

Intel X25-M | Chieftec Hi-Fi Series HT-01 | Vigor iSurf II

# CPU

COMPUTER POWER USER



The Modder's Holiday Gift Guide  
page 39

Don't Forget The Memory:  
Six Kits Reviewed Inside  
page 21

The PC Challenge:  
Home-Theater Shenanigans  
page 46

Firefox Road Test:  
Windows vs. Linux  
page 98

## VIDEO CARD BUYER'S GUIDE

36 Of The Best  
Video Cards  
Money Can Buy

PAGE 56

The Reflection Takes  
HTPC Aesthetics To New Heights  
Page 44

Q&A With  
Marc Davis  
Yahoo! Connected  
Life Chief On Bridging  
The Mobile  
Platform Divide  
page 110







### Structure as Beauty

Bold. Stylish. Revolutionary. Structured as the first open-air design of its kind, the Antec Skeleton is a PC chassis unlike any other. Create a true masterpiece and show off your system's beauty with its innovative frame and high-powered cooling system. Dare to think beyond the box with the Antec Skeleton. For more information, please visit <http://www.antec.com>.



**Antec**  
Believe it.

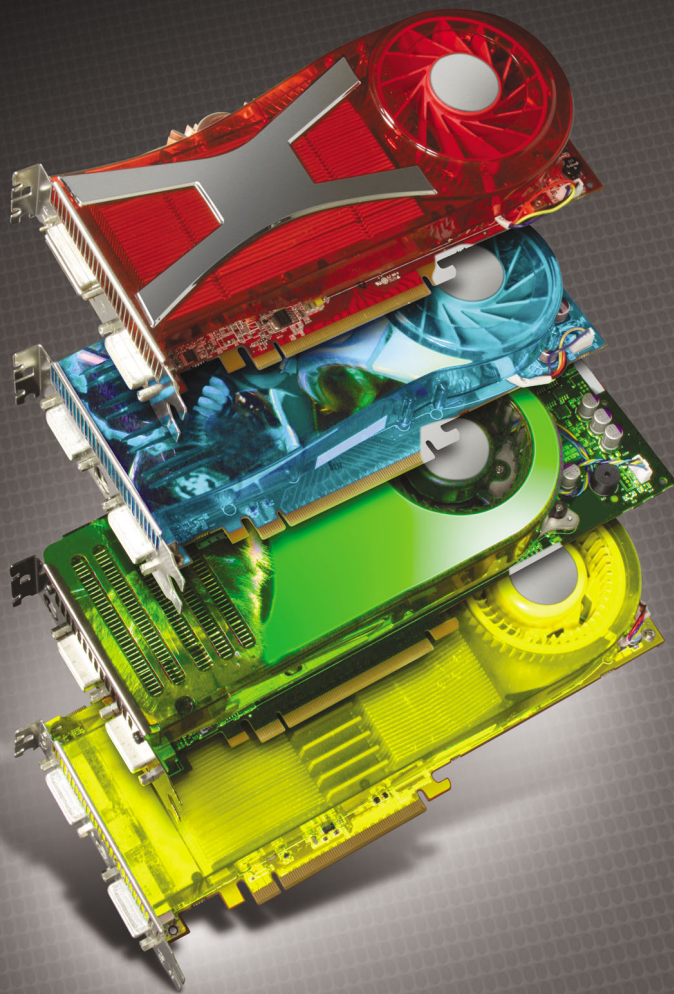


buy.com

amazon.com.

NCIX.com





## Video Card Buyer's Guide

# Spotlight

56

**Pick A Card**  
Our Colossal Graphics Card Guide

65

**Gear Guide: Special Advertising Section**  
Sponsored Video Card Profiles

Copyright 2008 by Sandhills Publishing Company. *Computer Power User* is a trademark of Sandhills Publishing Company. All rights reserved. Reproduction of material appearing in *Computer Power User* is strictly prohibited without written permission. Printed in the U.S.A. GST # 123482788RT0001 (ISSN 1536-7568) *CPU Computer Power User* USPS 020-801 is published monthly for \$29 per year by Sandhills Publishing Company, 131 West Grand Drive, P.O. Box 82667, Lincoln, NE 68501. Subscriber Services: (800) 424-7900. Periodicals postage paid at Lincoln, NE. POSTMASTER: Send address changes to *Computer Power User*, P.O. Box 82667, Lincoln, NE 68501.

## Frontside

- 8 **What's Happening**
- 16 **Digital Economy**
- 17 **The Saint**  
Chrome Redux

## The Experts



Anand Lal Shimpi  
**Anand's Corner**  
Page 34



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



Chris Pirillo  
**Dialogue Box**  
Page 87



Alex St. John  
**The Saint**  
Page 17



Barry Brenesal  
**The Cutting Edge**  
Page 94



Rahul Sood  
**Wagging The Dog**  
Page 102



Alex "Sharky" Ross  
**The Shark Tank**  
Page 36



Rob "CmdrTaco"  
Malda  
**The Department  
Of Stuff**  
Page 90



Peter Loshin  
**Open Sauce**  
Page 88





Page 21

## Heavy Gear

- 20 **Dream Hardware**
- 21 **DDR Deathmatch**  
A Collection Of Kits Duke It Out  
For Memory Supremacy
- 28 Intel X25-M  
Dell Studio Hybrid 140G
- 29 Vigor iSurf II  
Asus G50V
- 31 CyberPower PC Gamer Xtreme XE
- 32 Digital Storm Benchmark Crusher
- 33 Andrea Electronics Pure Audio USB-SA  
Chieftec HT-01
- 34 **Anand's Corner**  
Everything You Need To Know  
About AMD, Intel & Nvidia
- 36 **The Shark Tank**  
Nvidia's GTX 260 Core 216



Page 31



Spore  
Page 92

## Hard Hat Area

### PC Modder

- 38 **Tips & Tutorials**
- 39 **The Modder's Holiday Gift Guide**  
Spread Cheer With Some  
Hot New Gear!
- 44 **Mad Reader Mod**  
Home Theater In A (Very Cool) Box
- 46 **The PC Challenge**  
Best HTPC For \$1,500
- 51 **Advanced Q&A Corner**
- 54 **X-Ray Vision**  
Telescopic Pixels To Challenge LCDs

## Loading Zone

- 82 **The Bleeding Edge Of Software**  
Inside The World Of Betas
- 83 **Up To Speed**  
Upgrades That'll Keep You  
Humming Along
- 84 NTI Media Maker 8  
Sunbelt Software VIPRE AntiVirus +  
AntiSpyware 3.1
- 86 Adobe Creative Suite 4
- 87 **Dialogue Box**  
It's Time For The Web To Shine
- 88 **Open Sauce**  
What's The Deal With Office Suites

## Caught In The Web

- 90 **The Department Of Stuff**  
dontdrm.txt

## Digital Living

- 91 **At Your Leisure**  
Games, Gear, Movies & Music
- 94 **The Cutting Edge**  
Z Is For Zuse

## Tips & Tricks

- 95 **Software Tips & Projects**  
Polishing The Chrome
- 98 **Warm Up To Penguins**  
Two Faces Of Firefox

## What's Cooking

- 100 **Shavings From The Rumour Mill**  
Solid State Drives Are Rocks—We Hope
- 102 **Wagging The Dog**  
Absolute Power Corrupts Absolutely . . .  
& Kills Companies
- 103 **Technically Speaking**  
An Interview With Alissa Cooper,  
Center For Democracy & Technology
- 106 **Under Development**  
A Peek At What's Brewing  
In The Laboratory

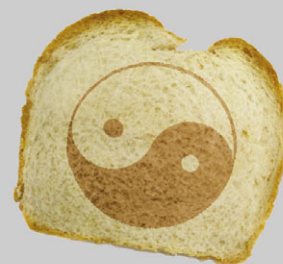
## Back Door

- 110 **Q&A With Marc Davis**  
Yahoo! Connected Life Chief On  
Bridging The Mobile Platform Divide

## Infinite Loops

Strange stats and other  
oddball items from  
computing's periphery

96, 99





## EDITOR'S NOTE

It's that time of year again, when people are a little nicer to each other, a little more giving. What does that mean for you? Hopefully, a new video card (or three). What better way to ring in the happiest, most festive time of year than by pwn'ing some noobs in crisp, clear 2,560 x 1,600 resolution?

OK, maybe that's a bit mercenary, but as we head into the waning weeks of 2008 there is an incredible array of video cards out there, offering huge upgrades for most of us no matter what our budget. We've put together a selection of the best cards you'll find anywhere, starting on page 56 and divided into High-End, Midrange, Budget, and Workstation/Pro categories for easy perusal. Plus, we have another installment of PC Challenge on page 46, this time pitting the brute strength of staff writer Andrew Leibman against the scrappy determination of editor Vince Cogley in a contest to see who can build the best HTPC for \$1,500.

There's a bunch more, as well, but I'm getting the wrap-it-up signal from the layout team, so enjoy, and we'll see you again next month.



Chris Trumble, Publication Editor, *CPU*

UNITED STATES POSTAL SERVICE (All Periodicals Publications Except Requester Publications)	
Publication Title: <b>COMPUTER POWER USER</b>	
Issue Date: <b>October 2008</b>	
Frequency: <b>Monthly</b>	
Number of Issues Published Annually: <b>12</b>	
Annual Subscription Price: <b>\$4.95</b>	
Single Copy Price: <b>\$0.42</b>	
Postmaster: Send address changes to <b>COMPUTER POWER USER, P.O. Box 15888, Lincoln, NE 68515-0888</b>	
Publication Title: <b>COMPUTER POWER USER</b>	
Issue Date: <b>October 2008</b>	
Frequency: <b>Monthly</b>	
Number of Issues Published Annually: <b>12</b>	
Annual Subscription Price: <b>\$4.95</b>	
Single Copy Price: <b>\$0.42</b>	
Postmaster: Send address changes to <b>COMPUTER POWER USER, P.O. Box 15888, Lincoln, NE 68515-0888</b>	

Statement of Ownership, Management, and Circulation	
Publication Title: <b>COMPUTER POWER USER</b>	
Issue Date: <b>October 2008</b>	
Frequency: <b>Monthly</b>	
Number of Issues Published Annually: <b>12</b>	
Annual Subscription Price: <b>\$4.95</b>	
Single Copy Price: <b>\$0.42</b>	
Postmaster: Send address changes to <b>COMPUTER POWER USER, P.O. Box 15888, Lincoln, NE 68515-0888</b>	



### Customer Service

(For questions about your subscription or to place an order or change an address.)

[customer-service@cpumag.com](mailto:customer-service@cpumag.com)

Toll Free: (800) 733-3809

Fax: (402) 479-2193

**Computer Power User**

P.O. Box 82667

Lincoln, NE 68501-2667

### Hours

Mon. - Fri.: 7 a.m. to 8 p.m. (CST)

Sat.: 8 a.m. to 4 p.m. (CST)

Online Customer Service & Subscription Center

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

### Web Services

(For questions about our Web site.)

[webhelp@cpumag.com](mailto:webhelp@cpumag.com)

(800) 733-3809

### Authorization For Reprints

Toll Free: (800) 247-4880

Fax: (402) 479-2193

### Editorial Staff

[editor@cpumag.com](mailto:editor@cpumag.com)

Fax: (402) 479-2104

131 W. Grand Drive

Lincoln, NE 68521

### Subscription Renewals

(800) 382-4552

Fax: (402) 479-2193

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

### Advertising Staff

Toll Free: (800) 247-4880

Fax: (402) 479-2193

131 W. Grand Drive

Lincoln, NE 68521



Gotcha.  
Here it is.



CYBERPOWER RECOMMENDS WINDOWS VISTA™ HOME PREMIUM



**\$699**

## GAMER INFINITY SLI™ GT

### Intel® Core™ 2 Duo Processor

(12MB Cache, 1333MHz FSB)	
Quad Q9650 3.00GHz	\$ 1135
Quad Q9550 2.66GHz	\$ 915
Quad Q9400 2.66	\$ 859
(8MB Cache, 1066MHz FSB)	
Quad Q6600 2.40GHz	\$ 789
(6MB Cache, 1333MHz FSB)	
E8600 3.16GHz	\$ 859
E8500 3.16GHz	\$ 775
E8400 2.83GHz	\$ 755
E7200 2.50GHz	\$ 699

NVIDIA® nForce® 750i SLI™ Chipset MB Supporting 2 Way x16 SLI™

### Genuine Windows Vista™ Home Premium

Corsair® 2GB PC-6400 DDR2-800 Dual Channel Memory  
320GB 7200RPM SATA-II 3.0Gb/s 16MB Cache Ultra Fast HD  
(2) NVIDIA® GeForce® 9400 GT 512 MB DDR2. Over 80% Performance  
Gain over single video card solution  
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  
X-Jupiter Jr. Mid-Tower Case w/680 Watt SLI™ Power  
Asetek Liquid Cooling System  
Free 802.11G Wireless PCI Network Adapter



**\$955**

## GAMER INFINITY 9800 GT

### Intel® Core™ 2 Duo Processor

(12MB Cache, 1333MHz FSB)	
Extreme Q9650 3.00GHz	\$ 1839
Quad Q9650 3.00GHz	\$ 1359
Quad Q9550 2.83GHz	\$ 1125
Quad Q9400 2.66GHz	\$ 1065
(8MB Cache, 1066MHz FSB)	
Quad Q6600 2.40GHz	\$ 989
(6MB Cache, 1333MHz FSB)	
E8600 3.16GHz	\$ 1065
E8500 3.16GHz	\$ 975
E8400 2.83GHz	\$ 955

NVIDIA® nForce® 750i SLI™ Chipset MB Supporting 2 Way X16 SLI™

### Genuine Windows Vista™ Home Premium

Corsair® 4GB PC-6400 DDR2-800 Dual Channel Memory  
500GB 7200RPM SATA-II 3.0Gb/s 16MB Cache Ultra Fast HD  
NVIDIA® GeForce® 9800 GT 512MB DDR3  
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  
X-Supra Mid-Tower Case w/See Through Window 580 SLI™ Power Supply  
Asetek Liquid Cooling System  
Free 802.11G Wireless PCI Network Adapter

CyberPOWER Inc.

# UN THE

**Order Toll Free 800-707-0393**

NVIDIA®, nForce®, GeForce®, SLI™ are trademarks or registered trademarks of NVIDIA Corporation or its subsidiaries in the United States and other countries. CyberPower PCs use genuine Microsoft® Windows® • [www.microsoft.com/piracy/howtotell](http://www.microsoft.com/piracy/howtotell)



# www.cyberpowerpc.com

Your Unlimited Gaming Solutions



**\$1185**



## GAMER INFINITY 8800 PRO SE

### Intel® Core™ 2 Duo Processor

(12MB Cache, 1333MHz FSB)	
Extreme QX9650 3.00GHz	\$ 2085
Quad Q9650 3.00GHz	\$ 1625
Quad Q9550 2.83GHz	\$ 1399
Quad Q9400 2.66GHz	\$ 1345
(8MB Cache, 1066MHz FSB)	
Quad Q6600 2.40GHz	\$ 1275
(6MB Cache, 1333MHz FSB)	
E8600 3.16GHz	\$ 1345
E8500 3.00GHz	\$ 1259
E8400 2.83GHz	\$ 1235
E7200 2.50GHz	\$ 1185

NVIDIA® nForce® 750i SLI™ Chipset MB Supporting 2 Way X16 SLI™

### Genuine Windows Vista™ Home Premium

Corsair® 2GB PC-6400 DDR2-800 Dual Channel Memory  
500GB 7200RPM SATA-II 3.0Gb/s 16MB Cache Ultra Fast HD  
NVIDIA® GeForce® GTX 260 896MB, LG® 22x DVD+/-RW Drive & 16x DVD-ROM  
High Definition 7.1 Surround Sound & 600 Watt Subwoofer Speaker System  
Logitech® Keyboard and Optical Wheel Mouse  
CoolerMaster Cosmo Sport Gaming Tower Case w/680 Watt SLI™ Power  
Asetek Liquid Cooling System  
Free 802.11G Wireless PCI Network Adapter



**\$1125**

## GAMER CROSSFIREX™ HD 4850

### Intel® Core™ 2 Duo Processor

(12MB Cache, 1333MHz FSB)	
Extreme QX9650 3.00GHz	\$ 2085
Quad Q9650 3.00GHz	\$ 1585
Quad Q9550 2.83GHz	\$ 1349
Quad Q9400 2.66GHz	\$ 1295
(8MB Cache, 1066MHz FSB)	
Quad Q6600 2.40GHz	\$ 1219
(6MB Cache, 1333MHz FSB)	
E8600 3.16GHz	\$ 1295
E8500 3.00GHz	\$ 1199
E8400 2.83GHz	\$ 1179
E7200 2.50GHz	\$ 1125

Intel® P45 Chipset MB Supporting CrossFireX™

### Genuine Windows Vista™ Home Premium

Corsair® 2GB PC-6400 DDR3 1333MHz Dual Channel Memory  
500GB 7200RPM SATA-II 3.0Gb/s 16MB Cache Ultra Fast HD  
(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 and Optical Wheel Mouse  
Sigma Gaming Unicorn Tower / 500 Watt CrossFireX™ Power  
Free 802.11G Wireless PCI Network Adapter



**\$679**

## GAMER INFINITY 8000 DREAM

### Intel® Core™ 2 Duo Processor

(12MB Cache, 1333MHz FSB)	
Quad Q9650 3.00GHz	\$ 1135
Quad Q9550 2.83GHz	\$ 899
Quad Q9400 2.66GHz	\$ 845
(8MB Cache, 1066MHz FSB)	
Quad Q6600 2.40GHz	\$ 769
(6MB Cache, 1333MHz FSB)	
E8600 3.16GHz	\$ 845
E8500 3.00GHz	\$ 755
E8400 2.83GHz	\$ 735
E7200 2.50GHz	\$ 679

Intel® P45 Chipset Motherboard Supporting CrossFireX™

### Genuine Windows Vista™ Home Premium

Corsair® 2GB PC-6400 DDR2-800 Dual Channel Memory  
320GB 7200RPM SATA-II 3.0Gb/s 16MB Cache Ultra Fast HD  
ATI Radeon™ HD3850 512MB  
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  
Free 802.11G Wireless PCI Network Adapter



- Intel® Centrino® 2 processor technology
- Intel® Core™ 2 Duo Processor
- Intel® PM45 Chipset
- Intel® WiFi Link 5300 802.11 A/G/N

**\$1059**

## GAMER XPLOER X5-7800

### Intel® Core™ 2 Duo Processor

(1066MHz FSB)	
T9600 6MB L2 Cache, 2.80GHz	\$ 1425
P9500 6MB L2 Cache, 2.53GHz	\$ 1225
T9400 6MB L2 Cache, 2.53GHz	\$ 1185
P8600 3MB L2 Cache, 2.40GHz	\$ 1105
P8400 3MB L2 Cache, 2.26GHz	\$ 1059

### Genuine Windows Vista™ Home Premium

2GB DDR-II PC6400 800 Memory, 250GB SATA150 Hard Drive  
15.4" WXGA TFT Display 1280x800 pixels  
8X DVD+/-RW Drive, 1000/100/10 Network, 56K V.92 Fax/Modem  
NVIDIA® GeForce® Go 9600 GT 512MB  
4-in-1 Built-in Media Reader, 3x USB 2.0 Ports,  
1 IEEE-1394 Firewire Port, 1 PCMCIA Type II Slot  
Weight only 6.8 Lbs, Free Carrying Case



- Intel® Centrino® Duo mobile technology
- Intel® Core™ 2 Duo Processor
- Intel® PM Chipset
- Intel® PRO Wireless 4965a/b/g/n Network Connection

**\$1069**

## GAMER XPLOER X7-7700

### Intel® Core™ 2 Duo Processor

(800MHz FSB)	
T9500 6MB L2 Cache, 2.60GHz	\$ 1399
T9300 6MB L2 Cache, 2.50GHz	\$ 1185
T8300 3MB L2 Cache, 2.40GHz	\$ 1109
T8100 3MB L2 Cache, 2.10GHz	\$ 1069

### Genuine Windows Vista™ Home Premium

4GB DDR-II PC5300 667 Memory, 250GB SATA150 Hard Drive  
17" WXGA TFT Display 1600x1050 pixels, 8x DVD+/-RW Drive  
1000/100/10 Network, 56K V.92 Fax/Modem  
NVIDIA® GeForce® Go 8600 GT 512MB  
3-in-1 Built-in Media Reader, 3x USB 2.0 Ports, 1 IEEE-1394 Firewire Port,  
1 PCMCIA Type II Slot, Weight only 7.6 Lbs, Free Carrying Case

Create the PC of your dreams

# LEAST E POWER

All Desktop systems come with 3 year Limited Warranty + lifetime toll free 24-7 techsupport

Celeron, Celeron Inside, Centrino, Centrino Inside, Centrino Logo, Core Inside, Intel, Intel Logo, Intel Core, Intel Inside, Intel Inside Logo, Intel Viv, Intel vPro, Itanium, Itanium Inside, Pentium, Pentium Inside, Viv Inside, vPro Inside, Xeon, and Xeon Inside are trademarks of Intel Corporation in the U.S. and other countries. All prices are subject to change without notice or obligation. CyberPower is not responsible for any typographical and photographic errors. Copyright © 2008 CyberPower. All rights reserved.

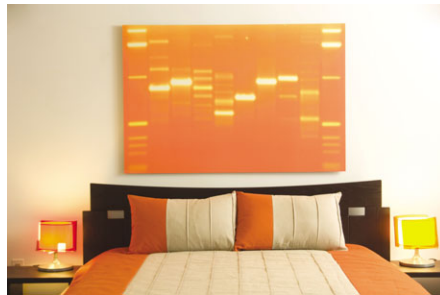
CyberPOWER Inc.



## DNA 11 Offers The Ultimate In Personal Gift Giving

Fruitcake be damned. If you're looking to give a truly original gift this holiday season, look no further than DNA 11. The company uses DNA, fingerprints, and lip prints to produce "unique art portraits" suitable for framing and hanging. DNA Portraits run \$390 to \$1,200 and come in 25 color combinations. Just use the provided swab-based kit to gather DNA from up to four people and DNA 11 will transfer it to high-quality canvas in 18- x 24-inch or 36- x 54-inch sizes.

Fingerprint Portraits, meanwhile, run \$190 to \$490 and feature a high-res scanned illustration of a thumb or finger's markings. If you're in the mood for something more randy, Kiss Portraits entail applying a lip print taken using MAC Viva GLAM Lipstick to 20- x 20-inch (\$290) or 40- x 40-inch (\$490) framed canvas. ▲



## 'Tis The Season For New Seasonic PSUs

Decided to give yourself the gift of building a new rig from the ground up this holiday season? Or maybe you're planning to play Santa and build a system for someone else. Whatever the case, Seasonic wants you to know about its new M12D series of PSUs in 750W (\$209.99) and 850W (\$289.99) versions. The company says both units offer improved OCP while sporting a dual 12V-rail circuit design. Also onboard is a 12cm Sanyo Denki San Ace Silent fan that combines with Seasonic's own 21FC fan and honeycomb ventilation. Look for the PSUs in November with a five-year warranty attached. ▲



## A Table Any Gamer Would Die For

Been searching for a special gift for that certain PC gamer in your life? Stop hunting. Digital Edge's Pro Gaming Table (\$379) might just be the ultimate apparatus for your Crysis-loving honey. Offering room for up to three 21-inch monitors, the multitiered Gaming Table is not only adjustable, it sports enough space to hold nearly every conceivable gaming doohickey you own. Further, Digital Edge states this feat of engineering was designed specifically with CH Products' controllers in mind. It's up to you, however, to supply the space for this steely black beauty, as well as a chair you'll likely never leave, mouse, joysticks, steering wheel, etc. ▲



## More Storage Than You Can Shake A USB Stick At

You want storage-related news? We've got it! Western Digital is now offering the ShareSpace NAS box in 2TB (\$699) and 4TB (\$999) versions with three USB 2.0 ports, iTunes server support, auto backup software, and integrated FTP server. WD is also reportedly in talks to buy Fujitsu's hard drive division for a rumored



\$660 to \$945 million. Fujitsu has denied the rumors, however. Seagate, meanwhile, has released 2008 versions of its FreeAgent external line, including a Time Machine-ready FreeAgent Go For Mac in 250GB (\$160) and 320GB (\$190) sizes supporting FireWire 800. At Corsair, there's a new 64GB bootable water-resistant Flash Voyager USB flash drive (\$249.99) which the company says can store 19,840 6MP JPEGs, 16,000 128Kbps MP3s, or 304 hours of 384Kbps MPEG-4 video. Finally, Toshiba has announced December availability of "the industry's first 250GB 1.8-inch HDD as part of a new MKxx29GSG series that also includes 160GB and 120GB 5,400 RMP 3Gbps SATA drives. ▲



## HARDWARE MOLE

### Zune Goes To War

Chances are you've already set aside a few greenbacks to pick up a copy of Gears Of War 2 when it blazes on the scene Nov. 7. If you're really psyched, set aside another \$249 for a special edition 120GB GOW2 Zune that Microsoft and Epic Games want to arm you with, also on Nov. 7. Amazon.com was already taking presales in early October for the player, which features laser-etched Crimson Omen art on the back and 1.14GB of GOW2 content on the inside, including the original soundtrack, trailers, artwork, photos, video, and commentary from design director Cliff Bleszinski. For those who favor iPods, Griffin Technology's Simplifi (\$69.99) is an intriguing dock solution that, in addition to a USB 2.0 hookup, has slots built in for Memory Stick/Pro, SD/SDHC, xD, and CompactFlash cards. ▲



### UK Prime Minister Makes Amends, PC Style

We like the intention behind UK Prime Minister Gordon Brown's recently announced three-year, roughly \$550 million plan to gift Britain's poorest families with vouchers to buy computers and Internet access; we just hope it does more than increase MySpace's population. "To ensure we are prepared for times to come, the government will allow upward of 1.4 million children to get online, enabling parents to link with teachers at their children's schools, and help young people with their homework and coursework," Brown stated. Still unclear is how families who can't afford Internet access in the first place will retain broadband access after the funding is depleted. Still, the gesture does somewhat rectify Brown's 2006 scrapping of a Home Computing Initiative that let companies loan PCs to employees, including low-income workers, as a tax-free benefit. ▲

### Micron Piles Up More Losses; Execs Feel The Pinch

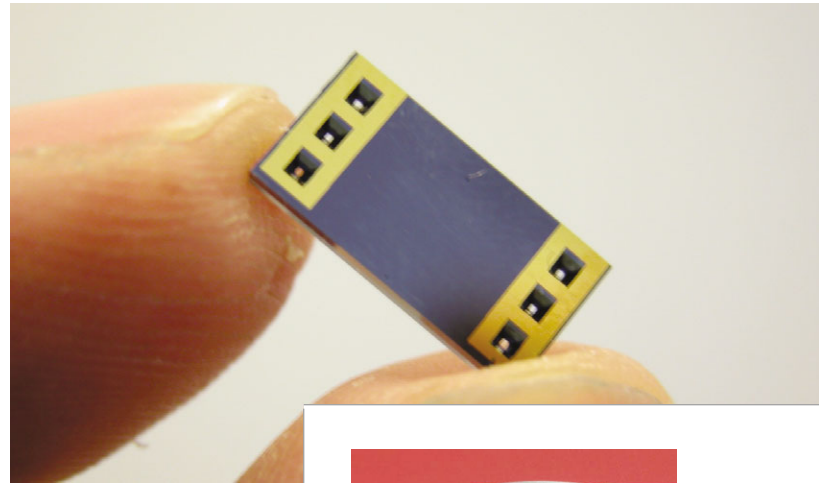
It's not a good time to be a senior executive at Idaho-based Micron (or most other places, for that matter). Facing its seventh straight quarterly loss and a \$344 million loss for 2008's Q4 alone (compared to a \$158 million loss for Q4 2007), the United States' leading memory chip maker announced in early October it will cut the salaries of senior executives to compensate. Micron posted a \$1.62 million loss for all of fiscal 2008 compared to \$320 million for 2007. "We are implementing a 20% reduction in salary compensation for Micron senior executives," stated Micron CEO Steve Appleton. "The global memory market continues to experience severe oversupply and price degradation, and it remains a challenging period for all of us competing in the industry." ▲





## Microstaq Has A MEMS Chip That Can Cut Air-Conditioning Costs

Air-conditioning systems seem like a weird market for new chips. But Microstaq has launched a micro-machined chip, or MEMS (Micro-Electro-Mechanical-System) device that can cut air conditioning costs by 20% to 30%. MEMS devices are mechanical devices, but they're built with semiconductor equipment. Chip designers can use MEMS manufacturing to make the tiniest of working parts. In this case, the Austin, Texas-based MEMS shop can create a Silicon Extension Valve to channel water into an air conditioner in the most efficient way. Just as the name suggests, it's a tiny valve. It may sound lovely, but valves are a \$300 billion market worldwide. ▲



## Tilera Debuts Second-Generation 64-Core Array Processors

Starting a new custom chip architecture can be hazardous to your health in an age where Intel and ARM dominate the processor market. But Tilera believes that its unique design of array processors will justify a new architecture. The company has launched two new models of its second-generation family of TilePro chips. They have as many as 64 tiles, or processors, which can process data more efficiently for communications applications. The chip processors can compute a piece of data and shift the result to the adjacent processor—all in the same clock cycle. The San Jose, Calif.-based company says it can outdo any other chip in processor performance and low power consumption. ▲



## Plastic Logic Debuts A Plastic Electronic Book Reader You Can Bend

Amazon.com and Sony have pioneered the ebook reader market. But Plastic Logic is outdoing them by creating a new digital book reader made out of plastic. The company has a full-page-sized display that you can drop or bend because it is plastic. The razor-thin display is embedded with electronic circuits that are etched into the plastic itself. The company plans to launch its readers in the second quarter of 2009. It has raised more than \$200 million to date, partly to build the plastic electronics factory to make the displays. Joe Eschbach, chief executive, says that the plastic electronics aren't as tough to make and could eventually cost 40% of silicon chips. ▲

## 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**	\$149	\$179
AMD Phenom X3 Triple-Core 8650 2.3GHz	3/27/2008	\$165**	\$119	\$145
AMD Phenom X3 Triple-Core 8450 2.1GHz	3/27/2008	\$145**	\$102	\$102
AMD Athlon 64 FX-70	11/30/2006	\$599/pair	\$333	\$210
AMD Athlon 64 FX-72	11/30/2006	\$799/pair	\$271	\$319
AMD Athlon 64 FX-74	11/30/2006	\$999/pair	\$279	\$279
AMD Phenom 9500	11/19/2007	\$251**	\$163	\$163
AMD Phenom 9550	3/27/2008	\$195**	\$144	\$149
AMD Phenom 9600	11/19/2007	\$283**	\$119	\$142
AMD Phenom 9600 Black Edition	12/23/2007	\$251**	\$179	\$229
AMD Phenom 9750	3/27/2008	\$215**	\$164	\$205
AMD Phenom 9850 Black Edition	3/27/2008	\$235**	\$179	\$194
AMD Phenom 9950 Black Edition	7/3/2008	\$235**	\$159	\$235
Intel Core 2 Duo E6750	7/16/2007	\$183**	\$159	\$184
Intel Core 2 Duo E6850	7/16/2007	\$266**	\$183	\$168
Intel Core 2 Duo E8190 45nm	1/7/2008	\$163**	\$163**	\$163**
Intel Core 2 Duo E8200 45nm	1/7/2008	\$163**	\$159	\$162
Intel Core 2 Duo E8400 45nm	1/7/2008	\$183**	\$169	\$169
Intel Core 2 Duo E8500 45nm	1/7/2008	\$266**	\$205	\$206
Intel Core 2 Duo E8600 45nm	8/10/2008	\$266**	\$269	\$266**
Intel Core 2 Quad Q6600	1/8/2007	\$851**	\$189	\$189
Intel Core 2 Quad Q6700	7/16/2007	\$530**	\$267	\$292
Intel Core 2 Quad Q9300 45nm	1/7/2008	\$266**	\$259	\$259
Intel Core 2 Quad Q9400 45nm	8/10/2008	\$266**	\$269	\$266**
Intel Core 2 Quad Q9450 45nm	1/7/2008	\$316**	\$342	\$342
Intel Core 2 Quad Q9550 45nm	1/7/2008	\$530**	\$327	\$324
Intel Core 2 Quad Q9650 45nm	8/10/2008	\$530**	\$542	\$530**
Intel Core 2 Extreme QX6800	7/16/2007	\$999**	\$1,048	\$1,041
Intel Core 2 Extreme QX6850 3.0GHz 8MB cache 1333MHz FSB 65nm	7/16/2007	\$999**	\$849	\$1,009



CYBERPOWER RECOMMENDS WINDOWS VISTA™ HOME PREMIUM

**www.cyberpowerpc.com**

Your unlimited gaming solutions

**AMD**   
Smarter Choice



AMD Phenom™ processors offer multi-core performance for life-like gaming, crystal-clear digital media and serious multitasking.

**Order Toll Free 800-707-0393**



**CyberPOWER Inc.**

Create the PC of your dreams

**UNLEASH THE POWER**



### Gamer Ultra CrossfireX™ Pro

**AMD Phenom™ X4**  
Quad-Core Processor

9950+ CPU \$ 1059  
(Black Edition)  
9850+ CPU \$ 999  
9650+ CPU \$ 985  
9550+ CPU \$ 945

**AMD Athlon™ X2**  
Dual-Core Processor

6000+ CPU \$ 905  
5600+ CPU \$ 885  
5200+ CPU \$ 875  
5000+ CPU \$ 865

AMD 790GX CrossFire™ Chipset MB w/ Dual 16X PCI-E  
Genuine Windows Vista™ Home Premium  
Corsair® 4GB PC-6400 DDR2-800 Dual Channel Memory  
500GB 7200RPM SATA-II 3.0Gb/s 16MB Cache Ultra Fast HD  
(2) ATI Radeon™ HD4850 512MB in CrossFire™ Mode  
Over 80% Performance Gain over single video card solution.  
LG® 22x DVD+-RW Drive & 16x DVD-ROM  
HDMI High Definition 7.1 Surround Sound  
600 Watt Subwoofer Speaker System  
Logitech® Keyboard & Optical Wheel Mouse  
Raidmax Sagitta II Gaming Tower w/ 580 Watt CrossFire™ Power  
6 Colors to Choose From  
Asetek Liquid Cooling System  
Free 802.11G Wireless PCI Network Adapter

From  
**\$865**



### Gamer Ultra 9800 GT

**AMD Phenom™ X4**  
Quad-Core Processor

9950+ CPU \$ 985  
(Black Edition)  
9850+ CPU \$ 959  
9650+ CPU \$ 909  
9550+ CPU \$ 869

**AMD Athlon™ X2**  
Dual-Core Processor

6000+ CPU \$ 829  
5600+ CPU \$ 799  
5200+ CPU \$ 795  
5000+ CPU \$ 785

NVIDIA® nForce® 750A SLI™ Chipset MB w/ Dual 16X PCI-E  
Genuine Windows Vista™ Home Premium  
Corsair® 4GB PC-6400 DDR2-800 Dual Channel Memory  
500GB 7200RPM SATA-II 3.0Gb/s 16MB Cache Ultra Fast HD  
NVIDIA® GeForce® 9800 GT 512MB  
LG® 22x DVD+-RW Drive & 16x DVD-ROM  
High Definition 7.1 Surround Sound  
600 Watt Subwoofer Speaker System  
Logitech® Keyboard & Optical Wheel Mouse  
ATop Raptor Mid Tower / 680 Watt SLI™ Power  
Add 19" ViewSonic Q9WB LCD display \$199  
Asetek Liquid Cooling System  
Free 802.11G Wireless PCI Network Adapter

From  
**\$785**



**AMD Turion™ X2**  
Mobile Technology

TL-68 \$ 1135  
TL-66 \$ 1019  
TL-64 \$ 899  
TL-60 \$ 855

**FREE SHIPPING**



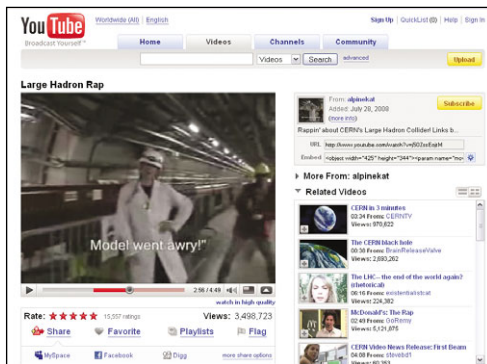
AMD Turion™ X2 Mobile Technology  
-AMD PowerNow! Technology  
-HyperTransport Technology  
-Enhanced Virus Protection Technology  
Genuine Windows Vista™ Home Premium  
2GB PC5300 DDR2 667 MEMORY  
250 GB SATA150 Hard Drive & 8X DVD+-RW Drive  
ATI Mobility Radeon™ HD 2600 XT 256MB Video w/ HDMI  
15.4" WXGA Wide-screen TFT Display 1440x900 Pixels  
Gigabit Network Card & 56K V.92 Modem  
Wireless 802.11G 54Mbps Networking, 3-in-1 Built-in Media Reader,  
1 Firewire IEEE 1394 & 3 USB 2.0 Ports, 1 PCMCIA Type II Slot,  
Weight only 6.39 Lbs, Free Carrying Case,  
5 Custom Colors to Choose From, 1 year toll free 24/7 techsupport.

From  
**\$855**



## Alpinekat Breaks A Funky Collider Beat

As heady *CPU* readers, we're guessing you're looking forward to CERN finally putting the Large Hadron Collider into motion as much as we are. So, while CERN's recent announcement that it's putting the project on hold until at least spring 2009 might have you feeling like a black hole, here's something to tide you over: Head to YouTube and take in Kate McAlpine's oddly entrancing "Large Hadron Rap." McAlpine, a Michigan State University grad currently doing intern work related to the project, also carries the hip-hop handle alpinekat. McAlpine reportedly spent about 40 hours filming and piecing together "Large Hadron Rap," which had nearly 3.5 million views at press time. When you're finished busting a groove, check out alpinekat's flow on "Physics Rap" and "N3UROCH!P Rap." ▲



## Chrome Apparently Isn't Shiny Enough

Data from Internet-tracking company Net Applications indicates that Google might need to do a little more polishing of its Sept. 2-released Chrome browser. According to information based on tracking 40,000 Web sites, Internet Explorer and Firefox suffered a slight hit in browser market share following Chrome's release, but Chrome's user percentage dipped from a 0.85% share following its first week of release to a 0.77% share just three weeks after launch. September also marked the seventh straight month that IE gave up a bit of its market share. At September's end, Microsoft's share stood at 71.52%, down from 72.2% for August. Firefox's share rested at 19.46% at September's end, while Safari reached an all-time high of 6.65%. ▲

## Who Really Impacts The Web?

According to *BusinessWeek* readers and staff members, those making the most impact on this little thing we call the World Wide Web these days include the obvious and not so obvious. The no-brainers on the publication's recent "25 Most Influential People On The Web" list include Steve Ballmer, Steve Jobs, Jeff Bezos, Rupert Murdoch, Sergey Brin, Larry Page, Eric Schmidt, Jimmy Wales, and Jerry Yang. Those you might not have guessed: Mozilla.org's Mitchell Baker, craigslist.org's Craig Newmark, digg.com's Kevin Rose, Arianna Huffington of huffingtonpost.com, and Jonathan Kaplan of Pure Digital Technologies and FlipVideo camera fame. Our own favorites making the grade: The wonderfully biting Jon Stewart of TheDailyShow.com and Maria Thomas of etsy.com, the homemade products-selling site we could traverse daily. ▲

## SIGHT SEEING

### Time Gives New Life To Life

Ask today's kids what they think of *Life*, and they'll probably tell you it's a really great-tasting cereal. (We wouldn't disagree.) Ask adults, though, and they'll more likely tell you *Life* was a beloved publication that showcased the world's best photojournalism until it ceased to exist in 2000, when Time pulled the plug on the magazine. Well photo-lovers, get ready for more eye-candy than you know what to do with. Time, along with Getty Images, announced in September they will bring back *Life* in the form of Life.com in early 2009. Beyond searching and browsing some 10 million photos, most of which have never been made available for public consumption, Life.com plans to publish 3,000 new images every day. The site also states that you're welcome to share and print photos for noncommercial use, as well as purchase framed photos and compile personal photo albums. Life just got a little better. ▲



### ScienCentral Takes Science To The People

If you've ever walked along NYC's Manhattan streets, you know you can buy everything from a painting of Yankee Stadium from a street artist to a halal meal fit for a king. What you might not know is NYC's streets also recently afforded access to a Nobel Prize-winning scientist. In its two-part "Street Corner Science" video, ScienCentral.com plunked down physicist Dr. Leon Lederman on the corner of Eighth Avenue & West 34th, where he enthusiastically answered questions about the Strong Force, the Big Bang theory, the surface tension of liquid, and more. To say Lederman, who won the Nobel Prize in 1988 for his work in "transforming the ghostly neutrino into an active tool of research," knows his stuff is like saying NYC has really tall buildings. Duh. ▲



## Verbatim Goes Automatic With PhotoSave DVD

We don't need to tell you to back up your data. You're a master of the task. Still, you undoubtedly know a friend or dozen who couldn't back up a car let alone hundreds of digital photos. Do your pals a solid and steer them toward Verbatim's PhotoSave DVD. Available in three- (\$9.99) and five-pack (\$14.99) versions, PhotoSave DVD integrates software on DVD-Rs to automate backing up photos (80 formats and multisc spanning supported) from a hard drive, flash drive, external drive, memory card, or connected digicam. Pop a PhotoSave DVD in the tray, and it automatically launches and searches for photos. All your buddy needs to do is click Record to store up to 2,000 shots on each 4.5GB disc. ▲

## Nero Brings TiVO To The PC

Put down the remote, TV addicts. You no longer have to leave your Windows XP or Vista PC to catch this week's "Sons Of Anarchy" (excellent, by the way). LiquidTV, new software from Nero and TiVO, puts TiVO's goodness, including its sweet interface, within reach of your mouse, keyboard, and mon-



itor screen in HD and standard-def options. As you'd expect from Nero's involvement, LiquidTV can also burn shows to DVD plus export them to mobile devices. A version with a year's subscription, TV tuner card, and IR blaster runs \$199. A \$99 package retains the subscription but omits the card. Also look for the newly released Nero 9 (\$99.99) and spanking new Nero Move It (\$49.99), audio and video converting/transferring software. ▲

itor screen in HD and standard-def options. As you'd expect from Nero's involvement, LiquidTV can also burn shows to DVD plus export them to mobile devices. A version with a year's subscription, TV tuner card,

## RealDVD Gets RealNetworks Really Sued

When RealNetworks announced plans in early September to release Real DVD (\$29.99), software that copies DVDs and ties them to your hard drive via an accompanying license, one couldn't help but wonder how long it would take the movie studios to crack back. Turns out, not long. On Sept. 30, the six major studios filed suit in a California District Court to prevent RealNetworks from propagating the software, which buyers could conceivably use to forego



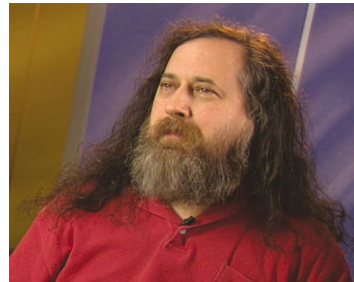
buying new releases and instead rent flicks and copy them. "RealNetworks' RealDVD should be called Steal DVD," the MPAA's Greg Goeckner stated. RealNetworks attorney Bob Kimball, meanwhile, countered that RealDVD "is not a product that enabled Internet piracy" but added the company is "very open to coming up with solutions" to the possibility of people copying movie rentals. As we headed to press, a judge temporarily halted sales for further review. ▲



## SOFTWARE SHORTS

## Does Cloud Computing = Stupidity?

Free Software Foundation founder and GNU operating system pioneer Richard Stallman thinks so. In an interview with *The Guardian*, Stallman stated cloud computing is “worse than stupidity. It’s a marketing hype campaign.” Stallman, not one to hold back what he really thinks, added “Maybe I’m an idiot, but I have no idea what anyone is talking about. What is it? It’s complete gibberish. It’s insane. When is this idiocy going to stop?” Apparently, not soon. In October, Microsoft’s Steve Ballmer unveiled MS will offer up details on Windows Cloud, the working title for an OS project separate from Windows 7 (an alpha should be available now) that MS will aim at developers of cloud computing-based apps. “We need a new operating system designed for the cloud, and we will introduce one in about four weeks . . .” Ballmer stated. ▲



## Mac OS X Continues Its Ascent

Mac OS X’s market share still hasn’t reached double digits, but according to a recent report from Net Applications, the OS cracked the 8% barrier for the first time in September, reaching 8.23%, a 0.4% gain over August (7.86%). The gain marks the OS’ largest one-month increase since May. Further, Mac OS X’s market share is up 3% over the past two years. Windows’ market share, meanwhile, continued moving in the wrong direction, falling about 0.4% in both July (91.02%) and August (90.66%) and 1.5% since the start of 2008. Still, a 90.29% share at September’s end isn’t anything to sneeze at. Linux’s, meanwhile, remained south of 1% (0.91%) as of September but was up from a 0.64% share in January. ▲



## Survey Says: People Hate Security Software

Looks like we’re not the only ones who think putting up with security software is akin to watching a “Hogan Knows Best” marathon. According to a recent survey Trend Micro conducted of 600 U.S. subscribers of said software, about 50% report being disgruntled with security apps, while 30% indicate apps don’t live up to manufacturers’ promises. Additionally, 30% reported that among home-oriented software, security software gave them the most problems in the last year. Somewhat startlingly, however, is that 30% of those queried reported that after their system contracted a malware infection, they simply gave up rectifying the situation and bought a new computer. ▲

## 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/cpudec08/bios](http://www.cpumag.com/cpudec08/bios) to see our entire upgrade list.

