BEST MOUSE EVER
Exclusive review: R.A.T. 7, the world's most customizable mouse *p. 80*

ALL-IN-ONE PCs
We torture-test four iMac killers *p. 40*

HACK YOUR ANDROID
Customize your phone's OS today with our handy walk-through *p. 69*

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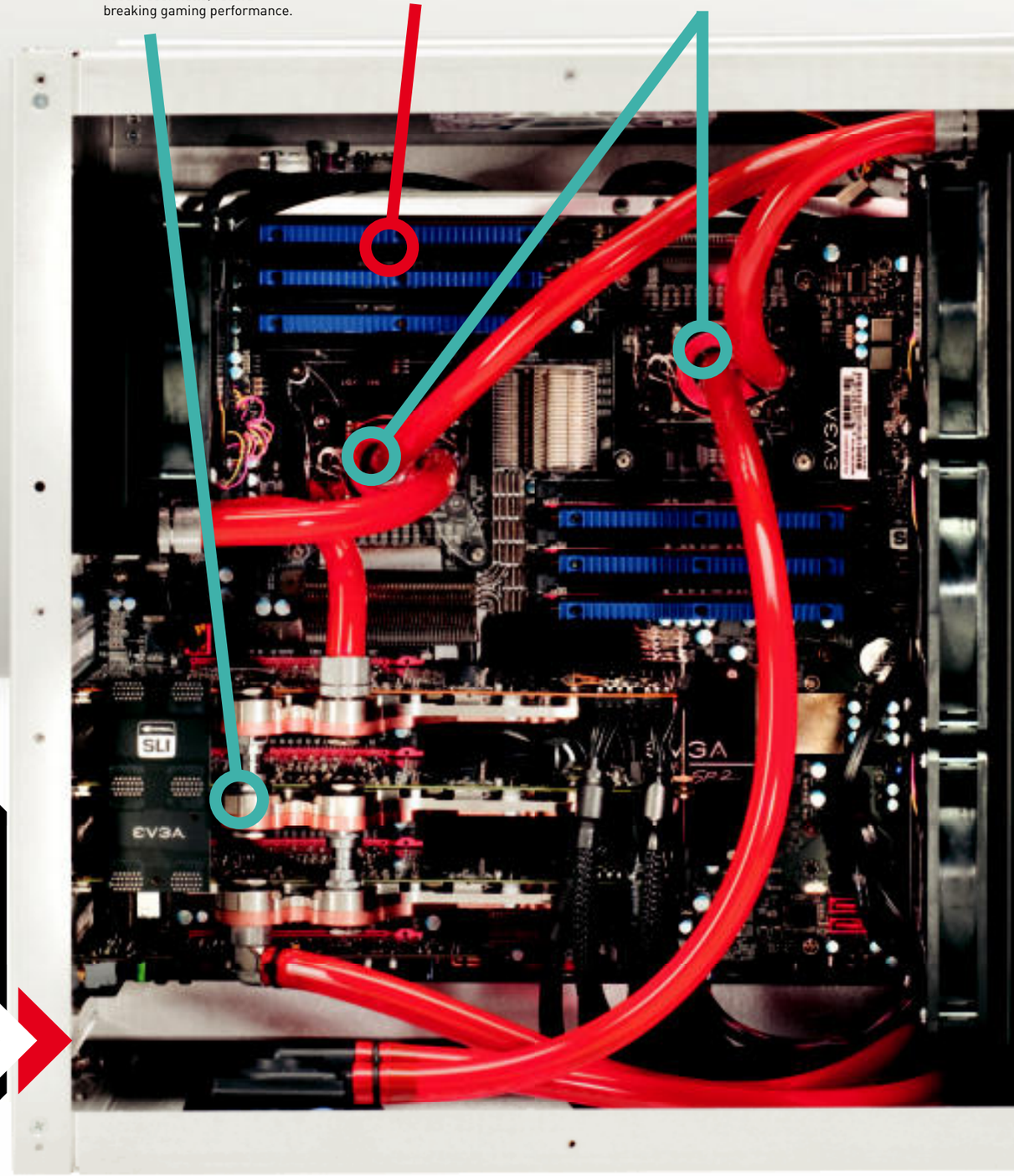

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GEEK QUIZ! Which was not a Windows code-name? A) Stockholm B) Memphis C) Janus D) Snowball 60-question quiz on p. 52!

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SEPTEMBER

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Why We Build the Dream Machine

Welcome back to another issue of *Maximum PC*. As always, we're glad to have you. First off, I appreciate your response to my request for input on what types of PC-building projects you think we should be spending our time and energy on. Your emails were just beginning to trickle in as we were finishing this issue. As always, I was impressed with how thoughtful and creative your ideas were—and that's just in the first 100 or so emails I received.

For the last 15 years, toward the end of each spring, our editors sit down to spec the year's September issue Dream Machine. Looking back at the archives, I can't believe this issue marks *Maximum PC*'s 15th time through the process. With only a few exceptions, our emphasis has revolved around power and innovation. I hope that one glance at our current Dream Machine cover makes it clear that these are also the themes this time around.

The truth, however, is that deciding on the Dream Machine's components is just the beginning of a bigger undertaking. Each year, our mandate is to use the DM project as a referendum on the latest PC components and technology as well as the most up-to-date PC-building techniques.

This year's build-out definitely fits this mold. We customized our case enclosure. We hooked together three GPUs, which was pretty straightforward, but we also chained together and overclocked two six-core CPUs on the same motherboard—which turned out to be trickier than we thought. We attempted—but failed—to RAID 0 two large SSDs. And we water-cooled the whole thing in a much more efficient way than we've ever water-cooled before.

Each step of the way, we documented what we learned and attempted to translate these lessons into the article that begins on page 22. For the trickier processes—overclocking the dual-proc configuration and setting up the water-cooling—we broke out sidebars to extend the conversation. Our expectation isn't that you'll build the exact same system that we did. Rather, it's that you'll learn from our experiences, and apply our successes (and single failure) to your own PC-building endeavors.

I'm now reading all your emails with an eye toward what our next PC-building experiment will be. We're going to kick off our series of build-it guides in the November issue, so stay tuned. For what it's worth, the leading contenders thus far are: a small formfactor box, an in-car PC, a mid/high-end gaming rig, and a sound studio system.

In the meantime, feel free to tweet more ideas to us @maximumpc. There's still time to sound off.

George Jones

THE BOSS'S CHOICES THIS MONTH

LETTERS POLICY Please send comments and questions to george@maximumpc.com. Include your full name, city of residence, and phone number with your correspondence. Unfortunately, George is unable to respond personally to all queries.

THE NEWS

3D TV Takes Hold

Experts predict that 3D TV will become standard in homes —GORDON MAH UNG

Love it or hate, 3D TV is apparently here to stay, industry experts and television makers say.

Introduced earlier this year, 3D televisions still only make up a small portion of sales but they're doing quite well for a nascent technology. Samsung, which holds the pole position in HDTV sales in the United States, says it's optimistic that 3D will be widely embraced.

"The industry, technology, and consumers are all ready for 3D experiences in the home," a Samsung spokeswoman told *Maximum PC*. "First, as the number of 3D theaters and 3D movie titles increases, so will consumer demand for 3D experiences in the home. Second, the finalization of the Blu-ray 3D standard is helping to make more 3D content available in the home. Finally, additional content, such as sporting events, concerts, and even games, is becoming available. 3D is more than just a groundbreaking technology—it's the future of television, and Samsung is committed to bringing this immersive viewing experience to consumers everywhere."

Samsung's not the only one bullish on 3D TV. Most industry analysts expect 3D TV sales to take off in the next few years.

Pietro Macchiarella, a research analyst covering the 3D space for Parks Associates, said he expects 70 percent of the HDTVs sold by 2014 to be 3D-ready.

Even with 3D capability available, Macchiarella said it's not likely people will watch the news in 3D. He thinks 3D will only be used for some sporting events, movies, and gaming. But what about reports that 3D sales in Europe are flagging? A survey of 120 retailers conducted by market research firm GfK indicates that just 25,000 3D televisions have sold so far on that continent.

Macchiarella said European adoption rates of 3D may be depressed because of limited 3D content on local cable and satellite stations, as well as the worsening financial situation. In the United States, 3D sales are doing somewhat better. The Consumer Electronics Association pegs the total 3D TV sets sold in the United States this year at 1.05 million, which represents just under 3 percent of TV sales.

Samsung's 3D LED 7000 is among the 7 million sets consumers are expected to snap up this year.

Worldwide, most analyst firms are forecasting from 7 to 10 million 3D TV sets sold. That seems to match what television makers are predicting. Quoting an unnamed source, DigiTimes reported that Samsung is expected to ship 2.6 million 3D sets, with Sony moving 2.2 million, Panasonic 1.1 million, and LG Electronics shipping 1 million sets. If HD TV sales hit the 250 million unit mark this year, that would make the 7 million sets sold just 3 percent.

Not impressed? Samsung officials say that while modest, 3D TV sales are outpacing the sales of LED TVs when they were introduced a year ago.

Parks Associates; Macchiarella said there's another reason he thinks the majority of TVs sold in four years will be 3D capable: cost. He said the cost increase to make an HDTV 3D-ready is about 15 percent. Right now, TV manufacturers are charging about a 35 percent premium for the feature, so it's worth pushing. That 15 percent will in turn continue to drop, which will help make the technology ubiquitous.

End of the Netbook Era?

It was a good run for netbooks, but the torch is being passed to tablets—so suggests market-research firm Forrester Research. According to Forrester, it will take just 24 months for tablet PCs to jump ahead of netbooks in sales. Even if the trade-off doesn't make perfect sense.

While Forrester Research Analyst Sarah Rotman attributes the tablet's similar "grab-and-go" usage model with luring consumers, she adds, "Forrester's data shows that the top features consumers say they want in a PC are a complete mismatch with the features of the iPad. But Apple is successfully teaching consumers to want this new device."

Forrester sees notebooks leading the pack in 2015 with a 42 percent share of the market, followed by tablets with 23 percent, desktops at 18 percent, and netbooks trailing all others at 17 percent. **—PL**

If tablets have their way, the Asus Eee PC could be rendered a relic.

ISPs Seek Net Neutrality Lite

The FCC has made it clear that net neutrality is a top priority, and it's seeking more authority to achieve it. Both AT&T and Verizon have voiced concern over being weighed down by new regulations. The two service providers are now pushing Congress to come up with net neutrality compromise legislation before the FCC acts.

The principal of net neutrality holds that an ISP should be required to treat all data in exactly the same way. For instance, an ISP could not filter torrent traffic, delay, or block it. By asking Congress to head the FCC off at the pass, the telecoms are hoping they can lobby their way to weaker regulations. **—RW**

S.F. Exposes Cell Radiation

Debate persists about the long-term health effects of frequent cell phone usage, and studies have come to mixed conclusions. But San Francisco's Board of Supervisors is playing it safe, voting in favor of a law that requires retailers to display a cell phone's radiation output.

Mayor Gavin Newsom is expected to sign the bill into law following a 10-day waiting period for public comment. "In addition to protecting the consumers' right to know, this legislation will encourage telephone manufacturers to redesign their devices to function at lower radiation levels," said Newsom, announcing the legislation.

In practice, San Francisco cell phone shoppers will see the specific absorption rate (SAR) of any cell phone being sold. Noncompliant retailers face a $300 fine. **—KS**

TOM HALFHILL

Intel GPU? Don't Hold Your Breath

You can buy any graphics card you want, as long as it's from AMD or Nvidia. A third choice would be great—but, so far, Intel's Larrabee project is generating more heat than light. The latest word from Santa Clara is that supercomputers will get Larrabee processors before PCs do.

Except the project is no longer called Larrabee, and the new focus is number crunching, not graphics. The new code-name for Intel's manycore-processor project is Knights; the code-name for the first Knights chip is Aubrey Isle; and Intel's official name for the technology is the Many Integrated Core (MIC) architecture.

The first MIC chip is clearly based on the first Larrabee design I described in November 2008. Aubrey Isle will integrate 32 64-bit x86 cores with 512-bit vector-processing units on a ring network. Each 1.2GHz core has a 256KB L2 cache, shareable with other cores, and they all share 1GB to 2GB of external GDDR5 memory. Each core has four-way Hyper-Threading—twice as many threads as existing x86 processors—for a total of 128 threads per chip.

The main difference between Larrabee and Aubrey Isle is that Intel won't sell the new chip as a GPU for PCs. Its power consumption, performance, and cost can't compete with AMD and Nvidia. Instead, Intel plans to sell Aubrey Isle on cards intended for scientific and engineering computing.

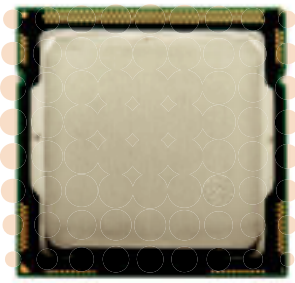
The first card, code-named Knights Ferry, will enter production this year and is for system designers and software developers. It paves the way for the real product, a card known as Knights Corner. That card will have a different MIC chip with at least 50 processor cores. It will be manufactured in the 22nm fabrication process that Intel plans to debut next year.

Although Intel says it hasn't given up on GPUs, the project has obviously suffered a setback. Focusing on high-end computing will buy time to turn down the heat. But Intel is aiming at a moving target as AMD and Nvidia aggressively improve their own GPUs. I think an Intel GPU is at least two years away.

Tom Halfhill was formerly a senior editor for *Byte* magazine and is now an analyst for *Microprocessor Report*.

New LGA1156 Top Gun Arrives

Price cuts expected, but have not arrived on other Lynnfield parts



Intel's new 3.06GHz Core i7-880 is here and will sell in volume for $583. That makes it slightly more expensive than the $562 2.93GHz Core i7-870 part.

The head scratcher is how the Core i7-870 makes sense for anyone since Intel introduced the nearly identical 2.93GHz Core i7-875K for just $362. And unlike the 870, the 875K is unlocked, which will help overclockers hit higher numbers. **–GU**

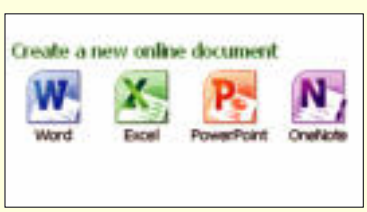
The Last Days of LimeWire?

Things are looking pretty bleak for the beleaguered P2P provider

Now that LimeWire's been found guilty of copyright infringement by a court of law, foes of the P2P music-file-sharing network are lining up for restitution. The decision came in a U.S. District Court lawsuit brought by the RIAA. Judge Kimba Wood ruled that network founder Lime Group didn't take "meaningful steps to mitigate infringement." Now, besides asking the judge to shut LimeWire down, the RIAA is reportedly asking for a monetary award of $1.5 trillion ($750 apiece for the 200,000,000 songs allegedly downloaded over the network).

Add to that a subsequent lawsuit against LimeWire by members of the National Music Publishers Association (NMPA), and you're looking at a company facing financial ruin.

For its part, the Lime Group is hoping to settle with the RIAA and forge a mutually beneficial relationship with the music industry. **–KS**



MS Office Web Apps

Joining all the other software makers now inhabiting the cloud, Microsoft debuted a free online version of its vanguard office suite simultaneous to releasing Office 2010. The MS Office Web Apps (http://bit.ly/9E6tw9), featuring online versions of Word, Excel, PowerPoint, and OneNote, are naturally pared-down versions of the full-fledged apps—in other words, the company's answer to Google Docs. The new unabridged Office suite costs $280. **–KS**

Starbucks Serves Up Free Wi-Fi

As of July 1, you can enjoy free unlimited Wi-Fi access in any Starbucks shop nationwide, no username or password required. (Can someone say 10-hour coffee break?) The company also has plans to launch the Starbucks Digital Network in partnership with Yahoo this fall. It would give store customers access to premium pay websites such as the *Wall Street Journal*'s. **–KS**

GAME THEORY

3D or not 3D?

Up in my attic, gathering dust, is a piece of cutting-edge hardware from 1995. It's a Forte VFX-1 virtual reality helmet, and it was going to *change the way we play games forever!*

You remember how everyone was slapping on $1,500 VR headsets, jumping into Magic Carpet, and dazzling to the 320x200/256-color 3D images and laggy head-tracking, right?

In the 15 years the thing has been in my house, it has logged less than one hour of total gameplay time, and I had to pay for *that* with several hours of residual headaches, blurry vision, and vertigo.

3D is once again riding a wave of dubious popularity thanks to *Avatar* and other films, with 3D TVs and gaming to follow. None of these are good trends. Roger Ebert is one of the few people calling 3D bunk, remarking that 3D is "a waste of a perfectly good dimension." As he pointed out in a recent *Newsweek* article, "Why I Hate 3D" (http://bit.ly/abeQ8M), the human mind already perceives the third dimension when it looks at 2D images due to the principle of perspective. Narrative 3D films add a mild gimmick factor, but extract a heavy price in image brightness, color depth, and eyestrain.

Games, which already place you inside three-dimensional environments, might appear to be a more natural fit for 3D, but are they really? Even if the technology is not a problem (and it is), how does the added illusion of dimensionality improve a game? Frankly, I think it's distracting, and the strain of mentally processing a fully immersive environment is wearying over long gameplay sessions.

Inspired by renewed 3D mania, Nvidia is touting its 3D Vision system, based on active-shutter technology that alternately darkens/lightens each eye. Although higher refresh rates can improve problems with flicker, no one who values their eyesight should spend hours viewing the world through active-shutter glasses.

Between the price ($200 for the Nvidia kit) and the eyestrain, the cost of 3D gaming seems awfully high for a gimmicky illusion, especially when the brain produces it for free.

Thomas L. McDonald has been covering games for 20 years. He is an editor at large for *Games* magazine.

Google TV

Breakthrough? Or WebTV redux?

Logitech's Revue will be one of the first Google TV products to hit the market when it ships later this fall. Price TBA.

You're to be forgiven if you don't remember WebTV, Microsoft's failed effort to meld TV and the Internet. If you *do* remember it, don't make the mistake of thinking that Google TV is the same idea warmed over.

"WebTV failed for lack of infrastructure and because web content wasn't related to TV content," said Intel's Wilfred Martis, general manager of retail CE. What does Intel have to do with Google TV? An Intel SoC based on the Atom C4100 will power the first Google TV hardware: Logitech's Revue set-top box, Sony's Internet TV, and a forthcoming Sony Blu-ray player.

Google TV devices will use Google's Android OS and Chrome browser to make it easy to find TV and web content, but the company expects third-party developers to create custom applications, too. The goal is to blend TV and web content—from your favorite TV shows to popular video, music, and photo apps—into a seamless entertainment experience.

Intel's SoC features separate pipelines for video and graphics, which will enable Google TV products to overlay graphics—such as a web browser, a user interface, or an application that enables viewers to interact with what they're watching—on live TV programming.

As exciting as that sounds, Google TV has a potential dark side, too: It could take product placement to a whole new level. Imagine a clickable ad popping up whenever a sponsor's product appears on screen. **–MB**

CLOUD CONVENIENCE

YouTube Offers Online Video Editor

Probably the vast majority of contributors to YouTube possess limited skills and computing resources for editing their video clips. These are the folks YouTube is targeting with its new online video editor (www.youtube.com/editor). The rudimentary app gives you access to any video clips uploaded to your account. Drop your clips onto the empty timeline, rearrange them as you please, preview the results in real time as you go, and even cut selections from the compilation. You can also add audio from a vast selection of available music tracks. –KS

BYTE RIGHTS

Every Silver Lining Has its Cloud

It's the latest thing to have the breathless tech punditry wheezing like geriatric smokers in a marathon—Cloud Computing! It's Google Apps, Facebook data, Amazon's easy virtual servers, and more. It's going to change the way we live. It might even be more revolutionary than the iPad or Segway.

Cloud computing is a fancy way of saying stuff's not on your computer. It's on a company's server, or many servers, possibly all over the world. Your computer becomes just a way of getting to your stuff. Your computer is an interface, but not where the magic happens. As my friend @obra says, "Cloud computing is just mainframes with rounded corners."

But there's a catch. When our stuff is in the cloud, it's not covered by the same laws about privacy and access by law enforcement that it is when it's in our houses or on our own computers. Getting access to anything in the cloud is much easier for the police, just by the simple fact that the laws were written during the time of 2400-baud modems and big-hair bands.

Companies, academics, and nonprofits have formed a coalition called Digital Due Process to push congress to update privacy and search-and-seizure for the age of the cloud. It's a great effort, but likely to hit resistance from other companies and law enforcement, some of which like being able to get all your data anytime.

But what might be worse is that your access to your data in the cloud is predicated on a terms and services contract that you clicked "agree" on without reading, which may give your cloud provider everything up to and including the right to extort your first born in exchange for access to your own data.

DRM may be a media and software jail, but the cloud is the first place where your own data can be held hostage even though you created it.

I know it's easier, cheaper, and more mobile, but until the law is squared away, I'm keeping my head out of the cloud.

Quinn Norton writes about copyright for Wired News and other publications. Her work has ranged from legal journalism to the inner life of pirate organizations.

THE LIST

The 9 Best Things at E3 2010

9 PARROT AR.DRONE

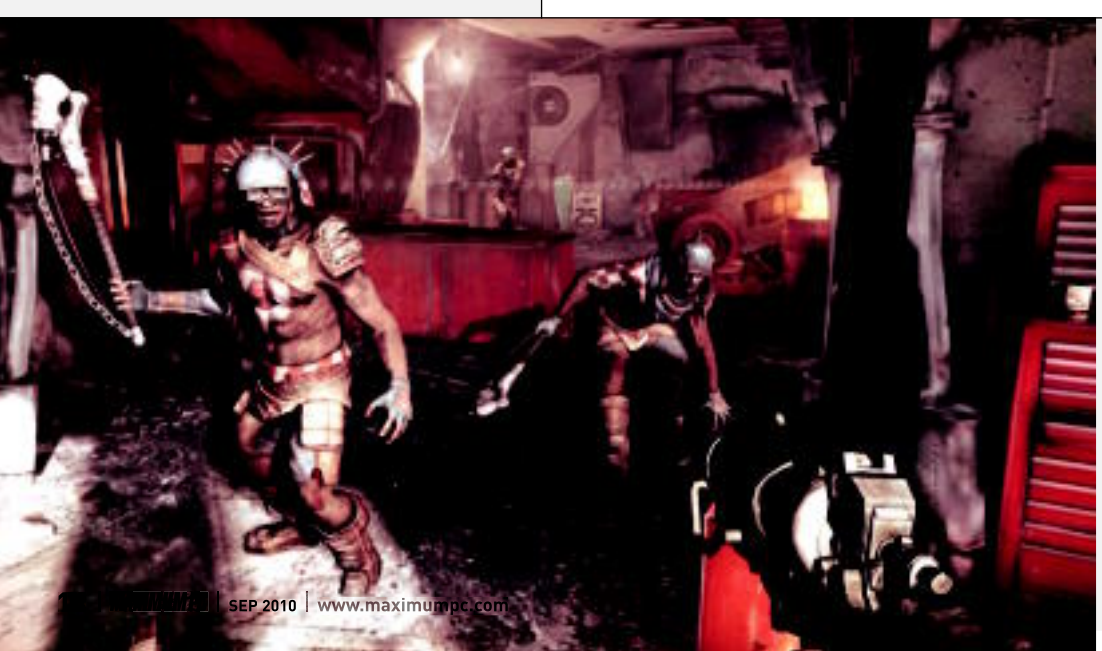
The moment we saw this Linux-based Augmented Reality quadricopter, we wanted it. You control it with an iPhone, which displays a feed from the chopper's onboard cameras and even identifies enemy targets that you can (virtually) fire upon. If your friend also has an AR.Drone, you can battle them in the skies. http://ardrone.parrot.com

8 Deus Ex: Human Revolution

A prequel to one of the smartest, most authentic science fiction games ever, Deus Ex: Human Revolution wowed the sweaty, teeming masses at the L.A. Convention Center. Set in the year 2027 with a design aesthetic that is part Cyberpunk and part Renaissance, the game allows you to customize your character with an assortment of nanotech augmentations. www.deusex3.com

7 KINECT

Regardless of what you think about Wii-style games, the tech behind Kinect is interesting. The facial and skeletal tracking/recognition come courtesy of an RGB camera, while movements are detected by two 3D depth sensors surprised to also discove array mic allowed us to control the Xbox with our voice. The proprietary USB connector makes it Xbox 360–only for now, but it's easy to imagine this being ported to the PC in time. http://xbox.com/kinect



6 Rage

The next highly anticipated shooter from id Software impressed us because 1) the role-playing and story elements represent a departure for id Software; 2) you can use looted artifacts to build new weapons and gadgets; and 3) it's the next Carmack engine and should be a great benchmarking tool. 'Nuff said. www.ragegame.net

5 Mafia 2

This open-ended action adventure surprised us with cinematic storytelling and stunning DX11 graphics. The setting is the mid-20th century in the fictional Empire City. You play as Vito, a World War II veteran who returns home to a life of crime. The experience bears a striking resemblance to Mario Puzo at his finest. Best of all, we got to play on a big-screen display in 3D courtesy of Nvidia's 3D Vision technology. www.mafia2game.com

4 3D GAMING

The third dimension is now officially in play. Literally. At its core, E3 2010 could be boiled down to the following: 45,000 gamers playing PC, PS3, and Xbox 360 games while wearing 3D goggles. Any suspicions we had that the 3D movement was premature were put to rest the moment Nintendo announced the goggle-less Nintendo 3DS, which uses a lenticular display to impressive effect.

3 ORIGIN PC EON15-3D

If you read the August issue of *Maximum PC*, you probably remember that Origin PC's Genesis system was wicked fast. Imagine our delight when we stumbled upon the company's EON15-3D laptop at the show. It's fully customizable—you can build one out with up to a Core i7 820QM quad-core CPU—and is fully enabled for 3D gaming. www.originpc.com

2 PORTAL 2

GLaDOS and the Aperture Science Labs are back, and so is the smartest first-person game we've ever played. Valve showed off a short demonstration of Portal 2 that introduced a handful of new puzzle-solving mechanisms including pneumatic-style tubes and texture paints with special properties, as well as a hilarious new sidekick. www.valvesoftware.com

1 Civilization V

This fifth incarnation of the grandaddy of strategy games looks like it will be the best one ever. New to the world- and empire-building mix this time around: more nuanced victory options, increased tactical depth, a cloud-based save-game system that will allow you to play your games on different systems, the elimination of unit stacks, and a much more vibrant and dynamic game map. www.civilization5.com

This month the Doctor tackles...

- In-text Pop-ups
- Dual Bios
- HDMI Underscan

Kill In-text Pop-ups

Recently, a lot of websites have started to put little pop-up advertisements in their text. I read with my mouse, so as I follow along with my pointer I hit a word like "Film" and it pops up with a little box about local theaters. It interrupts what I am reading and is really annoying. Is there a way to turn this off? I know it's an advertisement and a source of income but I get enough of that when I have to sit through a commercial to watch a movie trailer or get an ad page in between going to a new web page. I use Chrome as my main browser, and Firefox and IE when I have to.

