head. Thus, you point your squads to



good cover so they can lay down suppressing fire. As enemies are suppressed, the circles overhead turn to gray—allowing you or squads under your command to flank and neutralize them. Take out an enemy with a great explosion or sniper shot and you'll be treated to a cinematic Action Camera view of the carnage. These strategic gameplay elements are essentially battlefield action puzzles and are the game's strong point. We loved how the AI was not wholly dependent on us to take out the enemies and how the cover was destructible. On occasion, you will need to go it alone. Though tense, the solo on-foot missions have been done better in other shooters. Piloting tanks starts out exciting but becomes repetitive. We happily played through the Xbox 360 and PC versions to unlock the Authentic mode where the HUD disappears and gameplay becomes far less accommodating.

Hell's Highway is a poignant and moving epic that left us hungering for more. And if the game's finale is to be believed, it's not over yet. We'll be ready. ▲





\$49.99 (360/PS3/Wii); \$29.99 (PC/PS2)

ESRB: (T)een

Warner Bros. Interactive Entertainment

<http://legobatmangame.com>

## More Gently Into The Night —by Dr. Malaprop

What happens when a slew of villains escape from Arkham Asylum? Well, it's up to classic Batman and Robin to rein them in and put them back where they belong. That's the gist of this original Batman game, without any link to the recent and too-dark-for-the-youngsters "Dark Knight" movie. There are six acts in the game. The first half has you controlling Batman and Robin while the second half puts you in the shoes of the villains. You'll accumulate money to unlock additional heroes in the Free Mode, which will give patient gamers (or 5-year-olds) ample reason to play through again.

Playing all of Telltale Games' prior Lego titles, starting with Lego Star Wars through the recent Lego Indiana Jones, showcases some obvious misses in Lego Batman. The charms of the aforementioned Lego games played on the related film licenses and cute cut scenes that carried the stories. That charm is lost in Lego Batman, because the original narrative is immediately forgettable. Furthermore, as was missing in Lego Indiana Jones, there's no online co-op here—bizarre because the co-op AI is virtually brain dead. This is a family-friendly title for the young ones but best left as a rental for the rest of us. ▲



# ROCKBAND 2

\$59.99 Game Only (360/PS3); \$49.99 (Wii)

ESRB: (T)een • Electronic Arts

[www.rockband2.com](http://www.rockband2.com)

## Next Verse, Similar To The First —by Dr. Malaprop

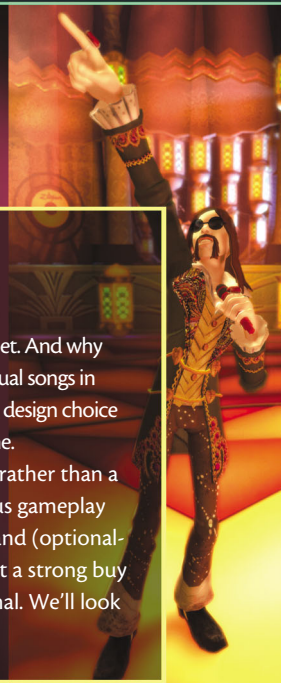
Rock Band 2 is an evolutionary upgrade to the original. You now get 84 new songs (original master recordings, not covers!) along with a coupon to download 20 additional songs that should be available as you read this. Furthermore, you can pay a \$5 licensing fee to import nearly all your previous Rock Band songs into RB2. How's that for listening to the customer? Veterans will recognize the World Tour, Battle Of The Bands, and Tour

Challenges modes. World Tour has undergone ample revision for the better with new online support and the ability to play without the same real-world members in the room.

We liked the improved look and feel of the new wireless guitar. It's less toy-like with its faux wood finish and features a sensor to automatically calibrate the guitar to your HDTV; the strum bar also feels better than v1. The updated drum kit is sturdier, quieter, and wireless, but it still has

a tendency to slide across the carpet. And why force players to unlock the individual songs in the solo mode? This is an irritating design choice for such a consummate party game.

RB2 feels like a v1.5 upgrade rather than a full-on sequel, but the numerous gameplay enhancements, superb set list, and (optionally) updated instruments make it a strong buy for anyone that loved the original. We'll look for you on the road. ▲



# STAR WARS THE FORCE UNLEASHED

## Born To Be Bad —by Dr. Malaprop

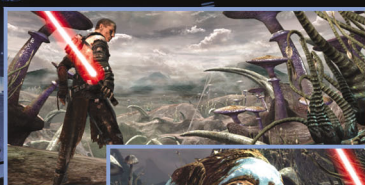
The newest Star Wars game begins with Darth Vader. You step into his boots and lay waste to Wookies as you go about your business. It's Vader at his most intimidating, with power to spare—and it feels great. At the end of the mission, Vader finds what he's seeking: a young boy that's strong with the Force. The story fast-forwards to Vader's new dark apprentice as a young adult, now tasked with doing his master's bidding.

A highly compelling storyline, one that's more intriguing and better acted than Episodes I to III, is the game's strong suit. It's an excellent transition to "Star Wars Episode IV: A New Hope." Unfortunately, gameplay is a mixed bag. At times, you'll revel in the thrill of manipulating your Force powers to pick up enemies, spread energy bolts, throw your lightsaber, and more. At other times, you'll be frustrated with the in-game camera and design decisions that leave you watching the same unskippable cut scene every time you die in battle with a Force-impervious foe. The game looks superb on the Xbox 360 and features great physics effects. It's worth a rental but hard to recommend for long-term play. ▲

\$59.99 (360/PS3); \$49.99 (Wii); \$39.99 (PS2)

ESRB: (T)een • LucasArts

[www.lucasarts.com/games/theforceunleashed](http://www.lucasarts.com/games/theforceunleashed)





# CRYSIS WARHEAD

## Time To Go Psycho

—by Dr. Malaprop

\$29.99 (PC) • ESRB: (M)ature

Electronic Arts

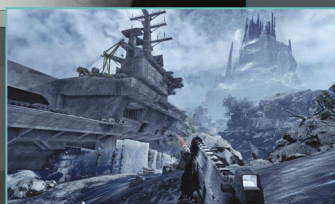
<http://crisiswarhead.ea.com>



It's abundantly clear that developer Crytek listened to all the feedback from the original Crysis and rolled those comments into Warhead. The game's pacing has the intended effect—an intense gameplay experience from start to finish. Warhead is not billed as an expansion pack or sequel. Rather, it's a new standalone game that chronicles the adventures of Sergeant Sykes after you separate in the original Crysis. Turns out Psycho is on another part of the Crysis island with plenty going on to keep him occupied with both the North Koreans and the alien factor.

There's not much new in the way of weapons, but the game engine has been fine-tuned so it looks better without taking a performance hit. Even the original Crysis looks better than pretty much any PC FPS on the market today. Those with less cutting-edge hardware will appreciate that Crysis: Warhead's gameplay is enough to keep any trigger-happy FPS player satisfied.

Most gamers will complete the game in well under seven hours. The short time to the end-game could be construed as a negative, but the low price of entry doesn't make it feel that way. Crysis: Warhead is the game you'll want to own if you want to show off or tax your uber-rig. ▲



# SILENT HILL HOMECOMING

\$59.99 (X360, PS3) • ESRB: (M)ature

Konami • [www.konami.com](http://www.konami.com)

## A Decade Of Scares & Blunt Trauma —by Dr. Malaprop

Hard to believe it's been nearly 10 years since the first time we guided a character through the foggy, nightmare-infested streets of Silent Hill, isn't it? In Silent Hill Homecoming (which began life as Silent Hill 5), you play as Alex Shepherd, a young man who returns home following a medical discharge from the military only to find his kid brother missing and his hometown in pretty bad shape.

Alex's hometown, incidentally, is not Silent Hill, but rather a similarly sleepy little town called Shepherd's Glen, but don't let that throw you off; this game is pure Silent Hill. Konami gave SHH a couple of huge improvements: The graphics (we reviewed the Xbox 360 version) are the best yet by far, and in-game combat is a huge

improvement over the clumsy, staid flailing about that has passed for combat in previous installments.