Manufacturer	Model	Version	Date	Description	URL
ASRock	ALiveNF6G-GLAN	1.40	9/12/2008	Updates CPU code	<a href="http://download.asrock.com/bios/AM2/ALiveNF6G-GLAN(1.40)Win.zip">download.asrock.com/bios/AM2/ALiveNF6G-GLAN(1.40)Win.zip</a>
ASUS	P5Q Premium	1306	8/25/2008	Enhances compatibility with certain memory	<a href="http://support.asus.com/download/download.aspx?SLanguage=en-us">support.asus.com/download/download.aspx?SLanguage=en-us</a>
ASUS	Rampage Extreme	0501	9/3/2008	Fixes load-line calibration function error	<a href="http://support.asus.com/download/download.aspx?SLanguage=en-us&amp;model=Rampage%20Extreme">support.asus.com/download/download.aspx?SLanguage=en-us&amp;model=Rampage%20Extreme</a>
Gigabyte	GA-EP45T-Extreme	F3	8/22/2008	Supports DDR3 speed to 2,000MHz and beyond for overclocking	<a href="http://america.giga-byte.com/FileList/BIOS/motherboard_bios_ga-ep45t-extreme_f3.exe">america.giga-byte.com/FileList/BIOS/motherboard_bios_ga-ep45t-extreme_f3.exe</a>

# 30 million computer users don't trust the power grid.



APC Back-UPS BE750G with SmartShedding™ Technology automatically powers down idle peripherals to save energy and money.



## They do trust APC. Shouldn't you?

Think of all that you rely on your computer for: personal and business files, financial information, broadband access, videos, photos, music, and more. Increasingly, computers are the hub for managing our lives. And more people rely on APC to protect their hardware and data than any other uninterruptible power supply (UPS) brand.

Why is APC the world's best-selling power protection? For 20 years, we have pioneered power protection technology. Our Legendary Reliability® enables you to save your data, protect your hardware, and prevent downtime. It also guards against a power grid that is growing less reliable every day.

According to the Department of Energy, electricity consumption will increase by 40% over the next 10 years. Yet today, investment in utilities is at an all-time low. It's a "perfect storm" for computer users, one that makes APC protection even more essential.

*"The pricetag on the new UPS is \$99.99. While I'm not in the habit of endorsing products in this blog, if you're in the market for a workstation-class UPS, why not opt for the greener option?"*

- Heather Clancy,  
ZDNet.com

APC has a complete line of power protection solutions to suit a range of applications. Already an APC user? Get the latest replacement battery cartridge for your unit or upgrade to a newer model. For more information on this or our other great products, or for information about environmentally responsible disposal of your old battery, visit [www.apc.com](http://www.apc.com)

### Energy efficient solutions for every level of protection:

Save \$25 per year\* on  
your electric bill!

#### Surge Protection

Starting at \$34  
Guaranteed protection  
from surges, spikes,  
and lightning.

7 outlets, Phone/Fax/Modem  
Protection, Master/Controlled Outlets



Save \$40 per year\* on  
your electric bill!

#### Battery Back-UPS®

Starting at \$99  
Our most energy  
efficient backup for  
home computers.

10 outlets, DSL and Coax  
protection, Master/Controlled  
Outlets, High Frequency Design,  
70 minutes of runtime¹



APC can help with your other power protection needs.  
Visit [apc.com](http://apc.com) to see our complete line of innovative products.

APC power protection products are available at:  
**BEST BUY** **CDW** **City** **STAPLES**  
that was easy:  
**Office DEPOT**



**Enter to Win a Back-UPS® ES 750G! (a \$99 Value)**

Also, enter keycode to view other special offers and discounts.

Visit [www.apc.com/promo](http://www.apc.com/promo) Key Code d598w or Call 888.289.APCC x8022 or Fax 401.788.2797

**APC®**  
Legendary Reliability®

©2008 American Power Conversion Corporation. All trademarks are owned by Schneider Electric Industries S.A.S, American Power Conversion Corporation or their affiliated companies.  
e-mail: [esupport@apc.com](mailto:esupport@apc.com) • 132 Fairgrounds Road, West Kingston, RI 02892 USA • 998-0971 ¹Runtimes may vary depending on load.

\*Average savings are based on comparable competitive models, and are comprised of two energy saving features: an ultra efficient electrical design, and the master/controlled outlets feature.



## Job Of The Month

The next generation of mobile applications (i.e. iPhone and Android) is here, and so are the development jobs. If you really want to get in on the very ground floor of open-platform mobile development, then apply to the tech incubator City 17, which needs a Senior Software Engineer to work on iPhone/Android

programs. The job description calls for an ability to work with a small team of designers and developers as well as with "the random people who wander into the office on any particular day." Apparently, they practice "open platform" principles in their everyday work routines, as well.

[seeker.dice.com/jobsearch/servlet/JobSearch?op=302&dockey=xml/e/9/e9672567828dcdccb7cc9be3a42a6474@endecaindex&source=3](http://seeker.dice.com/jobsearch/servlet/JobSearch?op=302&dockey=xml/e/9/e9672567828dcdccb7cc9be3a42a6474@endecaindex&source=3)

# HELP WANTED

## Raw Numbers

### \$3 million

Amount spent by "Obama for America" campaign on Google advertising, January to July 2008

(ClickZ)

[www.clickz.com/showPage.html?page=3630772](http://www.clickz.com/showPage.html?page=3630772)

Obama!

### 56 million

HD video streams served by NBCOlympics.com during the Summer Games

(Microsoft)

[www.computerworld.com/action/article.do?command=viewArticleBasic&taxonomyName=knowledge\\_center&articleId=9114378&taxonomyId=1&intsrc=kc\\_top](http://www.computerworld.com/action/article.do?command=viewArticleBasic&taxonomyName=knowledge_center&articleId=9114378&taxonomyId=1&intsrc=kc_top)

### 5 billion

Approximate number of video streams served by YouTube in July 2008

(comScore)

[www.comscore.com/press/release.asp?press=2444](http://www.comscore.com/press/release.asp?press=2444)

### 70%

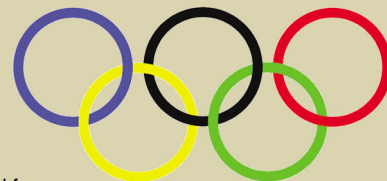
Percentage of college students who use mobile text messaging

(Alloy Media)

[www.emarketer.com/Article.aspx?id=1006523](http://www.emarketer.com/Article.aspx?id=1006523)

## Olympics Video Boom Or Bust?

Online video is all the rage with users, but not necessarily with advertisers. Despite streaming 56 million clips of the Summer Olympic Games online, NBC probably netted only \$5.75 million in advertising, or just 1.1% of the \$505 million garnered overall, mainly in TV advertising, estimates eMarketer analyst Dave Hallerman. "That revenue—both substantial for one site in only 17 days and insufficient for an event of Olympian magnitude—illustrates the market's growing pains." Users love the experience of online video, but so far the ad spending has not been high enough to support most programming.



[www.emarketer.com/Article.aspx?id=1006524&src=article1\\_newsltr](http://www.emarketer.com/Article.aspx?id=1006524&src=article1_newsltr)

## Presidential Buzz: Down To The Wire

As America goes to the polls, online buzz appears to be neck-and-neck. According to Nielsen Online's index of online discussions about political figures, Barack Obama and John McCain came out of their conventions in September nearly in a dead heat.



Convention Speaker	Buzz Index
Barack Obama	100
John McCain	97
Sarah Palin	80
Hillary Clinton	33
Joe Biden	26
George W. Bush	12
Michelle Obama	12
Bill Clinton	11
Cindy McCain	5
Ted Kennedy	5

Source: Nielsen Online (The BuzzMetrics Index measured the relative volume of online conversations after each of the party conventions, with the top speaker ranked as 100.)

[www.nielsen-netratings.com/pr/pr\\_080908.pdf](http://www.nielsen-netratings.com/pr/pr_080908.pdf)



## Chrome Redux

So, Google is launching its own Web browser called Chrome. Wow, talk about history repeating itself; over a decade ago, the guys I worked with to create DirectX at Microsoft created a revolutionary new browser product for Microsoft, also called Chrome. Apparently nobody in Google's legal department informed them that Microsoft holds the trademark for browsers with Chrome-related names ([tinyurl.com/4u5pzn](http://tinyurl.com/4u5pzn)). What's interesting is that the press release for Google's Chrome browser ([tinyurl.com/5a66q9](http://tinyurl.com/5a66q9)) is not so very different from the one Microsoft fired off about the browser it nearly launched in 1998 ([tinyurl.com/4qpgoa](http://tinyurl.com/4qpgoa)).

I wrote the Chromeffects white paper and the press release cited in that Seeking Alpha article. The whole story of Microsoft's Chrome browser is told in a book called "Renegades of the Empire," by Michael Drummond. The short version is that, having been very successful with the creation of Microsoft's media architecture, we were asked to apply our media talents to the problem of beating Netscape. Naturally, we proposed the integration of richer media with HTML and script so that Web pages could access all the powerful media features enabled via DirectX over the Web from a secure environment.

Our early contributions to the browser included licensing Macromedia's Flash player to ship with IE, shipping a VRML engine with IE, and ironically and embarrassingly (you won't hear that from me often), naming the IE browser plug-in's runtime ActiveX. Given the popularity of DirectX APIs with developers and the expectation that plug-ins would primarily be used to enable richer media (including video) in the browser, Microsoft's marketing folks felt IE's plug-in architecture should be given a DirectX-related name like "DirectBrowser." As the brand keepers for DirectX, we didn't like that idea; IE's browser plug-in design wasn't really "Direct," and we thought the name was best reserved for gaming- and media-related APIs. I suggested that they come up with their own "cool" naming convention for Web-based APIs and gave them a list of suggestions, which included "ActiveX."

The Chromeffects browser was, in many respects, a DirectBrowser. It featured a very rich

scripting language that enabled access to a broad range of DirectX media capabilities, including of course Direct3D. One of the first truly compelling demos created for Chromeffects was a mapping application that (not coincidentally) functioned exactly like Google Maps. I had left Microsoft before the completion of Chromeffects to start WildTangent. Microsoft contracted WildTangent to create the early Chromeffects technology demos including the mapping demo, which I patented and sold to Google years later.

Interestingly, the Chromeffects browser also anticipated many of the security problems that plagued all subsequent Microsoft browser releases. It did not use ActiveX controls to expose direct access to media APIs, as this was understood to be a major security flaw in browser design. Instead, Chromeffects exposed a rich set of hardware-accelerated media features via a sandboxed scripting interface including access to video, sound mixing, 2D and 3D graphics effects, and Flash-like vector graphics. Like Google's Chrome browser, Chromeffects ran each Web page as an isolated, secure process to prevent crashes from killing the whole browser or security breaches from infecting the whole PC. And like Google's Chrome, Chromeffects also sported a download manager, an obvious feature that never made it into IE.

Chromeffects was set for release in September 1998 but was mysteriously canceled just prior to that date; the popular myth was that there was a "lack of interest" in the product. The truth was that Chromeffects was designed to be a Netscape killer, and Microsoft was being indicted for "anticompetitive" practices toward Netscape ([tinyurl.com/54zqwk](http://tinyurl.com/54zqwk)) at the time. Eric Engstrom, the Microsoft GM leading the Chromeffects effort, was one of Microsoft's 12 key witnesses in the DOJ trial.

Thus Chromeffects was quietly buried, despite being finished and ready for mass-market release. It's taken Microsoft and Google almost a decade to rediscover the same ideas in browser design and security that were lost with Chrome's untimely demise. ▲



*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 multi-media browser. Today Alex is President and CEO of WildTangent Inc., a technology company devoted to delivering CD-ROM quality entertainment content over the Web.*

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



# Start your website with the World's #1 Web Host!

## No excuse for not having a website!

1&1 has everything you need to build your personal website. The 1&1 Home Package is ideal for creating an attractive internet presence for all your needs. Whether you are building a family web page or small business site, we have a package that will allow you to build your site without programming skills.



### It's easy to get on the web!

Included with all web hosting plans, 1&1 WebsiteBuilder lets you design a professional-looking website with no HTML knowledge! Using simple point-and-click prompts and a built-in text editor, creating your website has never been easier.



### FREE domains!

Sign up for one of our Web Hosting packages and receive up to 5 domain names FREE! You don't need a separate registrar!



### 90 Day Money Back Guarantee

We take pride in our reputation for reliability. If you're not completely happy within 90 days from placing an order with 1&1, you will receive your money back - no questions asked.



### All Inclusive for All Levels

1&1 gives you a choice between different web hosting packages at unbeatable prices! Easy enough for any beginner, yet powerful enough for the most demanding developer.



### Proven reliability

Choosing a reliable web host is important. 1&1 is both the world's biggest web host, and the fastest growing. Our global community is over 7 million people strong. We are financially stable, profitable, and look forward to hosting your website for many years to come.



Call **1.877.go1and1**



**Special Offers every month!**  
**Visit our website now!**

**1&1**

Best Value:  
 Compare for yourself.

**Go Daddy**

**Hostway**

	Home	DELUXE	STARTER
Included Domain Names (.com, .net, .org, .info or .biz)	<b>2</b> 2 Domains FREE	\$1.99/year	\$7.95/year
Web Space	120 GB	150 GB	100 GB
Monthly Transfer Volume	1,200 GB	1,500 GB	Unlimited
E-mail Accounts	1,200 IMAP or POP3	500 POP3	500 POP3
Mailbox Size	2000 MB	500 MB	75 MB
Website Builder	12 Pages	Additional \$8.99/month	3 Pages
Access to Open Source Application Library	✓	✓	—
Starter Software Suite	✓	—	—
Search Engine Submission	✓	—	—
90-Day Money Back Guarantee	✓	—	30-Day Money Back Guarantee
Support	24/7 Toll-free Phone, E-mail	24/7 Phone, E-mail	24/7 Toll-free Phone, E-mail
Price Per Month	<b>\$4<sup>99</sup></b>	<b>\$6<sup>99</sup></b>	<b>\$15<sup>95</sup></b>

### Featured Menu

Crab Cakes Served with Asian Greens and a  
 Aioli Up Country Salad

Assorted Julienne Vegetables,  
 with a Grape Seed Vinaigrette

Grilled Mahi Mahi in a  
 Creamy White Sauce Served  
 with Pistachio  
 and Fry Vegetables



© 2008 1&1 Internet, Inc. All rights reserved.

Visit 1and1.com for details. Prices based on comparable Linux web hosting package prices, effective 9/15/2008.  
 Product and program specifications, availability, and pricing subject to change without notice.  
 All other trademarks are the property of their respective owners.

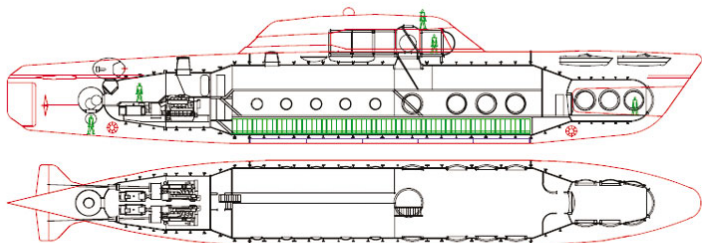
**1&1**

Visit us now **1and1.com**



# DREAM HARDWARE

These Gizmos Don't Sing It, They Bring It



Run silent, run deep. From Davy Jones's locker to the George Washington Expressway, you'll be running on noiseless electrons. When it's time to unmute your day, play that tune *adagio*.

by Marty Sems

## U.S. Submarines' Phoenix 1000

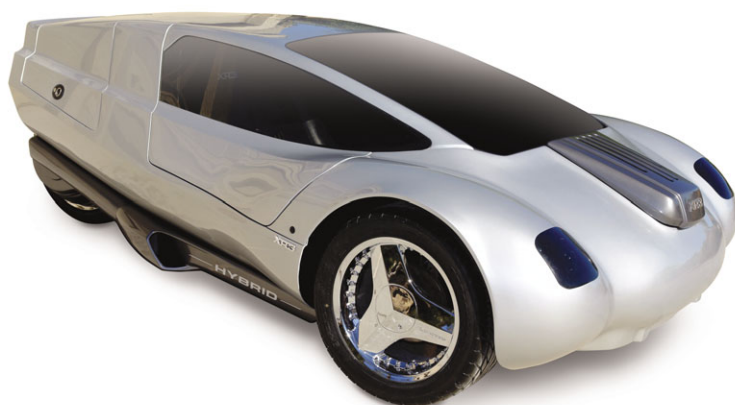
Oftentimes we range far afield in our search for dream hardware, but just imagine how far afloat you could range at the helm of a Phoenix 1000 ([www.ussubs.com](http://www.ussubs.com)). Picture yourself as a latter-day Captain Nemo, only without all the false imprisonment and murder and stuff. This underwater megayacht is more than two-thirds of a football field long with more than 5,000 square feet of interior space. It can dive to 1,000 feet—deeper than a World War II U-boat—and can cross the Atlantic with ease, not to mention stay submerged for up to 20 days. There are no torpedoes to damn, but the 8-inch thick acrylic bow makes for a truly amazing observation deck. U.S. Subs hasn't built one of these yet, so yours could be the first if your treasure chest contains \$78 million in doubloons or pieces of eight.

## Crestron Adagio Digital Media System

The winner of the Best New Technology category at CEDIA this year was the ADMS from Crestron ([www.crestron.com](http://www.crestron.com)). Not only can this AV storage and presentation system handle virtually any audio or video format in your collection, it also can stream media you buy, lease, or rent from a handful of online services, including Amazon Unbox. Better still, its WorldSearch feature finds media files without caring one whit where they're located. The 1080p system runs the gamut of AV outputs, including HDMI 1.3a. It can simultaneously feed separate audio streams to three zones, including a home-theater area (7.1-channel 24-bit/96kHz) and two stereo zones. A Blu-ray capable ADMS-BR (\$11,000), fully outfitted with 1,000 discs' worth of additional changers (five ADC-200BR units), 1TB of onboard RAID 1 storage, and a 4TB NAS with RAID 5 protection, goes for \$63,600.

## XR3 Hybrid

For bona fide gearheads, hybrid technology is the next big thing to figure out how to retrofit into classic cars and street rods. A subset of the species is the kit car DIYer. With a sub-\$10,000 to \$25,000 investment, a little experience in laying up fiberglass, and a *lot* of spare time, you could build yourself a Futurama hoopty. Following the design advice of Robert Q. Riley ([www.rqriley.com](http://www.rqriley.com)), author of the book *Alternative Cars in the 21st Century*, you could build a 125mpg diesel or 225mpg diesel hybrid with a three-wheeled frame. The two-seat XR3 Hybrid prototype weighs less than 1,500 pounds and has a top speed of 80mph. Plans and diagrams cost \$170, but for \$200 you'll also get CAD files and 3D models for bespoke component fabrication via waterjet or laser. Riley says that complete kits may be on the way. ▲



# DDR Deathmatch

## A Collection Of Kits Duke It Out For Memory Supremacy

There's no doubt about it—DDR2 is the most prolific system memory technology currently in use. All of AMD's platforms rely on it, because the Phenom

that a number of motherboard vendors will adopt speeds as high as 2,000MHz to push performance even further.

AMD is also expected to hop onboard



**TWIN2X4096-8500C5D**

\$135

Corsair

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



and Athlon processors all have integrated memory controllers able to recognize DDR2 modules exclusively. And although Intel is pushing the advantages of DDR3 memory, most third-party motherboard vendors are still arming Core 2-based platforms with DDR2 slots. After all, DDR2 is the incumbent. It's significantly less expensive and, thus far, almost every bit as fast as DDR3.

But the undisputed reign of DDR2 is coming to an end, just like DDR before it. The imminent launch of Intel's Nehalem architecture will not only see the X58 chipset embrace three channels of memory in lieu of two, adding extra throughput, but it will also support DDR3 alone. Officially, you should only expect Intel to advocate DDR3-1066. Behind closed doors, however, it's clear

with DDR3, though it won't be cutting ties with DDR2 entirely. According to the company's internal roadmaps, AMD plans to launch its Socket AM3 interface at the end of 2008, simultaneously introducing DDR3 and its 45nm Deneb quad-core Phenom. Those AM3-based chips should drop into AM2+ motherboards, extending the life of systems using DDR2. However, you won't be able to drop an AM2+ processor into one of the newer boards because the older Phenoms and Athlons don't have DDR3 memory controllers built in.

And so, DDR2 and DDR3 will be your memory options through 2009, the former fading as the latter receives intensified backing from Intel, followed by AMD's joining the party. By rounding up a handful of memory kits centering on

both technologies, we seek to find the best options for overclocking, value, and overall performance.

### Corsair TWIN2X4096-8500C5D

The first kit to hit our lab is Corsair's verbosely named TWIN2X4096-8500C5D, a 4GB package consisting of two 2GB memory modules. Rated for DDR2-1066 frequencies, an enthusiast kit like this is ideal if you're building a new system using an AMD Phenom X3 or X4 processor, which officially caps out at 1,066MHz.

Of course, raw frequency is just one variable in the performance picture. Corsair also emphasizes the low latencies of its Dominator family, to which the TWIN2X4096 belongs. At 2.1V, Corsair says that the 1,066MHz modules can achieve timings of 5-5-5-15-2T. Bear in mind that JEDEC, the semiconductor engineering standardization body responsible for defining DDR2, originally only went up to DDR2-800 in its list of DDR2 speeds. DDR2-1066 was added after the fact as a specialty spec late in 2007. Nevertheless, it bears the same 1.8V recommendation, so these Corsair modules are running a little "hot" vs. the official sanction.

Corsair deals with the higher voltage (and the increased heat generated as a result) by sandwiching the ICs on both sides of its PCB with thin extruded aluminum heatsinks. If you take a top-down look at the modules, you'll actually see four rows of fins. The outer pair draws heat from the memory chips themselves, while the inner two pull heat from the circuit board.

If you're building a Phenom-based enthusiast-class machine, modules like Corsair's TWIN2X4096-8500C5D are ideal for several reasons. First, they take advantage of the fastest speed grade recognized by AMD's built-in controller. Second, they sport ultra-low timings—a one-two punch for realizing great performance. An unlocked Phenom Black Edition CPU on a 790FX/SB750-based motherboard is going to yield the best



overclocking results without ever needing to get involved with extreme memory tweaking.

But ironically, in order to get the most comparable benchmark scores, we shied away from the Phenom/790FX combo and tested using Asus' 780i-based Striker II Formula motherboard armed with the same Core 2 Duo E8500 used to evaluate the other five kits. Corsair's Dominator kit had little trouble keeping up with and, in the case of our Photoshop test, beating the DDR3 contenders. Of course, the extra burst of speed comes from running 4GB of capacity. We're at an inflection point now where the move to 4GB does outweigh an extra bit of frequency.

### Crucial 2GB Ballistix DDR2-800 (BL2KIT12864AA80A)

You don't always need to spend big money to garner great performance. Priced under \$60, this 2GB Crucial Ballistix memory kit centers on DDR2 technology rated for 800MHz. We heard great things about its overclocking headroom, though, and wanted to see how far these modules would go. But before we tune the 1GB sticks, it's worth noting that even at stock settings, Crucial's kit puts up a respectable fight. It is officially rated at 800MHz, running aggressive 4-4-4-12 latencies. Matched to an older, pre-Phenom AMD processor with a memory

controller limited to 800MHz, these modules make for a perfect drop-in.

The Ballistix modules use nearly as much voltage as Corsair's Dominator family—a whopping 2.0V. Like Corsair, Crucial employs heat spreaders to help combat the effects of pumping more juice through the modules. The orange aluminum plates don't quite cover all of the memory

**2GB (1GBx2)**  
**Ballistix DDR2-800**  
\$54.99  
Crucial  
[www.crucial.com](http://www.crucial.com)



ICs, but that doesn't seem to hurt their performance at all. And despite overshooting JEDEC's 1.8V standard by 0.2V, Crucial's offering handles heat without an issue. But just in case these modules succumb to electromigration due to the elevated voltage, Crucial also protects the 2GB kit with a lifetime warranty; you're covered.

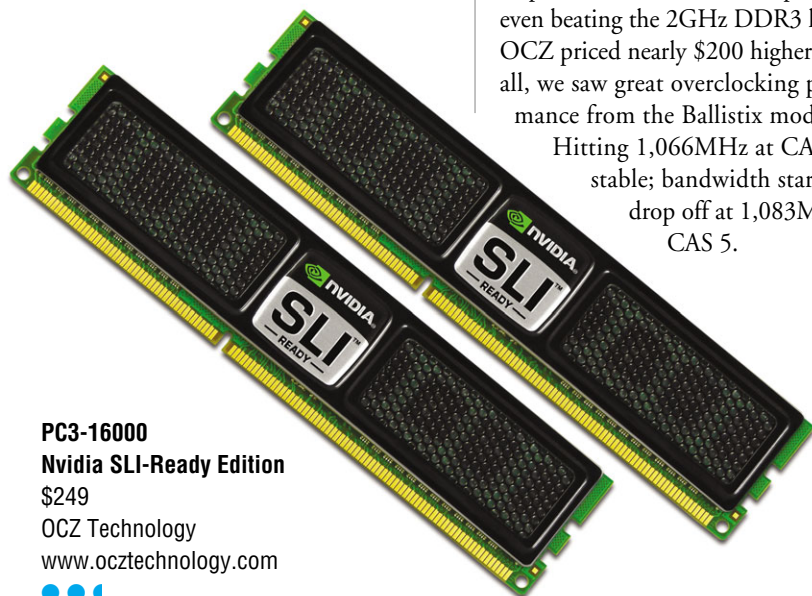
Crucial's kit steps into this technological cage match at a disadvantage. It not only centers on aging DDR2 but also runs at just 800MHz and offers 2GB of capacity as a kit. Although memory bandwidth at default settings clearly lags, overall performance remains competitive—even beating the 2GHz DDR3 kit from OCZ priced nearly \$200 higher. Best of all, we saw great overclocking performance from the Ballistix modules.

Hitting 1,066MHz at CAS 4 was stable; bandwidth started to drop off at 1,083MHz at CAS 5.

### OCZ Technology PC3-16000 Nvidia SLI-Ready Edition

You already know what SLI means to the graphics world, but why care about SLI-ready memory? At the platform level, SLI has more to do with compatibility and stability than performance. An SLI certification means that you can drop a pair of modules into an nForce-based motherboard with GeForce GPUs, and a similarly certified power supply, and not run into configuration issues. Part of that ease-of-use message involves supporting EPP (Enhanced Performance Profile) settings. So, when you install these OCZ DDR3 modules into a 790i-based board, for instance, it'll expose certain settings that wouldn't be available otherwise.

Running at full-tilt, OCZ's fastest available SLI-Ready Edition kit operates at 2,000MHz with latencies of 9-9-9-30. Higher timings are the price you pay for the scorching frequency. The 2GB kit employs 1.8V to hit its 2GHz target. That'd be within spec if these were DDR2 modules. However, DDR3 uses a 1.5V supply voltage, so 1.8V is actually a substantial boost. Don't worry, though: OCZ protects against the over-aggressive factory settings with a lifetime warranty. Just bear in mind that OCZ only sells this extreme setup in a 2GB kit, and the 790i-based motherboards we've seen only work with two of four



**PC3-16000**  
**Nvidia SLI-Ready Edition**  
\$249  
OCZ Technology  
[www.ocztechnology.com](http://www.ocztechnology.com)



LIMITED TIME OFFER  
ENDS DEC 31, 2008

# FREE UNLIMITED WEB HOSTING FOR A YEAR

## Start Making Money Now with Reseller Web Hosting

Build your own web hosting business with our powerful reseller solution. Unlimited web hosting **FREE** and without obligation for a year! (Offer applies to the subscription fee only)

Host unlimited websites, email and domain names in our world-class US data center and resell everything under your own brand. Ideal for web designers, developers and entrepreneurs.

**Reseller**  
WEB HOSTING PACKAGE

NORMALLY  
~~\$50~~  
PER MONTH

**FREE**  
UNLIMITED  
WEB HOSTING  
FOR A YEAR

### ★ Unlimited Websites

Total flexibility - create your own web hosting solutions or resell our white-label plans.

### ★ Unlimited Bandwidth

Unlike other providers, we don't limit your website traffic or charge you extra.

### ★ Unlimited Web Space

Host large websites knowing you'll never have to pay for more space again.

### ★ Unlimited Email

Resell unlimited POP3/IMAP mailboxes and offer complete Hosted Microsoft Exchange solutions.

#### Great Features and Benefits

- Create your own plans and custom solutions
- Load balanced Windows and Linux options
- Fast US web servers in our world-class data center
- Private-label tools - use your own brand name

See website for details



Unlimited  
Web Hosting



Unlimited  
Email



Low Cost  
Domain Names



Private-label  
Branding



100%  
Online Control



US Based  
Data Center



24/7 Technical  
Support



## 24/7 Technical Support

- Experts on hand whenever you need them
- 24/7 helpline and email support
- In-house professionals based in the US
- Comprehensive reseller support website

## The Flexible One-Stop Reseller Hosting Package

Start Making Money Today at

**www.fasthosts.com**

or Toll Free: 1-877-440-5515

Fasthosts and the Fasthosts logo are trademarks of Fasthosts Internet Inc



World Class Web Hosting



slots populated. Plug memory into the wrong place and you'll run into serious stability issues. Unfortunately, that also means a 2GB memory ceiling—potentially problematic in a Windows Vista environment.

Moving forward, we already know that certain motherboard vendors will be adding DDR3-2000 support to their Intel X58-based designs, expanding the appeal of this kit beyond Nvidia's 790i chipset. At \$249, the SLI-Ready kit is awfully expensive for a scant 2GB of memory. Moreover, we're not exactly bowled over

by the loose timings. Enthusiasts who don't mind riding the bleeding edge of technology might want to check out OCZ's 2GHz DDR3 kit, but it's only really a sure thing if you're willing to tolerate 2GB on a 790i motherboard. Come X58, you'll still be one channel short of a trio.

Bottom line: You'll only want to pay big bucks for this 2GHz kit if you know you need the guaranteed clock speed. Otherwise, you're giving up too much in capacity to make the 1GB modules worthwhile. Our Evga 790i test bed

wasn't able to manually set a memory frequency between 2,000MHz and 2,075MHz either, so our efforts to break 2,080MHz failed even after timidly applying 2.1V. Minimal overclocking, a fairly steep price tag, and 2GB in a 4GB world? We'll pass, at least until larger kits become available.

### OCZ PC3-12800 Reaper HPC (4GB)

If you thought those DDR3-2000 modules were expensive, then OCZ's PC3-12800 Reaper HPC kit is going to look even more extravagant. Ah, but wait. This is a 4GB kit made up of two 2GB modules. That's much better for folks looking to run Vista on a high-performance machine. OCZ rates the PC3-12800 combo at 1600MHz with 7-7-7-24 timings. It doesn't boast the raw clock speed of OCZ's 2GHz SLI-Ready solution, but lower timings help make up for the frequency gap.

Interestingly enough, these modules require a higher voltage (1.9V) to reach 1,600MHz than the SLI-Ready kit needed to achieve 2GHz. Chalk it up to the denser 2GB modules, which very often

## Memory By The Numbers

We built two test beds in order to test these 2GB and 4GB kits. Both platforms shared an Intel Core 2 Duo E8500, a GeForce GTX 280 graphics card, a PC Power & Cooling 1kW PSU, and a 1TB Seagate Barracuda 7200.11. The DDR2-based machine employed an Asus Striker II Formula motherboard, and the DDR3 setup used Evga's reference 790i Ultra SLI board. All configurations were tested under Windows Vista Ultimate and Nvidia's GeForce release 178.13/nForce 15.23 driver packages.

Each of our real-world benchmarks is designed to reflect actual performance, and as you can see, there is often very little performance difference between memory kits sporting similar capacities. The most marked variance is introduced by our Photoshop test, which applies a series of filters to a reference image. Meanwhile, the virus scan and video conversion tests are not nearly as telling.

	TWIN2X4096-8500C5D	2GB Ballistix DDR2-800	PC3-16000 Nvidia SLI-Ready Edition	PC3-12800 Reaper HPC
Manufacturer	Corsair	Crucial	OCZ	OCZ
Capacity	4GB (2x 2GB)	2GB (2x 1GB)	2GB (2x 1GB)	4GB (2x 2GB)
Rated frequency	DDR2-1066	DDR2-800	DDR3-2000	DDR3-1600
Voltage	2.1V	2.2V	1.8V	1.9V
Rated timings	5-5-5-15	4-4-4-12	9-9-9-30	7-7-7-24
Sandra Integer Buffered iSSE2	7.38GBps	7.17GBps	7.68GBps	7.64GBps
Sandra Floating Point Buffered iSSE2	7.37GBps	7.13GBps	7.6GBps	7.62GBps
Adobe Photoshop*	1:35	1:49	2:11	1:34
Virus scan*	2:39	2:38	2:40	2:38
MPEG2 to H.24 conversion*	4:08	4:04	4:06	4:04
Best overclock	1,111 MHz, CAS 5	1,083 MHz, CAS 5	2,000 MHz, CAS 9	1,866 MHz, CAS 8
Price	\$135	\$54.99	\$249	\$299
CPU	●●●●	●●●●	●●●●	●●●●
*minutes:seconds				

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

give up performance in the interest of capacity and similarly suffer reduced over-clocking headroom, as well. We think the tradeoff is worth it in order to get 4GB while only populating two slots.

OCZ prepares the Reaper kit for additional voltage by outfitting it with a fancy cooling solution, HPC (heatpipe conduit). In essence, two strips of aluminum sandwich the memory ICs on either side of OCZ's PCB. Heat dissipates through the plates and flows through the rounded copper heatpipe above the PCB. A slotted block of aluminum envelops the copper, suspended over the PCB, helping shed the heat faster.

Remember that JEDEC specs DDR3 memory at 1.5V, so a bump to 1.9V is more than just a minor-league tune. The good news is that despite the aggressive settings, OCZ still stamps its Reaper kit with a lifetime warranty. Of course, pushing higher voltages in the hope of more megahertz is going to void that protection, so be wary of overclocking already-overclocked memory.

If you need another reason to consider this slightly slower solution with tighter

### PC3-12800 Reaper HPC 4GB

\$299

OCZ Technology

www.ocztechnology.com



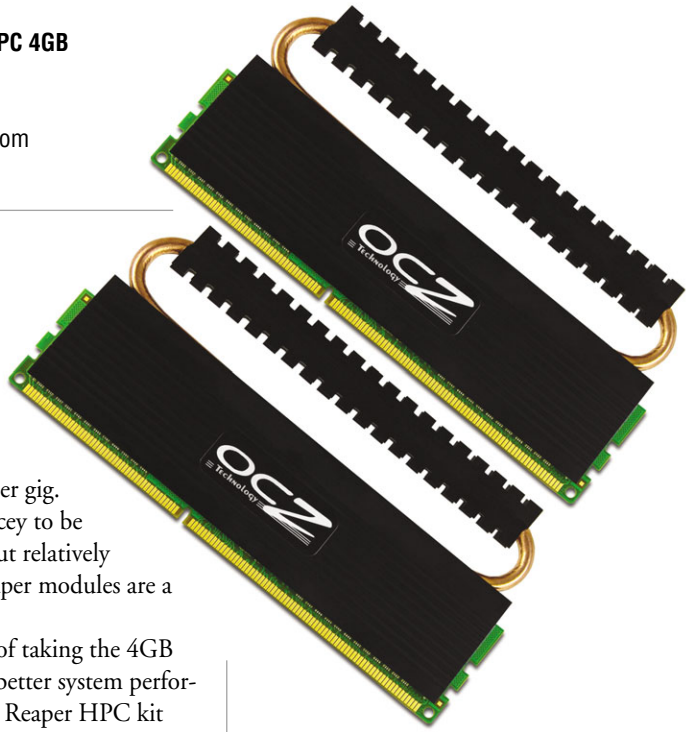
timings instead of a 2GB, 2GHz kit, look at the price per gigabyte. At \$299, you're paying \$75 per gig. A pair of 2,000MHz modules runs \$125 per gig. DDR3 is still too pricey to be considered a value, but relatively speaking, OCZ's Reaper modules are a much better buy.

The overall result of taking the 4GB route is quantifiably better system performance. Although the Reaper HPC kit "only" runs at 1,600MHz, it finished our H.264 conversion, virus scan, and Photoshop photo filter benchmarks faster than the higher-frequency kit—and delivered comparable throughput at a lower cost per gigabyte. We were able to push the 1,600MHz kit up to 1,866MHz by loosening up timings just slightly to 8-8-8. Any higher and we'd need to deal with a CAS 9 setting.

### Patriot Memory PDC32G1866LLK

Lying somewhere in between OCZ's 1,600MHz and 2,000MHz kits is Patriot's own entry into the high-end DDR3 market. Sporting a 1,866MHz frequency and timings set at 8-8-8-24, it strikes a balance between clock speed and latency in addition to costing \$50 less than the SLI-ready offering in this roundup. At \$199, that means you're paying \$100 per gig.

In order to hit those premium settings, though, Patriot requires that its Extreme



Performance modules run at 1.9V. Unlike OCZ's Reaper HPC modules, however, Patriot doesn't use fancy cooling. Rather, the twin-module kit is actually fairly plain-looking, with modest aluminum heat spreaders covering each side of the PCB and nothing else suggesting an enthusiast pedigree. We're not worried about cooling performance affecting longevity, though. Patriot similarly applies its own lifetime warranty to the proclaimed low-latency kit.

Perhaps you're thinking that DDR3-1866 sounds like one of those strange in-between speed grades that's never standardized. Indeed, JEDEC hasn't defined it yet. So who would want a kit running at 1,866MHz? In short, it's going to be the overclocking devotee eying an Intel platform and relying on serious FSB tuning in order to get his 45nm CPU cranking along in excess of 4GHz with ample bandwidth. If you're running more

	PDC32G1866LLK	W1800UX2GP
	Patriot Memory	Super Talent
	2GB (2x 1GB)	2GB (2x 1GB)
	DDR3-1866	DDR3-1800
	1.9V	2.0V
	8-8-8-24	7-7-7-21
	7.37GBps	7.48GBps
	7.43GBps	7.47GBps
	1:46	1:47
	2:38	2:37
	4:01	4:03
	1,934 MHz, CAS 8	1,925 MHz, CAS 8
	\$199	\$189
	●●●●	●●●●

The undisputed reign of DDR2  
is coming to an end,  
just like DDR before it.





# PDC32G1866LLK

\$199

Patriot Memory

www.patriotmem.com



conventional settings, you'd likely be better off with a slower kit with tighter timings and a cheaper price tag.

Thankfully, our 790i-based test platform took the 1,866MHz setting without a problem. That's more than we can say for Super Talent's 1,800MHz kit, which the BIOS throttled back to 1,777MHz. Performance at the Patriot kit's rated settings was reasonable for a 2GB kit and in line with the other DDR3 kits. Perhaps most interesting was the fact that we were able to hit 2GHz at CAS 8 with these, although stability wasn't perfect. We eventually settled on 1,934MHz at CAS 8 and saw a marked improvement to memory bandwidth.

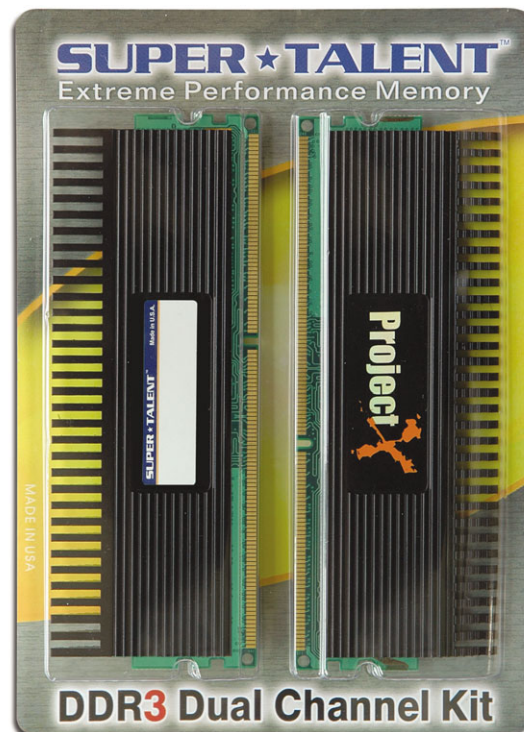
## Super Talent W1800UX2GP

Super Talent's offering another enthusiast DDR3 memory kit sporting a nonstandard clock speed. And yet, this one still manages to impress, given its claims of enhanced performance. Super Talent's 2GB DDR3-1800 package sacrifices just a hair of frequency in favor of exciting 7-7-21 timings. The compromise should be worthwhile given the importance of both figures in determining performance.

The key to hitting fast frequencies and audience-pleasing latency numbers really seems to be lower-capacity single-rank modules. That's why Super Talent's fastest 4GB 1,800MHz kit is only able to manage 8-8-24. But in order to run at 1.8GHz and CAS 7, Super Talent requires no less than 2.0V, a greater than 30% increase over the

JEDEC specification. Despite this, Super Talent keeps up with the pack and maintains a lifetime warranty on its Project X memory kit.

In order to help keep the memory ICs cool enough to run reliably, Super Talent attaches a single-sided heatsink to the chips themselves. Slotted fins rise up above each PCB with the hope of maximizing cooling surface area and keeping temperatures down. The resulting slim profile makes it easy to install these



# W1800UX2GP DDR3-1800

\$189

Super Talent

www.supertalent.com



modules side by side on motherboards where wider, bulkier kits might not fit.

According to Super Talent, its Project X kit is perfect for P35- and X38-based motherboards. Unfortunately, Nvidia's 790i Ultra SLI didn't seem to make that cut. Super Talent's DDR3-1800 2GB package was the only one to not run stably at its rated settings. We manually keyed in 1,800MHz to our Evga test bed, which translated to 1,777MHz after filtering through the board's multiplier, setting a 7-7-7 latency config, and requesting 2.0V of juice from the BIOS. Windows Vista would boot without incident, but random crashes sent us back to the board's BIOS. After a little more trial and error, we settled on significantly looser 8-10-10-2T timings to achieve stability at 1,777MHz. Naturally, the luster of a high-speed, low-latency kit quickly wears off when it isn't able to hit its advertised frequency or timing.

There is a silver lining, though. Despite lower-than-average memory bandwidth numbers, the Project X kit did beat both of OCZ's offerings in the virus scan and H.264 conversion tests. But at the end of the day, paying fewer dollars per gigabyte for the 4GB Reaper HPC kit is still the better choice.

We were able to hit 1,925MHz at CAS 8 with Super Talent's Project X modules, but performance actually decreased the higher we went. Clearly, overclocking is a matter of diminishing returns here. ▲

by Paul Cross



# YOU DREAM IT, WE BUILD IT™

MAXIMUM PERFORMANCE

- FREE Shipping
  - \$250 Instant Savings
  - Same Day Shipping\*
- \*On Select Configurations



## Gaming Dominator



Powered by the Intel Core 2 Quad Processor



## Best Bang for Buck



Powered by the Intel Core 2 Quad Processor



## Mobile Powerhouse



Powered by the Intel Core 2 Duo Processor



## Power and Value



Powered by the Intel Core 2 Quad Processor



## TwisterBoost™ Overclocking

Our unique performance enhancement package pushes today's bleeding edge hardware to the next level. Experience tomorrow's performance today.