—Gary Davidson

Gary, some of these "in-text advertisements" let you opt out via a cookie, but they have a tendency to reappear as soon as you delete your cookies. If you don't mind re-opting out every so often, click the little question mark (or "help") option in the pop-up. That will send you to a website; click the Disable tab and hit "Click here to disable." You won't see any more of these ads until you delete your cookies.

Barring services that block *all* ads (such as AdBlock, which works on both Chrome and IE, but which we can't recommend because, well, we rely on advertisements to keep our website afloat), the easiest way to disable text ads in Chrome is to use the Disable Text Ads extension for Chrome. (The Doc knew there was a reason he liked this browser.) It does exactly what it says it does, and you can get it at http://bit.ly/dsWWaP.

Help Rock out My System!

My current rig is an HP Pavilion M8530F with a Viola-GL8E motherboard. The CPU is a 2.2GHz Phenom X4 9550. The board is AM2+. I asked HP for a copy of the mainboard's user manual hoping it could tell me what AM2+ chip I could drop in. However, I find myself even more confused. I think a 2.6GHz Phenom 9950 X4 will work even though it is a 125-watt chip and my current 9550 is a 95-watt chip.

I'd rather not spend the money only to be proven dead wrong and be stuck having to borrow my fiancée's Vaio laptop. It may be nice, but it's not my desktop. So far, the only change made to my rig in the two years I've had it was the addition of a graphics card cooler, of the intake variety. I've done research and the more questions I have answered, the more confused I get. If I could, I'd just buy/build a new rig, but that's not an option. Some newer games, like BioShock 2, require AMD core speed in excess of 2.2 GHz, and mine barely meets the requirements. Even the budget upgrade article in the July 2010 issue is vague on whether I can upgrade. Doc, please steer me in the right direction, lest I crash on the rocks of inaction.

—Lucas Allain

By design, pretty much any AM2+ board with the right BIOS and the correct thermal engineering should be able to run just about any AM2+ chip. Since the Phenom 9950 X4 launched several months before the Phenom 9550 X4, the Doc believes there is a high probability the Phenom X4 9950 will work. But to make things a little muddier, you should remember that there are two versions of the Phenom 9950 X4 in circulation. The original part, released in July 2008, was a blazing 140-watt version. In October, AMD released the same chip, but its thermals were scaled back to 125 watts. You'll want the 125-watt part, of course—unless you are sure your board supports 140-watt processors. Got it?

Want more confusion? The Doctor isn't guaranteeing anything, but some owners of HP boxes with the Viola-GL8E (it's built by Asus and is also known as the M2N78-LAHP) report success with Phenom II procs—but only after updating to the latest BIOS for the board. A Phenom II is preferable to a Phenom for the greater clock speeds and larger cache.

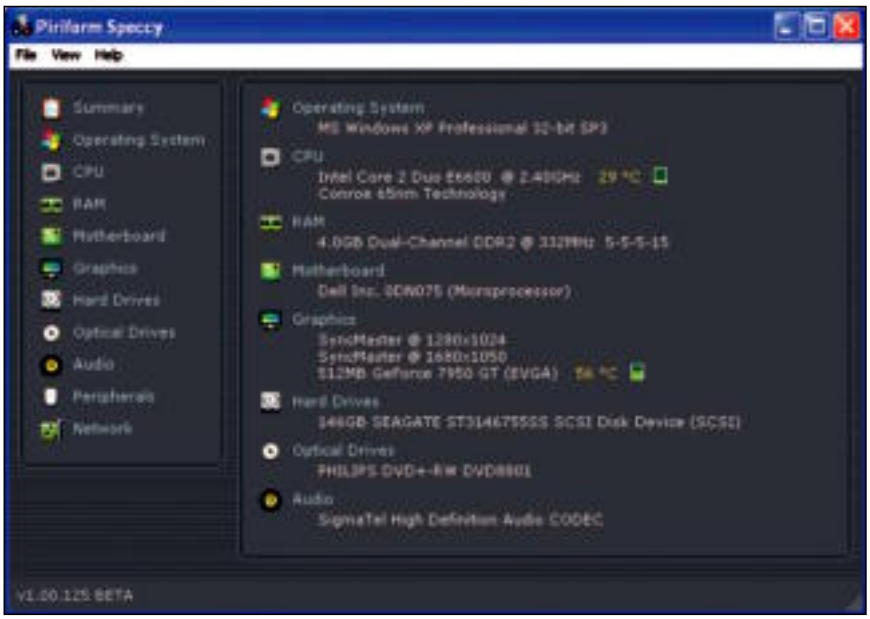
So, what would the Doc do? Update the graphics card. If you go with the chip that is likely to work, the Phenom X4 9950, you're looking at stepping up a massive 400MHz. The Doc knows a used 9950 is less than $50 on Fleabay, but you would probably be happier in gaming by updating your GPU instead.

Dual BIOS Necessary?

I am looking at a new build with an AMD CPU. I normally use Asus, but I see that Gigabyte puts out a board with a dual BIOS. What are the advantages and disadvantages of a dual-BIOS board?

—Rich

Gigabyte's secondary BIOS is redundancy for the motherboard's main BIOS. If you suffer a corrupt BIOS from a bad flash, the board reverts to the backup BIOS to boot the system. It's a nice feature for folks who believe in redundancy, but the Doc doesn't think it's a make-or-break feature unless you hack on your BIOS so much that you need the fallback. The Doc has flashed hundreds of motherboard BIOSes over the years and has suffered only one catastrophic failure. These days, updating the BIOS is pretty easy and no longer gives you the same pucker-up fear that you got in 1997 or 2000, when Gigabyte first introduced its dual-BIOS feature. It was certainly



Programs like Speccy will show you exactly what hardware is in your PC, down to CPU stepping and revision numbers.

scarier back in those days. Again, unless you've been burned by a corrupt BIOS in the past, there are probably other more important features that should inform your purchasing decision, such as performance, slot configuration, accessories, and price.

Sata 6 Mysteries

Are 6Gb/s SATA ports on the newer motherboards backward compatible like USB 3.0 is with USB 2.0? I'm eventually going to purchase either an Asus Crosshair 4 Formula or a MSI 890FXA-GD70 motherboard.

I need to know if my two Seagate Barracuda 7200.12 1TB hard drives will work in these motherboards' 6Gb/s SATA ports. I won't be using any RAID configurations. The first drive is for Windows 7 64-bit and programs. The second is going to be for the Documents, Downloads, Music, Photos, and Videos folders.

Also, when are 6Gb/s SATA hard drives for desktop computers going to be available?

—Keith Brooks

Yes, 6Gb/s SATA ports are backward compatible; you can run 3Gb/s SATA drives just fine on them. There are several 6Gb/s SATA drives on the market, including the 1TB WD Caviar Black WD1002FAEX, Seagate Barracuda XT 2TB, and the latest 600GB and 450GB WD VelociRaptors. Crucial's 256GB C300 SSD runs on 6Gb/s SATA, as well. Aside from burst speeds and some alleged NCQ benefits, there's not much to gain from running mechanical hard drives on SATA 6Gb/s. Some solid state drives, on the other hand, benefit immensely—3Gb/s SATA tops out at about 240MB/s, while the Crucial C300's average read speeds on 6Gb/s topped 300MB/s. Not shabby!

What's Inside?

I have an older Dell with an Intel Pentium 4 CPU. As you know, it's not easy to track down specific hardware configurations for old Dell machines. Can you direct me to a source for info so I can find out if it's even possible to get an updated BIOS and/or a better CPU for my PC?

—Tom Winn

Tom, there are several nifty utilities that let you find out exactly what hardware is running on your system. Our favorites are CPUID's PC-Wizard (www.cpuid.com/softwares/pc-wizard.html) and Piriform's Speccy (www.speccy.com). Both will let you know what processor, chipset, and motherboard are in your system. That's the easy part, though. Intel used the same LGA775 socket through many generations of CPUs—but unlike AMD, didn't appear to give a damn about compatibility. There are enough iterations of chipsets and front-side bus versions to impact your upgrade that it would take an entire feature article just to explain which chipset works with which CPU. In

other words: Never ever assume that an LGA775 CPU will work in your board because it's an LGA775 board. The best way to proceed is to find out what chipset, motherboard, and BIOS you have. Then check the vendor's website for the mobo's compatibility list, and cruise the forums looking for experiences from other people who have successfully upgraded those boards.

Why the 2TB Ceiling?

I have been putting off building a home file server for more than two years now. I have been patiently waiting for the 2TB SATA hard drives to be surpassed by 2.5TB SATA drives, in the hopes that prices for 2TB hard drives go down to $80 per unit. Needless to say, my patience is running short. It has been more than two years now and hard drive manufacturers seem to have stalled at a 2TB capacity limit for all SATA hard drives.

What do you think is causing the stall in hard drive capacity growth? Is it this bad economy? Is it due to Windows XP's inability to read from hard drives that exceed 2TB? I would really appreciate it if you can provide any insights on when you think this long-standing 2TB capacity limit will be broken with the introduction of 2.5TB hard drives.

—Ivan

There is indeed a 2TB barrier (sorta), but it only applies to boot partitions, not all drives. And not just in Windows XP; it's a long-standing limitation that is finally being reached by hardware.

Back in the Stone Age, floppy disks were formatted into tiny chunks—512-byte sectors, to be precise. In order to find data on a disk, the drive needs to know where to look, so each sector has an address that the Master Boot Record uses to locate information. The MBR stores disk partition information as 32-bit integers, meaning it can address a maximum of 4,292,964,296 512-byte sectors, or 2,199,023,255,552 bytes. Look familiar? It's 2.2 tebibytes, or 2TB. Since the MBR can't allocate addresses to partitions with more than 2TB worth of 512-byte blocks, you can't boot from them. No problem if you're booting from another drive, but a bummer for people who really want a massive boot partition.

The solution, as discussed in our June 2010 White Paper, is three-fold. You'll need a motherboard that uses Extensible Firmware Interface (or EFI) instead of the 32-bit BIOS that's standard, a GPT-initialized drive (as opposed to MBR), and a 64-bit version of Vista, Windows 7, Linux, or OS X. Only then will you be able to boot from a partition greater than 2TB. Manufacturers have resisted transitioning from BIOS/MBR to EFI/GPT, but as physical drives with more than 2TB of storage become a reality, they may finally have to comply.

So that's the bad news. The good news is, if you don't need to boot from it, and just want a *storage* device that's greater than 2TB, all you have to do is wait for 3TB drives later this year, as both Western Digital and Seagate are bringing them to market by the end of 2010.

Underscan Man

I recently built an HTPC with a Gigabyte GA-MA785GM-US2H mobo and AMD Phenom X2 550 processor, with 64-bit Windows 7. Everything runs like a top. I have the HTPC connected to my 46-inch Samsung UN46B6000 via HDMI (input 1), with only one problem: The video output displays onto the TV with black bars all around it, about an inch on each side. When viewing cable stations, watching a Blu-ray movie (via HDMI input 2), or playing Wii over the component connection, the display fills the full screen, no problem.

I've tried switching HDMI inputs around, using different HDMI cables, even switching from the Gigabyte motherboard's onboard HDMI port to using a Radeon HD 4650 with HDMI out. The problem persists. No settings to adjust this are found within the ATI drivers/settings. Windows display settings are set to full 1920x1080. When connecting the HTPC to the TV via the analog connection, it does use the full screen, but the colors don't seem as bold as with HDMI. I really would like to utilize the convenience of audio and video on one HDMI connection.

It's hard to find, but ATI's Catalyst Control Center *does* have an underscan/overscan slider.

The TV itself does have "zoom" features that will stretch the picture out or make it bigger than 1080 pixels, but then it's cutting off edges! We still use it for our Hulu viewing and day-to-day use, and everything works fine, but it's a nuisance having those black bars around the screen.

—Name Withheld

AMD should be ashamed of itself for making this driver setting so ridiculously hard to find. Right-click the desktop and choose Catalyst Control Center from the menu. Click the Graphics menu in the top-left of the CCC window and choose Desktops and Displays. Now, click the black triangle in the *smaller* of the two icons representing the display you wish to control—it's at the bottom of the CCC window beneath the heading "Please Select a Display." Now all you need to do is click the Scaling Options tab and move the Underscan/Overscan slider until the desktop fills the screen appropriately. Click OK and you're done.

SUBMIT YOUR QUESTION Are flames shooting out of the back of your rig? First, grab a fire extinguisher and douse the flames. Once the pyrotechnic display has fizzled, email the doctor at doctor@maximumpc.com for advice on how to solve your technological woes.

The Power Cube

Three turned out to be the magic number for this year's Dream: three GPUs, three radiators, three grills—even the 12 cores (and 24 threads) are divisible by three.

RAW, Wanton Power

Dream Machine 2010 was an exercise in PC building, overclocking, cooling—and patience

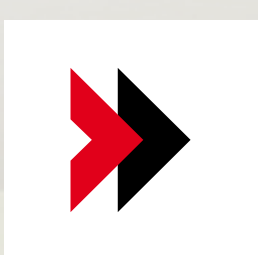
BY THE MAXIMUM PC STAFF

So, the desktop PC will become nothing more than a truck? Well, here's your Mack truck, Mr. Jobs, filling your rear-view mirror on Interstate 80 as you try to get that tablet-sized, Flash-less-powered toy out of the fast lane. Oops, sorry about running you over.

Our take? If the future of the desktop PC is as a truck, it might as well be one hell of a fast and powerful truck. In building Dream Machine 2010, we embraced the notion of raw, wanton power. The result is a power rig capable of hauling a heavily threaded load uphill in top gear while other single- and dual-processor machines are barely chugging along in the slow lane with their hazard lights on.

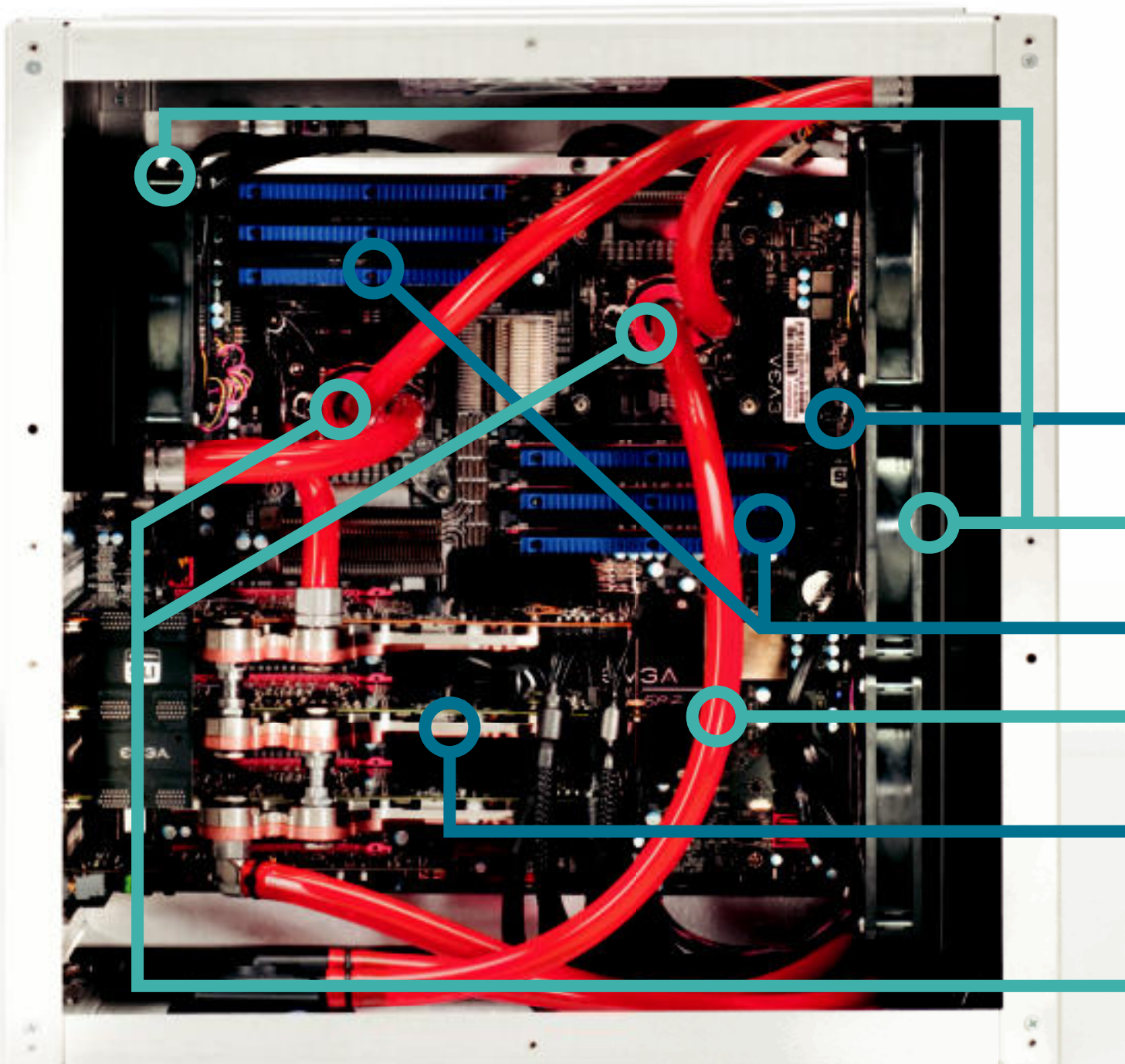
At the onset of our Dream Machine project, we were concerned. 24 threads. Three videocards. 24GB of RAM. 4.4 terabytes of storage. Could we get it all to work together? And could we overclock the CPU and GPU enough to qualify as the fastest PC in the world? It took some wrangling, but we're happy to reply with an emphatic YES. Even better, all this power has some astounding real-world benefits in multithreaded applications.

The simple paint job and tough-looking grills and fans on this year's system complete the theme. This is not a system for the faint of heart. Read and enjoy.



Power Exposed

Want to know what's inside Dream Machine 2010? Here's the full monty



THE PARTS LIST

CATEGORY	NAME	PRICE	URL
CPU	Two Xeon X5680	$3,326	www.intel.com
RAM	24GB Corsair Dominator DDR3/1600	$1,300	www.corsair.com
Motherboard	EVGA Classified SR-2	$650	www.evga.com
Graphics	Three EVGA GTX 480 SuperClocked	$1,575	www.evga.com
Power Supply	Corsair AX1200	$300	www.corsair.com
	Thermaltake Power Express 450W	$100	www.thermaltakeusa.com
Solid State Drives	Two OCZ Vertex 2 200GB	$1,480	www.ocztechnology.com
Hard Drives	Two Western Digital 2TB Caviar Black	$400	www.wdc.com
Optical Drive	Plextor B940SA	$219	www.plextor.com
Soundcard	Auzentech X-Fi Forte	$150	www.auzentech.com
Case	Mountain Mods U2-UFO	$600	www.mountainmods.com
Cooling	Danger Den Custom Liquid Cooling	$1,159	www.dangerden.com
Bezels	MNPCTech	$205	www.mnpctech.com
Keyboard	Microsoft X6	$58	www.microsoft.com
Mouse	Mad Catz R.A.T. 7	$100	www.madcatz.com
Fan Bay	NZXT Sentry LX	$80	www.nzxt.com
Monitor	Three HP ZR30w	$3,900	www.hp.com
OS	Microsoft Windows 7 Ultimate	$180	www.microsoft.com
TOTAL		**$15,782**	

EVGA CLASSIFIED SR-2

This may be the first Dream Machine in which the motherboard steals the show. And why shouldn't it? The Classified SR-2 is such an over-the-top piece of technology that even the most jaded among us got all hot and bothered in its presence.

HARDWARE LABS SR-1

Dream Machine 2010 features three premium Hardware Labs SR-1 radiators (no relation to the SR-2 motherboard). We have a triple radiator in front, a single in the rear, and a double radiator mounted on the other side of the case.

CORSAIR DOMINATOR DDR3/1600

You know how badass the Dream Machine is? It can run 24GB of system RAM and have room for expansion. If we needed to max it out at 48GB, we could.

DANGER DEN COOLING

With this much hardware, water-cooling isn't really an option, it's mandatory. The water blocks we used for the GeForce 480 GTX cards are works of art in themselves, but what they really let us do was overclock the hell out of the GPUs. Stock air-cooled GTX 480 cores poke around at about 700MHz—with water-cooling we were pushing those babies up to 910MHz. Even more impressive was the heat reduction we saw from the water-cooling.

EVGA GEFORCE GTX 480 SUPERCLOCKED

Take the fastest single GPU in the form of Nvidia's GTX 480 and then multiply by three to get stupendous DirectX 11 performance. On air, tri-SLI is not for the faint of heart—the heat these three cards throw off during gaming is enough to make you strip down to your skivvies. On water, however, these beasts are well tamed and capable of extremely high overclocks.

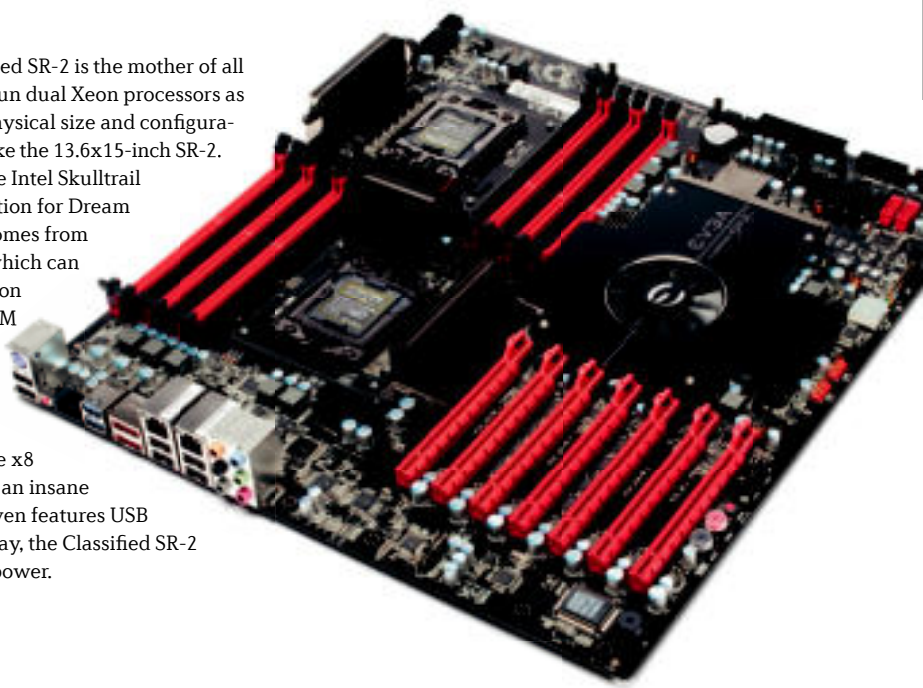
XEON X5680

Running at 3.33GHz and built on Intel's new 32nm process, these two Xeon procs are pretty much what Intel makes its super-fast 3.33GHz Core i7-980X chips out of—except we can run two of them here. With their Hyper-Threading capabilities, that gives Dream Machine 2010 up to 24 threads of computing power. With water-cooling, we're running the two Xeons at a very prudent 4GHz clock speed.

MOTHERBOARD

EVGA Classified SR-2

This is the biggest motherboard we've ever seen

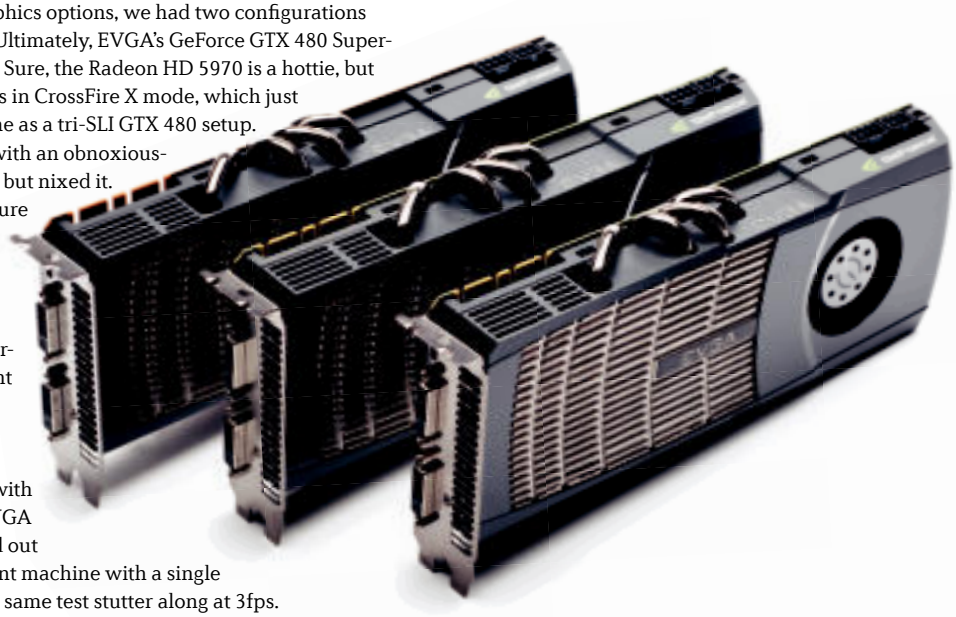


No one doubts that EVGA's new Classified SR-2 is the mother of all motherboards. Sure, other boards will run dual Xeon processors as well as 48GB of RAM, but in terms of physical size and configuration, there is literally nothing on Earth like the 13.6x15-inch SR-2. In sheer size, it dwarfs even the massive Intel Skulltrail motherboard that served as the foundation for Dream Machine 2008. The girth of the board comes from EVGA's proprietary HPTX formfactor, which can accommodate as many as nine expansion slots. However, given the SR-2's 12 DIMM slots and two proc sockets (not to mention the nForce 200 bridge chips), this mobo has only seven slots. Fortunately, they're all full-length x16 slots, with four running x16 data rates. The rest are x8 PCI-E 2.0. The board can accommodate an insane four double-wide graphics cards and even features USB 3.0 and SATA6 ports to boot. In every way, the Classified SR-2 embodies this year's theme of wanton power.