Despite these changes and one or two others, the game retains the sense of lurking horror punctuated occasionally by all-out fright that has marked Silent Hill games from the beginning. (Thank you Konami for taking away control of the Otherworld shifts that players had in the PSP/PS2 game Silent Hill Origins!) In short, if you like a good scare, Silent Hill can still do it like few games before or since; we recommend it for longtime fans and neophytes alike. ▲



# WORLD WARCRAFT WRATH OF THE LICH KING

## CPU's Beta Preview —by Michael Sweet

It's been nearly two years since Blizzard released its last WoW expansion, The Burning Crusade, and the game's millions of players are ready for some new scenery. That new scenery will come in the form of Northrend, a new collection of zones introduced in Wrath of the Lich King. Northrend, as the name suggests, is a cold, wintry world, a far cry from Burning Crusade's mostly demon-infested, decaying lands of fire and foreboding. The new continent may be chilly, but players will be quick to warm to its zones; they look simply gorgeous, and it's clear that Blizzard spent

\$39.99 (PC) • ESRB (T)een

Blizzard Entertainment • [www.worldofwarcraft.com](http://www.worldofwarcraft.com)

a good deal of time polishing the look of every nook and cranny of this expansion.

Naturally, new zones mean a lot of new adventures (as well as many changes in game mechanics) for WoW players. The quests and dungeons in the early lower level zones of Northrend seem to cater to players who don't want to be chained to the game for hours on end. It looks as though leveling in Wrath will be a bit more forgiving for casual players than in previous WoW worlds.

Wrath of the Lich King also introduces the new Death Knight character class. We're happy to report that the Death Knight is well-designed and a blast to play. It's a pretty safe bet that when Wrath is released, Azeroth is going to be crawling with 'em.

By next issue, we will already have surrendered a number of days to the full retail version of WotLK; check back for a full review. ▲





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## Thanks For The Memory

“We’re Windows. We grow more beautiful and infinitely slower with the passing of each new release,” I said. A friend of mine answered by suggesting I upgrade my main computer to Vista. “And making my apps crawl worse is going to speed them up how, again?”

“Buy more memory,” came the stock answer. “It’s cheap.” Sure it is, but throwing more RAM at something to make it usable is gluttony, not memory management.

For the cutting edge in memory management, we need to look back to the latter DOS and early Windows days, roughly from the mid-1980s to the mid-1990s. During that time, the 640KB RAM ceiling was finally cracked open, initially thanks to a coding error in the 80286 chip that allowed what was called the HMA (High Memory Area), the first 64KB of extended memory, to be accessed directly without hardware-based memory protection. Memory managers were able to move portions of DOS from the area between 640KB and 1MB to above the 1MB limit. That left users with more than 640KB RAM—anywhere up to an additional 70KB, depending upon computer configuration. This doesn’t seem like much today, when you can order 4GB of RAM with the ease of a Wall Street banker ordering a federal bailout, but back then it had a dramatic effect on new feature-rich programs. Then along came the 80386, with full extended memory access above 1MB via the expanded memory page frame. The sky was officially the limit.

While Windows memory management tools allow users to allocate more memory to either the platform or applications, those original memory managers, such as Quarterdeck’s QEMM, Helix’s Netroom, and Qualitas’ 386MAX, were more ambitious in scope and operation. They could, for example, provide more RAM on the fly to device drivers and TSRs that required a lot to initialize. Once the necessary files were loaded and required less memory, that RAM was automatically freed up for use elsewhere. These utilities flagged shared resources, optimized loading order, defragmented memory as required, cached data for speed improvements, and moved portions of DOS into the HMA, as noted above. They

were also capable of swapping multiple programs out of the same memory area, or inversely, protecting one program’s memory region from other memory-hungry ones. Even under Windows XP and Vista, this kind of invasive behavior still causes an occasional BSOD.

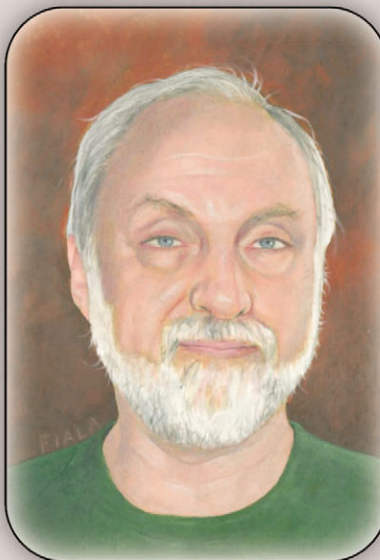
These programs were smoothly automated. They scanned your system and offered choices as though they were high-school dates, from perfectly safe to sleeker but slightly dangerous. Inevitably, the latter fea-

tured the best memory gains, but even the safe options offered considerable improvement over stock settings. You could also do your own memory management configuration after receiving these suggestions, either in minor or extremely detailed ways.

A wise man once said, “Never try to swallow anything larger than your head,” but with memory managers, your PC could run programs larger than your old conventional RAM could handle. There was a bonus, too. Users of the multitasking environment DESQview (or, more accurately, pseudo-multitasking, because it quickly switched out programs rather than running them simultaneously) had a lot more base RAM from which to launch additional apps with reasonable speed, including Windows 3.0. The GUI was notoriously unstable at the time, so running it under DESQview instead of DOS-based programs under Windows made sense.

Ultimately Microsoft’s decision to add primitive memory management into its flagship product led to the decline and eventual death of this genre of third-party software. While a new group of memory managers have appeared on the scene since, they’re but a shadow of their ancestors, focusing chiefly on data caching and memory defragmentation.

Don’t get me wrong, I’m not pining for a return to DOS and text-based programs. The GUI is a real boon, and true multitasking is joy unbounded. Every time somebody suggests throwing RAM at Windows to solve all its problems, however, I can’t help reflecting on a time when a feast of memory was barely more than a dream, and we rejoiced in the crumbs we stole from the dinner plate of DOS. ▲



*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.*



# Software

## Tips & Projects

### Quick & Easy Surrealism

One of the coolest aspects of digital imaging programs is their combination of image editing with a full range of paint tools. In imaginative hands, hi-res reality and total creative freedom can produce striking surrealistic effects. In Photoshop CS3 (CS4 will be out as you read this), the techniques for radical image manipulation can get quite complex as layers pile onto layers to create unusual effects. This month we give you several quick ways to get a trippy look in just a few minutes. Although we used PS CS3 for these tutorials, similar tools and operations are available in Paint Shop Pro and Photoshop Elements.

#### Hazy Hi-Def

One fashionable new effect in film and still photography is a hazy, gauze-like sheen on an image that still gives the impression of underlying detail. It looks hi-def but soft-edged at the same time. There is a very quick and simple way to create this effect. Pull a photo of your choice into the main screen. In the Layers menu, right-click the main layer and make a duplicate layer. Highlight the Background Copy layer and use the drop-down menu to activate the Multiply setting. You will see your image darken considerably. Now, use the Layer menu to access New

Adjustment Layer/Levels. You can give the Layer a name in the pop-up confirmation window and then click OK. In the Levels dialog box that pops up next, you will need to play with the white and gray triangles to lighten your image. Relying solely on the white adjustment can make your image harsh and contrasty, which might be the desired effect. Lightening by moving the gray slider to the left will tend to lighten up the mid-tones without washing out

highlights. When the image is where you want it, click OK.

Highlight your Background Copy layer again, and on the Filter menu choose Blur/Gaussian Blur. The pop-up menu lets you add a blur filter to this one layer, but it also blends that layer with the underlying original sharp layer of the image. It is the combination of the detail in the original layer with the blurring in the filtered layer that produces that hazy but hi-res effect. Use the slider at the bottom of the Gaussian Blur window that pops up to get just the right amount of haze. A setting of 30 worked well in our test, but this is where you can play with some settings. Make sure the Preview box is checked so you can see these adjustments on the fly in your main window.