## FrostBite™ H<sub>2</sub>O Cooling

Our research and development team has designed a quiet and effective method of dissipating heat to maximize performance and stability.

## A Company That Cares

Customer satisfaction is our highest priority. Don't just take our word for it, read honest customer reviews in our community forums.

Visit our website now ([DigitalStormOnline.com](http://DigitalStormOnline.com)) and customize your next system with the assistance of our expert staff and advice from a dedicated community of hardcore gamers, knowledgeable enthusiasts, and past customers.

3 Year Warranty | Lifetime U.S. Based Support | 30 Day Money Back Guarantee



**CUSTOMIZE / BUY**  
**1.866.817.8676**  
**[www.DigitalStormOnline.com](http://www.DigitalStormOnline.com)**

© 2008 Crytek GmbH. All Rights Reserved. All prices are subject to change without notice or obligation. Digital Storm is not responsible for any typographical and photographic errors. Copyright © 2008 Digital Storm. All rights reserved.



## Intel X25-M

When you stop to think about the construction of the average SSD, it's apparent that the incumbent players that exist in the standard hard drive market will likely not be the same that will dominate in SSDs. Take a peek under the hood of any SSD, and you'll see it's an all-semiconductor play. Thus, the players to watch will be the top dogs in chips.

Although you might not think of Intel as a powerhouse memory manufacturer, it's had a stake in NAND flash memory for a very long time.

We took a look at Intel's first mainstream SSD, an 80GB MLC (multilevel cell) SATA 3Gbps drive, the 2.5-inch X25-M 80GB. Intel specs the SSD as

offering up to 250MBps read bandwidth and up to 70MBps of write bandwidth, along with an 85 microsecond read latency. We compared the performance of Intel's new X25-M to a number of offerings—both MLC- and SLC-based—from OCZ, SuperTalent, and Mtron, many of which were actually rebranded Samsung drives.

The results were refreshing against the backdrop of what we're used to seeing from many MLC NAND-based SSDs, where random write performance is extremely inconsistent due to intrinsic MLC Flash erase/rewrite latencies.

Intel's foray into the SSD market looks to be taking off in typical Intel



**X25-M**  
\$595  
Intel  
www.intel.com  
●●●●●

**Specs:** Capacity: 80GB; 1,000G operating (.5ms) shock; wear-leveling, 1.2 million hour MTBF

fashion. We recommend the X25-M, if you have the extra cash for an SSD. ▲

by Dave Altavilla

### Benchmark Numbers: Intel X25-M

IOMeter - Workstation Pattern	
Iops	3778.4
MBps	29.51
Average response time (ms)	0.264
CPU Utilization	2.08%
HD Tach	
Avg. read (MBps)	214
Avg. write (MBps)	76
Burst speed (MBps)	224.5
CPU utilization	6%
PCMark Vantage - HDD Performance Module*	
Gaming	188.64
Vista Startup	183.9
Windows Defender	187.67
Windows Photo Gallery	208.66
Windows Media Player	130.17
Application Loading	125.91
Windows Movie Maker	106.4
Windows Media Center	117.47

\*All scores are in MBps.

## Dell Studio Hybrid 140G

Lately eco-friendly computing, with its low power footprint, has been all the rage. In addition, the recent explosion of less-is-more machines, from the new class of "Netbooks" to bleeding-edge SFF desktops, has sparked a revolution of minimalist design innovation that is an industry trend all its own. Dell had its eye on the proverbial ball and recently released a product called the Studio Hybrid, a mini-desktop machine that takes on the task of power-efficient computing in a space-saving design.



**Studio Hybrid 140G**  
\$749 (as tested)  
Dell  
www.dell.com  
●●●●●

The Dell Studio Hybrid is a 4.8-pound machine that measures about 8.5 inches tall and is built around Intel's Mobile 965 Express chipset, which includes Intel's integrated X3100 graphics. Although the chipset only partially offloads the digital video processing stack, the Hybrid we tested came equipped with an Intel Core 2 Duo T5850 mobile processor clocked at 2.16GHz, which is more than enough horsepower to play back 1080p content.

The system also has a built-in Gigabit Ethernet port, five USB 2.0 ports, a FireWire port, and DVI and HDMI video outputs.

In testing, the machine was quiet and responsive with the kind of performance and "feel" you would expect from a full-sized desktop. At idle, the Studio Hybrid consumed about 28 watts of power; it

### Benchmark Numbers: Dell Studio Hybrid 140G

3DMark06	
Overall	453
SM2.0	144
SM3.0/HDR	169
CPU	1775
Cinebench 10	
Multithreaded (min:sec)	3:41
Multithreaded (score)	3989
PCMark Vantage Pro 1.0	
Overall	2898
Memories	1604
TV and Movies	2248
Gaming	1426
Music	3177
Communications	3284
Productivity	2172
HDD	2482

drew approximately 63 watts under full load. Although the machine doesn't have any sort of real gaming potential, it does make for a sleek and stylish business-class desktop or HTPC that's also pretty miserly on power. ▲

by Dave Altavilla

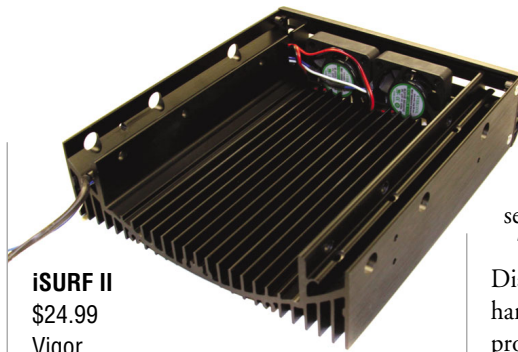
**Specs:** CPU: 2.16GHz Intel Core 2 Duo T5850; Memory: 3GB DDR2-667; HDD: 160GB at 5,400rpm; Optical Drive: 6X DVD±RW/BD-ROM; GPU: Intel X3100

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

# Vigor iSurf II

You probably recognize Vigor Gaming as a company that builds custom gaming rigs, but you may not know them as a company that also sells cooling components. I recently got my hands on Vigor's iSurf II HDD cooling system. This attractive cooler is made of aluminum and has two 40mm reversible fans to help dissipate heat from your hard drive quickly. These fans run at 4,000rpm and are relatively quiet. I didn't notice a big increase in noise while the fans were running. To add to the look of the cooler, Vigor included a blue power LED. A nice option, the iSurf II has two power connectors: one that powers the LED and the cooler and one that powers only the cooler.

A series of cooling fins, rather than a solid surface, touch the drive at 15 points.



**iSURF II**  
\$24.99  
Vigor  
www.vigorgaming.com  
●●●●●

A solid, curved piece of aluminum that spans the width of the cooler connects these fins.

Installation is straightforward: You simply place the drive in the U-shaped opening and secure it with screws. If you tighten one side completely, the other

side of the drive won't touch the cooler—there's about 1/16 inch of extra space side-to-side. Even with the small amount of extra room, however, the screws held the drive securely in place.

To test the iSurf II, I used a Maxtor DiamondMax Plus 200GB ATA/133 hard drive connected to two temperature probes on either side of the spindle motor. I then used a Thermaltake Hardcano 13 to measure the temperature of the drive. I tested the drive on its own and while attached to the cooler. To put the drive under load, I ran PC Mark Vantage's hard drive benchmark. The hard drive reached 41 degrees Celsius on its own and 35 C while in the cooler.

The iSurf II is both attractive and affordable. More importantly, it effectively pulls heat off your hard drive. ▲

by Jennifer Johnson

**Specs:** Approximate chassis dimensions: 1.63 x 5.59 x 6.77 inches (HxWxD); aluminum material; two 4,000rpm 40mm fans; 12V DC fan voltage rating; 1.29 pounds

# Asus G50V

The first day I had the G50V at my desk, three people stopped by and commented on the styling of this notebook, specifically mentioning that the bright orange casing caught their eye. A few also mentioned the status panel, which adds to the look by displaying helpful system status information without taking up valuable screen real estate.

Of course, looks are important, but so is performance. The G50V returned decent scores in CPU-intensive benchmarks, such as the CPU component of 3DMark Vantage, Cinebench 10, and WinRAR. It didn't score quite as well on GPU-intensive benchmarks, such as World in Conflict, however. (It reached 9fps in this game.)

While testing, I ran into one minor glitch with this notebook: World in Conflict needed a graphics driver update before it would run properly. Although the driver isn't available through the

**G50V**  
\$1,699 (as tested)  
Asus  
www.asus.com  
●●●●●



download or support page for the G50V, it is available by navigating to Asus' Download page, selecting Notebooks, Drivers for the Series (not G50 as one might expect), and VGA for the Model.

One of the really cool features of the G50V is Express Gate, an instant-on environment where you can access several applications without booting Windows. From the Express Gate menu, you can choose Web, Music, Online Games, Photo, Chat, and Skype. For example, as you choose an option, such as Web, it loads a browser. When you're finished using Express Gate, you can power down or boot Windows normally. ▲

by Jennifer Johnson

**Specs:** CPU: 2.53GHz Intel Core 2 Duo T9400; Memory: 4GB DDR2-800; HDD: 500GB (2x 250GB) 5,400rpm; GPU: Nvidia GeForce 9700M GT (512MB GDDR3); Display: 15.4-inch (1,680 x 1,050); OS: Windows Vista Home Premium 64-bit SP1

## Benchmark Numbers

GPU Score	1583
GPU1 (fps)	4.37
GPU2 (fps)	4.91
CPU	5183
CPU1 (Plans/s)	693.21
CPU2 (Steps/s)	7.48

<b>Cinebench 10</b>	
Multithreaded (min:sec)	2:30
Multithreaded (score)	5863

<b>Dr. DivX 2.0.1*</b>	5:33
------------------------	------

<b>PCMark Vantage Pro 1.0**</b>	
Overall	4480
Memories	2817
TV And Movies	2726
Gaming	3829
Music	3537
Communications	4483
Productivity	3658
HDD	2615

<b>POV-Ray 3.7 Beta***</b>	1177.83
----------------------------	---------

<b>WinRAR 3.71*</b>	2:51
---------------------	------

<b>S.T.A.L.K.E.R.</b>	22.158
-----------------------	--------

<b>World in Conflict</b>	9
--------------------------	---

\* minutes:seconds  
\*\* Tested at 1,280 x 960  
\*\*\* pixels per second  
\*\*\*\* Games tested at notebook's native resolution: 1,680 x 1,050



GIGABYTE™

# COPPER COOLED QUALITY

GIGABYTE Ultra Durable™ 3 Motherboards

DDR2 1366+

Unique Technology from GIGABYTE

## Ultra Durable 3

2oz Copper PCB  
50,000hrs. Japanese Solid capacitor  
Lower RDS(on) MOSFET  
Ferrite Core Choke

Ultra Durable3 vs  
Traditional  
Motherboard Temp.

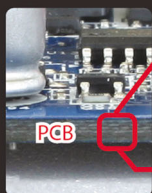
50°C

Cooler

Ultra Cool

## 2oz

Copper PCB



PCB layer cross-section image, magnified 200x

New Design

## 2oz

Copper Inner layer

Old Design

## 1oz

Copper Inner layer



## 2oz

Copper Inner Layer

Ultra Cool

Ultra Performance

Ultra Durable

Ultra Power Efficient



Supports



GA-EP45-UD3P



GA-EP45-UD3R



For more information, please call our distributor

NCIX.com

new egg.com

mwave.com

Zip2omfly.com

Quality Components Makes Quality Motherboards

www.gigabyte.us



# CyberPower PC Gamer Xtreme XE

Think you need to spend more than \$2,000 to get a quality gaming machine? Boasting ATI's Radeon 4870 X2, an Intel Core 2 Quad Q9550, and 4GB of DDR3 memory, CyberPower's Gamer Xtreme XE posted impressive scores in both our synthetic and real-world benchmarks, including 19fps in Crysis, 41fps in World in Conflict, and 67fps in Company of Heroes.

CyberPower used a Cooler Master Centurion 590, and we like that the builder took advantage of the case's tool-less chassis design. Our Gamer Xtreme XE features Asetek Liquid CPU Cooling System, and CyberPower overclocked the processor from 2.83GHz to 3.6GHz. There are plenty of expansion options, including a free PCI-E x16 slot and three PCI-E x1 slots, and we like that the Radeon 4870 X2 graphics card (or even a second 4870 X2) had room to breathe. CyberPower didn't cut a side window, but with blue LEDs in the two top-panel fans and the front chassis, the Gamer Xtreme XE produced some attractive exterior lighting.

CyberPower attached a 120mm fan to the case's side panel to vent hot air, and in conjunction with the two top-panel fans, the Gamer Xtreme XE had decent airflow. In terms of storage, our Gamer Xtreme XE featured two 500GB Hitachi Deskstars. If you're looking for faster performance, you can configure the Gamer Xtreme with a Western Digital Raptor and still pay less



**Gamer Xtreme XE**  
\$1,699 (as tested)  
CyberPower PC  
www.cyberpowerpc.com  
●●●●●

than \$2,000 for this system. A Sony BR-5100S drive gave us the ability to play BD movies, and an LG GE20LU10 20X LightScribe-capable DVD Multi-Recorder provided burning capabilities. We also like that CyberPower included a 12-in-1 card reader for convenient access to the popular media card formats.

Although the Gamer Xtreme XE didn't break any records in our benchmarks, it posted scores within range of many of the top-notch systems (see "Leaders Of The Pack" on page 20 of the September 2008 issue of *CPU*) we saw in our dream PC roundup. The graphics processing power of the Radeon 4870 X2 shined in our gaming benchmarks. The Gamer Xtreme XE achieved a playable frame rate of 38fps in Crysis when we changed all the settings to High, and its 19fps at the Very High settings was also impressive. In addition, scores of 13930 (multithreaded) in Cinebench 10 and 3333pps in POV-Ray 3.7 Beta place the Gamer Xtreme XE's results near those of the dream PCs.

A PCMark Vantage Pro overall score of 7074, which includes a 5633 Gaming score, is also notable considering the system price.

The Gamer Xtreme XE is a well-designed, capable system. Of course, its affordable price is also appealing. ▲

by Nathan Lake

**Specs:** CPU: Intel Core 2 Quad Q9550 @ 3.6GHz; Motherboard: Gigabyte EP45T-DS3R (Intel P45 chipset); RAM: 4GB Kingston HyperX DDR3-1375; HDD: 500GB Hitachi Deskstar (2x; RAID 0); GPU: ATI Radeon 4870 X2; PSU: Corsair TX650W (650 watt); OS: Windows Vista Home Premium

## Benchmark Results CyberPower Gamer Xtreme XE

### 3DMark Vantage

Overall	P14402
GPU	14407
CPU	14387

### Cinebench 10\*

Multithreaded (score)	13930
Multithreaded (min:sec)	1:01

### Dr. Divx 2.0.1\*

3:20

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

3333

### PCMark Vantage Pro 1.0

Overall	7074
Memories	5275
TV And Movies	4992
Gaming	5633
Music	5622
Communications	6657
Productivity	6364
HDD	4829

### SiSoft Sandra Lite XII SP1

Processor Arithmetic	
Dhrystone ALU (MIPS)	61836
Whetstone iSSE3 (MFLOPS)	51100

### Processor Multi-Media

Integer x8 iSSE3 (itps)	468,794
Floating Point x8 iSSE2 (itps)	217,627

### Memory Bandwidth

Integer Buffered iSSE2 (GBps)	7.00
Floating-Point Buffered iSSE2 (GBps)	6.95

### WinRAR 3.71\*

1:53

### Crysis 1.1

19

### Company of Heroes 2.1.0.2 (4XAA)

67.7

### World In Conflict 1.005 (4XAA, 4XAF)

41

### S.T.A.L.K.E.R 1.0005

95

\* minutes: seconds

\*\* pixels per second

Games tested at 2,560 x 1,600.



# Digital Storm Benchmark Crusher

When you purchase a high-end desktop from a boutique builder, you want a system that looks as impressive as it performs. Digital Storm's Benchmark Crusher is a custom PC that has the appearance, both inside and outside, of a high-quality custom desktop. Additionally, the Benchmark Crusher delivered scores that live up to its prideful, if not lofty, moniker.

The StormWhite high-gloss automotive finish gives the Benchmark Crusher a clean, modern appearance. Digital Storm also added a white cold-cathode light near the clear window to the modified Silverstone Temjin case. The Digital Storm builder told me that it's a special case they have modified for them from Silverstone. The bright light helps illuminate the tightly stacked hardware inside the case. At the top of the window, you get a glimpse of Digital Storm's liquid-cooling setup, which consists of a loop that runs through three radiators to efficiently dissipate heat. Below the liquid-cooling hardware, an Asus Xonar D2X sound card sits closely above three Evga GTX 280s running in 3-Way SLI. A 1,200-watt PC Power & Cooling power supply is visible at the bottom of the case. The components also stand out because Digital Storm painted the case interior in a jet-black, glossy finish.

To cool the stacked hardware, the case features a midsection air duct that helps move outside air over the Asus Xonar D2X and GTX 280s. However, I noted that after running a Prime 95 stress test, the sound and graphics cards were

extremely hot to the touch—though I experienced no problems during our limited system testing. On the plus side, liquid-cooling the processor and the addition of a Corsair Dominator Airflow fan kept the hardware at the top of the case cool. The three-radiator liquid-cooling setup allowed Digital Storm to overclock the Intel Core 2 Quad QX9770 to 4.2GHz.

I put the squeeze on the Benchmark Crusher with a variety of tests. An Overall PCMark Vantage score of 8738 and a 3877pps mark in POV-Ray beta highlight its best synthetic benchmarks, and 110fps in Company of Heroes and a 2:50 (minutes:seconds) time in Dr. DivX illustrate the system's proficiency in real-world

benchmarks. Based on this system's hardware, I would have expected a little shorter WinRAR time (1:27) and a higher Crysis mark (22fps). Still, both scores are respectable. The Asus Xonar D2X sound

produced excellent 3D audio during games, and its echo cancellation worked well in my voice tests.

Digital Storm offers a wide variety of colors for the case, including StormRed, StormBlue, and StormBlack, and I think the automotive finish gives the system a classy appearance. I was also impressed that Digital Storm was able to fill the desktop with hardware and still maintain a clean, organized interior appearance. Generally, the Benchmark Crusher produced scores that are in line with the hardware Digital Storm included in this build. ▲

by Nathan Lake

**Specs:** CPU: Intel Core 2 Quad QX9770 @ 4.2GHz; Motherboard: XFX nForce 790i Ultra (790i chipset); RAM: 4GB Corsair Dominator XMS2 DDR-2000; HDD: 1TB Western Digital Caviar Green, 300GB Western Digital VelociRaptor (2x; RAID 0); GPU: Evga Nvidia GeForce GTX 280 (3-Way SLI); PSU: PC Power & Cooling Turbo-Cool 1200 (1,200-watt); OS: Windows Vista Ultimate (64-bit)



**Benchmark Crusher**  
\$8,197 (as tested)  
Digital Storm  
[www.digitalstormonline.com](http://www.digitalstormonline.com)

## Benchmark Results

<b>3DMark Vantage</b>	
Overall	P28726
GPU	25609
CPU	45248
<b>Cinebench 10*</b>	
Multithreaded (score)	18795
Multithreaded (min:sec)	0:47
<b>Dr. Divx 2.0.1*</b>	
	2:50
<b>POV-Ray 3.7 Beta**</b>	
	3873
<b>PCMark Vantage Pro 1.0</b>	
Overall	8738
Memories	4158
TV And Movies	5499
Gaming	6092
Music	7463
Communications	8577
Productivity	8892
HDD	6292
<b>SiSoft Sandra Lite XII SP1</b>	
<b>Processor Arithmetic</b>	
Dhrystone ALU (MIPS)	69647
Whetstone iSSE3 (MFLOPS)	56850
<b>Processor Multi-Media</b>	
Integer x8 iSSE3 (itps)	553,273
Floating Point x8 iSSE2 (itps)	346,553
<b>Memory Bandwidth</b>	
Integer Buffered iSSE2 (GBps)	8.77
Floating-Point Buffered iSSE2 (GBps)	8.77
<b>WinRAR 3.71*</b>	
	1:29
<b>Crysis 1.1</b>	
	25
<b>Company of Heroes 2.1.0.2 (4XAA)</b>	
	110
<b>World In Conflict 1.005 (4XAA, 16XAF)</b>	
	63
<b>S.T.A.L.K.E.R 1.0005</b>	
	93

\* minutes: seconds

\*\* pixels per second

Games tested at 2,560 x 1,600.

# Andrea Electronics Pure Audio USB-SA

When you picture an external sound card, a USB thumb drive doesn't exactly come to mind. That's exactly what Andrea Electronics Pure Audio USB-SA External Digital Sound Card is, though. Although the name is impossibly longwinded, this small fry aims to replace a "computer's existing integrated sound system" to eliminate external noise while "increasing both the intelligibility and performance of stereo microphone input and stereo speaker output." Does it work? Yes. Is it worth \$44.95? That depends greatly on how much you value audio quality.

Before plugging the USB-SA in, you must download a software suite that includes the company's patented noise-reduction, speech-enhancement algorithm; a full-duplex echo-cancellation algorithm; a Digital Super Directional Array app that blocks noise during video chats; and an



## Pure Audio USB-SA

\$44.95

Andrea Electronics

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



AudioCommander interface with mic and speaker volume controls and 10-band custom equalizer and 18 presets.

I plugged the USB-SA into an aged IBM ThinkPad (1.5GHz Pentium M, 1GB RAM, and SoundMax integrated audio) that I use regularly to play streaming Internet radio, WMP and iTunes audio, Web video, and DVD movies. Almost immediately after inserting headphones

into the USB-SA's speaker jack (there's also a mic jack), I noticed a stark increase in volume strength from what I was used to. Andrea says the USB-SA works with any legacy headset, microphone, or speakers. I used gear from Sennheiser, Altec Lansing, Sony, Shure, Jabra, Orbit Sound, Able Planet, and others. Universally, the USB-SA produced "cleaner, stronger signals," just as Andrea indicated it would. Further, bass reproduction was especially impressive during DVD playback, arguably alone making the USB-SA \$44.95 well spent.

I also noticed a marked bump in clarity during Skype and Google Talk sessions I channeled through the USB-SA. Whether this warrants a \$45 investment, however, likely depends on how important VoIP confabs, videoconferencing, and speech-recognition apps are to you. If you're saddled with integrated sound that isn't cutting it, the USB-SA is worth a listen. ▲

by Blaine Flamig

**Specs:** 2-channel stereo mic and speaker output; 20dBA boost gain via software; 95dBA dynamic range; -6 to 33dBA record gain; 20 to 20,000Hz frequency response stereo output

# Chieftec HT-01

For home-theater enthusiasts, the Chieftec HT-01 chassis is a winner. This HTPC case comes in black or silver with a brushed aluminum front panel and will look great with the rest of the equipment in your home-theater setup.

Conditions were cramped inside the HT-01, but not to the point that building was difficult or aggravating. You'll need a microATX motherboard for this little guy, and I recommend securing power to the motherboard before installing the ODD to save yourself from some spatial issues later on.

The HT-01 has a single 5.25-inch ODD bay, two 3.5-inch HDD bays, and four expansion slots to give you plenty of modification options. There are two 60mm fans in the rear to help with cooling, and although these seem a little inadequate, squeezing in larger fans would have



## HT-01

\$219.95

Chieftec

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



made this case considerably larger, defeating the purpose of an inconspicuous unit.

One feature I really appreciated was the removable ODD bay, which pivoted back and upward out of the case. This made installing and securing the ODD simple and quick. Another likable feature was the 56-in-1 card reader incorporated on the side.

Included with the HT-01 is SoundGraph's iMon Manager Software, which can be used to control a number of multimedia applications such as Windows Media Player, iTunes, and Power DVD.

Getting started with the iMon Manager was as easy as installing the software and launching the application. The menus were intuitive and easy to navigate with the included remote, which has a mouse-like navigation pad. The remote took a little getting used to but worked great once I got the hang of it. Included in the software is an on-screen keyboard, timer, and various Web tools. What's not included is a power supply, and it's worth mentioning that you'll need a SFX PSU.

Chieftec doesn't disappoint with the HT-01. There are no major drawbacks for this chassis, and it's competitively priced. ▲

by Kris Glaser

**Specs:** Dimensions: 5.8 x 16.2 x 13.8 inches (HxWxD); Bays: 1 5.25-inch external, 2 3.5-inch internal; Fans: 2 60mm. Side ports: 1 USB, 1 FireWire, audio I/O.



# Anand's Corner

by Anand Lal Shimpi

## Everything You Need To Know About AMD, Intel & Nvidia

AMD's graphics team has been on a roll once again. There's the Radeon HD 4670, a \$79 card, which is absolutely the best you can get at that price. The GPU is actually very similar to last year's Radeon HD 3870 in terms of processing power; it has 320 shader processors, but they run a bit slower, and you get much less memory bandwidth on the 4670 thanks to its 128-bit memory interface. That being said, for gaming at 1,280 x 1,024 or lower resolutions on today's games, the 4670 does very well. Without a doubt, this is the sub-\$80 card to get. If you spend another \$50, you'll obviously get a much higher-performing card, but for a strictly budget-priced part AMD did very well.

The first Radeon HD 4870s with 1GB of GDDR5 also started shipping at around \$280 to \$300, and these things do very well. The first 4870 only had 512MB of GDDR5, which limited what the card could do at higher resolutions and detail settings. The 1GB card solves that and actually manages to boost performance by as much as 20% at 2,560 x 1,600. Clock speeds haven't changed, but at \$300 for high-res gaming, this is the new card to get despite more competitive advances from Nvidia.

Speaking of Nvidia, there's a new variant of the GeForce GTX 260 called the Core 216 (featuring 216 shader processors vs. 192 in the original GTX 260). Also priced at around \$300, the GTX 260 Core 216 was designed to compete with the Radeon HD 4870, and it actually did quite well in its role there; in terms of performance the cards are virtually indistinguishable. The new 1GB 4870, though, is a different story.

On the CPU side, AMD has been very quiet, but that's because in the next two quarters we should finally see the release of AMD's first 45nm CPUs. I'm expecting a much more competitive AMD going forward, at least in the more price-sensitive markets. The 45nm Phenom processors won't solve everything, but they'll run cooler and should overclock a lot higher than what we're seeing today. I'm guessing

that they will finally close the gap between Phenom and Conroe/Kentsfield.

All of which brings us to Intel and its impending Nehalem launch; in the coming months, Intel will launch its first new architecture since Conroe back in 2006, and from what I've seen, Nehalem is going to be pretty good. The biggest performance improvements will obviously come in well-threaded applications

on the desktop; things like 3D rendering or video encoding will see tremendous boosts. You'll see more minor performance improvements elsewhere, but overall we should see better-than-Penryn scaling out of Nehalem. On the server side, Nehalem should have an even bigger impact, as that's where the architecture was mostly designed for, but I'll save that discussion for another time.

The most interesting thing to come out of Intel recently was its first generation of 2.5-inch mainstream SSDs. These flash-based storage devices have been around for a while, but within the next three years I'd expect them to replace mechanical disks in nearly all notebooks. Intel's first attempt at a mainstream SSD was an astounding success, and while the price is pretty high (\$595 for 80GB), the performance almost justifies it.

The drive basically cuts application launch times in half and provides greater multitasking performance than any mechanical hard drive (2.5-inch or 3.5-inch, and that includes Western Digital's VelociRaptor). Reliability should be much improved over mechanical disks, as well, so really the only complaints are cost and capacity.

I won't go into benchmark specifics here, but these things are fast—fast enough that it's pretty much the only SSD I would actually go out and spend money on today. That being said, the price really keeps me from recommending it across the board, although next year we should see better pricing or larger capacities (or both), thanks to Moore's Law. ▲



*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)



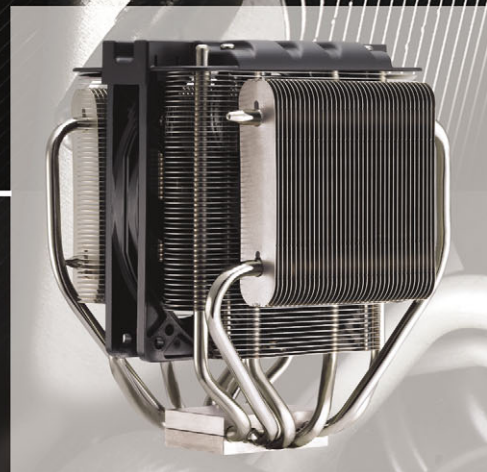


V8

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)



# The Shark Tank

by Alex "Sharky" Ross

## Nvidia's GTX 260 Core 216

2008 will go down as a bit of a cold sore for the men in Green (Nvidia). On the front lines, Nvidia's GPU dominance was put to the test by AMD (now with ATI), and the company certainly hasn't enjoyed the unpatrolled successes of the previous few years. The company's stock price has dramatically plummeted, and for the first time in Nvidia's history, it's been forced to announce large-scale layoffs. Nvidia has even festered conspiracy-theorists' claims of price-fixing with a class-action lawsuit that finally made headlines this year. Then there are the warranty claims. . . . But shoving that all out of the way and getting back to basics, Nvidia has somehow managed to roll out another GPU in the form of the GT260 Core 216 (yes, that's some nomenclature).

With AMD's successful Radeon HD4850 and HD4870 launch, Nvidia had to rethink its marketing strategy and product placement in the all-important \$300-GPU market. The HD450 and HD4780 even took aim at the GTX 260 and GTX 280, which were priced at \$400 and \$650. Initially, Nvidia took to merely cutting the price of the GTX 200 series, but that wasn't going to suffice. The "re-worked" core remains entirely the same except for the unlocking of one more functional block within the GTX 260's core. Just like NASA, GPU manufacturers always put a little more reserve in the tank for emergencies. The GTX 260 Core 216 bumps up the number of stream processors from 192 in the GTX 260 to, you guessed it, 216. The number of texture filtering units is also tweaked up from 64 to 72. The clock speeds all remain the same at 576MHz for the core, 1242MHz for the shader, and 999MHz for memory.

At the time of going to press, only two boards were available, from Evga and Zotac. Both mimic the original first-generation Geforce GTX 260 design right down to the PCB and heatsink and fan. They both have dual DVI outputs, and on the surface the only difference seems to be the decal. But look under the hood and, just like AMG does for Mercedes, Evga has

overclocked its 260 Core 216 part to 626MHz, with a 1350 MHz shader clock and 896MB of 1053MHz DDR memory. It comes bundled with DVI/VGA, HDMI, SPDIF adapters/cables, as well as Evga's own Precision Overclocking utility and a free copy of 3DMark Vantage Advanced. Zotac's version is boosted even further to 650MHz for the GPU clock, 1400MHz for the shader clock, and 1050MHz memory. The included HD compo-

nent output dongle is also noteworthy, as well as a full version of GRID—a very solid game in its own right.

Early tests show a bit of a back-and-forth battle with no single winner left standing. In *Enemy Territory: Quake Wars*, the original GT 260 is slightly behind the HD 4870, but the Core 216 actually pulls ahead. Running *Crysis*, in itself a chore on anything but the very latest hardware, showed the same trend with the winning margins being less than 5%. *Age of Conan* and *Unreal Tournament 3* are a close-run affair with Nvidia closing in on the Radeons but still not managing to take the lead with the Core 216. GRID was one area in which the Radeon fleet still pulls quite a lead over anything the Core 216 can bring. If GRID is of any importance to you (and it is to driving game buffs), then do yourself a favor and pair up the HD 4870 in CrossFire mode. Also making the choice a little more difficult is ATI touting the DX 10.1 flag in its corner whilst Nvidia continues to wave the Physx and CUDA flag. In terms of power consumption, the Core 216 uses a tad more than the original GTX 260, but still draws less wattage and runs cooler than the Radeon HD 4870 (although us gamers usually share a Lamborghini-like carbon footprint). The Core 216 boards also tend to be on the loud side. With the Core 216, Nvidia has at the very least improved its position on the \$300 battlefield, even if it hasn't yet won the war. ▲



*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 overclocks/tunes Porsche 996 Turbos with [www.sharkwerks.com](http://www.sharkwerks.com) when he's not tweaking PCs.*

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

# PlayiT TweakiT Get more out of iT



Palit's exclusive  
video cards are  
engineered to:

outperform at higher settings  
run beyond standard clock speeds  
quietly cool for better performance



**PALIT**®  
[www.palitmultipedia.com](http://www.palitmultipedia.com)



# PC Modder

## Tips & Tutorials

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

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

### Mods & Ends

#### OCZ Gladiator Max

Modders in the market for a high-performance yet quiet CPU cooler have a new option to consider, courtesy of OCZ Technology. The new OCZ Gladiator Max CPU cooler (\$49.99; [www.ocztechnology.com](http://www.ocztechnology.com)) features four copper heatpipes, which connect its base to an array of aluminum alloy fins. The fins are folded to deliver a lot of surface area while minimizing the cooler's overall dimensions. The heatpipes aren't standard issue, however, as the Gladiator Max also features what OCZ calls a HDT (heatpipe direct touch) design. The heatpipes themselves cover a large portion of the cooler's base and make direct contact with the CPU beneath, which improves heat transfer into the heatpipes.

In addition to its interesting design, the Gladiator Max sports a quiet cooling fan

with a noise output rating of 19.6 to 26.4dBA. The 120mm fan spins as high as 1,500rpm and features rubber mounts to minimize vibration, as well. The Gladiator Max is compatible with AMD socket 754/939/940 /AM2/AM2+ and Intel LGA775 processors. OCZ also includes a tube of generic thermal compound.

#### Swiftech Apogee GTZ Water Block

The well-known liquid-cooling specialists at Swiftech recently introduced a new flagship waterblock for Intel Socket 775 and 771 processors (a separate "hold-down plate" is required for Socket 771 CPUs), the Apogee GTZ (\$69.95; [www.swiftnets.com](http://www.swiftnets.com)). What sets the Apogee GTZ apart from its predecessors is a new micro-pin matrix that offers the lowest thermal resistance of any Swiftech waterblock to date. A topographically mapped CPU contact area with a mirror finish results in a 75 to 300% improvement in TIM joint thermal resistance vs. the Apogee GT/GTX series.

The Apogee GTZ uses a tool-less retention and mounting system that uses spring-loaded thumbscrews and a universal socket 775 motherboard backplate. Chrome-plated high-flow 1/4-inch BSPP x 1/2-inch barbs also come preinstalled on the block, but a pair of 3/8-inch barb fittings are included, as well.



The OCZ Gladiator Max cooler's four copper heatpipes make direct contact with the CPU's surface for optimal heat transfer.



Swiftech designed the Apogee GTZ Water Block for watercooling enthusiasts who seek the utmost performance.

#### Scythe Kaze Maru

If you want to increase the airflow through your case or CPU cooler but don't want to deal with heightened noise levels associated with high-RPM fans, using larger lower-RPM fans is sometimes an option. But what if you're already using a giant 120mm CPU fan? Scythe has the answer. The Scythe Kaze Maru 140mm case fans (\$19.99; [www.scythe-usa.com](http://www.scythe-usa.com)) feature slim circular fan cages with specialized mounts that fit 120mm mounts, despite the larger fan blades. The Scythe Kaze Maru 140mm fans are available in a trio of speeds (500rpm, 1,200rpm, or 1,900rpm), each with different CFM ratings and noise output levels.



Through the use of a slim circular fan cage with specialized mounts, Scythe was able to produce a 140mm case fan that fits a standard 120mm mount.

### Fashionably Fresh Firmware

#### D-Link DIR-655 Wireless Broadband Router (v1.20)

The latest update for D-Link's DIR-655 Wireless Broadband Router fixes a WPS (Wi-Fi Protected Setup) problem and resolves a bug that could slow WAN speeds.

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

#### QNAP TS-509 Pro Turbo NAS (v2.0.2 Build 080916)

A recent update for the QNAP TS-509 Pro Turbo NAS improves the performance of the device, adds support for dynamic SSH, and fixes a number of issues related to initialization, external eSATA backups, and scheduled startups.

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

#### Thecus N5200/N5200PRO (v2.00.12)

A firmware update for the Thecus N5200/N5200PRO multibay NAS devices updates the SATA driver for Samsung 750G and 1TB hard disk drives and resolves an undisclosed security exploit.

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

by Marco Chiappetta

# The Modder's Holiday Gift Guide

Spread Cheer With Some Hot New Gear!

The holiday season is almost here! And you know what that means. Say goodbye to all-nighters in front of the PC gaming, modding, or over-clocking. It's time for all of us to get out there, be on our best behavior, and answer all of those backlogged tech-support questions from friends and family in the hopes that they'll surprise us with some goodies under the tree.

Just in time for this holiday season, we've pulled together a list of a few hot products that are sure to appeal to all of you enterprising modders. We realize everyone has different budget constraints, though, so the list isn't completely jammed with exorbitant goodies—we included a select few of which you can afford. There's some pricey stuff on the list, of course; we're aficionados, after all. So we've assembled a mix of goodies everyone can afford and premium products everyone wants to be able to afford.

In last year's holiday gift guide, we recommended that you circle the items you really liked and place your copy of *CPU* in a conspicuous location where potential gift buyers are sure to see it. That was good advice, so we're going to do the same this year. After all, there's no room for subtlety when your rig's bling factor or performance is on the line!



Swiftech bundles CPU, GPU, and chipset waterblocks; tubing; a radiator; fans; RAMsinks; and an assortment of other hardware with their H20 220 APEX ULTRA+ liquid cooling kit—basically everything you'd need to liquid cool an entire PC.

## Swiftech H20 220 Apex Ultra+

Liquid-cooling a single component in a system is relatively easy. Liquid-cooling an entire PC, however, is a different story. You need to worry about pump and radiator capacity, barb sizes, tubing, power, and a myriad of other issues. For the uninitiated, piecing together a complete liquid-cooling system can be a daunting task to say the least. If you want to take the plunge into liquid-cooling but don't want to concern yourself with the minutia associated with designing a full kit on your own, Swiftech may have the answer with its H20 220 APEX ULTRA+ kit.

The Swiftech H20 220 Apex Ultra+ (\$379.95; [www.swiftnets.com](http://www.swiftnets.com)) is a

top-to-bottom complete liquid-cooling kit, which includes the company's popular Apogee GT CPU waterblock, MCW60 VGA kit and MCW30 chipset waterblock, along with an MCR220 Radiator (with fans), an MCB-120 R2 Radbox, MCP655 pump, MCRES Micro Reservoir, RAMsinks, and all of the tubing, Smartcoils, HydrX coolant, and various noise-reduction accessories you will need.

## Dremel 400 Series XPR Rotary Tool Kit

Dremel rotary tools are popular with hardcore PC modders for a reason. When

coupled with the right bits and accessories, Dremels are perfect for performing a plethora of mods, from cutting and grinding to engraving and polishing. We've used Dremel rotary tools in a number of the mods we have performed in the pages of *CPU*, and many of the Mad Reader Mods we've featured would be considerably more difficult without a Dremel.

The current top-of-the-line Dremel 400 Series XPR rotary tool kits (prices vary; [www.dremel.com](http://www.dremel.com)) come in a number of configurations. Our personal favorite attachments and accessories include the Dremel Flex Shaft for precise work and the Circle Cutter, for, well, cutting perfect circles. Of course, an assortment of cutting, grinding, and polishing bits are also a must.



The 400 Series Dremel is powerful enough for almost any project, and its adjustable speed makes it suitable for finer projects, as well. Consider your toolbox incomplete without one of these puppies.

### Evga GeForce GTX 280 HC16

Everyone loves a powerful video card. But modders love to take those powerful video cards and overclock them, or maybe replace the stock cooling with something that can handle a little more oomph. The problem with doing so is that modding a graphics card will usually void its warranty.

If you want a new graphics card this holiday season that's more exciting than a reference card and happens to be "premodded," Evga may have the answer. The Evga GeForce GTX 280 HC16 (\$639.99; [www.evga.com](http://www.evga.com)), features a preinstalled copper waterblock and a factory overclocked GPU, running at a cool 691MHz. The 1GB of frame buffer memory on the card is overclocked, as well, coming in at a stout 2,430MHz. Heck, if you have some generous loved ones with money to burn, you could even link two or three of these babies together in SLI for some killer graphics. But can it play Crysis? You betcha.

### Thermaltake A2413

The Thermaltake A2413 (\$399.99; [www.thermaltakeusa.com](http://www.thermaltakeusa.com)) is an interesting

product on a number of levels. No, the Thermaltake A2413, a 7-inch touchscreen LCD won't fit in a standard 5.25-inch drive bay. Thermaltake makes the screen for only a few of its high-end cases that feature a special—you guessed it—7-inch bay. But modders are known for making round pegs fit into square holes, and the Thermaltake A2413 opens up a whole world of exciting possibilities for modded HTPCs or even desktop systems in need of some bling.

The Thermaltake A2413 uses 12V power from a standard 4-pin PSU connector. The touch-sensitive screen also comes with a full function infrared remote control if you can't bring yourself to mar the display with your fingerprints. The screen works with any VGA input and offers resolutions from 800 x 480 to 1,024 x 786. The screen operates on a motorized track that slides out of the unit's main body and angles upward for easy viewing. If you're feeling creative and want to make use of one of the extra display outputs on your graphics card, the Thermaltake A2413 7 could certainly make for some interesting mods.

### Logitech ChillStream

Yes, we know that a keyboard and mouse are the preferred input devices for most serious PC gamers, but there are

some games that are better-suited to a gamepad. Driving games, sports games, and many console ports, for example, are just more fun when played using a good gamepad. To that end, Logitech recently introduced a line of new gamepads that are sure to please PC and console gamers alike.

As the name implies, Logitech's ChillStream PC (\$29.99; [www.logitech.com](http://www.logitech.com)) and PS3 (\$19.99) gamepads were designed with the idea of keeping your sweaty mitts cool and dry when the in-game action heats up. The ChillStream cooling feature, as it is known, provides continuous air flow through vents that run along the sides and edges of the controllers. They also feature analog sticks and triggers and soft rubber grips for more secure handling.

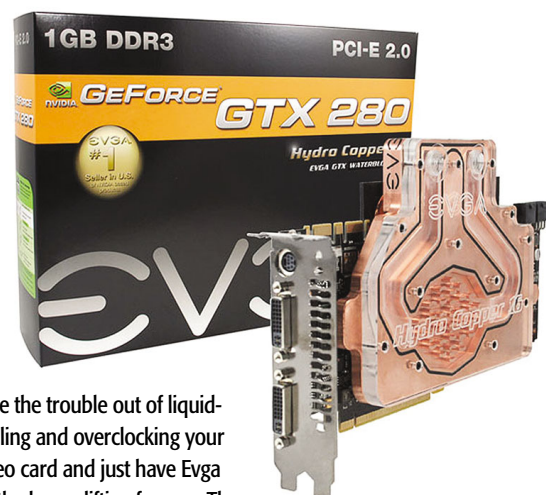
### Razer Destructor

Hardcore gamers know the benefits of using a high-quality mouse mat. A good mouse mat typically stays in place better, provides a smoother, more accurate tracking surface, and is usually more durable than the cloth freebies included with many machines or components.

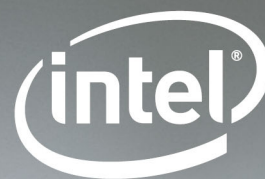
Razer's Destructor professional gaming mouse mat (\$39.99; [www.razerone.com](http://www.razerone.com)), for example, sports the company's own Fractal surface for high-precision mousing with both optical and laser gaming mice.



Dremel's rotary tools are a staple of PC modders. Its 400 Series XPR rotary toolkits offer a wide array of tips and accessories that can come in handy while performing a multitude of mods.



Take the trouble out of liquid-cooling and overclocking your video card and just have Evga do the heavy lifting for you. The Evga GeForce GTX 280 HC16 is one of the highest-clocked and coolest-running GTX 280 cards on the market, thanks to its preinstalled Hydro Copper waterblock.



# Quad-Core. For the hardcore.

Eurocom's D90xC Phantom-X is the ultimate laptop for serious graphics performance, featuring incredible processor performance upgrades and storage.

Get the perfect mobile workstation for graphics professionals, gaming, 3D modeling, CAD digital content creators, engineers, and anyone demanding maximum power and video, or looking for a mobile "server on-the-go."

