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STATION 6:
OORAH, STAFF SERGEANT
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Video, Audio, Photos & Games: This Chip Does It All

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Gaming PC Buyer's Guide

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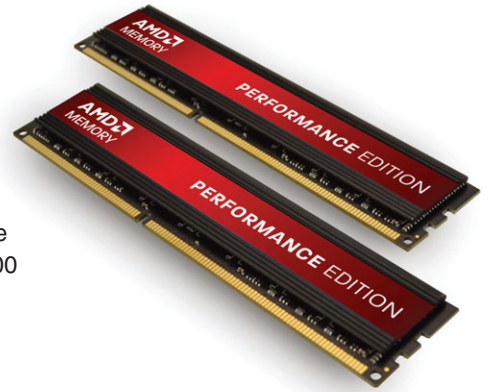
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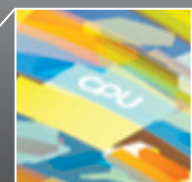
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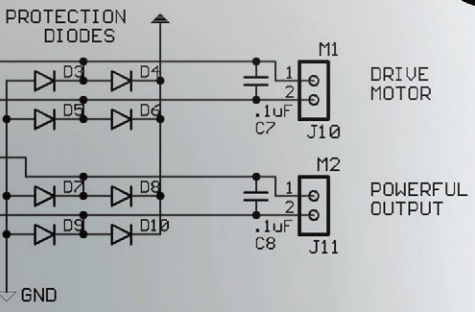
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Carbon Nanotubes Continue To Amaze

To paraphrase Ronald Joseph Aaron Burgundy, carbon nanotubes are kind of a big deal. Many believe these amazing bits of nanoscale tech hold the keys to future advancements in several scientific areas, and researchers at the University of Maryland recently found another reason why. As you know, the transistors that make up current CPUs are limited by how much heat they generate. This heat is the result of a phenomenon known as “Joule heating,” which occurs when electric current running through a metal wire causes electrons to bounce off of the atoms that make up the wire. These vibrations create heat, which is why you need a CPU cooler for your PC to run. But Kamal Baloch and John Cumings of the U of M’s A. James Clark School of Engineering have discovered that although carbon nanotubes conduct electricity like nanoscale metal wires, they do not manifest Joule heating. The nanotubes in their experiments stayed cool, causing the silicon nitride substrate beneath to heat up instead, possibly via electrical fields generated by the electrons travelling through the nanotubes. The research duo calls this “remote Joule heating” and suggests that it could change the way we think about building computers. “A transistor that doesn’t dissipate energy within itself as heat, like the nanotubes in our experiment, could be a game-changer,” Baloch says. “This new mechanism of thermal transport would allow you to engineer your thermal conductor and electrical conductor separately, choosing the best properties for each without requiring the two to be the same material occupying the same region of space.” ■

PNY Launches The XLR8 GeForce GTX 680

PNY’s XLR8-branded graphics card and memory products generally need no introduction, but PNY’s latest piece of XLR8 gear is based on NVIDIA’s GeForce GTX 680, a 28nm Kepler card that includes features such as GPU Boost (dynamic clock speed optimization), Adaptive Vertical Sync Mode (seamless behind-the-scenes vsync adjustment), Single GPU 3D Vision Surround, and so on. The XLR8 680 also comes with a very handy accessory: a PNY 16-foot Smart Active High Speed HDMI Cable, so you can hook your new 680 up to a monitor or an HDTV for 1080p gaming right out of the box. Like all of PNY’s XLR8 cards, the XLR8 GeForce GTX 680 comes with free 24-hour tech support and PNY’s standard one-year warranty, which you can extend to a Limited Lifetime Warranty by registering your card within 90 days of purchase at PNY.com. ■



WATCHING THE CHIPS FALL

Here is the pricing information for various AMD and Intel CPUs.

CPU	Released	Original Price	Last Month's Price	Online Retail Price*
AMD FX-8150 Black Edition Eight-Core	10/12/2011	\$245**	\$249.99	\$239.99
AMD FX-8120 Black Edition Eight-Core	10/12/2011	\$205**	\$189.99	\$189.99
AMD FX-6100 Black Edition Six-Core	10/12/2011	\$165**	\$149.99	\$149.99
AMD A8-3870K Black Edition Quad-Core	12/20/2011	\$135**	\$139.99	\$139.99
AMD A8-3850 Quad-Core	7/3/2011	\$135**	\$129.99	\$119.99
AMD A6-3670K Black Edition Quad-Core	12/20/2011	\$115**	\$109.99	\$119.99
AMD A6-3650 Quad-Core	7/3/2011	\$115**	\$109.99	\$109.99
AMD FX-4100 Quad-Core	10/12/2011	\$115**	\$109.99	\$109.99
Intel Core i7-3960X Extreme Edition	11/14/2011	\$990**	\$1,049.99	\$1,039.99
Intel Core i7-990X Extreme Edition	2/14/2011	\$999**	\$1,029.99	\$1,029.99
Intel Core i7-3930K	11/14/2011	\$555**	\$599.99	\$599.99
Intel Core i7-2700K	10/24/2011	\$332**	\$339.99	\$339.99
Intel Core i7-2600K	1/9/2011	\$317**	\$324.99	\$319.99
Intel Core i7-2600	1/9/2011	\$294**	\$299.99	\$299.99
Intel Core i7-3820	2/13/2012	\$285**	\$319.99	\$309.99
Intel Core i5-2550K	2/8/2012	\$225**	\$229.99	\$229.99
Intel Core i5-2500K	1/9/2011	\$216**	\$224.99	\$219.99
Intel Core i5-2500	1/9/2011	\$205**	\$209.99	\$209.99
Intel Core i3-2130	9/4/2011	\$138**	\$149.99	\$149.99
Intel Core i3-2120	2/20/2011	\$138**	\$127.99	\$127.99

* As of April 2012

** Manufacturer's estimated price per 1,000

Corsair Adds Cases To Its Vengeance Line

Corsair's Vengeance line of gaming products started with Vengeance memory kits and then expanded to include Vengeance-brand mice, keyboards, and headsets. Now there's a new member of the family: the Vengeance C70 gaming PC case. The C70 is a midtower that Corsair designed especially for gamers who occasionally (or frequently, as the case may be) haul their PCs to LAN parties and the like: Its steel construction and built-in carry handles mean you can move it easily and without worrying for the safety of your expensive components. Corsair built it for maximum airflow (it comes with three 120mm fans and has mounts for a total of 10 fans altogether), and its side panels are equipped with quick-release latches for easy access when adding, swapping, or readjusting hardware. Speaking of hardware, the C70 has eight expansion slots (quad GPUs, anyone?), room for



long graphics cards, tool-less drive bays that you can pull out if you want, and room enough for two 240mm radiators. You can get the C70 in one of three colors (Arctic White, Gunmetal Black, and Military Green) at an MSRP of \$139.99. ■

Put The Ninja Cloud To Work For You



Lots of interesting projects have hit their funding goals and become reality thanks to the Kickstarter microfunding site, and one of the coolest gadgets we've seen is the Ninja Block (ninjablocks.com). Ninja Blocks are tiny, web-connected

devices that contain an assortment of sensors and take simple commands from you to carry out very specific functions. For example, the company's site says, you can tell your Ninja Block to take a picture of your front lawn and save it to Dropbox when it detects movement there. Or, you can have it send a notification to your phone when your UPS or FedEx guy leaves a package at your door. Want to know when people from your Friends List are on Xbox Live or Steam? A Ninja Block can detect such status reports and let you know. A standard Ninja Block comes with an Ethernet port and built-in accelerometer and thermometer; you can order such extras as a webcam, Wi-Fi, and sensors for light, humidity, distance, and motion on the site, thereby making your Ninja Block exponentially more useful. Either way, you can start dreaming up tasks for your Ninja Block to solve right out of the box, and the Ninja Block's easy-to-use web browser interface and powerful open-source software will do the rest. ■

MSI Unveils Trio Of Power Edition Radeon Cards



MSI recently announced that it had three new additions to its Radeon HD video card line: the R7850 Power Edition 2GD5/OC, the R7770 Power Edition 1GD5/OC, and the R7750 Power Edition 1GD5/OC. As you probably noticed, the phrase "Power Edition" is a recurring theme here; these cards are all equipped to handle considerable overclocking via MSI's Afterburner performance app. Using Afterburner's Triple Overvoltage setting, the new MSI Radeons will provide up to 45% boosts to performance. The cards also come with advanced cooling features such as MSI's Dust Removal Technology, which runs fans backward for 30 seconds on boot up to clear dust from the fan blades. The R7850 Power Edition incorporates a custom Twin Frozr IV cooler, while the R7770 and R7750 are the first cards to feature MSI's TransThermal design, which lets you add a second fan to the card's standard single Propeller Blade fan for increased airflow and lower temperatures. All three cards boast MSI's Military Class III components, which meet MIL-STD-810G military specs. No pricing info was available at press time. ■

TRENDnet Is In Ur Electrics

TRENDnet has been banging the gong for Powerline networking for many years now, and with good reason. Powerline connections are a godsend for lots of people for whom Wi-Fi just won't get it done thanks to too much neighborhood interference, structural issues, or other problems. And now TRENDnet has launched a Powerline adapter with a top end speed of 500Mbps; this bad boy will deliver your packets anywhere in your house where there's an outlet, and at blistering speeds. The TPL-405E has an MSRP of \$109.99, and is especially adept at enabling high-speed video

streaming throughout your domicile. It comes equipped with four Gigabit Ethernet ports and LED displays that provide activity and troubleshooting information. The adaptor is, of course, always on, but it has a power-saving mode that lets it lower power use by as much as 70% when not in use. The TPL-405E is backed by TRENDnet's limited three-year warranty. ■



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Hardware Mole



Enermax OSTROG The Most Case Ever For Under 40 Bucks?

We're not sure as of yet, but the company's newest midtower, the OSTROG 3250, has an MSRP of \$39.99 and comes with internal USB 3.0 header support, tool-less drive bays, up to 174mm clearance for a CPU cooler,

and (if you remove the upper of two hard drive cages) more than 16 inches of horizontal clearance for high-end graphics cards. The case has a nice flat black finish that extends throughout its interior, and comes in four variants, each with a different color of mesh running along the front panel's bezel—this comes in white, black, red, or blue. The OSTROG 3250 also comes with a CPU cutout and cable management features built into its motherboard tray, a PSU mount with vibration-dampening rubber pads and a removable dust filter, mounts for as many as seven fans (one 120mm rear fan is included), and support for ATX and Micro ATX boards. ■



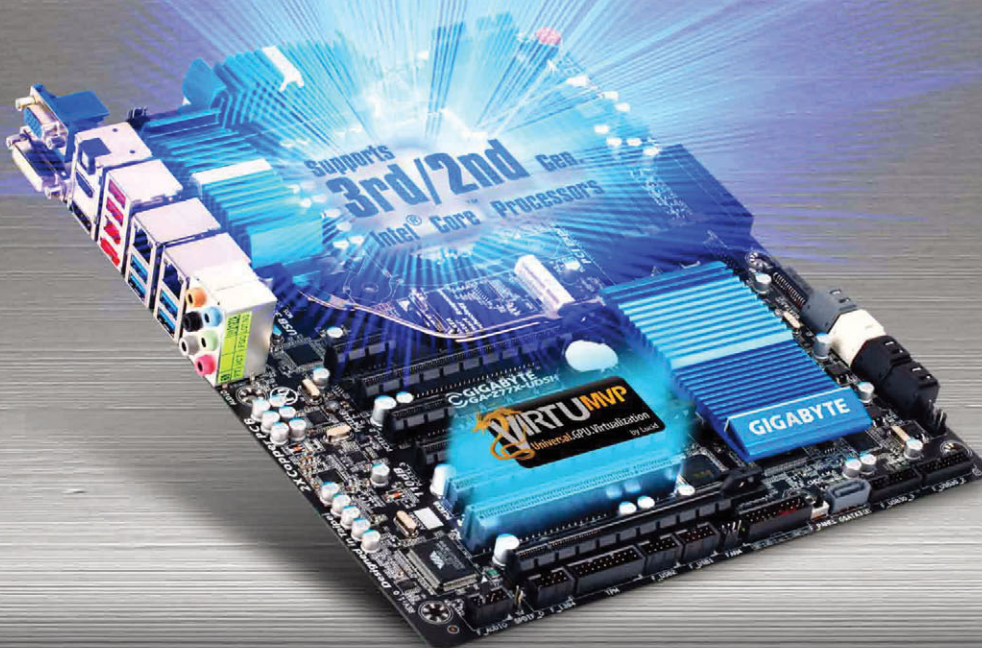
Cooler Master Adds New & Improved Sentinel To Its CM Storm Line

The latest CM Storm mouse from Cooler Master may look similar to the Sentinel Advance, but a quick look under the hood shows that appearances can be deceiving. Where the original Sentinel Advance maxed out at 5600dpi (which is nothing to sneeze at), the CM Storm Sentinel Advance II is equipped with the newest Avago sensor available (the ADNS-9800) and can track from 200 to 8,200dpi. (You can adjust resolution on the fly in 200dpi increments as needed.) The Sentinel Advance II also weighs a hair less than its predecessor at just under a third of a pound, but includes the same weight fine-tuning options via its five 4.5g removable weights. It also provides similar customization options via the programmable multicolor LED inside the case and behind the scroll wheel. The mouse's onboard Sentinel-X 128KB memory lets you store your profiles and macros, and the eight programmable buttons can provide functionality of up to nine more virtual buttons using various combinations. ■

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*PCIe Gen. 3 & DX 11 are dependent on CPU and expansion card compatibility.
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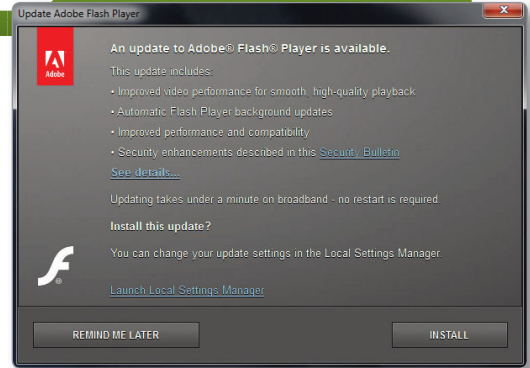
Windows 8 To Come In Just Four Versions

Microsoft's Brandon LeBlanc posted on his Windows blog on April 16 that Windows 8 will come in four versions, a nice change from previous releases that included as many as six. These will include Windows 8, Windows 8 Pro, Windows 8 RT, and Windows 8 Enterprise. Windows 8 and Windows 8 Pro, LeBlanc wrote, will be the primary consumer versions of the OS, designed to run on "PCs and tablets powered by x86 processors (both 32- and 64-bit) . . ." Pro will improve on the vanilla offering by adding enhanced features for enthusiasts and business and tech professionals, such as encryption, virtualization, and network management. Windows 8 Pro will also come with an "economical" option to add Windows Media Center. Windows RT (aka Windows on ARM, or WOA) will not be a retail package but will be preinstalled on ARM-based devices and will include special "touch-optimized" versions of the key Office apps. Windows Enterprise will be Win8 Pro plus additional IT management and security features. Oh yeah—LeBlanc also officially confirmed that "Windows 8" will be the new OS' name. (No word at press time on pricing or availability.) ■



Flash Player Updates, Malware & You

If you've gotten to the point where you click through the frequent dialogs prompting you to update Adobe's ubiquitous, handy Flash Player plug-in without even stopping to glance at them, you're not alone. We've done it plenty of times, and we wouldn't be surprised to learn that most people do this almost reflexively. That's why the Flash Player update dialogs are a perfect tool for social engineers to exploit so they can load up your machine with malware. The recent spate of Flashback infections on Macs should serve as a reminder to PC and Mac users alike that it's best to view such update reminders with a critical eye, especially if they appear just as you're clicking a tantalizing link from your favorite social networking site, as happened to many folks back in 2008. Adobe's site offers direct downloads of the most current version of Flash Player, Acrobat Reader, and so on, so if you're ever unsure about the validity of a prompt to update, disallow the update and visit Adobe.com to see whether you have the current version. If not, download it from the source. ■



Software Shorts

NCSOFT Offering Early Guild Wars 2 Access With Pre-purchase

Anyone who's ever been involved with an MMO knows that one of the biggest challenges can be coming up with cool character and guild names that haven't been taken. (We're looking at you, xXLegolas24Xx.) That's why one of the coolest perks tied to a pre-purchase of NCSOFT's upcoming Guild Wars 2, aside from access to all beta weekend events (starting on April 10 and running up to the launch in June), is a three-day head start. That's right, if you purchase the game now at buy.guildwars2.com or a participating retailer, you get to jump into the GW2 world three full days ahead of the general, non-preordering public, which in turn means that you have a much better chance to stake your claim to the character and guild names that you fancy than if you wait and take your chances post-launch. The pre-purchase program includes three options: the \$59.99 Digital Edition, which is a download of



the standard game; the \$79.99 Digital Deluxe Edition, which includes a number of in-game bonuses; and the \$149.99 Collector's Edition, which includes all of the Digital Deluxe Edition stuff plus a 10-inch Rytlock figurine, five prints and an art portfolio along with a custom art frame, and a Best of Guild Wars 2 soundtrack CD. ■

One In Five Adults Not Online

The Pew Internet & American Life Project began tracking Internet usage statistics in 2000, and at the time the organization found that there were several factors that clearly correlated with whether people were online. Age, race, household income, education, and other factors were pretty solid predictors of a survey respondent's likely Internet use. Some of those factors are still in play, although some, like race, have become less effective as predictors. In a survey of 2,260 U.S. adults (age 18



and up), Pew found that senior citizens, survey respondents who preferred to take the survey in Spanish rather than English, adults with less than a high school education, and respondents from households with less than \$30,000 annual incomes were the least likely to have Internet access. In many cases, however, Pew found that limited access was less of an issue than perceived relevance. Half of those surveyed who indicated they don't use the Internet said they weren't interested because they didn't think the Internet was relevant to them. (For some perspective, it's important to note that the majority of those respondents also told Pew that they had never used the Internet.) ■



Google Drive Takes A Bow

Have you ever used Google Docs or Picasa to store your stuff in “the cloud”? Have you ever used an online file storage/sharing/synchronization service like Dropbox? If you said yes to either or both of these questions, you might be interested to know that Google launched its new Google Drive service just a few days before this issue went to press. Google Drive makes it easy to access your files from any Internet-connected device; just drag and drop your files into the Google Drive folder created when you install the client, and those files are instantly available and up-to-date. Google gives you 5GB of storage space gratis. For those of you who require more, you can pony up \$2.49 per month and bump your Drive real estate up to 25GB, \$4.99 per month for 100GB, or \$49.99 per month for 1TB. As with any online storage service, it's a good idea to check the terms of service before you sign up so you'll know what sort of files you feel comfortable storing there. ■

Site Seeing

Surf TV On Boxfish

We've all grown accustomed to amazing web search technology that can help us find mentions of people, places, and things, from weighty, mainstream topics like Brangelina to more obscure things like, you know, Chicago Cubs World Series victories. Wouldn't it be great if there were a similar search engine for TV so you could find references to specific things and people in real time? That's what the folks behind the Boxfish beta site thought (beta.boxfish.com), and now there is. You can enter a search word or phrase on Boxfish and it will quickly retrieve a list of current, appropriate references, including the network and show where the reference has occurred. You're probably thinking, “What manner of devilry is this?” Actually, it's quite simple, but then most really good ideas



are. Boxfish grabs close captioning streams from all over TV land and scans it for your search. Now you're wondering why you never thought of this, and we have no answer for that. ■

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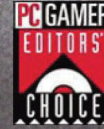
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- ✦ Gigabyte® X79-UD3 USB3.0 & SATA III
- ✦ Corsair® 16GB-DDR3 1600 Mhz Quad Channel Memory
- ✦ 2TB SATA III 7200RPM HD 64MB Cache
- ✦ Nvidia® Geforce® GTX 680 2GB Direct X 11 Video
- ✦ NZXT Switch 810 Full Tower Case 800 Watt Power
- ✦ **Asetek Liquid Cooling System**



Intel® Core™ i7 Processor

i7	i7 3960X Extreme 3.33Ghz	\$ 2519
	i7 3930K 3.20Ghz	\$ 2039
	i7 3820 3.60Ghz	\$ 1739

From **\$1739**

Nvidia® 3D Vision Glass and LCD + \$499



GAMER XTREME 2000

INTEL® CORE™ i7 PROCESSOR

Genuine Microsoft™ Windows® 7 Home Premium 64-bit Edition Service Pack 1

- ✦ Gigabyte® GA-Z77-D3H Mainboard w/ USB 3.0 & SATA 6
- ✦ Corsair® 8GB DDR3 1600 Mhz Dual Channel Memory
- ✦ 1TB SATA III 7200 RPM HD 32MB Cache
- ✦ AMD Radeon™ 6850 1GB Direct X 11 Video Card
- ✦ Thermaltake Commander Gaming Tower Case 700 Watt Power
- ✦ **Asetek Liquid Cooling System**

i7	Intel® Core™ i7 Processor	
	i7-3770K 3.50Ghz	\$ 959
	i7-3770 3.40Ghz	\$ 925

i5	i5-3570K 3.40Ghz	\$ 855
	i5-3550 3.30Ghz	\$ 829
	i5-3450 3.10Ghz	\$ 815

From **\$815**



GAMER XTREME 3000

INTEL® CORE™ i7 PROCESSOR

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- ✦ Gigabyte® GA-Z77-D3H Mainboard w/ USB 3.0 & SATA 6
- ✦ Corsair® 16GB DDR3 1600 Mhz Dual Channel Memory
- ✦ 2TB SATAIII 7200 RPM HD 64MB Cache
- ✦ Nvidia® Geforce® GTX 560 2GB Direct X 11 Video Card
- ✦ CoolerMaster HAF 912 Gaming Tower Case 700 Watt Power
- ✦ **Asetek Liquid Cooling System**

i7	Intel® Core™ i7 Processor	
	i7-3770K 3.50Ghz	\$ 1179
	i7-3770 3.40Ghz	\$ 1139

i5	i5-3570 3.40Ghz	\$ 1075
	i5-3550 3.30Ghz	\$ 1049
	i5-3450 3.10Ghz	\$ 1035

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Intel® HM67 Chipset
802.11 B/G/N Wireless Network

GAMER XPLOER X6-9250

INTEL® CORE™ i7 2670QM PROCESSOR

Genuine Microsoft™ Windows® 7 Home Premium 64-bit Edition Service Pack 1

- ✦ 8GB DDR3 PC1333 Memory
- ✦ 500GB SATAIII Hard Drive
- ✦ 15.6" Full HD 1920 X 1080
- ✦ Nvidia® Geforce® 540M 2GB Direct X 11 Video Card
- ✦ 1000/100/10 Network Card
- ✦ Free Carrying Case

i7	Intel® Core™ i7 Processor	
	2960XM	\$ 1769
	2860QM	\$ 1229
	2760QM	\$ 1029
i5	2670QM	\$ 885
	2430M	\$ 819
i3	2350M	\$ 785

From **\$785**



Intel® HM67 Chipset
802.11 B/G/N Wireless Network

GAMER XPLOER X6-9450

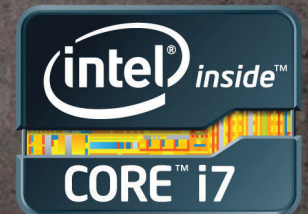
INTEL® CORE™ i7 2670QM PROCESSOR

Genuine Microsoft™ Windows® 7 Home Premium 64-bit Edition Service Pack 1

- ✦ 8GB DDR3 PC1333 Memory
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- ✦ 15.6" Full HD 1920 X 1080
- ✦ Nvidia® Geforce® 560M 1.5GB Direct X 11 Video Card
- ✦ 1000/100/10 Network Card
- ✦ Free Carrying Case

i7	Intel® Core™ i7 Processor	
	2960XM	\$ 2219
	2860QM	\$ 1669
	2760QM	\$ 1469
i5	2670QM	\$ 1329
	2430M	\$ 1259
i3	2350M	\$ 1229

From **\$1229**



KaPow!

FRONTSIDE
DIGITAL ECONOMY

Job Of The Month

The comics industry is in peril. Print sales have been in decline for years. Comic book shops are an endangered species. Are you the digital superhero who can help the industry migrate to a new age of apps, tablet and smartphone editions, and interactive comics before it's too late? Marvel Entertainment (yes, the company behind "The Avengers") needs a Web Application Developer who can help it craft web and mobile experiences from its many comics and character franchises. You will be working with the guys who make the comics and who generate new generations of apps. Marvel recently introduced comics that trigger augmented-reality enhancements on smartphones and apps that animate the comics narrative. To do your part in making a post-print future for comics, you will need five years of experience with web services like SOAP and with the PHP and LAMP environments. And you should know what it means to make digital services millions of people use each month. Yup, the print experience may be on the wane, but mobs of fan boys are flocking to new digital experiences. Excelsior!

BAMM!!!

bit.ly/bxfpvJ



Turning On The Second Screen

According to a recent survey conducted by Nielsen, about 88% of tablet owners report using their devices while watching TV in the last month, while 86% of smartphone owners say they are consulting the "second screen" during TV time.

Frequency	Tablets	Smartphones
Several Times A Day	26%	27%
Once a Day	19%	14%
Several Times A Week	24%	23%
Several Times A Month	13%	13%
Once a Month Or Less	7%	9%
Never	12%	14%

If An Employer Asked You For Your Social Media Passwords, What Would You Do?

Following reports that some prospective employers were asking applicants for access to their social profiles, American Pulse asked more than 3,500 survey panelists how they would react.

22.2%	I do not use a social network
40.2%	Quit/withdraw my application and find a different job
10.9%	Hand them over – I need the job
10.5%	Edit my social media profiles first, then hand over my passwords
16.1%	Delete my social media pages

RAW Numbers

21%

Percent of Americans who have read an e-book in the last year
(Pew Internet & American Life Project)

32.3%

Percent of mobile customers playing mobile games
(comScore)

66%

Percent of people under age 30 who access their email on mobile phones
(Constant Contact)

55 MILLION

Number of U.S. households that own at least one Apple product
(CNBC)



E-Book Reading Escalates Sharply in Two Years

The proliferation of dedicated e-ink book readers and now multipurpose tablets has had a profound effect on reading habits, according to a Pew Internet & American Life Project study. As of late 2011, 84% of those who had read a book "yesterday" when asked are using print books while 15% are using an e-book, up from 95% using print and only 4% on e-books in June 2010.

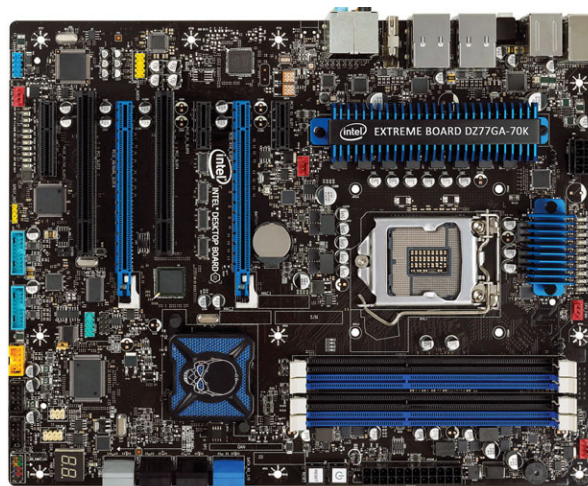
Panther Point Meets Ivy Bridge

A Bevy Of Z77 Motherboards, Raced & Paced

The Z77 chipset is Intel's update of the Z68 platform, so the target audience includes both mainstream users and performance enthusiasts. Key technology upgrades in the Z77 chipset, compared to its Z68 predecessor, include standard support for Intel's Rapid Start and Smart Connect technologies. Rapid Start is a feature that captures a snapshot of your PC's open apps and saves the data to an SSD (or flash memory), which allows you to suspend the computer at nearly zero power. When you wake the system, Intel indicates that the snapshot will let you return to work after only five seconds. Smart Connect is somewhat similar in that it can update web-based content (including email, social media, and cloud services) while the system is asleep, meaning everything's current when you resume your system.

Architecture Upgrades

The Z77 chipset, code-named Panther Point, features an Intel LGA1155 socket and provides support for both Sandy Bridge and Ivy Bridge processors. Like its Z68 predecessor, the Z77 chipset allows for CPU overclocking and supports Intel Turbo Boost and Hyper-Threading. Dedicated graphics capabilities are the same as Z68, with 16 PCI-E 3.0 graphics lanes; Intel updated the Z77 to use a PCI-E 3.0 interface rather than the Z68's PCI-E 2.0 interface. Dual-GPU setups will split into two x8 PCI-E lanes, and a triple-GPU system will split one of those x8 connections to two x4 connections.



DZ77GA-70K
\$240 | Intel
www.intel.com

Of course, the Z77 also supports the new HD Graphics 4000 found in several of Intel's Ivy Bridge CPUs. A step up, naturally, from HD Graphics 3000, this latest on-chip GPU operates at a maximum frequency of 1,350MHz and supports DirectX 11. Intel also indicates that its 3rd Generation processors support the spanning of your Windows Desktop across up to three displays.

Panther Point also provides you with built-in USB 3.0 connectivity, which wasn't found on the Z68 chipset. Z77 natively offers four USB 3.0 ports and 10 USB 2.0 ports. In our roundup, we found that most vendors opted to install third-party USB 3.0 ports, as well as front-panel headers, to give you more ways to connect USB 3.0 devices. The stock Z77 configuration features two 6Gbps SATA ports and four 3Gbps

SATA ports. Here again, most vendors also added a couple extra 6Gbps SATA connectors. In terms of memory, standard Z77 chipsets will support DDR3 modules up to 1,600MHz, and it operates dual-channel configurations, rather than the quad-channel setup found in Intel's X79 chipset. 3rd Generation Intel Core i7/i5 processors can utilize Intel new XMP 1.3 profiles for a quick way to bring the RAM up to its rated performance.

Overall, the Z77 chipset offers a number of incremental upgrades and a few new features, which make it a good choice for those who want a motherboard to take full advantage of their Ivy Bridge processor. In our roundup, we'll examine the different additions that each vendor has provided to enhance the Z77 chipset. For instance, nearly all vendors added LucidLogix Virtu MVP Technology,

which essentially utilizes the processor's integrated GPU to remove redundant rendering from your dedicated GPU.

As always, we put the various Z77 motherboard through our collection of rigorous benchmarks. Our test system consisted of an Intel Core i7-3770K processor, Thermaltake's Frio CPU cooler, two ZOTAC GeForce GTX 580s, 16GB of G.Skill Ripjaws memory (DDR3-1600MHz), and a 128GB Crucial RealSSD C300—all of which were housed in Corsair's Graphite Series 600T.

Intel DZ77GA-70K

This is Intel's newest Extreme Series motherboard. The DZ77GA-70K includes all kinds of extra goodies, including a Bluetooth receiver, Wi-Fi adapter, and USB 3.0 front-panel module. With the DZ77GA-70K, Intel also has introduced a new version of its Visual BIOS that is designed to let you more quickly configure speeds for your processor, memory, and graphics.

The DZ77GA-70K's rear I/O panel provides you with four USB 3.0 ports, four USB 2.0 ports, and one 6Gbps eSATA port. We'll note that the 6Gbps eSATA port was a rarity among the boards we tested. Another helpful feature are the two fast charging (yellow ports) USB 2.0 ports, which is perfect for connecting and charging peripherals such as a smartphone or tablet. Compared to other Z77 boards, there are fewer video outputs (only an HDMI port), but we suspect most DZ77GA-70K buyers will plan on investing in a dedicated graphics card, anyway.

Speaking of graphics, the DZ77GA-70K offers two PCI-E 3.0 x16 slots. You'll also find two PCI-E 2.0 x1 slots (located above and below the top PCI-E x16 slot), two legacy PCI slots (located above and below the second PCI-E x16 slot), and one PCI-E 2.0 x4 slot found at the bottom of the board. The spacing of the slots makes it convenient for those with add-in cards



GA-Z77X-UD3H

\$169.99

GIGABYTE

www.gigabyte.us

that use the PCI-E x1 or PCI slots, because you'll have room to install them around the graphics cards. Intel also offers a variety of I/O headers along the bottom of the motherboard. There are two USB 3.0 headers, three USB 2.0 headers, a FireWire header, and an S/PDIF header.

To handle your SATA devices, the DZ77GA-70K provides you with four 6Gbps SATA ports and four 3Gbps SATA ports. The four 3Gbps SATA ports are sandwiched between the 6Gbps SATA ports. Another thing we like about the design of Intel's DZ77GA-70K are the four fan power connectors, which are well-spaced around the motherboard. Intel's benchmarks were similar to all of the others in our roundup, but what really sets this board apart is the well thought-out design and variety of extra features and I/O options provided.

GIGABYTE GA-Z77X-UD3H

With the GA-Z77X-UD3H, GIGABYTE includes an mSATA slot where you can install a low-capacity SSD that can work with Intel's Smart Response and Intel's Rapid Start technologies to improve your PC's responsiveness. GIGABYTE also indicates that the GA-Z77X-UD3H offers a completely digital PWM controller, which is designed to

deliver precise levels of power to your CPU, VTT, processor graphics, and memory. The digital controller array also works with GIGABYTE's 3D Power Utility that gives you control over things like OVP (overvoltage protection) and PWM frequencies.