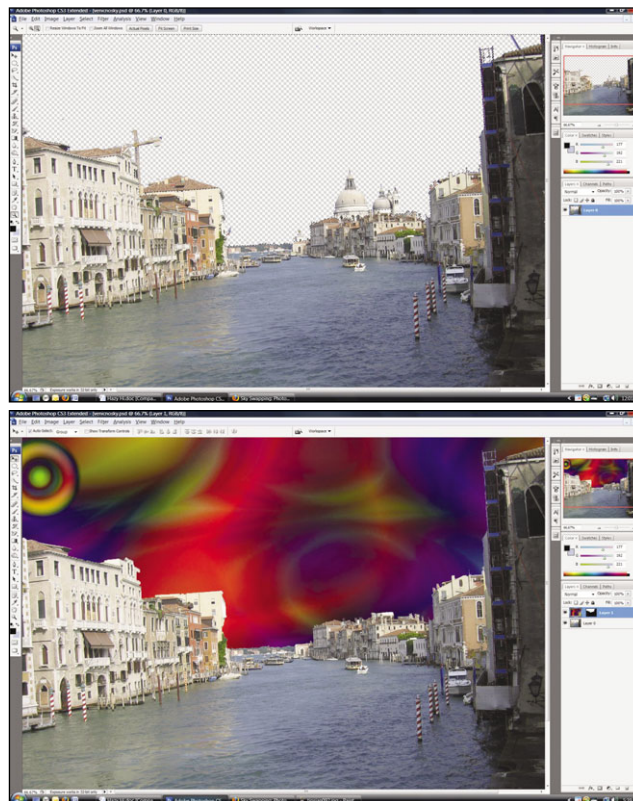
Once you have these settings to your liking, you can add other effects layers such as Black And White to go monochrome or Hue/Saturation to increase the color intensity for the colors. If you really want to get that other-worldly effect on landscapes, try the Channel

Mixer layer and play with the various primary colors. (Thanks to the 2-Minute Photoshop Tricks Wiki for that tip: [tricks.onigo.net/wiki/index.php](http://tricks.onigo.net/wiki/index.php).)

#### Psychedelic Skies

You can make landscapes that are truly trippy by combining two Photoshop tricks, image masking and gradients, to create psychedelic skyscapes. As Photoshop Pros well know, there are many ways to replace skies using multiple layers and matting techniques. For this tip, we want to use the quickest method.

Choose a landscape photo with a sky that you want to replace with a color-drenched psychedelic alternative. The image should have a fair expanse of sky that is well-delineated from the land. Press ALT-CTRL-I to bring up that image's dimensions in pixels. Create a new blank canvas and



By using simple Photoshop tools, you can replace a Venice sky with a psychedelic cosmos.

bring up CTRL-ALT-I again and make the new canvas match the dimensions of your landscape photo.

Start by making the surreal sky. In the new and blank canvas, click the Gradients tool. In the Gradients toolbar, use the drop-down menu to choose a color scheme for the design. Multiple colors such as yellow, violet, orange, and blue work very well. Make sure the Linear Gradient setting is activated and use the next drop-down to select the Difference mode. Now drag the gradient tool across the canvas from one end to the other either on the diagonal or across or up and down. Do it again from a different direction. As you do more of this, the design will fill with wavy multi-colored hues. You can introduce short stretches of gradient in the middle of the image, but that will add a less fluid set of gradient bars. If you want to introduce a psychedelic sun, then click the Radial Gradient setting in the toolbar and drag the gradient cursor near an upper corner to get an orb-like gradient. To make fine adjustments, call up the Hue/Saturation window with CTRL-U and monkey with these sliders. Save this finished sky image as its own file.

Now we need to prepare your original landscape shot. Click the Eraser tool to bring up the Magic Wand. Click the sky in your photo, and you will see much of it deleted. If the sky has a fairly even tone, the Magic Wand may erase much of it in a single click, but you will have patches of blue sky that remain and

pieces of sky peeking around and through objects that you may need to erase with subsequent clicks. Use the Zoom tool to get in close to these areas and apply the Magic Wand to eliminate them. In larger expanses of sky, you can also switch to the standard Eraser tool to delete larger swathes. Once you are satisfied you have deleted all the sky in the image, switch to the Quick Selection tool. Drag the selection tool across the deleted sky area to select all of it. Again, you probably won't pick up all the areas at the first try. Click the Add To Selection button and start selecting all of those nooks and crannies that remain. If you overdo it, toggle over to the Subtract From Selection button to remove areas.

With all of the deleted sky area selected, go back to our surreal sky image and use the Select menu to click All. Use the Edit menu to click Copy. With the psychedelic sky now in the clipboard, go back to your landscape. Use the Edit menu to activate the Paste Into command. This will paste the psychedelic sky into all of the empty sky areas you selected here. You can also use the Move tool to shift the sky up or down to get just the right horizon line.

### Paisley Dreams

For a very '60s mod look, Tutorials-Photoshop.com inspired us with one of its tips to play with simple colored bars. Create a new blank canvas. Click Levels/New to make and activate a new level. Use the Rectangular Marquee tool to draw vertical bars of varying width down the width of the canvas. Fill each

one using the Paint Bucket with a solid bar of the colors of your choosing. Because we will be experimenting with different filters on this set of bars, save the original set as a new file that we can recall in this pristine state.

You can do a lot with these simple bars and the Filter/Distort menu. We tried Twirl and Spherize to create more rigid but symmetrical designs. A recommended starting point for the more chaotic Wave filter are the following settings: Number of Generators: 5; Wavelength: 34-155; Amplitude: 6/155; Scale: 25%/26%. The bars will start bending into one another to create paisley-like effects. If you use the CTRL-F key combination, the effect will continue to morph until you get just the right design.

Now create a duplicate layer of this distorted set of bars. With the new layer active, try to experiment with other effects such as Emboss or Solarize. If you contain these experiments to the duplicate layer, then you can always back out of them by deleting the copy layer and starting fresh with the original Wave distortion. ▲

by Steve Smith

### Windows Tip Of The Month

Do you have Windows Explorer folders in Vista that show Excel files as thumbnails or an image library as a set of bland file names? Your OS may not be identifying the folder type properly to apply the right template as documents, music, pictures, or video. A folder type tells Vista how best to display the files and which operations to associate with them. In the errant folder, simply right-click the folder and choose Properties. Go to the Customize tab and use the topmost drop-down menu to change the template to the one you like.

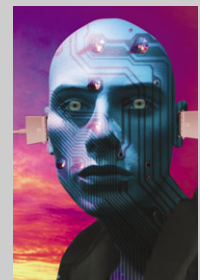
### Registry Tip Of The Month

Windows Vista likes to be helpful . . . sometimes too helpful. Those pesky tips that pop up when you mouse over certain Windows tools can be distracting and too rudimentary for old pros. To suppress them, go to the Registry key HKEY\_CURRENT\_USER\Software\Microsoft\Windows\CurrentVersion\Explorer\Advanced and look for the Value Name ShowInfoTip. Change the Value Data from 0 to 1.

## Infinite Loop

### Meet Jules, The Robot Who Smiles Back

Researchers at the University of Bristol in the UK have developed a robot who can mimic a person's facial expressions with amazing detail. The robot uses software to scan a person's expression, then the software controls the more than 30 servos in Jules face to copy the expression. It's a little creepy but pretty impressive.





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# Warm Up To Penguins

## Managing Disks With Linux, Part I

**Y**ou've been using Linux for a while and you're starting to run out of disk space for your data. You add a second hard drive to your system, but when you boot up, Linux doesn't recognize it. Is something wrong, or is this how Linux works? How can you get your system to see the new drive? These are simple questions, but because of the many different Linux flavors, the answers aren't so simple.

In this article, we won't be discussing external USB drives and flash drives. When you connect these drives to your Linux system, they "just work." We want to cover internal hard drives, which offer you the most flexibility in terms of management options.