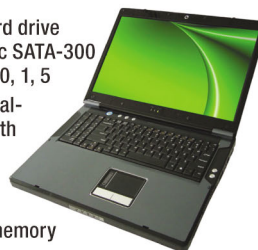


[www.eurocom.com](http://www.eurocom.com)

1-877-EUROCOM x302 or [sales@eurocom.com](mailto:sales@eurocom.com)

## D90xC Phantom-X

- Upgradeable Intel® Core™2 Extreme, Intel® Core™2 Quad, or Intel® Xeon® processor
- Incredible 1.5TB of hard drive space w/three 3GB/sec SATA-300 hard drives with RAID 0, 1, 5
- Supports single- or dual-SLI VGA technology with NVIDIA 9800GTX or Quadro FX3700
- Up to 8GB DDR2-800 PC2-6400 superfast memory



Intel is not responsible for and has not verified any statements or computer system product-specific claims contained herein.

© 2008, Intel Corporation. All rights reserved. Intel, the Intel logo, Intel Core, and Core Inside are trademarks of Intel Corporation in the U.S. and other countries.

\*Other names and brands may be claimed as the property of others.

© 2008, Eurocom Corporation. All rights reserved.





It won't fit in a standard 5.25-inch drive bay, but the Thermaltake A2413 7-inch touchscreen LCD opens up a whole world of multimonitor modding possibilities.



Some of the best mods are also the simplest. Quickly add some ventilation to a stuffy case with Silverstone's Aero Slots vented expansion slot covers.



High-quality thermal paste, nylon zip ties, and Velcro straps make for some useful stocking stuffers.



Logitech has a pair of gamepads that feature integrated coolers for keeping your fingers and palms dry during intense gaming sessions.



All of the best gamers use high-quality mouse mats such as the Razer Destructor Professional. Give yourself an edge and ditch that moldy cloth pad for good.



Although Enzotech's MOS-C1 MOSFET heatsinks are marketed for motherboards and VGA cards, they're compatible with virtually any component that they can be mounted on.

The Destructor also features a nonslip rubber base for a firm grip, even on smooth surfaces. It's also quite large, so you won't be constantly picking up and repositioning your mouse during heated frag sessions. At 2.3 x 280 x 350mm (HxWxD), the Destructor is more than twice the size of traditional rectangular mouse pads. Razer even throws in a protective case for the Destructor for safe transport to and from your LAN parties. Once you try a quality mouse mat like the Destructor, you'll never go back to a generic mouse pad again.

#### Enzotech MOS-C1 MOSFET Heatsinks

We all know how important it is to keep a system cool to maintain stability or maximize its overclocking potential. All too often though, we focus solely on cooling our processors or GPU, when adequately cooling less conspicuous components can be just as crucial. Keeping the MOSFETs or PLLs cool on a motherboard or graphics card, for example, can help maintain stability at ultra-aggressive clock speeds. Conversely, keeping those MOSFETs or PLLs cool in a quiet PC with low rpms is paramount to maintaining stability when there isn't much air circulating through the case.

To aid in cooling those smaller components, Enzotech offers the MOS-C1 MOSFET heatsinks. The tiny Enzotech MOS-C1 MOSFET Heatsinks (\$13; [www.enzotechnology.com](http://www.enzotechnology.com)) are made from pure forged copper and are easy to install, thanks to the included 3M 8815 thermal tape. With the included thermal tape, you

can simply stick the MOS-C1s to any component that you want to cool. For even better performance though, you may also want to think about picking up a couple of tubes of thermal epoxy.

#### Silverstone Aero Slots

Sometimes the simplest ideas make for a useful product. Don't believe us? Check out Silverstone's handy Aero Slots (\$7.99; [www.silverstonetek.com](http://www.silverstonetek.com)). The Silverstone Aero Slots are slotted expansion slot covers that give modders the ability to quickly and easily add more ventilation to their cases. The black nickel-coated Aero Slots come in a four-pack, which is probably more than enough for any system. When you've tweaked your cooling setup as far as it will go and are looking for that little something extra, Silverstone's Aero Slots may be the last way to increase the amount of air flowing through your rig.

#### Thermal Paste, Zip Ties & Velcro Straps

They might be the socks and underwear of gifts to give a modder, but thermal paste, nylon zip ties, Velcro straps, and other assorted tools are staples of every good modder's diet. They may not make for the most exciting holiday gifts, but waking up to a stocking full of thermal paste and zip ties is a heck of a lot better than having to run out and buy your own whenever you need them. And all of these items are relatively inexpensive and easy to find. ▲

by Marco Chiappetta

# BFG POWER TO THE PEOPLE



## BFG ES Series



These days, it's all about being "green" this and "eco-friendly" that. That's hard to do when your PC demands more and more power every time you upgrade components. Now you can take control of that power with an **ES-800 power supply** from BFG Tech.

Unique in the industry, the BFG ES Series power supplies use **Frequency Conversion technology**. Because the ES-800 changes the frequency at which it converts AC to DC depending on the load, it can actually scale to the performance of virtually any size PSU up to 800W and still be over 80% efficient at loads as low as 80W. Also, the ES-800 features a completely independent +5VSB power supply within the unit providing the **best stand by efficiency of any other power supply on the market**.

The ES-800 from BFG Tech—giving more power to the people. Get yours today.

**WWW.BFGPOWER.COM**



**[BFG Tech]**



**TigerDirect.com**



# Mad Reader *MOD*

## Home Theater In A (Very Cool) Box

Magnus Persson (aka [WP@]Wolverine) knows how to mod. He has about 20 system builds under his belt (give or take a couple), which he constructs in his kitchen/workshop. Persson often draws his mod project inspirations from movies, architecture, and music.

Persson's goal in creating The Reflection HTPC was to make a stylish home-theater system that would look beautiful but unobtrusive in a living room setting—and we think he nailed it.

The Reflection HTPC is made mostly from sheets of black, blue, and transparent acrylic. Persson also used black anodized aluminum for some of the parts, and he used acrylic rods for the case's corners. Persson says he spent about 150 hours over the course of a month and a half building the PC. We think it was time well spent.

Because the system is designed to be small, Persson used an MSI RS690T mini-ITX AM2 motherboard with an integrated ATI Radeon Xpress 1270 graphics controller. He dropped in an AMD 4850E dual core CPU and cooled it with a Hiper HFC 20820 C1 low-profile cooler. He also plugged in 2GB of Corsair DDR2 RAM and powers the system with a 300W FSP300-601U PSU. As a finishing touch, Persson added a Matrix Orbital GX Typhoon USB LCD to the case.

The Reflection HTPC is a beautiful combination of form and function. In this digital media age, who wouldn't want a good HTPC? And if you're going to have one, we think it makes sense to have one that also looks cool.

Fresh off the success of The Reflection HTPC, Persson is already at work on his next big project, a huge gaming system incorporating not one, but two watercooling systems packed into a customized Cooler Master Stacker 832 case. We're sure that the project will dominate his kitchen workshop for some time, but the results will be excellent. ▲





The Reflection HTPC begins to take shape.



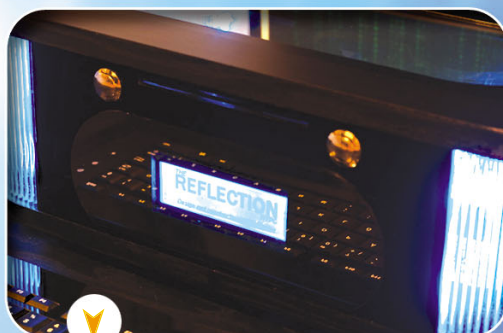
Persson had a lot of hardware to pack into his small case, including a mini-ATX motherboard and a Hiper CPU cooler.



Persson spent quite a bit of time cutting and working with the many pieces of acrylic that form the case.



You can take a peek into The Reflection HTPC through a clear panel in the case's top.



One of the bits of flair that Persson added to his system was a Matrix Orbital LCD.



The final product: The Reflection HTPC is ready to entertain.

## Give Us Your Mod

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

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

If we include your system in our "Mad Reader Mod" section, we'll help you load up your modder's toolbox with \$1,500 and a one-year subscription to *CPU*.



# PC Challenge

Best HTPC For \$1,500

Sponsored by:



The "PC Challenge" pits two *CPU* staffers against each other in a contest to build the best PC in a chosen category and within a certain budget. Debuting with the first issue of *CPU*

back in December 2001, the Challenge was an instant hit among readers and staffers alike. The feature took an extended hiatus following the April 2003 issue, but you've been asking for it ever since,

and now it's back. We'd like to thank our sponsor, Newegg.com, for supplying all of the parts for both builds.

This month's challenge: To build the best HTPC for less than \$1,500. ▲

## Vince

There's something undeniably desirable about HTPCs. You get all the goodies of multiple home-theater components wrapped up in a neat, brushed aluminum package and the power of a PC, to boot. So when Newegg handed me 1,500 bones and turned me loose to piece together an HTPC, I was the Charlie Bucket to Newegg's Wonka Candy Company. Yet, I quickly learned that having \$1,500 forced me to leave some of the delicious HTPC candy on the shelf.

Initially, I wanted my HTPC to be an ensemble of hardware designed around a svelte system that would be the brains of the operation. A NAS server would act as a vault for virtually limitless media, while a powerline networking router would be the hub that could stream content to future satellite systems. Alas, this strategy, while sound in theory, led me down an ultimately untenable path.

You see, the oh-so-thin SilverStone ML02B-MXR was everything I wanted in a chassis from an aesthetic standpoint, but its requiring a slimline optical drive didn't jibe with my desire to include a Blu-ray drive. (Such a Blu-ray drive, while available, would've taken a big enough chunk out of my budget that I would've needed to make drastic compromises elsewhere.)

Despite ditching my top chassis choice, I nonetheless found refuge in another SilverStone case, the bigger (yet roomier)

SST-LC16B. Although not as sleek as the ML02B-MXR, the SST-LC16GB afforded me more options for virtually every component I needed and wouldn't create as much of a sauna underneath the roof. As an aside, I personally recommend picking a case first. Beauty may only be side-panel deep when it comes to building a high-performance PC, but you don't want a bread-box-sized aluminum brute throwing off the mojo of your otherwise refined HTPC stack.

Even though a bigger case would theoretically lead to a lower ambient

internal case temperature (and thus, less noise), I still went low-watt in the hopes that a smaller power footprint would keep the system fans from contributing a lovely whirring to my listening experience. This meant scoring an AMD 1.8GHz Phenom 9150e CPU, which I paired with a passively-cooled, 780G-based Gigabyte MA78GM-S2H motherboard. Sure the 790GX is out there, but I couldn't find a MicroATX motherboard in that flavor and didn't want a full ATX motherboard creating cramped quarters. My decision to use Western



Digital's 1TB Caviar Green drive was based on the hope that the drive's low energy consumption and trio of "Intelli-" technologies would further keep a muzzle on my HTPC.

With so many low-watt parts and no discrete graphics card guzzling power, there wasn't a need to use a mammoth power supply in this build. I used PC Power & Cooling's Silencer 370W, which, in all honesty, was still probably overkill. Still, the Silencer 370 is the smallest horse in PCP&C's stable, and I wasn't about to take my chances with a Valu-Brand DiceRoll Edition PSU.

I'm not convinced Blu-ray has won the hi-def format war, with digital distribution continuing to gain ground, but that didn't stop me from going whole hog with a BD-RE/HD DVD combo drive, LG's GGW-H20L. There's still a price premium for joining Club Blu-ray at this stage, but the GGW-H20L also included CyberPower's hi-def suite.

When selecting a TV tuner card, I opted to go with an industry veteran, Hauppauge. The WinTV-HVR 1800 was the dual-tuner delight that would be perfect for receiving and recording either NTSC or ATSC signals.

Although a remote will handle the lion's share of input device duty, this *is* still a PC, so I wanted a keyboard and mouse. Microsoft's Wireless Entertainment



Desktop 8000 is still a pricey proposition, so I went last-gen (the WED 7000) and shaved \$157 off the bottom line without sacrificing too much functionality. This choice turned out to be fruitful, as I learned my PC Challenge counterpart was forced to subsist on a Logitech diNovo Mini. The diNovo Mini is unquestionably cool, but I can't imagine the thought of

doing my typing—let alone mousing—on a Sidekick-sized input device. (Plus, methinks someone didst cheat on his build by using a separate PS/2 keyboard for his initial Vista setup, wink wink.)

With the requisite HDMI and optical audio cables in tow, this build is proof you can have it all (almost) for less than a grand-and-a-half. ▲

## Vince's Parts

Part	Newegg Item #	Newegg Rating	Price	Shipping	Rebate	Total
Western Digital Caviar Green WD10EACS 1TB	N82E16822136151	4 (313)	\$129.99	\$0.00	\$0.00	<b>\$129.99</b>
SilverStone SST-LC16B	N82E16811163053	4 (27)	\$279.99	\$22.99	\$40.00	<b>\$262.98</b>
LG GGW-H20L	N82E16827136137	4 (93)	\$244.99	\$0.00	\$0.00	<b>\$244.99</b>
Microsoft Windows Vista Home Premium SP1 32-bit	N82E16832116485	4 (126)	\$99.99	\$0.00	\$0.00	<b>\$99.99</b>
Gigabyte GA-MA78GM-S2H	N82E16813128090	4 (524)	\$84.99	\$0.00	\$0.00	<b>\$84.99</b>
AMD Phenom 9150E	N82E16819103287	4 (5)	\$139.99	\$0.00	\$0.00	<b>\$139.99</b>
PC Power & Cooling Silencer 370W	N82E16817703018	5 (6)	\$59.99	\$0.00	\$0.00	<b>\$59.99</b>
Corsair XMS 2 4GB (2 x 2GB) 240-pin DDR2-800	N82E16820145184	5 (350)	\$69.99	\$0.00	\$25.00	<b>\$44.99</b>
Hauppauge WinTV-HVR 1800	N82E16815116015	4 (181)	\$99.99	\$6.99	\$0.00	<b>\$106.98</b>
Microsoft Wireless Entertainment Desktop 7000	N82E16823109012	4 (36)	\$115.99	\$10.73	\$0.00	<b>\$126.72</b>
Link Depot 10 ft. HDMI to HDMI A/V Cable	N82E16812189054	5 (108)	\$7.99	\$6.99	\$0.00	<b>\$14.98</b>
Tripp Lite A102-02M 6.6 ft. Toslink digital optical audio cable	N82E16812120019	5 (38)	\$9.99	\$10.95	\$0.00	<b>\$20.94</b>
CyberPower 850	N82E16812120401	5 (75)	\$14.99	\$8.25	\$0.00	<b>\$23.24</b>
<b>Total</b>			<b>\$1,358.87</b>	<b>\$66.90</b>	<b>\$65.00</b>	<b>\$1,360.77</b>



## Nathan

Having an HTPC sitting in my living room that was built from excess parts, I was excited for the chance to spend \$1,500 and create a system that provided everything my “Frankenstein” HTPC does not. At the top of my priority list was the ability to play back BD movies; deliver 5.1 surround sound; record HDTV; and offer an easy-to-use, attractive design. Also on the agenda: construct an HTPC that would dominate Vince’s system.

My HTPC is built around AMD’s 790GX chipset, which offers an ATI Radeon HD 3300 integrated graphics core, native support for BD movies, 7.1-channel audio, and HDMI and DVI outputs with HDCP. I chose MSI’s DKA-790GX Platinum board because it was one of the most affordable 790GX chipsets available, and its DrMos technology helps reduce heat within the case. Although my build wasn’t going to be thrown into a crowded entertainment center for testing, I wanted to avoid any heat issues and assemble a system that was built to last. For additional heat conservation, I utilized the integrated ATI Radeon HD 3300 for the HTPC’s graphics processing power, rather than a discrete graphics card. My guess was that the 790GX’s



integrated graphics could let me record HD video and perform other common HTPC tasks without skipping a beat.

An AMD Phenom X4 2.6GHz—on sale at Newegg for \$173.99, compared to its \$235 list price—and 4GB of Corsair XM2 DDR2-1033 memory give the system plenty of home theater kick. In fact,

the 2.6GHz quad-core processor and 4GB of memory are probably overkill for an HTPC, but I like that the hardware covers my home theater requirements into the foreseeable future. To utilize the 4GB of memory, I invested in a 64-bit version of Windows Vista Premium. I picked a Lite-On DH-401S-08 BD-ROM drive and a

### Nathan's Parts

Part	Newegg Item #	Newegg Rating	Price	Shipping	Rebate	Total
MSI- DKA790GX Platinum	N82E16813130190	4 (21)	\$159.99	\$10.17	\$0.00	<b>\$170.16</b>
AMD Phenom X4 9950 BLACK EDITION 2.6GHz	N82E16819103273	5 (204)	\$173.99	\$0.00	\$0.00	<b>\$173.99</b>
Western Digital Caviar Green WD10EACS 1TB	N82E16822136151	4 (307)	\$129.99	\$0.00	\$0.00	<b>\$129.99</b>
Corsair XM2 2GBx2 DDR2-1033	N82E16820145215	4 (7)	\$150.00	\$0.00	\$30.00	<b>\$120.00</b>
Windows Vista Home Premium 64-bit (OEM)	N82E16832116488	4 (301)	\$109.99	\$0.00	\$10.00	<b>\$99.99</b>
Lite-On DH-401S-08 BD/DVD-ROM	N82E16827106225	4 (76)	\$119.99	\$8.97	\$0.00	<b>\$119.99</b>
Silverstone GD01B-MXR HTPC case	N82E16811163076	5 (20)	\$259.99	\$18.99	\$0.00	<b>\$278.98</b>
Silverstone ST400 400-watt PSU	N82E16817256032	5 (23)	\$49.99	\$10.97	\$2.00	<b>\$47.99</b>
Logitech diNovo Mini	N82E16823126039	4 (34)	\$149.99	\$8.97	\$10.00	<b>\$148.96</b>
Trendnet TEW-423PI 802.11b/g Wi-Fi card	N82E16833156141	3 (221)	\$17.99	\$7.29	\$0.00	<b>\$25.28</b>
MSI HDMI Cable	N82E16814999011	No Reviews	\$14.99	\$6.99	\$0.00	<b>\$21.98</b>
Altec Lansing AHP612 wireless headphones	N82E16826257014	3 (5)	\$79.99	\$9.39	\$20.00	<b>\$69.38</b>
Visiontek TV Wonder HD 650 HDTV TV tuner	N82E16815129006	3 (42)	\$118.99	\$8.97	\$0.00	<b>\$127.96</b>
<b>Total</b>			<b>\$1,535.88</b>	<b>\$90.71</b>	<b>\$72.00</b>	<b>\$1,554.59</b>



WINNER 4 YEARS IN A ROW!  
BEST PLACE TO BUY

ONLINE PERIPHERALS  
SOFTWARE CORE COMPONENTS



ASUS

### P5Q Pro LGA 775

Intel P45 ATX Intel Motherboard,  
1600/1333MHz FSB, 13-131-299



SAPPHIRE

### Radeon HD 4870

1GB 256-bit GDDR5, PCI Express 2.0 x16,  
HDCP Ready, 14-102-795



intel

### Core 2 Duo E8400

3.0GHz 6MB L2 Cache LGA 775 65W  
Dual-Core Processor, 19-115-037



AMD

### Phenom 9950

2.6GHz Socket AM2+ 125W Quad-Core  
Black Edition Processor, 19-103-291



# LOOKING FOR A BOOST?

Give your PC what it craves this holiday season. Just go to Newegg.com, where you'll find the perfect upgrade.

SHOP OUR HUGE SELECTION OF COMPUTER COMPONENTS AT [WWW.NEWEGG.COM](http://WWW.NEWEGG.COM)!



GAMING



PC CASES



HARD DRIVES



MEMORY



SOFTWARE



NOTEBOOKS

WE HAVE WHAT YOU NEED  
PRICE • SERVICE • SELECTION



NO PAYMENTS FOR 6 MONTHS with your Newegg.com Preferred Account\*  
See website for more information. Promotion ends 01/31/09





VisionTek TV Wonder HD 650 tuner card for my BD and HDTV needs. After putting the system together, I realized that a DVD burner would have been nice to add. A 1TB Western Digital Caviar provides a decent amount of storage to record TV shows and movies, while Trendnet's TEW-423PI Wi-Fi (802.11b/g) card covers Web access, so I won't have to connect an Ethernet cable to the HTPC.

Selecting an ATX motherboard isn't the wisest idea when choosing your HTPC components; it severely limits your case options. Fortunately, Silverstone's GD 01B-MXR offered the media features I wanted—an LCD, a built-in media card reader, and a HTPC-style remote control—and I also think it looks sleek. The GD01B-MXR didn't include a power supply, so I paired it with a Silverstone ST400 that offers a silent-running 120mm fan. I felt I could have put more hardware inside the system, but I wouldn't have had enough money for my HTPC extras.

The first accessory on my list was a Bluetooth mouse and keyboard combo so I'd avoid any IR line-of-sight or Wi-Fi signal issues. The Logitech diNovo Mini fit the bill perfectly. Initially, I was planning to use the mouse/keyboard combo in conjunction with the remote included with the Silverstone GD01B-MXR. It turned out that the diNovo Mini—with its palm-sized QWERTY keyboard, touchpad mouse, and support for Windows Media Center—worked so well that I didn't need



the other remote. With what I thought was \$100 left over (*I absentmindedly neglected to include shipping costs!*), I decided to invest in an Altec Lansing AHP612 wireless headset so I could listen to movies late at night without disturbing my neighbors and an HDMI cable from MSI. Although I can't defend going over budget, I will note that if you take away the wireless headset—certainly a nonessential HTPC component—from my \$1,554.59 total, the final cost sits right at \$1,485.21.

I was pretty happy with the final look and functionality of the PC. Using Windows Media Center in Vista Home Premium, I was able to time-shift HDTV while recording another channel without any lag. HDTV recordings and BD movies looked and sounded excellent. Moreover, the Logitech diNovo Mini and the Silverstone GD01B-MXR LCD screen offer a cool, easy-to-use design that I'm hoping will overcome my budgeting oversight. ▲

## And The Winner Is . . .

I like PCs of all types: power user rigs, small form factor setups, cheapo Web surfing machines, you name it. But I especially like HTPCs, because HTPCs are designed specifically for Fun. And I love Fun. So I was eager to check out the HTPCs our two competitors saw fit to piece together with a generous \$1,500 budget.

In Nathan's case, that generous budget was not quite generous enough, as he went north of \$1,500 with the purchase of the Altec Lansing headphones. Wireless headphones are a nice addition to a home theater rig, to be sure, but they're not an essential piece of the hardware, so I wish he'd have left them off the shopping list. Still, the overall system build is solid. I love the diNovo Mini remote and the fact that this rig can connect to a Wi-Fi network, something not found in Vince's setup.

Vince's HTPC came in under budget—way under budget. \$130 is a lot of coin to leave on the table when building a new system. I'm sure

that, in these economic times, many people would just as soon stuff that \$130 in a mattress or invest it in a gallon of gasoline, but I'd have to think there's something he coulda spent that money on that would enhance this already fine HTPC even more (such as the powerline router he mentioned earlier). Still, the system itself is well-equipped, with ample (and appropriate) emphasis on temperature and noise control—two factors that rightfully are a priority when building an HTPC. Also, as nice as the diNovo Mini is, Vince does have a point about the usefulness of a full-sized keyboard and mouse with which to control your HTPC.

I'm going to give Vince's system the nod primarily because of Nathan's over-budget party foul, but I'd be pretty happy with either system. Now, where's that copy of "Iron Man"? ▲

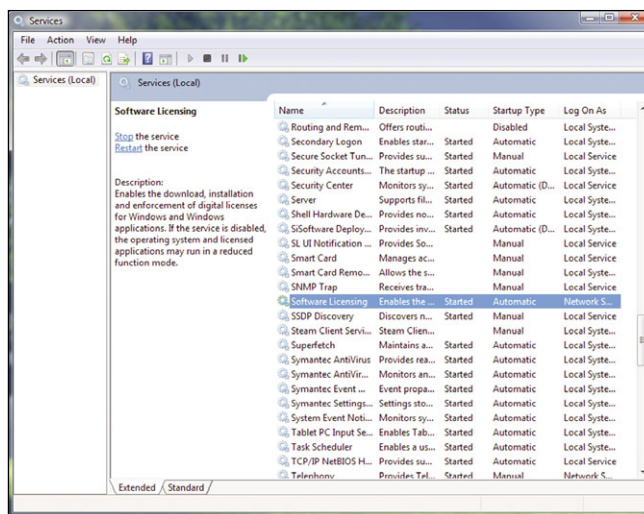
by Michael Sweet

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

“ Although some manufacturers are conservative with their battery life claims, others are more optimistic. ”

*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.*

**Raul V. asked:** After installing a new set of Forceware video drivers for my GeForce 9800 GTX, I noticed something really weird going on with Windows Vista (Ultimate, 32-bit). My system has been working fine for months, but after I updated my drivers, I noticed that I couldn't open my Control Panel, System Properties, or Device Manager. I would click them, and Windows would act like nothing had happened. I wouldn't get an error message or anything; literally nothing would happen. Otherwise the system works normally, at least as far as I can tell. I did some searching online and found that other people have had this issue, as well, but it's not limited to just Nvidia video drivers. ATI users have reported the same thing. Have you guys heard of this problem, and do you have any idea how to fix it?



From within the Microsoft Services control panel, users can start, stop, and get descriptions of all of the services running on their machines.

**A:** You're in luck, Raul. We have seen this problem many times. Because we have to maintain an assortment of systems to keep a benchmark and testing lab up and running, and often use beta drives and early versions of many applications in our work, we come across a slew of odd Windows behaviors. Of course we have to find the solutions to the problem, as well, if we want to get any work done!



So we, too, have seen this issue after installing graphics drivers from both major manufacturers. We are unsure as to the exact root cause but do have a fix that has worked for us on every occasion. The problem seems to arise from a software licensing or file registration bug that crops up during the driver installation process. For one reason or another, one (or more) of the low-level driver files is not being registered properly during the installation, and it causes a Windows licensing issue that makes the OS behave like it is in a pseudo-limited functionality mode, which is why Control Panel and Device Manager won't open.

Fixing the problem requires multiple steps and fiddling with a couple of Windows services. Press the Windows-R keyboard shortcut to bring up the Run menu, and in the Open field, type **services.msc** and then press ENTER. The Windows Services control panel will open. In the list of services shown in the right pane, scroll down and find the SL UI Notification Service and the Software Licensing Service, then right-click each one and choose Stop from the context menu. Don't worry if you get a warning about other services having to be stopped, as well; this is only temporary, and they'll start back up automatically. Once the services have been stopped, wait a few moments for any hard drive activity to cease, and then right-click both services again to restart them. After they have been restarted, you should be able to access the Control Panel and Device Manager again. Go in to the Control Panel, uninstall the drivers that caused the problem, and then restart your machine. When the system comes back up, check that you can still access the Control Panel, Device Manager, etc.; do a disk cleanup to clear any temp files; and if everything is copasetic, reinstall the drivers. At this point, you should be all set.

**Anthony A. asked:** I just bought a cheap Gateway notebook at Best Buy and am unhappy with its battery life. When I bought the machine, the salesman (and the tag on the notebook) said it would get up to three hours of battery life. But when I took it home, installed my applications, and used it for a while, I found that the battery would only last about an hour and half if I was lucky. I went back to the store and complained and was able to swap out the battery for a new one, but it acts exactly the same way, so I think I'm just out of luck. The salesman said there are some settings that could increase the battery life and that changing some options in Windows could help, but I'm not sure what to try. Any suggestions?

**A:** As you have probably guessed, that three hours mentioned by the notebook's marketing materials and the salesman were best-case estimates. Although some manufacturers are conservative with their battery life claims, others are more optimistic. But the salesman was right. There are a myriad of ways to increase your notebook's battery life. First, make sure your battery is calibrated properly to ensure it is being utilized to its fullest potential. Many notebooks have tools embedded within their system BIOS to calibrate the batteries; the process usually consists of completely charging, discharging, and then charging the battery again to ensure peak performance.

You could also try disabling any unused hardware or software on the machine to minimize the consumption of system resources.

If, for example, you don't use the IR detector, or maybe a parallel port or Bluetooth controller, disable them via the system BIOS and/or Device Manager. Also, disable or uninstall any applications that load at startup to prevent them from using system resources, which in turn saps battery power.

A few other easy ways to increase battery life are to lower the brightness of your screen or to lower, or even mute, the speaker volume. Notebook displays in particular use relatively large amounts of power in relation to other components, so turning down the brightness can have a significant impact on battery life. You could even use a dark-colored or black desktop background to keep the screen as dark as possible. You should also check Window's power plan to ensure it's set for Power Saver (go to the screen saver control panel and click the Change Power Settings link).

There may be a few other more advanced methods available to you, as well, such as under-volting and under-clocking your processor, but they aren't available on every notebook PC and could possibly void your warranty, so it's best to stick with our other suggestions unless you get desperate. ▲

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

For bonus content, subscribers can go to  
[www.cpubmag.com/cpudec08/q&a](http://www.cpubmag.com/cpudec08/q&a)

## HighSpeed PC

Specialty Computer Hardware

### HSPC Tech Station Fast-Access Computer Case!

“The Tech Station (patent pending) is a hardware workbench bringing PC parts within easy reach yet keeping them safe and secure. Perfect for PC builders, upgraders, and overclockers.”



- New! Secure rubberized motherboard standoffs
- HDD storage/cooling rails for up to two 3.5" hard drives
- AGP/PCI card supports brace w/ thumb screws (no loose add-in cards!)
- ATX Control Kit (mini power/reset switches, LEDs, speaker)
- 120mm fan for ideal cooling
- Anti-static and non-conductive!
- Standard, Large, and Custom sizes/colors available



Hard Drive Storage Rails



AGP/PCI Support Brace



ATX Control Kit

www.highspeedpc.com



## The best gaming systems run with **DOMINATOR**

*"The XPS 730-series platform is the ideal place for Dell to showcase the best that PC performance hardware has to offer, we had very aggressive performance goals for this platform, including the ability to run 4GB of overclocked main memory with rock-solid stability. Corsair's DOMINATOR DDR3 modules were the only logical choice for the best-in-class performance memory required for the Dell XPS 730."*

Patrick Desbois, Dell XPS Gaming Engineering



**DELL**  
YOURS IS HERE

**OTHER  
AWARD WINNING  
GAMING PRODUCTS**



High  
Performance  
Power Supplies



Water  
Cooling  
Solutions

 **CORSAIR™**  
THE WORLD'S MOST AWARDED MEMORY

Available at:

 amazon.com™

**Buy.com**



**Fry's**  
ELECTRONICS

 NCIX.com

 newegg.com®

**TigerDirect.com**

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



# Telescopic Pixels To Challenge LCDs

When thinking of Microsoft and display technology, your first thought probably will be that Microsoft is the company that creates the content *shown* on the display, not the company that creates the technology that makes the display work. Thanks to a research partnership, however, that line of thinking might be as out of date as Windows Me.

## Developing Telescopic Pixels

Microsoft researchers, working with Anna Pyayt, a University of Washington Ph.D. candidate who was named a Microsoft Research Fellow in 2007 and 2008, have developed the concept of telescopic pixels.

"Anna Pyayt had just started her three-month internship with us, and she wanted a challenging project," says Microsoft

researcher Mike Sinclair, who has worked extensively with telescopic pixels. "Her idea was to try to come up with a new idea for a pixel using MEMS [micro-electromechanical systems]."

Considering the technology's name, it's probably not surprising that Pyayt says the original idea came from using telescopes.

"The design of a telescope is very efficient," she says, "so [I thought] this pixel may transmit a lot of backlight."

## Telescopic Pixel Benefits

The research shows Pyayt's initial thoughts were correct: By using mirrors, the telescopic pixels can offer true black color, faster response times, and more efficient use of backlight than today's LCDs.

**Efficiency.** With the telescopic pixel design, Microsoft estimates it can make

use of about 36% of the backlight. An LCD usually only makes use of up to 10% of the backlight because the light must travel through several layers and filters. With a brighter output, the telescopic pixel screen would be more visible in bright sunlight than most LCDs.

**Speed.** With the mirrors in Microsoft's design, the response times to go from white to black (on to off) for the display are about 1.5 milliseconds, which is more than fast enough to counteract the blurring of moving images sometimes seen in an LCD, which requires up to 40 milliseconds to go from white to black.

**Power.** The telescopic pixel display would require less circuitry and could make use of LEDs as the backlight, both of which would reduce the amount of power required to run the display. Because

## Microsoft's Telescopic Pixels: A Closer Look

Figures A and B represent cutaways of the telescopic pixel design. In reality, the telescopic pixels are circular. The primary mirror is actually one large circle with a hole through the middle, not the two-piece construction it appears to be in this cutaway drawing. You can see the side-by-side mirrors and holes in Figure C, which represents a front view of six telescopic pixels.

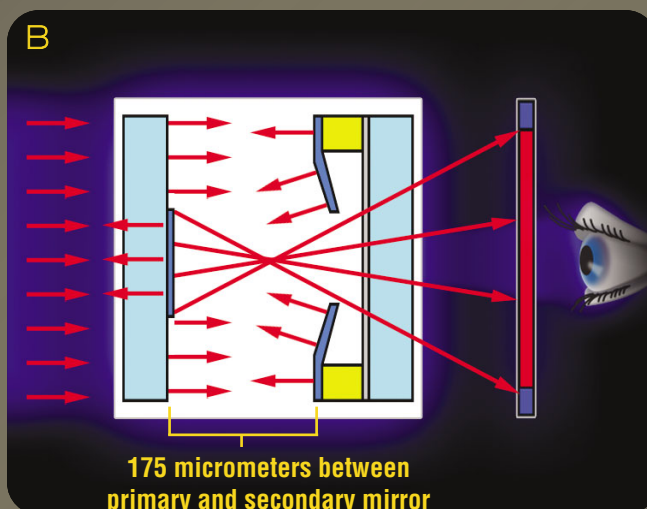
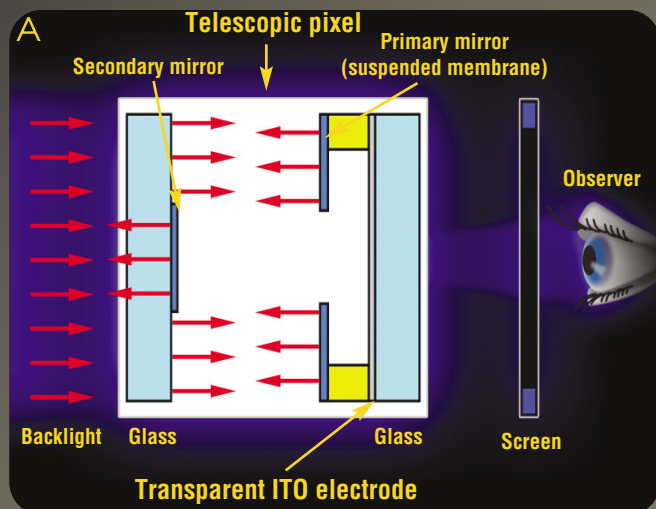
In Figure A, the observer sees a black pixel on the screen. The back of the secondary mirror reflects some light back toward the backlight. The remaining light travels through the backlight glass and strikes the primary mirror, which, when the pixel is to be black, remains parallel to the glass. By remaining parallel, the primary mirror reflects all of the light back toward the

glass, allowing no light to strike the secondary mirror and travel through the hole to the screen, where the observer can see it.

Because no light reaches the screen, the pixel can achieve true black. The configuration of pixels in LCDs allows some stray light from the backlight to reach the screen, making it impossible for a pixel to achieve true black.

"Again, as we are fairly early in the development stages and have only a simple working proof of concept, in theory, we should be able to match or exceed the contrast ratio of competing technologies," Sinclair says.

In Figure B, the observer sees a red pixel on the screen because the light from the LED backlight reaches the screen. As in the previous example, the



the telescopic pixels would be more efficient at using the available backlight, they also could require less power to create a display with the same brightness level.

### Potential Problems

The technology sounds as though it would be expensive to manufacture. High-definition LCDs contain 2 million or more pixels, and future LCDs might approach 10 million, which equals a lot of small mirrors.

However, because telescopic pixel technology can take advantage of some current LCD manufacturing practices, the overall cost could be lower than expected. Changes to the materials used in the telescopic pixels could lower costs, too. For example, the initial project research used indium titanium oxide. However, Sinclair says using aluminum could greatly reduce costs.

"The fabrication process is actually fairly simple: Create two patterned arrays of very thin aluminum, suspend them apart from each other, and enable one to be moved, or focused, through electrostatic attraction,"

Sinclair says. "The hard part is to get a manufacturing technique to produce optically flat suspended rings of aluminum, the primary mirror in the telescope."

At first glance, it would seem durability could be an issue, as well, as the movement of the mirrors could result in mechanical failures. However, Pyatt isn't particularly worried about durability.

"We have not done durability testing yet, but, for example, DLP technology is also based on moving mechanical parts, and this technology works just fine," she says.

Sinclair also feels strongly about the durability of the mirrors.

"One good thing about MEMS is that, once they're in place, they can take a severe beating," Sinclair says. "With the familiar equation, force equals mass times acceleration, the small mass of MEMS devices can take a lot of abuse."

### The Future For Telescopic Pixels

Sinclair says because the technology is in its early stages, it's difficult to pinpoint the

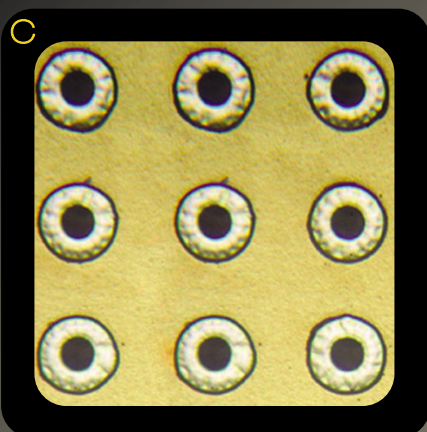
future uses of telescopic pixels. However, he says large TVs, computer monitors, and tiled displays are obvious starting points.

"We are interested in the concept of tiled displays," he says. "This is presently not directly possible with plasma or LCD. The telescopic pixel technique lends itself to being incorporated in small projectors that don't need to enlarge the image much, just enough to edge match to the tiles next to it."

Sinclair says it's also too early to put a target date on displays that use telescopic pixels. In fact, it's too early to know which companies will be creating the displays.

"Since Microsoft is not a display manufacturer, we would likely partner with a company that produces displays," Sinclair says. "The next milestone is to identify a manufacturer capable of making the optically flat aluminum primary mirror arrays. We will then produce prototypes, further extending the research." ▲

by Kyle Schurman



back of the secondary mirror reflects some light back toward the backlight. The remaining light again travels toward the primary mirror.

However, in this example, an electrical charge traveling through the transparent ITO electrode slightly bends the primary mirror, making it similar to the shape of a parabola. With the change in shape, the light reflects back to the secondary mirror, where it's redirected through the hole and onto the screen, which makes the pixel visible to the observer. By changing the amount of electrical charge applied, the circuitry affects the angle of the primary mirror and, consequently, the amount of light that travels through the hole to the screen, which affects the intensity of the pixel.

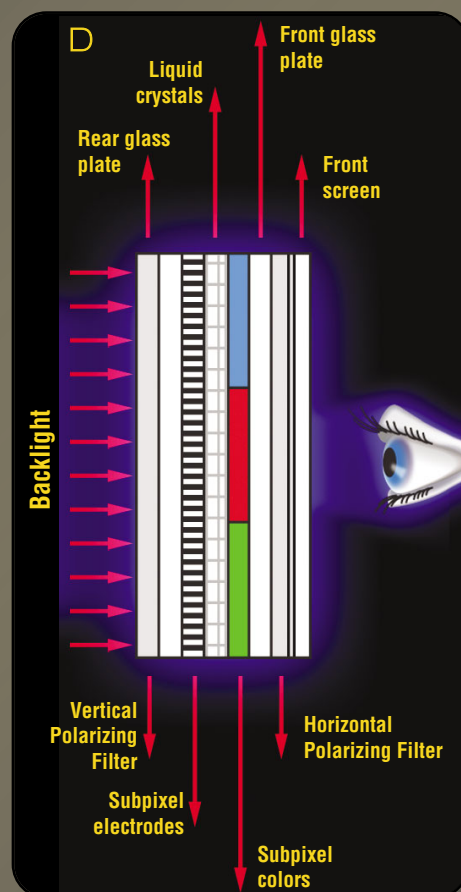
As shown in Figure D, an LCD pixel consists of three tiny subpixels (blue, green, and red). The circuitry inside the LCD adjusts the intensity of the light for each subpixel, and the mixture creates any color. Each subpixel requires its own circuitry, which increases cost and complexity.

Because of the high speed at which the telescopic pixels can change from on to off (up to 10 to 25 times faster than an LCD pixel), the technology wouldn't need subpixels. Instead, a telescopic pixel display could make use of three LEDs (again, blue, green, and red) as the backlight.

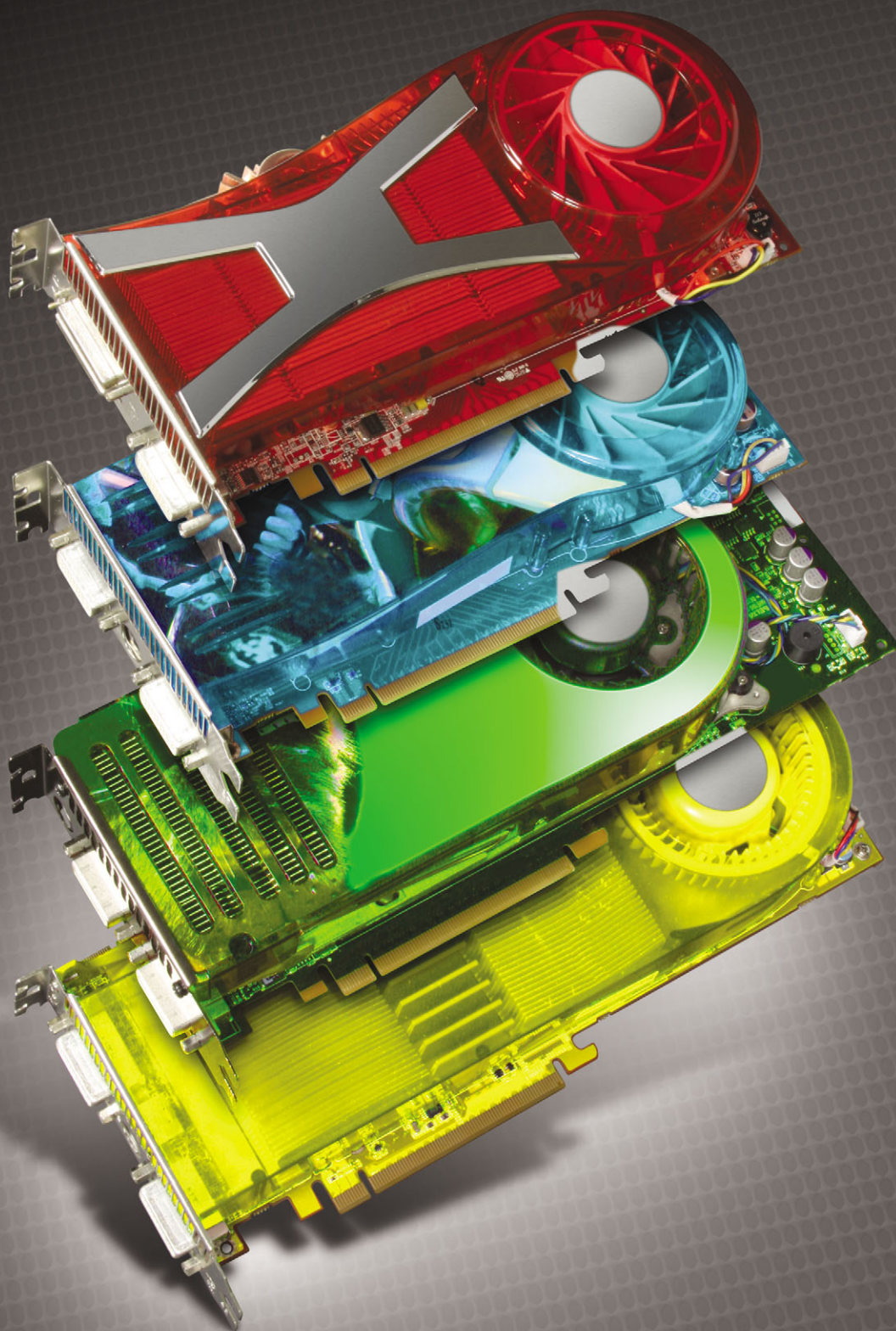
"Presently, LCDs are too slow to use a time sequential RGB backlight," Sinclair says. "It must have separate red, green, and blue subpixels for each colored pixel in the display. With the proven speed of the telescopic pixel concept, a backlight consisting of red, green, and blue emitters, or LEDs, would be sufficient for the backlight, and you would only need one telescopic pixel per display pixel."