GRAPHICS

EVGA GeForce GTX 480 SuperClocked

Water-cooling = overclocked tri-SLI

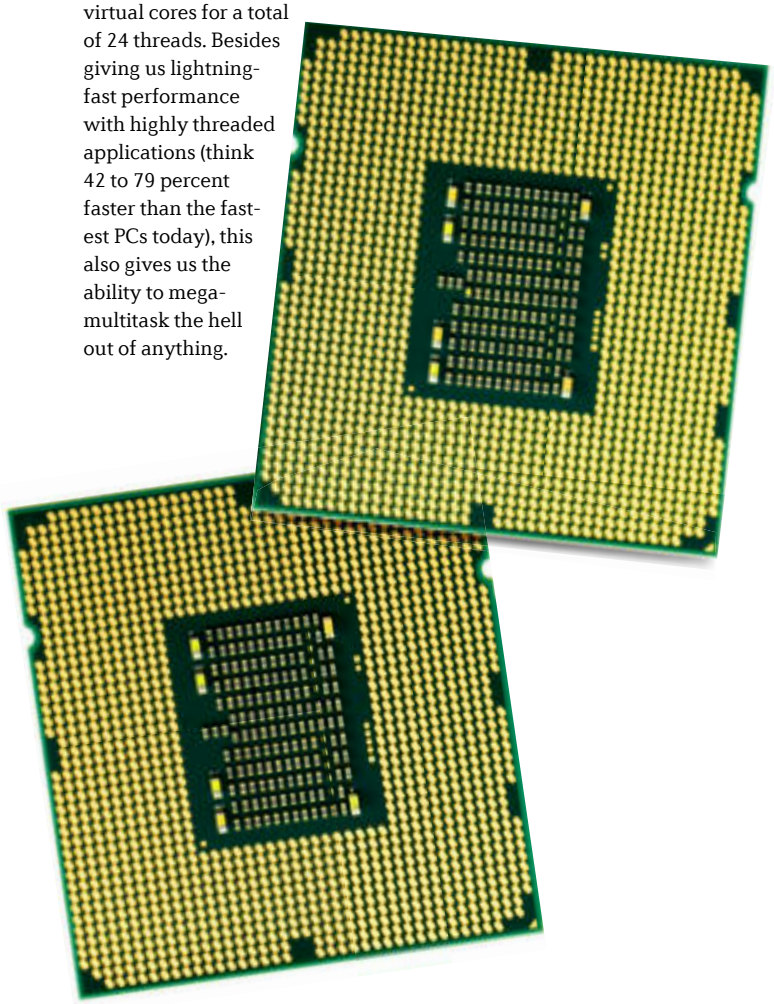


When we considered our graphics options, we had two configurations rattling around in our heads. Ultimately, EVGA's GeForce GTX 480 SuperClocked cards won the honor. Sure, the Radeon HD 5970 is a hottie, but we'd be restricted to two cards in CrossFire X mode, which just doesn't have the same panache as a tri-SLI GTX 480 setup. We briefly considered going with an obnoxious-sounding four GTX 480 cards, but nixed it. While decadent, we weren't sure anything would scale to four GPUs. And it's not like the tri-SLI cards were in danger of being overwhelmed. Once water-cooled and heavily overclocked to 910MHz (30 percent over a standard 480 card), the tri-SLI GTX 480 cards didn't even creak under load. In the Unigine Heaven benchmark with everything maxed out, the EVGA GeForce GTX 480 cards belted out nearly 60fps. On our zero-point machine with a single Radeon HD 5970, we saw this same test stutter along at 3fps.

Dual 3.3GHz Xeon X5680s Overclocked to 4GHz

Why Xeons? They give us 12 cores—and 24 threads

What's the only thing better than a hexa-core Intel 3.3GHz Core i7-980X? Two hexa-cores. Sure, Intel's 3.3GHz X5680 is technically a Xeon, but hardware geeks know that it's really the multiprocessor version of the Core i7-980X. If you're wondering why we didn't just use two Core i7-980X chips—both versions are LGA1366 processors, after all—it's because that's impossible. The Xeon X5680 features two Quick Path Interfaces—one to communicate with the chipset and the other to talk to an additional CPU. A Core i7-980X intended for desktop use has the second QPI disabled at the factory to prevent its use in a multiprocessor setup. So, what do two ultra-pricey Xeon X5680 procs give us? An insane number of threads: 12 physical cores and an additional 12 virtual cores for a total of 24 threads. Besides giving us lightning-fast performance with highly threaded applications (think 42 to 79 percent faster than the fastest PCs today), this also gives us the ability to mega-multitask the hell out of anything.



OVERCLOCKING

Dual Processors Make Overclocking Twice as Challenging

GORDON MAH UNG
SENIOR EDITOR

It doesn't really take a genius to overclock a Gulftown to reasonable levels. You crack open the BIOS, start cranking up the base clock (or bclock), and maybe add a little voltage to the CPU and the chipset. It's not quite as easy with a dual-processor setup, however. In fact, it's a bit daunting the first time you open up the BIOS on EVGA's Classified SR-2 board. Umm, IOH QPI Signal... set that to, um, what again? Right.

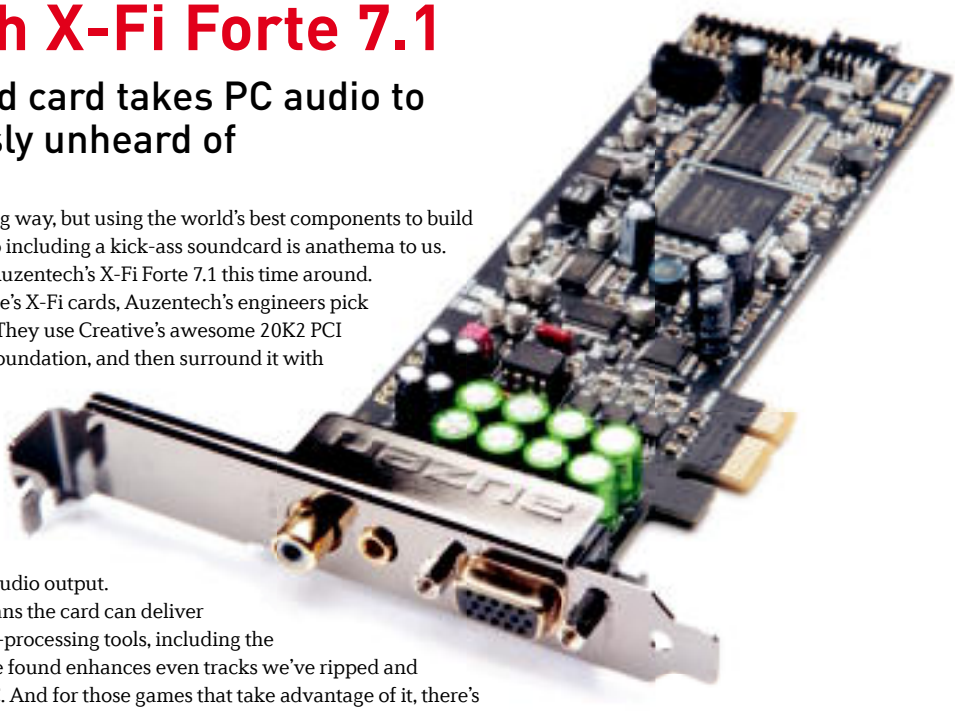
Don't take this as a knock against the SR-2 board. In fact, we're tickled pink that it's so overclocker-friendly, but the task still presents a challenge. Our goal was to reach a judicious clock speed—nothing too greedy. With the water-cooling in place, we were able to hit a stable 4GHz. We did this by disabling vdroop on both chips and increasing the core voltage to 1.35 volts, and by moving the CPU VTT up to 1.35. We actually underclocked the RAM to 1,066 and gave the chipset, or IOH, additional voltage of 1.45 volts. Digging around EVGA's forum, we found that the company's overclocking evangelist Shamino recommends an IOH QPI signal of -70 and -16. Our overclock was a simple bclock boost. By bumping up from the stock 133MHz to 160MHz, we achieved a very even and very stable 4GHz clock on both X5680 chips. With another 48 hours to futz around, we're sure we could have reached the low- to mid-4GHz range, but deadlines are deadlines. Still, 4GHz on 12 cores of computing is nothing to scoff at.

We'd be remiss if we didn't mention our GPU overclocking. Not everyone knows this, but MSI's Afterburner utility now supports the GTX 480 and even lets you dial up the voltage. With our triple-radiator water-cooling system taming these nuclear graphics cards, we used Afterburner to speed up the cores of the three GPUs to an amazing 910MHz. We also increased GPU memory to 2,200MHz. This gave DM2010 a heavy advantage in GPU-bound graphics tests such as Heaven 2.0 and STALKER: CoP.

SOUNDCARD

Auzentech X-Fi Forte 7.1

This fully loaded card takes PC audio to places previously unheard of



Onboard audio has come a long way, but using the world's best components to build a Dream Machine without also including a kick-ass soundcard is anathema to us. We immediately reached for Auzentech's X-Fi Forte 7.1 this time around.

As much as we dig Creative's X-Fi cards, Auzentech's engineers pick up where Creative's leave off. They use Creative's awesome 20K2 PCI Express audio processor as a foundation, and then surround it with high-end (and upgradeable) op/amps; an AKM AK4396VF DAC with 24-bit resolution, sampling rates up to 192kHz, and a signal-to-noise ratio of 120dB; an integrated headphone amp; and a combo optical/coaxial stereo digital-audio output.

Using the X-Fi chipset means the card can deliver Creative's entire suite of audio-processing tools, including the 24-bit Crystalizer, which we've found enhances even tracks we've ripped and losslessly encoded using FLAC. And for those games that take advantage of it, there's support for Creative's EAX 5.0.

SPEAKERS

Bowers and Wilkins MM-1 Speakers and PV1 Subwoofer

Awesome speakers + ingenuity = dreamy audio

While demoing the incredible MM-1 computer speakers, a B&W rep told us how its engineers, during early product development, had used rejected prototypes in surround-sound configurations for movies and gaming. We immediately asked how we could do the same thing for the Dream Machine.

We wound up using three stereo pairs (front L/R, surround L/R, and one pair for the center) for our 7.1 configuration. The MM-1s are full-range speakers, but we threw B&W's spectacular PV1 subwoofer into the mix for gut-punching bass.

Our configuration required a bit of creative cabling: The X-Fi Forte uses analog break-out cables, so we used the MM-1s' analog aux inputs instead of their USB ports. And since the card outputs the center channel and low-frequency effects on the same cable, we used a cable with a 1/8-inch female jack on one end and two RCA male plugs at the other end. We connected the RCA plug carrying the LFE to the sub and the other to the center channel via an adapter.

DISPLAY

Three HP ZR30w 30-inch LCDs

Screen real estate as far as the eye can see

We toyed with the idea of using a trio of Asus's new VG236 3D displays with this year's Dream Machine (three in 3D, get it?), but then HP dangled three of its brand-new ZR30w 30-inch LCDs in front of our eyes. The three 23-inch VG236 displays suddenly looked dwarfish sitting next to our massive aluminum cube computer.

The ZR30w isn't just big, it's an S-IPS panel (yay!) that uses 10 bits per pixel to produce 1.07 billion displayable colors. The ZR30w covers 100 percent of the sRGB color gamut and 99 percent of the Adobe RGB color gamut. As is common for displays this size, the ZR30w's native resolution is 2560x1600 (a 16:10 aspect ratio). This monitor is obviously aimed at the pros, but we found its 7ms gray-to-gray refresh rate plenty fast enough to play Just Cause 2 and Bad Company 2 at a resolution of 7680x1600. Ooh-rah!

OPTICAL DRIVE

Plextor B940SA

When price is no object, a Blu-ray burner makes sense

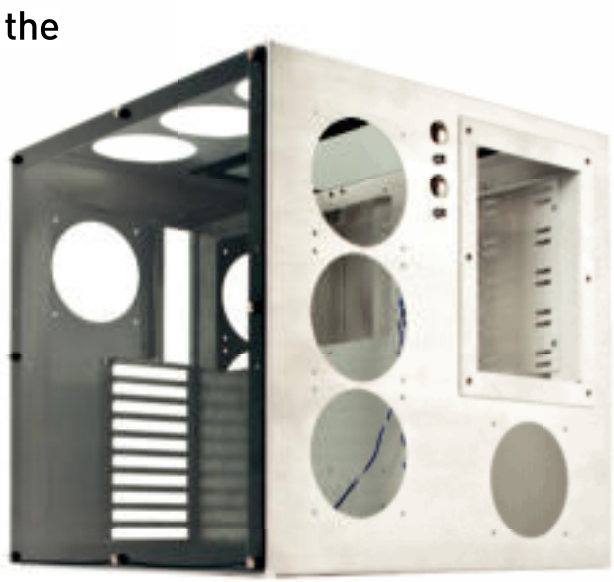
A Blu-ray burner is an extravagance, plain and simple. The drives are costly and so is the media. But this year's Dream Machine demands the utmost capability at any cost, so we're decking it out with Plextor's B940SA. It's got the highest available BD-R write rating at 12x. In real-world terms, that means we can fill a 25GB disc with data in a blistering 11 minutes. And that's when we're using Verbatim 4x media—this drive blows right past that speed rating, hitting 10x speeds during the course of its job. We can shave off even more time by using Sony or Panasonic media, which the drive is specially tuned for. Plus, the B940SA gives us the ability to watch Blu-ray movies, and what's not to like about that?

Besides offering unparalleled Blu-ray prowess, the B940SA tackles all standard DVD chores with total proficiency. If there's a more all-around capable optical drive to be had, we don't know of it.

CHASSIS

Mountain Mods U2-UFO

Gigantic and fully customizable, this is the ideal container for a Dream Machine



The 2010 Dream Machine was built around the massive EVGA Classified SR-2 dual-Xeon motherboard, which is so big it created its own motherboard standard: HPTX (short for High Performance Technology eXtended). At 13.6x15 inches, very few cases can contain this beast—and nearly all of them are made by Mountain Mods, which creates each of its hyper-modular all-aluminum chassis by hand.

We chose the U2-UFO, an 18-inch cube of pure aluminum. The configuration we chose includes no fewer than 10 12cm fan holes, two acrylic windows, a removable motherboard tray with 10 PCI slots, and room for everything we needed to cram into the Dream Machine—no mean feat. It came flat-packed but was a joy to assemble. We could have had it painted with one of Mountain Mods' gorgeous powder coats, but we like the raw look. We spec'd out the DM2010 case design using the Flash customization utility on the company's website, and it wound up costing us $350. That's a lot of dough, but this is a lot of case.

LIQUID COOLING

With this Much Hardware, Air-Cooling Wasn't Even an Option

You know you're an optimist when you think you can run three GTX 480 cards, 24GB of RAM, and two 3.33GHz Xeon X5680 chips on air-cooling. A few minutes of listening to the fan speeds crank up and down with load taught us that liquid-cooling is not an option—it's mandatory with this much hardware.

To liquid-cool this year's Dream Machine, we turned to one of the most respected companies in cooling for advice on how to keep temps under control: Danger Den. The final configuration includes two MC-TDX blocks for the Xeons, three massive DD-GTX480 blocks for the graphics cards, a RAD Reservoir, a DDC 3.25 pump, Feser Red Coolant, and three Hardware Labs SR-1 series radiators. Danger Den president Jeremy Burnett advised us that, contrary to popular belief, you don't have to run separate loops for the CPUs and GPUs—you just have to have enough cooling. Believe it or not, the three Hardware Labs radiators (a triple, a double, and a single) were up to the task. The routing pumped coolant from the first CPU and then into the triple radiator. From there it went to the second CPU and into the single radiator. From there, it went into the GPUs and then out to the double radiator and back to the CPU again.

In practice, it was impressive. Upgrading from air-cooling toasty GTX 480 cards to liquid-cooling was like day and night. Once heat was tamed, we were able to clock the GTX 480 cards to incredible levels. Stock GTX 480 cards run with the core at 700MHz, shaders at 1,401MHz, and memory at 3,696MHz. The EVGA SuperClocked cards bump those clocks up to 725MHz, 1,450MHz, and 3,800MHz, respectively. With the Danger Den liquid-cooling, we ran the GPUs with a core clock of 910MHz, a shader clock of 1,820MHz, and a memory clock of 4,400MHz. That gave us enough graphics power to motor past even the fastest gaming rigs we've seen to date. And we did it with very little noise and amazingly small amounts of heat.

MOUSE & KEYBOARD

Cyborg R.A.T. 7 and Microsoft Sidewinder X6

Finally—a real customizable mouse

If you skipped ahead and read the Cyborg R.A.T. 7 review on page 80 in this issue, you'll understand why it was the only option for our Dream Machine's mouse. This thing goes beyond the norm for gaming mice, offering an insane amount of customization (you can swap out parts and adjust the length, height, and width of the mouse), and a couple of awesome new features, including a temporary DPI-dropping "sniper button" and an industrial-strength metal thumbwheel.

For our gaming keyboard, we went with Microsoft's SideWinder x6 model, which combines an excellent-feeling keyboard with a solid set of features, including macro keys, profiles, and media controls.

MEMORY

24GB Corsair DDR3/1600

Hey now, that's a lot of RAM!

The Dream Machine's SR-2 mobo features no less than 12 slots for RAM, each of which feeds the tri-channel controllers in each CPU. In other words, we're talking not tri-channel but hexa-channel RAM in this system, if you want to count it that way. With 12 slots available, we had many different ways to skin the memory cat, but we ultimately settled on six 4GB Corsair DDR3/1600 DIMMs. That leaves us room to expand to 48GB of RAM if need be. With 24GB of RAM in the Dream Machine, we're in pretty good shape for even huge Photoshop files.

OPERATING SYSTEM

Windows 7 Utlimate

Alas, an OS that's worthy of running a Dream Machine

Looking back on the last year of Windows 7, it's like Windows Vista never happened. Hell, Windows 7 even has that hell-spawn OSX and its minion Justin Long on the run back to Mordor. Dream Machine, of course, is running the 64-bit version to make full use of our 24GB of RAM. One bit of building advice: Folks looking to build a dual-processor machine should remember that only Windows 7 Professional, Enterprise, and Ultimate support that config. Windows 7 Home Premium and lower versions only support one physical processor. They will support multicore procs, but only one of them. Got it?

STORAGE

Two OCZ Vertex 2s and Two Western Digital Caviar Blacks

4.4 terabytes of storage? Works for us

It wasn't easy picking the storage for this year's Dream Machine. Crucial's C300 SSD has unprecedented read speeds in 6Gb/s SATA mode, but its random and sequential write speeds have nothing on SandForce drives like OCZ's Vertex 2. We initially used two 200GB Vertex 2 drives in RAID 0, but we had some trouble using RAID with the onboard Intel chipset, so we ran our benchmarks using a single 200GB Vertex 2 as the boot drive. Why the Vertex 2? Well, other SandForce drives will have their "Max IOPS" firmware by the time you read this, but at press time the V2 was the fastest of the SandForce SSDs. It turns out there is an unexpected bonus to eschewing RAID: We get to keep TRIM support.

We opted to use two 2TB Western Digital Caviar Black drives for our mass storage, as they hit the price-performance sweet spot at that capacity. We tried to get 3TB drives, but they don't actually exist yet. 4.4TB of total storage should do us fine, though. For a while.

POWER SUPPLY

Corsair AX1200 and Thermaltake PowerExpress 450W

This year's Dream requires two separate power supplies

We're mighty impressed by Corsair's new AX1200 PSU. Despite its high efficiency rating, amazingly low acoustic levels, and its single-rail design, the AX1200 is modular enough that you can remove the main power connector. But even given its beefy design, we couldn't run Dream Machine 2010 with just this PSU alone. That's because the big-ass EVGA SR-2 board needs no less than two 8-pin EPS12V connectors plus three 6-pin PCI-E GPU power connectors, and the three GTX 480 cards eat a total of three 6-pin and three 8-pin PCI-E plugs, leaving us a bit short on plugs. To get around this problem, we considered slaving in another 1,200W or 1,500W PSU but ultimately decided that using a Thermaltake PowerExpress 450W was all we needed. Since two of the 6-pin plugs are optional on the board, we just left those unplugged and went to town. The DM2010 itself rarely exceeded 1,000 watts and the load on the PowerExpress rarely went past 80 watts, so we still have plenty of headroom.

Battle-Testing the Dream Machine

Every year, our goal is to build the fastest PC in the world. How did we do this year? Very well, thank you very much

Ideally, we'd love to compare Dream Machine 2010 against Dream Machines 2009 or Dream Machine 2008. Or even Dream Machine 1999, to see if we've been successful at moving the ball forward. Unfortunately, those machines are long gone. So, to measure the performance of this DM2010, we tapped our standard zero-point system: A 2.66GHz Core i7-920 overclocked to 3.5GHz, with a Radeon HD 5970, 6GB of Patriot DDR3/1333, and an Intel G2-160GB SSD, all on a Gigabyte X58-UDR3 running 64-bit Windows 7. That's no slouch by any measurement of a PC. In fact, it's pretty much faster than 95 percent of the computers in use today.

Still, that's hardly a worthy competitor to the Dream Machine, so in addition to our standard zero-point, we delayed returning Origin PC's Genesis rig, which we reviewed last month. The Genesis pretty much represents the pinnacle of computing and is an amazingly fast machine. It should be, considering its $7,500 price, which buys you a hexa-core Core i7-980X overclocked to 4.5GHz and three water-cooled GTX 480 cards.

For benchmarks, we selected our standard system benchmarks that we use in all our desktop PC reviews, and then threw in a handful of other benchmarks to get a more accurate reading of the DM2010's performance capabilities. Why add the additional tests? Frankly, the new benchmark tests we implemented in April are already a little inadequate. Since that time, more punishing DirectX 11 tests have come along, and hexa-core CPUs have hit the market. Our benchmarks are having trouble pushing machines to their maximum potential. Additional benchmarks included Maxon's new Cinebench 11.5 3D rendering benchmark, Unigine's Heaven 2.0, Bibble 5.2 RAW converter, and 3DMark Vantage.

How did the Dream Machine stack up? Well, first we were reminded that having a crapload of threads doesn't always pan out. We ran into an apparent bug with Sony Vegas Pro 9, which errored out during our benchmark. That's really a shame because we expected DM2010 to clean up in this multithreaded test. We're talking with Sony to see what's up, but in the meantime, no 24-thread encoding for us! Not surprisingly, the DM2010 is faster than our zero-point by double, triple, and even quadruple digits. The most shocking result was in Heaven 2.0, where even with

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the latest Catalyst driver installed, our 3.5GHz zero-point could only crank out 3fps. That is, mind you, at 2560x1600 with every single feature maxed out.

OK, but how'd it do against an uber computer? We won't make excuses—taking on the super-fast Genesis wasn't going to be easy. In the end, we could see the impact of that machine's higher clocks on most of the benchmarks that were not very multithreaded (at least not for 24 threads, anyway). With its 14 percent higher clocks, the Genesis actually beat the DM2010 in Lightroom, ProShow, and Far Cry 2, and tied it in Reference. In tests that exploit the full complement of cores or the higher-clocked GPUs though, the DM2010 held its head high. DM2010 was 20 percent faster in STALKER: CoP and even 18 percent better in the punishing Heaven 2.0 test. That's no small matter. DM2010 also pulled ahead by a whopping 80 percent in Cinebench 11.5 and 42 percent in Bibble 5.2. Hot damn.

3DMark Vantage also saw DM2010 ahead, but not by as much as we had hoped. Still, a 91,806 CPU score is nothing to fret over. The final tally? Of the 11 scores represented, the Dream Machine wins in eight of them with the ninth a tie. That's enough for us to declare DM2010 the champion and the fastest PC we've ever tested.

DREAM MACHINE 2010 vs. ZERO POINT

	ZERO POINT	
Lightroom 2.6 (sec)	356	296
ProShow 4 (sec)	1,112	932
Reference 1.6 (sec)	2,113	
STALKER: CoP (fps)	42.0 fp	
Far Cry 2 (fps)	114.4	177.5
Cinebench 11.5	6.3	
Bibble 5.2 (sec)	105.0	54.2
Heaven 2.0 (fps)	3.0	50.2
3DMark Vantage Overall	24,346	179
3DMark Vantage GPU	24,935	40,601
3DMark Vantage CPU	22,734	

0 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

DREAM MACHINE 2010 vs. ORIGIN PC GENESIS

	ZERO POINT	
Lightroom 2.6 (sec)	264	296 (-11%)
ProShow 4 (sec)	859	932 (-8%)
Reference 1.6 (sec)	1,402	
STALKER: CoP (fps)	85.2	101.9
Far Cry 2 (fps)	193.7	177.5 (-8%)
Cinebench 11.5	11.4	20.5
Bibble 5.2 (sec)	77.1	54.2
Heaven 2.0 (fps)	50.0	59.2
3DMark Vantage Overall	44,752	47,179
3DMark Vantage GPU	39,012	40,601
3DMark Vantage CPU	80,107	91,806

0 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

A Computer for **Every Room**

All-in-one PCs let you expand your computing activities throughout the home

BY MICHAEL BROWN

Compared to the hot-rod machines boutique manufacturers send us for review and the wicked-fast bruisers we build ourselves (this year's Dream Machine being a prime example), the all-in-one PCs we examine in this story are 98-pound weaklings. And make no mistake about it: We'd never recommend that you—our hardcore, game-playing readers—purchase *any* of these machines to serve as your primary rig.

But since when has just one computer ever been enough to satisfy *all* the needs of the tech-enthusiast's household? If it were up to us, we'd have a computer in every room: the kitchen, the den, the bedroom—heck, we'd even put one in the garage! Sure, you can carry a laptop from room to room, but that's not nearly as convenient as entering a room and having the PC there, ready to go at a moment's notice.

That's where the latest generation of all-in-one PCs comes in. By integrating all the PC components into an LCD's formfactor, these space-saving rigs boast very small footprints—as you'll see, some can even be mounted on the wall. Any of these models would be a great addition to any room; they're all whisper-quiet and include TV tuners, integrated Wi-Fi adapters, wireless mice and keyboards, and even Blu-ray drives.

According to stats compiled by market-research firm DisplaySearch, the all-in-one market grew by 57 percent between 2008 and 2009. Apple's iMac leads the way here, but in the Windows universe, HP's TouchSmart series has been the one to beat. HP's latest offering features a Core i7 CPU—the only machine in this roundup with Intel's top-shelf proc. Lenovo and Sony counter with speedy Core 2 Quads, and MSI uses the Mobile Core 2 Duo.

Since our benchmark suite is meant to put the squeeze on high-end rigs, a mantle no manufacturer would claim for its all-in-one offering, we pulled our 2007 suite out of retirement for this comparison. And since this class of machine isn't designed for hardcore gaming, we didn't run any games benchmarks on them. We based our verdicts on benchmark performance (versus our 2007 zero-point rig), component choices, feature set, usability, and price. HP enters the ring as the undisputed all-in-one PC champion, facing three very strong competitors. Will HP retain its crown, or will Lenovo, MSI, or Sony knock the company off the throne? Turn the page to find out!

HP TouchSmart 600-1155

Not the fastest, but by far the best

When we heard HP was building its latest TouchSmart with Intel's Core i7 processor, we figured it was game-over for the competition: Lenovo and Sony use quad-cores, too, but they both tapped Intel's Core 2 Quad. MSI picked an even less capable Core 2 Duo (and priced its machine accordingly). But when the benchmarking dust had cleared, HP sat in third place across the board. What happened?

We should have remembered that HP likes to use mobile processors in its TouchSmart line. In this case, a 1.6GHz Core i7-720QM. That's a capable enough proc, but the older (and cheaper) Core 2 Quad that Lenovo and Sony picked is a desktop model running at 2.66GHz. So even the larger cache, integrated memory controller, Hyper-Threading, Turbo Boost technology, and other goodies tucked inside the Core i7-720QM don't compensate for the mobile proc's lower clock speed.