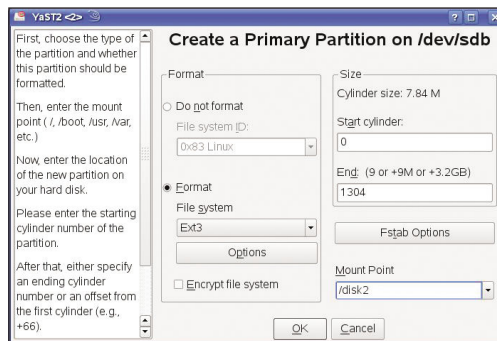
### A Disk Management Primer

Before we cover the different ways Linux lets you manage your disks, let's cover some important information first. Windows uses drive letters to identify partitions and store data, but Linux doesn't. Everything in Linux hangs off the top-level "/" directory. Disks and their partitions are mounted to a particular directory known as a mount point.

It's also worthwhile to have at least a cursory understanding of filesystems. Every OS supports at least one filesystem, and

Linux is no different. You probably know that Windows XP/Vista use Microsoft's NTFS filesystem. Mac OS X uses HFS+ (Hierarchical File System Plus), but Macs can also handle the older HFS.

Similarly, Linux distributions will generally format disks using the ext3 (third extended) filesystem. But it can understand earlier Linux filesystems, such as ext2, JFS (journaling filesystem), XFS,



openSUSE's Partitioner program lets you easily create and mount a new disk on one page.

and ReiserFS. And, best of all, most Linux distributions can also access Windows and Mac filesystems, as well.

As you might've guessed from the name, ext3 is derived from ext2. With the exception of ext3 adding journaling, it's identical to ext2. With ext3, every activity is written

to a log. This is important and helpful because it's much faster to check and repair an ext3 filesystem in the event of a system crash. Linux simply reviews the log to check where the data might've gone bad.

### Gentlemen, Start Your Partitioners!

With the preliminaries out of the way, let's get back to adding disks to a system. When you connect a new drive to your system, you need to partition it, just like you would for Windows. Some Linux distros include an in-house partitioning program, while others rely on widely available third-party programs. In-house programs tend to be a bit more powerful than those that rely on third-party stuff, but the open-source alternatives aren't shabby by any means. That said, Linux distros that rely on third-party programs make doing some really advanced stuff more difficult.

Mandriva and openSUSE are two Linux variants that rely on their own partitioning. To access these programs, you need to use the distribution's disk-management tools. For Mandriva, click Menu, Tools, System Tools, and Configure Your Computer. Then select Local Disks and choose Manage Disk Partitions.

When you click a tab for a particular disk, you'll see its partition layout and how each partition is formatted. Locate the hard drive you added, which will appear as a new unused disk, and click the white space underneath the tab. A Create button will appear to the right; when you click it, you can specify the size, the ext3 filesystem, and the mount point for the new partition. Click OK, and then you can click Format and Mount to finish the process.

As with Mandriva, openSUSE has its own partitioning program, Expert Partitioner, which you can find in the YaST Control Center as Partitioner. Once you're in YaST, click on System category on the left and then Expert Partitioner, which is on the right. You'll be given a warning that using Expert Partitioner can be dangerous, but since



you're familiar with partitioning (after all, you're reading this, right?) click Yes. You'll be presented with a list of all of your disks, the partitions on those disks, and the filesystem for each partition.

Look over the list of disks, and then click the Create button at the bottom. Select your new disk from the list and click OK. You'll be prompted for the partition type, either Primary Partition or Extended Partition. Unless you're doing something exotic, choose Primary Partition, and click OK. Now, choose the size, the ext3 filesystem, and specify the mount point for the new partition. Click OK, and once you're back in Partitioner, click OK to commit the changes. Click Finish to format and mount the new disk and return to YaST.

### Third-Party Software

As noted earlier, not all Linux distributions include their own partitioning program. Some of the most popular, such as Fedora Core and Ubuntu, rely on third-party, open-source partitioning programs to do the work. One of the most popular apps, which both Fedora Core and Ubuntu use, is GParted, but this will only solve half the problem. Although GParted will let you partition your disks, you also need your system to mount your new partitions. For the second half of the equation, you'll want to either load PySDM (for Ubuntu) or fwfstab FSTab Editor (for Fedora Core).

By default, none of these programs are included with Fedora Core or Ubuntu, so you'll have to add it to your installation. To add them to Fedora Core, click System, Administration, Add/Remove Software. In Ubuntu, click System, Administration, Synaptic Package Manager. Once you've added gparted and PySDM to Ubuntu, you can find both under System>Administration as Partition Editor and Storage Device Manager. In Fedora Core, Applications>System Tools will have GParted and fwfstab.

GParted provides an easy-to-use UI for partitioning your disks. The upper-right

drop-down menu lets you choose the disk you want to use, while the main display shows its partition information. Locate your new disk, highlight the unallocated space at the top, and click Partition and New. You'll be asked to specify a disk label, and, for the most part, you can just click Create to do so. GParted will ask you to confirm the choice, so click Create again.

Now reselect the unallocated space, and then click Partition and New again. Now, you'll be able to specify the size of the partition, the ext3 filesystem, and mount point for the new partition. Once you're happy with the selection, click the Add button. Click the Apply button to apply the changes, and you'll be asked to confirm. Click Apply again, and GParted will create and format the partition.

Exit GParted; you should have a newly formatted partition, but where is it? That's where PySDM and fwfstab come in. When Linux boots, it gets the list of what disks and partitions to mount, and where they are, by looking at the `/etc/fstab` file. PySDM and fwfstab give you a convenient GUI to modify this file.

To access PySDM, run the Storage Device Manager program. It lists your disks and partitions connected to your system on the left. Select your newly created partition and type a name that identifies it. Type in directory (it doesn't have to exist) as its mount point and click Apply. You can also mount or unmount the partition here, using the respective commands.

PySDM gives a friendly interface to managing mount points; fwfstab is a bit more basic. It lists the stuff in your `/etc/fstab` file and lets you add, delete, or edit the file on a line-by-line basis. You

can mount and unmount specific entries, as well, from within fwfstab. To add your new partition, click the New Entry button on the left, and a new dialog box should show up. Specify the partition you created, the filesystem, and an exiting directory for your mount point, and then click OK. Once you're back to the initial fwfstab screen, highlight your new entry and click Mount to access your new disk.

You should now have a pretty good feel for adding new disks to your system with Linux. And if you're wondering why we think Mandriva's and openSUSE's tools are better than GParted for advanced tasks, stay tuned for part two next month. ▲

by John Jung

## Infinite Loop

### Now That's A Mobile Home!

Should a global apocalypse ever wipe out the world's infrastructure, the Walking House has your domicile needs covered. According to the creator, the Walking House is "a modular dwelling system that enables a person to live a peaceful nomadic life." The idea behind the project is to create collectives of Walking Houses that traipse across the land as a mobile community. The odd-looking unit gathers rain water for drinking and can be outfitted with a wood-burning stove for those cold nuclear winters. Sure, it lumbers along at a snail's pace, but who needs speed when you can traverse the countryside in a living unit that looks like a giant beetle?

Source: gizmodo.com/5066484/walking-house-is-lunar-module-tie-fighter-and-cockroach-crossbreed



# Shavings From The Rumour Mill

by Mike Magee

## Goodbye Panasonic, Goodbye To Sony Vista

Since my last column, the price of memory has plummeted again, but I can't get hold of more than 512MB of memory for my beloved Panasonic CF-32W for love nor money. This Japanese machine is not widely available in Europe, and getting the appropriate SO-DIMMs proved practically impossible. Now that I'm working on a graphics-rich news site like ITExaminer.com, that amount of memory is not nearly enough to keep body and soul and graphics and multimedia and video applications together.

So I splashed out instead on a high-end Sony VAIO, a machine that comes with 4GB of memory and a 320GB hard drive. This is the not-so-catchily named VGN-Z11VN/B, which, in addition to having a Blu-ray drive, also comes with a nice graphics chipset, courtesy of Nvidia; a fingerprint sensor (no thanks); seven logos just below the keyboard; and something called Vista Home Premium. Shame that Windows limits the amount of usable memory to 3GB, but even 3GB is a vast improvement over 512MB.

Several conundrums to ponder here, and believe you me, I pondered them deeply. The machine, when I switched it on, looked very bright and shiny with Vista. The thing looked beautiful to behold, the battery life looked terrible, and I worried and wondered whether all of my software would work with Ms. Vista. So it only took a second for me to decide that I would, in Sony's words, "downgrade" to Microsoft Windows XP.