The rear I/O panel of the GA-Z77X-UD3H provides you with six USB 3.0 ports and two 6Gbps eSATA ports, so you'll have a number of fast transfer options. Video outputs for the processor graphics include HDMI, DisplayPort, DVI, and VGA. The GA-Z77X-UD3H supports 7.1-channel surround sound, and with built-in HDMI, S/PDIF, and DisplayPort connections, there are plenty of ways to get it to your surround-sound system. For internal headers, you'll find a USB 3.0 header, two USB 2.0 headers, and a TPM (Trusted Platform Module) header, which can store cryptography keys. There are six SATA ports, and the top two provide you with 6Gbps speeds. We'll note that if you choose to add a mini PCI-E SSD to the mSATA port, the board will shut off the 3Gbps port 5.

GIGABYTE lays out the board with overclockers in mind. Onboard voltage read points let you see real-time power readings, and onboard power and reset buttons provide you with quick power

REDEFINING STORAGE PERFORMANCE FOR THE **4**TH TIME.

Ver-tex (vur-tek(s)): noun, singular.

- 1.) The highest point
- 2.) Anatomy: the crown of the head
- 3.) Astronomy: a point in the sky towards which a star stream appears to move
- 4.) Computer Technology:
 - a. the pinnacle of storage performance: *Vertex offers a superior computing experience.*
 - b. continually sets the bar for SSDs each year
 - c. the culmination of SSD expertise, obsession, and evolution
 - d. does not follow the lead of another to obtain greatness; trailblazer



Four years in the making, the OCZ Vertex 4 Solid State Drive Series redefines the modern day computing experience with enhanced performance and endurance. Ingeniously engineered to deliver industry-leading file transfer rates and superior system responsiveness, the fourth generation Vertex Series was designed to unleash ultimate productivity, gaming, and multimedia applications like no other storage solution.



Industry's highest IO performance with up to 120,000 IOPS



Advanced suite of flash management to increase durability and reliability.



Better multitasking and all-round performance with no-compression related limitations.



Fast boot times and ultra-low latency



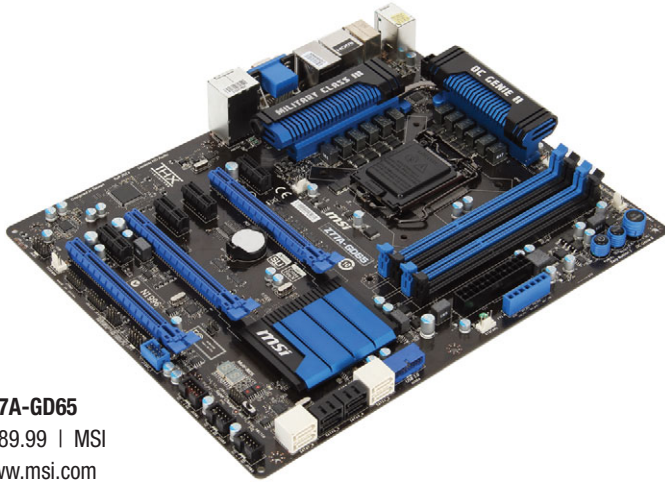
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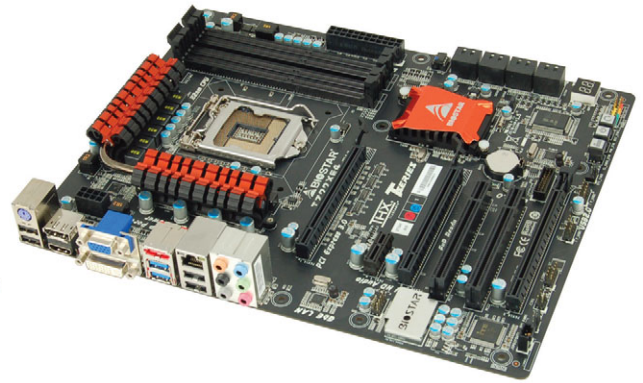
the SSD experts!

AVAILABLE AT





Z77A-GD65
\$189.99 | MSI
www.msi.com



TZ77XE4
\$169.99 | BIOSTAR
www.biostar-usa.com

controls. An LED display shows you debug codes when something goes wrong. Performance enthusiasts will also like that the GA-Z77X-UD3H supports DDR3 memory up to 2,666MHz and Intel XMP memory profiles. Other key features of the Z77X-UD3H include support for Lucid's Virtu GPU virtualization technology, a LAN optimizer software app to prioritize network traffic, and a PCI-E x4 connection (using an x16 physical slot) at the bottom of the board.

The GA-Z77X-UD3H posted the highest marks in SiSoftware Sandra 2012's Processor Arithmetic and Processor Multimedia tests. The rest of the scores were all in line with the rest of the motherboards in the roundup. Overall, we like the board layout of the GA-Z77X-UD3H, especially the inclusion of the mSATA port. Those who want a convenient way to utilize Intel's Smart Response and Rapid Start technologies should definitely check out this motherboard.

MSI Z77A-GD65

MSI's newest Z77-based motherboard, like many of MSI's boards, is built using MSI's Military Class III components for the capacitors and chokes. MSI indicates that all Military Class III components have passed the MIL-STD-810G certification. Just a few

highlights found on the Z77A-GD65 include support for up to 32GB of DDR3-2800, three PCI-E x16 slots (which run at x8/x4/x4 speeds when all filled), and eight SATA connectors (four 6Gbps and four 3Gbps).

On the rear I/O panel of the Z77A-GD65, you'll have access to two USB 3.0 ports and four USB 2.0 ports, as well as audio outputs for coaxial S/PDIF, optical S/PDIF, and analog ports—all of which support up to 7.1-channel surround sound. Internally, the Z77A-GD65 offers you three USB 2.0 headers, a USB 3.0 header, and a TMP Module header. There's also a voice control module header that you can use with the optional MSI Voice Genie for voice commands to boot up your PC, as well as other functions.

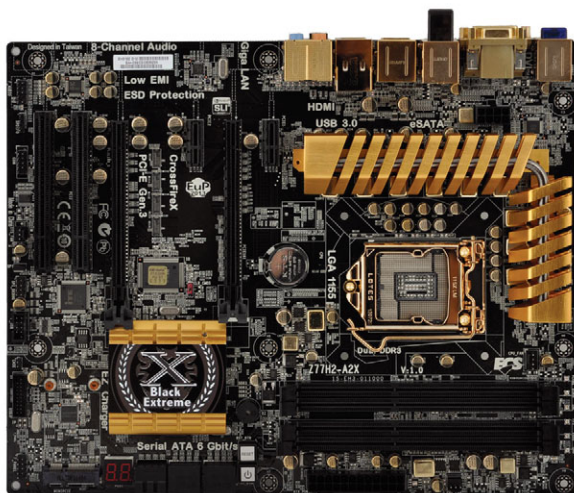
Overclockers' needs are also covered with the Z77A-GD65. MSI provides you with a multi-BIOS switch that allows you to shift from one BIOS to another prior to boot-up. You can also update each BIOS independently. There are LED status indicators for the CPU power phases, and a DrMOS alarm that will turn red when the motherboard is about to overheat. Along the right side of the board, MSI has installed voltage checkpoints where you can measure system voltages for the CPU, memory, and the platform controller hub.

MSI provides you with lots of bundled software, including Lucid's Virtu MVP and THX TruStudio PRO. MSI exclusives include OC Genie II (to access overclocking settings in Windows), MSI Super Charger (lets you boost power to USB ports for quick charging of tablets and smartphones), MSI M-Flash (lets you save BIOS data to a USB flash drive), and 3TB+ Infinity (support for 3TB hard drives). MSI's benchmark results were similar to the rest of the competition, but we'll note that they had the second highest marks in several tests, including 3DMark 11, PCMark 7, Cinebench 11.5, and POV-Ray Beta 3.7.

The Z77A-GD65 is a wise choice for builders who plan on using their PC as an entertainment center, as it offers both coaxial and optical S/PDIF, as well as an HDMI output. It's also a good option for overclockers, with its voltage checkpoints, status indicators, and support for RAM speeds up to 2,800MHz.

BIOSTAR TZ77XE4

BIOSTAR's TZ77XE4 offers three PCI-E x16 slots, and the top two will run at x8 with graphics cards installed in both. The third PCI-E x16 slot is located at the bottom of the motherboard and maxes out at x4. BIOSTAR also offers you two standard PCI slots for compatibility with legacy

**Z77H2-A2X**

\$220 | ECS

www.ecsusa.com

would go nicely with some understated interior lightning. ECS also includes lots of other bells and whistles with the Z77H2-A2X.

Starting at the rear I/O ports, you'll find built-in Bluetooth (2.1+EDR) and Wi-Fi (802.11b/g/n), so you won't need to install wireless add-in cards to your system for wireless access. In terms of video outputs, there are VGA, DVI, and HDMI ports. The Z77H2-A2X offers four rear USB 3.0 ports, four USB 2.0 ports, and a 3Gbps eSATA port. You can add an additional two USB 3.0 ports through the front panel/rear panel USB 3.0 header, while the USB 2.0 header can provide power and connectivity to two more USB 2.0 ports. For extra audio connectivity, you'll find both a front panel audio header and a S/PDIF output header. To connect your SATA devices, you'll find six SATA ports—four 6Gbps and two 3Gbps.

The Z77H2-A2X offers several options for add-in cards. For graphics cards, there are two PCI-E 3.0 x16 slots, which support two cards running at x8 speeds. You'll also find two PCI-E 2.0 x1 slots, two standard PCI slots, and a mini PCI-E x1 slot. LucidLogix's Virtu MVP lets the motherboard utilize the power of Intel's integrated graphics with a discrete video card. ECS provides support for 32GB of DDR3 memory that can be clocked up to 2,800MHz. Motherboard cooling is provided through ECS's Qooltech IV—three copper heatpipes that pull heat away from the chipset.

In our benchmarks, the ECS Z77H2-A2X was able to post the highest scores in SiSoftware Sandra's Memory Bandwidth test, and all of the other tests were within a few points of the rest of the group. Overall, we like the gold accents and like that ECS was able to include Wi-Fi, Bluetooth, and a variety of different slots for add-in cards. It's a good choice for enthusiasts who want a board that provides them with lots of different options for their component choices.

add-in cards. Those planning on utilizing the CPU's built-in graphics will like that the TZ77XE4 includes outputs for HDMI, DisplayPort, DVI, and VGA, so you shouldn't have to mess around with an adapter to connect this motherboard to your monitor. We also like that the TZ77XE4 supports RAM speeds up to 2,600MHz, so it can handle high-performance memory overlocks.

In terms of extra USB connectivity, BIOSTAR has added one USB 3.0 and two USB 2.0 headers, and the TZ77XE4 includes a USB front-panel bay, as well as a blanking plate for the rear panel if you don't have space on your case's front panel. There are four 6Gbps SATA ports and four 3Gbps SATA ports. All the SATA outputs are oriented with the connectors facing to the right side of the motherboard. SATA ports 1 through 6 support RAID 0/1/5/10 and Intel's Smart Response Technology. Below the SATA ports, you'll find a BIOS POST Code indicator and onboard buttons for clear CMOS, power, and reset. Board layout is fairly standard, with the exception of the second system fan connector that's found along the bottom of the motherboard near USB headers. Rear exhaust fans with short cords may not reach this location.

BIOSTAR provides a number of software and hardware features to improve your media playback and gameplay. BIOSTAR includes LucidLogix Virtu MVP Technology and THX TruStudio PRO, the latter of which allows you to control sound quality of your music, movies, and games. For example, the Pro Dialog Plus feature that helps enhance the voices in movies so you can hear them over the soundtrack.

The TZ77XE4's scores were in line with the rest of the motherboards in our roundup. We'll note that it did notch the highest overall scores in both 3DMark 11 and PCMark 7. BIOSTAR's support for high-performance memory speeds make this board a good option for enthusiasts looking for an affordable Z77 board that can handle demanding memory specifications.

ECS Z77H2-A2X

If you want to add a touch of gold styling to your PC, the Z77H2-A2X is the motherboard for you. This board is part of ECS's Golden Edition Extreme, which includes gold plating on the CPU pins, memory slots, and PCI-E slots, as well as a golden PCH and VRM heatsink. We think the gold accents are all tastefully done, especially in contrast with the black PCB, and

Z77 Overall

The Z77 chipset doesn't mark a huge change in performance, but Intel has managed to include a number of new

features that may make it worth upgrading for enthusiasts. The motherboards in our roundup represent a good range of prices, and the vendors all offer slightly different

feature sets that sets each apart, depending on the goal of your build. ■

BY NATHAN LAKE

Benchmark Results	Intel DZ77GA-70K	GIGABYTE GA-Z77X-UD3H	MSI Z77A-GD65	BIOSTAR TZ77XE4	ECS Z77H2-A2X
Price	\$240	\$169.99	\$189.99	\$169.99	\$220
3DMark 11 Extreme					
Overall	X3986	X4057	X4105	X4107	X4078
Graphics Score	3599	3750	3795	3798	3787
Physics Score	9292	8748	9257	9013	8163
Combined Score	4525	4611	4647	4605	4615
Graphics Test 1	18.81	18.72	19.29	19.25	19.25
Graphics Test 2	17.92	19.49	19.58	19.56	19.57
Graphics Test 3	16.99	18.83	18.98	18.93	18.94
Graphics Test 4	11.39	11.43	11.53	11.58	11.48
Physics Test	29.3	27.73	29.42	28.62	25.92
Combined Test	21.05	21.45	21.66	21.42	21.41
PCMark 7					
Overall	5245	5245	5286	5294	5242
Productivity	5239	5353	5291	5013	4880
Creativity	5149	5041	5281	5218	5069
Entertainment	5158	5179	5210	5196	5169
Computation	5427	5407	5595	5538	5368
System Storage	5126	5069	5104	4904	4733
SiSoftware Sandra 2012 SP1 Lite					
Processor Arithmetic					
Dhrystone SSE4.2 (GIPS)	120.92	122	121.4	121.11	121.13
Whetstone iSSE3 (GFLOPS)	93.1	94.38	92.48	93.26	93.28
Processor Multi-Media					
x16 Multi-Media Integer iAVX (Mpixels per second)	224.5	224.9	222.78	222.24	222
x16 Multi-Media Float iAVX (Mpixels per second)	311.12	314.87	312.55	311.63	311.44
x8 Multi-Media Double iAVX (Mpixels per second)	174.53	176.69	174.83	174.67	174.38
Memory Bandwidth					
Integer Memory Bandwidth B/F AVX/128 (GBps)	19.89	20.35	20.16	20	20.37
Floating Memory Bandwidth B/F AVX/128 (GBps)	19.89	20.32	20.16	20.22	20.37
Media Transcode					
Transcode WMV (KBps)	1020	1000	1007	1019	1000
Transcode H264 (KBps)	994	965	1000	1006	958
Cinebench 11.5					
CPU*	7.32	7.48	7.42	7.36	7.29
POV-Ray 3.7 Beta**	1309.35	1340.04	1336.43	1325.34	1313.25
Games (2,560 x 1,600)					
Metro 2033 (4XAA/16XAF)	34.93	38.7	34.18	37.65	37.88
Aliens vs. Predator (8XAA/16XAF)	53.6	53.6	53.7	53.5	53.6
* points					
** pixels per second					
Test system specs: CPU: Intel Core i7-3770K; RAM: 16GB G.Skill Ripjaws DDR3-1600; GPU: ZOTAC GeForce GTX 580 (2x, SLI); Storage: 128GB Crucial RealSSD C300					

Intel Core i7-3770K

The new Core i7-3770K is Intel's flagship processor for the Z77 chipset, and as such includes all of the new 3rd Generation Intel Core i7 processor features. There's support for DDR3-1600 (2nd Generation Intel processors support a maximum 1,333MHz) and the improved Intel HD Graphics 4000 graphics processor.

As we saw with the 2nd Generation processors, Intel continues to add more technologies into the processor. For example, the new Intel HD Graphics 4000 only supports DX10.1) and a maximum resolution of 2,560 x 1,600. HD Graphics 4000 processors can also span the Windows Desktop across up to three independent displays. There's also embedded support for DisplayPort and HDMI v1.4a. Intel indicates that it has improved its Quick Sync Video performance by up to 60%.

At stock, the Core i7-3770K runs at 3.5GHz with a Turbo Boost speed of 3.9GHz. Of course, the "K" suffix on means you'll have an unlocked multiplier at your disposal. Similar to the Core i7-2600K and 2700K, the i7-3770K provides you with four cores with Hyper-Threading, as well as an 8MB of Intel Smart Cache. Intel also added support for DDR3L.

As it runs on the Z77 chipset, the Core i7-3770K is built for the LGA1155 socket. Intel indicates the Core i7-3770K will work on motherboards with Intel 7-Series chipsets and the following Intel 6-Series chipsets: Z68, P67, H67, and H61. The Core i7-3770K also offers two built-in security technologies, Intel Secure Key and Intel OS Guard. Secure Key is a hardware-assisted tool that helps you to create highly secure and long strings of random numbers for computing tasks that require security. OS Guard helps to prevent malware from gaining kernel-level access to your operating system.

We ran the Intel Core i7-3770K against Intel's Core i7-2600K, which includes using the processor's integrated graphics



Core i7-3770K

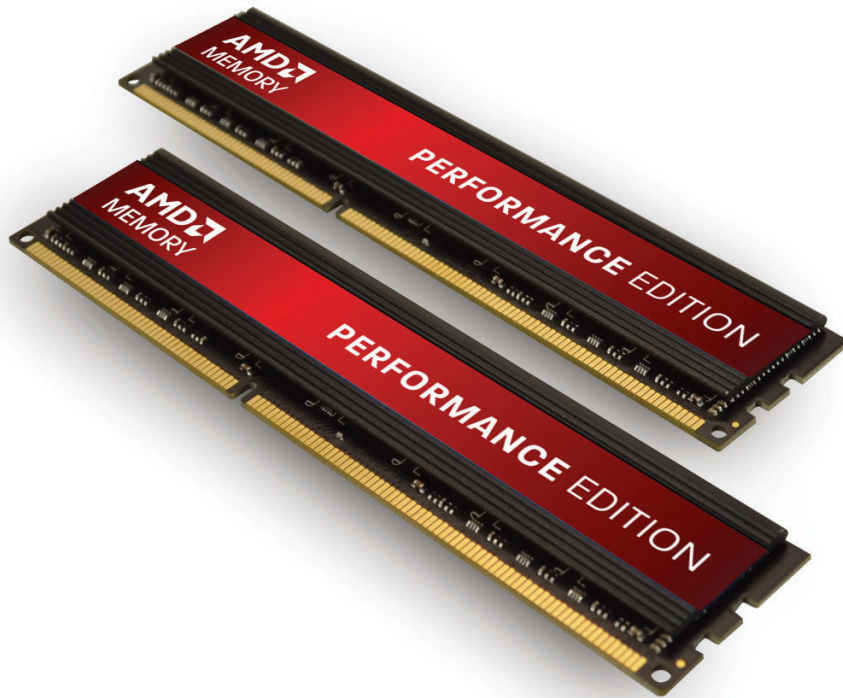
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core as our GPU. The Core i7-3770K offers slight performance upgrades across the board, with the biggest gains to be found in the gaming benchmarks. We were able to hit 25.3fps in Metro 2033 at 1,280 x 720 with the settings on low; the HD Graphics 4000 produced 40.7fps in Aliens vs. Predator. Our SiSoftware Sandra's Media Transcode results back up Intel's claim for improvements to Quick Sync Video, as we saw a nearly 60% increase. Processor-intensive scores are similar between the two, but with only a 100MHz stock speed difference, there's not much of a gap in terms of pure processing power.

Builders planning a new system will want to pair the Core i7-3770K with a Z77 motherboard, because you'll have access to all of the processor and chipset's new features. On the other hand, those who've recently built a system based on one of Intel's 6-Series motherboards will find that, after a motherboard BIOS update, the Core i7-3770K's Socket LGA1155 compatibility makes the processor a simple drop-in replacement. ■

BY NATHAN LAKE

Benchmark Results	Intel Core i7-3770K	Intel Core i7-2600K
3DMark 11		
Overall	P765	P545
Graphics Score	649	486
Physics Score	7200	6700
Combined Score	769	590
Graphics Test 1	3.87	2.98
Graphics Test 2	3.85	3.01
Graphics Test 3	4.15	3.78
Graphics Test 4	1.52	1.04
Physics Test	22.86	18.76
Combined Test	3.58	2.63
PCMark 7		
Overall	4422	4203
Productivity	5348	5138
Creativity	7205	6978
Entertainment	3353	3145
Computation	8907	8720
System Storage	5019	4621
SiSoft Sandra 2012 SP1 Lite		
Processor Arithmetic		
Dhrystone SSE4.2 (GIPS)	121.4	108.9
Whetstone iSSE3 (GFLOPS)	93.4	85.5
Processor Multi-Media		
x16 Multi-Media Integer iAVX (Mpixels per second)	223.4	204
x16 Multi-Media Float iAVX (Mpixels per second)	311.12	277
x8 Multi-Media Double iAVX (Mpixels per second)	174.9	157.78
Memory Bandwidth		
Integer Memory Bandwidth B/F AVX/128 (GBps)	19.63	18.32
Floating Memory Bandwidth B/F AVX/128 (GBps)	19.58	18.32
Media Transcode		
Transcode WMV (KBps)	3,690	2,314
Transcode H264 (KBps)	4,290	2,674
Cinebench 11.5		
CPU*	7.44	6.54
POV-Ray 3.7 Beta**	1327.86	1162.59
Metro 2033 (4XAF)	25.3	19.4
Aliens vs. Predator (4XAF)	40.7	33.8
Games tested at 1,280 x 720.		
*points		
**pixels per second		
Specs: Socket: Intel LGA1155; Clock speed: 3.5GHz (3.9GHz Max Turbo); 8MB Intel Smart Cache; TDP: 77W; Graphics: Intel HD Graphics 4000		
Test System Specs: Processor: Intel Core i7-3770K; Motherboard: Intel DZ77GA-70K; GPU: Intel HD Graphics 4000; RAM: 16GB G.Skill Ripjaws DDR3-1600; Storage: 128GB Crucial RealSSD C300; OS: Windows 7 Enterprise (64-bit)		



AMD Performance Edition DDR3-1600

This 8GB kit of AMD's Performance Edition DDR3 memory runs at 1,600MHz with aggressive timings of 8-9-8. The use of a low-profile heat spreader is also ideal for those who own wide, tall CPU heatsinks, because it's more likely the memory modules won't present a clearance issue. We'll note that AMD's memory is manufactured and supported by Patriot Memory, and like Patriot's modules, the AMD Performance Edition DDR3 is backed by a lifetime warranty and is 100% hand-tested.

With AMD's Performance Edition lineup, there's a black heat spreader that's affixed to either side of the modules, and the AMD Performance Edition logo graces the heat spreaders. We installed the kit in a system with SAPPHIRE's PURE Platinum Z77K and Intel's Core i7-3770K. (AMD

memory can operate on both Intel and AMD memory platforms.) The modules also can operate at DDR3-1333 with a voltage of 1.5V and timings of 8-8-8 if you prefer your RAM to run at a lower voltage.

In SiSoftware Sandra's 2012 Lite Memory Bandwidth test, the 8GB AMD Performance Edition kit produced a bandwidth of a 21.36GBps in the Integer B/F iAVX/128 test and 21.34GBps in the Float B/F iAVX/128 test. It also posted an impressive score of 23.5 nanoseconds in Sandra's Memory Latency benchmark.

Those looking for an affordable 8GB kit can pair the Performance Edition kit with either their AMD or Intel setup. The 1,600MHz speed and low latency provides you with

quick response times for memory-intensive tasks. ■

BY NATHAN LAKE

Performance Edition DDR3-1600

\$54.99 | AMD

www.amd.com

Benchmark Results		AMD Performance Edition DDR3-1600
SiSoft Sandra 2012 Lite		
Memory Bandwidth		
Integer B/F iAVX/128 (GBps)		21.36
Float B/F iAVX/128 (GBps)		21.34
Memory Latency		23.5ns
Specs: Capacity: 8GB (2x 4GB); Timings 8-9-8-24; Voltage: 1.65V; Unbuffered; Non-ECC; Lifetime warranty		
System specs: Processor: Intel Core i7-3770K; Motherboard: SAPPHIRE PURE Platinum Z77K; GPU: ZOTAC GeForce GTX 580; Storage: 128GB Crucial RealSSD C300; OS: Windows 7 Enterprise (64-bit)		



ARCTIC Accelero Xtreme III

High-end graphics cards are responsible for a hearty chunk of your system's power consumption and subsequently generate heat like nothing else. If you're running two, three, or even four graphics cards, then heat can quickly get out of hand. Even if it's not too much to sound alarms and initiate a shutdown, the slow baking of your internal components can reduce their respective life spans. ARCTIC's latest aftermarket graphics card cooler, the Accelero Xtreme III, is a one-size-fits-plenty cooler that claims to be able to lower your temperatures and do so while running significantly quieter than stock coolers.

The unit is designed to work with reference boards from NVIDIA and AMD and supports about 50 different graphics cards from both, including most of the NVIDIA GeForce GTX 600 and 500 series, as well as some of the AMD Radeon HD 7000 and most of the 6000 series. To see the complete list of supported graphics cards, visit tinyurl.com/7fswjlg and then click the Compatibility tab.

The Accelero Xtreme III consists of five copper heatpipes threaded through

a massive series of 84 aluminum fins. A thin black plastic heat shroud surrounds a trio of 92mm PWM fans; all told, the unit is capable of dissipating 300W of thermal energy. Also included in the package are 31 RAM and VRM heatsinks, a thermal paste spreading tool, and more thermal adhesive to apply to those heat-sensitive components. Once installed, we were impressed that the Accelero Xtreme III didn't increase our GeForce GTX 580's footprint much at all. Most importantly, it remained a dual-slot card, so we can still use this card in SLI (or CrossFire for Radeon cards).

As a prototype of the Accelero Xtreme III, our unit didn't have the pad of MX-4 preapplied to the copper surface of the heatsink, but we applied some using the packaged thermal paste. Installation was quick and painless; the hardest part was simply removing the dozen or so screws on the GeForce GTX 580's stock cooler.

To test the Accelero Xtreme III, we first ran a stock GeForce GTX 580 through Unigine Heaven with Tessellation set to Extreme and measured the GPU temperature at load. Following

the completion of the benchmark, we waited for the temperature to decrease and level off and then measured that as the idle value. We did the same with the Accelero Xtreme III installed and also performed some sound testing, as well. The GeForce GTX 580's cooler, which we lauded at the time of its launch as being nice and quiet, generated 11.5 more decibels compared to its idle value. The temperature performance was 43 degrees Celsius (idle) and 79 C (load).

The Accelero Xtreme III blew those numbers out of the water, idling at 30 C and peaking at 51 C. Noise output remained effectively flat, right around the stock cooler's idle noise level, under both idle and load. Throughout the testing, the PWM fans never saw fit to increase the fan speed above 2,000rpm. Looking at those temps, we can see why. ■

BY ANDREW LEIBMAN

Accelero Xtreme III
\$119.95
ARCTIC
www.arctic.ac

Specs: Maximum cooling capacity: 300W; Materials: Copper (base, heatpipes), aluminum (fins); Fans: 3 92mm PWM; Warranty: 6 years

Aerocool Shark Fan Evil Green Edition

Here at *CPU*, we spend a lot of time talking about enthusiast-grade processors, graphics cards, memory, motherboards, and more. In short, we're all about anything that makes your PC better and faster. Sadly, those adjectives almost always show up with an uninvited guest in tow, heat. But heat's not hard to chase off, especially if you're toting one (or more) of Aerocool's Shark Fans.

The Shark Fan is available in a handful of colors, including red, black, blue, white, and Evil Green to perfectly complement your case's interior or LED color scheme. Speaking of LEDs, this fan has four of them, which look particularly nice reflected against the translucent green fan blades of the Evil Green fans we installed. The Shark fans come with two mounting methods, via a quartet of antivibration screws or with four standard screws. Also in the package is a 3- to 4-pin converter cable, and everything is sleeved black.

The fan also includes a voltage reduction cable with an inline resistor (12V to 7V) for Silence mode (800rpm). Without the resistor, the fan operates in a 1,500rpm Power mode. In Silence mode, the 140mm fan outputs 50cfm, and in Power mode, it nearly doubles to 96cfm. As you'd expect, the different modes also have different noise output ratings. In Power mode, you can expect the Shark fan to add to your overall system noise to the tune of 29.6dBA. Silence mode slashes the noise output to 14.5dBA, which was easily lost among the hum of our CPU fan and rear exhaust fan.

Another unique feature of the Shark fans is the blade design, which features a ribbed design. Aerocool offer these fans in 120mm and 140mm sizes; both



Specs (140mm): Dimensions: 140 x 140 x 25mm (HxWxD); Voltage: 12V (Power), 7V (Silence); Speed: 1,500rpm (Power), 800rpm (Silence); Air flow: 96.5cfm (Power), 50cfm (Silence); Noise: 29.6dBA (Power), 14.5dBA (Silence)

Specs (120mm): Dimensions: 120 x 120 x 25mm; Voltage: 12V (Power), 7V (Silence); Speed: 1,500rpm (Power), 800rpm (Silence); Air flow: 82.6cfm (Power), 32.5cfm (Silence); Noise: 26.5dBA (Power), 12.6dBA (Silence)

are 25mm thick. The fans have a MTBF rating of 100,000 hours.

Such reliable and versatile fans are perfect for replacing your old case fans or supplementing the current air cooling in your case. To test this fan, we installed it in the top panel of our Enermax SpineRex case, to draw more heat from the VRM, CPU heatsink, and memory. Installation was quick and easy, and we liked the variety of mounting hardware.

If you're looking to take a bite out of your thermal budget and keep your enthusiast gear cool, then Aerocool's Shark fans can do the job in style. ■

BY ANDREW LEIBMAN

Shark Fan Evil Green Edition
\$15.99 (120mm), \$17.99 (140mm)
Aerocool
www.aerocool.us

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PROCESSOR

Plextor M3 Pro 128GB

This is a love story. It started several years ago, when we were still young and finding our way in the world. We met a little company named Plextor. At the time, we were attracted to the company's excellent optical disc drives, as well as Plextor's ConvertX hardware. It was a great relationship.

Then, a few short years ago, Plextor decided to take the relationship to the next level and offer us an impressive lineup of solid-state drives. Today, we can happily say that things between us are better than ever, especially after Plextor renewed its commitment with the M3 Pro SSD family. These drives are currently available in 128GB, 256GB, and 512GB capacities. We took a look at the 128GB M3 Pro.

The 128GB M3 Pro brings the latest and greatest. It uses 24nm Toshiba Toggle NAND, which is essentially at the top of food chain, performance-wise. The controller here is Marvell's 88SS9174, which you might remember from our SSD roundup last month. (See "Solid-State Soirée" on page 17.) The Marvell 88SS9174 is also the controller of choice for Corsair's Performance Pro Series SSDs, and it has a key performance-related difference over the other heavy hitter in the enthusiast SSD market, the SandForce SF-2200 controller: The 88SS9174 controller delivers the same performance regardless of whether the workload is compressible or incompressible data.

We tested the 128GB M3 Pro with CrystalDiskMark 3.0.1 (both the

Default and All 0x00 [0 Fill] tests) and AS-SSD to see how it measured up. It's a speed freak for sure, and the best part is that, yes, your performance will be more or less the same regardless of the type of data you feed the M3 Pro. In short, you shouldn't need a special set of circumstances (i.e., a compressible workload) in order to hit the drive's advertised speeds.

The 128GB M3 Pro is a fantastic drive with a great pedigree. If Plextor keeps releasing SSDs like this, we see no end in sight to this wonderful relationship. We know we have to share, but we don't want to. ■

BY VINCE COGLEY

M3 Pro 128GB

\$199.99

Plextor

www.plextoramericas.com



Benchmark Results	Plextor M3 Pro 128GB
CrystalDiskMark 3.0.1 Default*	
Sequential read	510.3
Sequential write	342.2
512KB read	389.4
512KB write	345.9
4K random read QD1	27.87
4K random write QD1	54.2
4K random read QD32	272.9
4K random write QD32	270.1
CrystalDiskMark 3.0.1 All 0x00 (0 Fill)*	
Sequential read	528.4
Sequential write	348.8
512KB read	402.5
512KB write	348
4K random read QD1	27.6
4K random write QD1	59.74
4K random read QD32	267.5
4K random write QD32	266.9
AS-SSD*	
Sequential read	500.46
Sequential write	324.74
4K read	25.89
4K write	52.9
4K-64Thrd read	278.53
4K-64Thrd write	245.97
*Results in MBps.	