HP uses a discrete mobile GPU: Nvidia's GeForce GT 230M paired with 1GB of dedicated GDDR3 memory in a mobile PCI Express module (the same graphics configuration used in the TouchSmart 600-1055 we reviewed in March). The mainboard is a Pegatron E66 with Intel's HM57 chipset. Our eval unit came equipped with 6GB of 1,333MHz DDR3 memory (two 3GB sticks running in dual-channel mode).

The TouchSmart 600-1155 is priced $280 higher than the fastest all-in-one we reviewed (Lenovo's IdeaCentre B500-08873AU sells for $1,400) but it's $320 cheaper than the second-fastest rig (Sony's VAIO VPCL117FX, which at $2,000 was the most expensive all-in-one here). The TouchSmart, however, was twice as fast as MSI's budget offering (the Wind Top AE2220, priced at just $950). So why exactly are we calling this match for the HP? Because it delivers many more features than you'll encounter in other all-in-one designs. The entries from MSI and Sony feature touch-screen displays (Lenovo's does not), but HP is the only manufacturer to take the technology to the next step with both a touch-optimized user interface that sits atop Windows 7 and applications—including Hulu and Netflix clients, a custom web browser, and more—that take maximum advantage of that UI.

All four machines feature integrated webcams, but the one built into the TouchSmart delivered far superior image quality and it tilts, so you can use it seated or standing. All four machines come with TV tuners, but only HP thought to include an IR emitter and A/V inputs, so you can control and record from a cable or satellite set-top box. All-in-ones aren't gaming powerhouses, but only HP, MSI, and Sony thought to include an HDMI input, so you can plug in your Xbox 360 or PlayStation 3 and use the computer's display.

HP stays at the top of the all-in-one heap by virtue of its excellent touch-screen display and software that takes great advantage of it.

VERDICT

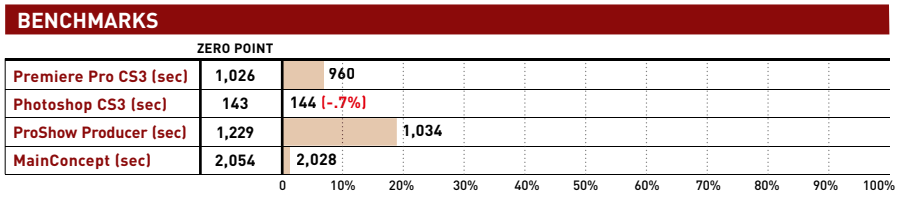
HP TOUCHSMART 600-1155
$1,680, www.hp.com

9

SPECIFICATIONS

Processor	Intel 1.6GHz Core i7-720QM
Chipset	Intel HM57 Express
RAM	6GB DDR3/1333 in dual-channel mode
Videocard	Nvida GeForce GT 230M with 1GB memory
Display	23-inch multitouch LCD, 1920x1080 resolution
LAN	Gigabit Ethernet; 802.11b/g/n; Bluetooth
Storage	1TB Hitachi HD721010SLA360
Optical	Blu-ray player/DVD burner combo drive

BENCHMARKS



Our test bed consists of a 2.66GHz Intel Core 2 Quad Q6700, 2GB of Corsair DDR2/800 RAM on an EVGA 680 SLI motherboard, two EVGA GeForce 8800 GTX cards in SLI mode, a Western Digital 150GB Raptor and 500GB Caviar hard drive, an LG GGC-H20L optical drive, a Sound Blaster X-Fi, and a PC Power and Cooling Silencer 750 Quad. OS is Windows 7 Home Premium 64-bit.

Lenovo IdeaCentre B500-08873AU

Great price/performance ratio, but no touch screen

THE GARAGE PC:

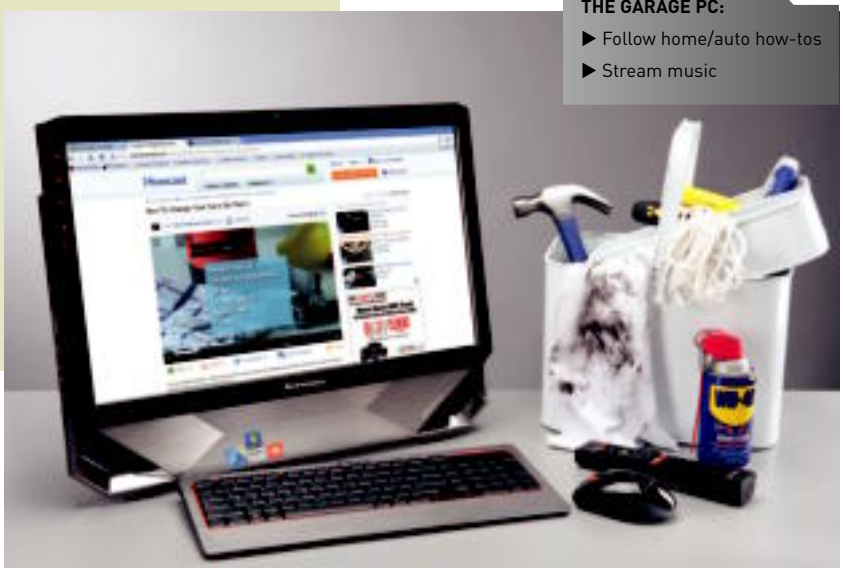
- ▶ Follow home/auto how-tos
- ▶ Stream music

If you don't like highly reflective displays and don't care about a touch-screen user interface, Lenovo's IdeaCentre B500 is the all-in-one to buy. It's the fastest machine in the bunch, and it's attractively priced at just $1,400.

Lenovo and Sony both reached for mid-range Intel Core 2 Quad desktop processors—namely, the 2.66GHz Core 2 Quad 8400S—but Lenovo paired the CPU with speedier memory (4GB of 1,066MHz DDR3, compared to the 6GB of 800MHz DDR2 memory Sony chose) and a more powerful discrete mobile GPU (Lenovo tapped Nvidia's GeForce GTS 250M, which has 96 cores, while Sony uses the GeForce GT 240M, which has only 48). Lenovo uses a proprietary motherboard with an Intel G41 chipset.

You'll either love or hate the Lenovo's bold color scheme and angular aesthetics. We like the brushed-metal and black diamond-plate (although the latter is visible only from behind), but the aggressive edges and orange accents strike us as a wee bit garish. We do like the down-facing LED that illuminates the keyboard (HP's TouchSmart has a similar feature, but you can change the HP's hue to any color in the rainbow).

All four machines came with Media Center remote controls, but Lenovo's is a unique motion-sensing Bluetooth model that's compatible with the handful of FlingPC games that come preinstalled on the computer (tennis, ping-pong, pool, bowling, etc.). You can use the remote like a tennis racket, ping-pong paddle, or pool cue and swing it around to interact with the games (Lenovo thoughtfully includes a wrist lanyard lest the remote slip out of your hand and smash into the display). It's just like Nintendo's Wii, except that the controller is only half as responsive and not nearly as dependable—we gave up in disgust after repeatedly watching our ping-pong ball literally pass through our onscreen paddle.



If you can get over the absence of a touch screen, Lenovo's IdeaCentre B500-08873AU delivers terrific performance.

The Lenovo's JBL stereo speakers were the best in the field—although that's not saying much; none of these machines will satisfy an audiophile—but the computer's sound quality surprised us given Lenovo's decision to use Realtek's aging ALC662 codec. And given the attention to performance in other areas, we were surprised to discover that the Lenovo's hardwired LAN interface supports only 100Mb/s Ethernet (the integrated Wi-Fi adapter is compatible with IEEE 802.11b/g/n networks). The rest of the components are more in line with the rest of the field: There's a 1TB Seagate hard drive, a slot-fed Blu-ray/DVD-burner combo drive, and an ATI TV Wonder tuner.

The Lenovo IdeaCentre B500 is a strong, attractively priced contender, but we're willing to trade its superior performance and a little more coin to get the HP's touch screen, user interface, custom apps, superior web cam, and flexible mounting options.

VERDICT

LENOVO IDEACENTRE B500-08873AU
$1,400, www.lenovo.com

8

SPECIFICATIONS

Processor	Intel 2.66GHz Core 2 Quad Q8400S
Chipset	Intel G41 Express w/82801GB I/O controller
RAM	4GB/1066 DDR3 in dual-channel mode
Videocard	Nvidia GeForce GTS 250M with 1GB memory
Display	23-inch LCD, 1920x1080 resolution
LAN	100Mb/s Ethernet; 802.11b/g/n; Bluetooth
Storage	1TB Seagate ST31000528AS
Optical	Blu-ray player/DVD burner combo drive

BENCHMARKS

	ZERO POINT	
Premiere Pro CS3 (sec)	1,026	840
Photoshop CS3 (sec)	143	141
ProShow Producer (sec)	1,229	997
MainConcept (sec)	2,054	1,832

0 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our test bed consists of a 2.66GHz Intel Core 2 Quad Q6700, 2GB of Corsair DDR2/800 RAM on an EVGA 680 SLI motherboard, two EVGA GeForce 8800 GTX cards in SLI mode, a Western Digital 150GB Raptor and 500GB Caviar hard drive, an LG GGC-H20L optical drive, a Sound Blaster X-Fi, and a PC Power and Cooling Silencer 750 Quad. OS is Windows 7 Home Premium 64-bit.

MSI Wind Top AE2220

A bang-for-the-buck all-in-one option

Before you examine the benchmark chart to see how MSI's Wind Top AE2220 fared against the bigger, badder competition, take a look at the spec chart: integrated multitouch screen, Blu-ray drive, HDMI input, eSATA…. Now look at the price tag: $950!

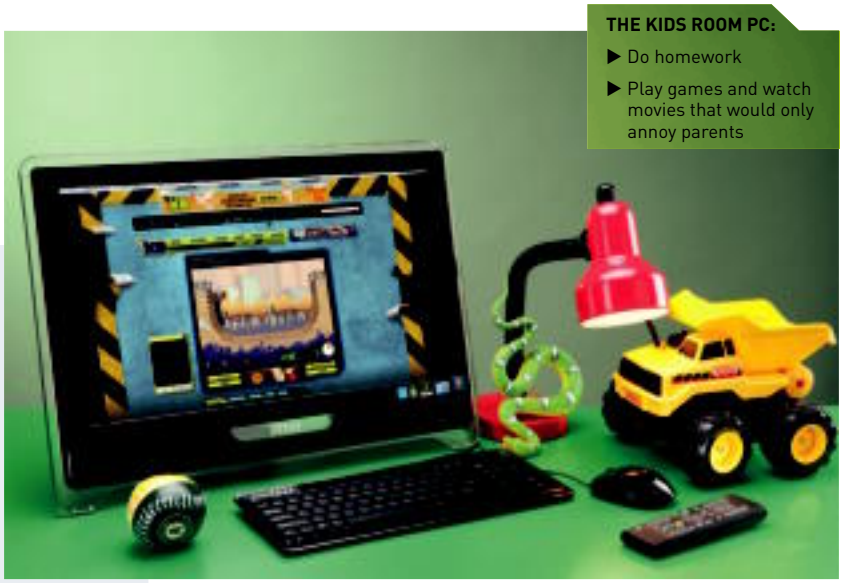
Are there trade-offs? To be sure. The 21.5-inch screen is substantially smaller—especially compared to Sony's 24-inch panel (but it still delivers 1920x1080 resolution). MSI uses a mobile dual-core CPU—Intel's 2.2GHz Core 2 Duo T6600—where the rest of the field sports quad-cores. And we're more accustomed to seeing Nvidia's Ion chipset in Atom-powered netbooks than in desktops.

Graphics and video decoding, meanwhile, are handled by a relatively weak integrated 16-core GeForce 9300 accessing a paltry 256MB of dedicated memory. Despite these modest specs, the machine played Blu-ray movies just fine. The 500GB hard drive is smaller than the 1GB drives found in the competition, but you can easily hide a more spacious external USB or eSATA drive behind the panel (unless you mount the machine on the wall or to an articulating arm using MSI's optional bracket).

The rest of the Wind Top's spec sheet holds up pretty well against the other contenders: There's a Gigabit Ethernet NIC, an IEEE 802.11b/g/n wireless network adapter, an integrated HDTV tuner, a six-in-one media-card reader, and the same Realtek ALC888 audio codec used in the TouchSmart. MSI also deserves props for including not only an HDMI input, but a VGA input, too. The wireless mouse and keyboard, on the other hand, are nothing to write home about, and the integrated webcam is borderline crap.

THE KIDS ROOM PC:

- Do homework
- Play games and watch movies that would only annoy parents



MSI's Wind Top AE2220 is the slowest all-in-one we tested, but it includes a 21.5-inch touch screen, a Blu-ray/DVD-burner combo drive, and a $950 price tag.

It should come as no surprise that MSI's rig brought up the rear in each of our benchmark tests. The Wind Top's dual-core CPU was no match for the quad-cores the other manufacturers fielded. We pulled HP's previous-gen TouchSmart 600-1005t (powered by Intel's mobile 2.13GHz Core 2 Duo P7450) out of storage and re-ran our benchmark suite on it for the sake of comparison. The old TouchSmart, which is no longer available, delivered superior benchmark numbers with ProShow Producer and Adobe Premiere, but the MSI performed better with Main Concept and Adobe Photoshop.

The Wind Top's touch screen is responsive and accurate, but unlike HP and Sony, MSI's engineers didn't produce any special software to take advantage of the technology. If you buy this machine, we recommend configuring Windows 7 to display at 150 percent of normal to make the icons, dialog boxes, and window controls large enough for fingertip use.

There's one design decision, however, for which no excuses can be made: Why would any PC equipped with 4GB of DDR2/800 memory come throttled with the 32-bit version of Windows 7? As such, the Wind Top leaves approximately 750MB of RAM dangling their bits in the breeze. That's just dumb.

VERDICT

MSI WIND TOP AE2220
$950, www.msi.com

7

SPECIFICATIONS

Processor	Intel 2.2GHz Core 2 Duo T6600
Chipset	Nvidia Ion
RAM	4GB DDR2/800
Videocard	Integrated Nvidia GeForce 9300 with 256MB memory
Display	21.5-inch touch-screen LCD, 1920x1080 resolution
LAN	Gigabit Ethernet; 802.11b/g/n
Storage	500GB Western Digital
Optical	Blu-ray player/DVD-burner combo drive

BENCHMARKS

	ZERO POINT	
Premiere Pro CS3 (sec)	1,026	1,980 (-48.2%)
Photoshop CS3 (sec)	143	198 (-27.8%)
ProShow Producer (sec)	1,229	2,151 (-42.6%)
MainConcept (sec)	2,054	3,603 (-43%)

0 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our test bed consists of a 2.66GHz Intel Core 2 Quad Q6700, 2GB of Corsair DDR2/800 RAM on an EVGA 680 SLI motherboard, two EVGA GeForce 8800 GTX cards in SLI mode, a Western Digital 150GB Raptor and 500GB Caviar hard drive, an LG GGC-H20L optical drive, a Sound Blaster X-Fi, and a PC Power and Cooling Silencer 750 Quad. OS is Windows 7 Home Premium 64-bit.

Sony VAIO VPCL11FX/B

The biggest display—and the biggest price tag

Sony's VAIO L-series computers boast plenty of sex appeal, and this particular model boasts a 24-inch screen that's one inch larger than the rest of the field (albeit with the same wide-screen resolution of 1920x1080). It's not just a pretty face, either; its benchmark performance puts it a close second to the edgy-looking Lenovo. The VAIO's $2,000 MSRP, however, renders it $600 more expensive than that machine, $320 pricier than HP's TouchSmart 600 Quad, and more than twice as costly as MSI's budget-friendly offering.

Sony tapped the same midrange desktop CPU that Lenovo did, Intel's 2.66GHz Core 2 Quad 8400S, and paired it with an Intel P43 chipset and 6GB of DDR2/800 memory on a proprietary motherboard. Nvidia's discrete mobile GeForce GT 240M GPU, with 1GB of dedicated memory, handles graphics duties. Sony's VAIO Media Gallery makes good use of the touch-screen display, enabling you to produce slide shows and movies by dragging thumbnail images around with your fingertips. But Sony's touch-screen software is much less comprehensive than HP's offering.

Sony offers several of the other features we saw on HP's TouchSmart, including an HDMI input (for connecting a console gaming system), vacant space beneath the unit where you can stash the keyboard when it's not needed, and an integrated face-tracking webcam (Sony calls it Motion Eye). The webcam's image quality, however, falls far short of the HP's and is slightly inferior to the Lenovo's (but it's leagues better than the MSI's).

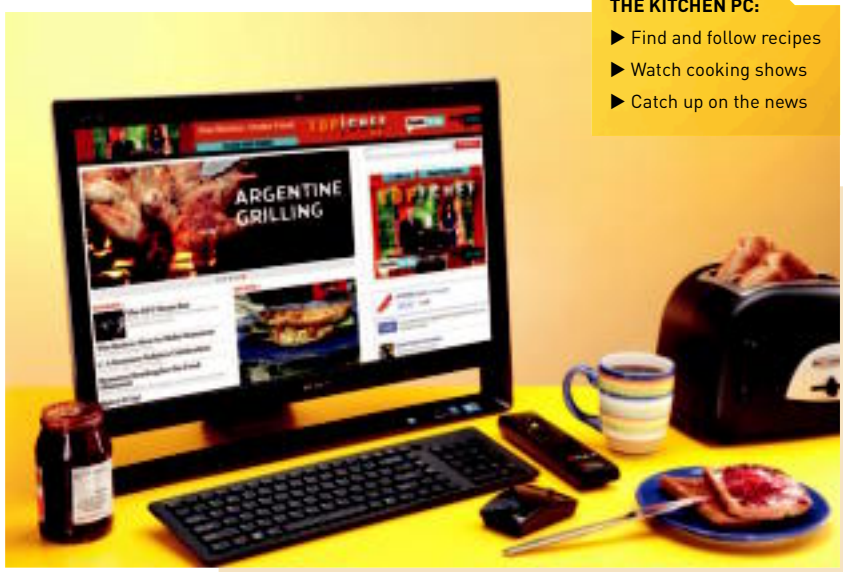
Apart from that, the VAIO L-series is pretty similar to the TouchSmart and the Lenovo: All three machines support Bluetooth networks (and have Bluetooth mice and keyboards), and they all provide integrated TV tuners and feature Blu-ray/DVD-burner combo drives for watching movies. If you're looking for a PC to connect to an A/V receiver or stand-alone powered speakers, Sony does use a better audio codec than any of the other three manufacturers: Realtek's ALC889 is an eight-channel part with a digital-to-analog converter that delivers a signal-to-noise ratio of 108dB. HP and MSI use Realtek's more pedestrian ALC888, which has a DAC offering signal-to-noise ratio of 97dB. Lenovo uses Realtek's six-channel ALC662, with a DAC that delivers a signal-to-noise ratio of 98dB.

This being a Sony product, the VAIO integrates a MemoryStick Pro slot (with support for Sony's MagicGate DRM technology) in addition to a separate SD card slot. The HP, Lenovo, and MSI machines all include more typical memory-card readers. Sony is also the only manufacturer to include an i.LINK connector (aka a four-pin IEEE-1394 port). The VAIO is outfitted with an IEEE 802.11b/g/n client adapter, just like the rest of the bunch, and gigabit Ethernet (the Lenovo is the only one with a 100Mb/s NIC).

The VAIO VPCL117FX/B's benchmark performance crushes MSI's product and it includes a much bigger display, but it costs more than twice as much. It's more than a little faster than HP's TouchSmart, but has inferior touch-screen software and is a lot more expensive. And it's slightly slower than Lenovo's offering, which doesn't have a touch screen, but is significantly cheaper. That leaves fashion sense, MagicGate, and IEEE 1394 as the only reasons—tenuous as they might be—to recommend this all-in-one over the competition.

THE KITCHEN PC:

- ▶ Find and follow recipes
- ▶ Watch cooking shows
- ▶ Catch up on the news



Sony's VAIO computers are always beautiful and almost always overpriced.

VERDICT

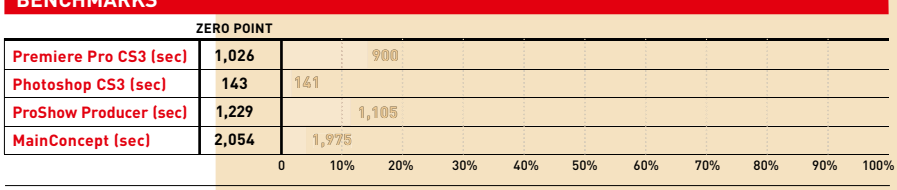
SONY VAIO VPCL117FX/B
$2,000, www.sony.com

6

SPECIFICATIONS

Processor	Intel 2.66GHz Core 2 Quad Q8400S
Chipset	Intel P43 Express w/Intel 82801JR I/O controller
RAM	6GB DDR2/800
Videocard	Nvidia GeForce GT 240M with 1GB memory
Display	24-inch multitouch LCD, 1920x1080 resolution
LAN	Gigabit Ethernet; 802.11b/g/n; Bluetooth
Storage	1TB Seagate ST31000528AS
Optical	Blu-ray player/DVD burner combo drive

BENCHMARKS



Our test bed consists of a 2.66GHz Intel Core 2 Quad Q6700, 2GB of Corsair DDR2/800 RAM on an EVGA 680 SLI motherboard, two EVGA GeForce 8800 GTX cards in SLI mode, a Western Digital 150GB Raptor and 500GB Caviar hard drive, an LG GGC-H20L optical drive, a Sound Blaster X-Fi, and a PC Power and Cooling Silencer 750 Quad. OS is Windows 7 Home Premium 64-bit.

MOUNT UP!

Many all-in-ones can be hung on the wall or mounted to an articulating arm

An all-in-one computer's formfactor consumes about the same amount of space as the typical LCD monitor, but some manufacturers provide the option of mounting their machines on the wall or on an articulating arm. This not only reclaims desk space, but enables you to position the display for optimal viewing wherever you happen to be in the room—a real boon when you're watching movies or slide shows or using the PC's integrated TV tuner.

Sony's VPCL117FX/B is the easiest to mount—it has a standard VESA mount built right into its back panel. HP's TouchSmart 600-1055 requires HP's VK554AA wall-mount adapter, $50, which includes inserts to replace the computer's front feet. MSI's Wind Top AE2220 needs an optional bracket, too, but this one costs only $15. Of the three machines we tested, Lenovo's IdeaCentre B500-08873AU was the only one that can't be mounted.

Each of the mount manufacturers we contacted offers a dizzying array of options; here's a look at just four.

Atdec Telehook TH-1030-VFM Flat-screen Wall Mount

The strong, silent type

CAtdec's Telehook TH-1030-VFM supports a surprising amount of weight for its size: a maximum of 44 pounds—more than enough to support any of the all-in-ones in this story—while requiring a single wall stud. The mount can pan 90 degrees left and right, tilt five degrees up from vertical to 20 degrees down, and extend up to 9.8-inches from the wall. $79, www.atdec.com

Peerless SA740P-S Articulating Wall Arm

Industrial strength; designer looks

This Peerless articulating arm is similar to Atdec's Telehook, but it supports almost twice as much weight—a maximum of 80 pounds—and it has three pivot points, enabling it to swing out nearly two feet from the wall. It can swivel 90 degrees left and right and tilt five degrees up and 20 degrees down. The anodized aluminum finish is very attractive. $258, www.peerlessmounts.com

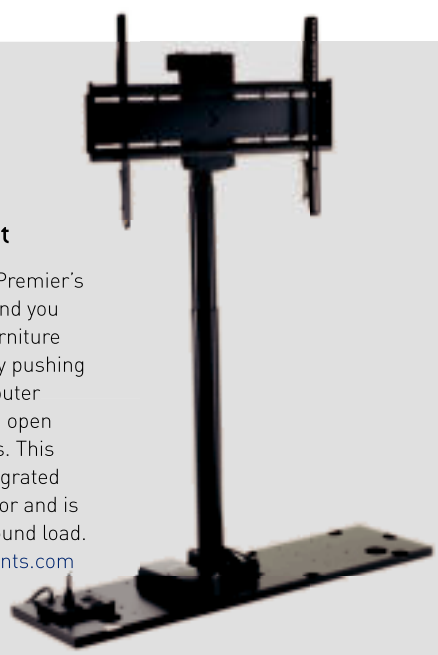
Peerless LCT-101 Articulating Arm

At your desk, but not *on* your desk

Clamp or bolt the Peerless LCT-101 to your desktop and you can lift, lower, tilt, and swivel your all-in-one. Peerless uses gas struts and ball joints, but its maximum weight capacity is 25 pounds. That's sufficient to hold MSI's Wind Top AE2220, but you'll need something more substantial for heavier computers. $258, www.peerlessmounts.com

Premier Mounts LIFT1-L180H

Pull a disappearing act



Mount your all-in-one to Premier's flat-panel motorized lift and you can hide it in a piece of furniture and amaze your friends by pushing a button to have the computer rise into position, pushing open a hinged lid in the process. This device comes with an integrated six-outlet surge suppressor and is capable of lifting a 180-pound load. $2,500, www.premiermounts.com

Maximum PC's

ANNUAL

Geek Quiz

Prove your mental mettle in the ultimate test of nerd know-how

BY THE MAXIMUM PC STAFF

Imagine yourself competing in the geekiest of all game shows, facing off against the geekiest of geeks—those characters of pop culture whose intellectual excellence you aspired to as a child and still seek to emulate in present day. Could you hang? Could you hold your own in such rarefied company, matching wits with the best of 'em? Sadly, we can never know that, but *Maximum PC*'s annual Geek Quiz is a pretty good indicator of brain power in its own right. And you don't even need to be first to the buzzer or frame your answers in question form. So what's stopping you, smarty pants? It's time to get your Quiz on!