No discs with Mr. Laptop, so I followed the instructions Sony gave meticulously and created the two recovery discs intended to restore the machine to its factory state, and I carefully set these aside just in case I needed to change my mind later on. We'll revisit the downgrade process presently.

I looked at the logos attached to the keyboard of my machine, and they really marred the look of my machine—they are plumb ugly things proclaiming how great Nvidia is, how wonderful Vista is, how great some BIOS is that I never heard about—and left it looking nothing like the one on the Web.

Sony shouts loud and long about the excellence of its support, so I decided to use

it to ask the safest way to remove the plastic logos. From past experience, these things gradually wear away and turn into ugly lumps on your keyboard.

A day or two passed, and finally Sony replied, recommending that I not remove these stickers, which essentially are a way it gets additional discounts from suppliers such as Intel, Nvidia, and Microsoft. Of course, this is advice that I ignored. If you find

yourself in a similar situation, you really shouldn't use any kind of solvent to remove them, as there's a much simpler way. Use your fingernails to get the logos off, then rub your fingers over the gum repeatedly until you can simply scrape the remnants away.

I hadn't gotten round to installing my legacy software, so I thought I'd have another look at Vista. I've been rather hard on it in the past. Oops. The recovery discs didn't work. I haven't figured out how to get the original discs from Sony yet, but in any case I went ahead and installed the software I needed. It works. Microsoft provides a pretty useful page on its Web site that tells you about a heap of compatible and non-compatible apps.

The "downgrade" was pretty straightforward, but when I installed Windows XP, it was without drivers for most of the stuff built into the machine. Thankfully, Ethernet drivers were installed, so I legged it over to the Sony VAIO support site and grabbed the drivers I needed. Not exactly laborious, but a little fiddly, and it took about 20 minutes to get everything I needed working. I even somehow installed the drivers for the fingerprint reader—er, no thanks.

I've mostly praised this Sony machine to the heavens, but you're probably wondering if I am going to ditch my desktop. The answer remains a resounding no. However nice this little machine is, the keyboard and the display still can't match the ones attached to my desktop, and that's often worth even more than the VAIO's much speedier performance. ▲



*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. He has contacts from top to bottom in the business, spanning the entire chain, who help him root out interesting rumours and speculation.*

Send rumours to "Mad Mike" Magee at [mike@cpumag.com](mailto:mike@cpumag.com)





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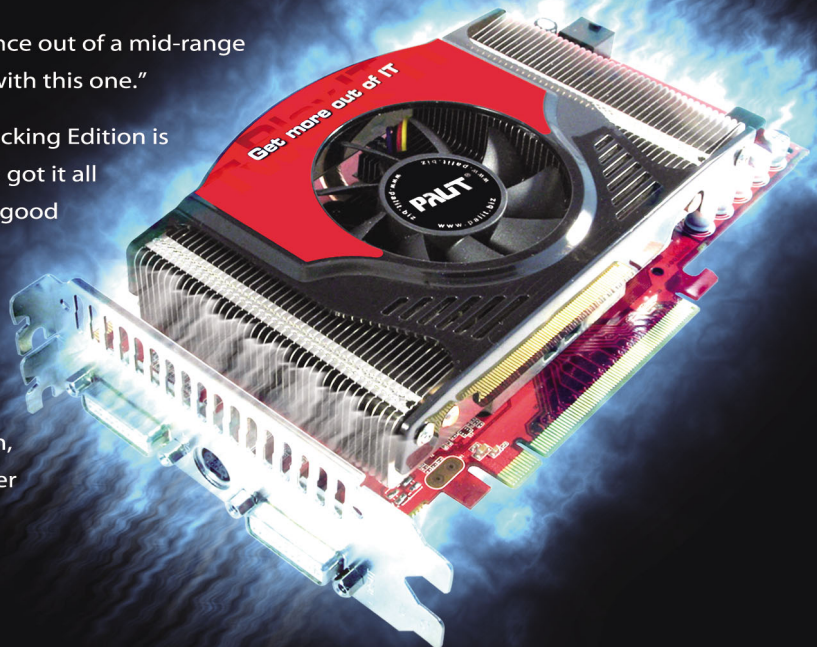
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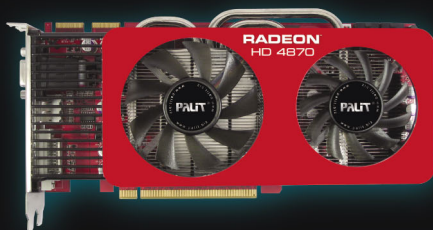
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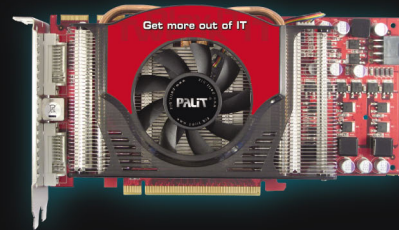


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# Wagging The Dog

by Rahul Sood

## Finding A Good Job In A Tough Economy

After the recent stock market crash, bank shutdowns, and home foreclosures, millions of people are worried about their current and future job prospects. Companies everywhere are in hiring freezes, dramatically shrinking the pool of good, available jobs and making it very difficult for managers to requisition new positions. And not just in North America; this economic slowdown has been a global event, so no one is immune, save possibly healthcare workers and (of course) the very wealthy.

The bottom line is we have been thrown into an employment situation direr than most of us have experienced in our lifetimes and hopefully none of us will have to experience again.

So what do you do if you're just out of school and you are looking for a job in the technology industry? The answer is quite simple: specialize and differentiate yourself from the pack. The fact is, when you are looking for a job in a field where there are millions like you out there, millions of people who know basically what you know, it's going to be hard to find the dream career that you can grow into.

In some ways, it's very much like starting a business in a highly commoditized industry. For years, I ran a small business and took it through many highs and lows. Along the way, we discovered that if we didn't find some way to differentiate ourselves from the pack, we would be left in the dust in challenging times.

So here you are, a blank sheet of paper. Now what?

The first thing you want to do is figure out what you actually enjoy doing. Take it from me; if you are lucky enough to find a job that involves something that you enjoy doing, you won't think of it as just a job. In addition, in many cases it may be something that you can excel at without extensive prequalification.

This doesn't mean if you enjoy playing Guitar Hero that you go out and start your own band. Be realistic; if you enjoy playing

video games, you might want to upgrade your skill set by taking some courses on game development. In the meantime, you could find a job in a company that allows you to develop scripts and work with network infrastructure.

The next thing would be to look at what holes you could fill

in a particular growth industry or company—and you should also look for opportunities based on future trends as much as possible. There are going to be many opportunities in environmental management and control, healthcare, and other high-tech initiatives. This doesn't mean you need to be an expert on the environment, but there are companies that focus on the environment that require IT skills. The same goes for healthcare and every other growth sector.

This might require some research, but most likely it's nothing that Google can't help you with. In other words, don't just create a generic résumé and blanket email it out. I can't tell you how many times people email me their résumés without any correspondence or any description of what exactly they're doing emailing me in the first place.

Be absolutely sure you make a cover page tailored to the company and the position you are looking for. If you're unfamiliar with the various résumé formatting rules, it's easy to find good samples online—there are even companies out there that will draft your résumé for you for a small fee.

Finally, make sure you do some research on a company before you show up there for an interview; few things will make you look worse than being unable to answer basic questions about what the company is or does. ▲



*Rahul Sood's love for computers started at the young age of 11. Much to the shock and dismay of his parents, he ripped apart his brand-new Apple II/c and painted it red before turning it on. His parents' dreams of having a doctor for a son were shattered when college drop-out Rahul founded what is now one of the most respected high-end computer companies in the world, Voodoo Computers.*

Send your opinions to this opinionated guy at [rahul@cpumag.com](mailto:rahul@cpumag.com)



# Technically Speaking

Interview With Vinny Lingham,  
CEO Of SynthaSite



Vinny Lingham is the CEO and founder of SynthaSite, a San Francisco-based Web 2.0 startup that provides free Web site building, publishing, and hosting services. He was also the founder of global search marketing experts incuBeta and its subsidiary, Click2Customers. The latter won the Horizon Award for Innovation from Commission Junction in 2004, while Lingham himself won the Top Young IT Entrepreneur in Africa in 2006.

by Barry Brenesal

**CPU:** Though “fear of computers” is pretty much a thing of the past, there are still a lot of people who refuse to set up their own Web sites, even just a blog, because the details seem too difficult to manage. Your company, SynthaSite, promises to bring incredibly easy site creation to that group of holdouts.