Specs: Maximum sequential read/write: 535MBps/350MBps; Maximum random 4K read/write: 75,000IOPS/69,000IOPS; Interface: 6Gbps SATA; Five-year warranty

Test System Specs: CPU: Intel Core i7-3770K; Motherboard SAPHIRE PURE Platinum Z77; RAM: 8GB AMD Performance Edition DDR3-1600; GPU: ZOTAC GeForce GTX 580; Storage: Crucial RealSSD C300 128GB

Cooler Master CM Storm Trigger

Seems like gaming keyboards are a dime a dozen these days; everybody has one or two or more of them, and in many cases, it seems the only thing that qualifies a keyboard as a gaming keyboard is that it looks like one. Maybe it has a flashy backlight and is festooned with media controls, and some extra function or macro keys, but when you start to actually play with one of these posers it quickly becomes apparent that functionally there's little difference between it and cheapie models you find for \$20 or so in the big box stores.

This is not the case with Cooler Master's new CM Storm Trigger, a mechanical gaming keyboard that does more than just talk the talk. Cooler Master equips the four Trigger models with four variants of the excellent Cherry MX switches: Black, Blue, Brown, or Red.

Our review unit came with Cherry MX Browns, which I happen to favor; they provide the tactile feedback I like without the clicky noise. They have a nice, deep range of motion and just the right amount of springiness, which means they are comfortable even when in use for long periods of time (LAN party, anyone?).

But the Trigger's charms go beyond its excellent mechanical switches. For starters, the keyboard has an impressive amount of heft and is solidly built. Durability is very likely a byproduct, but it's also nice to know that your keyboard won't slip and slide one way or another in the heat of combat and leave you groping for the keys you need to survive. And thanks to its 6-key rollover, the Trigger won't lose any commands, even when the action dictates several-key combos.

For all its sturdiness, however, the Trigger isn't stiff or uncomfortable in any way. Its rubber edges and the included, detachable wrist rest ensure that it pampers your hands. (And if, like me, you have bad typing posture, your wrists.)



It seems pretty clear that Cooler Master's product designers spent a lot of time thinking about what gamers want and need from a keyboard in designing the Trigger. The keyboard isn't just backlit, it also gives you dimmer controls and lets you choose between a fully lit keyboard and a setting that only lights up the WASD and arrow keys, along with the macro control keys along the left side and the CM Storm logo in the upper-left corner.

The Trigger sports a flexible but heavy-gauge cord that is sheathed in black nylon braid; you can detach it from the keyboard for transport by way of its mini USB connection, which is situated just to the outside of its two gold-plated USB ports and an AC power jack that doesn't have a matching adapter—you can pick one up if you want to use the keyboard with devices that require more power than a USB connection can provide.

On top of everything else, the Trigger provides lots of excellent macro options, and it's equipped with 64KB of onboard memory for storing the macros you enter so that you don't have to backtrack and re-enter them.

We spent some quality time with the Trigger, playing both RTS and FPS titles, and it performed admirably in both scenarios. This is a keyboard that you can depend on when things get hectic, and this combined with its comfort, accuracy, and good looks make it one of the most accomplished gaming keyboards to come along in several years. ■

BY CHRIS TRUMBLE

CM Storm Trigger

Price TBA

Cooler Master

www.coolermaster-usa.com

Specs: Interface: USB; Cherry MX Brown mechanical keyswitches; Anti-ghosting; 6-Key rollover; Detachable wrist rest; 64KB onboard memory for profile storage; 1 ms response time



Intel 3rd Generation Core Processors

Master Your Media

Intel Core i7-3770K

A year and a half ago, Intel's Second Generation Core processors started a revolution; these modestly priced CPUs were competitive with high-end, enthusiast CPUs in gaming and broke new ground in media creation and management. Now, Intel introduces its 3rd Generation Core processors, which take everything you liked about Sandy Bridge to the next level.

The four-core, eight-threaded Core i7-3770K is based on Intel's newest 22-nanometer manufacturing process, so it packs more transistors into less space than its predecessor: Its 160mm² die contains 1.4 billion transistors. And these are Intel's new tri-gate transistors, which are more energy-efficient, so combined with the process shrink this architecture adds up to significant gains in performance requiring significantly less power.

In its tests, for example, Intel has observed that the Core i7-3770K is 43% faster than the Core i7-2600 at transcoding video for YouTube with ArcSoft's Media Converter 7, 81% faster when transcoding video for playback on an iPhone in CyberLink's

Media Espresso, and 199% faster when running Futuremark's 3DMark Vantage. Similar performance gains can be observed when working with other media types, as well. (For more performance information and comparisons, visit bit.ly/Kmxopj.)

And, as the "K" in its name suggests, the Core i7-3770K is fully unlocked, so demanding users who insist on wringing every last cycle out of their CPUs will be right at home when overclocking the chip.

Intel DZ77GA-70K

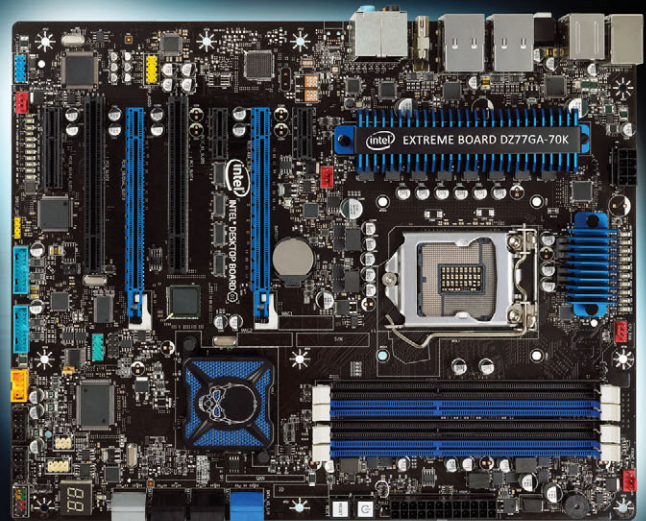
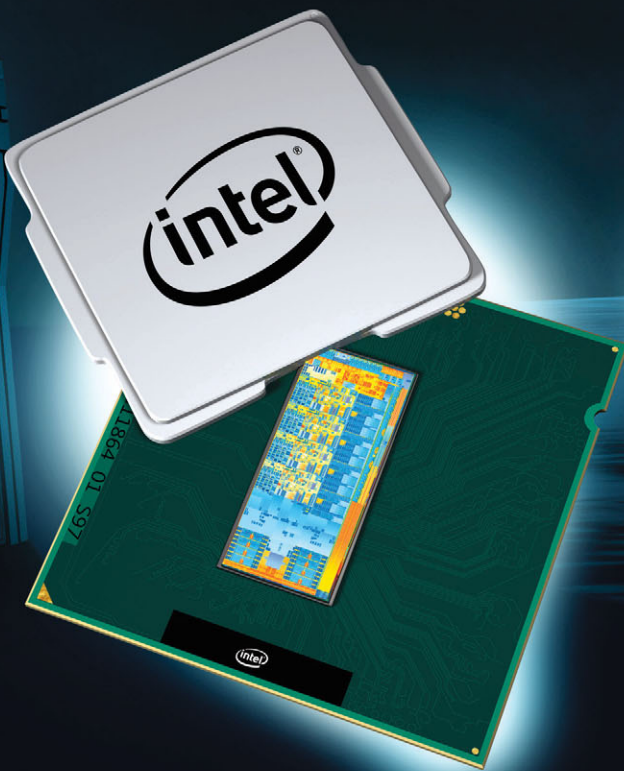
The good news continues when you consider Intel's design for the 3rd Generation Core processors as part of a powerful computing ecosystem. The Core i7-3770K and a motherboard equipped with Intel's Z77 chipset provide native support for USB 3.0, DirectX 11, SATA 6Gbps drives, and triple-display configurations.

Intel's own Z77 motherboards are, of course, tailor-made for the 3rd Generation Core processor. The Extreme Series DZ77GA-70K has full support for all of the Core

NEW
3rd Generation



with Intel **TURBO BOOST**
Technology 2.0



i7-3770K's impressive features, and in addition provides two PCI Express 3.0 x16 slots, support for up to 32GB of dual-channel DDR3-1600+ memory, 10-channel digital audio, eight USB 3.0 ports (four external, four via internal header), and Intel's Rapid Storage Technology for RAID 0, 1, 5, and 10.

A system equipped with the Core i7-3770K, the DZ77GA-70K, and one or more Intel 520 Series SSDs unlocks the potential of your games and gives you the tools you need to create and manage powerful video, world-class audio, and amazing digital images.

Power & Flexibility

Intel designed its 3rd Generation Core processors to perform at a high level, but they are also incredibly adaptable. For starters, they are physically compatible with Intel's Socket LGA1155, so in addition to motherboards designed around Intel's 7-Series chipsets, you can install 3rd Generation Core processors in motherboards equipped with Z68, P67, or H67 chipsets—currently shipping boards

include support out of the box, and existing boards need only a simple firmware update.

Once installed, Intel's Smart Connect technology checks web applications that you have open for new content, even when your PC is in sleep mode, so your apps are always up-to-date and ready at a moment's notice. Another Intel feature, Rapid Start technology, is an extremely power-efficient hibernate mode that lets your PC resume full operation within 5 to 6 seconds.

These processors also come with Intel's Small Business Advantage, a set of free tools features that make them incredibly handy for small business use. Intel Wireless Display, Data Backup & Restore, PC Health Center, USB Blocker, Software Monitor, and Energy Saver are designed to simplify IT tasks for small-business and home office users.

At work or at play, Intel's 3rd Generation Core processors make you better at everything you do. ■

Patriot Memory Wildfire 480GB

We all know “the guy.” The guy who builds a fanless system because the only thing he wants to hear is the sound of his own typing. The guy who retrofits his home with Ethernet cabling and outlets because he simply has to have the reliability of a wired network in every single room in the house. The guy who mods his Xbox 360 and PlayStation 3 to fit within a single chassis because two separate consoles simply take up too much space in his home theater. You know, the guy.

Patriot’s 480GB Wildfire is the perfect SSD for “the guy.” He’s the one who will say, “Yes! I now have almost half a terabyte of Toggle NAND at my disposal!” We’re guessing that the guy already has a few things planned for such a drive.

Under its hood, the Wildfire 480GB is packed with 32nm Toshiba Toggle-Mode NAND memory. A SandForce SF-2281 storage processor, which we’ve all come to know and love over the last year and a half, calls the shots in this SSD. So, of course, you get all of the benefits that the SF-2281 bestows, including DuraWrite, wear leveling, garbage collection, and so forth. The SF-2281 claims some of the Wildfire’s available NAND to perform these functions, which is why we have 480GB of available storage instead of 512GB. (Also remember that all SandForce 2200-based SSDs will have a certain degree of overprovisioning; the Wildfire 480GB is not unique in this regard.)

The now infamous BSOD bug that plagued all SandForce 2200-based SSDs appears to have been solved. Patriot’s 3.3.2 firmware update, which rolled out last October, includes this fix, so getting

a Wildfire now means you’ll have an SSD that should be more reliable than ever.

Patriot reports that the 480GB Wildfire’s performance is just slightly off the pace of its smaller 120GB and 240GB Wildfire drives. The 480GB Wildfire’s sequential reads and writes peak at 540MBps and 450MBps, respectively, while the 120GB and 240GB Wildfires can touch 555MBps and 520MBps. Still, the Wildfire 480GB performed very well in our benchmarks, CrystalDiskMark and AS-SSD. You can see the Wildfire deliver great throughput with sequential reads across the board, and it’s extremely fast with a workload of compressible data. 4K random reads are universally good here, as well.

The Wildfire performs exactly as Patriot promises. It includes a 3.5-inch drive bay adapter, so it will mount in virtually any system you can imagine, and carries a three-year warranty. And again, 480GB of Toggle Mode NAND in



a single SSD is simply wild. Tell the guy we’ve found his drive.

BY VINCE COGLEY

Wildfire 480GB

\$979.99 | Patriot Memory
www.patriotmemory.com

Benchmark Results	Patriot Wildfire 480GB
CrystalDiskMark 3.0.1 Default*	
Sequential read	485
Sequential write	236.4
512KB read	459.8
512KB write	162.5
4K random read QD1	27.23
4K random write QD1	18.1
4K random read QD32	226.8
4K random write QD32	102.2
CrystalDiskMark 3.0.1 All 0x00 (0 Fill)*	
Sequential read	505.4
Sequential write	437.6
512KB read	453.6
512KB write	398.8
4K random read QD1	30.63
4K random write QD1	26.38
4K random read QD32	230.7
4K random write QD32	214.2
AS-SSD*	
Sequential read	498.35
Sequential write	244.51
4K read	20.22
4K write	18.3
4K-64Thrd read	210.13
4K-64Thrd write	131.48
*Results in MBps	
Specs: Maximum sequential read/write: 540MBps/450MBps; Maximum 4K random IOPS: 40,000IOPS; Interface: 6Gbps SATA; Warranty: 3 years	
Test System Specs: Processor: Intel Core i7-3960X; Motherboard: GIGABYTE GA-X79-UD3; GPU: NVIDIA GeForce GTX 580 (2x, SLI); Memory: 8GB Kingston DDR3-2400; Storage: Kingston 240GB HyperX SSD	



Patriot Memory PBO Alpine

The PBO Alpine from Patriot Memory is a network-attached media player that supports 1080p resolutions (at 30fps), and it can connect to your network through either a wired or wireless connection (with the help of an optional USB Wi-Fi adapter). It runs a modified version of Android 2.2 to provide you with an easy-to-use interface. Patriot Memory builds in a HDMI port for convenient connection to an HDTV or projector, and there's also an optical S/PDIF output. We checked out the PBO Alpine and found it to be extremely responsive.

When you first fire up the PBO Alpine, you'll see an interface that provides you with quick buttons for Video, Photo, Music, Bookmarks, Applications, and Settings. You can use the included remote to make your selections. If you choose one of the multimedia options, the PBO Alpine provides you with a network map that lets you search for the folders and files where your multimedia is stored. You can also add a manual network link if you want to add a location that's not currently online. When switching between menus, the PBO Alpine quickly brings up the files stored on your network devices.

Besides the file name, the media player also provides you with a windowed preview of the given video, song (if cover art is included), or image, so it's easy to find what you're looking for. If your media isn't stored on the network, you'll be able to play it by loading it through the front USB 2.0 port or SD memory card slot. Another USB 2.0 port is available in the rear of the PBO Alpine, and the rear port is ideal for connecting a USB keyboard (to enter text into the Web browser, for example) or Wi-Fi adapter.

In terms of video playback, 1080p content streamed via the Internet looked great, and we experienced no lag or motion judder during playback. With most sources, you'll be able to select among the video quality options, such as 1080p, 1080i, 720p, and 480p, which is nice if your Web connection isn't able to handle the bandwidth required for the larger HD-quality options. You'll find support for M-JPEG, MPEG-1, MPEG-2, MPEG-4, H.263, H.264, VC-1, DivX, Xvid, RealVideo, VP6, and MKV video formats. The Dolby Digital Plus and DTS 2.0 audio standards are provided for surround sound.

The PBO Alpine supports MP3, OGG, Real Audio, WMA, and several other audio formats. Music sounded crisp on our home theater's speakers. The most common image formats—JPEG, BMP, GIF, and PNG—are supported, as well. In addition to the previously mentioned web browser, Patriot Memory includes apps for iRadio, iTV, YouTube, and Picasa. You can sideload apps from a flash drive or SD card if you want to add further functionality. It currently doesn't support the Google Play Store or the Amazon Appstore.

As multimedia streaming devices go, the PBO Alpine provides you with a lot of convenient features for network playback. We'd love to see support for Google's Play Store or a similar app marketplace, but the PBO Alpine remains a respectable home theater add-on. ■

BY NATHAN LAKE

PBO Alpine

\$89

Patriot Memory

www.patriotmemory.com

Specs: CPU: ARM926; OS: Android 2.2; Front ports: USB 2.0, SD card; Rear ports: Ethernet; HDMI out, USB 2.0, optical S/PDIF out



Deepcool By Logisys Gamer Storm

The CPU cooler is easily one of the hardest working components in an enthusiast's rig. It doesn't directly impact performance, but if you want to push your processor to its limits, you'd better have a cooler substantial enough to handle the heavy lifting. That's exactly what Logisys had in mind when designing the Gamer Storm CPU cooler. Read on to see if it has what it takes to handle your overclocking ambitions.

The first thing you'll notice about the Gamer Storm is the fairly standard design that consists of heatpipes bisecting rows of aluminum fins. But the difference is in the details. There are six heatpipes and a total of 48 aluminum fins. The main unit is coated in nickel to ensure the Gamer Storm remains capable of efficiently evacuating heat as long as you own it. And because it supports processors from AMD and Intel, you'll likely be able to use this cooler through several upgrade cycles. The base of the Gamer Storm is a solid block of copper, polished to a mirror sheen for superior heat transfer.

Strapped to the cooler is a 120mm PWM hydro bearing fan with a rubberized black frame and baby blue fan blades. The low-speed 7V mode produces a whisper quiet 17.6dBA. The idle fan speed is 500rpm (+/-200). When the CPU starts to break a sweat, though, the 12V mode kicks on and pushes the fan to 1,500rpm (+/-10%). At its peak, the Gamer Storm pushes 66.3cfm and hums along at 27.6dBA. The fan attaches to either side of the cooler with a pair of metal clips, but thanks to the rubberized surface of the fan frame, vibration is not an issue. Logisys includes a spare set of clips in case you want to add a second fan for more extreme air cooling performance.

The Gamer Storm is one of the more versatile CPU coolers available. It supports Intel Socket LGA775/1155/1156/1366, as well as AMD Socket AM2/2+/3/3+ and FM1. Installation was straightforward, and we were happy to discover that we didn't need to remove the motherboard from our case to install this cooler. (A CPU cutout in the motherboard tray is

necessary, however.) The height of your memory heatsinks and the position of your memory banks may force you to place the fan on one side or another, but this is easily accomplished.

By now you've heard that the Intel Core i7-3770K runs hotter than Sandy Bridge, which is why we used it to test the Gamer Storm. Under load the processor temperature climbed to 60 degrees Celsius, and at idle the CPU runs at a chilly 31 C. We overclocked the processor to 4.4GHz, and under load, temps climbed to a very manageable 70 C, still a far cry from the processor's TJ Max.

If you're looking for an affordable cooler that'll take your processor to the next level, the Gamer Storm should be at the top of your list. ■

BY ANDREW LEIBMAN

Gamer Storm

\$69.99

Deepcool By Logisys
deepcool-us.com

Specs: Dimensions: 6.22 x 5.28 x 3.86 inches (HxWxD); Socket compatibility: Intel LGA775/1155/1156/1366, AMD AM2/2+/3/3+, AMD FM1; Materials: Copper (base), aluminum (fins), Maximum air flow: 66.3cfm; Noise: 17.8 to 27.6dBA

Love at first sight



Level 10 **GT**
Driving Inspiration

Snow Edition

Don't let the good look fool you. Level 10 GT – Snow Edition is a streamlined computer case engineered to accelerate cooling and offers full suite of technical features that redefines the definition of performance PC. Three oversized 200mm ColorShift fans and one 140mm TurboFan ensure your high-end graphic cards, CPU and hard drives are all quietly cooled. The keyword is “quietly”. All intake fans come with built-in filter that can be easily cleaned without the use of any type of tools. Plug&Play side panel fan, 240mm high-efficiency water cooling radiator support and much more, to find out, visit us at www.thermaltakeusa.com. Are you in love yet?



facebook.com/ThermaltakeInc





Enermax DreamBass Genie AP001

Why would famed PSU manufacturer Enermax make an audio amplifier for PCs? Because it's about power, man! Of course, with a name like "DreamBass," you might expect a lot from something not much bigger than a thimble stuck on an L-shaped USB adapter. (This is so the DreamBass will stand upright when plugged into a notebook.) The DreamBass Genie lives up to expectations, however, because it works some impressive magic without the use of drivers. Just plug it in and enjoy.

Using VIA's VT1620A audio chips, the device runs your audio stream through a handful of post-processing algorithms and backs it with a +6dB boost at 80Hz. Armed with Sony's MDR-V6 studio headphones, we tried out the DreamBass against the integrated audio on a relatively new \$500 notebook. The difference was glaring, and

we were instantly reminded of what we like so well about discrete audio products like the DreamBass Genie. Bass goes from sounding like something passing through a long cardboard tube to being right there in your head, significantly richer and deeper. Mids suddenly rematerialize, eliminating that "hollow" feel so prevalent with integrated audio. The DreamBass Genie doesn't do that much with the highs, but the improved channel separation makes highs cleaner and more prominent.

We also tried out the DreamBass with a few HD movies, as well as Metro 2033. Overall, the clarity of speech in both cases remained roughly equal to what it was before the DreamBass took over. The payoff was in battle scenes and sound effects, which suddenly became much more booming and dramatic. Explosions and firefights sound more visceral

because they recover a large portion of their lower frequencies. Enermax's DreamBass puts the drama back in your soundtrack.

Enermax's old-school vacuum tube look is appealing, as is the device's compatibility support for Windows, MacOS, and Linux. Bottom line: You get big sound from a tiny package. This little gem is now a permanent fixture in our notebook bag. ■

BY WILLIAM VAN WINKLE

DreamBass Genie AP001

\$29.99 | Enermax

www.ecomastertek.com

Specs: USB Audio Class 1.0; Jacks: 3.5mm mic/line-in and stereo out; Audio: 24-bit, 96kHz playback, THD-N -80dB; SNR: 95dB



TRENDnet TPL-405E 4-Port 500Mbps Powerline AV Adapter

It's hard not to take the TPL-405E as a godsend at first glance. The palm-sized powerline networking adapter doubles as a four-port Gigabit Ethernet hub. Imagine you're in a home without structured wiring, and you have a home entertainment center with a gaming console, TiVo, Blu-ray player, and a connected TV. You want the stability of wired networking because Wi-Fi happens to stink in this area. The TPL-405E is a perfect fit. So long as you have another TRENDnet Powerline AV adapter plugged into your router, all four devices can use the same wall wart to get online.

Now, let's talk about reality. We all know to expect half (at best) of the theoretical throughput of most wireless and powerline networking gear. We plugged TRENDnet's TPL-402E 500Mbps Powerline AV Adapter (which features a pass-through outlet—a helpful bonus) into the office LAN's Gigabit switch, then plugged the 405E into the adjacent room, almost exactly on the

opposite side of the wall (Location 1). We also tested the 405E at the far end of the building, about 40 feet away (Location 2), keeping in mind that distance is likely much greater when you factor in the length of wiring needed to reach from outlet to outlet.

Transferring a 2GB data folder took about 6:20 (minutes:seconds) from Location 1, averaging about 5.4Mbps. Location 2 started at 200Kbps, continued to slide under 100Kbps, and we gave up trying at an estimated transfer time of 22 hours. The Advanced Networking benchmark in PerformanceTest 7, told a similar story, with 16K TCP tests hitting 26.5Mbps in Location 1 and 5.2Mbps in Location 2. The UDP 16K test showed 92.4Mbps and 12.2Mbps, respectively.

So, that's not the 500Mbps theoretical max, but we've seen far worse testing 802.11n gear in the same locations. And although the Location 2 UDP throughput graphs show a lot of regularly spaced pits, the Location 1 graphs all show strong, stable speeds, which makes for reliable video streaming.

The building we tested in was built in 2006, but we have a lot of electronics, some of which may be injecting noise into the lines. Because powerline networking hardware can be extremely dependent on a given location's electrical wiring, your results may end up being considerably better, so we'd encourage you to try the 405E for its compact size and four-port convenience. ■

BY WILLIAM VAN WINKLE

TPL-405E 4-Port 500Mbps Powerline AV Adapter

\$97.99

TRENDnet

www.trendnet.com

Specs: LAN interface: 4 10/100/1000 RJ-45 ports; Power interface: NEMA 5-15; Speed: 500Mbps (powerline), 2Gbps (LAN, full duplex); Coverage: 984 feet; Security: AES-128; Dimensions: 4.1 x 3 x 2.2 inches (HxWxD)

ZOTAC ZBOX nano XS AD11 Plus

With the nano XS AD11 Plus, ZOTAC has somehow managed to slim down their nano lineup of miniature PCs to a mere 1.46 x 4.17 x 4.17 inches (HxWxD). Compared to ZOTAC's ZBOX nano AD 10 Plus, which we reviewed in the October issue, the nano XS AD11 Plus has been reduced by 0.83 inches in width and depth, and its height is even 0.31 inches less. ZOTAC was able to reduce the size by using the Kingston SSDNow mS100, which is a 64GB SSD that fits into an mSATA slot on the motherboard.

In exterior appearance, the nano XS AD11 Plus is similar to previous iterations of the ZBOX that we've reviewed. When powered on, there's a ring that glows green. On the front panel, you'll find a power button, a 4-in-1 memory card slot (SD, SDHC, MS Pro, and Multimedia), a combo 3Gbps eSATA/USB 2.0 port, and audio inputs. The side of the unit features mesh openings where heat can escape. The rear of the nano XS AD11 Plus features an HDMI output, two USB 3.0 ports, an Ethernet port, and two USB 2.0 ports.

The nano XS AD11 Plus is powered by AMD's E-450 Zacate APU, which combines a 1.65GHz dual-core processor with Radeon HD 6320 graphics processing. The latter supports DirectX 11, features 80 shader units, and runs at 508MHz (600MHz in Turbo). With the AD11 Plus model, ZOTAC installs 2GB of DDR3-1333MHz memory, which was Samsung-branded in our test unit. The 64GB Kingston SSDNow mS100 offers sequential read speeds of 255MBps and sequential writes of 170MBps. The miniature system also includes an integrated IR receiver and media remote, which makes it ideal for use as an entertainment PC for use in the living room,



kitchen, or other area where you want access to a computer.

The remote features a Windows Media Center button, as well as volume, record, play, pause, stop, fast forward, and rewind controls to manage Windows Media Center playback and recording. ZOTAC also bundles a VESA monitor mount, so you can attach the nano XS AD11 Plus to the back of a monitor to minimize the amount of space it takes up. Because you may not locate the system in a place with convenient wired Ethernet access, Zotac also builds in 802.11b/g/n Wi-Fi and provides a Wi-Fi antenna.

Our benchmark tests aren't exactly ideal for the nano's hardware, but it was able to push through even the toughest of the tests. The unit scored particularly well in CrystalDiskMark, due to the 64GB SSD, posting a 512KB random read of 146.5 and a 512KB random write of 123.9.

The ZOTAC ZBOX nano XS AD11 makes an ideal PC for those who want an exceptional small form factor system. It'd fit next to a TV in the living room or bedroom as well as it would in a home theater rack. The included remote also makes it easy to control for media playback. ■

BY NATHAN LAKE

ZBOX nano XS AD11 Plus

\$419.99

Zotac

www.zotac.com

Benchmark Results		ZOTAC ZBOX nano XS AD11 Plus
3DMark 11 Entry		
3DMark Overall		E515
Graphics Score		516
Physics Score		637
Combined Score		373
Graphics Test 1		2.19
Graphics Test 2		2.24
Graphics Test 3		3.21
Graphics Test 4		1.77
Physics Test		2.02
Combined Test		1.73
PC Mark 7		
PCMark Score		1547
Productivity Score		1319
Creativity Score		1737
Entertainment Score		1208
Computation Score		746
System Storage Score		3355
SiSoft Sandra 2012 SP1 Lite		
Processor Arithmetic		
Dhrystone ALU (GIPS)		10.09
Whetstone SSE3 (GFLOPS)		7.82
Processor Multi-Media		
x8 Multi-Media Integer SSSE3 (Mpixels per second)		15.73
x8 Multi-Media Float SSE2 (Mpixels per second)		12.43
x8 Multi-Media Double x4 SSE2 (Mpixels per second)		6
Memory Bandwidth		
Integer Memory Bandwidth B/F AVX/128 (GBps)		3.48
Floating Memory Bandwidth B/F AVX/128 (GBps)		3.61
Media Transcode		
Transcode WMV (KBps)		93
Transcode H264 (KBps)		102
Physical Disk		
Read Performance (MBps)		242.72
Cinebench 11.5		
CPU*		0.64
POV-Ray 3.7 Beta**		
		150.65
CrystalDiskMark 3.0.1 (MBps)		
Sequential Read		240
Sequential Write		151.5
512KB Random Read		146.5
512KB Random Write		123.9
4KB Random Read QD1		8.84
4KB Random Write QD1		20.62
4KB Random Read QD32		9.955
4KB Random Write QD32		24.34
Aliens Vs. Predator (4XAA, no AF)		
		9.6
Metro 2033 (4xAA, no AF)		
		6.9
* points		
** pixels per second		
Games tested at 1,280 x 720		

System specs: Processor: AMD E-450; GPU: Radeon HD 6320; RAM: 2GB Samsung DDR3-1333; Storage: Kingston SSDNow mS100

LET THERE BE LIGHT

YOU'VE SPENT A LOT OF HOURS

getting your case and the components inside to look just the way you like them. Your case is sporting a new paint job and the acrylic window in the left side panel shows just how hard you worked to get the cables tucked out of sight where possible and sleeved and bundled everywhere else.

What's left? Lighting, of course.

You could spend a bunch of cash on several, separate lighting products and patch together your own custom setup, or you could look to one of the brands you've known and trusted for years: Antec.

Antec has two affordable LED kits that will help you highlight your favorite components, show off your handiwork, and generally make your system look awesome.

Antec Advance Accent Lighting

Antec Advance Accent Lighting strips come in red and blue, are USB-powered, and are great for internal or external use. Run them along the bottom or back panel of your case to give it extra dimension in low light, run them along the bottom of your keyboard to tie it in with your PC's lighting (not to mention making it easier to find), or run them along the inside of your case near window panels to illuminate your new pair of video cards or an immaculate custom cooling setup.

No matter where you put them, Antec Advance Accent Lighting strips are the perfect finishing touch.



Antec Advance Bias Lighting

If a soft, white light is the missing piece from your build's look, Antec



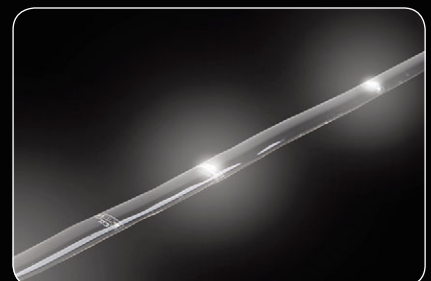
Advance Bias Lighting strips are just the ticket. As with the red and blue Accent Lighting strips, you can put these white, 6-LED strips on keyboards, cases, or you can install one on the back of your monitor to increase image clarity and contrast, and to reduce eye fatigue.

Less eye fatigue means you can spend more time playing games and watching

movies, and if your system looks better as a result, well, that's even better.

Break The Mold, Not The Bank

Antec's lighting kits help you create the unique, stunning look you've always wanted for your PC, but without the cost you would expect from most custom LED setups. Antec Advance Accent Lighting strips and Antec Advance Bias Lighting kits have a suggested retail price of just \$12.95 each, so you can load up, trick out your system, and save the leftover cash for a rainy day. ■



HARD HAT AREA
PC MODDER
MAD READER MOD



Station 6

Last month's "Mad Reader Mod" featured a first-time modder, and as unlikely as it seems, we have another mod from a first-timer this month. But that's not even the most amazing fact about Station 6, the gray and black beauty you see before you.

Look very closely at the paint and guess how much time Geoff Groves has spent wielding an airbrush. Got your guess ready?

"As for the paint job," Groves says, "I knew I wanted it to be a smoke-like outside finish and a lighter, contrasting inside. Only problem was, I didn't have an airbrush, nor had I ever used one. Getting the case done by a shop was just too expensive for my liking, so I found a deal on an airbrush on eBay. After getting it in the mail, it sat on my shelf until the day I was ready to paint the case. (Everything was primed and base-coated with spray cans.) That day, I sat down to practice my airbrushing skills, and that lasted all of 4 to 4.5 minutes. Then I jumped straight into the final case job you see. I did repaint the front panel because it turned out too dark the first time, but that's my first-ever experience painting with an airbrush. See what you can learn from watching a few YouTube how-tos?"

Groves constructed Station 6's enclosure from aluminum sheets cut in his garage. He did all the cutouts, including the fan holes, radiator mounts, lettering, and such with his jigsaw, Dremel, and power drill.

The name "Station 6" came from Groves' fellow Marine Gunnery Sergeant Adam Quire; Groves tells us Quire used to say he was "heading to Station 6" when he'd leave for the day and head home.

"When I go home, I tend to tinker around with computers and play games, and at that time I was searching for a name for the mod. So I filled my buddy in on my idea for naming the case 'Station 6,' and it just stuck," Groves says. "The mod became my Station 6."

In addition to cutting, building, and painting the case, Groves also installed Station 6's components, including an Intel Core i7-920 (overclocked to 4.2GHz) mounted on an MSI Big Bang-Xpower motherboard, 12GB of G.Skill PI Series DDR3-1600, an XFX Radeon HD 7970, a Thermaltake Toughpower 700W PSU, four 60GB Force Series Corsair SSDs, and three 300GB Western Digital Raptor hard drives.

Finally, Groves put together the mod's cooling system, which consists of two Swiftech 480mm radiators, eight Yate Loon case fans, EK water blocks, and a Swiftech MCP655 pump.