$ 8,200
$ 200
$ 4,000
SCOTTY
SHELDON
Steve

1 Which graphics API feature is new to DirectX 11?

A Geometry shaders
B Texture compression
C Dynamic shader linkage
D HLSL

2 Which of the following was not a prerelease code-name for a version of Windows?

A Stockholm
B Memphis
C Janus
D Snowball

3 A femtocell is:

A A portion of radio frequency reserved for hardware signaling
B A small cellular base station
C A smartphone marketed to women
D None of the above

4 Theoretical physicist Dr. Sheldon Cooper has an arch-nemesis. Who is it?

A Darth Vader
B Wil Wheaton
C Justin Beiber
D Brent Spiner

5 Which of the following games would not run in DOSBox (a popular DOS emulator)?

A Lemmings
B Sim City 2000
C Duke Nukem 3D
D Jedi Knight: Dark Forces II

6 ARM processors are:

A 8-bit
B 16-bit
C 32-bit
D 64-bit

7 Which of these initiatives is not related to the power-line networking standard?

A ITU G.hn
B MoCA
C HomePlug AV
D IEEE P1901

8 The Mobile Phone Throwing World Championships have been held annually in this country since 2000:

A Germany
B Finland
C United States
D Japan

9 What kind of connector is this?

A Mini HDMI
B Micro DVI
C HDMI 1.4
D DisplayPort

10 Which of the following is a Clarksfield processor?

A Core i7-720QM
B Core i7-620LM
C Core i5-430M
D Both a and b

11 Which is the correct order?

A Terabyte, exabyte, zamobyte, heckabyte
B Petabyte, exabyte, zettabyte, yottabyte
C Terabyte, zettabyte, zamobyte, nanobyte
D Petabyte, zamobyte, exabyte, yobibyte

12 Which consumer graphics chip first implemented bump mapping?

A S3 ViRGE
B ATI Rage 3D
C Matrox G400
D 3dfx Voodoo 3

ANSWERS: 1-C, 2-A, 3-B, 4-B, 5-D, 6-C, 7-B, 8-B, 9-D, 10-A, 11-B, 12-C

GEEKY GREATS OF TV AND MOVIES

Submitted for your approval: 17 of our favorite geeks from pop culture, past and present. We left out a bunch of worthy nerds, so make sure to send us some angry letters about our most glaring omissions!

JAMES ELWOOD

Remember the *Twilight Zone* episode where the computer programmer is cyber-stalked by his own machine? Played by Wally Cox, the character James Elwood in "From Agnes—With Love" was likely America's first introduction to the computer geek stereotype.

QUARTERMASTER MAJOR BOOTHROYD

Better known simply as "Q," this character from James Bond mythology supervised the R&D for such gear as a garrote-loaded wristwatch, the "Little Nellie" one-man attack chopper, and a touchpad-driven remote control for Bond's BMW 750iL. Gadget badassery at its finest.

SHELDON COOPER

He's into comics. He plays Rock Band. He riffs on Schrödinger's cat. He's one of the very few TV characters who proudly rocks a PC instead of a Mac,

13 What was the name of Microsoft's two-screen tablet concept, which was recently scrapped?

A Courier
B Chronicler
C Streak
D Slate

14 Which is the electronic symbol for an inductor?

A 
C 
B 
D 

15 In DirectX 11, hardware tessellation describes a means of:

A Generating complex geometry from a relatively sparse data set
B Producing more realistic animated characters
C Improving in-game physics
D All of the above

16 In which property was James T. Kirk's middle name first revealed?

A Star Trek: The Original Series
B Star Trek: The Animated Series
C Star Trek: The Motion Picture
D Star Trek IV: The Undiscovered Country

17 Which of the following is an authentic touch-screen technology?

A Acoustic pulse recognition
B Parabolic capacitance
C Bidirectional image capacitance
D Dispersive LCD imaging

18 The FCC approved a proposal for AMPS (Advanced Mobile Phone System) in what year?

A 1969
B 1904
C 1990
D 1982

19 The WiGig specification version 1.0 supports data transmission rates up to:

A 11Gb/s
B 5Gb/s
C 7Gb/s
D 18Gb/s

20 Which of the following drives does *not* utilize a 6Gb/s controller as of June 2010?

A 600GB WD VelociRaptor
B 2TB Seagate Barracuda XT
C 256GB Crucial C300
D 480GB OCZ Vertex 2

21 The fastest IEEE 802.11n router is capable of theoretical throughput of:

A 300Mb/s
B 54Mb/s
C 450Mb/s
D 150Mb/s

22 Which of the following is *not* a new feature in Adobe Photoshop CS5?

A Content Aware Fill
B HDR Pro
C HDR Toning
D Clone Warp

23 Which CPU series never had Nvidia chipset support?

A Athlon 64
B Atom
C Core 2 Duo
D Core i7

ANSWERS: 13-A, 14-D, 15-D, 16-B, 17-A, 18-D, 19-C, 20-D, 21-C, 22-D, 23-D

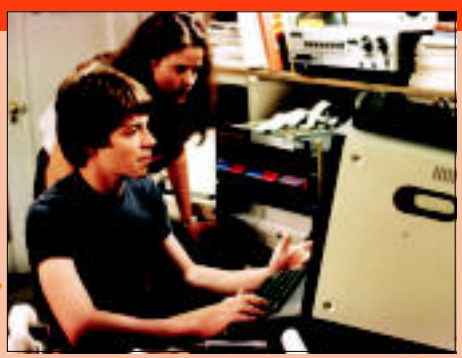
and he openly discusses the joys of defragmentation and alternative OSes. Don't knock *The Big Bang Theory*. This show (and its lead nerd) capture geek culture with legit authenticity.

LIEUTENANT COMMANDER MONTGOMERY SCOTT

Spock knew more nerd stuff, but lacking human passion, he wasn't a geek. Scotty? He lived for technology. This line from "The Trouble With Tribbles" says it all: "Thank you, sir! This will give me a chance to catch up on my technical journals!"

DAVID LIGHTMAN

A high school computer enthusiast (let's not call him a "hacker") accidentally engages a military supercomputer in a game of nuclear brinksmanship. That's the plot of *WarGames*, which catapulted super-high-functioning teenage computer nerds into the pop-culture lexicon.



24 MSI has finally decided to retire BIOS. What is the name of the modernized bootloader that will replace it?

A IFFO
B BIOS 2
C UEFI
D FFIU

25 Advanced Format refers to:

A A standard for storing data on hard drives
B A specification for HTML5 video
C 3D Blu-ray media
D The transmission protocol between IPv4 and IPv6 hardware

26 Which phone did gadget-hound James Bond not use?

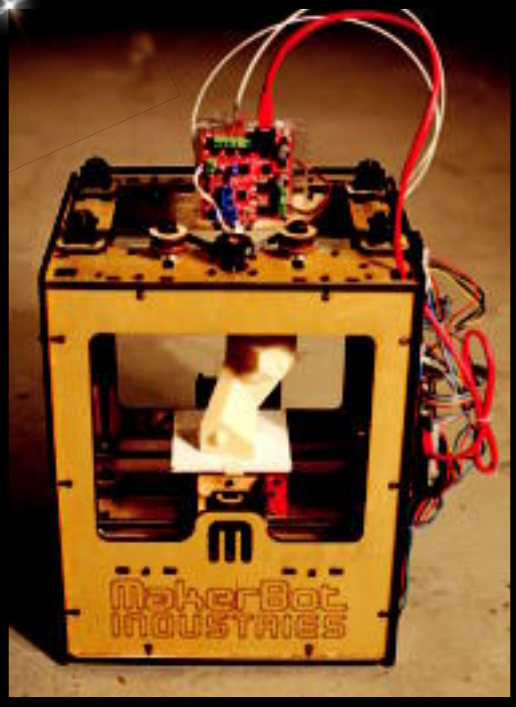
A Sony Ericsson K800i
B Sony Ericsson C902
C Sony Ericsson W960i
D Sony Ericsson R380

27 Which is not a netbook-optimized operating system?

A MeeGo
B JoliCloud
C Chrome OS
D Kin

28 What is this?

A A DIY garbage compactor
B A 3D printer
C A miniature CNC router
D A prop from the movie *The Last Starfighter*



29 In 1898 at Madison Square Garden, Nicola Tesla became the first person to demonstrate which of these technological innovations:

A Transmission of wireless telegraphy
B Wireless remote control
C Radio detection and ranging (RADAR)
D VTOL aircraft

30 Nvidia's Optimus technology enables:

A Fully customizable LED keys on notebook keyboards
B Up to six monitor outputs per graphics card
C Seamless switching between integrated and discrete graphics
D Cars that turn into robots

ANSWERS: 24-C, 25-A, 26-C, 27-D, 28-B, 29-B, 30-C

GEEKY GREATS OF TV AND MOVIES

THE LONE GUNMEN
This eclectic trio of network hackers from *The X-Files* brought conspiracy theorization into the geek culture mix. We think our own Gordon Mah Ung would have fit in well.

DANIEL FARADAY
The physicist from Lost studied the Kerr Metric, Casimir Effect, and Carter-Penrose Diagram to transport consciousness across time. Sure, we never saw him work on a PC, but still.

COMIC BOOK GUY (AKA JEFF ALBERTSON)
Best. *Simpsons* character. Ever.

DENNIS NEDRY
Fans of *Jurassic Park* will remember that it was sys-admin Nedry who shut down the park's security apparatus, causing the dino doody to hit the fan. He's geeky, yes, but it's his taunting, animated response to failed password attempts that gets him on this list.

PROFESSOR ROY HINKLEY
The Professor was the voice of reason, logic, and intelligence on *Gilligan's Island*. And aside

31 When was the first OpenGL specification released?

A 1992
B 1995
C 1997
D 1998

32 The original 3dfx API was called Glide. What was Rendition's bare-metal application interface called?

A RRadical
B RRedline
C RRorschach
D RRevolution

33 There were 17 billion text messages sent in 2000. How many were sent in 2001?

A 20 billion
B 150 billion
C 250 billion
D 500 billion

34 Which of these is a quad-core CPU?

A 2.93GHz Core 2 Extreme X6800
B 2.66GHz Core i5-750
C 2.53GHz Core i7-610E
D 1.33GHz Core i7-660UM

35 Next-generation Ion graphics chips no longer rely on shared system memory; instead they ship with this amount of DDR2 or DDR3:

A 256MB
B 512MB
C 768MB
D 1,024MB

36 The aperture setting on a camera primarily controls what?

A Shutter speed
B Depth of field
C Color temperature
D Shading

37 Which of the following does not belong?

A Mozy
B Google Docs
C TrueCrypt
D Dropbox

38 How many lanes of PCI-E 2.0 does a Core i7-870 have in the core?

A 48
B 32
C 16
D 8

39 In *The Simpsons*, which of the following was not invented or discovered by Professor Frink?

A The sarcasm detector
B Linguo the grammar robot
C Hamburger Earmuffs
D The Frinkahedron

40 Which video-streaming service is not natively supported on Western Digital's WD TV Live Plus?

A Hulu
B YouTube
C MediaFly
D Netflix

41 Which of the following is not a requirement to display Blu-ray 3D at 1080i resolution?

A A display or projector capable of receiving a 120Hz video signal
B An HDMI 1.4 cable
C An A/V receiver with an HDMI repeater
D B and C

ANSWERS: 31-A, 32-B, 33-C, 34-B, 35-B, 36-B, 37-C, 38-C, 39-B, 40-A, 41-D

GEEKY GREATS OF TV AND MOVIES

from his inability to construct a boat, was there anything this guy couldn't hack together with bamboo and coconuts shells?

C3PO AND R2D2

The tall one is fluent in more than 6 million forms of communication and can instantly calculate the odds on almost anything. The short one is an astromech who can hack an X-Wing fighter in mid-flight. The geekiest characters in the *Star Wars* universe aren't even human!

WARRANT OFFICER ELLEN RIPLEY

Much like her equivalents in the U.S. military, Warrant Officer Ripley of *Alien*-series fame served as a technical expert with the Colonial Marines. Whether flying space vehicles, firing pulse rifles, or operating a powerloader, she was a hardware geek of the highest order.

42 Which of the following 2010 games is not a PC exclusive?

A All Points Bulletin
B StarCraft II
C Diablo III
D Metro 2033

43 Which heavily hyped graphics card never actually shipped?

A Vérité V4400
B Voodoo 5 5500
C Diamond Viper Z200
D PowerVR Kyro II

44 Which of the following is not a feature of the new iPhone?

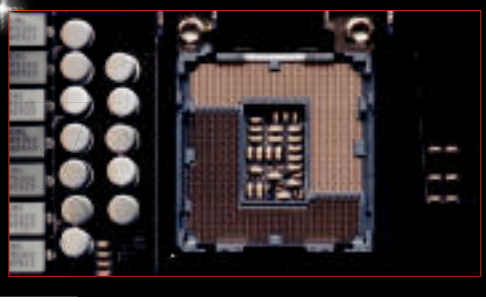
A 24 percent slimmer
B Front and rear camera
C Intel Atom processor
D Video chat capability

45 The FCC's comprehensive plan for broadband service in the United States is known as:

A Net Neutrality
B Broadband Data Improvement Act
C Telecommunications Act of 2010
D National Broadband Plan

46 Which processor goes with this socket?

A Core i7-875K
B Core i7-980X
C Phenom II X6 1055T
D Xeon X5680



47 The Phenom II X6 series features a new auto-overclocking feature called:

A Turbo Boost
B Turbo Speed
C Turbo Core
D Super Charger

48 Intel's Clarkdale CPU integrates:

A USB 3.0 and H.264 acceleration
B Graphics and SATA 6Gb/s
C PCI-E and graphics
D 802.11n and PCI-E

49 AMD's Socket AM3 has:

A 941 pins
B 939 pins
C 940 pins
D 754 pins

50 To boot from a partition bigger than 2.1TB, all of the following are necessary except:

A Extensible Firmware Interface instead of BIOS
B GUID Partition Table instead of master boot record
C 4KB sectors instead of 512-byte sectors
D A 64-bit operating system

51 Which CPU has the most transistors?

A Nvidia GeForce GTX 480
B Core 2 Extreme QX9775
C Phenom II X4 965 Black Edition
D Core i7-975 Extreme Edition

ANSWERS: 42-D, 43-A, 44-C, 45-D, 46-A, 47-C, 48-C, 49-A, 50-C, 51-B

GEEKY GREATS OF TV AND MOVIES

STEVE URKEL
His Poindexter personal style reinforced slanderous geek stereotypes, but there's no arguing that the *Family Matters* TV star was a nerd inventor extraordinaire. Consider the Urkel-bot, Wacky Tacky Glue, and exploding "vegetable bombs." Yes, Steve, you did that.

ROBOT
This General Utility Non-Theorizing Environmental Control Robot (Class M-3 Model B9) brought some much-needed geek cred to the *Lost In Space* mythology. And he was polite, too: "My micromechanism thanks you, my computer tapes thank you, and I thank you."

LUCIUS FOX
Just as Bond has Q, Batman has Lucius Fox, a gadget-creating engineer of epic proportions. He helped outfit his batty friend with the Bat Suit, the Bat Grappler, and the Bat Pod—among other bat-themed gear and contraptions.

DOCTOR EMMETT LATHROP BROWN
If not for the time-traveling experiments of Doc Brown in *Back to the Future*, a nation of geeks wouldn't hold the DeLorean DMC in such high regard. The Doc might have had a sucky car, but his mastery of flux capacitation was without equal.

52 What type of work should not be published using a Creative Commons license?

A Illustrations
B Software
C Photographs
D Movies

53 This year, what company overtook Microsoft as the most valuable tech company, measured by market cap?

A Cisco
B Apple
C Oracle
D Intel

54 Which chipset has native SATA 6Gb/s support?

A Intel P55
B Intel X58
C Nvidia NForce 790i
D AMD 890FX

55 Intel's Core i7-980X Extreme processor has a default clock speed of what?

A 3.00GHz
B 3.13GHz
C 3.60GHz
D 3.33GHz

56 Which company purchased online movie-streaming site Vudu?

A Amazon
B Walmart
C Blockbuster
D Comcast

57 Which residential device is a Z-Wave system *not* capable of controlling?

A Pet feeder
B HVAC system
C Window coverings
D Entry locks

58 Which of the following web services launched first?

A YouTube
B Facebook
C Wikipedia
D Twitter

59 The bandwidth difference between the theoretical maximum throughputs of SATA 6Gb/s and USB 3.0 is:

A 2GB/s
B 6Gb/s
C 1Gb/s
D None

60 Which handset was inspired by a modified handset that Neo used in The Matrix?

A Nokia 5110
B Nokia 7110
C Nokia 3310
D Nokia 2650

ANSWERS: 52-B, 53-B, 54-D, 55-D, 56-B, 57-A, 58-C, 59-C, 60-B

NEO
Never forget that before he became the flying kung fu artist we know in *The Matrix*, Thomas A. Anderson was a programmer by day, and a hacker named Neo by night. He lived in a barren hovel of an apartment, and typed at command prompts in the middle of the night. That's geeky.

GEEK METER How do you rate?

0-15 CORRECT: Really? Were you even trying? Perhaps you need a one-button mouse and the advice of a "Genius."

16-30 CORRECT: May we recommend that you lock yourself in a room with a case of Hot Pockets and a stack of *Maximum PC*s?

31-45 CORRECT: As Darth Vader says: "Impressive." Crack open a cold one (Mountain Dew), kick your feet up on a massively huge tower PC, and feel proud.

46-60 CORRECT: C3888583924096A4A340A3888540828987408299818995409695 40C29985A3A35A40E896A47D9985408140A2948199A3409496A38885994B40E38881A37DA24099898788A34B40E38885409485A399898340A2A8A2A385944B

WHITE PAPER

HDMI 1.4

The HDMI Licensing consortium is adding 3D, additional color spaces, higher resolution, Ethernet, and more to this increasingly ubiquitous interface –ZACK STERN

Hitachi, Panasonic, Philips, Silicon Image, Sony, Technicolor, and Toshiba make up the HDMI Founders, the group that defines the specifications and direction for the digital A/V connector. Since its 2002 launch, the consortium has introduced regular updates. HDMI 1.4 and HDMI 1.4a specify the most recent changes.

HDMI utilizes three physically separate means of communication: Display Data Channel (DDC), Transition Minimized Differential Signaling (TMDS), and Consumer Electronics Control (CEC). DDC provides a path for devices to report their audio and video specifications so they can automatically configure their maximum resolutions. DDC also handles HDCP (High-bandwidth Digital Content Protection) authentication. (For more on HDCP, see http://bit.ly/de5Gcc).

TMDS supplies the main audio, video, and related auxiliary data, which can be encrypted using HDCP. TMDS requires such precise timing that there's a wire tolerance of just 1/20,000-inch. Bandwidth in the original HDMI spec tops off at 4.9Gb/s for video and up to eight channels of audio.

HDMI 1.4, finalized in May 2009, introduced 3D support, higher resolutions, additional color spaces, Audio Return Channel, Ethernet, and two new connector types. The 1.4a specification, finalized in May 2010, concretizes the structure of 3D content in movies, games, and TV.

3D TAKES SHAPE

HDMI 1.4 defines 3D structures in the way frames are delivered, so that an HDMI 1.4 Blu-ray player from one manufacturer will work with any other manufacturer's HDMI 1.4 3D TV. (For a 3D primer, see http://bit.ly/cbV2JA).

3D video is often delivered in two channels: one for each eye. Supported 3D structures handle the two streams as interlaced, field-alternative frames with frame packing that stacks the two 720p or 1080p frames vertically; with full- or half-resolution frames side-by-side; in full-resolution with alternating lines; and more.

The 3D structure standards also support 2D+depth and the similar WOWvx format for the experimental Phillips glasses-free 3D TVs. These methods send the left 2D frame and a grayscale depth map that the TV can turn into a stereoscopic pair of frames or 3D effects for glasses-free 3D TVs.

HDMI 1.4 source devices must support at least one of the mandatory formats: 1080p/24 with frame packing for film content, or 720p/60 or 720p/50 with frame packing for gaming content. Display devices must support each mandatory format. Additionally, HDMI 1.4a defines the mandatory broadcast frame formats that displays must support: side-by-side horizontal 1080i/60 or 1080i/50, top-and-bottom 720p/60 or 720p/50, and top-and-bottom 1080p/24.

The display device identifies its 3D capabilities with EDID (extended display identification data), and the source device automatically sends a supported format. Additional metadata defines the video structure and format as InfoFrames sent through the TMDS channel.

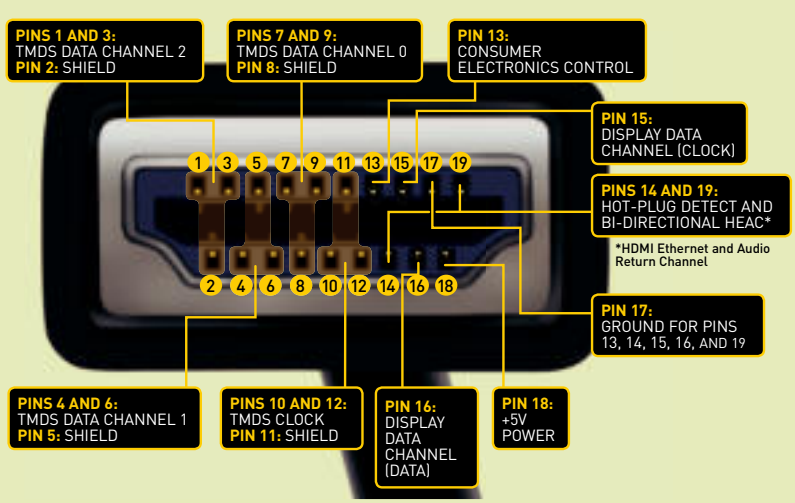
While HDMI 1.4 cleanly defines these 3D standards, DVI and certain HDMI 1.3 devices can still send supported 3D structures, making them compatible with an HDMI 1.4 TV. For example, an upcoming PlayStation 3 update will add Blu-ray 3D support, while other companies have sold HDMI 1.3 sources and displays that work together. Nvidia's 3DTV Play system will connect an Nvidia-powered PC to an HDMI 1.4 3D TV, even if you need to adapt from DVI on your videocard. Otherwise, that setup supports the stacked-frame 3D structure as defined in HDMI 1.4.

GET THE PICTURE

While HDMI 1.3 ramped up bandwidth, HDMI 1.4 takes advantage of room size, supporting 4Kx2K video formats (up to 4096x2160 pixels at 24 frames per second). That's the same format

HOW IT WORKS

HDMI High Speed with Ethernet Cable



The HDMI Licensing consortium has banned cable manufacturers from labeling their products with HDMI spec numbers. Make sure the cable you buy is labeled "HDMI High Speed" or "HDMI High Speed with Ethernet" if you want 100Mb Ethernet support.

as many digital movie theaters. Depending on their color gamut, those big streams reach the 10.2Gb/s maximum. And while HDMI 1.3 widened the color gamut, HDMI 1.4 supports digital still camera (DSC) spaces: sYCC601, AdobeRGB, and AdobeYCC601. These let you connect a camera to different displays and maintain consistent color reproduction. The wide color space also allows HDMI 1.4 devices to show a bigger range of hues than before.

The HDMI consortium recommends the use of "High Speed" HDMI cables for these advanced display technologies.

ETHERNET CONNECTIONS

HDMI 1.4 adds full-duplex 100Mb/s Ethernet: Connect one device—even your TV—to your hardwired network and every other HDMI device in the chain becomes a part of your network.

HDMI cables retain the same pin configurations as before; the Ethernet Data Channel is carried on the existing DDC/CEC ground, HPD (hot-plug detect), and Utility pins. Keep in mind that you'll need a new HDMI cable bearing the "with Ethernet" designation, since this upgraded version shields each wire to eliminate crosstalk.

Audio Return Channel eliminates yet another cable. This lets a TV with a built-in tuner or other A/V device send its audio signal upstream to your receiver over the single, connected HDMI cable. This process is compatible with LipSync, introduced in HDMI 1.3.

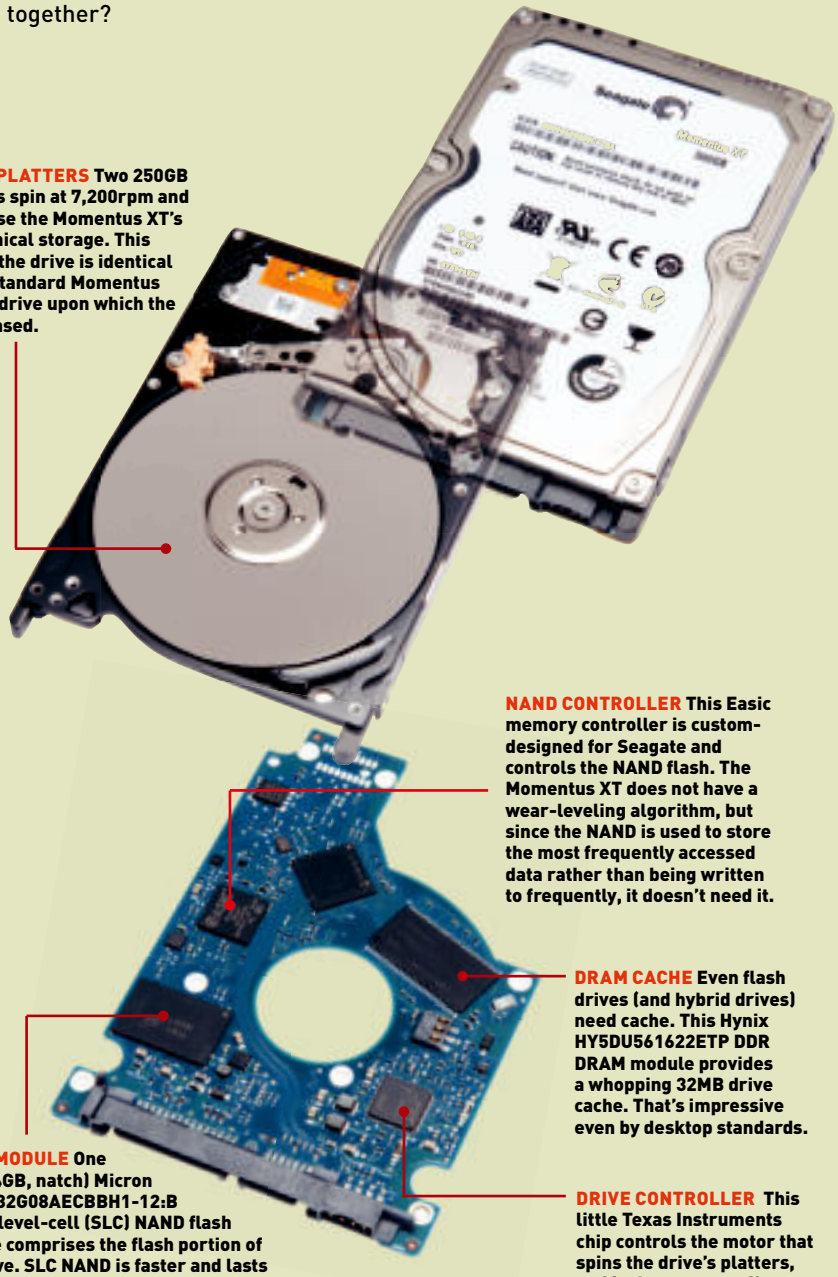
PLUG IN

HDMI 1.4 introduces an additional automotive connector that carries a maximum 720p/1080i signal and omits Ethernet, but includes a locking mechanism that's more resilient to road conditions. A Micro connector, also new to HDMI 1.4, is about the same size as Micro USB. It supports the same features and is equipped with a full complement of 19 pins, just like the standard and mini versions.

One final note: The HDMI Licensing consortium has mandated that manufacturers move away from using HDMI version numbers and categories in their packaging and marketing materials in favor of HDMI names. If you have older HDMI 1.3 cables, anything identified as "Category 1" is the same thing as a newer "HDMI Standard" cable, and those labeled "Category 2" are the same as newer "HDMI High Speed" cables. Essentially, the only reason to upgrade from an HDMI 1.3 Category 2 cable is to gain Ethernet and the HDMI Audio Return Channel.