**Lingham:** The way we see the world right now is very much akin to when DOS initially appeared. It was really for the geeks and the business folk who used word processors and similar software. But when Windows came out, the graphical user interface made drag and drop possible, and software became easier to use. In many ways, we’ve taken that metaphor and applied it to what’s happening on the Web these days. A lot of Web site blogging requires code, technical interfaces, FTPs, file servers, Web site creation and hosting, and an understanding of what URLs are and how they work. That’s beyond the average person. They don’t get it, and it’s expensive. Hosting companies charge \$50 to \$100 a year.

We’re using a drag-and-drop paradigm to create Web pages. You can choose from a broad range of elements, then move them on a page where you’d like them to be. Other than writing text, when it comes

to building a Web site, there’s no typing. It’s just literally selection and layout: a seamless, codeless interface, which takes out all the friction from having to install software onto your computer.

**CPU:** On your Web site you state, “100% free. No hidden fees.” Understandable if you put ads on the Web site, but you have neither ads nor banners there. How can you make a company based on a free product commercially viable in these circumstances, after your venture capital is gone?

**Lingham:** One way we make money is through ad sales. If you want to own a private domain name, a dot com, you would then pay us for that. Also, we created a very detailed premium business model based on revenue share partnerships with companies that want to tap into our user base. Some people will want to put advertising on their Web sites. For those people who do, we would work out a deal on their behalf with the advertisers. So if a person wants to put up an e-commerce Web site, the partner who provides the e-commerce functionality would give us a revenue share. The product remains free, but if you want additional features, we charge you for that.

**CPU:** You clearly attempted to attract specific users who never thought of making their own Web sites before. How did you decide what they needed most, out of such a product?

**Lingham:** We are constantly surveying our user base and really listen to what they want and need from a free Web builder. They are clearly an important entity to our business, and it would be impractical to not pay attention to them. When they say they want something, we do our best to make it happen. We have introduced a number of new features this year because of that user feedback.

We get that feedback through a forum on Get Satisfaction ([getsatisfaction.com](http://getsatisfaction.com)), a consumer satisfaction Web site. All our staff is there, over 30 people, who are managing the forum. We have people posting questions, problems. We engage them actively, in part because we have a very large support team for a company our size. We prioritize our development based on what users ask for. We’re building a very market-driven company, and this feeds into further development of our product.

**CPU:** Can you provide some examples of features requested by users?

**Lingham:** Our Widgetbox integration gives SynthaSite users access to over 60,000 widgets. We have a small business photographer who uses the GenBook module and has tripled his business because of its online appointment feature. We had loads of small businesses wanting to build an ecommerce Web site, so we recently announced shopping cart capabilities through PayPal. Our new domain registration feature gives users a secure way of purchasing the available domain of their choice with a few simple clicks. Everybody wants to engage with their valued community, so everybody is blogging these days. SynthaSite has a robust blogging functionality that allows our nontech users to create a standalone blog or add a blog to an existing Web site.

I could go on and on, but I think you get my point. All these features were added because our end users wanted them.

**CPU:** Most companies that deal either directly or indirectly with their users typically use focus groups, experts, questionnaires, and small groups of beta testers to

combination of different entities for making our product the best it can be, while simplifying that end user data to make SynthaSite what it is.

**CPU:** Before this interview started, you stated that SynthaSite was growing, not changing, in response to user feedback. But whatever words one uses, surely constant, incremental application alterations mean your product is making new demands in your audience. Does that ever lead to complaints from users about an ever-expanding learning curve? Don't some of them at least want a Web site creator they can learn and not worry about permanent feature creep?

**Lingham:** We've gotten no complaints from the growth of the product. In July, we launched a new user interface, and to my knowledge, we didn't hear a single negative response after doing so. The only comments were on the positive side. In fact, we have been getting requests for more and more features, and we have not received a single complaint to the direction we're taking.

person builds a site using SynthaSite, our tag is at the bottom of their page, and that links back to us. Every time someone views one of these user sites, the SynthaSite link provides us with an opportunity to attract more customers.

That said, we also leverage search and are running a number of campaigns across various search engines. In addition, we're utilizing some natural search tactics to improve our SEO on relevant keywords where possible.

**CPU:** That brings up a good point. You come to SynthaSite with a great deal of success and experience in the search engine marketing field—notably so with Clicks2Customers, which your own blog states generated over \$100 million per annum in client revenue. Your new product is clearly a major departure for you, as a result. What led you to jump the fence?

**Lingham:** Before SynthaSite, my teams built Web site after Web site for our clients. We'd get all their information, design what they wanted from scratch, and market it through the search engines.

Our Widgetbox integration gives SynthaSite users access to over 60,000 widgets.

—Vinny Lingham

point product development. That includes software developers, with obvious reasons for understanding their users' needs and catering to them. What led you off in a different direction?

**Lingham:** Tough question. I think most companies don't have the same structure we do. We are focused on our end users and solicit their feedback in every way possible, to change our product into whatever they need it to be. We do use focus groups, experts, questionnaires, and beta users. Also, the paradigm of moving from the desktop to the Web for applications changes the way we think about applications. We're not locked into desktop. We really have a

**CPU:** How do you acquire new users? You've said you rely heavily upon word of mouth, but several years ago, it was an accepted fact that word of mouth on the Web wasn't sufficient by itself to generate enough users and income for a new product.

**Lingham:** We definitely use word of mouth. Our SynthaSite Web builders love how easy the product is to use. We also have a lot of end users who are into blogging. They go and tell their friends, who then tell their friends, and it snowballs from there. What's more, when a

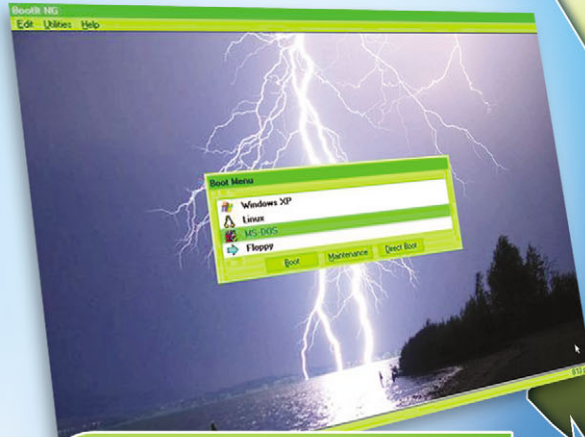
It took a lot of time and a lot of technical know-how to make this happen. It wasn't a scalable business model. Because of that, we decided to create a new product that would make our own lives easier—and that is what SynthaSite became. We didn't jump the fence, so much that this is an evolution of our efforts. We were doing the marketing through search engines, and now we're enabling other people to market themselves through search engines. They don't need to know HTML, and they don't need to have technical background to market themselves. **CPU**



Subscribers can read bonus content with Vinny Lingham at [www.cpumag.com/cpujan09/lingham](http://www.cpumag.com/cpujan09/lingham)

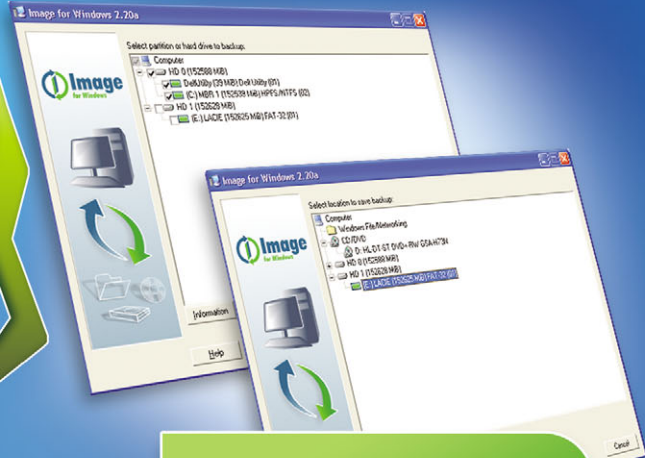


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# Under Development

A Peek At What's Brewing In The Laboratory

## Quiet! The Surveillance Cameras Are Listening

There are a few sounds that make us collectively squinch our shoulders in stomach-dropping dismay—the squeal of tires before a crash, the thud of something hitting a person's head, the smashing of a window pane. Even before we actually see these cringe-worthy events transpiring, we still get the “uh-oh” feeling based on what we hear. And now it seems that surveillance cameras will share that “feeling.”