"I started this case almost on a whim, having no idea how much work was actually involved when creating a whole case," Groves says. "I'm very pleased with myself for grinding it out through all the measuring, cutting, drilling, and related setbacks. If you put your mind to it, it can be done." ■

Give Us Your Mod

Have a computer mod that will bring tears to our eyes? Email photos and a description to madreadermod@cpumag.com. If we include your system in our "Mad Reader Mod" section, we'll send you \$1,500 and a one-year subscription to *CPU*.



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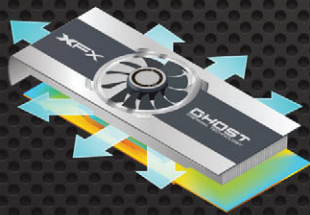


XFX R7000 SERIES GRAPHICS CARDS

KEY FEATURES

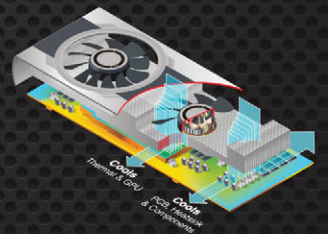
GHOST THERMAL TECHNOLOGY

This floating cover design maximizes airflow by creating exceptional venting through out the card. This design allows airflow to cool the heatsink as well as the components and PCB.



DOUBLE DISSIPATION

Dual Fans increases airflow by almost 3x making your GPU quieter by up to 13dB & cooler by up to 7°C than standard single fan GPUs.



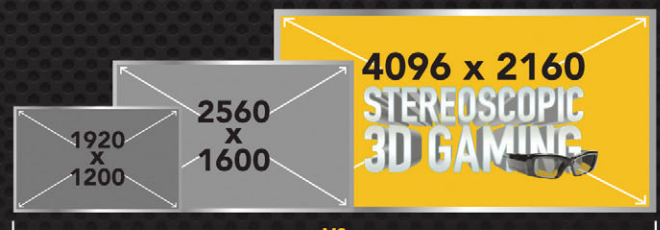
DURATEC PROFESSIONAL GRADE



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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. Please include all pertinent system information.

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

Scott W. asked: I'm planning on getting Diablo III when it comes out, but my PC just isn't up to scratch. I'm going to build a new rig and I'm looking for suggestions; I'm torn between an AMD or an Intel.

A: The question of which processor to go with barely scratches the surface. Thankfully, Blizzard's Diablo III System Requirements web page (tinyurl.com/6wsj8of) is a great place to start. At the top of this page you'll find minimum system requirements for operating system, processor, graphics card, memory, storage, optical drive, screen resolution, and Internet connection. But if you're building a new system to play the game, you'll be much better off basing it on the recommended system requirements.

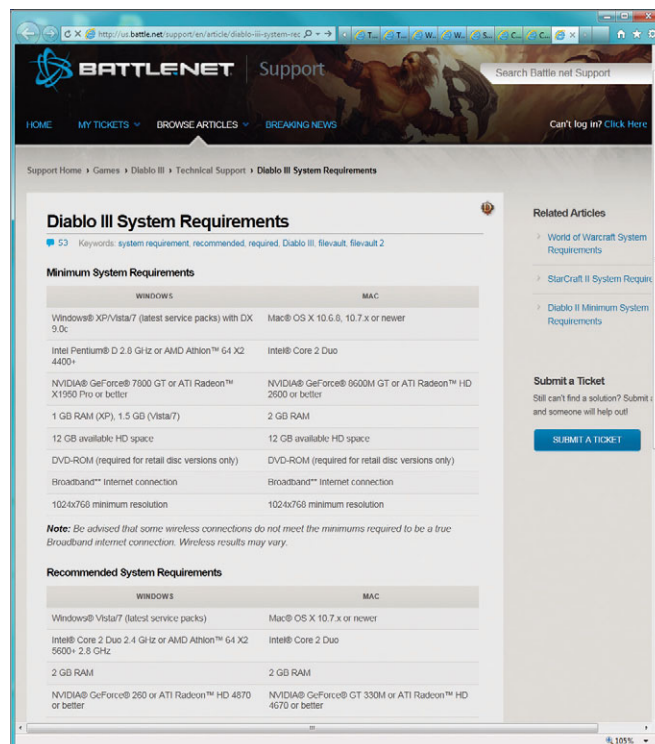
These recommendations only cover the operating system, processor, memory, and graphics card. They assume you have a broadband Internet connection (note: Wi-Fi may not be fast enough), DVD-ROM drive, and at least 12GB free space on your hard drive or SSD. Regarding that Internet connection, keep in mind that you'll need to be connected to the 'Net if you want to play the game.

Although Blizzard indicates that Vista or WinXP will work, if you need to purchase a new OS anyway, we'd recommend going with Win7 64-bit, and don't forget to update it once your build is complete. The 2GB RAM recommendation is on the lower end of the spectrum for Win7, let alone a game. Memory is cheap enough these days that 4GB to 8GB isn't buying too much.

Blizzard recommends a 2.4GHz Intel Core 2 Duo or 2.8GHz AMD Athlon 64 X2 5600+ (which suggests that the game's

custom engine will be at least slightly multithreaded). However, these processors are rather old, so you may have a hard time finding them. For something more current, we can suggest a 3.1GHz Core i3-2100 Sandy Bridge chip, which was readily available for around \$125 as we went to press. For about the same amount of money, you can get a quad-core AMD FX-4170 Zambezi, which will also be more than enough to run Diablo III.

Last but certainly not least, the graphics card is going to have the



Check Battle.net for your Diablo III system requirements.

biggest impact on your enjoyment of Diablo III. Here, Blizzard recommends an NVIDIA GeForce GTX 260 or AMD Radeon HD 4870. That's great if you are building your system in 2009, but you'll get a lot more mileage out of a current graphics card. Those graphics cards come with 1GB and 896MB of onboard memory, respectively, so let's make 1GB GDDR5 our recommended minimum for a graphics card. Those two cards have fairly similar fill rates, (between 12 and 16 gigapixels per second and between 30 and 36 gigatexels per second) and memory bandwidths (115.2GBps and 111.9GBps, respectively). A current graphics card with similar numbers from NVIDIA is the GeForce GTX 550 Ti. If you're playing at higher than HD (1080p) resolutions, we'd even suggest a GeForce GTX 560 to be able to turn on plenty of eye candy. From AMD, the Radeon HD 7770 should deliver a solid experience; the Radeon HD 6850 will cost you just a little bit more but give you enough headroom to handle higher resolutions and all the visual enhancements.

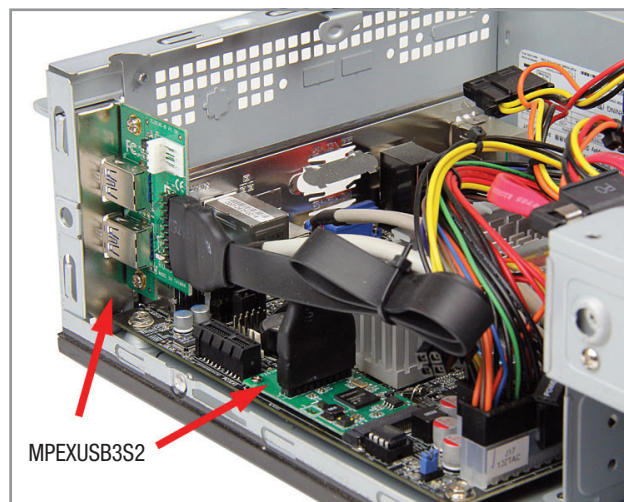
Steve H. asked: I have an Acer Aspire One A0722-0828 netbook, which I love. As a photographer, I use a Canon EOS 5D Mark II, which uses Compact-Flash cards to store images and videos. The problem is that the netbook doesn't have a CF slot, so I'm forced to use a USB adapter to get my images onto the netbook. My camera's still image files are up to 25MB each, and the videos are up to 200MB each, so a full day of shooting can result in as much as 7GB, which takes a long time to transfer over to my netbook.

Is there a way to upgrade one of the netbook's USB 2.0 ports to USB 3.0? Barring that, is there a CF-to-SD card adapter that will speed things up for me?

A: We can definitely relate to your impatience, Steve, but unfortunately the short answer is no. The USB 2.0 ports



Yes, it's possible to mod an Acer Aspire netbook to support USB 3.0, but you might not like the tradeoff.



This is how the mini PCI-E USB 3.0 module fits onto a Mini-ITX motherboard.

on your Acer Aspire One are a part of the netbook's chipset. USB 3.0 ports are similarly backed by some pretty substantial hardware that needs to be built into the motherboard. The ports themselves have a different internal structure, as well.

Sadly, you're also out of luck as far as a CF-to-SD card adapter is concerned. Even if you found such a device, (we couldn't) the card reader on your Aspire One won't likely be any faster than your USB 2.0 card reader. We tested the data rate on our Dell Latitude E6400 notebook and found the internal SD card reader transferred files at approximately 7.3MBps; the

same files came over a USB 2.0 SD card reader at about 9.1MBps.

The longer more warranty-voiding answer, however, is a tentative *maybe*. A quick Web search for "Mini PCI Express USB 3.0 Card Adapter" gave us several hits for add-on modules that you could use to replace your current mini PCI-E device. In the Aspire One, that's your Wi-Fi radio. This module isn't really meant for a netbook or notebook, so you'd need to do some fairly involved cutting to install the ports and you'd need to get pretty creative to deliver power to the module, but it's by no means impossible (although something tells us that's not the answer you were looking for).

Anthony M. asked: I've already started assembling the parts for a new computer build and I settled on the ASUS P9X79 Deluxe motherboard. What I like most about it is the eight DIMM slots and support for up to 64GB of memory. My question is, with this much memory, won't that require a really large page file? I'm particularly concerned because I'd like to use an SSD for my OS drive. Does the old 1.5 * memory for a page file rule still apply? Do I even need a page file?

A: We'll tackle your last question first. By all accounts, you do need a page file. Sure, many have reported running flawlessly without it, however, some applications require it. Without a list of everything you run, or will run in the future, leaving the page file intact is the best strategy. According to Microsoft TechNet blogger Mark Russinovich, having a page file also lets the system have access to more usable memory. Furthermore, without a set pool of virtual memory, Windows won't be able to write kernel crash dumps.

You didn't mention it, but we assume you're going to be running Win7 on your new system, which does a pretty good job of managing virtual memory on its own. For a vast majority of users, even enthusiasts, it's best to just let Windows set the virtual memory minimum and maximum values. If you're running 64GB of RAM, however, a Win7 system will automatically set the paging file to 64GB, which is likely much more than you realistically need.

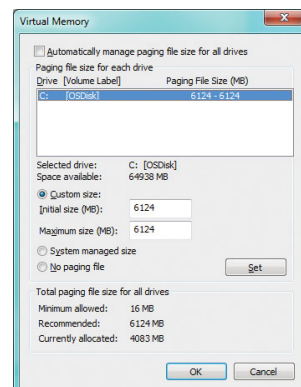
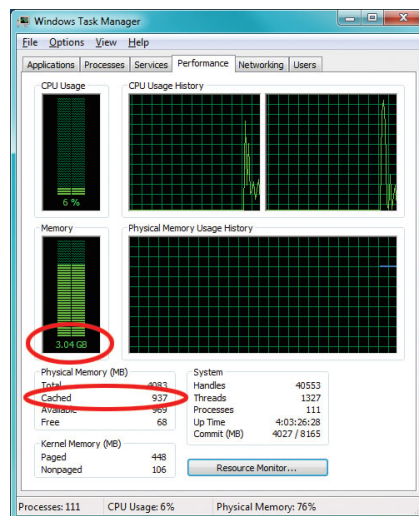
If you're determined to manually manage your virtual memory size, then you really need to monitor the system to determine how much you may need in a worst-case scenario. Launch the Performance Monitor by pressing CTRL-ALT-DELETE, clicking Start Task Manager, clicking the Performance tab. Now load your system by launching and using several applications simultaneously, particularly those that are memory-intensive, that you might typically run. To calculate your Commit Charge (how much memory Windows is using), you need to look at the Task Manager's Performance tab and add the Memory number

"If you're determined to manually manage your virtual memory size, then you really need to monitor the system to determine how much you may need in a worst-case scenario."

below the green bar graph to the Cached number from the Physical Memory (MB) box. Note the Cached memory is how much data is currently stored in the page file. Your page file should be at least this large. Adding 300MB should cover you for extreme cases.

Next, click the Start button, click Control Panel, click System And Security, and then click System. Click Advanced System Settings from the left side of the screen, click the Settings button from the Performance section

at the top, click the Advanced tab, and then click Change from the Virtual Memory section. Uncheck the box in front of Automatically Manage Paging File Size For All Drives, select your OS drive, click the Custom Size radio button, and input the size you calculated here. To prevent the paging file from growing any larger, input the same number in the Maximum Size (MB) box, click Set, and then click OK. If you shrink the size of the paging file from the default setting, you'll have to restart to make the change. ■



Input a custom virtual memory setting in this menu.

Add these two numbers together to find a good page file size.

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Powerful Power Supply

LEPA Takes Top Wattage Crown With Release Of G1600

If big power supply units have become all the rage, the Ecomaster LEPA G1600 is taking things to a new level.

The G1600 is the largest power supply unit on the market today, offering 1600W of power, with a peak power level of 1700W. Large power supply units typically will provide the most benefit to those enthusiast users who have high-end gaming systems, as well as people who may be operating servers or workstations.

“With peak power up to 1700 watts, the G1600 is designed to be efficient,

stable, and reliable, so that it will be able to fulfill its quintessential users’ need,” says Joseph Wang, PSU product manager for LEPA, as he explains why the company decided to issue the market’s

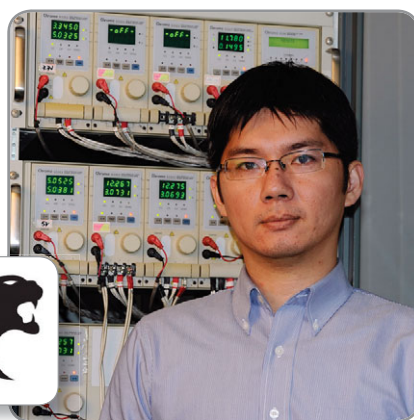
largest power supply unit. “We do know that 1600W is the largest PSU in the market and would catch everyone’s attention, but, to be honest, the primary reason is simply to fulfill users’ demand.”

Although such a large power supply may be overkill for many computer users, high-end users and enthusiasts certainly will find a way to take advantage of the G1600’s features.

“For super overclockers, multi-GPU users, or even professionals who run supercomputer workstations, G1600 can meet their demand easily,” Wang says.

Go For The Gold

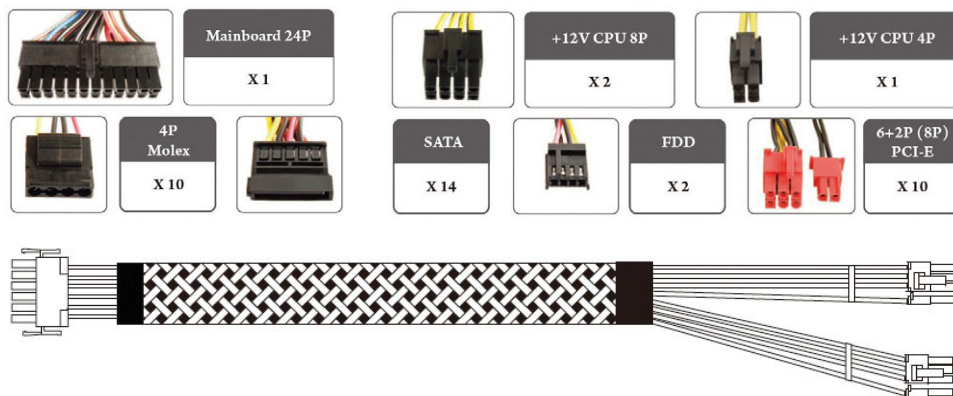
The G1600’s 80 Plus Gold rating is a certified measurement that guarantees a certain level of energy-efficient performance



G1600’s Cables & Connectors

“The G1600 is intended for multi-GPU users and is capable of running up to four high-end video cards,” Wang says. “G1600 can also support some special motherboards, such as SR-2 or SR-X from EVGA, which demand additional power sockets.” The full list of connectors with the G1600 includes:

- One 24-pin ATX MB (main board unit) handles the motherboard’s main power input, as well as I/O control.
- Two 8-pin CPU connectors and one 4-pin CPU connector. Some units require a detachable 4-pin module for the CPU.
- 10 6+2-pin PCI-E connectors handle power for graphics cards, with an 8-pin design or a 6-pin plus detachable 2-pin design.
- 14 SATA connectors provide power for any SATA interface devices.
- 10 4-pin Molex connectors provide power to peripheral devices.
- Two 4-pin FDD connectors provide power for floppy disk drives, although many hard disk drives also use this connector.



Sources: Ecomaster, LEPA

at a variety of loads. At 100% and 20% of rated loads, for example, the Gold standard unit must achieve at least 87% energy efficiency. At a 50% rated load, a Gold standard PSU must achieve 90% energy efficiency.

“Every now and then, we receive users’ feedback demanding larger wattage power supplies with higher efficiency to support the heavy-duty systems,” Wang says. “To respond to the users’ voices, we’ve put tremendous work to develop the G1600, surpassing 80 Plus Gold standards.”

It’s worth noting that some enthusiast-class computer users don’t believe these types of ratings really provide much of a benefit in terms of price savings, as most computer users don’t operate at a full power load at all times, and many companies estimate the cost savings of the 80 Plus standards based on full power

loads. However, the PSUs that have received these ratings will provide at least some level of benefit in energy efficiency, even if it’s less than some of the marketing materials imply.

“The more efficient a power supply is, the less energy it wastes, which produces less heat and thereby enhances components’ lifespan and reliability,” Wang says.

Although a low-power-mode measurement is not part of the 80 Plus Gold rating, Wang says LEPA has made sure that its G1600 PSU does a good job with power efficiency in that mode, too.

“Some power supplies with Gold certification may still be relatively inefficient in standby mode,” he says. “LEPA G1600 puts the standby power into consideration, managing its standby power consumption much lower than 1W to achieve better standby efficiency.”

Keep The Heat At Bay

With a PSU running at such high power levels, the ability to keep the unit cool was something that required a lot of design work, Wang says. The entire system works together to do the job of cooling, making use of a 135mm fan with speeds between 1,000 and 2,500rpm, as well as a honeycomb-shaped ventilation grill.

“We also put a lot of effort into the airflow circulation design, where the heat can be more efficiently and quickly managed by directly cooling the hot spots,” he says.

Using a two-sided circuit board provides an advantage to the cooling system, too, Wang says.

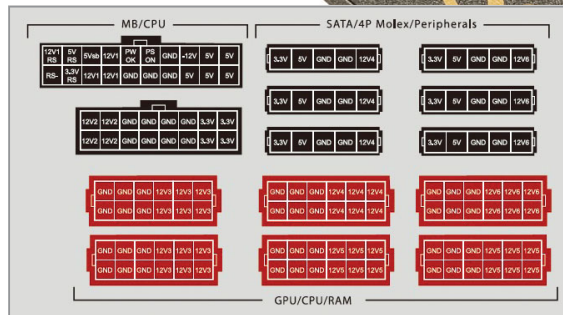
“Since it frees more internal space for components, a double-sided PCB layout has better airflow than a single-sided PCB and thereby dissipates heat more effectively,” Wang says.

G1600 Socket Diagram

Not only does the G1600 have a higher power output than other power supply units, but LEPA has also outdone competing PSUs in terms of the number of +12V rails the 1600W contains. With its six +12V rails, Wang says the G1600 offers a peak 40 to 50 amperes per rail, which caters to enthusiasts with powerful graphics cards.

“Unlike other PSUs featuring a single +12V rail, the G1600 is equipped with six rails with ample amperes on each rail for great compatibility with heavy-duty graphics cards,” Wang says.

Sources:
Ecomaster, LEPA



By using both sides of the circuit board, LEPA minimizes its conduction losses and can connect more components, Wang says. The G1600 PSU can generate additional power with its two-sided board, by connecting MOSFETs and ICs, too.

Small, But Powerful

Considering the ability of the G1600 to deliver such large amounts of power, it's a bit of a surprise to see the size of the unit, which measures just over 7 inches in

depth. Wang says most similar PSUs have a depth of at least 8 to nearly 9.5 inches.

"Every time we mention the product concept of G1600 to our prospects, a question quickly arises: How large is this product going to be?" he says. "Because of its smaller size, the G1600 allows users to have more flexibility of PC chassis selection."

Wang says LEPA has plans to continue trying to build even more power into its PSUs of the future.

"For the future, we are aiming to create more high-efficient products to not only offer users more stable and reliable power solutions, but also to save energy," Wang says. "Will we launch any power supplies going beyond 1700W? We have been working on some projects to evaluate the feasibility. However, it'll be a greater challenge to strike a balance between larger power output and electrical safety regulations." ■

BY KYLE SCHURMAN

G1600 Safety Features

With such a powerful PSU, LEPA needed to put some significant safety features into the unit, including:

- BOP (Brown-Out Protection)
- OCP (Over Current Protection)
- OPP (Over Power Protection)
- OTP (Over Temperature Protection)
- OVP (Over Voltage Protection)
- SCP (Short-Circuit Protection)
- SIP (Surge and Inrush Protection)
- UVP (Under Voltage Protection)

For those who are running high-end graphics cards in their systems, Wang says OCP is especially important.

"To retain the safety, G1600 has +12V rails with individual OCP," Wang says. "Therefore the power supply will shut

off to protect the system when unusual, huge current flow occurs. Furthermore, for a power supply with OCP, the protection will kick in 25 times faster than ones without the safety of OCP."

Although the difference only amounts to a fraction of a second—a PSU without the OCP safety feature may require 500 milliseconds to shut down the power supply, vs. about 25 milliseconds for the G1600—Wang says that small amount of time is significant.

"Such a tiny window of time will determine whether your system will live or die," Wang says. "G1600 offers high compatibility with high-end video cards with complete protections."

Sources: LEPA, Ecosystem

Protection Trigger Range

	+3.3V	+5V	+12V1/V2/V3/V4/V5/V6
Over Current Protection	30A~45A	30A~45A	40A~50A
Under Voltage Protection	2.0V~2.4V	3.3V~3.7V	8.5V~9.5V
Over Voltage Protection	3.9V~4.5V	5.7V~6.5V	13.3V~14.5V

Protection Point

Over Power Protection	Triggered when output power >110~160% of rated max load
Over Temperature Protection	Triggered when PSU heat sink >90°C~110°C
Short Circuit Protection	Main output power shall latch into shut down state within 50ms when short circuit applied. +5Vsb is designed as auto recovery mode protection.

White Paper: Intel Ivy Bridge

Meet The Tick That Thinks It's A Tock

When Ivy Bridge appeared on Intel's CPU roadmap, it was in the "Tick" position on Intel's Tick-Tock model. We knew that Ivy Bridge, as a Tick, would shrink the Sandy Bridge microarchitecture manufacturing process. The shrink would also reduce the overall power demands for the chip, as well, but most expected that the other improvements in Ivy Bridge would be incremental in nature.

In other words, most people didn't expect anything earth-shattering.

Ticks are usually a setup for the Tock coming a year or so down the road. The Tock position represents significant changes to the chip's architecture. Last year's release of Sandy Bridge followed this model, providing a completely new chip architecture.

So, with Ivy Bridge's "Tick" release this April, Intel's switch to a 22nm

manufacturing process didn't catch anyone off guard. However, the significant change in the way Ivy Bridge will handle graphics was a bit of a surprise. In fact, Intel is referring to Ivy Bridge as a "Tick+," at least partially to signify the reworked graphics processing power, which should provide big benefits, especially in the mobile arena.

"Ivy Bridge is introducing a new graphics architecture, delivering

Intel's Tick-Tock History & Future

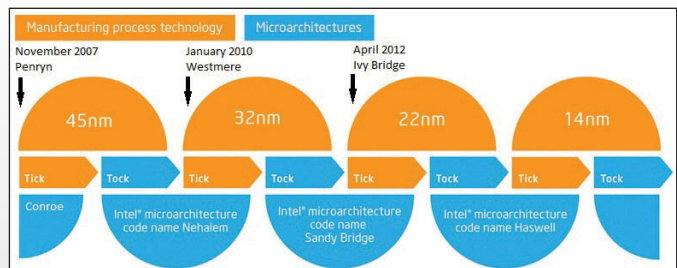
It all started with Moore's Law, named after Intel co-founder Gordon Moore, who said that the number of transistors on a CPU should double every two years. Since the integrated circuit first appeared in 1958, the company has followed Moore's Law closely.

"The future of Moore's Law will continue to deliver a magnitude of exponential capability increases, driving a fundamental shift in processor and graphics computing," says Galo Bustamante, Intel's Ivy Bridge desktop platform marketing manager. "Market needs and Intel's architectural innovation will determine if the capability increases are directed towards improved performance, increased graphics processing capabilities, or new functionality not yet developed."

Adding to the idea of Moore's Law, since 2006 Intel has made use of what it calls a Tick-Tock model, planning to release new microprocessor technologies every 12 to 18 months. With the release of Ivy Bridge, Intel remains on track.

"The Tick-Tock model aims at staggering technology process improvements from architectural improvements with each generation of products," Bustamante says.

Each Tick introduces a new manufacturing technology process, going from 45nm to 32nm to Ivy Bridge's 22nm. Chips that have been Ticks include Penryn (November



2007) and Westmere (January 2010). Each Tock introduces a new microarchitecture, including the Sandy Bridge architecture released in January 2011. This means that each manufacturing process lasts a little over two years and each microarchitecture lasts a little over two years.

On the Intel roadmap, a new microarchitecture (the Tock), code-named "Haswell," is scheduled for a mid-2013 release, while sometime in 2014, you can expect to see a 14nm manufacturing process (a new Tick) used on the Haswell microarchitecture.

"The definition of each new product generation starts years ahead of the introduction, but Intel monitors and determines the ability to introduce innovation well into the execution phase," Bustamante says. ■

Source: Intel

significant performance improvements on graphics and media over Sandy Bridge that will benefit both desktop and mobile form factors,” says Galo Bustamante, Intel’s Ivy Bridge desktop platform marketing manager.

Added Graphics Power

The improved graphics capabilities within Ivy Bridge’s integrated GPU will let Ivy Bridge meet demands for better graphics performance. Although gamers and power users will still want the power of a dedicated graphics card, an Ivy Bridge CPU’s integrated graphics should be able to easily meet the graphics processing demands of average users.

With the increasing popularity and frequency of HD video playback on average desktop and laptop computers, all consumers are requiring more graphics horsepower. Intel has responded to these demands with Ivy Bridge. The new chip will support DirectX 11, OpenCL 1.1, and OpenGL 3.1, as well as provide greater 3D performance.

“In addition, higher-end Ivy Bridge SKUs with Intel HD 4000 Graphics have a higher number of execution units, 16,

vs. 12 EUs in Sandy Bridge,” Bustamante says. “On the display side, Ivy Bridge graphics deliver support for three independent displays, which was limited to two with Sandy Bridge.”

Bustamante says the move to stronger graphics capability with the integrated GPU has been on-going for the past few years.

“With the past two generations of products, Intel has made significant strides in advancing the graphics and media capabilities of the processor graphics to meet the needs of demanding applications,” he says.

More Transistors, Overclocking Features

Although Ivy Bridge’s graphics processing capabilities are much improved, the move to a 22nm



manufacturing process nonetheless gave Intel the opportunities to improve the CPU in other areas, as well. This move gives Ivy Bridge higher performance while also reducing its power demands compared to previous chips from Intel.

“Shrinking the process technology makes room for a larger transistor budget for the platform architects and product

Digital Random Number Generator

With Ivy Bridge, you’ll find a built-in digital random number generator, which will result in stronger security measures. The DRNG, which Intel is calling Secure Key, is part of Intel’s inclusion of several ISA bus changes with Ivy Bridge. Each of the random numbers that Ivy Bridge generates is considered compliant with encryption standards.

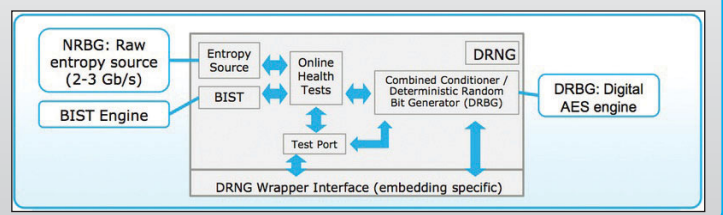
The DRNG generates numbers using an Intel-created algorithm, which makes use of a physical process that’s based on indeterminate states, guaranteeing random numbers. The algorithm measures the work of semiconductor circuitry inside the chip to find the indeterminate states.

“Secure Key is a processor technology designed to produce secure, high-quality, high-volume random numbers through an on-chip entropy source to support usage models like full-disk encryption, Internet security, VPN, and so forth,” says Galo Bustamante, Intel’s Ivy Bridge desktop platform marketing manager.

A NRBG (non-deterministic random bit generator) is the entropy source, and it works with a BIST (built-in self-test) engine to begin the process. Online Health Tests ensure the quality of the process. The Test Port and the DRNG Wrapper Interface perform further debugging, ensuring a truly random number.

Finally, the Combined Conditioner/DRBG area performs the final post-processing work via AES (Advanced Encryption Standard) modes. ■

Source: Intel



planners to introduce new architectural innovation geared at improving the system performance and adding new functionality,” Bustamante says.

A quad-core Ivy Bridge chip likely will offer about 20% more transistors than a similar Sandy Bridge chip—about 1.4 billion vs. 1.16 billion, but Bustamante says it will have a die size of about 160mm², or about 26% smaller than Sandy Bridge’s 216mm². Additionally, Intel is using its new 3D Tri-Gate technology in the 22nm transistors.

Although there are many advantages to shrinking the manufacturing process, making the change is not an easy process, which is why companies like Intel must carefully plan for the transition over several years. Bustamante says designers must take into account things such as gate voltages, leakage from the transistors, and design rules when trying to implement a new manufacturing process.

“Transitioning to smaller process technology requires considerable attention to myriad design and

manufacturability details,” Bustamante says. “3D Tri-Gate technology tackles many of the considerations and enables much better transistor performance at low voltage operating points, improving the overall power-performance equation.”

Overclocking will be possible with unlocked chips, labeled as “K” chips, of course, Bustamante says.

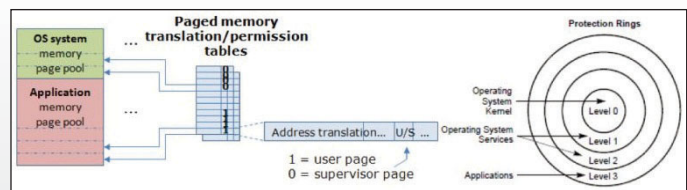
“Unlocked Ivy Bridge improves the user’s ability to achieve high core and memory frequencies by independently raising the clock speeds without

Supervisory Mode Execute Protection

A security feature built into Ivy Bridge is Supervisory Mode Execute Protection, which Intel calls OS Guard Technology. With this, Ivy Bridge chips can provide protection against EoP (Escalation of Privilege) attacks, where applications that are unknown will be unable to operate in supervisor mode or gain access to key areas of the OS.

A typical EoP attack will take advantage of programming errors and flaws to obtain access to areas of the system that normally would be blocked to an unknown application. The attacker then is able to control the system by gaining privileges he isn’t normally entitled to have. However, Ivy Bridge looks to eliminate the ability of an attacker to exploit a flaw through implementation of SMEP in the CPU.

When using SMEP, each application in the system is assigned a level of permission, what Intel calls a flag or level. An application assigned Level 0 will have all permissions, including access to the operating system kernel, while an application assigned Level 3 will have only the most basic permissions, with no access to the operating system kernel or operating system services.



You can think of the permission levels like rings, as shown here. The application with access to the innermost ring also has access to any rings surrounding it. An application with access restricted to an outer ring cannot access the inner rings. By limiting the permissions and access for each application, SMEP should better guard against EoP attacks.

“The typical user, if using an operating system that takes advantage of [SMEP], will see no performance impact to benign applications,” says Galo Bustamante, Intel’s Ivy Bridge desktop platform marketing manager. “Attack applications will generate exceptions to be handled by the operating system.” ■

Source: Intel

Ivy Bridge Display Options

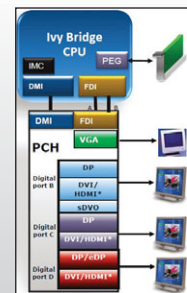
The Ivy Bridge processor has a built-in display engine. The processor communicates with the platform controller hub via the Flexible Display Interface channels. FDI is a proprietary Intel technology that carries data for the display to the PCH.

Through the three digital ports, the PCH can support a variety of display output formats, including DisplayPort, HDMI, DVI, and sVDO. There’s also support for VGA displays built into the PCH.

Ivy Bridge supports DMI 2.0 (Direct Media Interface), and the chip offers a maximum theoretical bandwidth of 2GBps in each direction.

Ivy Bridge offers 16 PCI-E 3.0 for discrete graphics cards, as well. ■

Source: Intel



impacting other system components,” he says. “All non-K versions of 3rd Generation Intel Core i7 and Core i5 processors have a limited unlocked multiplier. Memory, power, and graphics are fully unlocked.”