Seagate Momentus XT Hybrid Drive

Hybrid drives are back, baby! After a brief foray into the sunlight a few years ago, hybrid drives—which wed flash memory with mechanical storage—disappeared. Seagate's new Momentus XT (reviewed on page 78) smooshes together a 500GB, 7,200rpm mechanical drive with 4GB of onboard SLC NAND for speedy access to your most frequently used files. So, how does it all fit together?



DRIVE PLATTERS Two 250GB platters spin at 7,200rpm and comprise the Momentus XT's mechanical storage. This part of the drive is identical to the standard Momentus 7200.4 drive upon which the XT is based.

NAND CONTROLLER This Easic memory controller is custom-designed for Seagate and controls the NAND flash. The Momentus XT does not have a wear-leveling algorithm, but since the NAND is used to store the most frequently accessed data rather than being written to frequently, it doesn't need it.

DRAM CACHE Even flash drives (and hybrid drives) need cache. This Hynix HY5DU561622ETP DDR DRAM module provides a whopping 32MB drive cache. That's impressive even by desktop standards.

NAND MODULE One 32Gb (4GB, natch) Micron MT29F32G08AECBBH1-12:B single-level-cell (SLC) NAND flash module comprises the flash portion of the drive. SLC NAND is faster and lasts 10 times longer than MLC NAND, but is more expensive.

DRIVE CONTROLLER This little Texas Instruments chip controls the motor that spins the drive's platters, and is the same on all Momentus drives.

SUBMIT YOUR IDEA Ever wonder what the inside of a power supply looks like? Don't take a chance on destroying your own rig; instead, let us do the dirty work. Tell us what we should crack open for a future autopsy by writing to comments@maximumpc.com.

HOW TO

Step-by-Step Guides to Improving Your PC

THIS MONTH

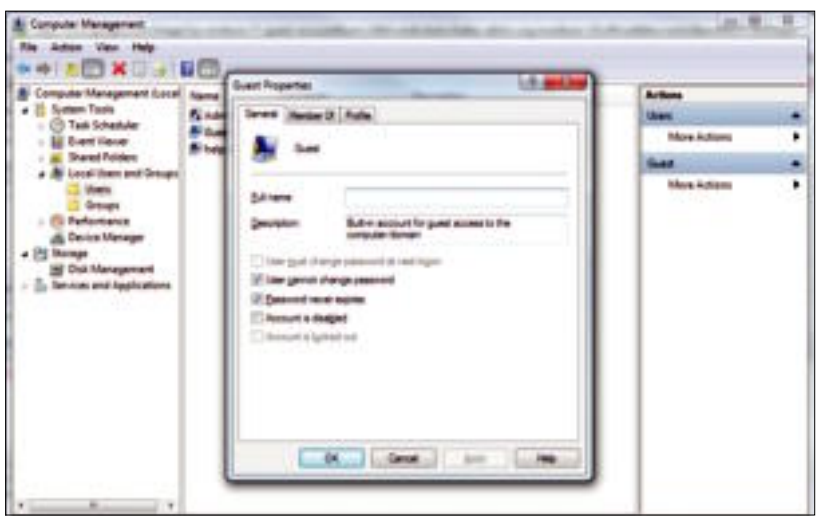
MANAGEMENT TRAINING

ALEX CASTLE
ONLINE MANAGING EDITOR

A surprising number of PC users don't know about the Computer Management pane—one of the most powerful configuration utilities in Windows. The pane is hidden in plain sight; it's in the right-click context menu for the My Computer or Computer icon.

In Computer Management you'll find some incredibly useful tools, including the ability to add and manage user accounts and groups, as discussed in this month's Windows Tip. There's also an array of powerful disk management tools, which allow you to reassign drive letters and map network drives. For the truly advanced, the Computer Management pane lets you schedule system tasks, manage device drivers, and a whole lot more. If you like to think of yourself as a Windows power user, you need to be familiar with the Computer Management tool.

WINDOWS TIP OF THE MONTH



Show Some Hospitality

If you ever plan on letting anyone else use your computer, create a guest account for them. That way they won't have to deal with your cluttered desktop, and you won't have to worry about them changing something they shouldn't. In Windows 7, right-click Computer, and select Local User and Groups, and then Users to enable guest access.

SUBMIT YOUR IDEA Have a great idea for a How To project? Tell us about it by writing to comments@maximumpc.com.

Sync Your Music Library Across Multiple Computers

In the decade or so since the rise and fall of Napster, it's become very hard to find a single person who doesn't keep a super-size collection of MP3s on their hard drive. That's all well and good, but what happens when you get a new roommate or move in with a significant other, and want to merge two music collections into one? Windows 7 and most popular music library managers, like Windows Media Center, iTunes, and WinAmp, offer solutions for sharing your music library over a home network, but a big decentralized library (likely with lots of duplicate files) spread out over a network is inefficient, hard to manage, and hard to keep backed up. In this article, we'll show you how you can use a free program to merge multiple libraries into a single, organized music archive. –ALEX CASTLE


A

B

1 PUT MUSIC IN ONE PLACE

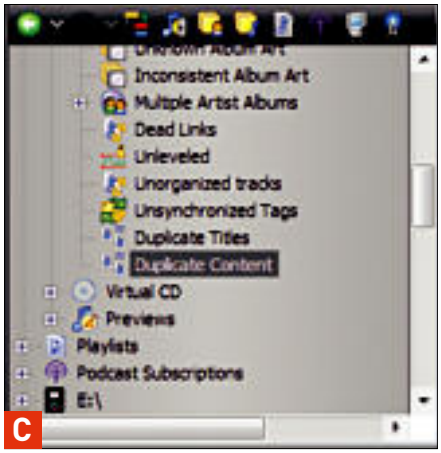
So, what's the first step to merging two libraries? Start with the heaviest lifting—mash them together. That's right, the very first step will be to just copy every single music-holding folder into a single repository. A NAS box or home server is the best place for this folder, of course, but you can also use a large hard drive on one computer. Don't worry too much about keeping things organized, just dump the contents of all your music folders into your new archive. If you have folders for each album (and hopefully you do) just drag the whole album folders over.

It might take quite a while for all those files to transfer, especially if you've got a lot of music. But when it's done, you've got all your music in a single library, right? Wrong—you've got all your music in a single, sloppy pile. Next, you'll have to clean it up.

2 REMOVE DUPLICATES

The biggest problem with your music library right now is that (unless the creator of every library you're merging has completely different tastes in music) it's probably got plenty of duplicate files, which take up extra space and make the library a mess to browse through. Perfect duplicates, with the same exact name and in the same exact folder in each library will be automatically taken care of during the merge, if you choose to overwrite existing files, but most duplicates won't be quite so clean-cut.

There are plenty of programs for cleaning out dupes, but we prefer to use MediaMonkey (www.mediamonkey.com), a fantastic iTunes-alternative and media management program. Just download it (the free version has all the tools we need) and install it, selecting to import music from your merged music folder.



C

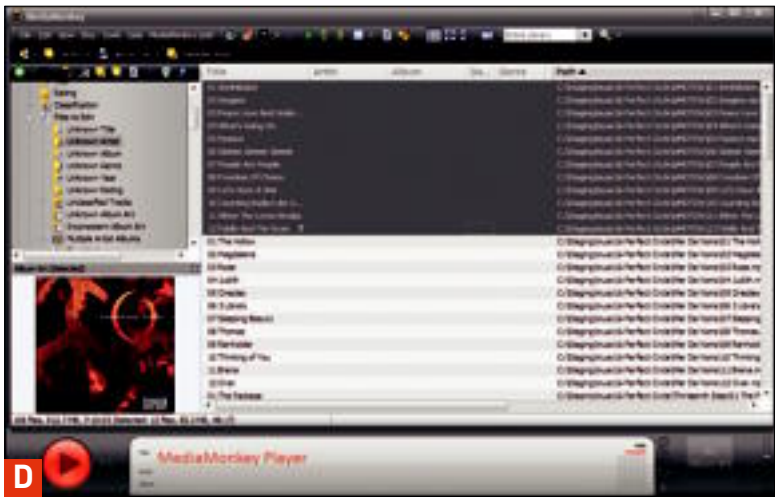
In Media Monkey, you'll see a list of all your music files. On the left, there's a tree view of your library, which lets you browse through your music by any of the normal criteria: title, artist, album, and a bunch more. If you keep scrolling past the normal sorting methods, you'll see one called Tracks to Edit. This branch contains nodes that let you isolate your music by anything that might be wrong with it, including missing tags and duplication.

To get started cleaning out dupes, click the Duplicate Titles node. This will show you a list of every set of songs that share a title (image A). Select the duplicates you don't want to keep, and press Delete. You'll be asked if you want to delete the file from your computer, or just remove it from your library (image B). Choose to delete it from your computer. This can be an easy way to clean out obvious dupes (if a whole album is duplicated, for instance, it will appear prominently in the list), but many items on a list won't be legitimate dupes. For instance, if you have the same song on an album and an EP, you don't want to delete the dupe, even if they have the same name, as doing so will leave a hole in one of the albums. Don't kill yourself trying to figure out exactly which dupes to delete, as there's an easier way to find them.

Once you've gotten all the obvious

dupes from the initial list, click the node called Duplicate Content (image C). A window will pop up (if it doesn't, double-click the Duplicate Content node) informing you that your tracks haven't been scanned for redundancy. Tell it to go ahead and perform the scan, and go make yourself a sandwich—this will take some time.

When it's done, the Duplicate Content node will still be empty of tracks. That's alright, just click the plus next to it, and you'll see a new node for each song that has a duplicate. You have to deal with the dupes on a case-by-case basis, which is a little irritating (this is why you should remove as many easy ones as you can using the Duplicate Title feature) but it doesn't take too long, and it's generally very good at finding actual dupes.



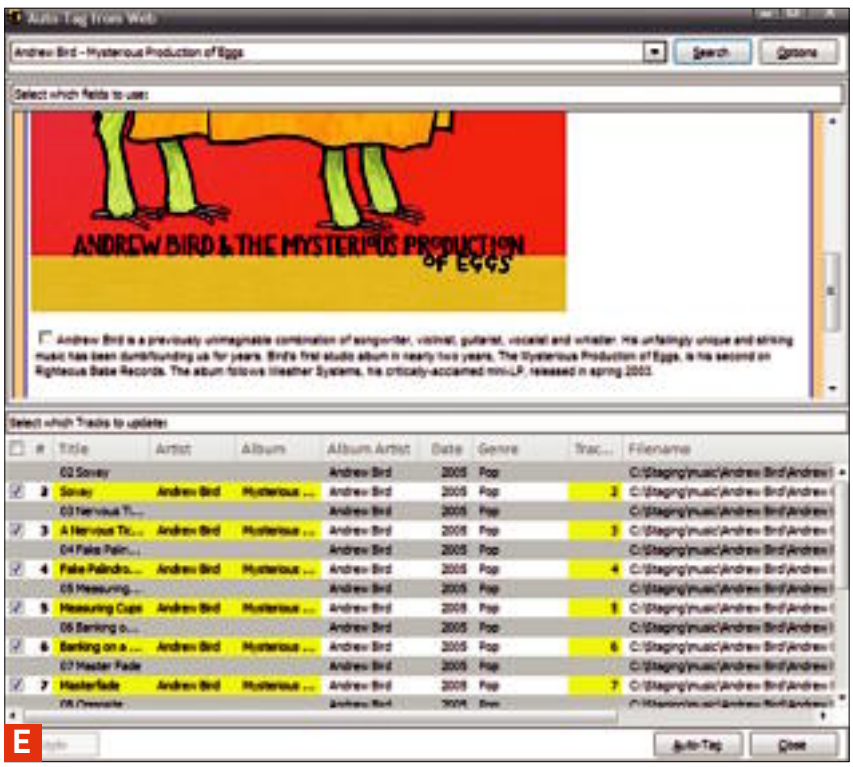
D

3 REPAIR TAGS

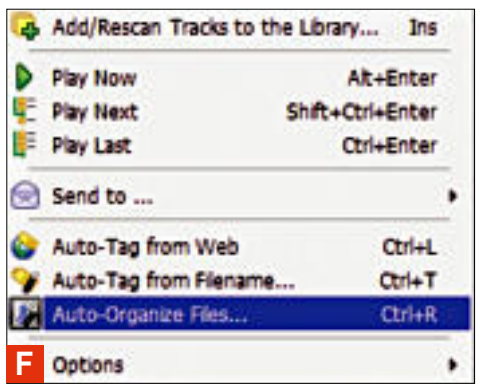
Now that the music library is more or less free of duplicates, it's time to make sure that everything is tagged. This can take some work, but when you're done, you'll have a library that's much easier to manage and organize. Fortunately, Media Monkey can make the process less painful.

To see what you've got to deal with in terms of untagged tracks, click the right-hand node called Unknown Artist. This shows you any track that doesn't have an Artist ID3 tag, and any song lacking an artist tag is probably completely without tags, so this should be all the tracks you have to fix.

The actual process of fixing the tracks isn't too difficult, thanks to Media Monkey's feature that auto-tags tracks from an online database. The only downside to the feature is that it only works one album at a time, so you can't just do your entire collection at once. Assuming your old library had some sort of file structure, you can usually group albums together by choosing to sort the Unknown Artist tracks by their filename, which will put any files that were in a folder together next to each other on the list. Drag a box or shift-click to select an album's worth of tracks (image D), then right



E



F

click and select Auto-Tag from Web.

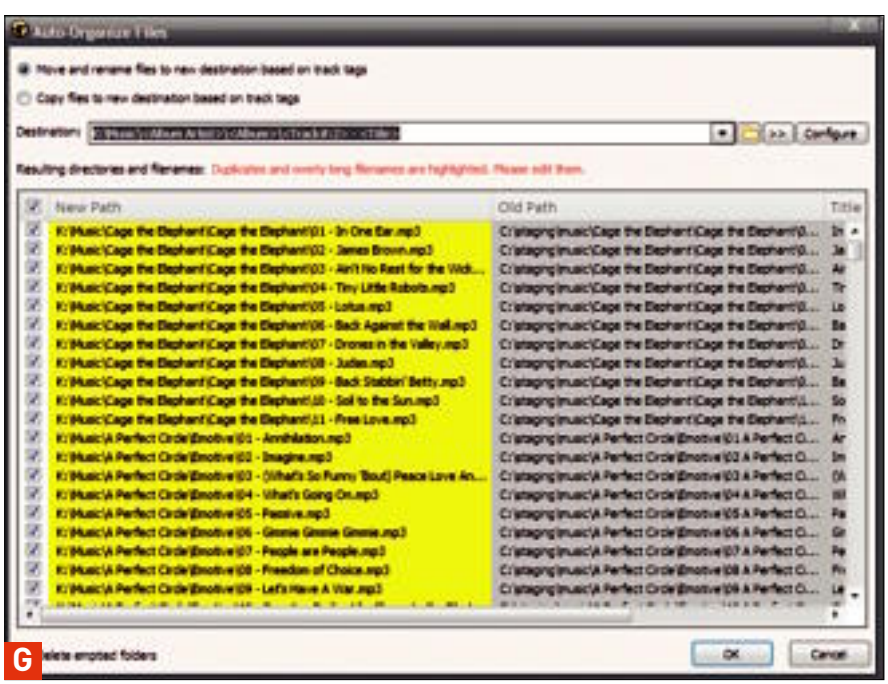
A window will pop up, with a possible album match for your selected songs (image E). Frequently the auto-tagger will get the artist right but the album wrong. If this is the case, click the drop-down menu at the top, and select the correct album. You'll know you've got the right one when the tracks turn yellow, indicating a good match. Click Auto-Tag, and the songs will be given the proper ID3 tags. Repeat this process until you've eliminated most or all of the untagged songs in your library. Now you're ready for the final step.

4 REORGANIZE YOUR FILE STRUCTURE

Now, we'll have MediaMonkey reorganize all the files in the media archive, based on their ID3 tags. To do this, return to the tree view on the left side of the window, and scroll down until you see the node titled My Computer. This node shows you the files as they actually exist on your computer, rather than by how they're classified in MediaMonkey's library. Navigate to your merged music library and right-click the root folder. Select Auto-Organize Folders (image F).

You can now select how your music is to be organized. The default is .\<Artist> <Title> which is definitely not what you want. In fact, all the defaults start with the .\ that indicates that the new files should be placed relative to their current location. We want an absolute path, so if you wanted to have your music files look like: K:\Music\The Beatles\Abbey Road\1 - Come Together, you would enter the following into the destination bar: K:\Music\<Album Artist>\<Album>\<Track#:2> - <Title> (image G).

Click OK, then let MediaMonkey do its thing. Just like that, you've got a pristinely organized music library file-structure, full of well-tagged, non-duplicated songs. Now everyone in your house can access this library using Windows 7's homegroup sharing, MediaMonkey itself, or iTunes' homesharing function.

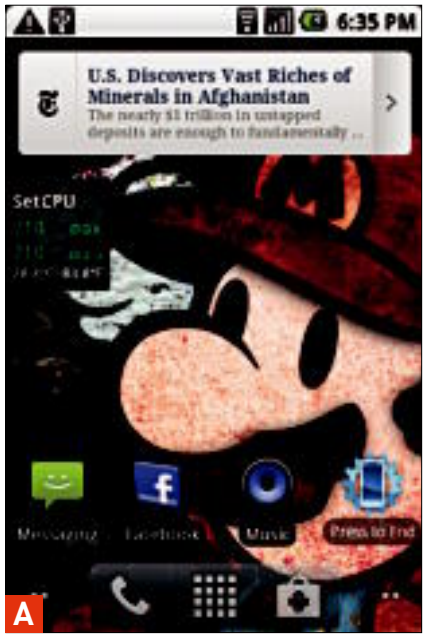


G

Install a Custom ROM on an Android Phone

Since its release, the Android platform has grown by leaps and bounds, finding its way onto laptops, netbooks, tablets, and smartphones. Helped by the momentum of search giant Google, much of Android's popularity is due to its open-source nature. This led to a wide variety of features unique to specific Android models: Some had HTC's gorgeous SenseUI, some had Android 2.1's slick Eclair home screen, and lucky Evo 4G users got WiMax.

As a result, developers have been creating custom ROMs. For those who are unfamiliar with the terminology, a cell phone's operating system is referred to as a ROM (which stands for read-only memory). It's actually a bit of an antiquated term since smartphones now use flash memory for their operating systems instead of ROM, but the same concept applies. A custom ROM can bring a wide assortment of improvements to your Android phone. The most common reason to install a custom ROM is to bring Android 2.1 to an older handset model that has not yet had an official 2.1 update, such as the HTC Hero, which only just recently received an official 2.1 update but has had custom ROMs running 2.1 for six months. Custom ROMs also add features that are not available on official firmware. The most popular features are Apps2SD, which allows applications to be installed to the SD card and free internal phone memory, and Wi-Fi tethering, which turns your phone into a wireless hotspot. Other improvements include multitouch browsing (a popular mod for the Motorola Droid), overclocking capabilities (image A), and specialized skins and interfaces. –PAUL ESCALLIER



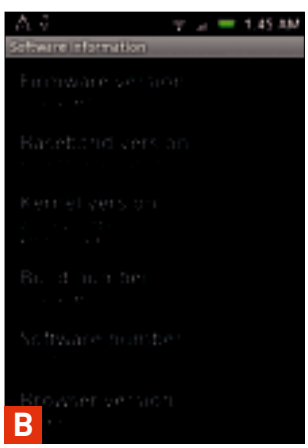
ROOT YOUR PHONE

To install a custom ROM, you must first "root" your device and flash a "custom recovery image." Rooting your phone gives you access to your entire file system, allowing you full admin rights. Because the rooting method varies from model to model, and

even between software-build versions, this is the most difficult part of the custom ROM process. Methods are always being refined and updated, so instead of compiling a giant systematic guide covering every Android phone just to have it become obsolete in a few months, we're going to arm you with the necessary information to find the latest rooting instructions for your phone.

KNOW THE RISKS

Before embarking on your rooting adventures, take a moment to consider the possible consequences. Generally, rooting your phone will void any manufacturer's warranty attached to it—although there is still debate as to whether unrooting it leaves any trace. In addition, making a mistake during the rooting process can potentially "brick" your phone, in other words, permanently break it. Keep these caveats in mind, as you are solely responsible for any actions you take.



B

The easiest way to brick your phone is to flash it with a method or image intended for another device. To avoid this, it's best to know your phone inside and out. Fortunately, most of the information you need to know can be found directly in your phone. Simply hit Menu, go down to About Phone, and select Software Information (image B). Take note of all the information—especially the firmware version and software version. Flashing a GSM phone with CDMA software or vice versa is a common and fatal mistake. If your phone uses a SIM card, it's GSM, otherwise, it's CDMA.

Finally, some newer phones and firmware have not yet been rooted. Unfortunately, when this is the case, you're pretty much stuck—installing a custom ROM isn't possible until a rooting method is created. Because official firmware updates often patch the exploits used for rooting the previous version, it's best not to update a phone if you plan to install a custom ROM.

Once you've gathered all necessary information, it's time to find the appropriate rooting guide. Most Android forums have courteous users who can not only point you in the right direction, but will also help you if you run into any problems. Two stand-out forums are: All Things Root (http://bit.ly/aJME3m) and xda-developers (http://bit.ly/stTp). Both have sub-forums dedicated to specific Android devices, and rooting guides are often pinned to the front page for their respective devices.

COMMON ROOTING METHODS

There are two common rooting methods. The more versatile of the two involves downloading the Android SDK and using the included Android Debug Bridge (referred to as ADB). When installed properly, ADB is accessed through the command prompt/terminal on your computer. Guides that use this method will walk you through each command, one at a time. Be sure to pay attention to any instructions describing when and how to plug/unplug your USB cable to change certain settings on your phone. If you're using the ADB method, you will also most likely have to download a special exploit file, used to achieve root status; as well as a custom recovery image, used to flash your new ROM.

The alternative method is to use an Android application called Flashrec (image C), available at http://bit.ly/4EeLD8. The Flashrec method is generally much more newbie-friendly, as it does not require using the command prompt/terminal. Unfortunately, Flashrec only works on a few select Android models (such as the HTC/Sprint Hero, MyTouch 3G, and G1), and the exploit it uses has been patched in most recent firmware. In some cases, the Flashrec method will allow you to download and flash the custom recovery image directly from your phone; in other cases, you will need to download a special recovery image and "trick" Flashrec into flashing it for you. Again, available guides to using this method will walk you through the whole process.

C

INSTALL THE CUSTOM ROM

Once you've successfully rooted your phone, installing a custom ROM is extremely easy. First, you'll want to find a compatible ROM for your device—again, use the two sites we mentioned previously to hunt down the ROMs that are compatible with your handset. Now all you have to do is copy the desired ROM, in .zip form, onto the root directory of your phone's SD card. Then boot into recovery mode, accomplished by holding the Home button while turning on your phone. You should see a screen similar to image D.

In almost all cases, you will want to select the Nandroid Backup option before applying any update option. The Nandroid Backup feature creates a snapshot of your current ROM and saves it to your SD card. This means if anything goes wrong while installing the new ROM, you can always restore your phone to its previous state.

Once the Nandroid Backup is complete, you're ready to start installing your new ROM. Be sure to check for any specific instructions for the ROM you've chosen. Some require you to perform a full wipe of your phone, done with the "wipe data" options. Keep in mind that a full wipe will return your phone to a factory-like condition. All of your settings, data, and apps will be erased (your SIM card and SD card will not be affected).

When you're ready, use the "Apply any zip from SD" option and select the ROM file you copied to your SD card. This will begin the flashing process and inform you when it is complete. Once the flash is finished, reboot your phone into your brand-new custom ROM.

D

REVIEW

Tested. Reviewed. Verdictized.

INSIDE

ONLINE

- EVEN MORE REVIEWS!
- BEST OF THE BEST
- BREAKING TECH NEWS
- NO BS PODCAST

iBuypower Armada Touch MT20X

No multitouch games? Roll your own

Veteran gaming-PC company iBuypower is offering the first multitouch gaming laptop, along with a workaround for the complete dearth of multitouch games.

The 15.6-inch MT20X features a capacitive screen with glass overlay to take full advantage of Win7's multitouch support. All the neat features we've come to associate with multitouch—finger-based dragging, scrolling, zooming, rotating—are performed with smoothness and precision on the MT20X's screen. But neat as this is, it felt a bit unnatural to use on a conventional laptop. For instance, we resented that the trackpad's lack of a scroll feature forced us to move our fingers from the keyboard to the screen to scroll through web pages and documents.

But then again, the main selling point of the MT20X is gaming, and here touch functionality could actually be handy, particularly in RTS and MMO games, where you could dispense with all the mouse clicking and more directly control the action onscreen using your fingertips. Unfortunately, PC game developers don't seem too keen on exploring this technology. No touch-supported PC games currently exist (other than the three casual games that Microsoft includes with its free Touch Pack software) and little attention was paid to touch gaming at this year's E3—as all efforts seemed focused on 3D.

To fill this void, iBuypower has developed third-party software called MAGIC (short for Multitouch Advanced Gaming Interface Control) that lets you remap mouse and keyboard controls to multitouch gestures in games (and most other apps) that don't support multitouch natively. The software is beta, but it's available for free to anyone who buys an iBuypower multitouch laptop. The company provides a few sample profiles, but a straightforward interface makes it easy to create custom profiles. We experimented with a sample profile for Supreme Commander II and appreciated the added touch functionality, although the experience wasn't perfect. There's naturally a learning curve involved and the implementation itself has some glitches that iBuypower acknowledges. We were most frustrated at being unable to smoothly scroll around the game environment using our fingers. IBuypower says it is committed to refining the software over time.

We were pleasantly surprised that the MT20X's glass-covered 1920x1080 touch screen didn't appear covered in fingerprints after regular multitouch use.

Performance-wise the MT20X's Mobility Radeon HD 5650 is DX11-capable but still just a midrange part. In our gaming benchmarks, it couldn't hold a candle to our zero-point's GTX 260M. Its performance was closer to that of the ultraportable Alienware M11x we reviewed in August. In DX11 titles, the MT20X didn't buckle, but it hardly soared. In our STALKER: Call of Pripyat benchmark, it averaged 23.7fps at 1680x1050 with both tessellation and contact hardening shadows enabled. In the very graphically demanding Heaven DX11 benchmark, the MT20X averaged 8.2fps.

The MT20X is more impressive on the CPU side, thanks to its Core i7-720QM, which offers eight effective threads of processing power to apps that can take advantage of them, as well as Turbo Boost.

But it would be silly to buy the MT20X for productivity purposes, paying a premium for its touch screen in the process. As a gaming rig, it offers a novel, if still imperfect, new approach for enthusiasts of the RTS genre, but its GPU will likely hold it back on newer titles.