A group of University of Portsmouth researchers in the United Kingdom, led by Dr. James Hui, are working on adapting AI software to enable CCTV cameras to identify sounds that are considered “aggressive” or atypical. The software, which currently only flags visual activity, will be able to detect an auditory anomaly in real time, point the camera in the direction of the sound, and, working with its visual capabilities, pick out actions that coincide with the aggressive sound.

Hui and his fellow programmers are developing algorithms that assess and identify sound templates of sound. For instance, the waveform profile created by a window shattering would be a specific sound profile. This profile, how it rises and falls, creates a certain

shape that the AI software can read. By using fuzzy logic, the software can identify the waveform shape as being a type of glass breaking.

The new software will assist with a multitude of issues associated with CCTV cameras. Currently it's tedious for camera operators to effectively monitor all cameras in a structure over long periods of time, plus it is particularly difficult to manually pan a camera with accuracy and speed toward a disturbance. In addition, instead of requiring a person to sit through hours of tape to extract footage of suspicious activity, the software will be able to identify the incident quickly, whether the camera is recording or not. According to researchers on the project, because of the AI component of the software, the longer the system is being used, the smarter it becomes in identifying problems.

A potential boon for security professionals managing public spaces, private properties, government agencies, or public transport, a commercial software suite is the anticipated outcome of the three-year project. ▲

Researchers at the University of Portsmouth are adapting AI software for CCTV cameras so they can identify and turn toward sounds that indicate crime.



## Thank Plastics For Your Future Cheap Chips

When Mr. McGuire had one word, just one word, for Benjamin in “The Graduate,” it turns out he was right: Plastics. Plastic may just be the material that drastically reduces the cost of computer memory in machines to come.

The low-cost plastic memory material (and resulting diode using the material) recently developed by Ph.D. student Kamal Asadi at the Zernike Institute of Advanced Materials at the University of Groningen performs similarly to non-volatile memory, such as flash memory cards in digital cameras and cell phones. In both cases, data is

retained in the memory card and can be transferred without a connection to a power source.

Asadi arrived at this breakthrough during his Ph.D. research project. Building on previous work of other University of Groningen researchers, integrating ferroelectric polymers into plastic transistors, Asadi and his team eschewed the traditional stacking of semiconducting material on top of ferroelectric materials and instead created a mixture of the two materials. The duality of the material (the ferroelectric aspect feeds the current through

the semiconducting part) allows for creation of a diode chip, which can be easily and inexpensively fabricated.

The new memory diode requires low voltages for quick programming, stores data for long periods, and works at room temperature.

The University of Groningen is considering using the new memory for a variety of consumer-oriented purposes, including electronic price tags that would replace bar codes on products and product packaging that would notify users of an expiring product. ▲



## Quantum Communication In Space, Courtesy Of Entangled Photons

When two photons are spawned from a single event (say a laser splitting a photon into two), they are born “entangled.” The magic of this entanglement is that the photons can communicate instantaneously from any distance apart. Call it photon ESP.

In fiber-optic cables, photons can travel about 160 kilometers (100 miles) before they break down and lose their quantum character. However, in space, the possibilities for photon travel (and the ability to send messages between them) are theoretically endless. In 2007, scientists, led by physicist Anton Zeilinger of the University of Vienna, were able to transmit encrypted

photons about 144 kilometers (89.5 miles) between two telescopes in the Canary Islands.

Now, a 10-country team of scientists and researchers (spearheaded by the aforementioned Zeilinger) is setting out to push the current earthbound limits of the photon’s communication skills with its Space-QUEST (Quantum Entanglement for Space Experiments) prototype. The team is developing a photonic transceiver (a device that both transmits and receives with common circuitry and housing) to be reviewed and hopefully approved by the ESA (European Space Agency) for project funding and an opportunity to

run tests from the International Space Station.

The team has already created an “entangled photon source capable [of generating] enough entangled photons to bridge the long free-space link from the satellite to the ground,” explains Dr. Rupert Ursin, also of the University of Vienna.

The goals to meet the ESA’s requirements have been tantamount. The satellite-based prototype (which includes two transceiver telescopes, an ultraviolet laser to split ultraviolet photons into infrared photons, single photon detection modules, and materials to keep all pieces in place during flight) must weigh under 100 kilograms,

be smaller than 1.4 meters at its longest side, and consume a maximum 250 watts.

Space-QUEST has met the ESA specs, and, if approved for flight, the primary focus in space will be testing encrypted communications via the transceivers on the ISS to receivers on the ground by the middle of the next decade. Beyond accomplishing a first-time demonstration of quantum global communications, the team will also be able to conduct a multitude of physics experiments in space, such as synchronizing distant clocks and doing research in quantum astronomy, for a fairly small budget of a few hundred million euros, says Ursin. ▲

## “Chatter Box” Project Hopes To Demystify Brain Disorders

The computer, ever since its inception, has sung a siren song to researchers as a tool to better understand the human brain. Transistors communicate in computer chips in a similar fashion to neurons’ synaptic connections. Memory storage and access is random and diffused.

The continuing challenge has been to create a super-computer that can completely mimic or surpass the brain’s functions. However, psychologist Dr. Stephen Welbourne, along with computer science researchers at the University of Manchester, is hopeful that their five-year “Chatter Box” project will be, according to Welbourne, “an invaluable tool for understanding all aspects of human cognition.”

The study is working hand-in-hand with Manchester’s “Brain Box” project, which involves researchers building a

computer to mimic complex areas of the brain involved in speech and language functioning. The human brain has approximately 100 billion neurons, all of which work together to perform everything from simple computations to more complex human behavior. In the same way, the Brain Box will use microprocessors that will share simple computations to reach end decisions.

The Chatter Box project challenges are multifold. In phase one of development, the researchers must adapt a 1,000-microprocessor computer with the software necessary to mimic the brain’s neural networking, specifically the methods referred to as “feedforward and recurrent backpropagation algorithms,” says Welbourne.

They must also create a “dedicated PDP (Parallel Distributed Processing)



Manchester University scientists are looking to unravel the mystery of brain disorders with a cluster of computers built to mimic the speech and language functioning of the brain.

machine” utilizing 10,000 microprocessors. PDP is a form of computation where many processors doing simple calculations can be collectively used to decipher more complicated problems. Welbourne adds, a PDP machine “is capable of training recurrent backpropagation networks at least 500 times faster than can be achieved on a single PC.”

Once the team meets the hardware challenges, it will be able to move to the second phase—creating software “that can support naming,

repetition, reading comprehension, and speech production tasks for all of the monosyllabic words in the English language.”