Thanks For The Assist, Sandy Bridge!

Some aspects of the Ivy Bridge architecture remain the same as what’s found in Sandy Bridge chips. The four-wide front end in Ivy Bridge continues to work with both x86 instructions and dedicated uOp instructions. In Ivy Bridge, uOp scheduling is the same, too. The uOp

cache is exactly the same in Ivy Bridge and Sandy Bridge, other than the fact that Ivy Bridge is slightly better enabled to handle single threads.

“Intel has continually modified and improved the ability to issue and retire more and more uOps per cycle, focusing on both raw parallel capabilities and microarchitectural improvements,” Bustamante says.

Ivy Bridge CPUs are compatible with Intel’s LGA1155 processor socket, just like Sandy Bridge. Ivy Bridge will also be compatible with 6-Series motherboards, as long as the proper BIOS support is added. That said, Intel released its 7-Series

(formerly code-named Panther Point) chipsets alongside Ivy Bridge, and an Ivy Bridge-Panther Point platform will give builders access to the most features, including four built-in USB 3.0 ports and 16 PCI-E 3.0 lanes.

A Loud Tick

Generally, when Intel brings a Tock chip to market on its CPU schedule, it’s a pretty loud release, thanks to the new architecture. Ticks often are accompanied by a little less fanfare, and you might have to strain a bit to hear the release of a Tick.

In this case, though, Ivy Bridge is sure to make plenty of noise. ■

3D Tri-Gate Technology

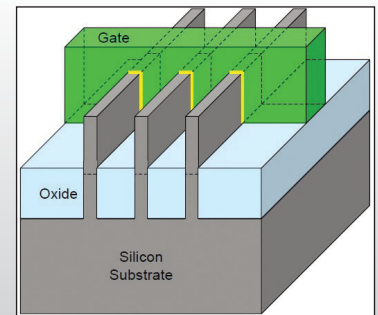
The 3D Tri-Gate transistor works differently from a traditional, planar transistor because it makes use of one or more fins. With the fin, the transistor’s gate makes contact with the conducting channel on three sides.

Using the multiple-fin Tri-Gate design, Intel will be able to offer high-end CPUs that feature a mixture of high-performance transistors with multiple fins, as well as mainstream chips with a single fin.

Because the control of the electrical current is better with Tri-Gate, its transistors can use less power than planar

transistors, which is important in allowing Tri-Gate processors to potentially work well in mobile devices. (For more information on 3D Tri-Gate Technology, see page 52 in the August 2011 issue of *CPU*.) ■

Source: Intel



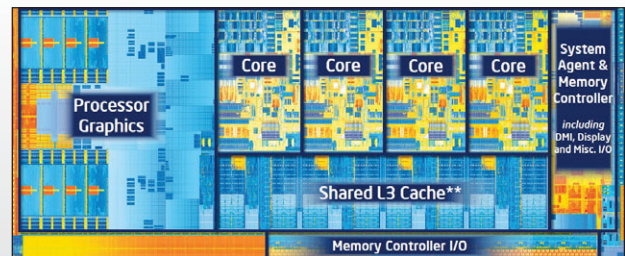
Ivy Bridge Processor Die

The new processors based on Ivy Bridge will continue to carry the Core brand name. In keeping with Intel’s recent naming scheme, Ivy Bridge CPUs are known as 3rd Generation Intel Core processors, and all will have a similar basic architecture.

Initially, they’ll be quad-core chips with a shared L3 cache area. The integrated processor graphics will also use the L3 cache.

The initial Ivy Bridge offerings will only involve quad-core processors. We should see dual-core and mobile, low-power CPUs using Ivy Bridge by June. ■

Source: Intel



	INTEL® CORE™ i7 PROCESSOR	INTEL® CORE™ i5 PROCESSOR	INTEL® CORE™ i3 PROCESSOR
Number of Processor Cores / Threads	4 / 8	4 / 4	2 / 4
Intel® Turbo Boost Technology ¹ 2.0	Yes	Yes	No
Intel® Hyper-Threading Technology ¹	Yes	No	Yes
Intel® Smart Cache	8 MB L3	6 MB L3	3 MB L3
AES New Instructions (AES-NI)	Yes	Yes	No
Intel® HD Graphics with DirectX® 11	4000	2500 / 4000	2500 / 4000
Intel® Virtualization Technology (Intel® VT-x) ¹	Yes	Yes	Yes
Performance Tuning Enabled ^{2,3}	Yes	Yes	No
Recommended Intel® Express Chipset	Z77	H77	H61 ⁴

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Overheating alarm temperature warning
Fan working display
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NEW

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Patented fan grill designed at an angle forcing the hot air to vent out of the case.

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Cool**



STRIKE-X GT



Case Type	Mid Tower
Material	SPCC 0.5mm
Motherboards	Micro ATX/ATX
Chassis Dimensions	450mm (H) x 180mm (W) x 480mm (D)
Drive Bays	4x 5.25" (Exposed) / 6 x 3.5" HDD or 2.5" HDD
Expansion Slots	7
Max length space available for PCI slots	400mm
I / O Ports	2 x USB2.0 / Audio+Mic

Case Type	Mid Tower
Material	SECC 0.6mm
Motherboards	Micro ATX/ATX
Chassis Dimensions	465mm (H) x 190mm (W) x 490mm (D)
Drive Bays	3x 5.25" (Exposed) / 9 x 3.5" HDD or 2.5" HDD
Expansion Slots	7
Max length space available for PCI slots	295mm
I / O Ports	1x USB 3.0 / 3x USB2.0 / Audio+Mic

Supports:
Up to HPTX and XL-ATX motherboards
10 PCI slots
Dual power installation
Hot-swap for 2.5" and 3.5" HDD
Fan controller controls up to max. 18 fans!

Case Type	Full Tower
Material	SECC 0.8mm
Motherboards	Micro ATX/ATX/E-ATX/XL-ATX/HPTX
Chassis Dimensions	635mm (H) x 230mm (W) x 700mm (D)
Drive Bays	4x 5.25" (Exposed) / 10x 3.5" HDD or 2.5" HDD / 1x 3.5"+2.5" HDD hot swap slot
Expansion Slots	10
Max length space available for PCI slots	430mm
I / O Ports	2x USB 3.0 / 2x USB2.0 / Audio+Mic

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VIDEO CARD BUYER'S GUIDE

IT'S BEEN SIX MONTHS SINCE WE LAST LOOKED at the state of the graphics card industry. In that time, there have been a surprising number of developments. Both AMD and NVIDIA made the transition from 40nm to 28nm, each launched a flagship graphics card, and we've already witnessed the opening salvos of what could shape up to be another price war.

AMD's Southern Islands Vacation

AMD unveiled the first of the Southern Islands family of GPUs, the Radeon HD 7970 and 7950, in

late December 2011. When they arrived two weeks later, the Tahiti-codenamed GPUs became the first to showcase AMD's new GCN (Graphic Core Next) compute architecture. Like the original Fermi (GF100) from NVIDIA, AMD designed these new cards to more aggressively crunch parallel processes and GPGPU workloads.

To give you an idea how far AMD has come from Cayman (Radeon HD 6900), consider that AMD got 2.703 TFLOPs of compute power out of the Radeon HD 6970's 389mm² die. Tahiti has a die that isn't much smaller at 352mm², but AMD has achieved 3.789 TFLOPs of compute power for a more than 150% raw compute performance improvement per square millimeter. Highlights of the flagship GPU include a

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384-bit memory bus (Northern Islands GPUs peaked at a 256-bit memory bus), 3GB GDDR5, improved PowerTune technology for more efficient idle and load thermal performance, and PCI-E 3.0 support. The new family also supports AMD's Discrete Digital Multi-Point Audio, which lets you configure your monitors with built-in speakers to handle independent audio streams for a more immersive listening experience; think of it as Earfinity for your monitors' speakers.

AMD went on to flesh out the Southern Islands family in February (Radeon HD 7750 and 7770) and March (7850 and 7870), but the OEM-only 7670, 7570, 7470, 7450, and 7350 were little more than rebrands, still manufactured at 40nm. In years past, these cards may have seen more than OEM-only attention, but the growing performance of on-die GPUs from AMD and Intel are really making their presence felt on this end of the market.

NVIDIA Answers With Kepler

It was very quiet in Santa Clara at the end of 2011. The Green Team let AMD's Radeon HD 7000 series debut without an answer. Then in late March, NVIDIA broke its silence with the launch of its new GPU, Kepler, in the guise of the GeForce GTX 680. With this launch, NVIDIA has made a deliberate shift to a smaller GPU.

Kepler has 3.5 billion transistors and is manufactured on the same 28nm process as AMD's new GPUs. The die in the GTX 680 is 294mm², which is downright tiny compared to the GPU under the hood of AMD's flagship Radeon HD 7970. You may have noticed that the codename for the GTX 680 is GK104, which follows the naming scheme of the GF114 and GF104, which were the GPUs in the GTX 560 and GTX 460, respectively. This card also only requires a pair of six-pin PCI-E power connectors to run. Highlights of the new card include PCI-E 3.0, Purevideo VP5 hardware acceleration, four-way multimonitor 2D support. GTX 680 owners can now enjoy three-way NVIDIA Surround 3D without SLI.

Although we have yet to get our hands on a GeForce GTX 680 (supply was very tight as we went to press), it sounds like even at its smaller size, the Kepler GPU is giving AMD's ace a serious run for the money. In fact, AMD dropped the prices of the 7900s and 7700s and threw in a (temporary) free game bundle to further sweeten the deal.

NVIDIA further shook things up as we went to press with the announcement of the GeForce GTX 690. Scheduled to be available for a cool \$999 by the time most of you read this, the GTX 690 drops two GK104 GPUs on a single board, which theoretically means you can get the performance of two GeForce GTX 680s in SLI, only with one graphics card. The GTX 690 boasts 3,072 CUDA cores, as well as 4GB of GDDR5. It looks like a stunner, too, with a plated aluminum frame, magnesium fan housing, polycarbonate windows, and laser-etched LED lighting.

No Time Like The Present

Oh yeah, now's a great time to buy a new graphics card. Read on for our updated Video Card Buyer's Guide, where you'll find tons of cards priced to move, along with a few words on why they're worth your money, who should buy, as well as memory, available ports, and interface specs. Prices marked with an asterisk (*) were current online prices at the time of this writing. ■

NVIDIA Quadro 5000

\$2,249

www.nvidia.com

Why You'll Dig It: The Quadro 5000 features NVIDIA's new Scalable Geometry Engine technology, which enables the GPU to process up to 950 million triangles per second, making it ideal for high-performance 3D workloads. This dual-slot workstation card features 352 CUDA cores capable of pumping out 718 GFLOPs single precision and 359GFLOPs double precision raw compute power. The 2.5GB of GDDR5 can also handle 120GBps memory bandwidth. Other features include NVIDIA Multi-OS Technology, SLI Mosaic Technology, NVIDIA CUDA Architecture, SDI option, G-Sync option, SLI frame rendering support, and NVIEW Display Management Software.

Who Should Apply: Professionals looking to supercharge their graphics-intensive applications will be pleased with the performance and feature set of this card.

Memory: 2.5GB GDDR5

Interface: PCI-E 2.0 x16

Ports: DVI, Dual DisplayPort, Stereo



GIGABYTE GeForce GTX 680 (GV-N6800C-2GD)

\$524.99

www.gigabyte.us

Why You'll Dig it: For its NVIDIA-based behemoth, GIGABYTE turned to its WINDFORCE cooler and a "Triangle Cool" Technology configuration to keep the GeForce GTX 680 quiet and quick. The stock GeForce GTX 680 has base and boost clocks set at 1,006MHz and 1,058MHz, but GIGABYTE blew those out of the water with 1,071MHz and 1,137MHz base and boost clocks, respectively. With the collection of Ultra Durable VGA components on this card handling power delivery, ambitious overclockers can confidently push this GTX 680 even further. We also like the GTX 680's support for tri- and quad-display multimonitor gaming without SLI.

Who Should Apply: This card is perfect for gamers who want enough graphics horsepower to run the games of today and tomorrow with buttery smooth frame rates and tons of eye-pleasing extras enabled.

Memory: 2GB GDDR5

Interface: PCI-E 3.0 x16

Ports: Dual DVI, DisplayPort, HDMI



MSI R7970 Lightning

\$519.99*

us.msi.com

Why You'll Dig It: The Radeon HD 7970 is already a beast in the latest DX11 games and 3D applications, but MSI goes above and beyond the call of duty with this over-clocked card. The 1,070MHz core and 1,400MHz memory clocks are impressive, as is the Twin Frozr IV cooler, which is designed to eliminate dust buildup and keep the card running fast and cool. We also like that MSI lets you unlock all protections and add your own extreme overclock. Other features include Digital PWM Controller, Enhanced Power Design, and MSI's Military Class III Components.

Who Should Apply: This card is ideal for serious gamers and 3D application enthusiasts who want the best this generation has to offer.

Memory: 3GB GDDR5

Interface: PCI-E 3.0 x16

Ports: Dual DVI, Four Mini DisplayPort



GIGABYTE Radeon HD 7970 (GV-R7970C-3GD)

\$499.99*

www.gigabyte.us

Why You'll Dig It: GIGABYTE's overclocked take on the Radeon HD 7970 pushes the core clock up 75MHz from the stock setting, largely thanks to GIGABYTE's exclusive "Triangle Cool" Technology-infused WIND-FORCE cooler, which uses three large fans with an antiturbulence structure in a new triangle pattern. This graphics card also features Ultra Durable VGA components, including a 2-ounce copper PCB, solid capacitors, ferrite-core chokes, and more, to let you push the clocks higher while maintaining consistent and efficient power delivery to the parts that need it.

Who Should Apply: Gamers and graphics professionals will find more than a few things to love about this card. Eyefinity enthusiasts will also get great results with this Radeon HD 7970.

Memory: 3GB GDDR5

Interface: PCI-E 3.0 x16

Ports: DVI, Dual Mini DisplayPort, HDMI



ZOTAC GeForce GTX 680

\$499.99

www.zotacsua.com

Why You'll Dig It: ZOTAC GeForce GTX 680 raises the performance bar with NVIDIA's new GPU boost technology that maximizes clock speeds on the fly for maximum performance in every gaming scenario. New NVIDIA Adaptive Vertical Sync technology adapts the monitor's vertical sync dynamically to current frame rates for maximum gaming smoothness and playability. NVIDIA Surround technology enables you to have an unmatched immersive gaming experience with a single ZOTAC GeForce GTX 680 graphics card and three displays. A new Assassin's Creed 3-Game pack (Assassin's Creed, Assassin's Creed: Brotherhood, and Assassin's Creed: Revelations) is bundled with the ZOTAC GeForce GTX 680 graphics card. ZOTAC's lifetime warranty for enthusiast and performance graphics cards is available when you register at ZOTAC's U.S. website within 30 days of purchase.

Who Should Apply: Gaming enthusiasts will get the most out of their games with this card.

Memory: 2GB GDDR5

Interface: PCI-E 3.0 x16

Ports: Dual DVI, DisplayPort, HDMI



XFx Double D HD 7950 (FX-795A-TDFC)

\$398.99*

www.xfxforce.com

Why You'll Dig It: Our first glimpse of the Radeon HD 7970 came from XFX (see the April issue of *CPU*, on page 17), and just about everything we loved about that card is here on the XFX Double D HD 7950. Although this card comes with stock core (800MHz) and memory (1,250MHz) clocks, the Double Dissipation cooler is ample enough to support some significant overlocks for willing tweekers. Other features include XFactor components, including solid capacitors, ferrite core chokes, two ounces of copper in the PCB, dust-free IP-5X fans, and the XFX-logoed bracket.

Who Should Apply: Serious gamers who want a compelling and quiet gaming experience will love this card. DYI overclockers will also find it has plenty of core clock headroom.

Memory: 3GB GDDR5

Interface: PCI-E 3.0 x16

Ports: DVI, Dual Mini DisplayPort, HDMI





Since 1979, Sandhills Publishing has produced publications covering technology beginning with the introduction of *Processor*. Over the years, the company has developed a complete line of computing publications, encompassing *Smart Computing*, *PC Today*, *Computer Power User*, and *First Glimpse*. Our plain-English approach has served audiences well for 30 years, ensuring they receive accurate and unbiased technology information to meet their needs.



PowerColor PCS+ HD7870 GHz Edition (AX7870 2GBD5-2DHPP)

\$349.99*

www.powercolor.com

Why You'll Dig It: The PowerColor PCS+ HD7870 GHz Edition is based on the Pitcairn GPU that has a stock 1,000MHz core clock, hence the "GHz Edition" moniker. But PowerColor takes things a step further in this PCS+ version by kicking the core clock up another 100MHz. The memory clock also gets a 25MHz boost for good measure. The card is capable of such impressive clocks thanks to the advanced cooler that uses three heatpipes that come in direct contact with the GPU. A large 92mm fan is also capable of pulling 60% more air across the fins than a standard 80mm fan. PowerColor's design makes the card 15% more stable, 10% cooler, and 15% quieter than the stock card.

Who Should Apply: Gamers with an affinity for Eyefinity will be impressed with this card, and single-monitor gamers won't be disappointed, either.

Memory: 2GB GDDR5

Interface: PCI-E 3.0 x16

Ports: Dual DVI, Dual Mini DisplayPort, HDMI



ASUS ENGTX570 DCII/2DIS/1280MD5

\$314.99*

usa.asus.com

Why You'll Dig It: When we think triple-slot graphics cards, ASUS is the board maker that immediately comes to mind, and it's because of cards like this one. Out of the box, this GeForce GTX 570 has an overclocked core set at 742MHz. Even so, it can pull heat away from the GPU more efficiently than a stock 570; ASUS reports its GTX 570 is 20% cooler thanks to the DirectCU II fansink. ASUS' Super Alloy Power components streamline power delivery for better performance, more stable overclocking, 35 degrees Celsius cooler operation, and the potential for a significantly longer lifespan. The bundled Gamer OSD tool also makes on-the-fly overclocking easy enough for beginners to try.

Who Should Apply: Gamers who want a fast card with a cooler that can handle being pushed to its limits will want to check out this tri-slot GTX 570.

Memory: 1,280MB GDDR5

Interface: PCI-E 2.0 x16

Ports: Dual DVI, DisplayPort, HDMI



HIS 7850 IceQ X (H785QN2G2M)

\$279.99*

www.hisdigital.com

Why You'll Dig It: What can you do with a stock-clocked card with an aftermarket cooler like Hightech Information System's IceQ X? The option is yours to leave the card as is and enjoy years of stable and quiet gaming, or you can push the core clock to new heights for even better performance. This card's cooler features a 92mm silent fan, has four heatpipes to more quickly evacuate heat from the GPU's surface, and only generates 28dB when idle. Like many other cards here, this card features solid capacitors and chokes and a Dynamic Phase Control PWM, which makes this card more energy-efficient and reliable. And like the rest of the Radeon HD 7000 series cards, this card supports AMD's Eyefinity 2.0.

Who Should Apply: This card strikes an excellent balance between gaming power and affordability that serious gamers can't ignore.

Memory: 2GB GDDR5

Interface: PCI-E 3.0 x16

Ports: DVI, Dual Mini DisplayPort, HDMI



Sparkle GTX 560-OC/2G (SXX5602048D5SMH)

\$251.28*

www.sparkletw.com

Why You'll Dig It: Although it's based on the 40nm Fermi instead of the 28nm Kepler used in the GTX 680, the GTX 560 is still an impressive graphics card that lets you push the effects all the way up in most current games. This card also has a large 2GB GDDR5 frame buffer for handling HD textures and all your multimedia needs. The 822MHz core and 1,002MHz memory clocks are ample for running modern games and 3D applications at medium and high resolutions. We also like that the largely enclosed heatsink shroud forces the heat from the GPU out the back of the card.

Who Should Apply: Gamers looking to replace an older graphics card will find a world of difference in the games they play when running on this card.

Memory: 2GB GDDR5

Interface: PCI-E 2.0 x16

Ports: Dual DVI, Mini HDMI



ECS GeForce GTX 560Ti (NGTX560TI-1GPI-F)

\$209.99*

www.ecsusa.com

Why You'll Dig It: ECS may not be known for its after-market coolers; considering the price of this card, however, that is just fine by us. This GeForce GTX 560Ti comes with the stock cooler, stock core clock (820MHz), and stock memory clock (1,000MHz). The benefit of an all-stock configuration is the completely enclosed heatsink shroud, which ensures that little to no excess heat escapes and raises the overall case temperature. Two of these in SLI will be able to handle anything your throw at it, and you get the benefit of NVIDIA's 3D Vision Surround, for an immersive 3D gaming experience.

Who Should Apply: This card is ideal for gamers who don't have supplemental GPU cooling on their case or those looking for a powerful SLI setup on the cheap.

Memory: 1GB GDDR5

Interface: PCI-E 2.0 x16

Ports: Dual DVI, Mini HDMI

**VisionTek Radeon HD 6850 (900339)**

\$174.99*

www.visiontek.com

Why You'll Dig It: AMD's last generation of GPUs, the Radeon HD 6000s, may not have the cachet that the new ones do, but they're currently selling for dramatically less than their launch prices and still deftly handle modern games. This card features a fully enclosed heatsink with a large central fan. The core and memory clocks are set to 775MHz and 1,000MHz, respectively. Although there isn't much in the way of extras available on and with this card, the price is definitely right.

Who Should Apply: Gamers who want a solid experience but don't want to take out a second mortgage will find this Radeon HD 6850 more than capable for the price.

Memory: 1GB GDDR5

Interface: PCI-E 2.1 x16

Ports: Dual DVI, DisplayPort, HDMI



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XFX HD 7770 Super Overclock (FX-777A-ZDSC)

\$159.99

www.xfxforce.com

Why You'll Dig It: Like the Radeon HD 7950 from XFX we already looked at in this buyer's guide, this card boasts XFX's Double D cooler, which consists of a pair of dust-free IP-5X fans and Ghost Thermal Technology, which ensures a quiet but powerful gaming experience. This Super Overclocked card comes with a 1,120MHz core clock and a 1,300MHz memory clock, for better than stock performance in games and 3D rendering workloads. Here too are the XFactor components, including solid-state capacitors, 2-ounce copper PCB, and the XFX bracket design. Like the other XFX card here, this one is fully CrossFire-ready, so multi-GPU gaming is well within reach.

Who should apply: Gamers who want the latest features from AMD's new 28nm GPU, but tend to game at medium resolutions.

Memory: 1GB GDDR5

Interface: PCI-E 3.0 x16

Ports: DVI, Dual Mini DisplayPort, HDMI



ZOTAC GeForce GTX 550 Ti Multiview

\$145.99

www.zotacusa.com

Why You'll Dig It: Embrace triple-monitor computing with the ZOTAC GeForce GTX 550 Ti Multiview graphics card. The ZOTAC GeForce GTX 550 Ti Multiview enables three simultaneous independent displays from a pair of HDMI outputs combined with dual-link DVI or DisplayPort outputs—a ZOTAC exclusive feature—from a single graphics processor. NVIDIA SLI readiness enables two ZOTAC GeForce GTX 550 Ti Multiview graphics cards to work together and deliver up to twice the performance of a single card for the ultimate gaming experience. NVIDIA PhysX technology takes realism to another level for unprecedented immersion.

Who Should Apply: Performance enthusiasts who need triple-monitor computing from a single card.

Memory: 1GB GDDR5

Interface: PCI-E 2.0 x16

Ports: Dual DVI, Dual HDMI, DisplayPort



SAPPHIRE ULTIMATE HD 7750 (11202-03-40G)

\$124.99*

www.sapphiretech.com

Why You'll Dig It: Anytime you read about a silent cooling technology, just mentally replace the word "silent" with the phrase "really quiet." But that's not the case here. Fans of silent should look no further than the SAPPHIRE ULTIMATE HD 7750; there's no fan on this card, so it's truly silent. The large passive heatsink consists of multiple heatpipes intersecting a complex network of aluminum fins. According to SAPPHIRE, it's the first card in this generation to use a passive heatpipe and heatsink cooler.

Who Should Apply: Although it's a full-sized dual-slot card that may not fit in very small or low-profile cases, the SAPPHIRE ULTIMATE HD 7750 is perfect for HTPC enthusiasts who want to enjoy gaming on the big screen.

Memory: 1GB GDDR5

Interface: PCI-E 3.0 x16

Ports: DVI, DisplayPort, HDMI



AMD FirePro V3900

\$119.99*

www.amd.com

Why You'll Dig It: The AMD FirePro V3900 is a professional graphics card designed to handle the 2D and 3D rendering in a variety of workloads. Graphics professionals who perform medium- to light-duty design work will appreciate the large 1GB DDR3 frame buffer. The card's low-profile design also makes it easy to fit in workstations of any size. The FirePro V3900 also supports up to five display devices using AMD Eyefinity multimonitor technology and the DisplayPort 1.2 multistreaming technology. The card also has a dual-link DVI port for running with legacy non-DisplayPort monitors.

Who Should Apply: Graphics professionals who perform medium to light design work and those who need to drive multiple monitors for 2D applications.

Memory: 1GB DDR3

Interface: PCI-E 2.1 x16

Ports: DVI, DisplayPort



Diamond Multimedia AMD Radeon HD 7750 (7750PE51G)

\$119.99*

www.diamondmm.com

These days, gamers on a budget can get some pretty decent performance out of their CPU's integrated graphics, but if you'd rather not toss out your current processor and motherboard, then check out the Radeon HD 7750 from Diamond Multimedia. This card has an 800MHz core clock and 1,125MHz memory clock, which is more than enough to produce playable frame rates at medium resolutions, even in modern games. The large 1GB GDDR5 frame buffer is another feature you'll like on this graphics card.

Who should apply: Gamers on a budget who want a taste of the latest technology from AMD should check out this affordable option from Diamond Multimedia.

Memory: 1GB GDDR5

Interface: PCI-E 3.0 x16

Ports: DVI, DisplayPort, HDMI



GALAXY MDT GeForce GT520

\$116.99*

www.galaxytechus.com

Why we dig it: When you think multimonitor graphics cards, you probably tend to think of AMD. But this NVIDIA-based card from GALAXY was specially designed to support up to four displays. Although it doesn't have the muscle to power four displays in games, 2D applications run fast and flawlessly on this card. This card features an 810MHz core clock and a 500MHz memory clock. A pair of DMS-59 ports on the back connect to the two DMS59-to-dual DVI adapters to support four DVI monitors. The single-slot card is also compact enough to fit in cramped cases and space-limited workstations.

Who should apply: This card is perfect for professionals who work in industries that require multiscreen viewing of several applications at once.

Memory: 1GB DDR3

Interface: PCI-E 2.0 x16

Ports: Dual DMS-59 ports (Four DVI)





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GAMING PC BUYER'S GUIDE

BUILDING A PC IS EASY. DESPITE WHAT OUR FAMILIES insist, you don't need to belong to a secret order of technowizards or hold an advanced degree from MIT to assemble a cutting-edge rig. Yes, there's a learning curve, but once you know what goes where, swapping PC parts is not so different from replacing a light bulb—a very, very expensive light bulb.

Whether you've been a *CPU* reader for 10 years or 10 minutes, you know that we're big believers in DIY. From buying parts to making precision mods, there's something almost viscerally satisfying about creating a truly custom PC yourself. Why do you think the car enthusiast comparisons flow so frequently on these pages? Our systems are our hot rods.

However, keeping both those things in mind, there's something to be said about going boutique. For starters, these builders' systems are, by and large, just as custom as something we could build. In some cases, boutique systems are even more custom than most DIY "custom" PCs. The fact of the matter is that most enthusiasts have never touched a spray gun and couldn't re-wrap

their PSU wiring if their lives depended on it. A lot of pro shops can paint and wire like it's their job . . . because it's their job.

Likewise, although many hardware makers have taken incredible strides to make overclocking and performance tuning more accessible than ever, really pushing a homebrew PC to its limits is as warranty-voiding as ever. But when you enlist the services of a boutique, the builder frequently backs any performance modding with a nice little warranty.

Many boutiques go beyond even standard extras. Some have the power to build a truly one-of-a-kind system, inside and out, tailored to your every whim and fancy. We have to be honest: It's a compelling proposition.

Now Playing At A Boutique Near You

In this cutthroat business, your stay will be a short one if you can't offer enthusiasts the latest and greatest. PC boutiques know this as well as anyone, and so they're all stocked with the best



THE PROFESSIONAL

components money can buy. Intel's biggest Bridge (that would be Sandy Bridge-E) and bunch of Bulldozers from AMD (in the form of its reborn FX line of CPUs) are available, as are graphics cards based on the latest GPUs from AMD and NVIDIA, wicked-fast SSDs (in RAID 0, if you want), and so many other premium offerings. Most of the systems we selected for this guide tend to be each boutique's flagship model, but rest assured that all of them have a wide selection of systems.

Finally, think of the systems featured here as a starting point rather than a final destination. Because these are custom systems, the parts, and therefore the price, could differ wildly from what you configure. All configurations listed were available at the time of this writing.

Have a look at the arsenals of these top PC mercenaries. ■

ONALIS

Falcon Northwest Mach V ICON2

\$5,448

www.falcon-nw.com

Why You'll Dig It: Falcon Northwest is one of the original birds of prey in the boutique PC space. Operating out of the Pacific Northwest for two decades, Falcon continually strives to produce custom gaming PCs that push the envelope in terms of performance and aesthetics. The boutique has just about every hardware configuration you can imagine at its disposal (our Mach V ICON2 has Intel's top-of-the-line CPU and two of NVIDIA's flagship graphics cards, for example), plus some truly out-of-this-world paint jobs. If you want proof of what sort of masterpieces Falcon's artists are painting on their "canvases," check out the company's gallery (www.falcon-nw.com/falcon-gallery).

Who Should Apply: The Mach V ICON2's GTX 680 tag team will stand up to whatever game you throw at it. This makes the Mach V ICON2 suited for everything from Battlefield 3 to FIFA.

CPU: Intel Core i7-3960X

Form factor: ATX full tower

Graphics: NVIDIA GeForce GTX 680 (2x, SLI)



Velocity Micro Raptor Signature Edition

\$5,079

www.velocitymicro.com

Why You'll Dig It: Velocity Micro is another pillar of the boutique community. The house that Randy (Copeland) built has been churning out custom rigs for a decade and a half (and for two decades if you count the time Copeland was building high-end CAD machines before Velocity Micro's founding in 1997). The Raptor Signature Edition is Velocity Micro's flagship system, and this one has a lot of muscle. Intel's Core i7-3960X is still king of the desktop CPU hill, and it's strapped to ASUS' very impressive P9X79 Deluxe motherboard. This monster also features Velocity Micro's LiquiCool 6 Fluid Cooling System, encouraging you to overclock your little heart out.

Who Should Apply: Thanks to an EVGA GeForce GTX 680, the Raptor Signature Edition will serve you well with the current crop of demanding titles, such as Metro 2033, and put in you good shape for the future. (Crysis 3, anyone?)

CPU: Intel Core i7-3960X

Form factor: ATX midtower

Graphics: EVGA GeForce GTX 680



Digital Storm Aventum

\$5,050

www.digitalstormonline.com

Why You'll Dig It: Digital Storm has declared war on system heat and has appointed its ARES (Automatic Response to Excess-Heat System) as its champion. ARES uses a host of thermal probes to gather real-time temperature readings and uses those readings to adjust the performance of the Aventum's 13 chassis fans on the fly. The right side panel even has a small display module that shows coolant temps, thermal zone temps, and system specifications. If you obsess over the thermals of your premium parts, the Aventum is the machine for you. And speaking of premium parts, the Aventum has a Core i7-3930K, ASUS SABERTOOTH X79 motherboard, Corsair Pro Gold Series 1,200W PSU, a 120GB Corsair Force Series GT OS drive, and two GeForce GTX 680s.

Who Should Apply: The Aventum's graphics subsystem is ideal for intense RTS titles with a lot of units displayed at once or for top-tier FPS games at high-resolutions and maximized visual effects.

CPU: Intel Core i7-3930K

Form factor: ATX full tower

Graphics: NVIDIA GeForce GTX 680 (2x, SLI)



Geekbox Ego X79 3D Vision 2

\$4,977

www.geekbox.com

Why You'll Dig It: Think of this as an all-in-one adventure kit for 3D gaming. There's a lot of choice hardware (Intel's Core i7-3960X, an ASUS Rampage IV Formula motherboard, and two NVIDIA GeForce GTX 680s) crammed into this geeky box, but this custom machine also comes with goodies outside of the chassis. In this instance, it's ASUS' VG278H, a 27-inch, LED-backlit, 3D LCD. (You also get a pair of NVIDIA 3D Vision glasses with this package.) You can give the Ego a cool look with one of Geekbox's existing paint jobs, such as Maniacal Metallic White or Ferrari Black, or give Geekbox a ring (888-GEEKBOX) to discuss a custom color of your own.

Who Should Apply: Anyone who's fully committed to 3D gaming will find that the Ego X79 3D Vision 2 will set them up to take on any game in glorious 3D.