—KATHERINE STEVENSON

BENCHMARKS

	ZERO POINT	
Premiere Pro CS3 (sec)	1,320	960
Photoshop CS3 (sec)	153	161 (-5.0%)
ProShow Producer (sec)	1,524	984
MainConcept (sec)	2,695	2,014
Far Cry (fps)	32.7	17.7 (-46.0%)
Call of Duty 4 (fps)	58.2	32.8 (-43.6%)
Battery Life	100.0	93 (-7.0%)

0 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our zero point notebook is an iBuypower M865TU with a 3.06GHz Core 2 Duo T9900, 4GB DDR3/1066 RAM, a 500GB Seagate hard drive, a GeForce GTX 260M, and Windows Vista Home Premium 64-bit. Far Cry 2 tested at 1680x1050 with 4x AA; Call of Duty 4 tested at 1680x1050 with 4x AA and anisotropic filtering.

SPECIFICATIONS

CPU	1.6GHz Intel Core i7-720QM
RAM	4GB DDR3/1333
Chipset	Intel PM55
Drives	Seagate Momentus 500GB (7,200rpm)
Optical	Sony Optiarc DVD+/-RW (AD-7560S)
GPU	Radeon HD 5650
Connectivity	HDMI, VGA, Ethernet, four USB 2.0, eSATA, FireWire, headphone, mic, 3-in-1 media reader, Wi-Fi, Bluetooth
Lap/Carry	6 lb, 6.1 oz / 7 lb, 6.5 oz

VERDICT 6

IBUYPOWER ARMADA TOUCH MT20X

+ TOUCH OF CLASS

Mobile quad-core is powerful in apps; good multitouch response; screen remains fairly smudge-proof.

– TOUCH OF EVIL

Multitouch gaming requires third-party app; graphics performance is middling; poor battery life.

$1,400, www.ibuypower.com

PNY XLR8 GTX 465

Nvidia closes in on the Radeon HD 5850

In the raging battle between AMD and Nvidia over DirectX 11 supremacy, AMD has had a decided edge in price/performance ratios, if not raw performance. Now, Nvidia aims to rectify that with the GTX 465.

Like the GTX 470 (and even the GTX 480, for that matter), the GTX 465 uses the same Fermi chip, with key functional units disabled. This may be by choice or because of yield issues, given the massive size of Nvidia's latest progeny. Whatever the case, it allows Nvidia to bring a card to market that's generally priced just a little less than AMD's sweet-spot card, the Radeon HD 5850. We've seen prices for the PNY card at around $280, as opposed to an average price ranging from $290 to $300 for the HD 5850.

So, what does the 465 give up relative to its bigger siblings, the GTX 475 and GTX 480? While there are indeed fewer shader cores (see chart), which implies lower performance in shader-heavy applications, game performance is also likely to be affected by the reduced number of ROPs in the final output stage. There are also fewer texture units, but that's actually balanced by the ROPs, and by the smaller memory interface.

How does that play out in actual performance? To find out, we compared the GTX 465 to a stock (not overclocked) Radeon HD 5850. Both cards are running the latest drivers at the time of the review: version 257.15 for Nvidia and Catalyst 10.4 for AMD. The XFX card comes in at around $295, while the PNY 465 GTX can be found for $280.

The result is a wash, with both cards winning some and losing some—although it's worth noting that when the Radeon HD 5850 wins, it wins by fairly large margins, while the GTX 465 ekes out just marginal wins when it pulls ahead.

Some of this, of course, is due to drivers. Fermi drivers are still relatively immature, and each driver release from Nvidia has produced notable performance increases. Power usage on the GTX 465 was still higher at full throttle, though the gap is narrowing. So the GTX 465 won't eat power supplies for lunch.

In the end, however, the GTX 465 is still a cut-down version of the GTX 480 (which in itself is somewhat crippled). It's great that Nvidia has brought the price down to a more affordable level, but we're looking forward to the next set of Nvidia GPUs, which will be built from the ground up for midrange and budget-class cards. That will tell us how effective Fermi really is as a scalable architecture.

In the end, if you buy your midrange card based on flipping a Maximum PC coin or simple brand loyalty, you'll be fairly satisfied either way. —LOYD CASE

BENCHMARKS

	PNY XLR8 GTX 465	XFX Radeon HD 5850
Unigine Heaven 2.0 (fps)	**19**	14
Battle Forge (fps)	40	40
Dirt 2 (fps)	57	**62**
Far Cry 2 / Long (fps)	**66**	65
Far Cry 2 / Action (fps)	**56**	54
Tom Clancy's HAWX (fps)	69	**76**
Crysis (fps)	19	**27**
DX11 Aliens vs. Predator (fps)	20	**25**
Just Cause 2 Concrete Jungle (fps)	31	**32**
STALKER: Call of Pripyat (fps)	26	**30**
Power Usage (Idle)	146W	**142W**
Power Usage (Full Throttle)	285W	**261W**

Best scores are bolded. Our test bed is a 3.33GHz Core i7-975 Extreme Edition in an Asus P6X58D Premium motherboard with 6GB of DDR3/1333 and an 850TX Corsair PSU. The OS is 64-bit Windows Ultimate. All games are run at 1920x1200 with 4x AA.

FERMI: DARE TO COMPARE

	GTX 465	GTX 470	GTX 480
Shader Cores	352	448	480
Texture Units	44	56	60
ROPs	32	40	48
Core Clock	607MHz	607MH	700MHz
Shader Clock	1,215MHz	1,215MHz	1,401MHz
GDDR5 Memory Clock	802MHz	837MHz	924MHz
Frame Buffer Size	1,024MB	1,280MB	1,536MB
Memory Interface	256-bit	320-bit	384-bit

VERDICT 8

PNY XLR8 GTX 465

+ HARRY DRESDEN

Good performance for the price; true sub-$300 Fermi card.

– URI GELLER

Draws more power; not quite as robust a performer as the HD 5850.

$280, www.pny.com

The PNY XLR8 GTX 465 is the first sub-$300 Fermi-based card.

Spring Design Alex eReader

This underdog ebook reader comes at a price

In an ebook reader market that's rapidly approaching the saturation point, a device needs to have a certain set of features to stand out from the crowd. The Alex eReader, a new ebook reader from Spring Design, has enough of them to make it an intriguing new product, and a fun one to try out, but not enough of them to warrant a buy recommendation.

First, the design of the Alex eReader is second to none. While it shares a general architecture with the Nook (an e-ink screen up top and a smaller, Android-powered, full-color touch screen below), the Alex is both better looking and more functional. At approximately 4.5x9 inches, it's longer than the Nook, but feels surprisingly sturdy, and is easy to balance while you read. The longer design leaves room for a larger color display down below, although the e-ink display is somewhat smaller than the Kindle's. Beauty is subjective, of course, but it's hard to argue that the Alex eReader isn't a fine-looking piece of hardware.

The color screen on the Alex isn't just for show, and it packs a couple of cool features that help the device serve for more than basic book-reading. For one, there's a full-fledged browser, which lets you surf the web, download ebooks, and even send content up to the top screen for easy reading. You can also use it to check your email, manage your library of books, and listen to music with a built-in MP3 player. When reading a book, the screen can be used to navigate, manage bookmarks, and highlight and annotate the text. The folks at Spring Design also have (ahem) designs for an "Alex Marketplace," where developers will be able to sell apps built for the device.

The e-ink screen looks just as good as any of its competitors', but not any better, and the pages turn at about the same speed, taking just over a second to refresh. The secondary screen also looks nice, but gets pretty choppy when browsing the web or (frustratingly) trying to enter text using the onscreen keyboard. Battery life is excellent as long as you're just using the e-ink screen, but drains much faster when using the bottom touch screen.

So, generally speaking, the Alex is a nice piece of hardware. Unfortunately, there are two huge problems that make this one a nonstarter.

First, there's the matter of buying books. The Kindle has Amazon's monster bookstore, and you can make purchases right on the Kindle and start reading them almost instantly, downloading over 3G. The Nook also has a built-in shop, as does the iPad. With the Alex, you have to find your own ebooks from a third-party store such as Ebooks.com. You can download them using the Alex's browser, but the experience just isn't as streamlined.

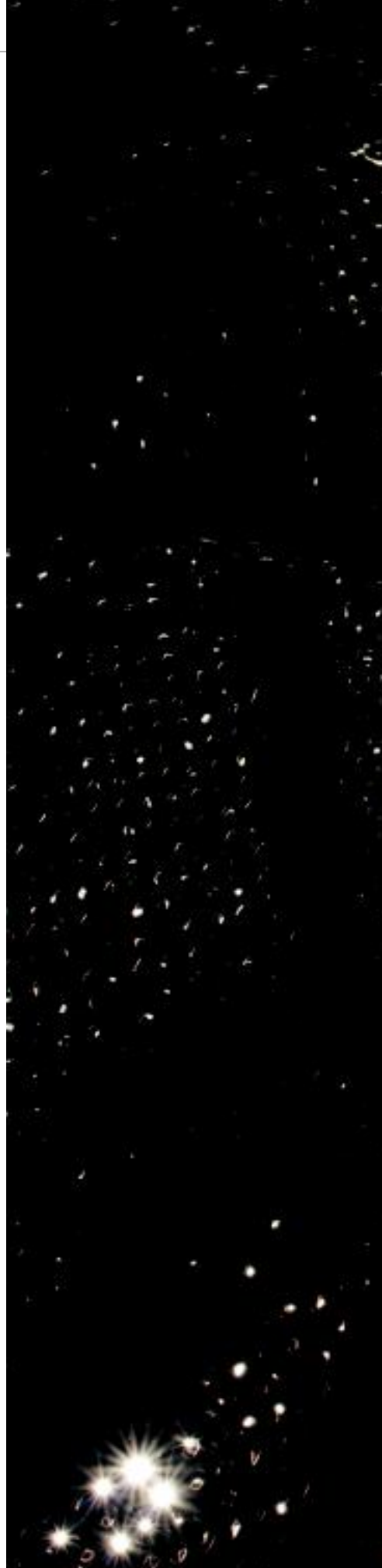
The second—bigger—issue is that of price. As of press time, the Kindle has had its price reduced to $190, and the Nook has a Wi-Fi-only model available for $150. The Alex, on the other hand, is listed at $400. We'll leave it up to you to decide if a nicer-looking ebook reader without the support of a major electronic bookstore is worth an extra $210 over the price of the current king of the category, but we have a hard time believing anyone will want to make the tradeoff. **–ALEX CASTLE**

VERDICT **6**

SPRING DESIGN ALEX EREADER

+ ALEXANDER THE GREAT	– ALEX DE LARGE
Beautifully designed; very solid feeling; useful secondary touch screen.	Less-elegant ebook-buying experience; browser lags; costs much more than its direct competitors.

$400, www.springdesign.com



While reading a book, the Alex eReader's Android-powered second screen can display your progress, bookmarks, or notes.

Seagate Momentus XT 500GB Hybrid Drive

Hybrid drives come back to the future

It's like a mechanical hard drive, but better. And more expensive.

We got the first hints that Seagate was planning a hybrid hard drive when, in response to an offhand question last year, company reps replied with "no comment," instead of saying "hybrid drives are deeeaaaad!" as we expected. Our suspicions were confirmed when we got our hands on the Momentus XT, a 500GB 7,200rpm notebook drive with 4GB of SLC NAND flash memory and an "Adaptive Memory" algorithm designed to speed up your system by copying the most frequently accessed files to the NAND flash.

By adding a small amount of high-speed flash memory to a standard mechanical drive, Seagate hopes to hit the middle-ground between solid-state speed and mechanical price and capacity. Under the hood, the Momentus XT is virtually identical to the non-hybrid 500GB Momentus 7200.4, with three key additions: a 32MB DRAM cache instead of 16MB, 4GB of SLC NAND, and the Seagate Adaptive Memory algorithm to make sense of it all.

Rather than trying to speed up the whole disk, Adaptive Memory moves the most frequently used files to the NAND for faster access time. So we won't see massive raw-speed improvements in the first sectors of the disk like we did with Silverstone's DIY hybrid HDDBoost (reviewed August 2010), but instead should see considerable improvements in day-to-day tasks.

Indeed, in our low-level drive benchmarks like HDTune, the Momentus XT was mostly indistinguishable from a current-gen Momentus 7200.4. We did see decent improvements in burst speeds, and massive improvements in random-access times for files present on the NAND flash—1.9ms read access times and 1.2ms write access times versus 16.5ms on the Momentus 7200.4. HDTune read and write IOPS also benefitted from the SLC NAND, with 4KB random-read IOPS at nearly 2,500, versus just 60 on the mechanical drive. This, of course, is due to the flash memory and is not present across the whole disk.

But if raw numbers don't tell the full story for the Momentus XT, what does? Real-world benchmarks, of course! After a few iterations to allow Adaptive Memory to get the hang of our Premiere Pro encoding benchmark, the XT turned in results that were 5 percent faster than the 7200.4.

The most impressive part of the Barracuda XT, though, was its performance in PCMark Vantage's HDD subtest, which tests hard drive performance over a series of real-world tasks. Our first run yielded a subscore of around 4,500, which is nothing to write home about—it's the same as a standard Momentus drive. But subsequent scores kept going up. And up, and up, until the Momentus XT's HDD subscore leveled off at 9,300 PC Marks—not exactly current-gen SSD levels, but faster than any mechanical hard drive has the right to be.

What does that mean? The drive works. Its base performance is every bit as good as a fast 500GB mechanical hard drive, and for your most frequently used files (including system files, hooray!), it's substantially better. And considering that it's only $50 more than a standard 7,200rpm Momentus drive, it's a good upgrade before the giant step to an SSD.

—NATHAN EDWARDS

BENCHMARKS

	Seagate Momentus XT	Seagate Momentus 7200.4	OCZ Vertex 2 (3Gb/s)
Capacity	500GB	500GB	100GB
HDTune 4.01			
Avg Read (MB/s)	82.5	83.7	**196.3**
Random-Access Read (ms)	1.9	16.5	**.1**
Burst Read (MB/s)	175.9	133.4	**228.0**
Avg Write (MB/s)	81.9	82.0	**221.9**
Random-Access Write (ms)	1.2	16.5	**.1**
Burst Write (MB/s)	175.7	172.2	**207.5**
4KB Read (IOPS)	2,417	60	**11,045**
4KB Write (IOPS)	110	85	**10,066**
IOMeter Random-Write IOPS (4KB, Queue Depth 32)	130	235	**48,958**
Premiere Pro (sec)	412	434	**359**
PCMark Vantage HDD	9,311	4,496	**39,309**

Best scores are bolded. All drives tested on our hard drive test bench: a stock-clocked Intel i7-930 CPU on an Asus P6X58D Premium motherboard with 6GB DDR3, running 64-bit Windows 7 Professional. All 3Gb/s tests performed using latest Intel ACHI drivers; all 6Gb/s tests use onboard Marvell 9123 6Gb/s SATA controller with latest drivers.

VERDICT **9**

SEAGATE MOMENTUS XT 500GB DRIVE

+ HYBRID	− MR. HYDE
Adaptive Memory works; considerably speeds up most-accessed files; competitive price.	More NAND would be better.

$150, www.seagate.com

Asus VG236H 120Hz Display

Great for 3D gaming, and not bad elsewhere

Before you scream, "Who in their right mind would pay $500 for a 23-inch twisted-nematic panel?!" know that this is a 120Hz monitor, and that Asus is putting Nvidia's 3D Vision kit—a $200 product—inside the box. If you're excited about 3D gaming and Blu-ray 3D movies (and have the appropriate videocard, playback software, and games), $500 is a compelling value. Oh, and the monitor's pretty good, too.

Let's discuss the aspects that temper our enthusiasm first, because this monitor isn't for folks with critical applications such as photo and video editing. In fact, some of you probably stopped reading at "twisted-nematic." Asus hasn't magically avoided all the problems we associate with TN panels—e.g., limited color gamut, backlight leakage, inability to distinguish between the lightest shades of gray and full-on white—but it has done a great job mitigating those problems.

Before we sat down for a gaming session, we used DisplayMate Multimedia with Test Photos (www.displaymate.com) to evaluate the VG236H's productivity prowess. This being a 6-bit panel, it relies on frame-rate control to cycle between different shades during screen refreshes to simulate intermediate colors it can't produce natively. We noticed that colors at the high end of the scale were oversaturated, so that we couldn't distinguish between the steps leading to peak values. The display was equally unable to separate very dark grays from absolute black. As a result, we had a difficult time seeing what was happening in the Blu-ray version of *Watchmen*'s opening fight sequence.

And in the low-saturation color test, color bars at two-percent saturation—very near peak white—either disappeared into the background or shifted tint: Pink became orange and green became yellow. We've yet to encounter those kinds of problems with a true 8-bit IPS panel that doesn't rely on dithering.

We were very impressed, on the other hand, with the VG236H's screen uniformity:

It's too bad Asus didn't go the extra step and incorporate Nvidia's 3D Vision USB dongle into the stand or bezel.

Many of the TN panels we've reviewed suffer from blotchiness and varying degrees of intensity while displaying a single shade across the entire display. This monitor produced a uniform shade nearly edge to edge. We did encounter a very slight degree of backlight leakage along the top and bottom edges. Not surprisingly, the leakage was most acute while the monitor was displaying uniform black, dark red, or dark blue. A very solid performance overall—considering this is a TN panel.

Most people contemplating a VG236H purchase will have gaming in mind, and from that perspective, it's a great choice—especially with games that take advantage of Nvidia's 3D Vision. (Asus plans to offer a second SKU sans Nvidia's glasses, but the company hadn't announced pricing at press time.) In addition to its ability to sync to a 120Hz video signal—an absolute requirement for compatibility with Nvidia's LCD shutter glasses—Asus claims the monitor is capable of a response time of just two milliseconds. We didn't encounter any ghosting while wearing the glasses and playing Metro 2033, Just Cause 2, and Batman: Arkham Asylum in 3D Vision mode; more importantly, the 3D effects added appreciably to our overall enjoyment of the games—especially when we had the luxury of connecting three of these displays to this year's Dream Machine. One feature we didn't appreciate, though, was the mirror-like glass reflecting everything in the room behind us.

—MICHAEL BROWN

SPECIFICATIONS

Viewable Area	23 inches
Native Resolution	1920x1080
Panel Type	Twisted nematic
Color Depth	6-bit with FRC
Gray-to-Gray Response Time	2ms
Stand Positions	Height, swivel, tilt
Video Inputs	Dual-link DVI, HDMI, component

VERDICT 8

ASUS VG236H 120HZ DISPLAY

+ PHILIP GLASS	− SHATTERED GLASS
Compatible with Nvidia's active shutter glasses and associated games.	Highly reflective screen; no DisplayPort; relatively wide bezel; no portrait mode.

$500, http://usa.asus.com

MadCatz Cyborg R.A.T. 7

The most customizable mouse we've ever held

When we saw early pictures of the Cyborg R.A.T. 7 from MadCatz, we had our doubts—to say it looked "gimmicky" is a bit of an understatement. Well, we're very pleased to have been proven wrong. The R.A.T. 7's futuristic stylings aren't just for show; they're a product of a startling number of customization options and features. We're going to walk you through these features, one by one. When we're done, we think you'll understand why this is our new favorite gaming mouse.

One of the most innovative things about the R.A.T. 7 is how incredibly customizable it is. The base of the mouse is a solid steel chassis, which makes the mouse feel exceptionally solid, and lends it a not-inconsiderable amount of weight. The R.A.T. 7 comes with additional weights, which can be slotted into the back of the mouse for some extra heft. We like ours heavy, so we used a couple of the weights, although the mouse is pretty weighty all by itself. If you like a super-light mouse, you're out of luck with the R.A.T. 7.

The replaceable elements of the R.A.T. 7 are its palm rest and pinky grip. Changing out and adjusting both lets you customize the texture, shape, length, and height of the mouse. The left-side panel, which contains three of the mouse buttons, is also adjustable. By turning a knob using the R.A.T. 7's built-in Allen wrench, you can slide the whole panel forward and backward, allowing you to position the buttons perfectly under your thumb.

The R.A.T. 7 manages to stand out in features as well, delivering all of the functionality we expect from a high-end gaming mouse, and a few very handy ones the Maximum PC Lab has never seen before.

First, the standard stuff: The R.A.T. 7 has a 5,600dpi laser sensor that's exactly as precise (or imprecise) as you need it to be. The sensitivity can be adjusted on the fly (cycling between four customizable sensitivity levels) using a two-way switch located behind the wheel; a red LED meter next to the profile button shows the current sensitivity setting.

That's all well and good, but what does the R.A.T. 7 bring that's new? First, there's the thumbwheel. Although the R.A.T. 7 isn't the first mouse to integrate more than one scroll wheel, it's the first to do so in a way that's as functional as this. The thumbwheel is a big, ridged steel affair with just the right amount of tension, and it can be configured in the profile manager (clockwise and counterclockwise rotation can each be bound to a key).

The other new feature we love is the "sniper button," a nonconfigurable button on the thumb panel that reduces your mouse sensitivity (you can choose the amount) for as long as it's being held down. This addresses our biggest gripe with the traditional DPI selector button: In most games, you're not going to be sniping all the time, and in the middle of a heated firefight in Modern Warfare 2, you're not going to want to fiddle with the DPI selector every time you stop running and gunning to go for a long shot.

So, yes, this is a badass mouse. The $100 price tag puts the R.A.T. 7 at the higher end of the gaming-mouse spectrum, but you're not going to find a mouse that's more feature-packed or customizable than this. —ALEX CASTLE

MAXIMUM PC KICK ASS!

MADCATZ CYBORG R.A.T. 7

VERDICT 10

+ RATATAT	− RATTATA
Very solidly built with amazing customization options and a heavy-duty feature set.	May be heavier than some folks prefer; doesn't come cheap.

$100, www.madcatz.com

A dedicated sniping button and incredible customization options make the R.A.T. 7 our new favorite mouse.

Bigfoot Killer2100 Network Interface Card

Is the third time the charm for this gaming NIC?

When gamers gather to discuss performance issues, complaints revolve around graphics cards, CPUs, and bloated game code. Not too many gamers will pipe up and say, "Y'know, that integrated NIC on my motherboard is really costing me some frag."

Bigfoot hopes that will change with the Killer2100. In this third iteration of its Ethernet card for gamers, Bigfoot has focused narrowly on building a card that minimizes lag while maintaining maximum bandwidth.

In our discussions with the folks from Bigfoot, they were frank about their past products, noting that the first Killer NIC painted with too broad a brush. For example, few users took advantage of the Linux kernel on the K1, nor did many use the integrated BitTorrent client. While gaming-PC vendors shipped thousands of cards, hardware reviewers, ourselves included, were unimpressed.

Bigfoot's Killer2100 NIC succeeds in reducing lag—but it may not matter.

Bigfoot went back to the drawing board for the Killer2100. The actual network chip is pretty much the same, but the firmware and drivers have been tuned. The Killer2100 still bypasses the Windows network stack, but where the older products would demonstrate bandwidth reductions in their attempts to improve ping times, the 2100's bandwidth is at least a match for the best integrated NICs.

Like Killer's earlier Xeno, the 2100 is a PCI Express x1 card, but unlike the Xeno, it offers only a single RJ45 gigabit Ethernet jack. Bigfoot also includes the Killer Network Manager, which allows you to custom-tailor connection speeds, priorities, and other settings.

We popped the 2100 into a Puget Systems Serenity quiet gaming PC, which is equipped with a Core i7-870, 4GB of RAM, and an AMD Radeon HD 5850. It's not bleeding-edge, but certainly still fairly high-end. The Asus P7P55D-E Pro motherboard in the Puget comes with an onboard Realtek gigabit Ethernet chip, something fairly common in motherboards.

We loaded up three games: Lord of the Rings Online, Team Fortress 2, and Borderlands, all of which offer somewhat different experiences. LOTRO is an MMO, which optimizes for server distances when you connect. Team Fortress 2 is the classic PvP multiplayer game, while Borderlands offers an almost pure co-op gaming experience. We recorded 15-20 minute sessions with and without the Killer2100, using FRAPS. We connected to the same servers at the same time of day on the same day of the week.

In all three cases, the Realtek adapter showed very high ping peaks. The worst case was in the MMO, which occasionally hit peaks of over 1,000ms (1 second) and often hit pings over 400ms. The Killer2100 occasionally hit peak pings higher than 150ms, but those were fairly rare. LOTRO would sometimes feel less laggy with the Killer2100 during gameplay, but lag was never a glaring problem with the Realtek part. At the time we played, however, our particular server wasn't heavily loaded.

We saw similar behavior with Team Fortress 2, but the scale was much different. Sure, the Realtek NIC would hit high peaks more often than the Killer2100—but those peaks were still shy of 45ms. We noticed no subjective difference between the two parts with TF2 on a fairly busy, 16-player server.

Like LOTRO, Borderlands would occasionally hit some very high pings with Realtek, while the Killer NIC only exceeded 400ms once (keeping well below 100ms the rest of the time.) Again, though, the subjective experience between the two sessions felt no different.

The Killer2100 will be available from add-in board partners such as EVGA for about $120, as well as bundled into gaming PCs.

The bottom line is that the Killer2100 does what Bigfoot promises—lowers ping times while maintaining high throughput. But unless you're a twitchy pro gamer, you probably won't notice any subjective difference. And while the Killer Network Manager is a cool little app, we're unconvinced that the package is really worth $120. **—LOYD CASE**

VERDICT **6**

BIGFOOT KILLER2100 NIC

+ EMPIRE STRIKES BACK	− PHANTOM MENACE
Lowers ping times relative to integrated NICs; cool control app.	Won't matter for most gamers; unnecessary expense.

$120, www.bigfootnetworks.com

OCZ Enyo 128GB USB 3.0 SSD

USB 3.0 and solid state storage: two great tastes that go great together!

We've seen a few USB 3.0 external drives here at *Maximum PC*, and we do appreciate the long-overdue speed boost. It's nice to have file transfers limited by drive speed again, rather than the interface—the 33MB/s maximum was killing us. And while we appreciated the boost we got from USB 3.0 in WD's My Book 3.0 and the Vantec NexStar 3 SuperSpeed enclosure, the former was only as fast as the mechanical drive within it and the latter couldn't even match the speeds of the drives it enclosed.

It's great to have a USB 3.0 interface on a mechanical drive, but wouldn't it be nice to combine USB 3.0 with SSD? With a theoretical bandwidth limit exceeding 5Gb/s, why wouldn't you? Thankfully, OCZ did. The Enyo is a compact anodized aluminum brick stuffed with MLC NAND and a USB 3.0 SuperSpeed port.

At 5.6x12x1cm, the Enyo is longer and slimmer than a 2.5-inch drive in an enclosure—it's more the size of a slim phone. Its 128GB of MLC flash and 64MB of DRAM cache are controlled by a Barefoot Indilinx controller. So it's essentially a last-gen OCZ Vertex or Agility (or any other Barefoot drive) and a SATA-to-USB 3.0 controller in a slightly different chassis. But the last USB 3.0 device we tested with an SSD couldn't come close to a drive's bare SATA numbers. How does the Enyo stack up?