As shown in the LCD example, the light from the backlight must pass through two filters, along with several other layers, before reaching the observer, which explains the lower efficiency of having the light reach the screen.

"We have proven in the lab that this telescopic pixel technique is more light efficient than that of LCD as much more of the backlight gets through when the pixel is on," Sinclair says. ▲







58	HIGH-END	■
60	MIDRANGE	■
62	BUDGET	■
64	WORKSTATION / PRO	■



# PICK A CARD

## Our Colossal Graphics Card Guide

Regarding graphics hardware, a lot can happen in a year. In our estimation, the latest cycle of major GPU releases started late October 2007, when Nvidia launched the first of its G92-based GPUs, the GeForce 8800 GT. This card was the first of Nvidia's 65nm GPUs and ushered in the latest interface spec, PCI-E 2.0. The 8800 GT performed so well that many industry observers considered it the final nail in the coffin for AMD's struggling graphics division.

Not long after, the 55nm R670-based Radeon HD 3870 and 3850 appeared, giving the Red Team the die size and power efficiency advantage. AMD also announced support for the tweaked features of DirectX 10.1. At the end of the day, the 8800 GT still beat the 3870, but AMD's quick response with such a competitive offering spoke to the strengths of the R670 architecture.

For the rest of 2007 and the first part of 2008, both firms released mainstream parts based on the G92 and R670, respectively. The next major release was the dual-GPU Radeon HD 3870 X2, followed six weeks later by Nvidia's dual-GPU GeForce 9800 GX2. ATI's first attempt at dual GPUs on a single card features two 3870 GPUs on the same PCB, while Nvidia's more conventional offering features a narrow double-sided heatsink and fan sandwiched between two separate PCBs. Although both cards posted some impressive numbers, neither blew us away. Both relied heavily on driver optimizations to scale properly.

On June 16, Nvidia dropped its flagship enthusiast card based on the GT200 GPU, the GeForce GTX 280, and followed with the GTX 260 less than two weeks later. The GTX 280 consisted of a massive 1.4 billion-transistor die, which is more than double the transistor count of the G80 (the core of Nvidia's architecture that was the basis of cards such as the 8800 GTX and 8800 Ultra). This release also saw the first graphics card to utilize a 512-bit memory interface since the Radeon HD 2900 series. It's massive, complex, and was lauded as the leader in graphics hardware when it exploded onto the scene.

A Radeon card hadn't seen the checkered flag at the high-end since the Radeon 9700 Pro, just over six years ago. But less than two weeks after the GTX 280 hit the ground running, AMD announced its own new flagship cards, Radeon HD 4800 series, which feature 800 stream processors and the latest GDDR5 memory. The Radeon HD 4870 outperformed the GTX 260 but cost \$100 less than the newer card when it launched. In July and August, Nvidia launched its GeForce 9500 GT, 9800 GT, and a retooled version of the 9800 GTX, called the 9800 GTX+.

Just weeks later, ATI launched its sophomore dual-GPU card, the Radeon HD 4870 X2, which solidly ousted Nvidia as the king of the enthusiast GPU hill. At 2,560 x 1,600, the 4870 X2 bested the GTX 280 in our gaming tests across the board. (See page 34 in the November 2008 issue.) Plus, it was priced \$100 less than the GTX 280 was at launch. ATI's newfound lead in the GPU arms race forced Nvidia to respond with an aggressive price-slashing campaign. Nvidia also hinted at releasing an enhanced GTX 260 to stave off the 4870.

In addition to cutting prices, Nvidia released an enhanced GeForce 260 to stave off the 4870. That tweaked card showed up on Sept. 16 with 216 processor cores, compared to the first-gen GTX 260's 192. In price and performance, the new card really narrows the gap with the 4870, but as of this writing, we have yet to see if Nvidia has something else up its sleeve to reclaim the lead.

Despite the back and forth, benchmark brinkmanship, price cuts, and overlocks, it's clear to us that there's never been a better time to be a PC gamer than right now. To help you choose your next graphics card, we've collected the best graphics cards available and offered several reasons why they're worth your consideration. We organized the cards by price rather than performance, but as a result, several of last generation's cards actually slipped into the next-lowest category. So if you're in the market for a new graphics card, read on to get the best visual experience for your dollar. ▲

by Andrew Leibman





**Evga GeForce GTX 280  
Hydro Copper 16**

\$659.99 • [www.evga.com](http://www.evga.com)

**Why we dig it:** The fastest graphics card in Nvidia's stable, which sports 240 stream processors and 1GB of onboard GDDR3, just got a *lot* faster, thanks to Evga's Hydro Copper 16 waterblock. This card features core and memory clocks tweaked from the stock settings to 691MHz and 2,430MHz, respectively. Evga also threw in a set of 1/2-inch and 3/8-inch stems and clamps.

**Who should apply:** If you're the type to have a liquid-cooling system, then spending an average user's entire PC budget on a graphics card probably makes sense to you.

**Memory:** 1GB GDDR3 (2,430MHz) **Interface:** PCI-E 2.0 x16 **Ports:** DVI (2), TV-out



**Evga e-GeForce 9800 GX2**

\$269.99 • [www.evga.com](http://www.evga.com)

**Why we dig it:** This dual-GPU behemoth features a total of 1GB of GDDR3 (512MB per GPU) and 256 stream processors. A built-in HDMI port lets you output HD video to a compatible TV. Evga doesn't stray from the reference design here at all, but it's an excellent bargain for what is effectively chipset-agnostic SLI.

**Who should apply:** This monster is capable of pushing some serious pixels, but it's been around for a while. The price makes this one card even frugal enthusiasts can cuddle up to.

**Memory:** 1GB GDDR3 (2,000MHz) **Interface:** PCI-E 2.0 x16 **Ports:** DVI (2), HDMI



**XFX GeForce 260 GTX  
896MB DDR3 X-XX**

\$299.99 • [www.xfxforce.com](http://www.xfxforce.com)

**Why we dig it:** Nvidia's latest pedigree isn't for casual gamers. This overclocked GTX 260 from XFX features 896MB GDDR3 and 192 stream processors to deliver stunning visuals at even the highest resolutions. The XXX version features core and memory clocks tuned to 640MHz and 2,300MHz, respectively. Depending on the SKU, it ships with either Assassin's Creed or, in CPU's own words, "[one] of this year's best-crafted videogames," Call of Duty 4.

**Who should apply:** This card is for gaming enthusiasts who've yet to purchase the stellar CoD4 and want the edge of a factory overclock.

**Memory:** 896MB GDDR3 (2,300MHz) **Interface:** PCI-E 2.0 x16 **Ports:** DVI (2), TV-out



**BFG Tech BFGE98512GTXPOCE  
GeForce 9800 GTX+**

\$199.99 • [www.bfgtech.com](http://www.bfgtech.com)

**Why we dig it:** The only thing better than a sub-\$200 GeForce 9800 GTX+ is the overclocked version from BFG. This 512MB GDDR3-equipped card has 128 stream processors, and its core and memory clocks set to 760MHz and 2,250MHz, respectively.

**Who should apply:** This card is based on the 55nm G92, making it a good choice for cooling-conscious hardcore gamers.

**Memory:** 512MB GDDR3 (2,250MHz) **Interface:** PCI-E 2.0 x16 **Ports:** DVI (2), TV-out



**Zotac GeForce 9800 GTX AMP!**

\$199.99 • [www.zotac.com](http://www.zotac.com)

**Why we dig it:** The G92-based GeForce 9800 GTX is a good deal less expensive than Nvidia's GeForce GTX 260 and the marginally better-performing GeForce 9800 GTX+. The bundle includes the videogame Lost: Via Domus, which might be a bonus for "Lost" fans but is an otherwise forgettable title. This card sports an overclocked core and memory settings of 750MHz and 2,300MHz, respectively.

**Who should apply:** The GeForce 9800 GTX is a serious gamer's card that'll get you solid performance in everything 3D.

**Memory:** 512MB GDDR3 (2,300MHz) **Interface:** PCI-E 2.0 x16 **Ports:** DVI (2), TV-out



**Evga GeForce GTX 260 Core 216**

\$299.99 • [www.evga.com](http://www.evga.com)

**Why we dig it:** Nvidia wasn't going to take the ATI Radeon HD 4870 lying down, and the updated GTX 260 is the retort. Evga offers one of the first of the new GTX 260s with an additional 24 processor cores enabled. It comes with 896MB GDDR3 (2,000MHz), and its core is clocked to 576MHz.

**Who should apply:** This card is ideal for any gamer who wants the latest performance bump for solid frame rates but doesn't want to have to pay through the nose for the highest-end component.

**Memory:** 896MB GDDR3 (2,000MHz) **Interface:** PCI-E 2.0 x16 **Ports:** DVI (2), TV-out





**Evga GeForce 9800 GT Akimbo Superlocked Edition**

\$189.99 • [www.evga.com](http://www.evga.com)

**Why we dig it:** For the successor to one of Nvidia's most successful graphics cards, the Green Team equipped the GeForce 9800 GT with 112 stream processors. Evga pumped the core and memory clocks up to 650MHz and 1,850MHz, respectively; threw in another 512MB of memory; and slapped on a dual-clot cooler.

**Who should apply:** This card is ideally suited to serious gamers who prefer to play on 22- and 24-inch monitors at resolutions of 1,920 x 1,440 or higher.

**Memory:** 1GB GDDR3 (1,850MHz) **Interface:** PCI-E 2.0 x16 **Ports:** DVI (2), TV-out



**MSI R4870X2-T2D2G-OC Radeon HD 4870 X2**

\$549.99 • [www.msicomputer.com](http://www.msicomputer.com)

**Why we dig it:** Most look at the 1,600 stream processor-equipped Radeon HD 4870 X2 and see perfection. MSI apparently thinks it needs a little extra juice in the form of 780MHz core and 1,800MHz memory clocks. Also, this over-clocked edition was priced comparably to the factory-clocked versions available as we went to press.

**Who should apply:** Gaming enthusiasts looking for peak performance should do themselves a favor and check out this card.

**Memory:** 2GB GDDR5 (1,800MHz) **Interface:** PCI-E 2.0 x16 **Ports:** DVI (2), TV-out



**Sapphire Radeon HD 4870 1G**

\$299.99 • [www.sapphiretech.com/us](http://www.sapphiretech.com/us)

**Why we dig it:** AMD made a smart move with GDDR5, and this card gets even smarter with 1GB of it. The clocks are all stock (750MHz core and 900MHz memory), but you can rest assured that memory won't be your bottleneck. Having that extra 512MB of memory at the ready doesn't improve its scores much, but it does make this card ideal for high-resolution gaming.

**Who should apply:** This card is the best choice for gamers who play demanding games at resolutions of 1,920 x 1,440 or higher.

**Memory:** 1GB GDDR5 (900MHz) **Interface:** PCI-E 2.0 x16 **Ports:** DVI (2), TV-out



**Palit Radeon HD 4870 Sonic Dual Edition**

\$269.99 • [www.palit.biz](http://www.palit.biz)

**Why we dig it:** The Radeon HD 4870 is the best single-GPU card AMD currently offers, and Palit takes that a step further with its Sonic Dual Edition. But Palit's custom treatment doesn't stop at the heatsink: This card features Palit's dual-BIOS-fuelled Smart Switch technology, which lets you flip a switch to throttle core and memory clocks to up to 775MHz and 4,000MHz, respectively.

**Who should apply:** Enthusiasts looking for a real gaming and 3D application workhorse will be well satisfied with this capable card.

**Memory:** 512MB GDDR5 (4,000MHz) **Interface:** PCI-E 2.0 x16 **Ports:** DVI (2), DisplayPort



**MSI R4850 512M Radeon HD 4850**

\$194.99 • [www.msicomputer.com](http://www.msicomputer.com)

**Why we dig it:** This Radeon HD 4850 comes with stock core (625MHz) and memory (993MHz) clocks, but the price is right. Plus, MSI outfitted this Radeon 4850 with a dual-slot copper quad-heatpipe cooler, letting you push the clocks on your own without having to fork over the extra dough for a factory overclock.

**Who should apply:** This is a great sub-\$200 card for gamers who're not ready to take out a second mortgage just to play current vid-eogames. DIY overclockers should also be impressed.

**Memory:** 512MB GDDR3 (993MHz) **Interface:** PCI-E 2.0 x16 **Ports:** DVI (2), TV-out



**Asus EAH3870X2/G/3DHTV/1G Radeon HD 3870 X2**

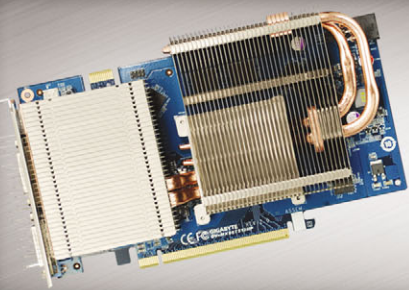
\$229.99 • [usa.asus.com](http://usa.asus.com)

**Why we dig it:** This dual-GPU card is a good value even at the stock core and memory settings. The 1GB of GDDR3 memory will also come in handy when playing at resolutions above 1,920 x 1,440. Asus threw in Company of Heroes: Opposing Fronts, and a so-called "leather" CD case to make it an even more enticing deal.

**Who should apply:** This CrossFire-on-a-card graphics card is ideal for the enthusiast gamer looking for excellent gaming performance at an unbeatable close-out price. Get a pair and create a quad-CrossFire rig on the cheap.

**Memory:** 1GB GDDR3 (1,800MHz) **Interface:** PCI-E x16 **Ports:** DVI (2), TV-out





Gigabyte GV-NX96T512HP  
GeForce 9600 GT

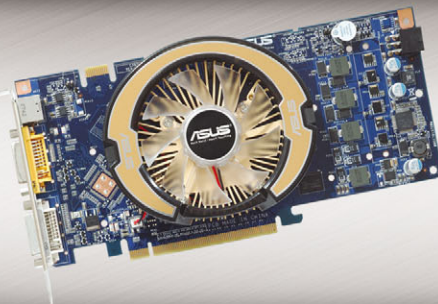
\$119.99 • [www.gigabyte-usa.com](http://www.gigabyte-usa.com)

**Why we dig it:** This passive GeForce 9600 GT features Gigabyte's Multi-Core cooler, which lets Gigabyte drop the reference fansink while boosting the core and memory clocks to 720MHz and 2,000MHz, respectively. Outfitting a decent gaming card with a passive cooler is always an impressive feat. Overclocking it by nearly 10% puts it head and shoulders above the rest.

**Who should apply:** This card is best for budget gamers who want a passive card, whether to silence their PCs or to form the centerpiece of their HTPCs.

**Memory:** 512MB GDDR3 (2,000MHz)

**Interface:** PCI-E 2.0 x16 **Ports:** DVI (2), TV-out



Asus EN9600GSO TOP/HTDP/384M  
GeForce 9600 GSO

\$84.99 • [usa.asus.com](http://usa.asus.com)

**Why we dig it:** If you can't afford the GT variant, then you'll get a surprisingly good card in this overclocked GeForce 9600 GSO from Asus. Core and memory clocks are 600MHz and 1,800MHz, up from the stock 550MHz and 1,600MHz settings. The oversized Glaciator fansink makes this 9600 GSO a bit bulky, but the increased surface area lets the fan spin slower and the clocks go higher.

**Who should apply:** This GeForce 9600 GSO from Asus is the perfect card for the bargain-bin gamer.

**Memory:** 384MB of GDDR3 (1,800MHz)

**Interface:** PCI-E 2.0 x16 **Ports:** DVI (2), TV-out



Gigabyte GV-N95TOC-512H  
GeForce 9500 GT

\$79.99 • [www.gigabyte-usa.com](http://www.gigabyte-usa.com)

**Why we dig it:** The GeForce 9500 GT is simply a die-shrunk and renamed GeForce 8600 GT. This card from Gigabyte handles most games at medium and low resolutions. Gigabyte also gave the core a healthy bump from the stock setting of 550MHz to 650MHz. Price is the name of the game in this category, and as we went to press, there were rebates knocking roughly 30% off this already rock-bottom price.

**Who should apply:** This card is ideal for casual gamers, or low-to-midrange systems that see light gaming.

**Memory:** 512MB GDDR2 (1,000MHz)

**Interface:** PCI-E 2.0 x16 **Ports:** DVI (2), TV-out



Zotac GeForce 8800  
GTS AMP! (G92)

\$159.99 • [www.zotac.com](http://www.zotac.com)

**Why we dig it:** If you're a shoestring gamer, then you can get great performance with last generation's graphics cards without spending a fortune. The AMP! Version of the 8800 GTS from Zotac features a core clock set to 678MHz and comes in at a fraction of the 8800 GTS's launch price.

**Who should apply:** Gamers who want solid frame rates in most games but don't mind missing out on the tweaks and improvements of the current generation GPUs shouldn't hesitate to snatch this up.

**Memory:** 512MB GDDR3 (1,940MHz)

**Interface:** PCI-E 2.0 x16 **Ports:** DVI (2), TV-out



Zotac GeForce 8800 GT AMP!

\$119.99 • [www.zotac.com](http://www.zotac.com)

**Why we dig it:** The GeForce 8800 GT really shows its age these days, but it can be had for a pretty penny less than the 9800 GT. It also boasts 48 more stream processors than the comparably priced 9600 GT. Zotac's AMP! Edition features a core clock upped to a respectable 700MHz (from 600MHz). Get one (or two) before it's gone.

**Who should apply:** This card is ideal for gamers with just over 100 bucks but who are still looking for decent fps in current-generation games.

**Memory:** 512MB GDDR3 (2,000MHz)

**Interface:** PCI-E 2.0 x16 **Ports:** DVI (2), TV-out



XFX PVT88SFDD4 GeForce  
8800 GS

\$84.99 • [www.xfxforce.com](http://www.xfxforce.com)

**Why we dig it:** The GeForce 8800 GS is the budget version of the 8800 GT, with 12 fewer shader units, fewer ROPs, and a narrower 192-bit memory bus. But because prices of the latter card have fallen, the 8800 GS dropped to less than \$100. Cheap performance is the way to CPU's heart, and this card had us at hello.

**Who should apply:** At medium resolutions, gamers can't pass this up. It's also one of the more inexpensive options you'll find for building an SLI rig.

**Memory:** 384MB GDDR3 (1,600MHz)

**Interface:** PCI-E 2.0 x16 **Ports:** DVI (2), TV-out



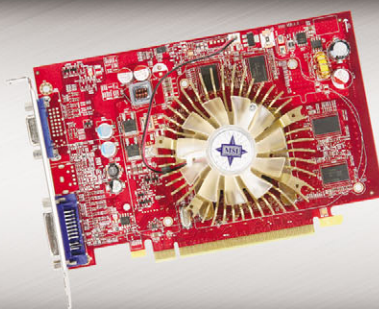


**HIS HD 4670 IceQ Turbo**  
\$99.99 • [www.hisdigital.com](http://www.hisdigital.com)

**Why we dig it:** ATI's mainstream benchmark-buster is the Radeon HD 4670, which features 320 stream processors (the same count as the 3870 and 3850 graphics cards) for less than 100 bucks. HIS dropped the stock cooling solution in favor of its UV-reactive IceQ cooler, which helps vent heat from the overclocked 780MHz GPU core.

**Who should apply:** This card is for medium-to high-resolution gamers looking for the best sub-\$100 performer from ATI's current generation GPUs.

**Memory:** 512MB GDDR3 (2,000MHz)  
**Interface:** PCI-E 2.0 x16 **Ports:** DVI (2), TV-out



**MSI R4650-D512 Radeon HD 4650**  
\$69.99 • [www.msicomputer.com](http://www.msicomputer.com)

**Why we dig it:** The Radeon HD 4650 is simply a 4670 equipped with a gimped memory subsystem, a slower 600MHz core clock, and a conspicuously absent CrossFire connector. But at \$30 cheaper, this card is a real bargain. This is one of the few Radeon HD 4650s available as we went to press, but it's already significantly cheaper than originally expected.

**Who should apply:** As long as you lay off the antialiasing and anisotropic filtering, this card's gaming performance at medium resolutions will be more than satisfying.

**Memory:** 512MB GDDR2 (1,000MHz)  
**Interface:** PCI-E 2.0 x16 **Ports:** DVI, VGA

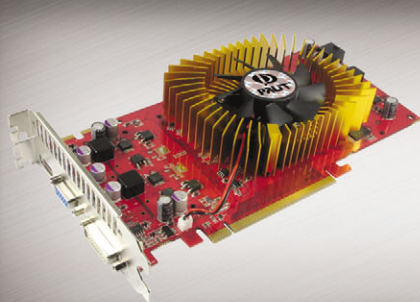


**Sapphire Toxic HD 3870**  
\$139.99 • [www.sapphiretech.com/us](http://www.sapphiretech.com/us)

**Why we dig it:** Sapphire's Toxic Radeon HD 3870, arguably the star performer of ATI's last generation, has received a nice price cut. Features include a single-slot Vapor-X cooler and a GPU core clock of 800MHz. Sapphire also went all out on the extras, giving you bundled versions of PowerDVD 7 and 3DMark06.

**Who should apply:** Gamers looking for the best performance in the sub-\$150 range would be hard-pressed to do better than the Toxic HD 3870.

**Memory:** 512MB GDDR4 (2,300MHz)  
**Interface:** PCI-E 2.0 x16 **Ports:** DVI (2), TV-out

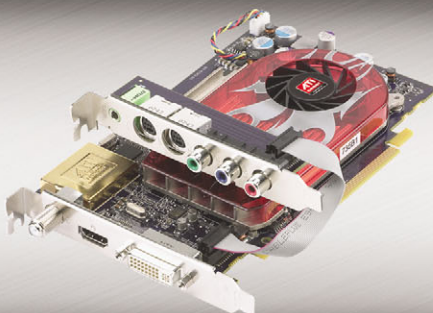


**Palit Radeon HD 3850 Super**  
\$89.99 • [www.palit.biz](http://www.palit.biz)

**Why we dig it:** Palit tossed the single-slot cooler of the reference design in favor of a dual-slot backplane and extra-thick fansink. It may not be the latest, or flashiest graphics card, but for less than \$90, we wouldn't expect it to be. It is, however, a surprisingly potent gaming card that could be a decent overclocker in the right hands.

**Who should apply:** Budget gamers looking for a great deal shouldn't pass this up. With the integrated HDMI port, this 3850 is also ideal for an HTPC.

**Memory:** 512MB GDDR2 (800MHz)  
**Interface:** PCI-E 2.0 x16 **Ports:** DVI, VGA, HDMI



**VisionTek All-in-Wonder HD**  
\$204.99 • [www.visiontek.com](http://www.visiontek.com)

**Why we dig it:** The single-slot AIW HD features an RV635Pro GPU, which is a 378 million-transistor GPU clocked at 725MHz. This card also features a Theater 650 Pro-based chip to serve as an ATSC, NTSC, and Clear-QAM TV tuner. VisionTek also bundles a telescopic antenna, remote control and receiver, and an expansion bracket that supports component video, S-Video in and out ports, and an analog audio port.

**Who should apply:** This card is perfect for users looking to turn a mATX-based system into an HTPC with modest gaming capabilities.

**Memory:** 512MB GDDR2 (1,200MHz)  
**Interface:** PCI-E 2.0 x16 **Ports:** TV/antenna input, HDMI, and DVI



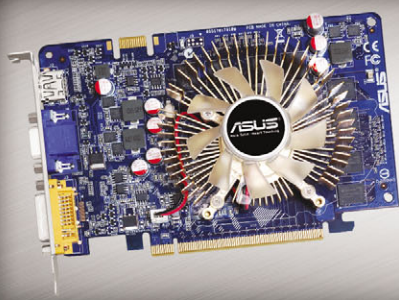
**Asus AH3650 SILENT/HTDI/512M Radeon HD 3650**  
\$89.99 • [usa.asus.com](http://usa.asus.com)

**Why we dig it:** In the unending battle against obsolescence, Asus calls for a tentative armistice with this AGP version of the Radeon HD 3650. Asus' V-cool passive cooler makes this a noiseless option, and core and memory clocks are set at 725MHz and 1,000MHz, respectively. Asus also threw in a DVI-to-HDMI adapter.

**Who should apply:** If you're looking to bring a legacy system up to speed or convert your old system into an ultra-quiet HTPC, then this Radeon HD 3650 is a perfect choice.

**Memory:** 512MB GDDR2 (1,000MHz)  
**Interface:** AGP 8X **Ports:** DVI (2), TV-out





**Asus EN9500GT MAGIC/DI/512M  
GeForce 9500 GT**

\$72.99 • [usa.asus.com](http://usa.asus.com)

**Why we dig it:** When Nvidia launched its GeForce 9500 GT, it was designed to clobber the Radeon HD 3650 in both price and performance, and it largely succeeds. This single-slot card features a high-profile fan-sink, 800MHz memory, and a 550MHz core clock. As we went to press the 9500 GT was also the lowest-end graphics card that supports SLI.

**Who should apply:** This affordable card won't disappoint casual gamers, videophiles, or HTPC enthusiasts.

**Memory:** 512MB GDDR2 (1,000MHz)

**Interface:** PCI-E 2.0 x16 **Ports:** DVI, VGA, HDMI



**BFG Tech BFG94512GTE  
GeForce 9400 GT**

\$69.99 • [www.bfgtech.com](http://www.bfgtech.com)

**Why we dig it:** The GeForce 9400 GT's product page on Nvidia's Web site doesn't say much about gaming, but this card can handle racing games, third-person adventure games, and RTS games at medium and low resolutions with stripped-down settings. BFG's low-profile 9400 GT features 16 stream processors, which is half that of the 9500 GT, but it delivers a 3D experience that is visibly superior to that of an integrated graphics adapter.

**Who should apply:** If you are looking to build a low-profile HTPC and don't mind a little fan noise, then this is your card.

**Memory:** 512MB GDDR2 (800MHz) **Interface:** PCI-E 2.0 x16 **Ports:** DVI, VGA, TV-out



**Chaintech GSE86GT 512MB  
GeForce 8600 GT**

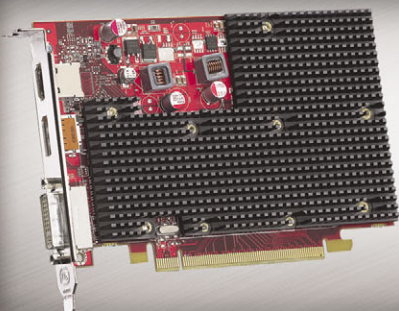
\$69.99 • [www.chaintechusa.com](http://www.chaintechusa.com)

**Why we dig it:** The GeForce 8600 GT is a bit long in the tooth, but it features double the stream processors of the 9400 GT and is often priced the same before rebates. Chaintech equipped this 8600 GT with twice as much memory as the reference design, but left the core clock at the standard 540MHz.

**Who should apply:** Casual gamers looking to update an older graphics card will be pleasantly surprised by what this card offers.

**Memory:** 512MB GDDR2 (800MHz)

**Interface:** PCI-E 2.0 x16 **Ports:** DVI, VGA, S-Video



**AMD ATI Radeon HD 4450**

\$55 • [ati.amd.com](http://ati.amd.com)

**Why we dig it:** As we went to press, this card was only available as a reference board from ATI. The Radeon HD 4450 we tested features a passive heatsink and a core clock set at 600MHz. It's everything we loved about the 3450 (especially the price) plus twice as many stream processors.

**Who should apply:** Only for casual gamers or RTS and WoW players. Home-theater enthusiasts will also want to make sure they get a passively cooled version for their next HTPCs.

**Memory:** 512MB GDDR3 (1,600MHz)

**Interface:** PCI-E 2.0 x16 **Ports:** DVI, HDMI, DisplayPort



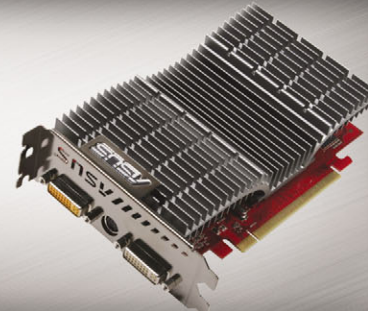
**PowerColor AX3450 256MD2-H  
Radeon HD 3450**

\$39.99 • [www.powercolor.com](http://www.powercolor.com)

**Why we dig it:** The Radeon HD 3450 is the Yugo of 3D gaming, but it gets great mileage in less demanding apps. It's a heck of a value for a secondary PC, silent compact PC, or HTPC. And it beats the pixels out of integrated graphics.

**Who should apply:** As long as you don't expect it to do any heavy lifting, this card will satisfy HTPC enthusiasts and silent PC fans (no pun intended) alike.

**Memory:** 256MB GDDR2 (800MHz) **Interface:** PCI-E 2.0 x16 **Ports:** DVI, VGA, HDMI



**Asus EAH3650 Silent MAGIC/  
HTDP/512M Radeon HD 3650**

\$54.99 • [usa.asus.com](http://usa.asus.com)

**Why we dig it:** This passively cooled Radeon HD 3650 from Asus is a prime example of what happens to last-gen cards when the latest-gen hits the market in full force. At this price, this card is a casual gamer's dream.

**Who should apply:** Get this card and you can even start playing WoW at high settings. Home-theater enthusiasts not deterred by the lack of HDMI will also get their money's worth.

**Memory:** 512MB GDDR2 (1,000MHz)

**Interface:** PCI-E 2.0 x16 **Ports:** DVI (2), TV-out



# PowerBird

FULLY MODULARIZED SERIES

## 900W/1100W

87% efficiency  
Fully modularized cables  
Wattage rated at 40°C  
Active PFC  
Ball bearing Sanyo Denki fan

**topower**  
Dare to be Different



Topower PowerBird PSU provides greatest freedom of cable routing and customization with fully modularized cable management capability. Rohs and maximum 87% efficiency is one of the greenest, yet, efficient high-wattage power supplies available in market.

SIX +12V rails ensuring great safety and stable current that evenly distributed to SIX PCIe, TWO 8pin processor connectors, and the rest components. The PowerBird will be available in 900W and 1100W configurations, delivering up to 1.1KW of continuous wattage rated at 40°C. Moreover, the PowerBird is kept extremely cool and silent with a large thermally controlled 120mm ball-bearing fan.

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



**Dual main transformers**

- Balance load sharing
- Best for high watt design
- 12V generated from both transformers

Patent No.202005013110.5



**Full Bridge Cable management**

- Flexible to plug in any bridge
- 6 sets of 12V rails design
- Eliminate clutter and improve airflow inside the cas



**Fiber PCB with double layers**

- Best flexural strength and dimensional stability.
- Up to 150°C utilization temperature



**PowerGood LED Indicator**

- Self-test for normal operation



**Mirror-effect coating**

- Titanium-like mirror coating.
- Nano technology for shielding EMI.





# SPOTLIGHT



**PNY VQFX3700-PCI-E-PB  
Quadro FX3700**  
\$839.99 • [www2.pny.com](http://www2.pny.com)

**Why we dig it:** When we got our hands on this single-slot G92-based card (the same GPU in the GeForce 8800 GT) a few months ago, it performed nearly as well as Nvidia's ultra high-end Quadro FX 5600. But the big advantage is that it's available for a fraction of the price.

**Who should apply:** This card is best suited to professionals who use CAD and Solid-Works on a regular basis. It's also a decent gaming card to boot.

**Memory:** 512MB GDDR3 (1,600MHz)  
**Interface:** PCI-E 2.0 x16 **Ports:** DVI (2), 3-pin stereo

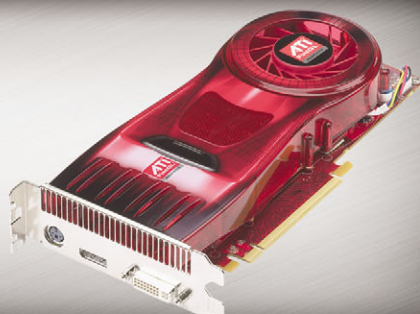


**PNY Quadro NVS 440 x16**  
\$449.99 • [www2.pny.com](http://www2.pny.com)

**Why we dig it:** The Quadro NVS440 is more of a 2D dynamo than a 3D wiz. This passively cooled card features dual-integrated 400MHz RAMDACs to support up to four displays at up to 2,048 x 1,536 on each display.

**Who should apply:** This card is ideal for users who work with multiple monitors in financial, medical, and oil and gas exploration industries.

**Memory:** 256MB of GDDR3 **Interface:** PCI-E x16 **Ports:** DMS-59 (2)



**ATI FireGL V7700**  
\$919.99 • [ati.amd.com](http://ati.amd.com)

**Why we dig it:** This card, which comes to you straight from AMD, just dominated our workstation-oriented benchmarks. It features 320 stream processors, memory, and a 775MHz core clock. ATI's Radeon HD 3870-based pro graphics card is best suited to CAD, 3D digital content creation, and simulation applications.

**Who should apply:** Digital artists and content-creators prize this card for its 3D rendering, but researchers and scientists also like its floating-point prowess for simulations.

**Memory:** 512MB GDDR4 (1125MHz)  
**Interface:** PCI-E 2.0 x16 **Ports:** DVI, Display Port, 3-pin stereo

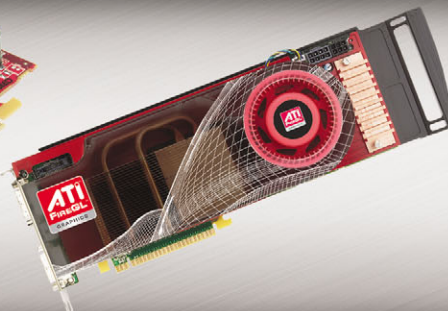


**ATI FireMV 2260**  
\$154.99 • [www.amd.com](http://www.amd.com)

**Why we dig it:** ATI's FireMV 2260 proves that workstation cards don't have to cost an arm and a leg. This dual-monitor-capable card features a low-profile PCB, fanless heatsink, and two native DisplayPort interfaces supporting resolutions up to 2,560 x 1,600. It supports DVI resolutions up to 1,920 x 1,200. ATI threw in a pair of DisplayPort-to-DVI adapters and a low-profile back plane to sweeten the deal.

**Who should apply:** The card can handle minor 3D work, but it's a boon to users of multimonitor setups.

**Memory:** 256MB GDDR2 **Interface:** PCI-E 2.0 x16 **Ports:** DisplayPort (2)



**ATI FireGL V8600**  
\$1,369.99 • [ati.amd.com](http://ati.amd.com)

**Why we dig it:** AMD's high-end FireGL V8600 is based on the 80nm R600 GPU and comes equipped with 320 stream processors, a 256-bit memory bus, and 111GBps memory bandwidth. This card really shines in Maya, UGNX, and high-end OpenGL work.

**Who should apply:** This card is ideal for users who need a massive frame buffer but don't want to pay for memory they probably won't use. (Compare the more expensive FireGL 8650.)

**Memory:** 1GB GDDR4 (868MHz) **Interface:** PCI-E x16 **Ports:** DVI (2), 3-pin stereo

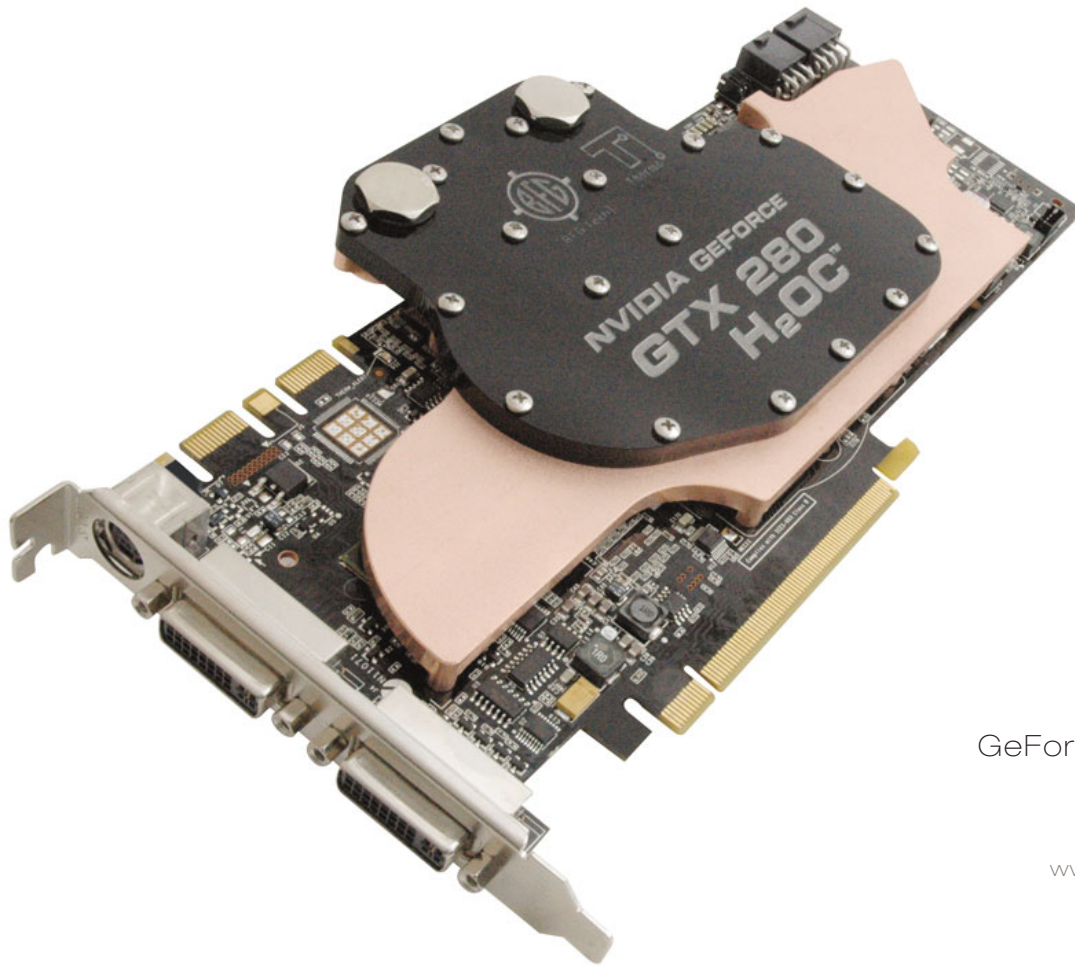


**Matrox Millennium P690 PCIe x16**  
\$184.99 • [www.matrox.com](http://www.matrox.com)

**Why we dig it:** Matrox, the third wheel in graphics, delivers a solid multimonitor card in the Millennium P690. It supports two digital displays up to 1,920 x 1,200, two analog displays up to 2,048 x 1,536, and a dual-graphics card mode for up to four displays.

**Who should apply:** The Millennium P690 is designed for users of a variety of professional applications that make use of multiple monitors.

**Memory:** 128MB GDDR2 **Interface:** PCI-E x16 **Ports:** DVI (2)



## BFG GeForce GTX 280 H2OC 1GB

\$629.99  
[www.bfgtech.com](http://www.bfgtech.com)

Backed by BFG's famous Lifetime Warranty, the BFG NVIDIA® GeForce® GTX 280 H2OC™ 1GB graphics card is the fastest factory-overclocked GTX 280 available. BFG's ThermoIntelligence® water cooling solution offers exceptional thermal performance in a single slot design. Co-developed by BFG and Danger Den™, the ThermoIntelligence® custom copper water block is totally silent and allows the GTX 280 GPU to be factory overclocked to the highest stable level,

delivering up to a 52C lower GPU operating temperature than reference cooling solutions.

Unlock the power of 240 processing cores to tackle demanding system tasks such as viewing photos in 3D or transcoding video to a personal video player up to 7X faster than the CPU. PureVideo® HD technology provides the ultimate interactive Blu-ray DVD movie experience with full hardware acceleration of HD movies and picture-in-picture content.

NVIDIA SLI® technology and 1GB of dedicated graphics memory allow you to max out game settings and resolution (2,560 x 1,600). Out-of-the-box overclocking provides a free boost to already blazing performance. NVIDIA® PhysX™ technology\* brings your games to life with massively destructible environments and ultra-realistic physical interaction. (*\*PhysX drivers are required to experience in-game GPU PhysX acceleration. Visit [www.nvidia.com/PhysX](http://www.nvidia.com/PhysX) for more details.*)

### SPECS:

- Bus Type: PCI Express® 2.0 (backward compatible with PCI Express®)
- Memory: 1GB (1,024MB) GDDR3
- Core clock: 680MHz (vs. 602MHz standard)
- Shader clock: 1,458MHz (vs. 1,296MHz standard)
- Memory data rate: 2,450MHz (vs. 2,214MHz standard)

- Processor cores: 240
  - Shader Model: 4.0
  - Texture fill rate: 54.4 billion per sec.
  - Memory interface: 512-bit
  - Memory bandwidth: 156.8GB/sec.
  - RAMDACs: Dual 400MHz
- ### FEATURES:
- 2nd Generation NVIDIA® Unified Architecture with GigaThread™ technology

- NVIDIA PhysX™-ready
- 3-way NVIDIA SLI® technology
- Microsoft® DirectX® 10 support
- NVIDIA CUDA™ technology
- PCI Express® 2.0 support
- NVIDIA Lumenex™ engine
- 128-bit floating point HDR (high dynamic-range) lighting
- 16x antialiasing technology

- OpenGL® 2.1 optimizations and support
- Display connectors: 2 dual-link DVI-I, HDTV + TV out
- NVIDIA PureVideo® HD technology
- Discrete, programmable video processor





## 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 SLI 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 heat pipe,

heat sink, and fans. But you'll never even know it's running.

NVIDIA's PureVideo HD2 technology will mollify any home-theater enthusiast with its HD image quality, and MSI StarOSD offers both home theater junkies and hardcore gamers the ability to easily adjust contrast, brightness, and more.

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



## Sapphire TOXIC HD 4870 512MB GDDR5 PCI-E

\$349.99  
[www.sapphiretech.com](http://www.sapphiretech.com)

The Sapphire HD 4870 Toxic Edition features the award winning—and Sapphire exclusive—Vapor-X cooler, Sapphire's implementation of VCT (Vapor Chamber Technology). This advanced cooling solution is used for the core

logic, and together with three heatpipes and thermally controlled fan venting outside the case provides more efficient and quieter cooling than competing solutions for this generation of high-performance graphics. The Sapphire HD 4870

Toxic Edition ships overclocked out of the box for an immediate high-performance graphical or gaming experience, and the advanced hybrid cooling solution provides enthusiasts with further scope for performance tuning.

### SPECS:

- Core Clock: 780MHz
- Memory Clock: 1000MHz, 4.0Gbps
- 512MB/256-bit GDDR5 memory interface

### FEATURES:

- 24x custom filter anti-aliasing (CFAA) and high-performance anisotropic filtering

- ATI CrossFireX™ multi-GPU support for highly scalable performance
- Use up to four discrete cards with an AMD 790FX-based motherboard
- PCI Express® 2.0 support
- Microsoft® DirectX® 10.1 support
- Dynamic geometry acceleration

- Game physics processing capability
- ATI Avivo™HD video and display technology
- Unified Video Decoder 2 (UVD) for Blu-ray™ and HD Video
- Built-in HDMI with 7.1 surround sound support and on-chip HDCP
- ATI PowerPlay™ technology
- I/O Output: Dual DL-DVI-I+HDTV

- PCI Express 2.0 x16 bus interface
- Dual Slot Active Cooler
- HDMI compliant via dongle
- 7.1 Audio Channel Support
- Shader Model 4.1 support





## VisionTek HD 4870 X2

\$549.99

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

Go beyond HD video with the Unified Video Decoder 2. The UVD 2 frees up your CPU for the most processing-intensive content, including VC-1, H.264, and MPEG-2. Take full advantage of Blu-ray functionality with dual-stream, PIP (picture-in-picture) capabilities.

With AVT (Accelerated Video Transcoding), you are allowed to convert videos to H.264 and

MPEG-2 formats up to 19 times faster than when using just a CPU. Full 1080p files can be converted to H.264 and MPEG-2 up to 1.8x faster than real-time.

Watch the hottest Blu-ray movies or other HD content at full 1080p display resolution and beyond. Watch standard DVD movies in near high-definition quality with DVD upscaling. Its Dynamic Contrast automatically adjusts the contrast and

brightness during scenes to consistently deliver a crisp, vibrant picture. Enjoy the latest audio technologies using HDMI with 7.1 digital surround sound support.