CPU: Intel Core i7-3960X

Form factor: E-ATX midtower

Graphics: NVIDIA GeForce GTX 680 (2x, SLI)



CyberPowerPC Fang III Black Mamba

\$4,695

www.cyberpowerpc.com

Why You'll Dig It: This mighty machine stands tall, thanks to the AZZA Fusion 4000 chassis, and is filled with high-end hardware. You get a liquid-cooled Intel Core i7-3960X, which CyberPower gives its Ultimate OC treatment, an overclock of at least 30%, free of charge. The liquid coolant coursing through the Fang III Black Mamba's veins also flows through the graphics subsystem, a pair of EVGA GeForce GTX 680 Hydro Copper in SLI, in this case. The Fang III Black Mamba does solid state right, too, using two 120GB OCZ Agility 3 SSDs in RAID 0 as a boot drive that's big enough for your OS and a lot of games. CyberPower also includes a 2TB HDD for your mass storage needs.

Returning to that AZZA case, it's simply a monster. Standing at 30.7x10.2x24 inches (HxWxD), the Fusion 4000 is a tower among towers. In fact, the bottom portion of the chassis supports a standard system, while the top portion can house a Mini-ITX-based system. (So many high-end rigs have lots of "dual" components, but it's rare to have a custom machine that can be a "dual-system" system.) In short, even though the Fang III Black Mamba is already dressed to the nines with amazing hardware, it has plenty of room to grow.

Throw in an ASUS Rampage IV Extreme motherboard, 16GB of DDR3-1600, a 1kW Cooler Master Silent Pro Gold 80 PSU, and an LG Blu-ray burner, and you have a sinister system with potent fangs.

Who Should Apply: Thanks to the tandem of 680s, gamers who play demanding FPS titles like Crysis or Metro 2033 will be very satisfied with the Fang III Black Mamba's firepower. Beyond that, the Fang III Black Mamba's mighty Core i7-3960X makes this system ideal for gamers who are also serious about video editing, file compression, and other CPU-intensive tasks.

CPU: Intel Core i7-3960X

Form factor: E-ATX full tower

Graphics: EVGA GeForce GTX 680 Hydro Copper (2x, SLI)



Puget Systems Deluge L2

\$4,683.67

www.pugetsystems.com

Why You'll Dig It: There must be something about the Pacific Northwest that brings out the boutique builders. Puget Systems hails from the suburbs of Seattle, but the hometown isn't really what matters. What matters is that Puget builds solid enthusiast systems and puts an emphasis on customer service. The boutique frequently receives rave reviews from its customers about the level of personal contact and support they receive from Puget throughout the life of their system. This is also a downright solid machine, with a liquid-cooled Intel Core i7-3930K and AMD Radeon HD 7970. It also has a 120GB Intel SSD 520, which you can and should load up with your most frequently played games.

Who Should Apply: If you're interested in custom liquid-cooling but don't want to get your hands wet to get the look, it's hard to beat the Deluge 2. Puget also has multiple SLI and CrossFire options, as well, in case you need a little more heavy artillery for your graphics subsystem.

CPU: Intel Core i7-3930K

Form factor: ATX midtower

Graphics: AMD Radeon HD 7970



Origin PC Genesis

\$4,677

www.originpc.com

Why You'll Dig It: Remember the Big O? (See page 70 in the October 2010 issue if you don't.) The same people who created that monstrosity have been building Genesis rigs for quite some time now. And trust us, the hardware in this Genesis, while exceptional by most standards, represents only a fraction of the awesome Origin is able to pack within the confines of a PC case. This Genesis has dual Radeon HD 7970s, dual 240GB Intel SSD 520s in RAID 0, and an ASUS Rampage IV Extreme motherboard. Intel's Core i7-3930K, with its unlocked multiplier, awaits your overclocking endeavors. If you long for more, the sky's the limit, provided you have the imagination and a bank account to match.

Who Should Apply: Although the duo of 7970s will no doubt appeal to FPS gamers who play titles notorious for crushing GPUs, RTS pros who regularly manage massive numbers of units will find that the Genesis provides a fluid experience.

CPU: Intel Core i7-3930K

Form factor: E-ATX full tower

Graphics: NVIDIA GeForce GTX 680 (2x, SLI)



AVADirect Custom Gaming PC

\$4,612.79

www.avadirect.com

Why You'll Dig It: AVADirect has built quite an impressive résumé, serving clients ranging from Lockheed Martin to the U.S. Army, so we'd like to think you'll be in pretty good hands if you tap them to build you a Custom Gaming PC. The components in this particular Custom Gaming PC are second to none, too; a pair of SAPHIRE Radeon HD 7970s in CrossFire and Intel's Core i7-3960X are the headlining acts. You also get a heaping helping of Corsair components, too, with 32GB of Vengeance LP PC3-12800 DDR3, a Hydro Series H100 closed-loop CPU liquid-cooler, and the menacing Obsidian Series 800D full tower.

Who Should Apply: AMD's flagship Radeon HD 7970 takes no prisoners. We can safely say that the pair of SAPHIRE 7970s in the Custom Gaming PC can handle every game out there, and probably at extreme resolutions and quality settings.

CPU: Intel Core i7-3960X

Form factor: E-ATX full tower

Graphics: SAPHIRE Radeon HD 7970 (2x, CrossFire)



StealthMachines Shadow

\$3,916

www.stealthmachines.com

Why You'll Dig It: Stealth Machines delivers the goods, with a little help from the likes of Intel, Corsair, XFX, and others. The heart of the Shadow is a 3.2GHz Intel Core i7-3930K, and its installed in MSI's X79A-GD65 mobo. Elsewhere, this Shadow sports two XFX Double D HD 7950s running in CrossFire, naturally, as well as a 120GB Intel SSD 520 boot drive and a massive 3TB Seagate Barracuda. Stealth Machines installed everything in Corsair's Obsidian Series 650D, so the system looks as intimidating as it performs.

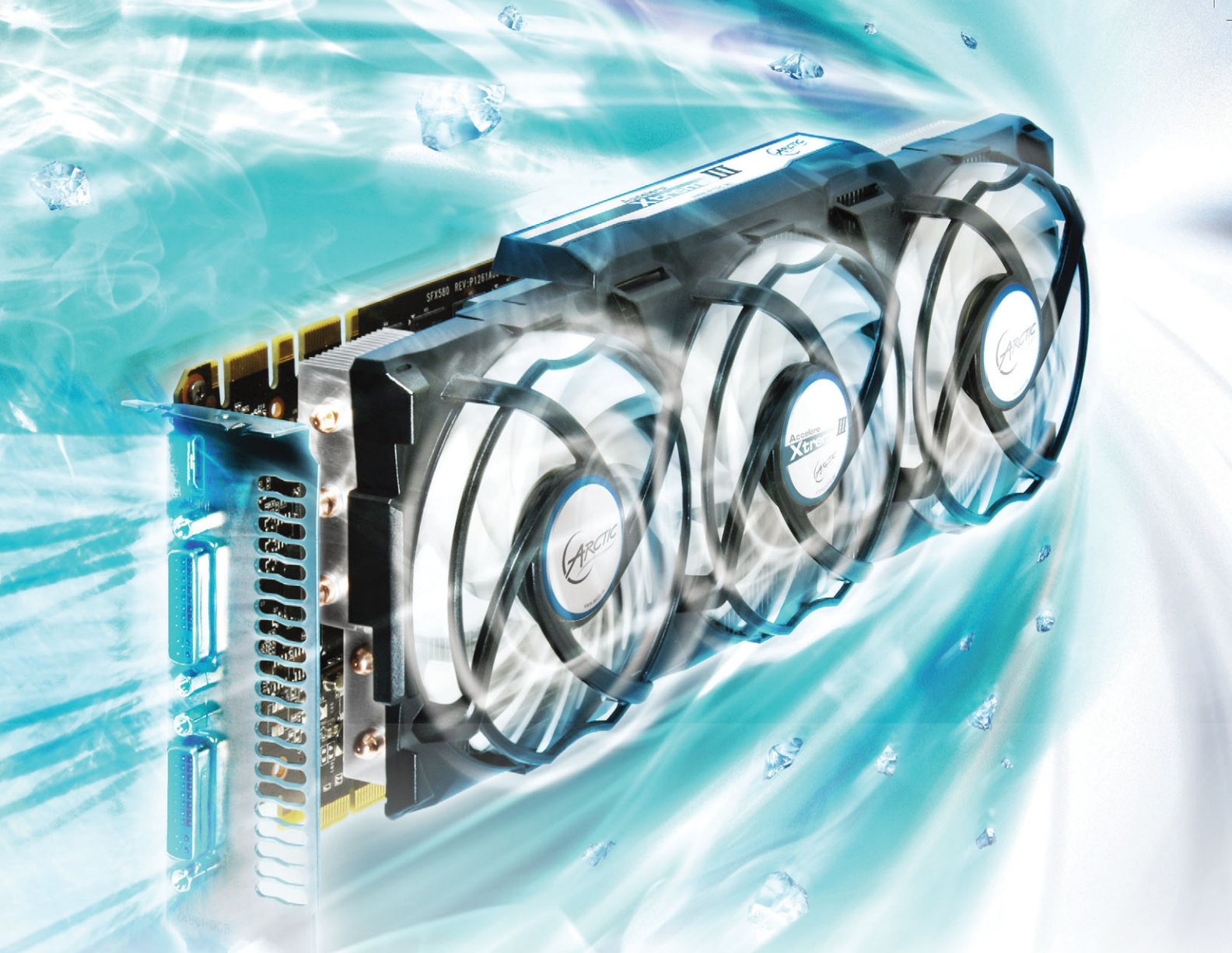
Who Should Apply: XFX's Double D HD 7950 is on double duty here, which should help you pull down some sweet frame rates if you're running a lush game such as Kingdoms of Amalur at high quality settings, or if you want to take advantage of games that offer impressive visuals when DX11 is enabled.

CPU: Intel Core i7-3930K

Form factor: ATX midtower

Graphics: XFX Double D HD 7950 (2x, CrossFire)





**Compatible with NVIDIA
GTX 680***

Cool Presto Graphics

*For more compatibility details please visit our website.

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VGA Cooler for Enthusiasts

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- Patented fan holder eliminates the buzzing sounds
- Enhanced RAM and VR cooling by thermal adhesive
- Pre-applied MX-4 thermal compound
- CrossFire, SLI compatible



www.arctic.ac



Shuttle H7 5800G Pro

\$3,729.99

us.shuttle.com

Why You'll Dig It: Shuttle's H7 5800G Pro banishes the notion that a benchmarking-busting rig needs to be of backbreaking proportions. Standing a mere 7.5 inches short (plus 8.2 inches wide and 12.8 inches deep), the H7 5800G Pro is a powerhouse you can practically fit in your backpack. Of course, putting a freaky fast Core i7-990X and NVIDIA's previous generation flagship GeForce GTX 580 into such a small frame is bound to generate a lot of heat, which is why Shuttle's proprietary I.C.E. Evo cooler is just what the H7 5800G Pro needs to avoid becoming a thermal disaster. With 16GB of DDR3-1600, a 256GB 6Gbps SATA SSD, and a Blu-ray burner, the H7 5800G Pro is a superb SFF PC.

Who Should Apply: LAN party gamers will fall in love with the H7 5800G Pro's portability, especially because its arsenal is easily as lethal as many full tower systems.

CPU: Intel Core i7-990X

Form factor: Custom small form factor

Graphics: NVIDIA GeForce GTX 580



CPU Solutions Core i7-3960X Extreme Performance PC Socket 2011

\$3,822.86

www.cpusolutions.com

Why You'll Dig It: Sometimes, the extras make all the difference. This gamer from CPU Solutions comes with some dynamite peripherals, especially the Razer BlackWidow Ultimate keyboard and Cyber R.A.T. 7 gaming mouse. Another big plus in this system is a wicked-fast OCZ RevoDrive 3 X2—240GB of PCI-E solid-state storage to boot Windows and load games in a flash. Corsair's Hydro Series H80 and an ASUS SABERTOOTH X79 motherboard are two more examples high-end hardware that's front and center here. CPU Solutions also subjects the PC to a 24-hour burn in period to ensure that all of the components are on the up-and-up.

Who Should Apply: A single Fermi is still a formidable force. If you roll with a 1,920 x 1,200 LCD, you'll find that the Core i7-3960X Extreme Performance PC Socket 2011's GeForce GTX 580 serves up great frame rates in AAA titles such as Skyrim, Battlefield 3, and more.

CPU: Intel Core i7-3960X

Form factor: ATX midtower

Graphics: PNY GeForce GTX 580



V3 Gaming Avenger 3DS

\$3,699

www.v3gamingpc.com

Why You'll Dig It: Here's another rig that's equipped for 3D gaming right out of the box(es). NVIDIA's 3D Vision is the tech of choice for the Avenger 3DS, and the system's two GeForce GTX 680s in SLI will give you all the eye candy those 3D glasses (which are also included, by the way) can handle. Elsewhere a quad-core Intel Core i7-3820 and MSI's X79A-GD45 combine to give you access to Intel's latest and greatest enthusiast platform. The best part, though, is that V3 Gaming ships the Avenger 3DS with an ASUS VG236H 23-inch wide-screen 3D LCD. Have your favorite games ready, unbox this beast, put on the glasses, and prepare for total immersion.

Who Should Apply: Naturally, if you're ready to take the 3D plunge, the Avenger 3DS gives you everything you need but the games. And for that, head to www.nvidia.com/object/3d-vision-games.html to see the list of qualified 3D Vision games.

CPU: Intel Core i7-3820

Form factor: ATX midtower

Graphics: NVIDIA GeForce GTX 680 (2x, SLI)



Centaurus PC Shadowtrail Project Warlord

\$3,669

www.centauruspc.com

Why You'll Dig It: Centaurus PC's Shadowtrail systems come in two flavors: Project Rezzor and Project Warlord. The latter is, according to Centaurus, the boutique's "most upgradable desktop ever." The Cooler Master HAF 922 is filled to the gills with enthusiasts' favorite hardware, including Intel's new Core i7-3930K, two NVIDIA GeForce GTX 580s, a 128GB Crucial SSD, and a Blu-ray burner. Centaurus also offers a veritable rainbow of cold cathode lighting, so you can add some flash to your fast.

Who Should Apply: NVIDIA's GF110 remains one of the powerful GPUs on the planet, so two of them together are going to give you great performance in games like Modern Warfare 3 and Battlefield 3. You'll be more than prepared for this year's big-time releases, such as Diablo III and Max Payne 3.

CPU: Intel Core i7-3930K

Form factor ATX midtower

Graphics: NVIDIA GeForce GTX 580 (2x, SLI)



Alienware Aurora

\$2,149

www.alienware.com

Why You'll Dig It: Alienware has been around for over 15 years, making it one of the oldest boutique builders in the biz. And although these extraterrestrials have serving on the Dell mothership for a few years, the systems Alienware builds maintain a distinct custom look. The Aurora ALX chassis looks oh so nice, and you can further personalize it by choosing a color from Alienware's broad palette (including Astral Aqua, Plasma Purple, and more). Beyond that, Alienware sells a host of its own peripherals (keyboard, mouse, and a beautiful, 3D-capable 23-inch display), which let you create a completely cohesive setup.

Who Should Apply: The AMD Radeon HD 7870s in CrossFire are surprisingly peppy, and you'll notice that the 2GB frame buffer in each of these cards will be especially helpful in games that are hungry for VRAM at higher display resolutions.

CPU: Intel Core i7-3820

Form factor: ATX midtower

Graphics: AMD Radeon HD 7870 (2x, CrossFire)



Performance Personal Computers Fenris

\$2,907

www.performancepc.net

Why You'll Dig It: Intel's Core i7-3930K and its unlocked multiplier are ready for serious overclocking, and the specialists at Performance PC are ready to do it. The Fenris suits up for battle inside Cooler Master's HAF 932, and Antec's KUHLEH H20 920 keeps this war machine running cool enough that we selected the 25-35% PPC Overclock. Elsewhere, the Fenris sports a 240GB OCZ Vertex 3 SSD, Western Digital's 1TB Caviar Green HDD, and 8 gigs of Corsair Vengeance DDR3-1600. Performance PC offers you a long list of optional components, and you can call them (888-574-6342) to request additional hardware if you don't see it available.

Who Should Apply: Because of its meaty, 3GB frame buffer, which runs on a 384-bit bus, the ZOTAC AMP2! GeForce GTX 580 found in the Fenris is ideal for running games that cripple cards without sufficient VRAM for all the eye candy turned on at higher resolutions. The card is custom-cooled and factory-overclocked, too, so it invites gamers who are also tweekers.

CPU: Intel Core i7-3930K

Form factor: ATX midtower

Graphics ZOTAC AMP2! GeForce GTX 580



iBUYPOWER Gamer Paladin D875

\$1,762

www.ibuypower.com

Why You'll Dig It: Recognize that chassis? It's Antec's LanBoy Air, one of the most interesting and customizable cases around. Thanks to the fact that most of the case is made up of perforated mini panels, the LanBoy Air is an easy-breezy case that gives your components all the air cooling they need. But if the LanBoy Air doesn't strike your fancy the way it strikes ours, know that iBUYPOWER lets you customize the Gamer Paladin D875 with an ample selection of alternate cases from the likes of Cooler Master, Corsair, Thermaltake, NZXT, and more. The Intel Core i7-3820, GIGABYTE GA-X79-UD3, and an NVIDIA GeForce GTX 680 form the foundation of a solid gamer.

Who Should Apply: There's no SLI, but no worry, either. The single 680 should let you battle in Battlefield 3 or war in Modern Warfare 3 giving you great frame rates on widescreen displays of any size.

CPU: Intel Core i7-3820

Form factor: ATX midtower

Graphics: NVIDIA GeForce GTX 680



CyberPowerPC Zeus Lightning 3000

\$1,439

www.cyberpowerpc.com

Why You'll Dig It: AMD's top dog CPU, the 3.6Hz octo-core FX-8150, is front and center in this system of Olympian stature. CyberPowerPC throws in its Extreme OC (which is a 20% minimum overclock) free of charge. Thanks to the included CyberPower Xtreme Hydro Liquid Cooling Kit, the intrepid among you could always try to push the FX-8150 even higher. And if you're a big fan of freebies, the Zeus Lightning 3000 qualified for free copies of DiRT 3 and Deus Ex: Human Revolution at the time of this writing.

Who Should Apply: In its standard configuration, the Zeus Lightning 3000 has an AMD Radeon HD 7850 graphics card. One of the most recently introduced GPUs in AMD's Southern Islands family, a single 7850 is just about perfect for RTS games. When StarCraft II: Heart of the Swarm launches, you'll be in great shape.

CPU: AMD FX-8150

Form factor: ATX full tower

Graphics: AMD Radeon HD 7850 2GB



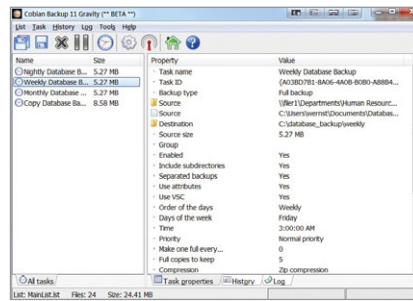
Inside The World Of Betas

Cobian Backup 11 Beta

We've been recommending Cobian Backup since version 8, and the latest beta of version 11 keeps building on greatness.

Cobian is not a disk imaging tool, nor is it a kind of "software RAID" that always checks for new files and then makes copies. Instead, it's more of a traditional backup tool: You tell it what files or folders you want it to back up, where you want the backed up files to go, and how often you want it to make a backup, and Cobian does the rest. It runs in the background either as a standalone application or as a set of Windows services, but its memory footprint is astonishingly small either way.

Cobian produces good old ZIP files, meaning you can recover your files using



any PC or Mac in the event of a disaster; the 7z compression format is an option, too. For the security-minded, Cobian also offers AES encryption. Cobian can make incremental, differential, or full backups, and it can automatically keep a certain number of old backups on hand for versioning. It uses a good combination of wizard-like dialog boxes as well as

Cobian Backup 11 beta
Publisher and URL: Luis Cobian,
www.cobiansoft.com

ETA: Q3 2012

Why you should care: Like a fine wine, this great backup utility gets better with age.

drag-and-drop to make file selection, exclusion, scheduling remarkably simple and intuitive.

Although the beta is basically the first for a brand-new version, Cobian Backup has been around for years, so we didn't experience any glitches typically associated with beta releases. Use it to send backups to external or secondary drives, network drives, or FTP sites, and you'll be pleased with the results. ■

MultiMi 0.20.1

Stop and think about all the online services you rely on every day. Staggering, isn't it? MultiMi not only rounds up the litany of social networks, webmail providers, and cloud services you use, but it also integrates them together in innovative ways.

Once installed, MultiMi prompts you for your login information to lots of popular services. (Fear not—MultiMi only stores your personal info locally on your system.) It knows how to work with Gmail, Yahoo! Mail, Hotmail, and IMAP/POP servers for email; Facebook, Google+, LinkedIn, and Twitter for social media; Google Calendar and Facebook's Events for dates and events, Picasa and Flickr for images and photos (along with your social media accounts); YouTube for videos; Google Docs, box.net, and your local file system



for documents; and Google Talk and Facebook Chat for IM. Once you let MultiMi log in to these services for you, the magic happens.

MultiMi's home screen acts as a dashboard for these services, showing you email, photos, a Facebook feed, and events all at once. They update automatically, and clicking something brings you to a specialized screen especially laid out for that content. You can also tweet, update your Facebook

MultiMi 0.20.1 beta
Publisher and URL: Zbang It, www.zbang.it
ETA: Q3 2012

Why you should care: There isn't a better way to streamline all of your social media accounts.

status, or send an email directly from the Compose button. You can drag and drop images from your Picasa web album (for example) directly into an email, or into a status update. In other words, MultiMi is able to make connections between otherwise separate services and people, potentially saving lots of time and effort.

If there's a negative, it's that the beta is awfully slow to respond to mouse clicks, but we hope that's just because we're playing with prerelease code here. Otherwise, this is an app to watch. ■

RUBY

- Dimension:180(W)x420(H)x420(D)= 7.10"x16.55"x16.55"
- Max. Motherboard size:12"x10"
- 4 open 5.25" drive bays
- 1 open 3.5" drive bays
- 5 hidden 3.5" drive bays
- Built-in 2 front USB 2.0+Audio Output
- An 80mm blue LED fan was installed in the back
- This case comes with a LOGISYS black coated 480watts SATA Cable power supply, compatible with 20/24pin MotherBoard
- Rear Fan Mount x1 for 80mm / 90mm Cooling Fan
- Toolless Thumb Screws
- Clear Side window w/ precut Vent and 80mm fan mounting grill.



ULTRA STYLISH
COOLING PAD

NP1

PORTABLE LAPTOP
COOLER

NP19

BAMBOO LAPTOP
COOLER

NP2600

PURE ALUMINUM
LAPTOP COOLER

NP8



368 SOHO

- Dimension:180(W)x420(H)x450(D)= 7.10"x16.55"x17.75"
- Max. Motherboard size:12"x10"
- 3 open 5.25" drive bays
- 1 hidden 5.25" drive bay
- 6 hidden 3.5" drive bays
- Built-in 2 front USB 2.0+Audio Output
- An 80mm black fan was installed in the back
- This case comes with a LOGISYS black coated 480watts SATA 12CM fan power supply, compatible with 20/24pin MotherBoard
- Front Fan Mount x 1 for 80mm / 120mm Cooling Fan
- Rear Fan Mount x 1 for 80mm / 90mm Cooling Fan
- Side Fan Mount x 1 for 80mm Cooling Fan
- Toolless Thumb Screws

WWW.ELOGISYS.COM

LOGISYS



Upgrades That'll Keep You Humming Along

Significant updates come from two security software publishers this month. Meanwhile, NVIDIA treats gamers to new features.

Software Updates

Ad-Aware 10 Free Antivirus +

This spyware and virus-hunting software has been with us for many years. But this major update across the line, including the premium version, adds numerous features. Gamers get a special mode that suspends security alerts, scans, and auto-updates to ensure smoother, uninterrupted gaming. Real-time protection watches for potentially dangerous behavior going on in the background at all times. New download protection scans files before they are downloaded to the hard drive. And a security toolbar scans links and URLs for danger.

www.lavasoft.com

AVG 2012 Service Pack

This year's version of the familiar free and premium virus protection suite gets a mid-year upgrade. This free service pack adds support for the Do No Track initiative by giving users the option to turn tracking on or off when a site is offering the option. Also in this release, WiFi Guard warns a user if her laptop is trying to connect to an unknown or previously unused network.

www.avg.com

Calibre 0.8.47

The versatile multi-format e-book reader and library management software now supports all named entities in the HTML5 spec when converting titles. The app now supports viewing and converting the Haodoo PDB format. The developers also fixed numerous bugs and added material from the Melbourne Herald.

calibre-ebook.com/whats-new

Chrome Beta

The latest pre-release of the popular Google browser now lets you sync your open tabs across devices. If you are signed in to Chrome on one browser, then you can see and choose to open tabs that are active on Chrome for your Android phone or laptop.

chrome.blogspot.com

iTunes 10.6.1

If Apple's venerable player/library software tends to quit when playing videos, changing artwork size or trying to sync photos to devices, then this fix is for you. The update also integrates better with VoiceOver and Window-Eyes interfaces so they properly describe the interface. This release also fixes a media ordering problem when viewing iTunes library material on your Apple TV.

support.apple.com

Lightroom 4.1 RC

Adobe's suite of photo-editing tools gets an update that accommodates the newly released Canon EOS 5D Mk III D-SLR. But more than that it also squashes a bug affecting external applications that use the "Edit In" function. The Point Curve adjustments have been restored. You now can update DNG previews and metadata for more than 100 photos. Performance issues have been addressed, especially those that affected loading GPS track logs.

blogs.adobe.com

Office 2011 SP2 For OS X

For the Mac user, this is a long-awaited major release. It includes important performance improvements for the all-important Outlook client, including better

display of message content, better deleting of multiple messages, and faster syncing with Exchange servers. PowerPoint now supports full-screen views in Lion, and users can now paste special hyperlinks. As of late April, Microsoft had temporarily withdrawn SP2 from auto-updating because of an issue some users were having with it corrupting the database. The update still can be downloaded manually, and Microsoft has posted workarounds for the problem at its blog.

support.microsoft.com

Safari 5.1.5

The update to Apple's cross-platform browser improves stability in the Windows version. It also includes the security fixes that were issued in the 5.1.4 version just a couple of weeks earlier. This fix addressed the possibility that Web visits still could be recorded in the browser history even when in Private Browsing mode. Security fixes involving WebKit sites also prevent scripting attacks from malicious websites.

support.apple.com

Driver Bay

NVIDIA GeForce R300, 301.10

The NVIDIA drivers add support for the new GTX 680 card. The drivers have GPU Boost Technology, which dynamically adjusts clock speed based on the workloads from games. The FXAA feature offers anti-aliasing up to 60% faster. Adaptive Vertical Sync enables vertical sync based on current frame rates. And Frame Rate Target lets you set the ideal frame rate for your gameplay if the third-party software supports it.

www.geforce.com

Microsoft Windows Store

We Get Up Close & Personal

Microsoft must sense that it's now or never. With Apple and Google devouring the mobile market and the number of desktop PC shipments steadily declining, the top minds in Redmond are pulling out all the stops for Windows 8. The Win8 Consumer Preview is now live, and the Metro interface that debuted under Windows Phone 7 is now spilling over into tablets, notebooks, and desktops.

In general, the response to Microsoft's Live Tile interface design has been positive. At least at this prerelease stage, the Win8 Consumer Preview seems meant for fingertips more than mouse clicks, but it's decent enough on a desktop with conventional peripherals, and we like having a more unified look and feel across Microsoft's device universe.

Along with Win8 comes the new Windows Store. If this seems like a copycat maneuver following in the wake of Apple's App Store and Google's Android Market (now part of Google Play), well, consider the realities of today's market. Between Steam, the Xbox Games Marketplace, and the various mobile app outlets, how often do most users go to a brick and mortar store and buy boxed software? The Windows Store is simply another logical step into the cloud for Microsoft, just as we've seen with SkyDrive, Office 365, and similar instances of Microsoft flexing its globally distributed data center muscle. Digital distribution is simply how publishers sell their apps now. No, Microsoft didn't popularize the app store concept, but that's no reason not to design and operate

Cut The Rope
Home > Games > Puzzle

2096 ratings
★★★★★
Free
Install

When you install an app, you agree to the [Terms of Use](#)

This app has permission to use:
Your Internet connection

Age rating: 3+
Developer: Zeptolab UK Limited (Preview)
Zeptolab

Overview Details Reviews

369 reviews Sort by: Newest

Great games - tons of laughs
★★★★★ Thursday, March 08, 2012
I just wish it had more levels!
2 out of 2 people found this review helpful
Was this review helpful? Yes No
[Report this review](#)

Very Cute
★★★★★ Thursday, March 08, 2012
Domenick
This is an addictive game for children of all ages (I'm 51) dl it and lose a few hours. A lot of people are complaining of crash's and hangs. Mine did also I removed soluto and it played fine, might just be another piece of software causing the problem it's definitely worth a try.
1 out of 1 people found this review helpful
Was this review helpful? Yes No
[Report this review](#)

Addictive and funny...
★★★★★ Thursday, March 08, 2012
Vincent
This game is very funny and addictive. Need more levels though.
1 out of 1 people found this review helpful
Was this review helpful? Yes No
[Report this review](#)

Excellent game!
★★★★★ Thursday, March 08, 2012
Nickolay
The greenie is just awesome, hilarious! Please, please add more levels!
0 out of 0 people found this review helpful
Was this review helpful? Yes No
[Report this review](#)

Games 17 apps

Home All subcategories All prices Sort by noteworthy

Action Adventure Arcade Card Casino Family Kids Music Puzzle

Adventure
★★★★★ Free

Jopli
★★★★★ Free

Xbox LIVE Games
★★★★★ Free

FlipSaw
★★★★★ Free

Solitaire
★★★★★ Free

Pew Pew
★★★★★ Free

Pirates Love Daisies
★★★★★ Free

Mahjong Deluxe!
★★★★★ Free

Carmen Sandiego Adventures in...
★★★★★ Free

Train Titans
★★★★★ Free

Air Soccer
★★★★★ Free

Pinball FX2
★★★★★ Free

Windows Store doesn't try to reinvent the review wheel. You'll see the familiar five-star scale, avatar thumbnails, and "Was This Helpful?" prompts.

Windows Store offers a handful of pull-down filter menus to help your browsing if you're not sure what title you'd like.

a great one. Let's dig into the Windows Store and see what you can expect.

First Store Steps

Right up front, know that the Windows Store is a retail front end for the distribution of Metro-style apps. This is no small change for Microsoft, which has a long history of trying to fold old habits and architectures into new releases. The old methods for buying pre-Metro software haven't gone away (although the current Windows Marketplace for Mobile is scheduled to evaporate on May 9), but the Windows Store looks to be a gateway for future development. Out of the gate, Windows Store will support x86, x64, and ARM apps, and the appropriate version will automatically download without any user intervention when purchased.

To use the Windows Store, you will need a Windows Live ID, so if you haven't obtained one through Xbox Live, Hotmail, SkyDrive, or any of Microsoft's other cloud services, get ready to sign up. Many of the usability and navigation attributes of the Windows Store depend on the new UI within Win8. However, because a description of Win8 Consumer Preview falls outside the boundaries of this article, we'll keep observations about tile sizes, empty screen space, scrolling methods, and so forth largely out of this article.

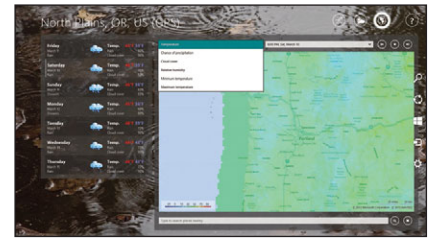
You can't miss the Windows Store. It's the first tile in the default Start screen of Win8 Consumer Preview. Once inside, you'll find the Store populated by several groups of tiles. Examples include the following: Spotlight, Games, Social, Entertainment, Photos, Music & Videos, Books & Reference, News & Weather, Food & Dining, Shopping, Travel, Finance, Productivity, Tools, and Security. Each of these (except Security at the time of this writing) has at least one "headliner" app and one smaller tile leading to top recommendations from the Windows Store team.

Clicking a tile brings up its Windows Store listing, dominated by a colored bar down the left showing the app's icon, average star rating, number of ratings, pricing, and installation button(s). Near the bar's bottom, you'll see the title's age recommendation and developer name. To the right of the bar are the Overview, Details, and Reviews tabs. Overview shows generously large screenshots of the app followed by its description, features, a link to its website and support pages, and a link for reporting the app to Microsoft. The Details tab exposes any release notes and gives information about supported processors, supported languages, and repeats the app's permissions list. The Reviews tab is exactly what you'd expect, and you sort reviews via a pull-down menu by newest, oldest, highest and lowest rated, and most helpful.