The team wants to “damage” the Brain Box to mimic the damage that has been found in brain-traumatized patients with such disorders as anomia; surface, phonological, and deep dyslexia; semantic dementia; and progressive nonfluent aphasia. Phase three will include utilizing the model to predict what may happen when patients with the listed disorders receive speech therapy and extending those predictions to real-life populations. ▲



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AsylumLAN 31 - Evansville, IN  
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CapLAN - North Vancouver, BC Canada  
[caplan-bc.com](http://caplan-bc.com)

Carolina Armageddon - North Carolina  
[www.carolinagaming.com](http://www.carolinagaming.com)

CarolinaCON - Stokesdale, NC  
[www.ncgaming.com](http://www.ncgaming.com)

Maximum Overkill - Bringhamton, NY  
[www.core.binghamton.edu/maxover](http://www.core.binghamton.edu/maxover)

NGC's LAN-A-GEDDON - Greenville, TX  
[www.networkgamingclub.com](http://www.networkgamingclub.com)

Whempy's LAN Party - Columbus, OH  
[whempyslan.org](http://whempyslan.org)

**11.21.08**

PDXLAN 12.5 - Portland, OR  
[www.pdxlan.net](http://www.pdxlan.net)

ugX 2008 - Topi, Pakistan  
[www.giki.edu.pk/ugx](http://www.giki.edu.pk/ugx)

**11.22.08**

Gamers of OK State University - Stillwater, OK  
[osugamers.com](http://osugamers.com)

Gamers On Campus - Arlington, TX  
[www.eznet-café.com](http://www.eznet-café.com)

Muncie Gamers - Muncie, IN  
[www.munciegamers.com](http://www.munciegamers.com)

Penn College ACM & Gamers Guild  
BYOC Gaming Event - Williamsport, PA  
[www.byoc.acm.pct.edu](http://www.byoc.acm.pct.edu)

**11.28.08**

Black Friday FragFest - Warner Robins, GA  
[www.fragfest.ots-ga.com](http://www.fragfest.ots-ga.com)

LANily Home Evening - Lafayette, IN  
[www.lhelan.org](http://www.lhelan.org)

**11.29.08**

NGC LAN Party - Groveton, NH  
[www.electronicesthetics.com/LANParties.htm](http://www.electronicesthetics.com/LANParties.htm)

Toronto FragFest - Toronto, ON Canada  
[www.torontofragfest.com](http://www.torontofragfest.com)

**11.30.08**

The Dungeon LAN Party - Leonidas, MI  
[www.thedungeonlanparty.com](http://www.thedungeonlanparty.com)

**12.05.08**

GVCCLAN - Placerville, CA  
[www.gvcclan.com](http://www.gvcclan.com)

**12.06.08**

LANBrew Association - Tulsa, OK  
[orgs.utulsa.edu/lanbrew](http://orgs.utulsa.edu/lanbrew)

**12.13.08**

E-Town LAN - Emporia, KS  
[www.etownlan.com](http://www.etownlan.com)

Mason ACM LAN Party - Mason, OH  
[www.masonacm.org](http://www.masonacm.org)

Nexus LAN - Dayton, OH  
[www.nexuslan.com](http://www.nexuslan.com)

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NGC's LAN-A-GEDDON - Greenville, TX  
[www.networkgamingclub.com](http://www.networkgamingclub.com)

**12.31.08**

LAN OC - Ohio City, OH  
[lanoc.org](http://lanoc.org)

**01.01.09**

MagFest - Alexandria, VA  
[magfest.org/index.php](http://magfest.org/index.php)

**01.02.09**

North Bay LAN's - North Bay, ON, Canada  
[pc-solutionz.ca/lanparty/index.html](http://pc-solutionz.ca/lanparty/index.html)

**01.10.09**

3.14LAN - Ventura, CA  
[314lan.com/index.php](http://314lan.com/index.php)

KILANFest - Louisville, KY  
[www.kilanfest.com](http://www.kilanfest.com)

Midwest LAN 10 - Darien, WI  
[www.midwestlan.com](http://www.midwestlan.com)

**01.17.09**

Intel LANFest Sacramento  
Winter 2009 - Folsom, CA  
[lanfest.intel.com](http://lanfest.intel.com)

NGC's LAN-A-GEDDON - Greenville, TX  
[www.networkgamingclub.com](http://www.networkgamingclub.com)

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**02.07.09**

Carolina Games Summit - North Carolina  
[www.CarolinaGamesSummit.com](http://www.CarolinaGamesSummit.com)

**02.20.09**

AWOL LAN - Wisconsin  
[www.awollan.com](http://www.awollan.com)

**02.21.09**

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

**03.01.09**

LANmaniac BYOC LAN Party - Bellflower, CA  
[www.lanmaniac.com](http://www.lanmaniac.com)

**03.13.09**

Madicon LAN Party - Harrisonburg, VA  
[www.madicon.org](http://www.madicon.org)

**03.21.09**

NGC's LAN-A-GEDDON - Greenville, TX  
[www.networkgamingclub.com](http://www.networkgamingclub.com)

**04.01.09**

Arkansas LAN - Arkansas  
[www.arkansaslan.com/index.php](http://www.arkansaslan.com/index.php)

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## Q&A With Ian Drew

**I**an Drew is the vice president of marketing at ARM. The Cambridge, England-based microprocessor company is one of the most successful in semiconductor history. More than 3 billion chips per year are shipping with ARM technology. But the company does not make those chips; it licenses its core architecture to other chip makers who use it in their designs. Increasingly, ARM is in the sweet spot because it has always put emphasis on power efficiency, which is the mantra in the new green tech era. But even as ARM grows more successful, it has to worry about big rivals such as Intel. Drew's job is to make sure that the ARM empire holds off Intel and keeps expanding to new devices.

**Q** What is the latest gadget with ARM's processor technology?

**ID** We've got a digital video player and recorder from Archos based on the ARM Cortex A8 processor core. It's Linux-based. It has 720p and HDMI out. It has Wi-Fi, Adobe Flash 9, a Web browser, and a 60GB hard disk. It has a 5-inch or 7-inch screen. It plays videos. It's got a touchscreen. It can run 720p for five or six hours. Web browsing you could do all day on one battery. It launched a few weeks ago in Europe at \$400. It will be launched over in the United States at some stage. It goes to sleep. You wake it four days later, and the battery will be in the same state. It uses a Texas Instruments OMAP chip with our core. The next generation will have a 3G modem. You can connect it via a dongle to the TV, and it can become a digital video recorder. There are a lot of mobile Internet devices out there, but this is the first with the ARM Cortex A8.

**Q** What's your strategy?

**ID** ARM's business strategy is around two areas. One is boring.

I hate to say that, but it is. It's around embedded control. Very low-end industrial controls, air-conditioning systems, and other things that used to use 8-bit processors. There are billions of chips in this part of the market. The other part is delivering the Internet to everywhere. Sony, Samsung, and Vizio—the top three digital TV makers in North America—all now use ARM-based processors in their TVs.

**Q** What sort of solutions does ARM provide?

**ID** We aren't a chip company. We're a provider of intellectual property, of processor cores that others license and put in their chips. We ship more than 900 million cores a quarter. So if you target an ARM-based architecture, you know you can reach a large market. There are more smartphones now than laptops. In the next year, there will be more smartphones shipping than PCs and laptops combined. It's about having the Web when you want it. In your hand. We have 200-plus licensees, 500-plus companies in our connected community in software and hardware. For us, it's a business model. We provide a low-power, low-cost design. It is a half-a-watt processor.

**Q** How does that compare to Intel's Atom processor?

**ID** They claim Atom is three watts. I have yet to see a design in that range. The sleep mode on an Intel processor is a problem because you put it to sleep, and it still draws power. You can put ours to sleep and have it wake up a month later with the same power. We have very small power leakage. It's hundreds of times smaller than what Intel can do. We talk about weeks and months of sleep mode.

**Q** How do you compete with Intel?



**ID** We don't. We provide IP. Intel provides chips. It's really the ARM ecosystem of electronic design automation companies, the manufacturers, the software companies, and the system companies that compete against Intel. It's not really ARM vs. Intel.

**Q** But Intel is surely going after you.

**ID** I'm sure they would love to ship a billion parts. We have shipped 12 billion parts. That's not bad. We have 200 licensees. About 60 percent or 70 percent of the chips are for cell phones.

**Q** Intel keeps saying that the mobile Internet device needs a computer for a brain, not a cell phone chip for its brain.

**ID** No, it needs to run the Internet. It needs a Web browser. We can run that. We can run Adobe Flash. The only thing it doesn't have is Microsoft applications. That's the only thing you won't get on it. We do have Windows Mobile and Windows CE. But not Windows XP or Windows Vista. Why? You'll have to ask Microsoft. ▲

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