1600 stream processors and 230GB/sec of memory bandwidth provide the brute power needed to tackle the most intense 3D games, even those with artificial intelligence, physics operations and tessellation.

### SPECS:

- ATI Radeon™ HD4870 x2 Powered
- 2 GB of GDDR5 memory
- 2.4 teraFLOPS of GPU power
- DirectX® 10.1
- 1600 stream processing units
- 2 x 256-bit memory interface

### FEATURES:

- Dual mode ATI CrossFire™ multi-GPU support for highly scalable

### performance

- 24x custom filter anti-aliasing (CFAA) and high performance anisotropic filtering
- PCI Express® 2.0 support
- Dynamic geometry acceleration
- Game physics processing capability
- ATI Avivo™ HD video and display technology
- Unified Video Decoder 2 (UVD 2)

### for Blu-ray™ and HD Video

- DVD Upscaling
- Dynamic Contrast
- Built-in HDMI with 7.1 surround sound support
- Dynamic power management with ATI PowerPlay™ technology3
- Supported Operating Systems: Windows Vista (all), Windows XP, Windows XP Media Center Edition

- UVD 2 frees up your CPU for the most processing-intensive content, including VC-1, H.264 and MPEG-2.

\*actual card appearance may vary



## Zotac GTX 280AMP! ZT-X28E3LA-FCP

\$439.99  
[www.zotac.com](http://www.zotac.com)

One of the world's fastest graphics cards just got quicker. The Zotac GeForce GTX 280 AMP! edition offers the GeForce GTX 280 with a bump in the core clock (from 602MHz to 700MHz), processor core clock (from 1,296 to 1,400MHz), and memory clock (from 1,107MHz to 2,300MHz). Of course, Zotac's GeForce GTX 280 AMP! includes the graphics card's DirectX 10, Open GL2.1,

and Nvidia's PhysX technology to deliver some of the highest frame rates and fastest physics processing you can buy.

The SLI-ready Zotac GeForce GTX 280 AMP! features Nvidia's PureVideo HD video processing architecture to offload video decoding tasks onto the graphics card, and you also benefit from true

128-bit, floating point HDR lighting and 16x full-screen anti-aliasing. To help keep your PC cool, the two slot GPU features integrated air-cooling that pushes the card's hot air directly outside the PC's chassis. Zotac includes a DVI-to-HDMI adapter, which you can connect to one of the two dual-link DVI outputs, so it's easy to connect your PC to your HDTV.

### SPECS:

- NVIDIA GeForce GTX 280
- 240 processor cores
- 1GB GDDR3
- 512-bit memory bus
- Core clock: 700MHz
- Memory clock: 2,300MHz
- PCI Express 2.0 (compatible with 1.1)
- Height: 4.376 inches (111.15mm)

- Width: 9 inches (228.6mm)
- ED 480p
- HD 720p
- HD 1080i
- Full HD 1080p

### FEATURES:

- NVIDIA PureVideo HD technology
- 2nd-generation NVIDIA Unified Architecture
- NVIDIA PhysX Technology

- NVIDIA Lumenex Engine
- NVIDIA GigaThread Technology
- NVIDIA SLI-ready
- NVIDIA ForceWare drivers
- Microsoft DirectX 10
- OpenGL 2.1
- Microsoft Windows XP/Vista
- Dual dual-link DVI
- HDCP-compatible
- HDTV (component video)

- Dual SLI connectors (3-way SLI-ready)
- GRiD game bundle
- DVI to HDMI adapter
- Component video output dongle
- S/PDIF audio input cable
- DVI to VGA adapter





## BFG GeForce 9800 GT OC 512MB

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

Backed by free 24/7/365 world-class tech support and the best lifetime warranty in the industry, the BFG GeForce® 9800 GT OC™ graphics card is overclocked out of the box giving you more performance for free. The graphics processing power offered by GeForce 9800 GT allows for richer and more immersive game environments by enabling faster frame rates at higher resolutions with more image quality options enabled.

**GAMING PERFORMANCE.** The BFG 9800 GT OC features 112 stream processors, an impressive 256-bit frame-buffer for amplified graphics processing power. It's also NVIDIA SLI®-compatible, which can boost game performance up to 2x.

**GAMING FEATURES.** NVIDIA® PhysX™ technology brings your games to life with massively destructible environments and ultra-realistic physical interaction. Dynamic cloth, physical

weather effects, and next-generation volumetric effects add cinematic realism to game scenes.

**HD VIDEO.** Experience stunning movie playback with reduced CPU utilization and power consumption, as well as spectacular picture clarity and vibrant color with dynamic contrast enhancement. This powerful graphics card offers full support for HDTV resolutions up to 1080p.

### SPECS:

- Bus type: PCI Express® 2.0
- Memory: 512MB GDDR3
- Core clock: 625MHz (vs. 600MHz standard)
- Shader clock: 1,566MHz (vs. 1,500MHz standard)
- Memory data rate: 1800MHz
- Stream processors: 112
- Shader model: 4.0

- Texture fill rate: 35 billion per sec.
- Memory interface: 256-bit
- Memory bandwidth: 57.6GBps
- RAMDACs: Dual 400MHz

### FEATURES:

- NVIDIA® unified architecture with GigaThread™ technology
- NVIDIA SLI® technology
- Full Microsoft® DirectX® 10 support

- NVIDIA HybridPower™ technology
- NVIDIA PhysX™-ready
- NVIDIA CUDA™ technology
- PCI Express® 2.0 support
- NVIDIA Lumenex™ engine
- 128-bit floating-point HDR (high dynamic-range) Lighting
- 16x antialiasing technology
- NVIDIA GeForce UDA (Unified Driver Architecture)

- OpenGL® 2.1 optimizations and support
- Dual dual-link DVI support
- NVIDIA PureVideo® HD technology
- Hardware decode acceleration
- Display connectors: 2 dual-link DVI-I, HDTV + TV out



## Palit 4870 SONIC Dual Edition 1GB

\$299.99

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

Radeon™ HD 4870 1GB Sonic Dual Edition from Palit is equipped with 1024MB of GDDR5 industry leading memory and features a revolutionary graphics solution with dual BIOS and dual fan. The dual BIOS allows users to switch from Sonic performance up to Turbo performance clocks with the flick of the “Smart Switch” on the

bracket. The dual-fan cooling system is designed to provide more airflow while still running at low RPM to keep sound to a minimum. The fans work independently: The left side of the fan adjusts speed depending on GPU temperature while the right fan maintains low speed providing cool air flow over the full copper base and three heat pipes.

This Palit-exclusive design graphics card with four-in-one display output is a future-proof graphics solution allowing users to play now and prepare for tomorrow with HDMI and DisplayPort output on the bracket, along with DVI-I and VGA.

### SPECS:

- GPU clock: 775MHz
- Memory interface: 256-bit
- Memory type: DDR5
- Memory size: 1,024MB
- Memory clock: 4,000MHz (1000MHz x 4)
- Max resolution horizontal: 2,560
- Max resolution vertical: 1,600
- Length: 188mm

- Width: 112mm
- Height : dual slot
- Bus type: PCI-E 2.0
- HDCP-capable outputs: 1
- Profile: standard
- Thermal solution: dual fansink with three heatpipes

### FEATURES:

- User-switchable dual BIOS between SONIC and Turbo speeds

- Turbo speed: 775MHz Core, 4,000MHz Memory
- Sonic speed: 750MHz Core, 3,800MHz Memory
- Four outputs native on board; HDMI, DisplayPort, DVI-I and VGA
- 1,024MB of DDR5 memory
- PCI Express® 2.0 support
- ATI CrossFireX™ technology support for multi-GPU

- Microsoft® DirectX® 10.1 support
- Unified Superscalar Shader Architecture
- 800 stream processors units
- 128-bit floating-point precision for all operations
- Bundle: World of Warcraft trial





PNY  
XLR8 GeForce®  
9800 GT 1GB PCIe

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

Perfect performance. Perfect price. The PNY XLR8™ GeForce® 9800 GT graphics card powers next-generation games. Offering the highest data transfer speeds for today's games and 3D applications, it has all the specs and features gamers love, but at a lower price! The SLI®-Ready XLR8 GeForce 9800 GT supports

NVIDIA PhysX™ technology, which brings your games to life, capturing true human behaviors and atmospheric weather effects. The 9800 GT provides the ideal mix; with each core clocked at a blistering fast 1.5 GHz and a frame buffer interface operating at 900MHz, this card is what gamers need.

The XLR8 9800 GT 1024MB steps it up by carrying 1GB onboard memory, while offering the latest NVIDIA SLI-Ready GPUs with full DirectX® 10 support, HDCP capability and Overclocked options for hardcore gamers to push faster frame rates. Your competition won't stand a chance!

**SPECS:**

- PCI Express 2.0
- 112 processing cores
- 600MHz core clock
- 1500MHz shader clock
- 1024MB GDDR3
- 256-bit memory interface
- 1800MHz (effective) memory frequency
- 57.6 GB/s memory bandwidth

- 33.6 Bil/sec texture fill rate

**FEATURES:**

- NVIDIA® unified architecture with GigaThread™ technology
- Full Microsoft® DirectX® 10 Shader Model 4.0 support
- True 128-bit floating point high dynamic-range (HDR) lighting
- NVIDIA PhysX Technology support
- NVIDIA® CUDA Technology support

- NVIDIA® Hybrid Power Technology
- NVIDIA® Quantum Effects™ physics processing technology
- NVIDIA® SLI technology
- Two dual-link DVI output for supporting 2,560x1,600 resolution displays
- NVIDIA® PureVideo™ HD technology2
- HDCP-capable

- HDMI Support (with audio) via included adapter
- PCI Express® 2.0 support
- OpenGL® 2.1 support
- NVIDIA® ForceWare® Unified Driver Architecture (UDA)
- Built for Microsoft Vista



## Visiontek HD 4850

\$199.00  
[www.visiontek.com](http://www.visiontek.com)

P onying up \$400 to \$600 for a graphics card can put a hurt on your wallet. But with Visiontek's ATI Radeon HD 4850, you can play games at the highest resolutions without breaking the bank.

### Push Your Frame Rates

The Radeon HD 4850 includes a TeraScale graphics engine to improve the frame rates in your HD gameplay, and with enhanced anti-

aliasing and anisotropic filtering, you'll see less jagged edges and improved background and facial definition in your games. When teamed with an AMD 790FX-based motherboard, you can use up to four of Visiontek's Radeon HD 4850s and give yourself an edge on the frag count. The card supports DirectX 10.1 and PCI Express 2.0—giving you the bandwidth you need to play games with DirectX 10.1's full graphics capabilities.

### HD Decoding

The Visiontek Radeon HD 4850 also features ATI's Avivo HD technology that provides Unified Video Decoding for BD disc playback, built-in HDMI and multi-channel HD surround sound audio, and outputs that let you connect your PC directly to multiple HDTVs or monitors. There's also HDCP support, so you can assure playback of all your media.

#### SPECS:

- 512MB GDDR5 memory
- 256-bit memory interface
- 24x custom filter anti-aliasing (CFAA) and high-performance anisotropic filtering

#### FEATURES:

- PCI Express® 2.0 support
- DirectX® 10.1 support
- Dynamic geometry acceleration

- Game physics processing capability
- ATI Avivo™ HD video and display technology
- Unified Video Decoder 2 (UVD) for Blu-ray™
- Built-in HDMI with 7.1 surround sound support
- On-chip HDCP support
- ATI PowerPlay™ technology
- Supported operating systems: Windows Vista (all), Windows XP, Windows XP Media Center Edition
- Upscale beyond 1080p
- TeraScale graphics engine
- Brute processing power needed for physics, artificial intelligence, stream computing and ray tracing calculations
- ATI CrossFireX™ multi-GPU support for highly scalable perform-

ance (Use up to four discrete cards with an AMD 790FX-based motherboard)

\*actual card appearance may vary





## Visiontek HD 4870

\$299.99  
[www.visiontek.com](http://www.visiontek.com)

The VisionTek ATI Radeon HD 4870 brings the power of graphics supercomputing to gamers, setting a new standard for visual computing. The new TeraScale graphics engine delivers an immersive, cinematic gaming experience. Add this GPU to your PC and watch Blu-ray movies and play HD content with incredible visual fidelity. Do it all with breakthrough efficiency that doesn't compromise performance.

### Redefine HD Gaming

The ATI Radeon HD 4870 Series GPUs deliver a cinematic gaming experience with unprecedented performance. The powerful new TeraScale graphics will propel you deep into your gameplay with seamless frame rates and high resolutions. Enhanced antialiasing (AA) and anisotropic filtering create striking graphics with unparalleled realism so you can max out the set-

tings of the most demanding next-generation games or revitalize your favorite titles.

### Go Beyond HD Video

Add an HD 4870 Series GPU to your PC and watch the latest Blu-ray and HD movies play with incredible fidelity—upscale to nearly twice the display resolution of HD content. Support for the latest AV interconnects ensures you can take advantage of the latest display technology.

#### SPECS:

- 512MB GDDR5 memory
- 256-bit memory interface
- 24x custom filter antialiasing (CFAA) and high performance anisotropic filtering
- 800 stream processing units

#### FEATURES:

- PCI Express® 2.0 support

- DirectX® 10.1 support
- Dynamic geometry acceleration
- Game physics processing capability
- ATI Avivo™ HD video and display technology
- Unified Video Decoder 2 (UVD) for Blu-ray™
- ATI CrossFireX™ multi-GPU support for highly scalable performance (Use up to four discrete cards with an AMD 790FX-based motherboard)
- HD VideoBuilt-in HDMI with 7.1 surround sound support
- On-chip HDCP
- ATI PowerPlay™ technology
- Supported Operating Systems: Windows Vista (all), Windows XP, Windows XP Media Center Edition
- Upscale beyond 1080p
- TeraScale Graphics Engine

\*actual card appearance may vary



## Zotac

### 9600GT Display Port ZT-96TES3D-FSP

\$139.99  
[www.zotac.com](http://www.zotac.com)

Take advantage of next-generation display technologies with the ZOTAC GeForce 9600GT DP. DisplayPort technology is the future of display connectivity, and the ZOTAC GeForce 9600GT DP is completely compatible

with DisplayPort-equipped monitors and displays. The ZOTAC GeForce 9600GT DP features a full array of video outputs, including DVI, HDMI, HD, TV, and VGA for maximum compatibility with monitors and displays. With support

for all current display connection standards as well as DisplayPort, the ZOTAC GeForce 9600GT DP is your future-proof graphics card solution.

#### SPECS:

- NVIDIA GeForce 9600 GT
- 64 stream processors
- 512MB GDDR3
- 256-bit memory bus
- Core clock: 675 MHz
- Shader clock: 1650 MHz
- Memory clock: 1800 MHz
- PCI Express 2.0 (compatible with 1.1)

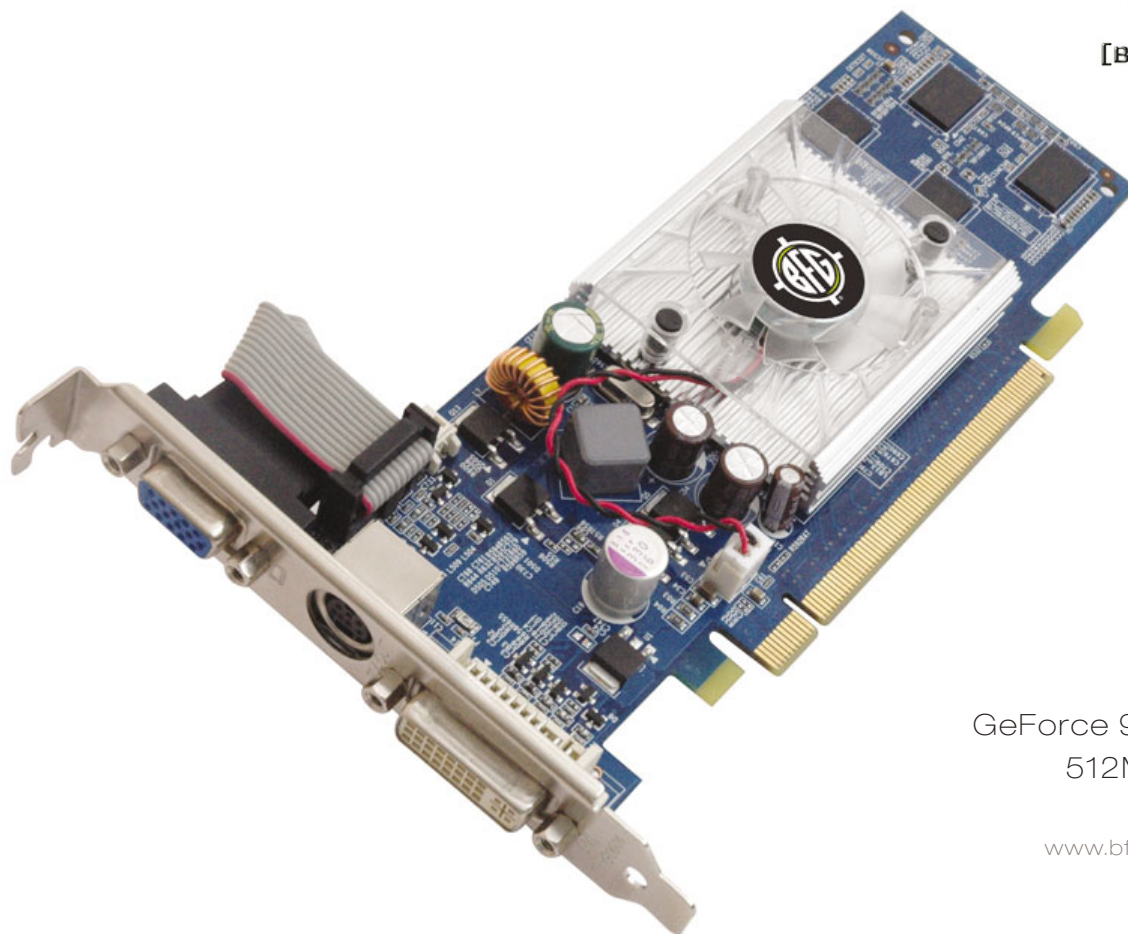
- Height: 4.376 inches (111.15mm)
- Width: 10.5 inches (266.7mm)

#### FEATURES:

- NVIDIA PureVideo HD technology
- NVIDIA Unified Architecture
- NVIDIA Lumenex Engine
- NVIDIA GigaThread Technology
- NVIDIA SLI ready
- Full HD 1080p compatible
- Dual dual-link DVI
- HDCP compatible
- DisplayPort
- HDMI
- VGA
- HDTV (component video)
- S/PDIF audio input
- SLI connectors
- NVIDIA ForceWare Drivers
- Microsoft DirectX 10
- OpenGL 2.1

- Microsoft Windows XP/Vista
- PCI Express power adapter
- S/PDIF audio input cable
- Lost game bundle





## BFG GeForce 9400 GT 512MB PCIe

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

Backed by free 24/7/365 world-class tech support and the best lifetime warranty in the industry, the BFG GeForce® 9400 GT graphics card makes your PC more visual than ever before for more vibrant photos, smoother videos, and more realistic gaming. By offloading tasks from the CPU, this graphics card allows you to share, edit, and manage your photos and videos easily. Enjoy an improved 3D user experience, astounding video-watching with NVIDIA® PureVideo® HD technology, and lifelike

game play at the lowest price point in BFG's GeForce 9 series lineup. And with a 2x performance increase over the GeForce 8400 GS, playing the latest PC games just got a whole lot smoother.

BFG includes a low-profile bracket kit right in the box, making the 9400 GT perfect for slimline cases or home-theater PCs. High-Quality Scaling enlarges lower resolution movies and videos to HDTV resolutions, while maintaining a clear, clean image. It also

provides downscaling of videos, including high-definition, while preserving image detail. The 3:2 & 2:2 Pulldown Correction recovers original film images from films converted-to-video (DVDs, 1080i HD content), providing more accurate movie playback and superior picture quality.

The BFG 9400 GT supports resolutions up to 1080i/1080p, depending on connection type and TV capability.

### SPECS:

- Bus type: PCI Express® 2.0
- Memory: 512MB DDR2
- Core clock: 550MHz
- Shader clock: 1,400MHz
- Memory data rate: 800MHz
- Stream processors: 16
- Shader model: 4.0
- Texture fill rate: 4.4 billion per sec.
- Memory interface: 128-bit

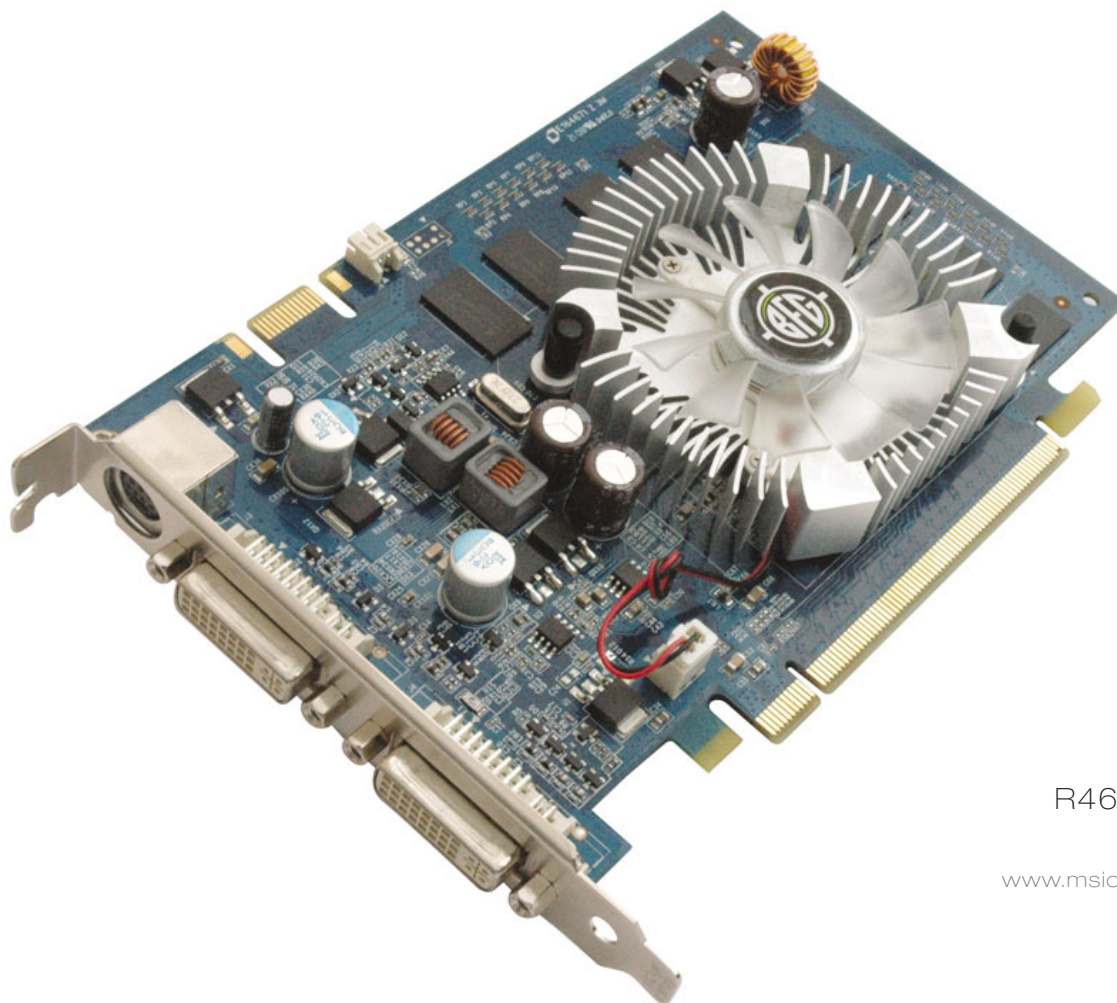
- Memory bandwidth: 12.8GBps
- Display connectors: Dual-Link DVI-I, VGA, HDTV + TV Out
- RAMDACs: dual 400MHz

### FEATURES:

- NVIDIA® unified architecture with GigaThread™ technology
- Full Microsoft® DirectX® 10 support
- PCI Express® 2.0 support

- NVIDIA Lumenex™ engine
- 16x antialiasing technology
- 128-bit floating point HDR (high dynamic-range) lighting
- NVIDIA GeForce UDA (Unified Driver Architecture)
- OpenGL® 2.1 optimizations and support
- Dual dual-link DVI support
- NVIDIA PureVideo® HD technology

- Discrete, programmable video processor
- Hardware decode acceleration
- HDCP capable
- High-quality scaling
- Inverse telecine (3:2 & 2:2 pull-down correction)
- Bad edit correction
- Noise reduction



## 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 SLI support for up to three total video cards, 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 three 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





## Palit 9500GT Super 512MB

\$64.99

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

GeForce™ 9500 GT SUPER from Palit is equipped with 512MB of memory to provide great performance even in higher resolutions. NVIDIA's GeForce 9500 GT features the revolutionary PureVideo® HD technology engine and delivers astonishing Blu-ray movie picture quality with reduced CPU utilization, all while

maintaining low power consumption. With support for NVIDIA SLI® technology, two cards can be installed for up to 2x the performance of a single card for incredible performance with today's and tomorrow's 3D games and applications. With outputs including dual-link DVI-I, VGA, and TV-out, this card can serve all types of

video and workstation needs. The dual-link DVI connector can support the latest large-screen display resolutions up to 2,560 x 1,600. Palit's GeForce™ 9500 GT SUPER ships with a passive heatsink, making it a silent solution with low power requirements. The result is an excellent for office or living room PC applications.

### SPECS:

- GPU clock: 550MHz
- Shader clock: 1,350MHz
- Memory interface: 128-bit
- Memory type: DDR2
- Memory size: 512MB
- Memory clock: 400MHz
- Max resolution horizontal: 2,560
- Max resolution vertical: 1,600
- Length: 174mm

- Width: 112mm
- Height: dual slot
- Bus type: PCI-E 2.0
- HDCP capable outputs: 1
- Profile: standard
- Bundles: none
- Outputs: VGA, DVI-I, TV-Out
- Thermal solution: passive heatsink

### FEATURES:

- Palit exclusive design

- Silent, passive cooling system
- PCI Express® 2.0 support
- Dual 400MHz RAMDACs
- 3-Way NVIDIA SLI™-ready
- Nvidia ForceWare® UDA (Unified Driver Architecture) GigaThread™ technology
- NVIDIA PhysX™ technology
- Full Microsoft® DirectX® 10 Shader Model 4.0 support

- True 128-bit floating-point HDR (high dynamic-range) lighting
- 16x full-screen antialiasing
- Two dual-link DVI outputs support two 2,560 x 1,600 resolution displays
- NVIDIA PureVideo™ technology®
- Built Microsoft® Windows Vista™



PNY

Verto GeForce®  
9500 GT 512MB PCIe

\$129.99  
[www.pny.com](http://www.pny.com)

Maximize your visual experience with the Verto GeForce® 9500 GT, providing more vivid photos, smoother videos, and a more true-to-life HD gaming experience. Take in the ultimate movie experience with enhanced 3D quality and HD-DVD and Blu-ray movie playback capability. Equipped with the NVIDIA® Lumenex™ Engine,

this card supports the most demanding DirectX® 9 and DirectX 10 games; delivering ultra-realistic image quality and floating-point accuracy at blazing frame rates. Increase the power of your graphics card with NVIDIA SLI® technology. Pair the Verto GeForce 9500 GT with an identical GPU based graphics card for up to double the per-

formance of a single card. Compatible with PCI Express and the new PCI Express 2.0 bus architecture, GeForce 9500 GT offers a link to the most bandwidth-intense games and 3D applications. The bar has been raised yet again! PNY GeForce 9500 GT takes your gaming experience to the next level without breaking the bank.

#### SPECS:

- 512MB DDR2 memory
- 128-bit memory interface
- 1GHz effective memory data rate
- 16GB/sec. memory bandwidth
- 32 stream processors
- 1,400MHz shader clock
- 550MHz core clock
- 8.8 billion pixel/sec. fill rate

#### FEATURES:

- NVIDIA® unified architecture with GigaThread™ technology
- Full Microsoft® DirectX® 10 Shader Model 4.0 support
- NVIDIA SLI®-ready
- True 128-bit floating point high dynamic-range (HDR) lighting
- NVIDIA Quantum Effects™ physics processing technology
- 16x full-screen anti-aliasing
- Two Dual-Link DVI outputs supporting dual 2560x1600 resolution displays
- NVIDIA PureVideo® HD technology
- HDCP capable
- PCI Express® 2.0 support
- NVIDIA® ForceWare® Unified Driver Architecture (UDA)

- OpenGL® 2.1 support
- Built for Microsoft® Windows Vista™





## Sapphire HD 4550 512MB DDR3 PCI-E

\$54.99

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

With all the latest features, the ATI Radeon™ HD 4550 graphics cards deliver an incredible visual experience with best in class performance. Enjoy unprecedented

levels of graphics realism and play the latest games with support for Microsoft DirectX®10.1. Add this graphics card to your PC and watch Blu-ray movies and HD content play

with incredible visual fidelity, and view digital photos with over 1 billion colors. Do it all with breakthrough efficiency that doesn't compromise performance.

### SPECS:

- Core Clock: 600MHz
- 80 Stream Processors
- Memory Clock: 900MHz, 1,800Mbps
- 512MB/64-bit DDR3 memory interface

### FEATURES:

- ATI Radeon™ HD 4550

- Microsoft® DirectX® 10.1 support
- 12x custom filter anti-aliasing (CFAA) and high performance anisotropic filtering
- PCI Express® 2.0 support
- Dual mode ATI CrossFire™ technology multi-GPU support for highly scalable performance
- ATI Avivo™ HD video and display

### technology

- Unified Video Decoder 2 (UVD 2) for Blu-ray™ and HD Video
- DVD Upscaling & Built-in HDMI with 7.1 surround sound support & Integrated DisplayPort with audio
- Dynamic power management with ATI PowerPlay™ technology
- I/O Output: VGA+DL-DVI-I+HDTV

- PCI Express 2.0 x16 bus interface
- Single Slot Active Cooler
- HDMI compliant via dongle
- 7.1 Audio Channel Support
- Shader Model 4.1 support





Intel  
LGA775/478  
AMD 754/939/940  
AM2/AM2+

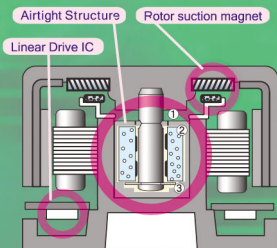
Cooler and Quieter!

# NINJA 2

CPU Cooler

SCNJ-2000

WWW.SCYTHE.COM



1. Surface Tension Seal
2. Porous Sintered Dynamic Sleeve
3. Fully Filled Oil

## S-FLEX™ Series

### S-FDB 120mm Quiet FAN

\* S-FLEX™ is registered trademark of SONY Corp.

Model Number

SFF21D (800rpm)

SFF21E (1200rpm)

SFF21F (1600rpm)

SFF21G (1900rpm)



## SHURIKEN scsk-1000

CPU Cooler



Only 64 mm in Height!!  
Perfect solution for  
low profile PC chassis!!



## Multi-VGA Cooler Compatible Design



VGA Cooler

MUSASHI scvms-1000

Now Compatible with  
ATI Radeon  
HD4850  
HD4870  
and More!





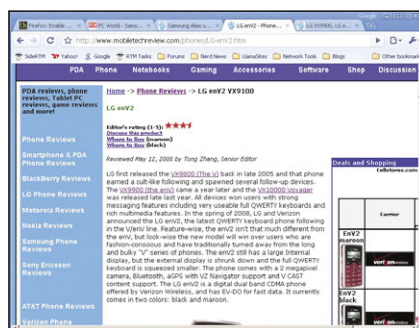
# The Bleeding Edge Of Software

Inside The World Of Betas

## Google Chrome 0.2.149.29

Though we should all be used to beta products from Google that work better than a lot of other company's released products (Gmail, anyone?), Google's new Web browser, named Chrome, is a very solid beta program that has surprised us with outstanding JavaScript performance and by re-inventing the Web browser GUI. Though the beta lacks some obviously needed features, it's good enough to earn a spot on your Desktop right now.

Google introduced the public to the rationale behind Chrome with a Web-comic book, of all things, and it makes a compelling case for a new browser. Most of today's browsers' codebase was created at a time when JavaScript was really only used for fancy on-screen widgets such as mouseovers and menus, but Web apps like Google Maps, Google Documents, Gmail, and sites such as Facebook are much more complex and should have a more robust platform to run on. Chrome therefore



**Google Chrome** (ETA: Q2 2009)

**Version # Previewed:** 0.2.149.29

**Publisher and URL:** Google, [www.google.com](http://www.google.com)

**Why You Should Care:** Chrome might be the shape of things to come for future browsers.

employs a new JavaScript engine (called V8) that's between three times and 12 times as fast as other browsers. Additionally, all the Chrome tabs and windows each have their own process with their own threads, so one frozen tab can't bring down

other tabs or freeze the rest of the browser as a whole.

Google also seriously looked at the modern browser GUI, which over time has had stuff added to it piecemeal, and started with a clean sheet. Tabs are above the address bar, for example, since the address changes with each tab—every other browser you're using really has it backwards. Numerous other small decisions result in a browser that's clean and uncluttered.

Already Chrome is a superior browser to IE6 and IE7 in every way except for occasional rendering differences. It just beats Safari outright. Opera users will find a different set of features but no worse site-rendering glitches, so we'll call it a tie. Firefox 3 is a slower browser that has features similar to Chrome until you consider all the extra flexibility Extensions give you, giving Firefox the win for now.

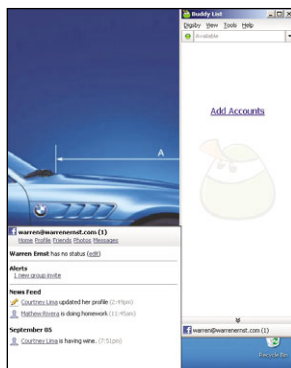
We look forward to seeing Chrome grow in the future and suggest you check it out sooner rather than later. ▲

by Warren Ernst

## Digsby build 15142

Among all the different IM systems we use, all the email accounts we keep track of, and now all the social networking sites we continually check and recheck, we need a lot of programs open and running at the same time. Not only can that be a memory hog, but then we also have pop-up notices that all look different and don't always work well with each other. Digsby hopes to change all that by providing one program that handles all of these distractions, providing, if nothing else, a single and unified source of distraction for your Desktop.

Digsby speaks AIM, MSN, Yahoo!, ICQ, Google Talk, Jabber, and Facebook



**Digsby** (ETA: Q1 2009)

**Version # Previewed:** build 15142

**Publisher and URL:** dotSyntax, [www.digsby.com](http://www.digsby.com)

**Why You Should Care:** Stay socially connected without the clutter.

Chat, but it has drag-and-drop tabs to make dealing with multiple chat threads simple and an extensive themes engine to make them look pretty. Digsby also keeps track of Hotmail, Gmail, Yahoo! Mail, AOL/AIM Mail, IMAP, and POP mail accounts, displaying a small pop-up when new messages appear and, if your

mail provider supports it, allowing you to mark new messages as spam or as "read" on the spot. You can also write quick replies or entirely new emails using whatever provider you have accounts for. If you use Facebook, Twitter, or MySpace, Digsby will display pop-ups with friend requests, new messages, group invites, and various system updates. You can also set your state (i.e., "away") globally, but with just a click or two. Facebook users can add a Digsby Chat applet to their home pages, so chatting visitors will have their IMs appear directly in a threaded Digsby window.

The degree to which Digsby excites you depends on how much of your life you spend with AIM and Facebook, but the beta version we looked at is very solid and fast and comes with a well-written Help Wiki. ▲

by Warren Ernst

# SPEED

UP TO

Upgrades That'll Keep You Humming Along

It's a browser-palooza this month as Microsoft, Google, Opera, and Maxthon all deliver new boards with which to surf. Also notable, Apple tries to fix some of its 3G woes with an iPhone update.

## Software Updates

### FileZilla 3.1.2

The popular FTP client gets a modest performance boost in its transfer queue. This update allows more flexible drive labeling for servertype DOS.

[filezilla.sourceforge.net](http://filezilla.sourceforge.net)

### Google Chrome 0.2.149.27 Beta

The first iteration of Google's long-rumored browser promises Web surfing, search, and application functionality in one box. Oft-used sites become thumbnails in any new tab. Chrome is designed to load pages faster and create Desktop shortcuts out of any Web application. It also includes a private browsing mode.

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

### Internet Download Manager 5.14 Build 4

The download accelerator and manager fixes a critical bug in this update. IDM improves download interception from some sites under IE and resolves some conflicts with third-party add-ins. A new IDM download panel works with Web-based players in IE.

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

### Internet Explorer 8 Beta

The next iteration of Microsoft's browser goes into a full public beta. New features include Web Slices (select site updates on the Favorites bar), Accelerators (right-click access to functions), and private browsing.

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

### Limewire 4.18

The P2P file-sharing program fixes file exceptions for Mojito StatusCode,

AbstractPoolEntry, and PushProxies Publisher, among others.

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

### Maxthon 2.1.4.443

Based on IE, this browser supports mouse gestures, skinning, and special drag-and-drop functions. This update improves compatibility with the latest IE8 beta. It also fixes some freezes during streaming video, problems involving shortcut behavior, page positioning in split view, and page repositioning during window resizing.

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

### Opera 9.52

The latest update for this alternative Web browser improves handling of skins and icons, adds a bookmark path for autocompleted bookmarks, and adds more information when startup fails. Greater security addresses potential holes during startup crashes, cross-site scripting, and custom shortcuts.

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

### Pidgin 2.5.1

This universal IM client (formerly GAIM) addresses most of the major messaging services. The update supports SOCKS proxies in GNOME or Windows proxy settings. It also fixes previous problems with Perl file handling, crashes in AIM buddy tooltips, and some crashes in MSNP15. A new throbber animation indicates the process of accounts connecting.

[www.pidgin.im](http://www.pidgin.im)

### PowerStrip 3.82.632

The venerable PC display manager delivers a maintenance release for several

updates throughout the summer, including new GeForce 8/9 timing options, improved multimonitor hotkey support, a new timing search engine, and preliminary support for ATI HD4XXX cards.

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

### Zoom Player Premium 60

Formerly WMV Professional, the Zoom Player supports a wide range of media files. This update supports PowerDVD v8 filters. It fixes improper loading of some M3U playlists. Additional tweaks address problems when deleting entries in Chapter Browser navigation, detached Control Bar, and Stay On Top enabled.

[www.inmatrix.com/zplayer](http://www.inmatrix.com/zplayer)

## Driver Bay

### ATI Catalyst 8.8

The latest display driver and control suite for most recent ATI cards adds AVIV video features to the Catalyst Control Center: dynamic Gamma/Contrast correction, improved video presets, and better Windows XP support. Also new is Hybrid Graphics for Windows XP, which increases 3D performance for many cards in this OS and now supports up to four independent displays.

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

### Creative Sound Blaster X-Fi Series Driver 2.18.0004

For most versions of the X-Fi audio card, the new drivers add to Vista Dolby Digital and DTS decoding for cards that included this support in WinXP. Also resolves an issue when a system crashed from switching to unsupported sampling rate in Audio Creation Mode with Dolby Digital Live enabled.

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

### iPhone 2.02

The firmware update for Apple's popular phone is designed to improve performance over 3G networks and alleviate some bugs involving third-party applications.

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



# NTI Media Maker 8

If you're in the market for a truly easy-to-use media suite, NTI's Media Maker 8 will likely meet your expectations. Media Maker allows you to get somewhat original with photo slideshows, custom videos, and audio mixing. Maybe you've snapped some quality photos at a recent event and you'd like to match them to your favorite songs to create a video—a video you can then convert and play on your iPod. This is one way to take advantage of Media Maker's features.

We won't dwell on installation since there were no abnormalities to discuss. Instead, we'll focus on the simplicity of the interface and Media Maker's capabilities. The home window, shaped like a compact disc, provides a noncomplicated launching pad for the following options: Audio, Video, Photo, Backup, Utilities, and Data. The subcategories in each of these features are displayed in the fashion of Windows Explorer.

Creating our home video was strangely uncomplicated. The EasySteps process (literally tabs marked 1, 2, and 3) simplifies video creation down to adding clips from your Documents, previewing the compilation, and finally burning the video to a disc. Cinematic Video, for which you select video (MPEG, AVI) and music (WAV, MP3) files, involves dragging and dropping your selections into a window and adding styles such as Classic Sepia or Cool Moon. Truthfully, there's not an overwhelming number of customization options.

In contrast, though, are high points like Live Audio and Audio Editor. You can record live tracks directly to Media Maker and create a disc in the same



## NTI Media Maker 8

\$79.99

NTI

www.ntius.com



session. To try out some primitive DJ skills, use the Audio Editor to cut, copy, or paste audio tracks together. NTI Backup Now is also worth your consider-

ation because you can choose particular files for backup and restoration, or safeguard your data on a portable hard drive, network, or FTP server.

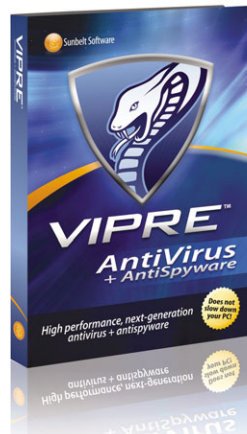
If these highlights piqued your curiosity, you'll likely value the rest of what Media Maker 8 has to offer. ▲

by Joanna Safford

# Sunbelt Software VIPRE AntiVirus + AntiSpyware 3.1

Security software is nothing new, of course. But not every antivirus program claims to monitor your PC without slowing down your activity or monopolizing all your resources. VIPRE (Virus Intrusion Protection Remediation Engine) AntiVirus + AntiSpyware works to your advantage in three ways: It performs virtually unnoticeable system scans, enables you to easily manage various risks to your PC, and keeps you posted on the latest worldwide viral threats.

We installed VIPRE via the program's built-in wizard; this process clocked in at about two minutes. Activating protection only took a few checkbox clicks as we completed the nearly painless setup.



The VIPRE interface is straightforward and organized into four tabs: Overview, Scan, Manage, and Tools. You can monitor your system status (recent and upcoming scans, email, Active Protection, updates, etc.) on the left-hand display and check the Worldwide Threat Level on the right side.

Our first Quick Scan was completed in less than one minute. VIPRE discovered multiple risks that required either quarantine or removal. We experienced no delays while working in other programs during

## VIPRE AntiVirus + AntiSpyware 3.1

\$29.95 per single user/year

Sunbelt Software

www.sunbeltsoftware.com



additional Quick Scans; annoying notifications were practically nonexistent. The Deep Scan (full PC scan) finished in 49 minutes and detected seven threat traces for removal.

Unfortunately, VIPRE doesn't include firewall protection. If VIPRE meets your personal antivirus standard, you could add the Sunbelt Personal Firewall to enhance your security beyond what Windows offers. Though this feature would complete VIPRE, there remain some tools designed for extra security. The Secure File Eraser deletes files from your hard drive without the option of recovery. You also can customize the removal of temporary Internet files with the History Cleaner. Further, the PC Explorer discovers malicious services that are typically concealed from the PC user.

On the whole, VIPRE delivers in terms of speed, real-time detection, and bonus material. ▲

by Joanna Safford

Advanced Thinking.

750W/850W

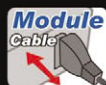
ATX 12V

**M12D**  
MODULAR GAMING SERIES

11. 2008 INITIATE.

The redesigned ultimate modular gaming power supply Seasonic M12D features with DC power conversion technology to exceed 80 PLUS Silver and Energy Star 4.0 standards. To find out more, visit [www.seasonicusa.com](http://www.seasonicusa.com).

**Seasonic®**



**MA★LABS**  
One-stop PC Component Supplier



**Supercom**

**DAIWA**





# Adobe Creative Suite 4

Remember the last time you experienced truly wide-eyed wonder? Maybe it was your first roller-coaster ride as a child or a vacation where you stood on the rim of the Grand Canyon. If you're a sucker for powerful design tools, you'll have exactly the same feeling when you test-drive Adobe's CS4 (Creative Suite 4; [www.adobe.com/products/creativesuite](http://www.adobe.com/products/creativesuite)). At the Adobe Reviewer's Workshop in July, one of the reps who led us through the evaluation sessions said Adobe had tried to accommodate as many user "wish list" items as possible. From what we have seen, the company succeeded.