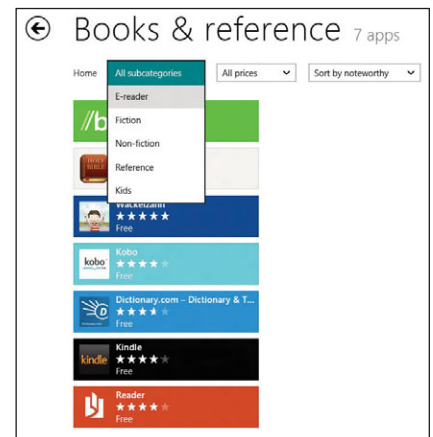
Content & Use

As of this writing, there were no paid apps in the Windows Store; everything shown was available for free, even though many app tiles featured Buy and Try buttons. The apps we sampled installed in seconds with no fussing over target directories, custom options, or anything else. As with phones and tablets, when you tap the Install button, the app takes over and handles the rest. (You can install multiple apps concurrently.) You'll see unobtrusive "installing" and "installed" notifications in the top-right corner of your display, followed by the app's tile showing up on the Metro home screen.

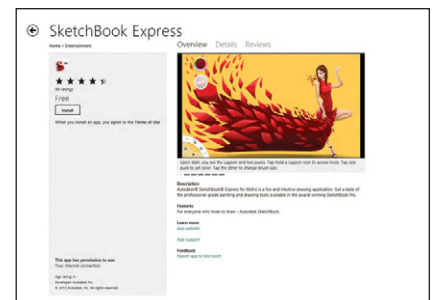
Microsoft deserves special praise for its new app removal procedure. The days of having to dig into the Control Panel are now a memory. If you want to remove one of your Windows Store acquisitions, simply right-click its tile. This brings up an options bar along the bottom of the screen, one of which will be to uninstall the app. That's all there is to it. Better yet, for those averse to bloatware, Win8 lets you uninstall apps that come pre-installed with the OS. We



Apps such as Elements Weather really show Metro at its aesthetic finest. Hopefully, well-crafted must-have titles like this will draw audiences to the Windows Store.



Windows Store filter pull-downs will vary in content according to what area you're in. Notice how the subcategories filter under Books & Reference changes according to genre and device type.



App stores need at least a handful of essential titles, and Adobe's SketchBook Express, a fun artwork/drawing app for the Metro interface, is shaping up to be one of the hot tickets in the Windows Store.

hope this remains true for apps installed by OEM vendors on new systems, as many Android devices, for example, won't let you uninstall OEM apps.

Time will tell whether the Metro aesthetic will grow to become the *de facto* way of displaying Windows UIs. In our experimenting, we found some cases, such as Elements Weather, in which the Metro look felt spot on, with simple text and graphics balanced well across a typically gorgeous Bing-like background photo. (Double points to Elements Weather for having a Live Tile showing a real-time three-day forecast on the Win8 Start screen.) In contrast, some developers may need to adapt their existing apps to account for Metro's unique design. The Evernote app, for example, had a decidedly different look and feel than what we were used to.

Be aware that Windows Store purchases are not refundable. The only exceptions are if the app clearly fails to be compatible with your device or is misrepresented in its description.

Microsoft has been quite vocal about its efforts to make apps discoverable. This means not overpowering tiles in the store with busy backgrounds. The Windows Store supports direct linking to applications, so search engines can index each app and you can access a given app straight from a search engine's results page. Aside from this, because only a handful of apps are currently available from the Windows Store, it's difficult to judge just how "discoverable" apps will be.

As the Windows Store's offerings will grow exponentially once it goes live, filtering will become essential. If you click a section name, such as Games or Books & Reference, you'll go to that section's main page. Within each of these main section pages, you'll find two or three pull-down menus, depending on the section's content. In all main section pages, there are Price (all prices, free, free and trial, paid) and Sort (noteworthy, newest, highest rating, lowest price,

highest price) pull-downs. To the left of these, you may also find a third pull-down for subcategories specific to that app type. For example, under Games, there are subcategories for Action, Adventure, Arcade, Card, Casino, and so on. Under Books & Reference, there are E-reader, Fiction, Non-fiction, Reference, and Kids subcategories. You can use multiple pull-downs simultaneously for precision filtering.

Compared To The Other Guys . . .

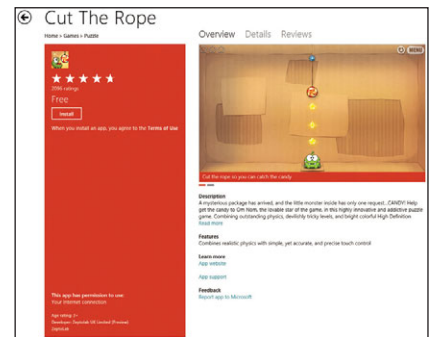
We still have yet to see how Win8 developers will price their apps. Microsoft officially starts pricing at \$1.49, and developers can increase their list prices in 50-cent increments up to \$4.99. Above \$5, the increment size increases. At a time when Google Play and Amazon's Appstore list plenty of apps at \$0.99 or less, with frequent promotions discounting paid apps even further, we wouldn't be surprised to see the Windows Store stay competitive by price-matching cross-platform apps. The maximum price for a Windows Store app is \$999.

Next, Microsoft has also embraced the idea of simplicity and hasn't looked back. Consider the Windows Store's front-located Spotlight section compared to Apple's App Store's Featured view. Apple dedicates a big chunk of its top section to one headliner app while scrolling through other featured apps off to the right. Immediately under this is the New And Noteworthy area, which is stocked with over a dozen colorful app icons. Then come five section tiles, while off on the right bar are Quick Links and the top paid apps. This is just what's visible without a single mouse click. Google Play and Amazon Appstore lay out their respective home screens along similar lines.

Compare this to the Windows Store, in which we see three apps listed in the Spotlight section. However, the two largest tiles in the section don't actually show apps, and five category tiles are merely blank blue squares with white



Long and lean, the Windows Store seeks to draw you in with a handful of large, attractive tiles rather than assaulting the senses with densely packed content, as with conventional online store design.



Microsoft has its own share of addicting games waiting in the in Windows Store, many of which will be free.

text. Only the leftmost part of the Games section is visible before scrolling is necessary. Almost two-thirds of our 1,920 x 1,080 display stands empty. We understand that there are serious challenges in creating a unified experience across screens from four-inch phones to 60-inch plasmas, and we dislike in-your-face, obnoxious advertising as much as anyone, but we suspect that the Windows Store might well benefit from a less restrained use of available real estate.

We're not too worried by some of the content omissions from the Windows Store at this early point. There's no word yet on how Microsoft will integrate its Office Mobile apps into Windows Phone 8, so it's no surprise that productivity apps are still missing here. Non-Metro apps will remain outside of Windows Store for now, so perhaps those types of

“heavy” UI applications will be slower to reach the Store. Microsoft has said that it expects 100,000 apps in the Store, so these gaps will surely be filled as soon as paid apps are allowed through the gate. Perhaps when the ranks fill up, we’ll see the Windows Store start to do more with having one app link to other titles from that publisher or similar titles from other publishers. We’ve become spoiled by Amazon’s “More Like This” functionality and hope Microsoft adopts it here.

The Windows Store currently only provides sideloading capabilities to enterprises. We’ll be interested to see how long it takes consumers to find workarounds to this. Clearly, more centralization and regulation makes for an easier, safer end-user experience, but power users have a habit of demanding (and creating) their own degrees of flexibility with application handling.

Are You A Developer?

Of course, Microsoft knows that nothing motivates participation quite like money, and it needs to woo the countless developers currently coding for Android and/or iOS, not to mention keep existing desktop developers on the Windows wagon. So, falling right in line with Apple and Google, Microsoft is offering Windows Store developers 70% royalties on all new Windows Store apps. If a given app grosses more than \$25,000, both from the purchase price as well as any revenue generated inside the app, that app’s royalty jumps to 80% for the life of the app. (Developers can use in-app transaction services besides Microsoft’s, and Microsoft won’t take any cut of the transactions, but these also will not count toward the \$25,000 crossover point.) Microsoft will support local currencies from the top 40 markets, ranked by GDP. All told, the Windows Store will be available across more than 230 markets spanning over 100 languages.

This is a pretty generous offer, but Microsoft also wants to make sure you have some skin in the game. Developers

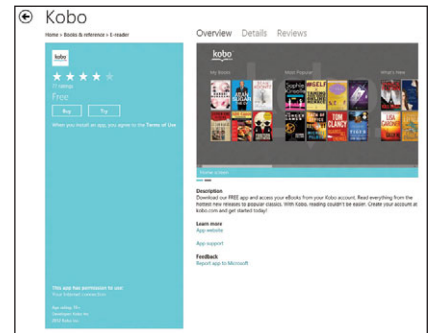
must maintain an annual subscription in order to have their apps in the Windows Store. The fee is \$49 for individuals and \$99 for companies.

If those fees work for you and you’re excited to see your apps in the Windows Store, your next stop should be Microsoft’s page on how to build Metro-style apps (msdn.microsoft.com/library/windows/apps). The documentation here will advise you on everything from designing for different form factors to planning app monetization. Once you have a working app, Microsoft will give you its Application Certification Kit to help you run through the self-assessment necessary to weed out most bugs, security holes, and so on. When you’re ready to submit your app, the Windows Store Dashboard will keep you posted on your creation’s progress toward approval and its subsequent sales performance.

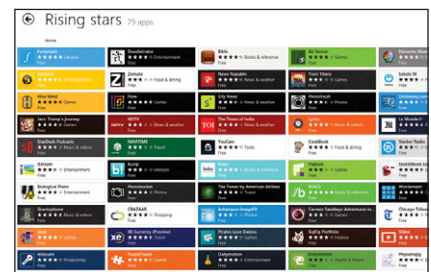
Final First Thoughts

We started off by noting that Windows, despite its still gigantic share of the desktop market, must accept that it’s not the only act in town. On top of that, Microsoft had to do something fundamental to try to reinvent the desktop experience. The split personality Win7/Metro interface design we see in Win8 Consumer is a big step toward that reinvention. Whether this mix will prove successful, whether Metro will find a comfortable home on the desktop, remains to be seen. It definitely has potential, and we applaud Microsoft for trying to create a unified, easy experience spanning from the pocket to the projector.

The Windows Store is a necessary component of that reinvention. Microsoft is trying to maintain a unified ecosystem and cleave closer to Apple’s path to success. When you go to the Windows Store, you’ll know that what you see is what you’ll actually get. We trust there will soon be ample selection, and we look forward to not having to relearn app interfaces with each new device form factor. Microsoft has done a lot right



The Kobo bookstore app illustrates that Windows Store will play host to many e-commerce business fronts, including this free app for purchasing and reading Kobo ebooks.



Looking for an easy way to see what’s hot in the app world? Windows Store has the “Rising Stars” section to help you take in the fastest moving apps at a glance.

here, and it looks to be highly valuing the developers it needs to build its catalog of apps and gain ground on the current leaders in the market.

If the Windows Store experience is good enough to persuade the 90% of the desktop market still using Windows, then the unified Metro experience will make it easier for those users to slide into Windows-based mobile devices. Given today’s mobility trends, this must be Microsoft’s top priority. A year ago, we might have been dubious about Microsoft’s chances of success in ever penetrating the mobile market. But with what we’ve now seen of Win8 Consumer Preview and the Windows Store, we’d say that Redmond now has a fighting chance. ■

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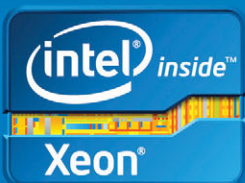
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SMC-20120221-1

Paragon Hard Disk Manager 12 Professional

Not everyone needs Photoshop. For most users, free software such as Paint.NET has most of the features needed to perform most common photo-editing jobs. Professionals, however, can justify the cost of the extra features Photoshop provides because their livelihood depends on it. Still, prosumers willing to pay its price can enjoy its well-documented interface.

The same is true of Paragon Hard Disk Manager 12 Professional. Its combination of powerful and straightforward features make it indispensable for an IT professional, but there are free alternatives that are, in some ways, almost as good; “everyone else” would probably be fine with these for occasional use.

Hard Disk Manager 12 Pro is a sort of do-it-all utility, covering hard disk and partition cloning, partition management and editing, file and folder backup and restoration, Windows boot repair, disk wiping, etc. There’s an innovative virtual disk image tool, as well. Each tool is extremely good, if not best-of-breed. Combined in one interface, they may be worth the nearly \$99.95 price tag, especially if you use all or most of them frequently.

Hard Disk Manager 12 Pro’s main interface lives within Windows (XP or later). It displays a list of all your drives, as well as their partitions, and represents them in a drive map where various colors and bars represent used and free capacities, formats/OSes, and partition types, rather like GParted but with many more options, such as downgrading the NTFS version, changing cluster sizes or serial numbers, etc. Right-clicking a partition from the list or mapping and choosing a command from the pop-up menu is the typical way to interact with the software, but there are the conventional pull-down menus, organized logically in groups, that offer these same commands plus other commands (which are more system-oriented than drive- or

partition-oriented, such as performing file backups or building boot media). The express launcher does these same things, too, but via a wizard-driven GUI.

You can back up a “live” Windows partition (or any partition) with Hard Disk Manager 12 Pro directly within Windows, which is a neat, but not unique, trick. If you want to restore the partition image, you’d best use Hard Disk Manager 12 Pro from bootable media, which is both easier and harder than the previous version to create. It’s easier because now you can make Linux-based bootable USB flash drives in addition to CDs, but it’s tougher because, thanks to licensing issues, the Windows PE version of the restore disc is no longer directly available for download. Instead, you have to download various recovery files from Microsoft and then follow a lengthy wizard-led process to make this second version of the restore disc. Both discs faithfully duplicate the Windows experience and offer handy wizards for recovering disc images off network drives, wiping hard drives, repairing Windows/DOS boot problems, and so forth. However, the Windows version let us try to restore a Windows partition image back onto a live version of Windows but endlessly spun its wheels at 56% before we killed it. You can easily mount a disk image to recover specific files, or use it as baseline for an incremental backup.

If you use VMware, Virtual PC, or VirtualBox, you can convert a backup image or partition/disk into a virtual

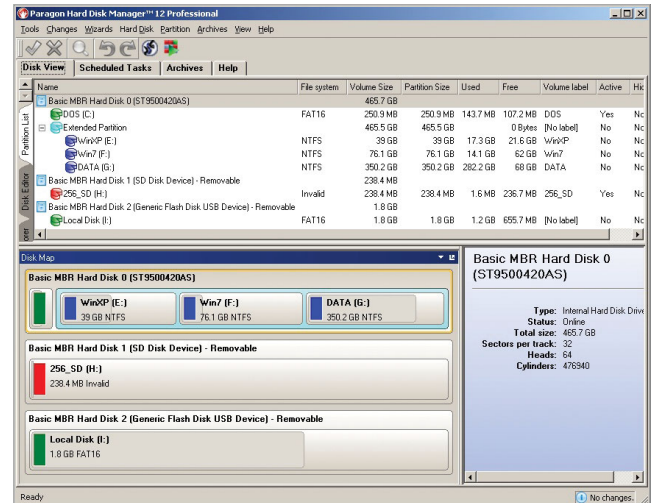
image, suitable for use as a virtual machine. This is a potentially huge time saver, and it worked nearly flawlessly in our tests with VMware and VirtualBox, simply requiring a little virtual BIOS tweaking before being able to boot. Too bad you can’t go back to a live machine from a virtual disk image.

Performance is quite good, with backup and restore compressions and times within a few percent of Norton Ghost (which is amazingly still widely used among corporate IT pros despite being 10 years old), yet generally faster than most free Linux tools. Finding networked stores of disk images is simple and reliable.

In the end, recommending Paragon Hard Disk Manager 12 Professional comes down to how often you need to manipulate drives and partitions. If your job revolves around it, then get it now and don’t look back. Otherwise, try the free tools out there first and see if they’re enough. ■

BY WARREN ERNST

Hard Disk Manager 12 Professional
\$99.95
Paragon
www.paragon-software.com



Innovative Solutions Advanced Uninstaller Pro 10

When a utility refers to itself as “the ultimate uninstaller for Windows,” it’s time to call for a show of cards. Advanced Uninstaller Pro isn’t engaging in a bluff, however. It really is single-mindedly focused on uninstalling—whether that means your fonts, programs, startup entries, Windows services, or duplicate or temp files. It can delete cookies, browser histories, browser add-ons, and extensions. It also cleans, backs up, and optimizes your Registry.

Many of these options are available elsewhere. For example, you can use the Control Panel’s Programs And Features tool to uninstall a program, but some invalid entries simply refuse to go away. AUP’s Forced Removal option will get rid of a stubborn entry, while Remove Invalid Entries removes them all. You can right-click, select Report, and get a web-based display of the names, versions, companies, and websites

for each program. Similarly, Piriform’s CCleaner is a small utility that cleans out the temp files, histories, and cookies for many browsers and some third-party apps, but AUP furnishes a much longer apps list.

We also like the few tools AUP supplies that aren’t related to uninstalling, such as file shredding, and duplicate file search and removal. Live file compression utilizes Windows’ compression system, and you can specify anything from entire drives to specific files. It uncompresses, too.

All of this content is managed through an easy-to-use front-end, with five major categories represented by buttons on the left side of its screen: General Tools, File And Folder Tools, Internet Browser Tools, Registry Tools, and Report And Extra Tools. Clicking any of these brings up a subcategory of utilities across the main screen. Mousing over a utility displays a brief description, though



we found the white text on a transparent gray backdrop difficult to read.

But this is a minor blemish in an excellent app that does just what it says and costs nothing. AUP is a winner. ■

BY BARRY BRENESAL

Advanced Uninstaller Pro 10
Free | Innovative Solutions
www.advanceduninstaller.com

Empty Loop Unlocker

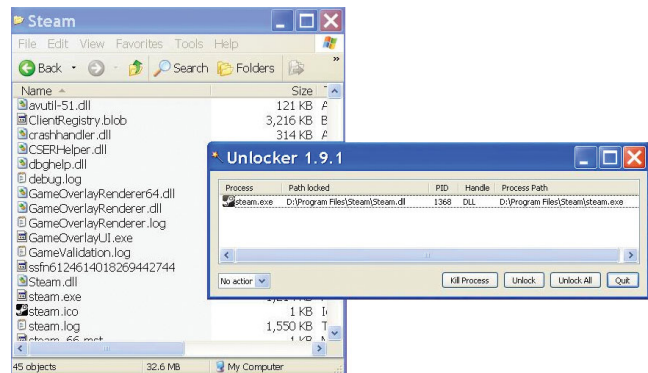
Sometimes it’s the small comforts in life that matter the most, like coffee machines that turn themselves on in the morning, so you can stumble to the kitchen and pour your first cup without pushing any buttons or measuring anything. Or free utilities such as Empty Loop’s Unlocker that can remove a file or a whole directory even when Windows tells you it’s in use and won’t let you delete it.

Unlocker is simple to use; just right-click the file you want to delete and click Unlocker. This brings up a small window listing the processes that are currently locking the folder or file. You can select any or all to unlock, and in the event that this is insufficient, there’s a Kill Process button that simply stops cold whatever’s blocking your attempts. If you right-click to unlock a file that isn’t locked, Unlocker still lets you

choose to rename, move, or delete it.

We found that Unlocker invariably worked, though Kill Process, the brute-force method of unlocking a file or folder, was only something to be used as a last resort when nothing else worked, including a reboot. There’s no evaluation tool to tell you when it’s safe to kill a process that is accidentally locking a file, but Empty Loop probably thinks it’s OK for you to figure that out on your own, seeing as how Unlocker is free.

Unlocker works on all Windows versions since Windows 2000 (both 32- and 64-bit). It’s not a utility you’re



likely to use often, but it’s a great tool to have handy for those special, headache-inducing occasions. ■

BY BARRY BRENESAL

Unlocker
Free
Empty Loop
www.emptyloop.com/unlocker

Own Your Data

Security, privacy, tracking, and user ownership of their data have all been critical issues in the conversations around personal computers and the Web in recent months. Almost all of the major players in the software and online services business, from Apple to Google, Microsoft to Mozilla, understand they need to get out in front of this issue before regulators and legislators provide policies for them. And so all of these companies have been doling out tools and software that purport to give the users greater access to, control over, and security

for their own data and digital activities. This month we look at some of the newer ways that the big players say they are giving you greater security and control.

Google Is Watching— Watch Back

With the lion's share of search activity on the Web going through its servers, Google likely has more data on you than just about any entity on the planet. Until recently a sparse Ad Preferences manager let you see how Google targeted ads to you and block them. As the stakes over online privacy have heightened, so have Google's efforts to assuage user concerns with new transparency tools.

The main suite of privacy tools at Google is located at www.google.com/policies/privacy/tools/.

Your basic tool is the Dashboard at www.google.com/dashboard/?hl=en. The most instructive part of this tool is how it shows you all of the devices from which you have accessed Google and the services you have used over the years. Bet you didn't recall that you set up an Orkut social profile or that you set up a Blogger site in 2010. All of the apps you have installed on registered Android devices, saved maps, etc., are all visible to you here as are privacy settings for many of these services. You will be surprised how many ways you touch Google.

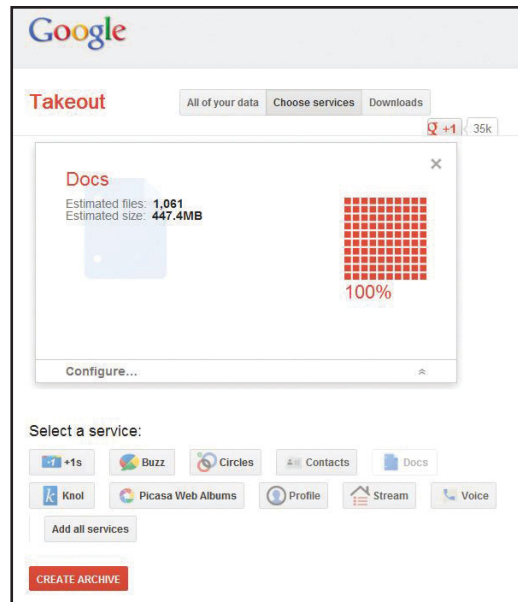
Also go to your Web history page at google.com/history (you need to be signed in) to see all of your interactions with

Registry Tip Of The Month

For those who are frustrated by mistakenly hitting the Caps Lock key and getting a string of unintended capitalized sentences, we have found this oldie but goodie from previous versions of Windows brings sanity to that keyboard. On traditional physical typewriters, the Caps Lock function was disengaged the next time you tapped the Shift key, which could minimize the damage from runaway capitalization. This Registry hack enables a similar functionality in Windows 7. In Regedit, go to HKEY_CURRENT_USER\Keyboard Layout. Right-click to create a New DWORD Value named "Attributes." Double-click on this new Value in the right pane and assign the hexadecimal value of "00010000" and click OK. Activating the hack requires a reboot or logging off and back on.

Windows Tip Of The Month

Time to take flight again. Old PC diehards will recall a time when the new version of Microsoft Flight Simulator was anxiously awaited. In its day, the game/simulator was a test of hardware power as well as an amazing demonstration of mapping real-world data into a simulation experience. It is back, and now in a freemium version from Microsoft at microsoftflight.com/en-US/home/. The 1.4GB download is part of the online MS Games Live system. You can play for free and get basic training or log in for more features and to purchase upgrades that let you fly in remote locales.

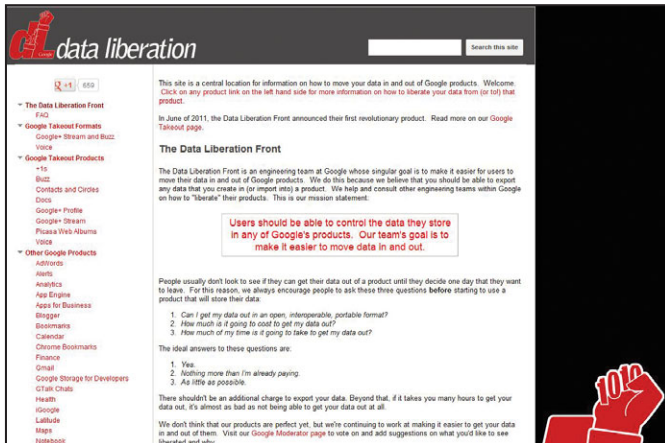


Takeout is a tool from Google that lets you package and download into specific formats content you created on select services like Google Docs and Picasa.

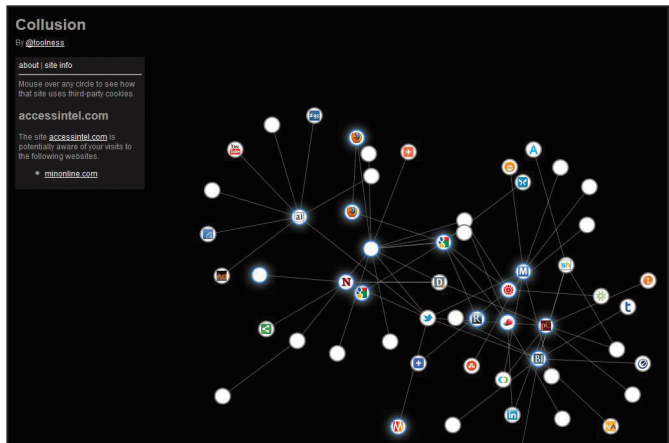
Google search and services in a timeline. Here you can filter out the history to see just interactions with maps, news, sponsored links, etc. More importantly you can check boxes to remove items and also pause the recording of your history. And don't miss the calendar navigation tool in the right rail. It tracks back all Google interactions by the day and even keeps a running total of how many searches you have run while logged in. Is it a bad thing that I have 56,743?

Fire Google

Finally, the big and cool new tools from Google that control your data are on the Data Liberation Front site at www.dataliberation.org. The principle of the site is that a user should have access to



The Data Liberation Front is a Google program that lets users access the data they have created across the company's many services and download much of it to their own PCs.



This is not a star map. It is a chart using Mozilla's Collusion extension for Firefox that charts the ways that sites share browsing activity data with one another via third-party cookies.

and the right to put in and take out any data Google is keeping for them. It is important to note that this is not a gateway into all of the data Google has about you so much as a single point of entry to all of the data that you yourself have created on Google—from Gmail contact lists to Chrome bookmarks. Each Google product has its own instructions for accessing and extracting your own content. For instance, the site directs you to where you can export or import a calendar or export Google chat logs.

Google Takeout is a new platform that lets you easily download some of your own content from Google in a common place and interface. Go to www.google.com/takeout/?pli=1 and you will see that data you have created via +1, Buzz, Circles, Contacts, Docs, Picasa, and other services can actually be downloaded in a variety of formats. Tap Docs, for instance, to have Google tally all of the documents you have made. The Configure tab in this tally box lets you package word processing, presentations, spreadsheets, and drawings into one of several formats. Hitting the Create Archive button will build a downloadable archive of each of the categories you have designated. Each then can be downloaded directly to your PC for use elsewhere.

Uncovering The Data Conspiracy

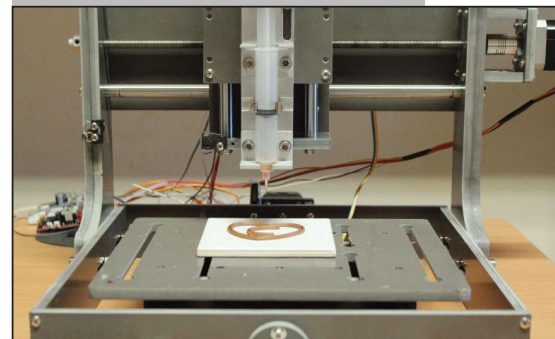
How publishers and third parties plant and share cookie information is at the center of debates about privacy and user tracking online. To get a direct look at the ways in which your online travels are being knit together by others, Mozilla is working with support from the Ford Foundation to craft an ingenious experiment called Collusion that creates a map in real time of the ways in which your landing on a single site can plant cookies that follow you and bring your data trail to other sites. You can link to the Firefox extension at www.mozilla.org/en-US/collusion/.

Once Collusion is installed, simply go about your usual Web browsing habits for a day or so. Then click the Collusion icon that appears in the lower right of your Firefox browser. You will see that Collusion has built a confusing map in which the circles with halos indicate the sites you have visited, with lines connecting to the services and other sites with which that destination has shared your information, often through a third-party ad or data network. In the left-hand rail, use the Site Info tab to highlight a site in the map and get a more orderly list. You will see a rundown of the sites with which the destination shares data and the other sites you visit that may be sharing data with the highlighted site. ■

INFINITE LOOP

Start Your Own Chocolate Print Shop

UK-based Choc Edge has started taking online pre-orders for its Choc Creator Version 1, a desktop 3D chocolate printer that can be yours for about \$4,600. The printer's deposition head uses a 10-milliliter syringe and highly precise stepper motor; designs for your creations can be uploaded via USB. Before you start drawing up plans for a semisweet, 1/144 scale Millennium Falcon, however, be aware that it will be suitable only for viewing, not eating. Choc Edge says the current printer is designed for "printing demonstration chocolates and making creative and artistic displaying objects only." A certified food-grade printer is three to six months away. ■



<http://www.chocedge.com/Choc+Creator+Version+1>



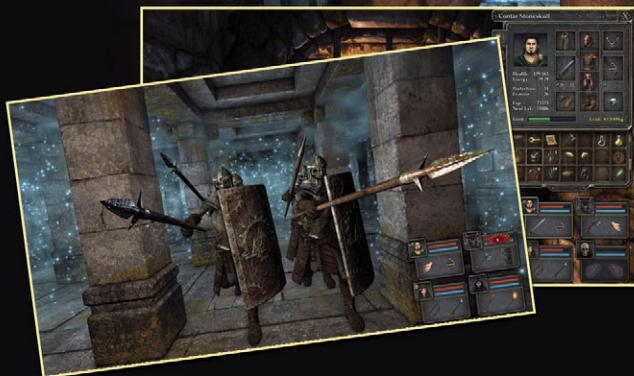
Yeah, we know you have blogs to post, video to encode, reports to write, and code to compile. We do, too, but you have to take a break once in a while (and maybe blow some stuff up). That's why each month we give you the lowdown on what to expect from the latest interesting PC and console games.



LEGEND OF GRIMROCK

A Dungeon Crawl To Freedom—by Barry Brenesal

\$14.99 (PC) • ESRB: N/A • Almost Human • www.grimrock.net



Talk about a blast from the past: I reviewed SSI's *Eye of the Beholder* very favorably back in 1991. Its combination of real-time exploratory action with a four-character party, utilizing excellent graphics in a first-person, 3D dungeon crawl made it enormously popular, and spawned two immediate successors. Now Almost Human Games has done a Beholder-like tribute, and you have an opportunity to understand what the praise was all about.

The game's premise is simple. Your party of four prisoners escapes from their cells in Mount Grimrock and starts a long journey toward freedom through endless corridors and down flights of stairs. It's really just an excuse for dungeon crawling, with carefully placed rewards and a seemingly endless supply of puzzles involving pressure plates, trapdoors, hidden switches, and magic portals. We can't forget the enemies, either: a delightful mix of clockwork-like undead soldiers, clumsy, giant snails, and herders who look like animated tree trunks. That's only a taste of what you'll

find. The enemy combat AI is excellent, so you'll see archers slide away from your melee attacks and imps hover out of range before shooting forward to claw at your party. The visuals are stunning, with great animations and particle effects in resolutions up to 2048 x 1546—and, best of all, it runs like a dream with all the graphical stops pulled out, even on a dual-core with 2GB RAM.

Some game design elements have changed along the path that led from Beholder to Grimrock. The Advanced Dungeons & Dragons classes, races, and alignment systems are out, presumably due to licensing considerations, and that suits us just fine: We've had it up to our eyeteeth with the AD&D clichés in nearly every RPG game. You'll get to choose among humans, minotaurs, lizardmen, and insectoids for races, with the classes limited to fighters, rogues, and mages. Good? Evil? How does that really matter when the only philosophical choice your party faces is whether it will or won't kill

the thing in front of you that wants flambéed adventurers for dinner?

Spells aren't auto-acquired with levels, though your party members do gain stats and skills as their experience improves. Instead, a system of nine runes that the player clicks to combine is used to produce magical effects. Spells are discovered on scrolls (or by experimenting) and can be cast as long as a mage has sufficient power. Power, like health, is recovered when not in combat, and especially while resting. Auto-mapping and auto-pickup on missiles make life in Grimrock a bit easier, though you can turn the former off at the start of the game.

But the core stuff remains the same: You right-click to launch an attack, use the arrow keys to move around, open inventories to chug potions, eat food, and swap out gear. And just like Beholder, Legend of Grimrock is both simple and perfectly beguiling. There's always just one more corridor ahead, one more puzzle to solve, one more monster whose shuffling you can hear around the corner. Good luck in escaping Mount Grimrock, and in escaping this game, as well. ■



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TOTAL WAR™ SHOGUN 2

FALL OF THE SAMURAI

The Last Samurai—by *Dr. Malaprop*

Fall Of The Samurai is a standalone expansion for turn-based Total War: Shogun 2. The game is a culmination of everything that's right with the Total War series and eschews much of the controversial design decisions we've seen in recent Total War games. Those new to Total War will be welcomed to turn-based strategic moves a la Risk with diplomacy and trade aspects. All of this on a massive scale with thousands of troops on-screen. Make your turn and then enter the real-time strategy mode, where you can get into the tactical engagement. Attributes such as soldier fatigue and morale play a big part here.