Of course, that astounding feature set comes at a jaw-dropping price—\$2,499 for the Master Collection if you don't own earlier versions or qualify for an educational discount. Fortunately, the upgrade pricing is fairly flexible, qualifying owners of previous releases all the way back to Macromedia Studio MX2004 and Creative Suite 1.x (and possibly beyond, depending on the program you purchase). As with prior offerings, you can buy individual programs or environment-specific (Web, video, or print) suites.

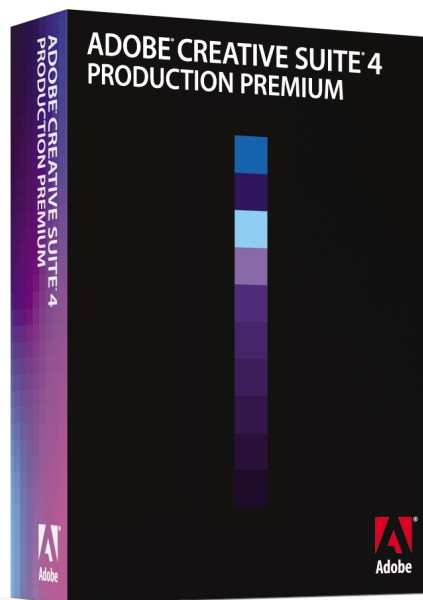
## Tighter Than Ever

One of the key features of CS4 is the increased integration among components—and not only within a single suite. For example, you can now export layouts created in InDesign into an XLF (Flash-compatible) format, then open them in Flash for further editing. Some of the collection's more impressive core components, such as Photoshop's powerful pixel-rendering engine, are embedded in other programs, such as Fireworks. You can import and embed more Adobe file types into other CS4 programs, and direct editing after import is easier than before. Through an enhanced Adobe Bridge, you can manage and search among your assets—projects, support files, and other elements—and access Version Cue (workgroup file management) and Device Central (a stellar performer that lets you preview

and test content for use on multiple mobile devices.)

## New & Noteworthy

Some of the new features in CS4's various programs are positively remarkable. Photoshop is one example. In addition to upgrading such retouch features as Dodge, Burn, and Sponge and adding oft-requested improvements, such as full-canvas (workspace) rotation and live



## Adobe Creative Suite 4

\$599 (upgrade) to \$2,499 (Master Collection)

Adobe

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



nondestructive corrections, Photoshop now offers what Adobe calls "content-aware scaling." Let's say you have a landscape-oriented shot with a friend in the center foreground, some nice scenery in the left-hand midground, and a way-too-wide expanse of ocean and sky in the background. You can tell Photoshop (or it may figure it out on its own) to be "aware" of your friend and the scenery. You then scale the picture horizontally, and Photoshop maintains the aspect ratio of the selected items and surrounding pixels but scales everything else

smoothly. You're left with a portrait-oriented image that places the focus on your friend, not that broad expanse of blue sky and sea. Now that's wow.

Illustrator, Adobe's vector-graphic design star, is another case in point. Users of this program know working with multiple artboards (workspaces) can be tricky. Now, Illustrator lets you have multiple different-sized artboards in a single document, or you can open multiple documents and use the new tabbed interface to toggle (or copy, drag, and drop objects) between them quickly. Other nifty improvements are transparent gradients (a design biggie), spring-loaded icons whose menus open when you drag objects to them, WYSIWYG clipping masks—the list goes on and on.

We've touched on only a few of the more than a dozen programs in CS4. Suffice it to say that nearly all of them are greatly enriched. The video-editing suite, for example, works in a beautifully fluid manner, with direct-to-disk recording, support for all the latest "tapeless" formats, significant improvements in the post-production environment, and much, much more. In short, if you use programs of this professional caliber, you owe it to yourself (and your clients, if you make your living with a PC) to take a fresh look at Adobe with CS4.

## What You'll Need

The system requirements for CS4 are fairly robust—especially for the Master Collection. To power this entire suite, you'll need a 2GHz processor (2.8GHz for HD), 2GB of RAM (we recommend 3GB or 4GB), 25GB of drive space for program installation, an OpenGL 2.0-compatible graphics card, a dedicated 7200rpm hard drive for DV and HDV editing, and more. (These requirements drop if you are not purchasing the video suite.) However, if you are reading this article, you probably already have a monster machine. Go have fun. ▲

by Jennifer Farwell

# Dialogue Box

by Chris Pirillo

## It's Time For The Web To Shine

When news first leaked that Google was going to be releasing its own Web browser, I was skeptical but hopeful. Several notable bloggers were posting scans from what appeared to be a fully produced comic book explaining "Google Chrome."

I flipped through those pages like I've never flipped through anything before. How could something so incredibly technical, so unbelievably complex be so outrageously compelling to read? Mission accomplished. Before I was halfway through the cartoon documentation, I couldn't wait to give Google Chrome a shot on my own desktop.

As you can imagine, the Web immediately exploded with a flurry of disjointed conversations. Was this really a newsworthy turn of events? My answer to that question is an emphatic "Yes!" If you need reasons to keep Chrome on your radar, here are a few points to consider:

1 It gestated for the better part of two years before the first public release. This isn't a pet project that a random employee picked up after Mozilla's much-ballyhooed "Download Day 2008" came and went. A small team of smart, experienced individuals have long been analyzing Web browser impracticalities and pitfalls and crafting Chrome to address many of them. You should be more impressed with the underlying technologies and engineering decisions than the brand stamped upon the binary, which brings me to my second point.

2 Google Chrome is 100% open-source. I was beside myself with joy to discover that they had opted to run with WebKit underneath, as Safari has been my Web browser of choice largely because of its raw speed and continued Web standards compliance. Friends turn to me now and say that the Web moves faster in Chrome, and I furrow my brow and exclaim: "I've been telling you to switch to WebKit for the past year!" If you don't like the officially distributed Google Chrome binary, you can take all of its components and build your own browser.

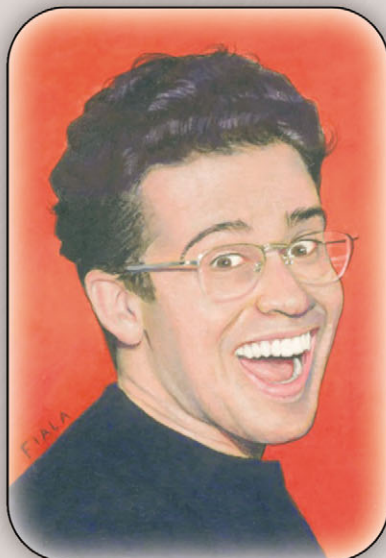
3 Chrome manages processes more intelligently than any other Web browser. Not only is each Chrome tab a separate process, but each particular extension is managed as a

separate process, as well. This means if you have 25 tabs open, and one of those sites is slowing everything down, you can kill that single tab (process) without losing the other 24 tabs. Moreover, you can kill a memory-leaking, CPU-eating plug-in (Flash, anyone?) independent of the page it's running within. If that doesn't knock your socks off, then you've never suffered from a poorly timed, all-out browser crash. (Then again, when is a browser crash well-timed?)

4 Competition promotes innovation. Consider the JavaScript Wars. For some unknown reason, performance has (to this point) taken a back seat to feature sets. Not long ago, WebKit announced its SquirrelFish JavaScript engine, which promises to dramatically increase the speed of JS execution within the browser. Google stepped it up by announcing its own V8, which leap-frogged SquirrelFish. Mozilla was quick to assert that Firefox 3.1 would come with TraceMonkey, keeping its JS performance up-to-speed (so to speak) with the WebKit crew. Before that could ship, WebKit fired back with SquirrelFish Extreme, which leap-frogged V8 and TraceMonkey. Safari 4.0 may very well retain bragging rights as the world's fastest browser. Microsoft IE8 beta builds lag so far behind competition, they're not even worthy of comparison. On a related note . . .

5 Someone is finally providing serious competition for Microsoft. Firefox fans should be rejoicing, even if it means their market share has a chance of eroding. Chrome will support plug-ins and extensions. (Aaron Boodman, creator of the Greasemonkey power tool, is on the Google Chrome team). This isn't a bit player; this is Google.

Even in the earliest build, Google isn't abusing its position, opting to keep the user's default search engine in place, even if it's Windows Live Search. They may not play fairly forever, but would it be a bad thing if half the galaxy stopped using IE6? Just when you thought the browser battle was over, along come reinforcements. ▲



*Chris Pirillo first experienced the Web through Lynx, a text-only browser that is still being actively developed today. Not long after, he witnessed blue hyperlinks for the first time in IBM OS/2 WebExplorer. A friend showed him NCSA Mosaic, and weeks later Chris found himself creating his first "home page" on the Internet. He graduated to Netscape and fell in love with Internet Explorer 2.0 for its speed and efficiency. He stuck with IE until discovering MyIE2 and remained faithful to that power tool until Safari 3.1 shipped. He's now using nightly builds of WebKit, which NightShift for OS X helps him manage. His blog at [chris.pirillo.com](http://chris.pirillo.com), his community at [geeks.pirillo.com](http://geeks.pirillo.com), and his video feed at [live.pirillo.com](http://live.pirillo.com) are no longer optimized for Lynx.*

You can dialogue with Chris at  
[chris@cpumag.com](mailto:chris@cpumag.com)



## What's The Deal With Office Suites?

While searching for open-source alternatives to PowerPoint for presentation software, it suddenly dawned on me that the whole concept of office productivity software suites is just so out of date. Do you not use Linux? Is it because you can't run Microsoft Office? You can do word processing, spreadsheets, presentations, databases, and any other applications that Office does; you can even work in Office file formats—you just can't use Office.

I've written about open-source office suites before. There's OpenOffice.org, the best-known and probably best (that is, most Office-like) of the lot, but there are also KOffice ([koffice.org](http://koffice.org)), GNOME Office ([live.gnome.org/GnomeOffice](http://live.gnome.org/GnomeOffice)), and Siag Office ([siag.nu](http://siag.nu)). But let's be honest; the open-source "office suites" range from adequate to ludicrous.

What makes Microsoft Office so great (because it is)? Microsoft packs enough software into Office for almost everyone to do almost every PC-related task in today's workplace, except, over the years, Microsoft got us all hooked on Office. If you want to be compatible with the rest of the world, you have to write your word processing documents in Word format, your spreadsheets in Excel, and your presentations in PowerPoint. Why?

Because in the 1980s, we got used to applications, such as word processors, that only store data in binary, proprietary file formats. Word saves in Word format by default, and only Word can open and edit that data. If you use WordStar, you must save all your documents in a neutral format (like RTF or ASCII), or else use export and import functions to hopefully correctly translate between Word and WordStar.

But, why couldn't everyone agree on a standard? Wouldn't that be easier for users?

Well, yes, it would be easier for users. However, software publishers—more concerned with market share than making users' lives easier—used proprietary formats to differentiate themselves from the competition. Microsoft actually has made users' lives easier by capturing virtually the entire office productivity software market, thus making it possible for users to stop worrying about whether their colleagues will be able to open

their files as long as everyone is using Office. The downside is that you have to buy Office, rather than choose from a range of different productivity applications.

Office suites have, over the years, demonstrated some technical advantages: consistent user interfaces, interoperability among applications, and cross-application scripting/macro languages. However, office suites are irresistible to corporate types for economic reasons: They

offer multiple applications at a discount, reduce IT costs related to installation, eliminate problems from incompatible formats, and streamline the purchasing process by giving users the option of buying Microsoft Office or, uh, nothing.

But here's why I think the idea of office suites is obsolete: open standards for file formats.

Microsoft Office formats have been the *de facto* standard for years, but with the ODF (OpenDocument Format), approved as a standard by the ISO, Microsoft's move this year to open up their proprietary protocols is telling. For one thing, it's no longer necessary to lock users into Office. Almost everyone who can use it is already using it.

And once you open the file formats, many of the advantages of the proprietary office suite evaporate. Any publisher's application can read and write files created with any other application, commercial or otherwise. And you can use any scripting or macro language you prefer to customize those productivity apps. Not only that, but you can choose the best word processor, spreadsheet, etc., rather than settling for the one that came with your office suite.

What about those other benefits? If you're using open-source software on Linux, the cost argument mostly goes away. You get whatever applications you like, and installation with a modern package manager is trivial. The UI is also a nonissue these days, as developers have had a couple of decades of practice developing the modern GUI.

So, which part of Microsoft Office would you get rid of first, if you could? ▲



*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)**

Give your PC a good foundation.



## Toughpower XT

Introducing the all-new Toughpower XT series power supply. You've got all the right processor, graphic card and motherboard, now you need a good foundation to make sure all the components run smoothly. All-new Toughpower XT delivers cleaner, more stable and efficient power to where it is needed and when it is needed with the most current technologies such as Fan-Delay Cool, LED Alarm Panel and 80PLUS® certification.

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





# The Department Of Stuff

by Rob "CmdrTaco" Malda

## dontdrm.txt

The hottest game of the fall season was unquestionably Spore. With a pedigree descended from Sim City and The Sims, the hype surrounding the release was huge. Years of delays didn't stop the hype. So when the game finally was released, it was inevitable that there would be some blowback. There's simply no way that any game can live up to the level of hype that was created here. But what was surprising was that the first and loudest complaint about Spore was not the game but rather the crippling DRM, which once again brought to the foreground an issue that plagues every part of the digital world.

The issue of DRM in games isn't new: The games I played in the '80s had numerous strange methods of protecting themselves from piracy, ranging from keywords in books to serial numbers to an ever-escalating arms race between floppy copy software and strange methods for preventing duplication. When the drive space requirements of modern games began to fill CDs, we were forced to insert the CD into the slot to play the game. How much time did I spend fumbling through drawers to find the disc just to play? And worse still, how many flights did I endure with a spinning CD in my laptop drive sapping my battery?

But Spore has become the poster child for new attempts at DRM. First of all, Spore requires you to create an account to play. Now this isn't new. Many games require an account for an online component. However, requiring an account for an MMORPG such as World of Warcraft is obvious, but for a game that is primarily a solo endeavor, it's quite annoying. Worse still, the single account per copy of the game meant families couldn't even really share the game. Furthermore, the game was limited to installation of three computers. I have a home machine, a work machine, and a laptop. The first time I replace one, I have to get on a phone and call to unlock a game that I just paid \$60 for?

What was interesting was watching the community reaction to all of this. The Amazon.com review page was overflowing

with user complaints about DRM problems with Spore. Amazon.com responded by deleting user comments that were critical of the restrictions. You certainly wouldn't want to dissuade someone from shelling out their cash based on the negative experience of other users. Amazon.com eventually resurrected the reviews, but not before clearly proving that the needs of their users come second to the corporate bottom line. It took a massive community reaction to get them to back down on the slimy practice.

Likewise, EA has promised to back down on some of its restrictions: It has added family member accounts to Spore and has upped the installation count from three to five. But these concessions fail to address the key point. By treating its users as thieves, EA inconveniences everyone. EA also sets up a customer support problem down the road, when users inevitably encounter problems a few months later when they try to reinstall their games on their latest and greatest gaming rigs.

A decade from now this problem may no longer exist. We may play all of our games on a platform that's exclusively online. The rules that we agree to now will likely influence what is possible in the future, but the restrictions that we tolerate today control what we will be able to do tomorrow.

The fact that this all happened on the first big PC game of the big fall gaming release schedule makes this all the more important. It probably would have mattered more if Spore ended up being a better game. No game could have lived up to the hype heaped upon this one. Maybe if it had, we wouldn't have seen the huge backlash from gamers irritated that the industry is trying to limit their ability to play their new games whenever and wherever they want, but I sure hope that it's not the case. Allowing distributors of any software to limit how we use it is ridiculous and shouldn't be allowed. But censoring our ability to be critical of these tactics is just plain evil. ▲



*Rob "CmdrTaco" Malda is the creator and director of the popular News for Nerds Web site Slashdot.org. He spends his time fiddling with electronic gizmos, wandering the 'Net, watching anime, and trying to think of clever lies to put in his bio so that he seems cooler than he actually is.*

Contact me at [malda@cpumag.com](mailto:malda@cpumag.com)

# At Your Leisure

The entertainment world, at least where it pertains to technology, morphs, twists, turns, and fires so fast it's hard to keep up. But that's exactly why we love it. For the lowdown on the latest and most interesting releases in PC entertainment, consoles, DVDs, CDs, and just leisure and lifestyle stuff we (for the most part) love and recommend, read on.

## Audio Video Corner

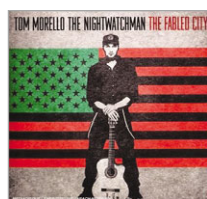
by Blaine A. Flamig



\$16.98  
RCA  
[www.kingsofleon.com](http://www.kingsofleon.com)

### "Only By The Night"—Kings Of Leon

On 2005's "Aha Shake Heartbreak," the Kings Of Leon burst onto the scene fueled by southern-tinged guitar fuzz, singer Caleb Followill's deliciously unintelligible vocals, and melodies so infectious that early fans couldn't wait to get more. A funny thing happened along the way, though. With 2007's "Because Of The Times," Caleb and brothers Jared (bass) and Nathan (drums) and cousin Matthew (guitar) caught the experimental bug and took their songs in directions fans didn't see coming. The experimentation continues on "Only By The Night," which offers up Led Zeppelin fuzz ("Crawl"), U2-worthy anthems ("Use Somebody" and "I Want You"), and arena-made sing-alongs ("Sex On Fire"). Although lacking the Kings' earlier grit and grime, "Only By The Night's" polish retains enough funk to satisfy.



\$9.99  
Epic Records  
[www.nightwatchmanmusic.com](http://www.nightwatchmanmusic.com)

### "The Fabled City"—Tom Morello/The Nightwatchman

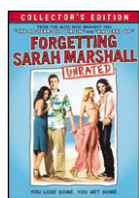
With his 2007 brooding solo debut "One Man Revolution," Tom Morello hinted that there's life for a mad-genius guitarist outside of Rage Against The Machine and Audioslave. With the excellent "The Fabled City," Morello proves he can make a damn fine living going solo if he desires. On the 11-track disc, Morello's biting lyrics depict the plights of everyday men and women trying to survive in today's America, but rather than machine-gun riffs fleshing out the tracks, Morello's booming voice commands your attention. With guest appearances from Shooter Jennings and System Of A Down's Serj Tankian on the gorgeous "Lazarus On Down," Morello has forged a sweet-sounding modern-day folk album that's street-fighting strong.



\$39.99  
Paramount Studios  
[ironmanmovie.marvel.com](http://ironmanmovie.marvel.com)

### Iron Man

We're assuming you helped contribute to the \$300-plus million "Iron Man" grossed at the box office. Don't let that keep you from plunking down for the two-disc Special Collector's Edition. Nearly every aspect of the generous package looks and sounds as fantastic as the action-drunk scenes director Jon Favreau ("Swingers," "Elf") brings to the screen based on the Marvel Comics classic. As Tony Stark—a brilliant but hard-drinking, harder-living weapons developer who's taken hostage by insurgents only to escape via a flame-throwing, sky-flying iron suit built in a cave—Robert Downey Jr. is his trademark magnificent self. Downey Jr. gives the role much-welcomed heart and wit. It doesn't hurt that Oscar winner Gwyneth Paltrow (Pepper Potts) and nominees Terrence Howard (Col. Rhodes) and Jeff Bridges (a sinister Obadiah Stane) are also onboard. Now bring on the sequel.



\$19.99  
Universal Studios  
[www.forgettingsarahmarshall.com](http://www.forgettingsarahmarshall.com)

### Forgetting Sarah Marshall

Reigning comedy king Judd Apatow has brought a few clunkers to the screen ("Drillbit Taylor," "Kicking & Screaming"), but "Forgetting Sarah Marshall" isn't one of them. Written by Jason Segel ("Freaks and Geeks," "Knocked Up"), "Sarah Marshall" may be short on plot but it's long on laughs. As Peter, Segel plays a musician aspiring to more than crafting "dark, ominous sounds" for actress girlfriend Sarah's (Kristen Bell) "Crime Scene" TV show. When Sarah dumps Peter for British rocker Aldous Snow (a terrific Russell Brand), he takes stepbrother Brian's (an acid-tongued Bill Hader) advice and flees to Hawaii. Sarah and Aldous, though, have the same destination in mind. Enter Rachel (a sizzling Mila Kunis), who slowly brings Peter around. Throw in wicked turns from Jonah Hill, Billy Baldwin, Paul Rudd, and Jason Bateman, and "Sarah Marshall's" three-disc unrated collector's issue is far from forgettable.

## DVD Byte

12/2

The Chronicles Of Narnia: Prince Caspian

Step Brothers

The X-Files: I Want To Believe



12/9

The Dark Knight  
Horton Hears A Who!

Lost—The Complete Fourth Season

The Wire—The Complete Series

12/16

Generation Kill  
Petticoat Junction—The Official First Season

Jurassic Fight Club—Season 1

12/23

Savage Grace

12/30

Surfer, Dude  
Comedy Central Roast Of Bob Saget  
The Tudors—Season 2

See the full reviews from A/V Corner at [www.cpumag.com/cpudec08/AYL](http://www.cpumag.com/cpudec08/AYL)



# SPORE

**CPU**  
Game Of The Month

## Toying With Life—by Dr. Malaprop

\$49.99 (PC-DVD) • ESRB: (E)veryone • Electronic Arts • [www.spore.com](http://www.spore.com)

The years have flown by as we've pined for the release of Spore, created by designer Will "I Made The Sims" Wright of Maxis. The basic overarching concept of the game is to manage your single-cell organism through a few billion years until you've created a space-faring race to explore the galaxy. This heady task is accomplished by playing through five stages: Cell, Creature, Tribal, Civilization, and Space. Each stage is a game in its own right, and it's the sum of these games that live under the high concept. The Cell stage is brief. Control your single-celled organism and evolve it to a point when it can walk on land. This brings us to the Creature stage, where your creature learns social interactions while gathering up DNA. The Tribal phase, which plays like a simplified RTS, has you competing for territory against other races. Civilization plays similarly to the Sid Meier game, but in simplified form. The primary focus is gathering spice while interacting with other races. The objective is to get into space. Once in the Space stage, the open world leads to interstellar exploration, conquest, and alliances with replicas of other players' worlds, which is nifty to behold.

The editing tools for your creatures, buildings, and space-ships allow for very complex creations with surprisingly simple tools. It's easy to lose hours just in creation if that's your fancy, which makes Spore almost feel like a toy instead of a game. Once you create your creature, the game brings your creation to life using procedural generation. This animates your creation on the fly based on algorithms that account for your creature's body shape, bone structure, etc. The end-result is a living creature that you find yourself sometimes getting emotionally attached to. Environments are also procedurally generated so no two games you play will be exactly the same. You even have Brian Eno creating a mutating score for the game. It's all very clever, but, more importantly, hugely fun. Bringing in the social aspect of the game is also very enjoyable. Having creatures from other players' games finding their way into yours at various stages is a blast. Think of Spore as a massively single-player game. Discovering creatures created by your friends (or strangers) inhabiting your game makes for many laugh out loud moments.

The expectation that this is a complex science sim will leave you disappointed because Spore is very obviously targeted at the mass market. There are faults: a kludgy DRM scheme (see Rob Malda's column on page 90), repetitive actions in some areas, and overly simple gameplay in others. However, we toyed around creating some new creatures, fiddled with others from the Sporepedia, and played through the game again and again, which is a clear sign of how well the title holds together. There's nothing quite like Spore on the market today, and it's something you should really experience for yourself. It's so good that billions of years fly by in just hours. ▲



## Spore Creature Creator



\$9.95 (PC/Mac)

ESRB: (E)veryone

Electronic Arts

[www.spore.com/trial](http://www.spore.com/trial)

At press time there were more than 27 million (and counting) new Spore creatures at the Sporepedia ([www.spore.com/sporepedia](http://www.spore.com/sporepedia)). If you want to simply spend time creating creatures with Maxis' nifty editing tools, then this is it. The Spore Creature Creator is something that all ages can enjoy—and is a gateway drug to the full game. The Spore Creature Creator is already built in to Spore, so there's little need to buy both unless you want the Creature Creator for a friend, family member, or nongamer. ▲



AVAILABLE AT

NEWEGG.COM | NCIX.COM | DIRECTRON.COM | MEMORYEXPRESS.COM

NEW 2008 ! [SHOPFSP.COM](http://SHOPFSP.COM) a FSP Group direct website



lock 'n' load



QUAD PCI-EXPRESS

2 - 6PIN | 2 - 8PIN



DUAL VARIABLE-SPEED

FRONT IN-TAKE COOLING FANS

450-WATT CONTINUOUS OUTPUT

525-WATT MAXIMUM OUTPUT

EASY-FIT TO 5.25" DRIVE-BAY

POWER BOOST TO MAIN ATX POWER

ULTIMATE PC-GAMING : | : BOOSTED BY



FSP GROUP

F S P GROUP IS A PROUD SPONSOR OF LAN PARTIES NATIONWIDE

F S P GROUP U . S . A . | ALL RIGHTS RESERVED 2008 | [www.fspgroupusa.com](http://www.fspgroupusa.com)



# The Cutting Edge

by Barry Brenesal

## Z Is For Zuse

The first programmable computer was designed by Charles Babbage: his Analytical Engine, which nobody would fund into existence. So what was the first programmable computer that ever saw light of day? That would be the Z3, created by Konrad Zuse in 1941.

Zuse's interest in creating a universal labor-saving device began, as so many of them do, as an attempt to save himself a lot of labor. He was studying civil engineering in the early 1930s in the Technische Hochschule of Berlin-Charlottenburg and got frustrated over the sheer number of routine equation calculations. This became something of a fixation for the young man, who got a job as a design engineer upon graduation but gave it up a year later to create his Z1 in his parents' apartment. It was a motor-driven mechanical calculator that could be programmed via binary code on punch tape. (There exists a picture of the Z1, looking like a giant crop feeder in front of what appear to be a map, a bicycle, and a foldable chair, all hanging on the back wall.) By contrast, Babbage had not used binary code, and that made his work much more difficult.

The Z1 only worked some of the time because, again unlike Babbage, Zuse wasn't willing to wait for the money to create precision mechanical parts. He adapted whatever he could find to his purpose. The inventor had plans for a more reliable Z2, but ran afoul of a little matter called World War II. During this period, the military assigned him to the infantry but in a shocking display of mental acuity, allowed Zuse to argue successfully in favor of his engineering work. He was reassigned and became a stress analyst assigned to glide bomb development. (That is to say, he worked on the element of stress in metals. He was not involved in actually testing glide bombs. That would have been infinitely more stressful.)

Zuse still found time to build his Z2 in 1939, with 600 electrical telephone relay circuits replacing much of the mechanical work—something that wasn't an option for his mid-19th century British predecessor. It worked well, so the inventor moved on to

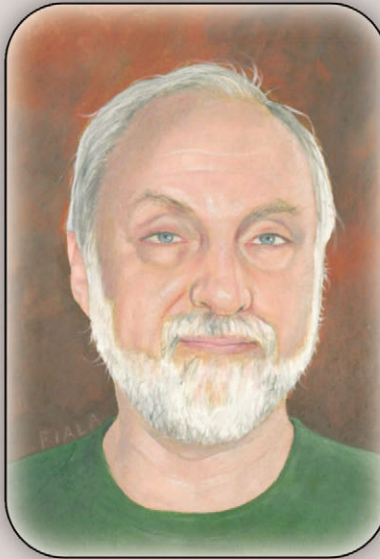
the Z3, a binary programmable 22-bit floating point calculator involving 2,600 relays, 600 in the arithmetic unit and 2,000 in the 64-word 22-bit memory. Its power consumption, 4,000 watts; its weight, slightly over a ton. Of course, it was slow, since the binary relays had to switch on and off to do the work. So, while the Z3 could manage three sums in a second, we are told it took five seconds for multiplication. Zuse demonstrated the Z3 before

an audience of scientists in Berlin on May 12, 1941, with great success. Alas, the German government responded to a request for funding that it was interesting, but "strategically unimportant."

Cash for the subsequent Z4 ended up coming from Henschel Aircraft, an early 19th century firm that made the move from locomotives to tanks, missiles, and airplanes during WWII. The company was always at the forefront of new ideas (or returning old ones, such as slave labor), and Zuse seemed to be on to something good. It took three years to complete, however, because of wartime shortages and inflation: for punch tape, Zuse had to resort to 35mm celluloid film because several film companies were going out of business. In the end, the incomplete Z4 was loaded in 20 boxes onto a train along with the inventor, his new bride, and a few of his employees.

The Berlin company offices and the Z3 were destroyed in air raids.

Zuse finally finished the Z4 in 1950 in Zürich. (Zuse remarked at the time, "The rattling of the Z4 is the only interesting thing about the Zürich nightlife.") It was the second computer in the world to have been commissioned and sold, and the sole one in Europe. It featured a Planfertigungsgerät, one of those swell German words that sounds like it could have been made up by Mel Brooks, but actually referred to a program design wizard that would train novice users in producing the Z4's punch tape in three hours. Definitely cutting-edge stuff, but as much can be said for the Z3, if not Zürich. ▲



*Barry Brenesal has written more than 1,000 published articles and reviews on electronic technology since 1987. His first personal computer was a Radio Shack TRS-80 model 100.*

*It was last seen functioning as a boat anchor.*

Wax nostalgic with Barry at  
[barry@cpumag.com](mailto:barry@cpumag.com)

# Software

## Tips & Projects

### Polishing The Chrome

Google tried to outflank the competition in the long-standing Web browser wars last month by releasing Chrome. With a cleaner design and optimization for Web applications, Chrome comes at the Web experience a bit differently, and some early users may have found the program a bit disorienting. But you can't make up your mind about the new online tool without giving it a fair test drive around the Internet. This month, we pop the hood and look for a few of Chrome's less obvious features.

#### Omnibox Does Math

We are only just now discovering how versatile Google's new style of browser address bar can be. Surely you have seen how it offers both search and navigation suggestions in the drop-down box. But did you know you can process raw calculations here, as well? Put in an equation such as "8 + 4 - 2 + 12" and Google Calculator delivers the answer. Try conversions such as "3 kilos in pounds" to get a Google search result page with the answer on top.

#### Custom Site Searches

The Omnibox will let you search some other engines and sites if you know the right parameters. If you type "Yahoo.com" for example, Chrome prompts you to press tab and turn the Omnibox into a search

box for Yahoo!. You can also add a custom roster of site-specific searches. Go to one of your favorite sites, such as Wikipedia or CNN, and do a topic search in that site's own box. Now right-click the Omnibox to bring up the Edit Search Engines Box. If the site you're using supports the Open Search standard, you'll see CNN.com or Wikipedia show up under the Other

Omnibox followed by the search phrase, and Chrome will run a site search.

#### Site Spy

Chrome gives you some great tools for understanding a Web page's behavior, resource usage, and efficiency. Load the page you want to analyze, and then right-click anywhere on the page to bring up the Inspect Element command. Now, reload the page while the Inspect Element box is open. The window gives you two main views. The Elements view is a detailed breakdown of the code elements of the page, which you can filter more precisely. The Resources tab shows you the size of each resource loaded by the page and the time it took to load it. You can reorder the results in several ways. Clicking any one of the resources reveals the underlying code. Very cool.

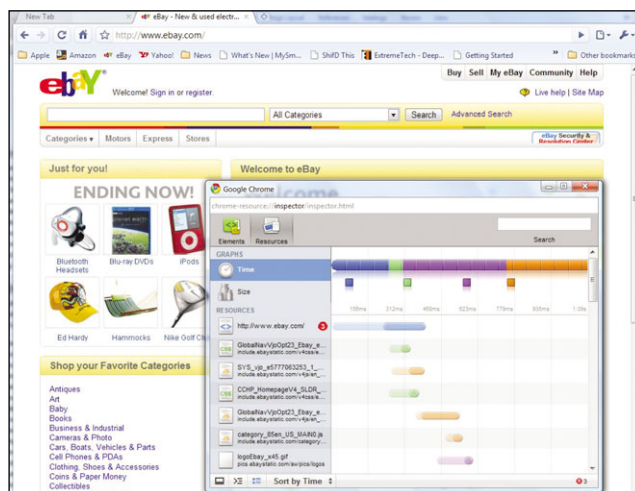
#### Take Me Home

Yes there is a Home button for the Browser interface. Many users mouse around feverishly looking for the familiar icon, and by default Chrome turns it off. To restore Home, go to the Options item in the tool icon (that is the wrench on the far right). Under the Basics tab, check Show Home Button On The Toolbar. This also is the spot where you can tell the browser to launch with thumbnails of your most recently viewed pages. Look for that radio button in the On Startup section.

#### Create Personal Profiles

Unlike most other browsers, the beta version of Chrome does not allow you to create profiles for different users. If you run Chrome on a communal or family PC, then everyone is sharing their bookmarks and history. This can be either cluttered and inefficient or downright embarrassing. Unfortunately, creating individual profiles is a little unwieldy. But here is one way to do it in less than five minutes.

First, go into Chrome and clear your history and recent data. Then, using



The Inspect Elements window in Google Chrome gives you a granular view of the resources a page loads and even the time it takes to do so.

Search Engines area. This means that if you preface an Omnibox entry with the associated keyword (i.e. "CNN.com," "Wikipedia.com") you can run a search specifically on that site no matter where else you happen to be online. You can also turn this keyword into a shortcut. First, highlight the new search engine entry and click Edit. In the Keyword field simply put any shortcut you like (CNN, for example). Now just type the keyword in the



Windows Explorer, find the User Data folder for Chrome. In Vista, we found it in C:\Users\username\AppData\Local\Google\Chrome\User Data. Here you will find the Default folder. Highlight and make a copy of Default, giving it a name that you want to use for the Profile (ProfileName) and leave this renamed copy in the same User Data area.

Return to the Desktop and right-click the Google Chrome shortcut, and then copy and paste another copy onto the Desktop. Name this new shortcut anything you like to indicate the specified profile (i.e. ProfileName). Right-click the shortcut and open the Properties window, and then go to the end of the Target command line. After the launch command for Chrome, place a space and then the parameter "-user-data-dir=..\User Data\ProfileName". The ProfileName should correspond to the name of the new profile folder name you created in that target directory above. Click OK to confirm everything. Using this shortcut for the first time will open Chrome in a fresh state that the designated user can use for his own history, bookmarks, theme, etc.

You can make as many of these profiles as you like for members of your family. You can hide the identity for your own shortcut or place it elsewhere for extra-private browsing.

Note for Windows XP users: The location of the relevant Chrome User Data

folder on your systems is C:\Documents and Settings\username\Local Settings\ApplicationData\Google\Chrome. All other parts of the procedure from Vista are the same for XP.

### Our Favorite Shortcuts

Many of Chrome's keyboard shortcuts are standard and familiar (i.e. CTRL + T for new tab). But here are a few of our favorites when using Chrome in particular.

**ALT + Home.** Return to Home page. Just in case you decide to forgo restoring that Home page icon (see above).

**CTRL + O.** Opens a document from your file library at the bottom of the Chrome interface. This can put a set of documents at the ready in your browser. The docs will continue to use their native application (Word, Excel, etc.) if you click on them, but the feature lets you keep some files at the ready and accessible without leaving the browser interface.

**CTRL + 0.** For when your text zooming in and out gets out of control, this command (that is CTRL + zero) returns the typeface size back to normal.

**CTRL + SHIFT + N.** Opens a new window in Incognito mode for browsing without leaving a history on the PC.

**CTRL + SHIFT + T.** Reopens the most recently closed tab. Repeat the combo to get the next most recently closed tab. This works pretty much like an Undo command but for tabs.

### Cool Hidden Windows

Try putting some of the following items into your address window in order to bring up some cool and ephemeral tools.

**About:network.** Lets you track Chrome's network usage in real time and see all I/O calls. You can keep this monitor open in one window while browsing in another to see every network call a page makes.

**About:stats.** Shows a highly detailed set of timers and counters of recent Chrome activity

**About:memory.** Compares memory used between any other active browser and Chrome

**About:plugins.** Shows all current plugins and their enabled/disabled status

**About:dns.** This page shows the dozen or so home pages that Chrome prefetches in order to accelerate browsing.

**About:cache.** Shows the pages Google currently caches, which can be voluminous. To clear the cache occasionally, go to the tool icon and open Clear Browsing Data. Check whichever of the items you want to have cleared, including the "Empty the cache" choice.

**About:version.** Shows current version.

by Steve Smith

### Windows Tip Of The Month

Vista's new ReadyBoost feature can use memory from a connected USB flash drive to speed up some operations. Vista will offer to dedicate memory to this function when you plug in the device for the first time, but how do you turn it on or off after that? Simply right-click the drive letter in Windows Explorer and open the Properties tab. A radio button lets you turn ReadyBoost on or off, and a slider controls the amount of memory on the drive to dedicate to accelerating Vista.

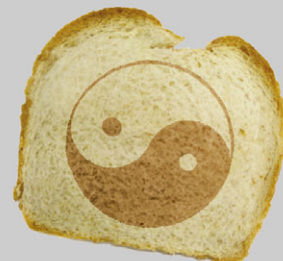
### Registry Tip Of The Month

The Shell command can be used at the Start menu search box to call up specific system folders and nooks and crannies of your Vista file system you may have trouble finding. For instance, typing **shell:cookies** in the menu search brings up the directory of cookies hidden about six levels deep in the directory structure. There are scores of such shell commands – too many to mention here. But you can find them all in the Registry. Just go to HKEY\_LOCAL\_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Explorer\FolderDescriptions. Each sub-key has a lengthy cryptic number, but if you highlight each, the Value pane reveals details about each Shell component. In the Name value, you will find plain prose descriptors such as Public or Playlists. Simply plug that name into the **shell:xxx** command at the menu search, and you will open the folder containing that data.

## Infinite Loop

### The Future Of Toast

Maybe you're not enthusiastic about leaving your mark on the world, but how about leaving it on a piece of toast? Sung Bae Chang, an industrial designer, whipped up a Scan Toaster that lets you toast an image from your PC onto a slice of bread. This could be the greatest thing since...well, you know.







**MSI**  
MICRO-STAR INTERNATIONAL

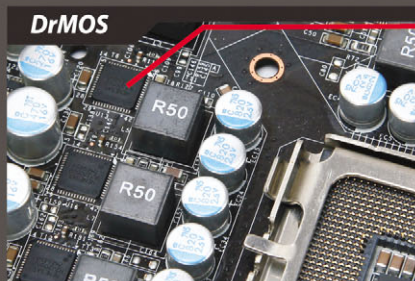
innovation with style



**Best Choice of  
COMPUTEX  
Award for 3  
Consecutive Years**

# DrMOS

## Out of This World Overclocking Performance



### • DrMOS: 3-in-1 High Quality Chip

Driver IC	+	Top-MOSFET	+	Bottom-MOSFET
= <b>Server-class DrMOS, is your best choice!</b>				

- Excellent power density maintains temperature and system stability.
- Integrated chip provides not only the best response time of electricity but also improves the electricity efficiency.



### P45D3 Platinum

- ◆ Intel® P45 Chipset Supporting Intel® Core™2 Processors
- ◆ 4 DIMMS for Dual Channel DDR3-2000(OC) up to 8GB
- ◆ MSI's Effective Circu-Pipe2 Cooling
- ◆ 2 16X PCI-E 2.0 for ATI® CrossFireX





# Warm Up To Penguins

## Two Faces Of Firefox

One of the most essential tools today is the Web browser. And for Linux users, the most popular one, without a doubt, is Mozilla Firefox. On top of that, it's the most popular open-source Web browser for all platforms.

But just because Firefox is an open-source project doesn't mean it's the same, or even behaves the same, across all platforms. Although they're mostly the same, they certainly don't behave *exactly* the same. Some of these differences are due to historical reasons, while others are the result of how the different operating systems behave. In this article, we'll point out the differences of how Firefox behaves on Linux vs. its Windows counterpart.

### My Two Browsers

When you first launch Firefox 3, there's one obvious difference between the Windows and Linux versions. On the Windows version, the Back button on the Navigation Toolbar is noticeably larger than the other buttons. On the Linux version, all of the buttons are the same size. The other obvious difference between the two versions is the location of the user preferences. On Linux, you need to click Edit and Preferences, but on Windows it can be found by clicking Tools and

Options. But these obvious dissimilarities are just the start.

One subtle but unavoidable difference between the Windows and Linux versions is the fonts used. Each system has its own built-in fonts, and as a result, Web pages' text will have a distinct look between the platforms. For example, where Windows uses Times New Roman font, Linux has the Serif font. Although the fonts generally look the same, the Linux fonts tend to look a tad bit larger and bolder than their Windows counterparts.

Fortunately, there is a relatively easy way to get around this inconsistency. In Linux, simply create a directory named ".fonts" in your home directory. Then, go to a Windows system and copy the Times New Roman, Arial, and Courier New fonts to the .fonts directory. When you restart Firefox 3, open the Preferences dialog box and click the Content tab. In the Fonts and Colors section, click the Advanced button and make the following changes: Serif to Times New Roman, Sans Serif to Arial, and Monospace to Courier New. Now when you visit Web sites the text will appear exactly as they would for Firefox users on Windows.

And as you visit more complicated Web pages, even more differences between the two appear. For example, just about everybody has Adobe Reader installed in order

to read PDF files. However, the latest version for Windows is Adobe Reader 9; Linux is still stuck with Adobe Reader 8. This isn't a significant version difference, but it does prevent some of the newer PDF files from being fully accessible on Linux.

Another more subtle problem for Firefox users on Linux comes with the Flash plug-in, also from Adobe, coincidentally. Firefox interacts with Flash differently on Linux than it does on Windows. Specifically, Web pages that overlay text on top of the Flash plug-in are rendered behind the plug-in on Linux. However, on Windows the text is overlaid in front of the plug-in. So for those Web pages that make even moderate use of Web technologies such as Flash, the content may not be fully accessible to the Firefox user on Linux.

### A Conundrum Of Content

Web pages that embed multimedia content are another common source of problems and probably the biggest grief for Linux users. Because Windows is such a dominant platform, most of the software is developed for it. This obviously includes media players that handle a wide variety of multimedia formats, such as QuickTime, RealMedia, etc. These players often include the necessary plug-ins for Windows-based Web browsers, including Firefox, by default.

However, things aren't quite so simple for the Linux Firefox user. Where on Windows you can easily download a player for a particular media format in most instances, Linux support for the same formats is not as comprehensive. On Linux, the open-source community has had to create the players from the ground up, sometimes without help from the author.

As a result, the support for these platforms can be a bit uneven. One Linux program can handle a particular format, while another program might only open a different format. And because of the diversity of the file formats, it's possible for one program to handle a subset of one file format, and another handles another subset.

There are many popular Linux multimedia players that handle a wide range of file formats. We'll cover two of them that have plug-ins that will allow the playback of multimedia content within Firefox.

The first media player that we'll discuss is Mplayer ([www.mplayerhq.hu](http://www.mplayerhq.hu)). It was created in 2000 and is continuously updated. It covers the most popular formats and is a command-line player. There are a number of graphical front-ends for mplayer, and you can configure it as a plug-in in Firefox to handle multimedia files. Mplayer and its libraries also form the back-end player for KPlayer, a KDE-based media player.

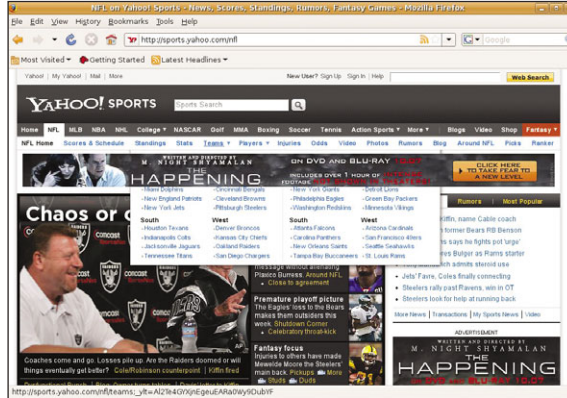
The other Linux multimedia player is Xine ([xinehq.de](http://xinehq.de)), also released in 2000. The most notable difference between Xine and Mplayer is that Xine has a built-in GUI, which circumvents the need for a separate front-end. You can simply run Xine, and you'll be presented with a DVD-like interface to open and navigate files. Xine and its libraries make up the back-end for Kaffine (for KDE users) and Totem (for GNOME users).

Extensions are another difference between Linux and Windows versions of Firefox. Firefox extensions are small applications that work within Firefox and provide extra functionality or useful tools. Some common extensions include in-page banner ad blocking (Adblock), an FTP client (FireFTP), and a download manager (DownThemAll).