Fall Of The Samurai's gameplay is set during the mid-19th century during the Boshin War when Japan was entering a dramatic modernization brought about by the industrial revolution. Until this point, the country was effectively a medieval society with a feudal government system. With modernization came turbulence, which plays exceptionally well for strategic and tactical gameplay and revisionist history in this superb turn-based strategy game. As the game moves toward its inevitable conclusion, the traditional pro-Shogun faction faces off against the modern pro-Emperor faction.

What really stands out after playing a slew of Total War titles is how well developer Creative Assembly created a user interface to manage the rather hefty complexity of the game. This makes Fall Of The Samurai one of the more accessible titles in the series. This time, you can even directly control certain units and artillery, and there's an abundance of unit types on which you can expand. It's a treat for strategy lovers. ■

\$29.99 (PC) • ESRB: (T)een • Sega
totalwar.com/shogun2/fall-of-the-samurai



RISEN 2

Dark Waters

Pirates, Sea Monsters & Lots Of Rum—by *Barry Brenesal*

Have you played any of the first three Gothic games, or the original Risen? If so, you have some idea what to expect from Risen 2: a first person action RPG where decisions you make really do affect the progress of your character's adventures. There are attributes, talents, and skills such as gunsmithing, pickpocketing, and liquor distillation to improve through a mix of "glory" (killing and quest fulfillment, definitely not the same thing) and paying trainers in gold. The dialog is gritty, and the distrustful NPCs are seldom inclined to do a favor without first receiving one in return.

German developer Piranha Bytes has chosen to set Risen 2 in a Caribbean-like area infested with pirates. (But no pirate jokes, thanks be to the gods.) Your main mission, in fact, is to help a pirate's daughter whom

\$59.99 (PC, PS3, X360) • ESRB: (M)ature
Piranha Bytes www.risen2.com

you first encountered in Risen acquire her father's treasure, which he's hidden away—and in exchange, she'll assist in finding a legendary artifact that will destroy a sea monster known as the Kraken.

There are three joinable factions in the game. You begin under a secret directive requiring you to join the pirates, but along the way you can return to your old allegiance with the Inquisition—now shorn of their magic, weapons only—or ally with the natives, who are used as slaves, but have their own legends and unique magic. Unlike so many other action RPGs, quest series here genuinely open and close depending upon the choices you make. This really helps Risen 2's replayability, just as it did its predecessors.

The voices and artwork are very fine, as is the animation, except for plenty of grotesque gestures and exaggerated arm-waving in the film cutaways, as though these pirates, officers, and slaves acquired their social skills by watching TV commercials for used car dealerships. Otherwise, we found Risen 2 less open-ended than the Gothic games, but less narrowly focused than Risen, and a delight to play. ■

ASURA'S WRATH

\$59.99 (X360, PS3) • ESRB: (T)een
Capcom • facebook.com/asuraswrath

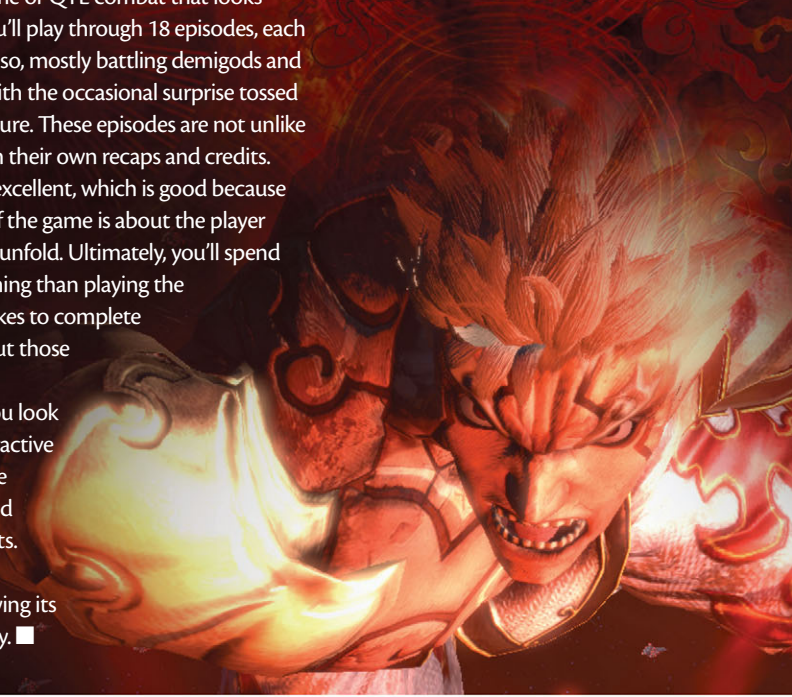
Interactive Anger Management—by Dr. Malaprop

The game begins with The Eight Guardian Generals and the Shinkoku army bearing down from space to attack the impure Gohma. General Asura is one of the eight demigod generals, and he leads the attack on the Vlitra, which is the source of the Gohma. Thanks to Asura's ranged attacks and a giant Buddha space weapon, the Vlitra are subdued, but not defeated. Amidst the celebration of the Shinkoku in the following days, Asura is framed for the emperor's murder, his wife murdered, and his daughter abducted. That's enough to make anyone angry. Unfortunately, the seven remaining demigods throw Asura to his death.

Thousands of years elapse before Asura comes to with a foggy memory. However, with the goading of a golden metallic spider, his memory slowly returns, as does his wrath. You've seen rage and revenge in classic novels and "Kill Bill," but it's a bit different when the key combatants are demigods larger than planets. It raises the stakes. Asura screams, punches, and performs all manner

of insane cut-scene or QTE combat that looks phenomenal. You'll play through 18 episodes, each of 20 minutes or so, mostly battling demigods and other enemies with the occasional surprise tossed in for good measure. These episodes are not unlike TV episodes with their own recaps and credits.

Animation is excellent, which is good because a large portion of the game is about the player watching events unfold. Ultimately, you'll spend more time watching than playing the seven hours it takes to complete Asura's Wrath. But those seven hours are entertaining if you look at this as an interactive anime experience with shooting and brawling elements. We walked away thoroughly enjoying its insanity and story. ■



JOURNEY

Captivating & Emotional—by Dr. Malaprop

You begin your journey sitting in exquisitely shifting desert sand. With minimal guidance or complication, it becomes clear that you're going to want to reach that towering mountain off in the distance. The sand is blowing, the sun is beating down, and you are very alone. Cresting the first dune, you revel in surfing down the sand. Along the way, you encounter basic puzzles and platforming that can be solved by taking time to explore environments. In addition to moving around, your onscreen character can discover pieces of cloth that build out a scarf. The scarf length indicates jumping and flying powers, which let you access locations that provide bonus collectible items, symbols, and tapestries that tell the story. Last but not least, your character can chirp/sing to interact with objects in the world. The narrative is yours to discover.

This last feature plays a key role when you discover another anonymous character in your game: a player that looks just like in-game you, perhaps with a different length scarf, one who communicates by movement or chirps. You sometimes discover that you bond closely with this unnamed stranger. The game manages to bring a level of emotional depth that's not often found in videogames, and this aspect on its own elevates Journey in our minds.

Journey manages to be endearing, often poignant, captivating, elegant, beautiful, and wallet-friendly. Whether or not you agree with its artistic sensibilities, it makes you experience emotion during the three hours or so it takes to finish. Journey is a game that will raise your expectations for what videogames can and will achieve in the future. To feel or understand Journey, you'll need to go beyond academic descriptions and reviews and play it. That's a suggestion we heartily stand behind. ■



\$14.99 (PS3) • ESRB: (E)veryone
Sony Computer Entertainment
thatgamecompany.com/games/journey



TRIBES ASCEND

Free (PC) ESRB: (T)een
Hi-Rez Studios • www.tribesascend.com

Free-To-Play Done Right—by Chris Trumble

The free-to-play model has become increasingly popular, and Hi-Rez Studios does a nice job of rewarding players for buying into its online team-based shooter Tribes: Ascend without making the game hostile to new and/or frugal players. This is partly a function of the game's well-balanced class system and partly due to Tribes: Ascend's nature—the game is played at breakneck speed, and when you are flying in one direction and trying to shoot someone hurtling through the air in another, your skill is the overriding factor

in whether you're successful. You may find that some classes and weapons best suit your personal style of play, but paying to unlock a premium class doesn't guarantee kills.

Tribes: Ascend rewards teamwork, and there are flags to capture and objectives to achieve, but at its core, this game is a pure run-and-gun shooter with a couple of very intriguing mechanics tossed into the mix: skiing and flying. If you're looking for a fast shooter that is easy to pick up but tough to master, Tribes: Ascend is definitely worth a look. ■



ANOMALY WARZONE EARTH

800 Points (X360); \$9.99 (PC/Mac);
\$3.99 (Android); \$1.99 (iOS)
ESRB: (E)veryone • 11 bit studios
anomalythegame.com

The Best Defense Is A Good Offense—by Chris Trumble

Anomaly: Warzone Earth, which recently came to Xbox Live Arcade after having been a hit on PC, Mac, iOS, and Android, takes the tower defense paradigm and inverts it, putting you in command of an armored column charged with going on the offensive in various locales in Iraq and Japan and taking out mechanized alien towers that cropped up following the impact of an extraterrestrial object. The story itself is inconsequential and the accompanying voice acting can get repetitive, but Anomaly's gameplay is intuitive and fun.

Most missions are straightforward clear-the-board affairs, but the game also mixes in some escort

missions, beat-the-clock rushes, and others, and aside from the campaign mode there are three variants of Horde-style survival minigames and a series of tactical trials that present some pretty intricate scenarios under the guise of training missions. (These are present in the XBL Arcade version; other versions have the campaign mode and two survival minigames.)

The game is brief but provides a ton of fun for a very modest price. Take a break and blow some stuff up; you'll be glad you did. ■

I AM ALIVE

1,200 Points (X360) • ESRB: (M)ature
Ubisoft • iamalive-game.ubi.com

Fear & Loathing In Haventon—by Chris Trumble

Ubisoft's I Am Alive is a unique and engaging action game that is well worth every penny of the 1,200 Microsoft Points (aka 15 bucks) you'll spend acquiring it on XBL.

You play the role of a man who flew "out east" just before a worldwide cataclysm referred to early on simply as "the event" wiped out most of the human race. Your goal is to journey through the ruins of your city and reunite with your wife and daughter.

Survivors mainly fall into two groups: victims and enemies. Members of both groups will drain your resources and put you in harm's way; add to that intimidation-based combat and an interesting climbing mechanic that you'll use to scale the listing skyscrapers littering the horizon, and you have a challenging little adventure with big-game production values that feels like survival-horror, only without zombies and stuff. ■



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An Interview With OWC's Larry O'Connor

Larry O'Connor is the founder and CEO of OWC (Other World Computing), a manufacturer and e-tailer of solid-state drives, data storage solutions, memory, and accessories for Macs and PCs. O'Connor has provided the strategic initiative and vision establishing OWC as a leading provider of technology products and services. His firm has developed the only non-Apple SSD solution for MacBook Air systems and a growing family of Windows notebook solutions. An alumnus of Marquette University, O'Connor has received numerous industry awards; he has been included in Dealerscope's 40 Under 40, the Inc. 5,000 list (five consecutive years), and was a two-year honoree in Crain's Chicago Business "Fast 50" list.

Q We heard a story that you founded Other World Computing because you were tired of paying too much for memory for your Apple II when you were a kid. Is that true, and how did you get started?

LO That's it in a nutshell. But it wasn't just the local Apple dealer; it was all the outlets advertising memory for Apple II. I picked up a *Computer Shopper* at the News Depot that was right down the street from school and work, found places listing the part numbers for the actual chips that made up these upgrade sets (used to be chips you plugged into a board), and gave it a whirl. Once all was confirmed, I upgraded my Apple for a fraction of the cost being offered in the space. I also began advertising on America Online's Classified Mall and in chat rooms to help others save on upgrades I then sold for a fraction of the big guys' prices and provided assistance with the how-to.

I remember the drill of taking the computer in to the tech, signing it in, and then having to come back a couple days later after they completed the "service." When I found out this was basically a 5- to 10-minute install, I had to educate others and help make the benefit of memory upgrades more accessible for a lower cost than what that two-day service cost—before the cost of the memory itself.



Q Now, of course, you sell products for Macs and PCs. Did your business change dramatically in 2005 when Apple adopted Intel platforms for Macs, or has getting PC folks to take another look been a more gradual process?

LO Things are always evolving, and we've long supported both Mac as well as Windows customers. Since Apple has shifted into the PC space, it definitely enabled an acceleration of our multiplatform support capabilities.

Q It sounds like Macs are possibly getting second-generation Thunderbolt controllers soon, while their PC counterparts have yet to adopt the standard. How big an impact on the computing world in general do you think Thunderbolt will have, and do you foresee it making greater inroads in the PC market than FireWire did?

LO Although the proof will be in the pudding, I do believe Thunderbolt/Light Peak will have a very long and successful place in the industry. It is really ahead of its time in many ways, and once the availability of peripherals and even cable options catch up, I think we'll see things really blow open. It's a real long-term benefit for Apple owners that this interface has been standard on the new models for over a year now. There will be a lot of choice in the near future for

Thunderbolt products. At the same time, I do acknowledge that USB 3.0 is more than suitable for many consumer needs while also having a far lower cost.

Q We have reviewed a couple of your company's SSDs now, and came away very impressed both times. In the case of the Mercury Electra 6G (the roundup starts on page 17 of the May issue), your drive actually produced better numbers in our tests than we expected from your marketing material, which almost never happens. What is it



about OWC's Mercury-series SSDs that makes them such strong performers?

LO We chose configurations as well as overall design parameters that seek performance and reliability. Both the grade and the configuration of NAND in an SSD make a big difference, and we choose accordingly. All of our Mercury SSD models are manufactured in the United States, built to last and perform for the long-term. As for our published specs, we'd rather be conservative and talk about real-world results vs. talking about a controller's theoretical maximums the way it seems others do.

Q How do your Mercury Electra 6G and Mercury EXTREME Pro 6G SSD lines differ?

LO Both are actually very similar, both built in the exact same platform. While the Electra is built

using performance asynchronous NAND configs, the EXTREME Pro 6G is built with Toggle-sync NAND. For those working with certain data types, the Toggle-sync NAND provides a higher level of performance. For the typical user, the Electra is all the SSD they should need.

Q Your site says that your drives are designed and built in the United States. We've all heard for many years now how difficult it is for domestic manufacturing to compete, yet your SSD prices are extremely competitive. How do you manage this? Do you think this issue has been overblown, or do you just know something others don't?

LO There are significant challenges to building in the United States, but with the right manufacturing partner and sound management, one can enjoy significant advantages. For instance, we are able to turn on a dime and manage

quality aspects that offset some of the cost differential vs. building overseas. What I think we know and believe more so than the competition is that the benefits in quality and performance are well worth a couple extra pennies spent in the long run. We're long-term focused, not short.

Q The "My OWC" area on your site is a nice resource for people with Macs who are looking for upgrades or replacements. Is this something that you might expand at some point to include help for PC owners looking for memory and/or SSDs? We notice you have some PC troubleshooting information on the site already.

LO We have huge plans for the same expansive coverage with PC specificity as we move forward with our PCSales.com site especially. It's all in the works.

Q Your site has a "Coming Soon" banner over a link to a Plasma

& LCD TV and display area. How soon will you be offering TVs, and how did you arrive at the decision to branch out in this direction?

LO It's a logical extension of our computing side. More and more people are using their Macs and PCs as home-theater controllers/media sources, and we already have many products that support this particular use. We want to offer high-performance and reliable products that are the right solutions for the longer term; we're not here to promote cycles of 9- to 14-month replacement needs. You don't have long-term customers if you promote such products, in my opinion.

Q In reply to a customer question about larger SSD capacities, one of your tweets says OWC will

have a 1TB SSD "coming soon," but it doesn't mention what form factor it might be. Do you expect such capacities to be 2.5-inch SATA drives, or do you think it's more likely that the initial 1TB drives will be PCI-E or will take some other form?

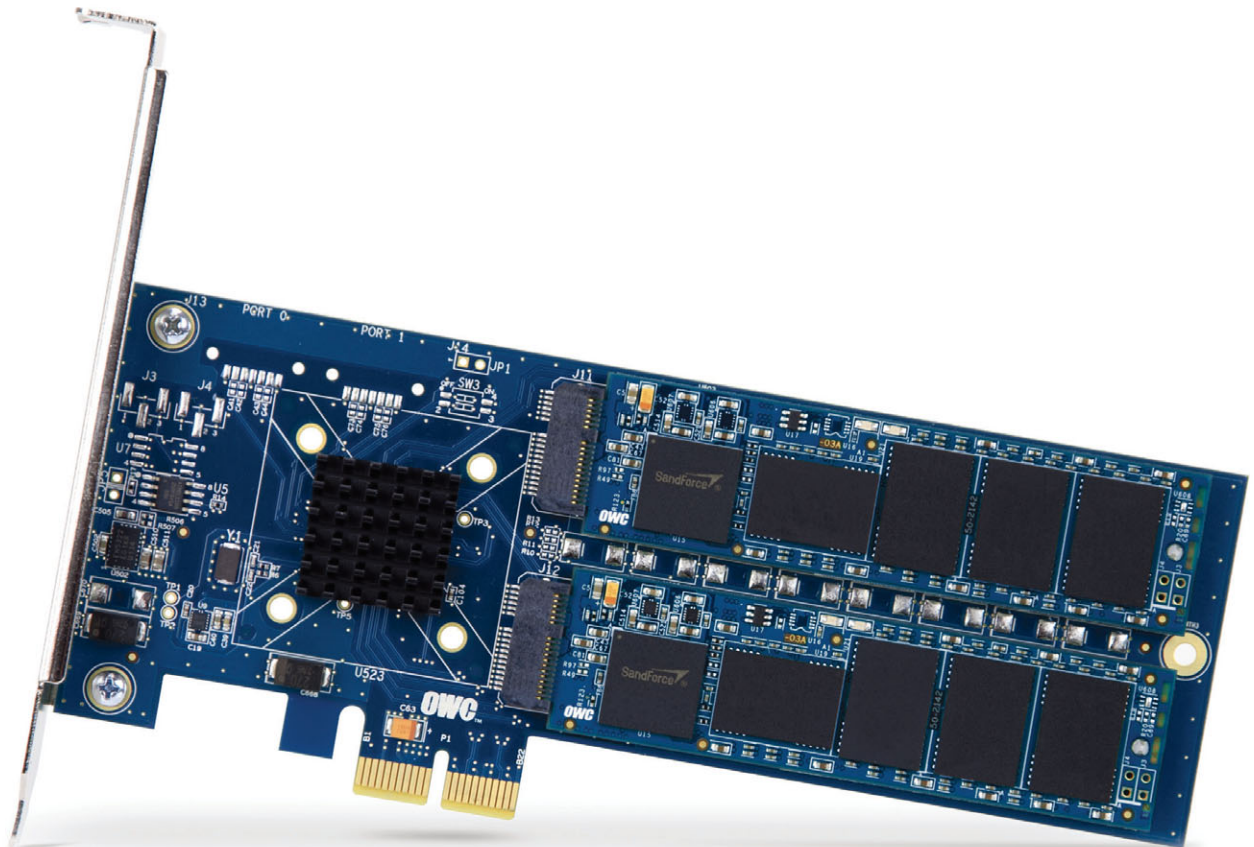
LO We just began shipping our 1TB (960GB after 7% over-provisioning) Mercury Accelsior PCI-E SSDs and will soon add a 2.5-inch profile 1TB, as well.

Q What else can we expect from OWC in 2012? Do you have any upcoming launches you can talk about?

LO Faster, higher capacity, lower cost per gigabyte. (Smiles.) Our Jupiter mini-SAS solutions are already gaining wide attention and will prove

themselves as an incredible option vs. the much more expensive and slower Fibre Channel storage today. We're not done evolving our PCI-E SSD products, either. Not entirely, but somewhat by choice, we've taken the slow road on our Thunderbolt product entries. However, in the second half of the year, we'll have an explosion of such. By Christmas, these solutions will be much more cost-effective when compared to competing performance interfaces, and while still more expensive than USB 3.0, will be a bit more comparable with consideration to the performance delta Thunderbolt will provide.

Our customers are large drivers of what products we support directly and indirectly, and we're here to make them happy with the right products for the evolving needs our customers of all types have. ■



A Peek At What's Brewing In The Laboratory

Early Warning System Attempts To Curb Insider Threats



A team of researchers from Georgia Tech have joined forces with several other universities to develop a system that will inform authorities if military or civilian governmental personnel's electronic behavior looks suspicious. The idea is to stop possible illegal activities before they happen.

It seems like many of the alerts and security measures in the United States deal with external dangers, but the news is also full of stories of military or government employees going off the rails. Identifying these insider threats is a time-consuming process, because analysts only have the capacity to investigate perhaps five (out of thousands) reported anomalies each day out.

A consortium of researchers at Georgia Institute of Technology, along with peers at Oregon State University, the University of Massachusetts, and

Carnegie Mellon University have come together under the leadership of SAIC (Science Applications International Corporation) to create a system that identify rogue personnel before they cause any trouble.

The \$9 million project has the researchers developing an unprecedented combination of algorithms in two categories—graph-processing and knowledge-based relational machine learning—coupled with statistical anomaly detection methods, to devise a system prototype called ADAMS (Anomaly Detection at Multiple Scales).

ADAMS can aggregate immense amounts of communication data in real time—texts, emails, file transfers, IMs, etc.—and scan them for unusual behavior. ADAMS would be installed in civilian government and military situations where personnel would expressly agree to monitoring, and the system then processes the information culled from all electronic activities. ADAMS then could deliver to superiors, “a very short, ranked list of unexplained events that should be further investigated,” says Dr. David Bader, a co-principal investigator at Georgia Tech. ■

New Analysis Methods Could Produce Better Prosthetics

The result of combat wounds, such as the amputation of a lower leg, are devastating in many ways, not the least being loss of mobility. Oak Ridge National Laboratory scientists Boyd Evans and John Mueller are working on a system that will better guide prosthetic development for disabled vets. Evans and Mueller want to perfect prosthetic fit and performance, helping soldiers who want to return to active duty or simply want to regain as many physical capabilities as possible.

Currently, prosthetics are designed for restricted physical exercise and can cause an uneven gait, which, beyond being uncomfortable, may lead to structural health issues later on.

Evans and Mueller, taking a page from new developments in videogaming (such as Kinect for Xbox 360), are studying natural walking patterns by strapping IMUs (inertial measurement units) and other sensors to a subject's foot, calf, and thigh. The device and sensors capture data regarding velocity, orientation, and gravitational forces on the leg while in motion; then they deliver it to a computer running analytic algorithms that assess the impact on specific joints.

Evans and Mueller have used a robotic leg (programmed with a human's info) to show proof of concept. In the coming months, they'll test their system on a person who has a prosthetic. ■

New App Predicts The Hits

Historically, there have been a few notable hit-makers in the music industry, folks who have a finger on the pulse of popular sound. In a “curiosity-driven research project” dubbed “ScoreAHit,” (scoreahit.com) the University of Bristol’s professor Tijn De Bie and a team of researchers are trying their hand at throwing science into the hit-predicting mix.

“We wanted to know to what extent it is possible to automatically distinguish songs that reach the top of the chart from those that remain at the bottom, based on just the audio,” says De Bie. “This seemed quite a challenging task, given that it’s likely that other factors will have a strong impact on the popularity of a song, as well. For example, the marketing budget, the prior popularity of the band, and social aspects surrounding the song are no doubt very important.”

The team used machine-learning technology for their investigation, which involves algorithms that learn from data input. Specifically, they examined the last 50 years of UK top 40 hits as baseline data to see if ScoreAHit could correctly predict each song’s status on the charts.

“To be able to do this, songs must be represented in a way that is mathematically convenient,” explains De Bie. “In this case we represent each song by a set of musically relevant numerical ‘features.’ This set of features includes basic ones related to the duration of the song and its tempo (beats per minute), and more advanced ones such as the danceability, energy, mode, time signature, and even harmonic simplicity (characterizing how musically simple a song is) and nonharmonicity (characterizing how harmonic the sound is).”

ScoreAHit’s ability to determine a hit song currently lands at about 60%, but De Bie and his team also unearthed some unexpected results. Predictability of a hit was at its lowest during the 1970s and ’80s, leading to the conclusion that those were extraordinarily creative musical eras. Another uncovered truth is that music, over time, has indeed become louder. (See, your parents were right about one thing.)

De Bie says that the research group is currently examining additional audio elements and external influences (such as artist popularity and lyrics) that could improve ScoreAHit’s performance. ■

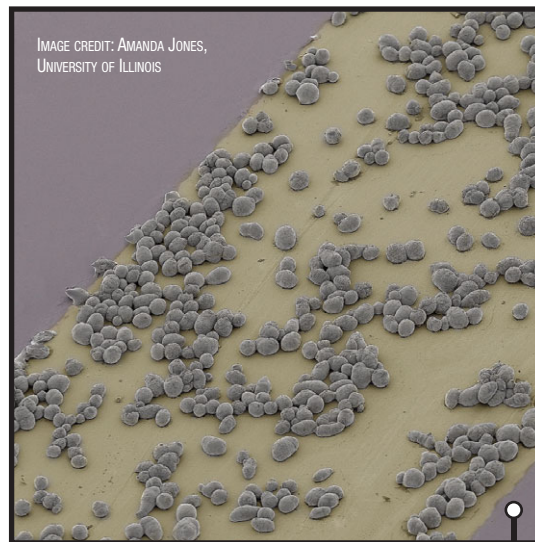


Researchers at the University of Bristol utilized a variety of “musical features” to mathematically identify elements in the algorithm they crafted for their hit song prediction application, ScoreAHit.

Self-Healing Electronics Work Longer, Reduce Waste

As electronics that use inexpensive computer chips have become ubiquitous, so has the habit of tossing, instead of repairing, devices when they go on the fritz. With an eye on conservation, a group of engineers at the University of Illinois have created a system that lets broken circuitry to heal itself, even without diagnostics or human intervention.

Aerospace engineering professor Dr. Scott White explains how their system works. “We encapsulate



University of Illinois scientists have created liquid-metal-filled microcapsules that reside on gold conductive wires to be used in a variety of electronic devices. When the wire fails, the microcapsules break and fill in the gaps, instantly restoring the wire’s conductivity.

a liquid metal [an eutectic alloy of Gallium and Indium] in a polymer microcapsule [made of urea-formaldehyde]. We then put these capsules onto a gold conductive line. When the line breaks, it also breaks the capsules, releasing the liquid metal. It flows into the broken line, and conductivity is restored.”

White says that finding a suitably conductive liquid challenged them, but they found a solution when they “tried metals that are liquids at room temperature, and were successful in encapsulating them.”

The team envisions their product seeing widespread adoption in circuit boards, but also in aircraft, satellites, and spacecraft, “where you need fault-free operation for many years and you have no opportunity to repair.” ■

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www.gblan.com

05.11-12.12

G33ktopia - Portland, OR

www.geeksofwar.com

05.11-13.12

Baselan 23 - Winnipeg, Manitoba

www.allyourbaseonline.com

05.18-20.12

Civil War LAN 4 - Corvallis, OR

oregonstate.edu/groups/osugaming

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Naois Gaming - York, PA

www.naoisgaming.com

NGC's LAN-A-GEDDON - Greenville, TX

www.networkgamingclub.com

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www.wvgamers.com

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ColossalCon - Sanduskdy, OH

NostalgiaConventions.com

06.08-09.12

Forge LAN III - Medina, OH

www.forgelan.com

06.16.12

NGC's LAN-A-GEDDON - Greenville, TX

www.networkgamingclub.com

Quake and Steak LAN - Mantua, OH

quakesteaklan.webs.com

WV Gamers - Eugene, OR

www.wvgamers.com

06.29-07.01.12

LANcouver 2012 - Richmond, BC

www.lancouver.com

07.06-08.12

Intel LANFest MassiveLAN 2012 -

Hamburg, NY

www.massivelan.com

07.13-15.12

AnimeSouthEast - Sevierville, TN

NostalgiaConventions.com

07.13-16.12

PDXLAN 20 - Tigard, OR

www.pdxlan.net

07.21.12

Naois Gaming - York, PA

www.naoisgaming.com

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Intel LANFest DESERTBASH ELEVEN

- Phoenix, AZ

lanfest.intel.com

08.02-05.12

Quakecon - Dallas, TX

www.quakecon.org

08.11.12

WV Gamers - Eugene, OR

www.wvgamers.com

08.18.12

NGC's LAN-A-GEDDON - Greenville, TX

www.networkgamingclub.com

09.14-16.12

Ouiumicon.com - Louisville, KY

NostalgiaConventions.com

09.15.12

NGC's LAN-A-GEDDON - Greenville, TX

www.networkgamingclub.com

09.15-16.12

Exile XII - Troy, NY

www.exilecomputergaming.com

09.22.12

WV Gamers - Eugene, OR

www.wvgamers.com

09.29.12

Naois Gaming - York, PA

www.naoisgaming.com

10.12-14.12

Banzaicon - Columbia, SC

NostalgiaConventions.com

10.20.12

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WV Gamers - Eugene, OR

www.wvgamers.com

11.02-04.12

PDXLAN November - Portland, OR

www.pdxlan.net/portland

11.17.12

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www.networkgamingclub.com

WV Gamers - Eugene, OR

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Q&A With Mark Leathem

Kingston's VP Of Corporate Marketing On HyperX



Q How long have Kingston's HyperX enthusiast products been around, and can you talk about the impetus for launching the brand?

ML Kingston Technology, which has been in business for around 25 years, launched its first HyperX enthusiast product almost 10 years ago, when we released a 256MB 333MHz DDR1 HyperX Genesis memory module on November 13, 2002.

Why'd we do it? It just made sense. At the time, we were already the world's largest third-party memory manufacturer, and while working with leading motherboard partners we became increasingly aware that the high-end consumer, gamer, and enthusiast was being underserved with their own line of high-performance products.

Q Kingston recently launched its 3K HyperX SSDs. How do these newer drives compare with the original HyperX SSDs, and what kind of user did Kingston have in mind when creating them?

ML The HyperX 3K SSD is essentially a cost-down version of the original HyperX SSD released last summer, while maintaining the exact same performance specifications. The only difference (aside from the lower price and the aesthetics) would be the usage of 3,000 program/erase cycle NAND. While the 3K has a lower endurance rating than the 5,000 P/E cycle NAND used in its predecessor, it

still has plenty of endurance for the typical user. The difference between Kingston and some of our competitors is that we give our consumers the choice to pick which is best for their workloads.

Q When PC enthusiasts think about Kingston, lots of them probably immediately think of HyperX. But we remember that a few years ago, Kingston's SSDNow drives were among the first on the market to provide consumers with affordable solid-state boot drives. How has the SSDNow line evolved since then?

ML SSDNow is still very much entrenched in providing value and performance SSDs to mainstream consumers and business professionals. What have evolved are our component relationships, especially in regards to our affiliation with LSI SandForce. This controller technology afforded us the opportunity to release industry-leading, enthusiast-grade SSDs. When we launched our enthusiast line of SSDs, it only seemed appropriate to launch them under the HyperX brand.

Q We've seen a lot of changes for memory support among Intel chipsets over the last few years, from dual-channel to triple-channel to quad-channel, and now it looks like we're headed back to dual-channel for Ivy Bridge. Do these changes present a challenge for companies like Kingston, and what do you have planned (or released) for folks looking to build Ivy Bridge systems?

ML It's no challenge, really. This is part of our everyday business—keeping track of processor and motherboard roadmaps to ensure that we have complementary products at launch. Enthusiasts who want to push the performance boundaries with Ivy Bridge will want to pair it with Kingston HyperX memory. At the Z77 launch, we will have HyperX dual-channel XMP-certified kits made especially for the new Intel Ivy Bridge 3rd Generation Core i7 and i5 processors. They will be available in 8GB and 4GB kits of two starting at 1,600MHz and going up to speedy 2,666MHz frequencies. We've even successfully tested 2,800MHz HyperX kits on ASUS, GIGABYTE, and MSI Z77 motherboards, not to mention the SATA 6Gbps HyperX SSDs and DataTraveler HyperX USB 3.0 flash drives that we also have to complement Z77.

Q What can we expect from Kingston in the second half of 2012? Any upcoming product launches in the works that you can talk about, or anything you'd like to add?

ML Given that it is HyperX's 10-year anniversary this November, keep on the lookout for some limited-edition SKUs, as well as some great promotions. We really want to reward our loyal fans for supporting Kingston HyperX throughout its 10-year existence.



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Outstanding Audio Quality

The Vengeance 2000 has large, custom-designed 50mm drivers that provide incredibly accurate audio response across the sound spectrum, ensuring that your sound is rendered with more detail and clarity. The meticulously tuned bass ensures rich, distortion-free lows even at high volume settings. And the 48kHz uncompressed wireless audio stream gives you DVD-quality audio without data loss or compression artifacts.

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