Although most Firefox extensions are platform-independent, there are some non-Linux extensions. Some work on Windows and Mac, such as Cooliris; others are platform-specific, such as the Mac-only FoxiPod and the Windows-only extensions such as Firefox Throttle. So if you're thinking about switching to Linux, double-check that your favorite extensions will work on it first.

### 64-Bit Setbacks

People who use 64-bit Linux face unique problems with Firefox plug-ins.



Notice the Flash banner ad overlaying some of the text here, just one of the many differences between Windows and Linux Firefox.

Although nspluginwrapper works with several common plug-ins, it's not a universal solution.

A rather noticeable shortcoming of 64-bit Firefox

on Linux is its complete lack of support for Java. Disappointingly, Sun, the author of Java, has already acknowledged that it doesn't have a plug-in that will work with any 64-bit Linux browsers.

So while Firefox may run on both Windows and Linux, they do behave differently. On Web pages with lots of content, those differences will become apparent. ▲

This is where issues with Firefox plug-ins are most problematic. That's because for the plug-ins to work correctly, they must be built specifically for 64-bit Linux. Given the relatively small user base for 64-bit Linux, most developers don't bother building 64-bit specific versions of their applications. That means that there's even less incentive for browser plug-in makers to create both 32- and 64-bit versions of their plug-ins.

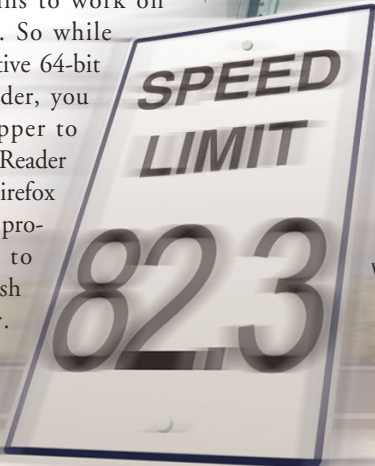
Fortunately, as with most things Linux, the open-source community is there to help. There is a compatibility plug-in called nspluginwrapper ([gwenole.beauchesne.info/en/projects/nspluginwrapper](http://gwenole.beauchesne.info/en/projects/nspluginwrapper)), which is developed specifically for 64-bit Linux users. This plug-in essentially bridges 32-bit plug-ins to work on 64-bit Linux Firefox. So while there may not be a native 64-bit version of Adobe Reader, you can use nspluginwrapper to hook the 32-bit Adobe Reader plug-in to work with Firefox on 64-bit Linux. This program is also known to work with Adobe's Flash plug-in and Mplayer.

on Linux is its complete lack of support for Java. Disappointingly, Sun, the author of Java, has already acknowledged that it doesn't have a plug-in that will work with any 64-bit Linux browsers.

by John Jung

## Infinite Loop

A Real-Life  
Excitebike



Traveling at 82.3 mph in a car is moving along at a pretty decent clip. Going that fast in a self-propelled recumbent bicycle is borderline jaw-dropping. But for Sam Whittingham, the feat was business as usual. Whittingham bested his previous world-best 81.02 mph speed at this year's World Human Powered Speed Challenge, set in Battle Mountain, Nev. Whittingham says he's hoping to eventually hit the 88 mph necessary to travel back to 1955 and score a date with Lea Thompson. ▲

Source: [blog.wired.com/cars/2008/09/worlds-fastest.html](http://blog.wired.com/cars/2008/09/worlds-fastest.html)



# Shavings From The Rumour Mill

by Mike Magee

## Solid State Drives Are Rocks—We Hope

The price of flash memory has never been lower and that's having its effect on the price of solid state drives, too. Well, it should be having an effect, but the devices are so new that firms are still charging a premium for devices that will boot Windows quickly.

Intel's drives, for example, have a high price tag for manufacturers buying them in the thousands, and that's being passed on to us because notebooks equipped with SSDs cost quite a bit more than those using the old-fashioned opto-magnetic technology.

Most of the reviews I've read of Intel's drives give them top marks for speed and performance, and the time before they fail (and you lose your data) is also pretty impressive. So in the last few weeks, the hard drive manufacturers—and, for that matter, the flash memory makers—have been manoeuvring and hinting at takeovers that could well herald the start of a new era in the age of the PC.

This isn't to say that hard drive companies like Seagate are resting on their laurels. They're not. Even though makers of flash drives are beginning to produce devices with fast read/write capabilities and lifetime figures that are halfway convincing, the Seagates of the world are refining their technologies, too, and that can only mean good news for all of us. The shrinking of components on digicams means that one RAW picture takes up more storage than the first PCs could even dream of. There's a penalty (isn't there always?) because the bigger the file sizes, the bigger the problem editing them, especially if you've got an older machine.

Luckily for us, but unluckily for the manufacturers that make DRAM, memory prices have never been lower. Four gigabytes of DRAM are now routinely included in the price of a notebook or a desktop, and those extra gigs can really make a big difference when you're doing heavy graphics crunching.

The PC industry has always lurched onwards on the basis that hardware and

software will eat up your dollars and you'll eventually be forced to upgrade. My digital SLR camera and my light Sony camcorder produce massive files, and transferring them directly from SD cards or using USB 2.0 still takes a lot longer than I'd like; I am looking forward to the introduction of USB 3.0.

It is time once again for me to buy a new notebook, and naturally I'd like a really fast microprocessor, lots of memory, a nice

screen, and 4GB of DRAM. But I'm not sure I want to pay \$800 more for a machine that has an SSD inside. That's because the price premium is too high right now. Because Intel has entered this market, we can expect to see prices for solid-state drives drop, although whether it's sooner rather than later depends on a couple of things. If you can ship drives and they're going like hotcakes, there's no need to drop the price because you can maximise profits and keep the price high. The very fact that SSDs are now nearly affordable means that the "traditional" hard drive manufacturers will offer their wares at a very low price, and so disks will remain quite attractive for quite a while.

I'd estimate that it will take 18 months or so for the price of solid-state drives to drop sufficiently for them to be competitive for the cautious buyer. It could happen faster, but that depends on how aggressive the Intels and Samsungs of this world are. It's true what they say; a leopard can't change its spots, so I also expect these two firms to push hard against the opto-magnetic hard drive firms, and, at some point, something will have to give.

Over the next six months, we'll likely see some fairly significant changes in the hard drive market and more consolidation in storage as the hard facts of profitability drive prices down. ▲



*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)



# VisionTek®

THE ULTIMATE HD GAMING VIDEO CARD



HDMI WITH 7.1 SURROUND SOUND

LIFETIME WARRANTY

LOW POWER CONSUMPTION

PLAY BLU-RAY™ AND HD VIDEO

## UNBELEIVABLY REAL

*"THE HD 4670 COMES UP BIG BY PACKING AS MANY FEATURES AS POSSIBLE INTO ONE AFFORDABLE PACKAGE."*

# RADEON™ HD 4670

VELVET ASSASSIN

Replay Studios



WWW.VISIONTEK.COM



©2008 Replay Studios GmbH. Replay Studios, the Replay Studios logo, and Velvet Assassin are trademarks and/or registered trademarks of Replay Studios GmbH. All Rights Reserved. Gamecock and the Gamecock logo are trademarks and/or registered trademarks of Gamecock Media. All other trademarks are the property of their respective owners.



# Wagging The Dog

by Rahul Sood

## Absolute Power Corrupts Absolutely . . . & Kills Companies

Absolute power can bring governments, companies, and leaders to their knees. Remember where Intel was three years ago? They were getting smoked by a smaller competitor, a *much* smaller competitor, who found a weakness and capitalized on it. Well, things certainly changed; Intel, humbled by its own arrogance and schooled by its largest yet tiny competitor, completely changed the way it does business.

There was a time not so long ago when Nvidia was the darling of Wall Street. The company seemed so laser-focused in its execution, and it rarely missed a step. And even when it did make a mistake, Nvidia only let its competitors (OK, *competitor*) slide by temporarily; there was no denying that, and Nvidia's level of innovation was beyond the competition in the graphics market. In the chipset space, Nvidia was doing some amazing things and practically owned the high-end business. The company's chips were reliable, simple to integrate, and they only had the features that their customers wanted. The nForce was truly the Ferrari of chipsets. Then, of course, there was SLI technology, which Nvidia acquired from 3Dfx, and it was so popular among gamers that it has become the industry standard for multiple-GPU graphics subsystems.

Things were going very well for Nvidia. So well, in fact, that some believe the company's leadership became overconfident to the point where they decided to take on Intel head to head in a no-holds-barred ego match to increase their platform's real estate inside the PC. The strategic choices that Nvidia made paved the way for one of the most brutal behind-the-scenes wars that I have ever seen in the industry. Nvidia broke one of Sun Tzu's cardinal rules: Never take on a giant head to head, no matter how strong you think you are. Instead of looking for holes that needed filling and plugging them, Nvidia focused on growth and market domination, a risky strategy from one of the most aggressive CEOs around.

Somewhere in the struggle to create increasingly competitive platforms, Nvidia lost its focus on its key competitor, AMD-ATI, simultaneously reinvigorating its new competitor, Intel. There's no doubt in my mind that the Intel monster will come out swinging when the time is right. Intel's chipset dominance in midrange

and value-priced PCs is nothing new, but that dominance is now spreading into the high-end personal computer business. It seems now that Intel can do no wrong, and we've all seen where that can take a company.

In this industry, as in any, it is very clear that if you take your eyes off the road and get caught in your own arrogance, you will lose. We have all been there, including my company, and in the end we became a much stronger company than we were before. Luckily for us, we did not have shareholders to answer to at the time, but in the case of companies such as AMD, Intel, and Nvidia, dealing with shareholder concerns can be just as difficult as reconciling customer issues.

There are no two ways about it; Nvidia has a long road ahead of it to fix what's broken. The company may be forced to get into the CPU business, which kind of sucks because it may cloud Nvidia's focus in other areas. On the other hand, with some strategic acquisitions the company may come out on top again, and I am excited about Nvidia's push for visual computing. I think it brings much-needed value to the high-end GPU space, and it may bring seriously needed value to the multi-GPU space, as well. Hopefully next time Nvidia is riding high it will remember where it came from and the reasons for its success.

These, of course, are my own personal views and not those of the company I work for. Signing off until next month . . . ▲



*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.*

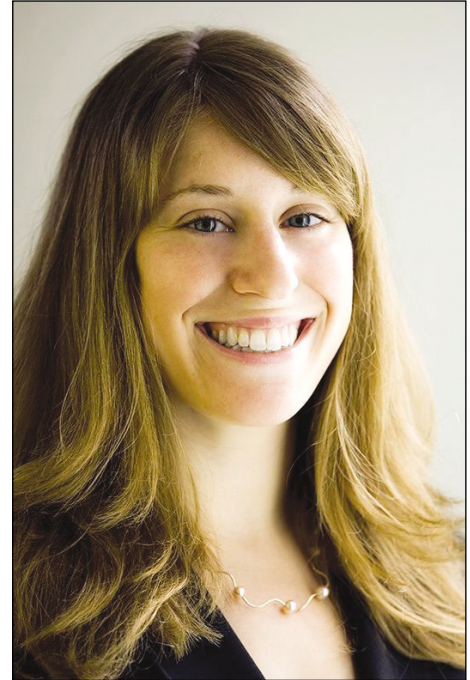
Send your opinions to this opinionated guy at [rahul@cpumag.com](mailto:rahul@cpumag.com)

# Technically Speaking

## An Interview With Alissa Cooper, Center For Democracy & Technology

Alissa Cooper is the chief computer scientist at the Center for Democracy and Technology. Her work focuses on a range of issues including consumer privacy, spyware, digital copyright, network neutrality, and identity management. She has appeared before the Federal Trade Commission and the National Association of Attorneys General and writes regularly on a variety of technology policy topics.

by Barry Brenesol



**CPU:** Consumer privacy online is a touchy issue nowadays, which explains in part the sudden success over the last few years of antiadware and antispysware programs. With that in mind, let's start our interview with a quote from a *New York Times* article from Aug. 10, 2008: "In NebuAd's version of deep packet inspection, a hardware device is put into an Internet service provider's network that can track where users are going online. NebuAd looks for categories that the user will be interested in. If the device notes that a user is browsing or searching for sites about German automobiles, it can deliver an ad about German automobiles later that day, even when the user is on a site about pets. NebuAd defends this, claiming they respect user privacy..." So would we be right in saying that NebuAd is circumventing the ability of consumers to remove adware, nowadays, by keeping the same data on its own servers?

**Cooper:** The analogy to adware is very apt, because with adware, what you have is an application running on your own computer. It tracks the Web sites that you visit and, at the right time, shows you pop-up ads that the software decides you might be interested in. What NebuAd does is basically a network version of that. Instead of

installing software on end-user computers, NebuAd places a hardware appliance in the middle of the network, where you have no control, that takes a look at all the Web sites you go to, builds up a profile of your interests, and stores it on its own servers. Then, at the right time, when you visit a Web site where NebuAd has purchased ad space, they display for you an ad based on your profile. You are not necessarily even aware that data about you is being collected, unless you've been given especially robust notice about it.

**CPU:** This rather puts paid to NebuAd's claim that they respect user privacy, doesn't it, or are we missing something?

**Cooper:** The company has some practices which are respectful of privacy—and which we would be happy if other Web companies would adopt. NebuAd doesn't retain a lot of information in its storage. What they keep about people are just these profile indicators, such as the preference for German automobiles, for example. They don't keep search terms or URLs. So on the data retention side, NebuAd does do a good job of protecting privacy. They store far less than search engines and even some traditional third-party ad network companies that operate on the Web.

**CPU:** So they're by no means the worst of the lot on the matter of data retention.

**Cooper:** No, but where the real privacy issue is, is with the data collection. By virtue of their relationship with Internet service providers, they are able to see and potentially collect far broader information about what you do online than their counterparts that only operate on the Web space. Thanks to having that appliance in the middle of the network, they have the ability to observe every Web site that you go to, including noncommercial sites, political sites, religious sites—all URLs that aren't generally involved in the more traditional Web-based advertising world. They also could see, assuming they want to, your chats, file transfers, emails, and other kinds of Internet-based communications.

NebuAd says that they don't do that right now, but their position in the middle of the network could allow it, if desired, in the future. The huge red flag on privacy is all on the data collection side.

**CPU:** Do NebuAd and companies that operate in a similar fashion have a large, ready market for this kind of thing?

**Cooper:** I think one of the drivers behind this is that ISPs are constantly



looking for new sources of revenue. NebuAd comes to them and says, "We can put our device on your network. You don't have to do much of anything. The ads that we serve make more money than untargeted ads, and we give you a cut." From the ISP perspective, it's a combination of no work and a little bit of free money.

**CPU:** They may be paying now for all this, however. You mentioned outside our interview that their CEO, Bob Dykes, has just resigned. Still, other ad tracking outfits are no doubt following the same path.

**Cooper:** Sure. There are a few other companies that we know about that have a similar business model. The one that's written about most in the press right now is called Phorm, operating mostly in the UK. It had originally signed contracts with the three largest ISPs in that nation: BT, Virgin, and Carphone Warehouse. That would cover approximately 70% of all UK broadband users, but Phorm has come under substantially similar criticism as NebuAd has here in the U.S. As with

so there's nothing invasive about the data collector.

**Cooper:** It's not incorrect to state that data collection is a form of personalization, but there are two key differences between the clerk in the store and the online ad tracking companies. The first is that, thanks to the digital revolution, they can now create this profile of you, and it's easy to build and share it. It's stored on their server and could be provided to their distribution partners and to the government. So whereas the clerk recognizes you and thinks, "Oh, I remember what kind of ties he likes to buy," that's only kept in his head. Nor is it an extremely detailed record of all the Web searches you've done, all the purchases you've made and articles you've read online, or all the social networking sites you've joined. The breadth of information that can be gathered of what's occurring online is much greater. That leaves you with this digital record, which has all kinds of uses.

The second difference is that with the clerk in the store, you have a choice. If you enter, and you don't like what he's

their capability to control the personalization experience online.

**CPU:** There have been some Congressional hearings on this matter over the summer. Is the reaction strictly on the federal level, or are we starting to see any kind of state legislative review of Web-based privacy laws?

**Cooper:** There have been a few states that have introduced privacy bills. These have been aimed at third-party traditional networks that do deals with specific sites tracking traffic through cookies. New York and Connecticut, at the very least, have introduced bills that would require companies operating in that model to institute some mild privacy protection. These are actually based on the industry self-regulatory framework that some of those companies already adhere to; so it's basically as though an attempt were being made to take these existing guidelines and establish them as law.

The framework is called the Network Advertising Initiative. It was created in

I think consumers are much more constrained in their capability to control the personalization experience online.

—Dr. Alissa Cooper

NebuAd, many of Phorm's trials have been stalled.

There are also a couple of other companies. FrontPorch is one of them. Adzilla is another. Both are making tentative moves in the U.S. market, but neither has seen the kind of headlines that NebuAd has.

**CPU:** NebuAd and other similar data collectors do have their supporters. One of the most frequently stated defenses is that the service they provide is analogous to a store you use frequently. The clerk or owner comes to know what you like and tells you about something in your area of interest that you might desire. As there's nothing invasive about the clerk,

suggesting to you, you can ask him to make a different suggestion or to stop making suggestions altogether. In the online context, all the data collection happens in many cases without consumers ever knowing what's going on. They don't have access to the profiles that are kept about themselves, and in many cases the choice they're provided about whether they want to participate or not is either nonexistent or not very robust—they're not permanent, or they're hard to use, or people don't understand them. I think consumers are much more constrained in

2000 in response to DoubleClick, now one of the more prominent companies that does advertising online. Back then, DoubleClick wanted to merge with a company named Abacus, which was an offline data broker. They collected information about where people lived, income levels, education levels, etc. The privacy advocacy community was extremely concerned about the bringing together of this offline and online data, which led in turn to NAI companies offering guidelines as a mechanism to alleviate some of those concerns. **CPU**

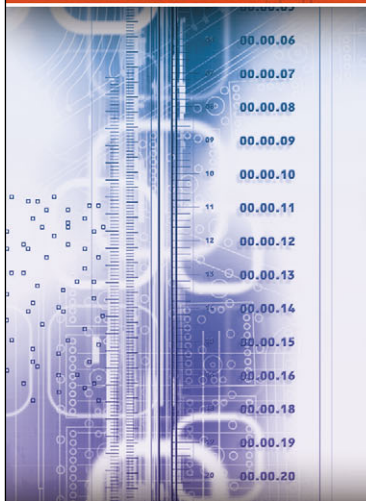


Subscribers can read bonus content with Gaël Duval at  
[www.cpumag.com/cpunov08/soneira](http://www.cpumag.com/cpunov08/soneira)

# BootIt<sup>TM</sup> NEXT GENERATION

Self-Booting Media  
For PC-compatible computers

**Multi-Boot & Partition Management Software**



## All In One!

- Partition Manager
- Boot Manager
- Imaging

*"A great way to backup and manage your tweaked systems."*



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

Copyright © TeraByte Unlimited. All Rights Reserved.

## Ascend!



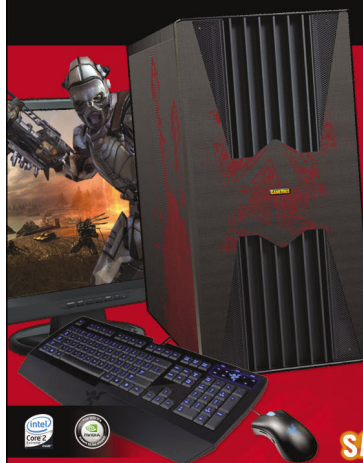
ELEVATE YOUR COMPUTER EXPERIENCE

### Mountain Mods - Ascension

541.386.0086

[WWW.MOUNTAINMODS.COM](http://WWW.MOUNTAINMODS.COM)

## GAMERIGS THE MONOLITH OF GAMING



ENEMY TERRITORY  
QUAKE WARS

Anarchy  
online

DESKTOP GAMING  
PC SYSTEMS

**SAVE UP TO \$300 OFF  
YOUR NEXT GAMING RIG**

**+ GET GAMING ACCESSORIES,  
GUIDES, IN-GAME GEAR  
AND MORE...**



**BATTLEMAT**  
GAMING MOUSEPADS

THE FIRST 100 GAMERS TO  
PICK THEIR FAVORITE MOUSEPADS,  
GETS ONE FOR FREE! (some conditions apply)

VISIT US ON THE WEB @ [WWW.GAME-RIGS.COM](http://WWW.GAME-RIGS.COM)

Copyright © 2008 GameRigs, division of the Neutalike Corporation. All trademarks belong to their respective owners.



# Under Development

A Peek At What's Brewing In The Laboratory

## Microchip That Sleeps On The Job

**A**lthough the “smaller, faster, cheaper” mantra of the processor industry continues to drive production of chips with those qualities, the size and life of their power source is ever the sticky wicket.

Researchers at the University of Michigan have found a unique way to tackle the power efficiency issue by creating a record-breaking, low-power microchip called the Phoenix processor. The Phoenix is being developed specifically for electronic devices that use sensors, such as biomedical sensors, environmental monitors, or motion detectors. These sensor-based devices are frequently in a standby, or sleep, mode, “waking” at regular intervals to perform their respective tasks.

Phoenix is a tiny,  $1\text{mm}^2$  processor, which is nothing unusual in its own right. However, the remarkable feat is that the processor is coupled with a thin-film battery of the exact same size—amazing, because batteries are often many times larger than the processors they power.

Dennis Sylvester, an associate professor in the Department of Electrical Engineering and

Computer Science and one of the researchers working on the project, explains what sets the Phoenix apart. “By making a very low sleep mode power chip, we can run off a tiny battery for several years, and make very small form factor systems (on the order of  $1\text{mm}^3$ ), which is 1,000 times smaller than other sensor nodes out there.”

Sylvester and his team worked their micromagic a few different ways. They incorporated a unique way of power gating—cutting the connection from the circuit to the power supply in sleep mode—by utilizing tiny transistors to connect the two instead of the typical wide switches. This change greatly reduces power leakage at the expense of performance. However, the tradeoff is more than acceptable, given the power savings.

Sylvester explains that the team also compressed memory so as to store its state



Low-power, record-breaking  $1\text{mm}^2$  microchips developed by University of Michigan researchers boast a batteries 1,000 times smaller than other sensor nodes on the market.

in a smaller area of the memory. “Retaining state during sleep mode is expensive, power-wise, so we spent some dynamic power compressing it before entering sleep to save on total energy consumed,” says Sylvester.

In addition, the team built Phoenix to operate at a very low voltage (0.5 volts vs. the typical 1 to 1.2 volts) on a “mature” system (CMOS), consciously giving up accuracy (i.e. the timer that wakes the processor only keeps time to approximately 10 minutes, give or take a few tenths of a second) in exchange for efficiency.

Sylvester hopes to have working processors to partner companies, and perhaps to the general public, within the next two years. ▲

## MIT's “Aware Car” Lives Up To Its Name

**W**ellness is quite the buzzword today in the context of self-care, but it's not the first thing you'd think of when purchasing your next vehicle. However, researchers at MIT's AgeLab ([web.mit.edu/ageLab](http://web.mit.edu/ageLab)) are keeping wellness in the forefront of their minds as they design their “Aware Car,” a high-tech prototype that helps drivers make safer driving decisions by providing real-time feedback about their bodies and driving performance. Although created with an aging populace in mind, the Aware Car's

capabilities can assist anyone, hopefully making the roads safer for everyone.

And the Aware Car is equipped to provide assistance in spades. A multitude of sensor devices (microcameras, infrared lights, biorhythm monitors, and lane sensors) are peppered throughout the car to monitor both the driver's state and the car's motion. The system pulls data by observing the driver's eye and eyelid motion, heart rate, blood pressure, and breathing. A global positioning system helps the driver find her way (or

rescuers find her in an accident), and lane-drifting sensors help prevent a driver from veering out of her lane.

All the data is processed and stored in a hard drive in the trunk. The system can learn a given person's driving style and report back to the driver with advice if it detects something has gone awry.

Although useful for the direct feedback it provides, the Aware Car also serves other purposes: gathering data about how aging people drive, what their needs are, and what impacts safe

or unsafe driving in most drivers. This research is invaluable for those who are designing roads, lights, and road signs focused on an aging Boomer population. The data will also help to assess how drivers' capabilities change as they age.

Though some elements of the Aware Car have already been incorporated into existing high-end vehicles (Lexus and Volvo have lane sensors and global positioning systems), the full package isn't expected to be available for another two decades. ▲

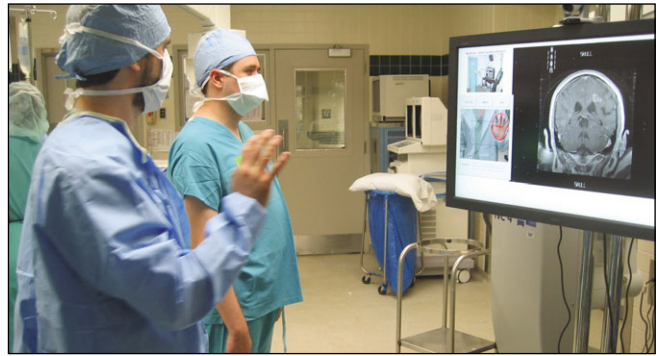
## Improved Sterile Operating Rooms At The Wave Of A Hand

U.S. hospitals are struggling with unacceptably high infection rates—and the issue is not with diseases that are brought in by patients, but ones that manifest while in the hospital. Though staff are taught certain procedures to maintain a sterile environment, they aren't always followed, and complications for patients then ensue.

With this in mind, researchers from Ben-Gurion University of the Negev in Israel have developed an innovative hand-gesture recognition system called Gestix to be used by surgeons to access medical information in the OR (operating room). Sealed touchscreens are the current technology used in ORs across the country, and though their smooth surface allows for decontamination after each

procedure, sometimes this is overlooked, says Dr. Juan Wachs, lead researcher on the Gestix project. Gestix provides another option to access information and one that maintains a sterile environment.

Gestix requires surgeons to walk through two steps before using it. First the tool must learn a doctor's particular hand gestures. Then, the doctor must in turn learn and utilize the eight navigation gestures for the tool. The surgeons practice moving their hands from a "neutral" area and back again to access the information they need on the computer, explains Helman Stern, principal investigator on the project. Moving the hand clockwise or counterclockwise lets the surgeon zoom in and out, while lowering the hands sends the computer into sleep mode.



Surgeons practice hand gestures utilized in Gestix—hand-gesture recognition software that delivers medical information in the OR without having to touch a computer.

A Canon VC-C4 camera (using an Intel CPU and a Matrox Standard II video-capturing device) captures the surgeon's gestures and then displays them on a large, flat-screen monitor. After a successful test of the system in an actual neurosurgical brain biopsy at Washington Hospital

Center in Washington, D.C., the team plans on expanding Gestix to include other control modes (i.e. voice) and explore other usages, such as assisting the visually impaired. Although they don't have a completion date for Gestix, the researchers are currently negotiating commercial distribution. ▲

## MICOLE Helps Blind & Sighted Children Share Space

For the most part, visually impaired children require a different method of instruction than sighted children. More progressive schools have combined classrooms, entwining the two pathways in hopes of bettering each. Now European researchers, as a part of the EU-funded MICOLE (Multimodal Collaboration Environment for Inclusion of Visually Impaired Children) Project, are stepping up with an open-source application to make those combined classrooms richer and more collaborative for all the students.

As a result, sighted and visually impaired students alike can together dive into exploring our solar system and outer space via a haptic device and the MICOLE software. A robotic arm serves as a mouse



Visually impaired and sighted classmates work together to explore the universe on MICOLE-developed software.

for a visually impaired child, guiding them, through pressure and resistance in the arm, around the solar system. The system also provides audio information about the planets as the student explores. A sighted child can enjoy the same program on the shared

workspace through graphics and sound and also assist in guiding their classmate.

Project lead Roope Raisamo explains that the aim of MICOLE is to assist the visually impaired in working at an equal level with the sighted, whether in the classroom or

out in society. "The goal of MICOLE is to build a multimodal learning environment used by both sighted and visually impaired children when they are learning together."

Because MICOLE has utilized extensive in-classroom testing and focus groups, the researchers have been able to observe what works well for collaborative learning. Raisamo says the most rewarding aspect of the research thus far has been "to see that the applications really help visually impaired children, and [that] they want to use them."

The team is working on applications beyond space exploration, such as one that explores physical sciences and expands the multimodal options (Braille, for example) provided by the software. ▲





Look For *CPU* At These  
LAN Parties Across The Nation!

**10.25.08**

ACM LAN II (TEXAS A&M) - Commerce, TX  
orgs.tamu-commerce.edu/acm/lanparty

ATD Arena - Charlotte, NC  
www.atd-arena.com

ExtremelANKC - North Kansas City, MO  
www.extremelankc.com

LANKnights - Orlando, FL  
www.lanknights.net

NGC LAN Party - Groveton, NH

Peace, Love, and Rockets - Keller, TX  
www.peaceandrockets.org

UWL LAN Computer Science Club - La Crosse, WI  
www.uwlax.edu/csclub

Warfactory LAN - Missouri  
www.warfactory.net

**11.01.08**

Ghetto LAN party - Dallas, TX  
ghettolanparty.com

**11.07.08**

ALL Your Base Lan - Winnipeg, Manitoba  
www.allyourbaseonline.com

De-Frag 2007 - Amana, IA  
www.de-frag.us

Netwar 15.0 - Omaha, NE  
www.netwar.org

TusLAN - Tuscan, AZ  
www.tuslan.net

**11.08.08**

E-Town LAN - Emporia, KS  
www.etownlan.com

WCU Second LAN of Fall 2008 - Cullowhee, NC  
wcugaming.org/?page\_id=6

**11.14.08**

Big Shot Gaming - Mount Pleasant, MI  
www.bigshotgaming.com

**11.15.08**

CapLAN - North Vancouver, BC Canada  
caplan-bc.com

Carolina Armageddon - North Carolina  
www.carolinagaming.com

CarolinaCON - Stokesdale, NC  
www.ncgaming.com

Maximum Overkill - Bringhamton, NY  
www.core.binghamton.edu/maxover

NGC's LAN-A-GEDDON - Greenville, TX  
www.networkgamingclub.com

Whempy's LAN Party - Columbus, OH  
whempyslan.org

**11.21.08**

ugX 2008 - Topi, Pakistan  
www.giki.edu.pk/ugx

**11.22.08**

Gamers of OK State University - Stillwater, OK  
osugamers.com

Gamers On Campus - Arlington, TX  
www.eznet-cafe.com

Muncie Gamers - Muncie, IN  
www.munciegamers.com

**11.28.08**

Black Friday FragFest - Warner Robins, GA  
www.fragfest.ots-ga.com

**11.29.08**

NGC LAN Party - Groveton, NH

Toronto FragFest - Toronto, ON Canada  
www.torontofragfest.com

**12.05.08**

GVCCLAN - Placerville, CA  
www.gvcclan.com

**12.06.08**

LANBrew Association - Tulsa, OK  
orgs.utulsa.edu/lanbrew

**12.13.08**

E-Town LAN - Emporia, KS  
www.etownlan.com

Nexus LAN - Dayton, OH  
www.nexuslan.org

Whempy's LAN Party - Columbus, OH  
whempyslan.org

**12.20.08**

NGC's LAN-A-GEDDON - Greenville, TX  
www.networkgamingclub.com

**12.31.08**

LAN OC - Ohio City, OH  
lanoc.org

**01.01.09**

MAGFest 7 - Alexandria, VA  
magfest.org/index.php

**01.02.09**

North Bay LAN's - ON, Canada  
pc-solutionz.ca/lanparty/index.html

**01.17.09**

NGC's LAN-A-GEDDON - Greenville, TX  
www.networkgamingclub.com

Whempy's LAN Party - Columbus, OH  
whempyslan.org

**02.07.09**

Carolina Games Summit - North Carolina  
www.CarolinaGamesSummit.com

**02.17.08**

LAN OC - Ohio City, OH  
lanoc.org

**02.20.09**

AWOL LAN - Wisconsin  
www.awollan.com

**02.21.09**

NGC's LAN-A-GEDDON - Greenville, TX  
www.networkgamingclub.com

**03.01.09**

LANmaniac BYLOC LAN Party - Bellflower, CA  
www.lanmaniac.com

**03.21.08**

NGC's LAN-A-GEDDON - Greenville, TX  
www.networkgamingclub.com

**04.01.09**

Arkansas LAN - Arkansas  
www.arkansaslan.com/index.php

**04.17.08**

LAN OC - Ohio City, OH  
lanoc.org

For our full list of upcoming events,

visit our *CPU LAN Yard* page at

[www.computerpoweruser.com/LanYard](http://www.computerpoweruser.com/LanYard).

*CPU* magazine is where hardcore power  
users go for their monthly dose of the  
latest and greatest in extreme hardware

Would you like us to help promote your next LAN?

Drop us a line at **1.800.733.3809** or visit our LAN Yard site at [www.computerpoweruser.com/LanYard](http://www.computerpoweruser.com/LanYard)  
to input your own information and see your LAN party name in our upcoming issues.

We'll be glad to consider your event!

Out of the ordinary.

## EUROCOM D90xC PHANTOM X

The ultimate mobile workstation for graphics professionals, gamers, 3D modelers, CAD digital content creators, engineers, and anyone else who demands cutting-edge components and no-compromise performance.

"It's a server-calibre computer complete with UPS (uninterrupted power supply) in a 12-pound notebook form factor," says Eurocom President Mark Bialic. "This is one extremely fast notebook that offers server on-the-go capabilities."

Your choice of Intel Core 2 Extreme, Intel Core 2 Quad, or Quad Core Xeon processors

Upgradable VGA technology up to 2GB of video GDDR3 and Nvidia GeForce Go 9800M GTX or Quadro FX3700 in single or Dual/SLI configuration

Up to 1.5TB of hard drive space: Three 500GB SATA-300 (3Gb/sec) hard drives configured in RAID 0, 1, or 5

Available SSDs (Solid State Drives) for maximum performance—up to 250MB/sec sequential read/write speed with RAID 0 enabled

Up to 8GB of superfast DDR2-800 (PC2-6400)

**EUROCOM**

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

© 2008, Eurocom Corporation. All Rights Reserved. Legal Notices  
1-877-EUROCOM / (613) 224-6122 x 302 | [sales@eurocom.com](mailto:sales@eurocom.com)





## Q&A With Marc Davis

**M**arc Davis is the chief scientist of Yahoo! Connected Life and an expert on digital media. He has focused his research on the development of digital media systems that let consumers become media producers. Davis has conducted research at the MIT Media Lab, the UC Berkeley School of Information, and now at Yahoo!, which he joined in 2006. He is the director of “early stage products” and a social media guru. He recently talked about Blueprint, the development technology that Yahoo! spent five years creating for mobile phone application developers.

**Q** What are your plans for Blueprint?

**MD** What Yahoo! is about is enabling an ecosystem for billions of mobile users. That’s our mission. We look at the mobile industry as one of the largest Internet destinations with half a billion users. We see a world where there are 3.5 billion mobile phone users. By 2011, there will be 4 billion. Almost everyone who can have a phone in the world will have one. With that kind of access, we want to make it possible for people to have experiences on or off Yahoo! to be incredibly simple. We want developers to reach and monetize that audience. We solved for ourselves basic problems in mobile infrastructure. With Blueprint, which we just announced, it’s about solving key problems. It’s a platform for developers that allows them to describe an application using XML. That can be rendered in HTML, HTML Java, Series 60, or the iPhone. It’s not the same on every device. But it’s the same logical structure. It works using the best user interface available.

**Q** Is Blueprint aimed at smartphones?

**MD** It’s broader than that. We are intentionally going after broader

devices. Markets like the iPhone are interesting. We love them. But that’s less than 10 million people today. It’s about getting to billions of users. We are in 63 markets around the world. In the U.S., we think about the PC. But globally, for many people, the phone is the primary access to the Internet. We want to enable those consumers to use the power of the Internet in a simple way. And we want developers to reach them. Blueprint lets them describe the logical structure of a piece of code it can render in the browser or run natively in a client.

**Q** This sounds very complex.

**MD** If you think of all of the mobile devices in the world, there are so many devices. You have to do millions of versions of applications. You multiply it by the number of phones, number of carriers, types of software. We try to reach each of those devices in the best way. That’s the beauty of Blueprint. You write it once and have the best of every device.

**Q** Java was supposed to do that.

**MD** Java is different. It tries to do the same app everywhere. You write it once and supposedly it will run everywhere. Its model is different. A Java app says this will be exactly the same wherever it goes. Blueprint is different. It is written in XML. It’s different from HTML. HTML is just a formatting language. XML describes a logical structure of an application. With Blueprint, you use XML and X Forms to say this is how this thing should work and the structure of the interaction. We then render it specific to each environment. What J2ME tried to do was create the same user interface and same controls in all of those different environments. We created a logical structure of the app so it can be rendered effectively



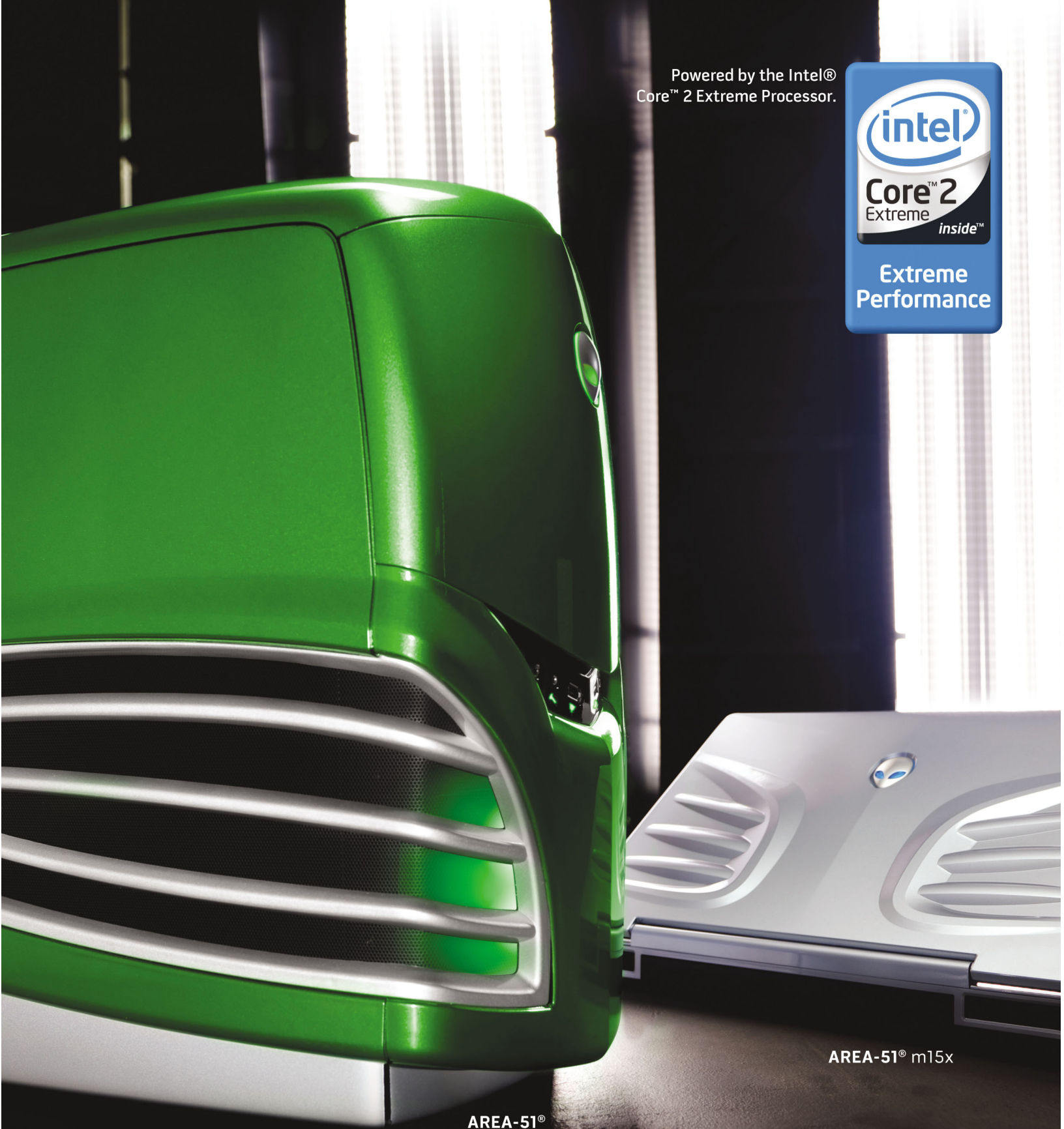
in each environment, not just in clients but also in browsers.

**Q** Why did you need to create Blueprint?

**MD** For reach. We had to do this in our own software to reach billions of people. We provide what we believe are the four core mobile services. The starting point is m.Yahoo.com. We have OneSearch, OneConnect, and OnePlace. We understand that consumers want access to content and services they want to use. Within Blueprint, we have third-party developers to get distribution through our network. We make development easy and fast. And we give them distribution. What will become possible is if I search for something, I will be able to get an application so that we are using our reach to get distribution to hundreds of millions of people. We are also solving monetization. To make an open mobile ecosystem work, you have to solve it. Because it’s open, people can use our monetization or use somebody else’s. ▲

Subscribers can go to [www.cpumag.com/cpudec08/davis](http://www.cpumag.com/cpudec08/davis) for bonus content.

Powered by the Intel®  
Core™ 2 Extreme Processor.



AREA-51®

AREA-51® m15x

## Did you Know?

The Alienware Area-51® m15x notebook features BinaryGFX so you can switch between onboard graphics for everyday tasks and throwing the hammer down with the pulse-pounding NVIDIA® GeForce® 8800M GTX. On the desktop front, the Area-51 comes equipped with dual ATI Radeon™ 4870 X2 quad-GPU graphics for the most intense gaming experience imaginable..

Nothing comes close. Learn more at:

[WWW.ALIENWARE.COM/CPU](http://WWW.ALIENWARE.COM/CPU)

1.800.ALIENWARE

Actual case may vary in design. Availability may change without notice. Alienware, Alienware Alien head logo and Area-51 are registered trademarks or trademarks of Alienware Corporation. Alienware can not be held responsible for errors in photography or typography. Intel, the Intel logo, Intel Core and Core Inside are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries. All other registered trademarks and trademarks are the property of their respective owners.







# PUT YOUR GAME FACE ON

**nia**  
neural impulse actuator

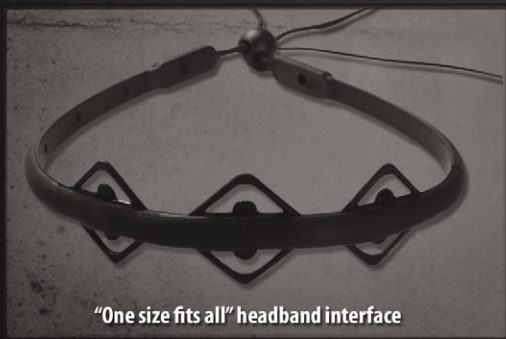
OCZ's Neural Impulse Actuator marks a new era in gaming. A pioneering foray that takes the first step toward total immersion into your gaming experience, the **nia** is compatible with any PC game — past, present or future — using keyboard input.

## PLAY GAMES USING BIOSIGNALS

Translate electrical potentials generated by your body directly into computer commands, creating a new way of playing your favorite game. Customize behavioral patterns of your character in your personal profiles and let your killer instincts take over.

## HONE YOUR REFLEXES

Where others have to practice reaction times, you can use reflex-based game play to get the better of your opponents by cutting your reaction time by 50%.



"One size fits all" headband interface

## BECOME YOUR CHARACTER

Streaming biopotentials into the computer and witnessing real-time feedback through the game will result in a novel way to experience something close to virtual reality

## POWERED BY USB

The **nia** powered directly by your PC via any USB 2.0 port

**OCZ**  
Technology  
www.ocztechnology.com

OCZ Technology Inc.  
860 E. Arques Ave.  
Sunnyvale, CA 94085 USA  
(408) 733-8400 Phone  
(408) 733-5200 Fax  
(408) 733-8400 Sales

AVAILABLE AT:

amazon.com  
amazon.com

ANTONLINE  
antonline.com

Buy.com  
buy.com

D&H  
dandh.com

eCOST  
ecost.com

MICRO CENTER  
microcenter.com

mwave.com  
mwave.com

NCIX.com  
ncix.com

newegg.com  
newegg.com

TigerDirect.com  
tigerdirect.com

Zip2Zoomfly  
zip2zoomfly.com