Like a boss. We tested the Enyo on our hard drive test bed's USB 3.0 ports (based on the NEC chipset) using both the latest NEC drivers and OCZ's custom Enyo drivers. Performance was about the same using both drivers, topping out near 180MB/s sequential reads and 166MB/s sequential writes. The OCZ drivers actually seemed slightly more sluggish, with random-access times bumping up to .2ms from .1ms on the native NEC drivers. We were able to write a 2.79GB test file from our rig to the Enyo in 23 seconds (or about 121MB/s), while a 660MB folder of smaller files wrote in 11 seconds (60MB/s). Not shabby at all. The Enyo is USB 2.0 compatible, of course, but you won't get more out of it than the USB 2.0 maximum of 33MB/s read and 30MB/s writes.

At $410 for 128GB—it's also available in 64GB ($230) and 256GB ($820) flavors—the Enyo is slightly more expensive than a SATA solid state drive of the same capacity, which is to say it's very expensive for external storage.

The OCZ Enyo is beautiful, fast, and very expensive. And fast.

It doesn't support TRIM (because the signals can't pass over USB 3.0) but it does have its own garbage-collection routines. It's also stupid fast.

If you have a computer with USB 3.0 and you need fast, portable, external storage (and you have a spare $400 to spend), the OCZ Enyo is the best thing going. Given the obvious benefits of combining solid state drives with USB 3.0 interface, the coming months and years will surely bring a spate of USB 3.0 SSDs, including many that will surpass the OCZ Enyo in capacity and performance. But the Enyo is hella speedy, good looking, and available today. To quote Woody Allen, "Eighty percent of success is showing up."

—NATHAN EDWARDS

BENCHMARKS

	OCZ Enyo (USB 3.0 Drivers)	OCZ Enyo (USB 3.0 NEC Drivers	OCZ Enyo (USB 2.0) Drivers)
HDTune 4.01			
Avg Read (MB/s)	**180.0**	178.5	33.3
Random-Access Read (ms)	0.2	**178.5**	0.1
Burst Read (MB/s)	182.6	**186.1**	33.3
Avg Write (MB/s)	166.3	**166.7**	29.4
Random-Access Write (ms)	0.2	**0.1**	0.4
Burst Write (MB/s)	182.9	**185.7**	33.3
4KB Read (IOPS)	5,073	**9,895**	2,067
4KB Write (IOPS)	4,800	**5,852**	2,106

Best scores are bolded. All drives tested on our hard drive test bench: a stock-clocked Intel i7-930 CPU on an Asus P6X58D Premium motherboard with 6GB DDR3, running Windows 7 Professional 64-bit, with NEC USB 3.0 controllers and drivers.

VERDICT 9

128GB OCZ ENYO USB 3.0 SSD

+ ENZO	− ENYA
Blistering-fast reads and writes; good-looking chassis; Barefoot controller.	Custom drivers are of questionable utility; not cheap.

$410, www.ocztechnology.com

HP Mini 5102

It's business time

Is "business netbook" a misnomer? Aren't business notebooks supposed to be both portable and powerful, while emitting a confident and businesslike aura? Can a netbook ever be enough for a business user? HP is one of the few companies out there betting that a netbook can be appealing to a business audience.

The HP Mini 5102 certainly looks businesslike. Its squared-off, all-metal chassis, matte-black magnesium alloy base, and brushed-aluminum lid exude a much more professional vibe than most netbooks, including HP's own consumer line. And though its base configuration hews close to the standard netbook build of this generation, HP offers a wide array of options that can turn the 5102 into something else entirely.

The model tested here has a 1.66GHz Atom N450, 1GB of DDR2 RAM, a 10.1-inch 1024x600 display, and Win7 Starter. Its 160GB HDD is 7,200rpm, which is nice. Its 6-cell battery (a $25 option), also offered notable benefits. The netbook performed to within a few percent of every other Pine Trail netbook we've tested, with the exception of battery life. In our rundown test, the Mini 5102 lasted eight hours, 10 minutes. That's half an hour longer than the previous champion. The 5102's square-key chiclet-style keyboard is spill-resistant, easy to type on, and doesn't feel mushy. One thing we don't like: the reversed function keys. To hit an actual function key, you have to hold the function button. Otherwise you'll wind up triggering the Mini's volume, brightness, or other secondary function keys. The convenience of hitting F10 to turn down the volume instead of Fn+F10 is counteracted the first time you instinctively hit F5 to refresh a page and send your computer into sleep mode.

At $425 (base price plus $25 for the extended battery), this Mini 5102 is a solid deal, if nothing to write home about. But it's the more esoteric configurations that bump up the Mini 5102's appeal—and price. Add $50 for a multitouch screen, or $25 for a 1366x768 screen res (no, you can't do both). Likewise, you can spend $45 and get the Broadcom Crystal HD video accelerator, but not if you have the $125 broadband modem. For $25, you can even boost the RAM to 2GB (but you'll also have to pay for an upgraded version of Windows). You can even swap in a 128GB SSD for an added $325, if you're so inclined. For what it's worth, we did test a model with the integrated multitouch screen, which worked fine, though we don't see much use for a touch screen on a non-convertible device. The optional $30 handle, however, is quite useful if you're sans backpack, but it does add five ounces to the netbook's overall weight.

The Mini 5102 has a lot of selling points, from the great keyboard to the good-looking (if fingerprint-prone) chassis. At the base model, it's a match for any Pine Trail netbook out there, and fully decked-out, it's considerably better. But even after you've upped the screen resolution, doubled the RAM, and added the 6-cell battery, you're still hobbled by the Atom processor and integrated graphics. A $650 netbook is hard to justify—unless, of course, you can expense it. **—NATHAN EDWARDS**

SPECIFICATIONS

Processor	1.66GHz Intel Atom N450
Chipset	Intel NM10 Express
Graphics	Intel GMA 3150
Display	10.1-inch LED-backlit TFT LCD@1024x600
RAM	1GB DDR2/667
Storage	160GB HDD (7,200rpm)
Ports	Three USB 2.0, audio in/out, SD reader, VGA, Gigabit
Wireless	802.11b/g/n, BT 2.1 EDR
Lap/Carry	2 lbs, 13.2 oz / 3 lbs, 9 oz

VERDICT **8**

HP MINI 5102

+ TK421	− 8t88
Great looks and solid construction; good keyboard; 7,200rpm HDD standard; lots of optional upgrades.	Fingerprint-prone; can get extremely expensive; weird function-key switching; can't compete with CULV ultrathins.

$425, www.hp.com

BENCHMARKS

	ZERO POINT	
Premiere Pro CS3 (sec)	708	673
Main Concept (min)	251	244
Quake 3 (fps)	60.9	56.1 (-7.9%)
Quake 4 (fps)	3.6	4.1
Battery Life (min)	255	490

0 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our zero point netbook is a Lenovo IdeaPad S12 with a 1.6GHz Intel Atom N270, 1GB of DDR2/667 RAM, a 160GB hard drive, Intel GMA950 integrated graphics chipset, and Windows XP Home SP3.

This "business netbook" starts strong and gets stronger—to a point.

Gigabyte GV-N470UD-13I GTX 470

This Fermi lite uses reference clocks, but it's no reference card

Sharp-eyed *Maximum PC* readers who care about performance will no doubt notice that Gigabyte's GV-N470UD-13I GTX 470 runs at stock reference speeds but achieves almost identical benchmark scores to last month's kick-ass overclocked EVGA GTX 470. Blame it on new drivers versus old.

To be fair, the N470UD-13I isn't exactly a stock card. While the card ships at reference clock speeds for core, shader, and memory, Gigabyte builds the board using its Ultra Durable manufacturing methods, which includes two-ounces-of-copper PCB technology, Japanese solid capacitors, high-end Samsung or Hynix GDDR5 memory, and low RDS(on) MOSFETs, which are designed to minimize switching resistance for faster capacitor charging and discharging. The PCB itself is blue, unlike many reference GTX 470 cards.

In theory, more robust components should make for an overclockable card. But we tested the N470UD-13I at the rated (reference) clocks, because that's the way the card ships. We used Nvidia's Release 256 drivers, which dropped just as we were launching into our testing. These drivers offer some performance enhancements, but also add Blu-ray 3D support, new setup controls for multi-GPU, and OpenGL 4.0 support.

Gigabyte's GTX 470 hammered the Radeon HD 5850, while trading wins with the reference-clocked HIS Radeon HD 5870. At its roughly $360 price point, this particular GTX 470 is priced well against the competition, as most Radeon HD 5850s still cost a little more than $300, while the HD 5870s go for close to $400.

Gigabyte also includes Nvidia's Supersonic Sled and Design Garage demos. Unlike past Nvidia demos, these are highly interactive. Launching the Supersonic Sled in high-arc trajectories is entertaining in its own right.

Included in the box are the usual set of accessories—power adapter cable, DVI-to-VGA adapter, and SLI connector. Gigabyte also tosses in a 1.5 meter Mini-HDMI-to-HDMI cable (not just an adapter.) That's handy for connecting to HDMI-equipped monitors.

As with other Fermi products, the Gigabyte card does draw more power at full throttle than its competition. At idle, our test system drew 142 watts, dead even with the same system running a Radeon HD 5850. At full throttle (defined as the Unigine Heaven 2.0 demo running at 2560x1600 with 4x AA), the system pulled down 324W with the GTX 470, compared to the 261W drawn by the HD 5850.

Overall, Gigabyte's GV-N470UD-13I delivers solid performance at a decent price. While we wish it drew less power, we're compelled to point out that the overall difference in power cost over a year is only a few dollars at worst. Given Gigabyte's more robust manufacturing techniques, you can probably expect decent overclockability or a reasonably long life span from this version of Fermi lite. **—LOYD CASE**

BENCHMARKS

	Gigabyte GV-N470UD-131 GTX 470	Asus Radeon HD 5850	HIS Radeon HD 5870
Unigine Heaven 2.0 (fps)	**24**	14	17
Battle Forge (fps)	**50**	40	47
Dirt 2 (fps)	71	62	**72**
Far Cry 2 / Long (fps)	**83**	65	75
Far Cry 2 / Action (fps)	**68**	54	63
Tom Clancy's HAWX (fps)	85	76	**89**
Crysis (fps)	24	27	**32**
DX11 Aliens vs. Predator (fps)	26	25	**30**
Just Cause 2 Concrete Jungle (fps)	**38**	32	36
STALKER: Call of Pripyat (fps)	32	30	**36**

Best scores are bolded. Our test bed is a 3.33GHz Core i7-975 Extreme Edition in an Asus P6X58D Premium motherboard with 6GB of DDR3/1333 and an 850TX Corsair PSU. The OS is 64-bit Windows Ultimate. All games are run at 1920x1200 with 4x AA.

MAXIMUM PC KICK ASS!

VERDICT 9

GIGABYTE GV-N470UD-131 GTX 470

+ UNOBTANIUM	− BALONIUIM
Excellent performance; reasonable price; card will fit in most cases; Mini-HDMI adapter cable.	Draws a lot of power; noisy at full throttle; costs more than a Radeon HD 5850.

$360, www.gigabyte.com

Gigabyte builds robust components into its take on Nvidia's GTX 470.

Crucial C300 256GB SSD

A new land-speed record—for sequential reads

The Crucial C300 tops 300MB/s in sequential reads, but can its write speeds keep up?

It's about damn time. 6Gb/s SATA is old news now. It's been half a year since we saw the first 6Gb/s SATA–enabled hard drive, and it was a frickin' mechanical drive. Talk about unnecessary. Solid state drives, on the other hand, have been bumping at the ceiling of 3Gb/s SATA's available bandwidth for a while now. So why not slap a 6Gb/s SATA controller on a solid state drive? Duh. Crucial, apparently alone among flash memory vendors, heard the call. Thus, the Crucial C300, a 6Gb/s SATA–enabled SSD that comes in 128GB and 256GB flavors.

But does the C300 actually benefit from a 6Gb/s SATA connection? Yes and no. In sequential read tests, it blows every other drive out of the water, with a maximum sequential read speed of 317MB/s and an average read of over 300MB/s! That's more than 50 percent faster than the SandForce-based drives, like OCZ's Vertex 2, that comprise our favorite SSDs and typically top out at around 200MB/s read speeds. On a standard 3Gb/s connection, the C300's read speeds were a still-impressive 222MB/s—about the same as a Barefoot Indilinx-based drive, like the Patriot Torqx or Corsair Nova.

Unfortunately, write speeds are a bit of a mixed bag. Initial sustained write speeds looked promising, but the drive started showing decreased performance quite rapidly—which should have been fixed after the drive was zeroed, but wasn't. Average sustained write speeds at 3Gb/s were nearly 200MB/s, but only 171MB/s on a 6Gb/s SATA port. And it got worse the more we tested. This seems to be a firmware problem, but as of press time we were running the latest firmware. It's worth noting that even 171MB/s sustained writes aren't bad—after all, that's on par with last year's Barefoot drives, which are still damned good SSDs.

Random reads in HDTune were in the 7,000 IOPS range—respectable, but nothing special. HDTune write IOPS of just 2,500, though, left us unimpressed. So we turned to IOMeter, which we haven't used for a while, but which seems to be the industry standard for SSD random write speeds. And since we've finally got a working, stable hard drive test bed with both USB 3.0 and 6Gb/s SATA (more on this in this month's Lab Notes section), which we'll be sticking with for the foreseeable future, we took the opportunity to reintroduce the benchmark. We're running a 4KB random write pattern at a queue depth of 32—pretty standard stuff. It doesn't give the same numbers as HDTune (to nobody's surprise), but it's a good second data point. At 6Gb/s SATA, the C300 put out 12,425 IOPS, and 8,760 at 3Gb/s. By contrast, the OCZ Vertex 2 (running SandForce's "Max IOPS" firmware) blazed through at 48,958.

There's no question that on a 6Gb/s SATA port, the Crucial C300 has by far the fastest read speeds we've ever seen. And on a 3Gb/s port, it's nothing to sneeze at. But for sequential and random write speeds, it can't touch SandForce drives. And its current firmware's instability is worrisome, though we have faith that Crucial can fix the problem. But hey, 300MB/s reads. So cool. If your rig has 6Gb/s SATA ports, and random writes aren't your biggest concern, prepare for the ride of your life. **—NATHAN EDWARDS**

BENCHMARKS

	Crucial C300 (6Gb/s)	Crucial C300 (3Gb/s)	OCZ Vertex 2 (3Gb/s)
Capacity	256GB	256GB	100GB
HDTune 4.01			
Avg Read (MB/s)	**302.9**	222.7	196.3
Random-Access Read (ms)	.1	.1	.1
Burst Read (MB/s)	215.6	172.8	**228.0**
Avg Write (MB/s)	171.2	199.8	**221.9**
Random-Access Write (ms)	.1	.1	.1
Burst Write (MB/s)	**222.4**	172.2	207.5
4KB Read (IOPS)	7,825	7,133	**11,045**
4KB Write (IOPS)	2,500	2,573	**10,066**
IOMeter Random-Write IOPS (4KB, Queue Depth 32)	12,425	8,760	**48,958**
Premiere Pro (sec)	350	**342**	359
PCMark Vantage HDD	**41,362**	35,507	39,309

Best scores are bolded. All drives tested on our hard drive test bench: a stock-clocked Intel i7-930 CPU on an Asus P6X58D Premium motherboard with 6GB DDR3, running 64-bit Windows 7 Professional. All 3Gb/s tests performed using latest Intel ACHI drivers; all 6Gb/s tests use onboard Marvell 9123 6Gb/s SATA controller with latest drivers.

VERDICT **8**

CRUCIAL C300 256GB SSD

+ CRUX	− CRAPS
Fastest read speeds ever; decent write speeds.	Random writes can't touch SandForce drives; write-speed slowdowns after use.

$750, www.crucial.com

Warpia Wireless USB PC-to-TV Audio/Video Display Adapter

Ultra Wide Band finally delivers something good

Our first experience with Ultra Wide Band technology left us decidedly unimpressed. Gefen's UWB-based Wireless USB Hub (http://bit.ly/dBQbKm) was both overpriced and uninspiring (who wants to pay $400 for a limited-range USB hub?).

Fortunately, we're feeling more encouraged about UWB's prospects after spending time with Warpia's poorly named but pleasant-to-use Wireless USB PC-to-TV Audio/Video Display Adapter. The, umm, Wireless USB AV adapter is simple to install. Just plug one end into a USB port on your PC, and the other end into your TV via HDMI. (The unit has VGA and 3.5mm analog ports, as well.)

The adapter will then beam both the video and audio streams (a version without audio support costs $40 less) to a distance of up to 30 feet. The device is capable of streaming up to 1440x1050 resolution, although Warpia recommends that you stream video at 1280x720. The TV is treated as a second monitor hooked up to your PC, but you can also clone or just turn off your primary monitor if you want to. The device works in the 3.1GHz to 4.7GHz range and is intended for in-room use with mostly unobstructed line of sight, so don't expect to watch video in your lead-lined safe room.

There is some compression applied to the stream, which you'll notice on more pristine source material. For those who just want to view already piss-poor viral videos, this won't be a problem. But you will definitely notice it on any of the HD streamed content from Vimeo, YouTube, or Netflix. So, temper your expectations or just build that HTPC instead.

Overall, the Warpia AV adapter is surprisingly satisfying. It's a cheap way to stream video, albeit of marginal quality, but hell, if you wanted to do this with a notebook, you'd either have to buy a $1,000 Gefen 1080p streamer or invest in Intel's Wireless Display technology. WiDi, as it's called, requires a current-generation laptop and another $100 for the TV Adapter. That makes the Warpia AV adapter a fairly compelling piece of hardware if you can swallow its limitations. **–GORDON MAH UNG**

VERDICT 8

WARPIA WIRELESS DISPLAY ADAPTER

+ GHOSTBUSTERS	– GHOSTBUSTERS II
Very affordable and simple to operate.	Limited to 30 feet in range; displays noticeable compression artifacts.

$160, www.warpia.com

Streaming audio and video has never been so easy or cheap.

Adobe Lightroom 3

Enhanced performance and new killer features make this a must-have app

Lightroom is tailored for photographers who often don't need or want the robust image-manipulation tools offered by the pricier Photoshop. From its outset, Lightroom presented photographers with a logical, clean workflow that facilitated photo improvements rather than alterations.

Lightroom 2 added 64-bit support and some refinements—welcome, certainly, but the second version didn't seem like much more than an incremental update. Lightroom 3, on the other hand, adds a couple of killer features—lens correction and improved noise reduction, namely—that really boost its worth.

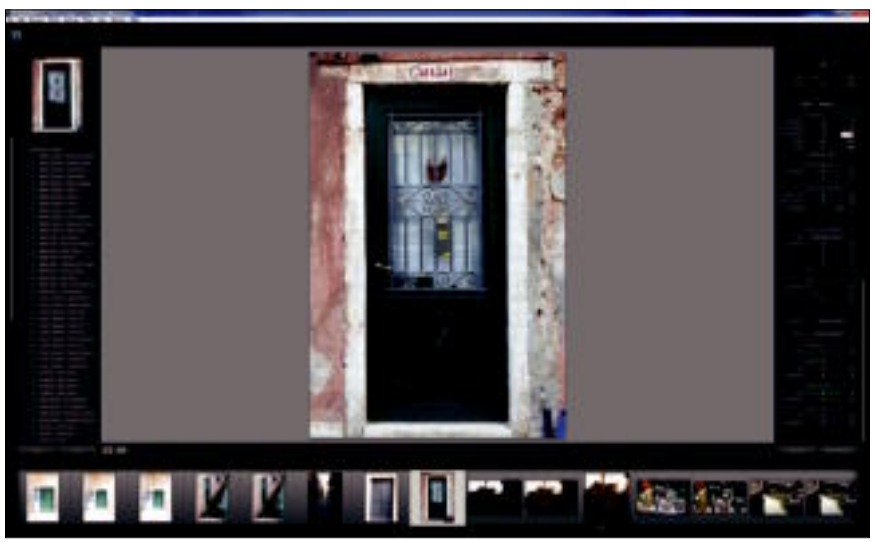
While Lightroom 2 offered limited versions of lens correction and noise reduction, Lightroom 3 takes that capability to the next level. First, the app offers profile-based lens correction for owners of Canon and Nikon professional lenses. It also incorporates the entire set of Sigma lenses. So if you're shooting with a wide-angle zoom that may have issues with barrel distortion, Lightroom can automatically correct it. You can even build profiles for your own lenses, if you've got the patience, by using Adobe's Lens Profile Creator (http://bit.ly/bsOKDY).

Auto-correcting for lens problems is one thing—what's even cooler is altering lens settings yourself. We took a photo of a door in Venice, Italy. The shot was a little off-center, and the lens axis wasn't perpendicular to the plane of the door. A few tweaks with the lens correction transform tool, and it looked much better. A little more time, and the image could have looked like it was shot from a camera mounted on a tripod and set up with a plumb bob and protractor.

You can, of course, also add lens distortion—for example, to achieve that barrel-distortion effect from fisheye lenses—if you're going for a certain aesthetic.

Adobe spent considerable time tweaking Lightroom's noise-reduction capabilities as well. Earlier versions had noise correction, but the results were often poor, particularly with high-ISO images. We would often use third-party noise-reduction filters in Photoshop to clean up images shot in poor lighting at high ISOs.

We took an image shot at ISO 3200 on a Nikon D300 and tweaked noise levels in Lightroom 3. The overall impact was dramatic—and that was just a quick-and-dirty setting, where we pushed luminance and color noise settings to 50 percent.



Lightroom 3's improved lens-correction capability lets you straighten out photos, such as this image of a door, which was off axis originally.

Noise correction for high-ISO images is greatly enhanced over Lightroom 2.

Of course, Adobe added other features, too. One of Lightroom's past strengths has been support for output to photo printers. Lightroom 3 gives you even more control over this, with flexible multi-image print layouts. If you've got a 13x19-inch printer, you can lay out multiple images onto a single sheet, either for a collage or to trim into separate photos.

If you find yourself having to build slide shows for others, you can create them in Lightroom and then export them into PDF format, as a set of JPEGs, or into a video file in MP4 format. You can even add music (for video export or playback directly in Lightroom), but there's no automated Ken Burns–style panning or zooming effects.

Performance in Lightroom 3 also seems improved—particularly cataloging performance. Lightroom built a catalog from a 24GB set of images in a little more than a minute. Our entire set of photos (nearly 400GB) was successfully cataloged in about 10 minutes. This is actually a first, as Lightroom 2 would always crash trying to build this massive catalog.

There are still issues left unresolved. Multiple-catalog support is still annoying—Lightroom closes and reopens itself if you switch catalogs. The app also still supports only two displays, and that second display offers limited capability. We'd love to have more flexible support for dual displays, or even three or more monitors.

Still, it's likely that Lightroom 3 will finally replace Adobe Bridge as our workflow solution of choice. It's easier to use, the new features offer interesting new options, and the improved output capabilities are genuinely useful.

—LOYD CASE

MAXIMUM PC KICK ASS!

VERDICT 9

ADOBE LIGHTROOM 3

+ ANSEL ADAMS	− RON GALELLA
Lens distortion correction; great noise reduction; improved performance; better stability.	Video capability limited to catalog only; current social media features pretty lame.

$300, www.adobe.com

PC Tools Internet Security 2010

Light on features, heavy on protection, and priced just right

It's been almost two years since we last looked at a security product from PC Tools—PC Tools Antivirus Free Edition (http://bit.ly/9uMtkM)—and the experience left such a bad taste in our mouths that we knew exactly how Will Ferrell felt when he was forced to lick a pile of white dog doo-doo in the movie *Step Brothers*. Yes, it was that bad.

This time around, the experience was measurably more palatable, which is to say it was a lot less like eating dung and more like ordering from the value menu. At $50 for a one-year license, PC Tools will protect up to three PCs and ranks as one of the more affordably priced security suites we've dined on this year. If your Google-fu is up to snuff, coupon codes abound, knocking the price down by as much as 30 percent. That comes out to only $35, folks, making this the poor man's security suite. As such, PC Tools stuffs a comparatively meager feature-set into the box, consisting of an antivirus scanner, spyware module, anti-spam controls, and a firewall. Noticeably absent are some of the side entrees other security vendors embellish their AV suites with, including parental controls, file shredders, identity safeguards, cloud storage, and various other garnishes.

Given how poorly it performed in the past, we braced ourselves for the worst, especially when the program implored us with a pop-up to disable Windows Defender—no other security suite has ever asked us to do that. But unlike last time, PC Tools didn't cower in the corner when we dumped a dirty archive onto our test bed's desktop. Instead, PC Tools identified all of our contaminated files, and passed our synthetic spyware (www.spycar.org) and virus (www.eicar.org) tests with flying colors. It also did a serviceable job at warning against and blocking us from visiting booby-trapped websites. From strictly a protection standpoint, PC Tools certainly has the muscle to keep malware at bay.

Not a whole lot of changes were made to the UI, but underneath the hood lies a vastly improved scan engine.

What it doesn't have is a sprightly scan engine. A full scan took a little more than 13 minutes, which isn't egregious, but subsequent scan times barely improved, plodding along at nearly 10 minutes to sweep through our hard drive on a second run. To put that into perspective, Comodo, our current speed champion, bolted through a subsequent scan in just one minute, 11 seconds. The trick is in caching files that haven't changed or are otherwise deemed safe, and PC Tools' performance in this area is merely average.

Out of the box, PC Tools comes ready to rock and doesn't require much, if any, tinkering. Should you want to tailor the suite to your liking, drilling down to the advanced settings takes just a couple of mouse clicks and most of the knobs and dials are clearly labeled. We're especially impressed with the firewall, which monitors both inbound and outbound traffic and lets you adjust settings for each of those individually by application. There's also a Game Mode, which suppresses pop-ups and other interruptions when using your PC in full-screen mode.

PC Tools has improved by leaps and bounds over where we last left off and is a good overall option for full-fledged security on the cheap. **–PAUL LILLY**

BENCHMARKS

	PC Tools	Avira	MSE	Norton	ESET
Scan 1 (min:sec)	13:09	**6:37**	16:56	16:18	7:45
Scan 2 (min:sec)	9:53	**3:12**	16:56	4:47	7:43
PCMark	5,224	**6,093**	5,622	5,760	6,067
Boot (seconds added)	+7	**+6**	+9	+18	+12

Best scores are bolded. Our test bed is a Core 2 Quad Q9400, 8GB DDR2/800, a Seagate Barracuda 320GB 7200.10 (~60GB filled across two partitions), a Radeon HD 3650, and Windows 7 Professional 64-bit. The reviewed app is compared to the top-performing apps from our AV showdown in the May 2010 issue (http://bit.ly/cB6sqN).

VERDICT 7

PC TOOLS INTERNET SECURITY 2010

+ GREEN JACKET	– STRAIGHT JACKET
Very low cost and fairly effective at catching malware.	Disables Windows Defender; mediocre scan performance.

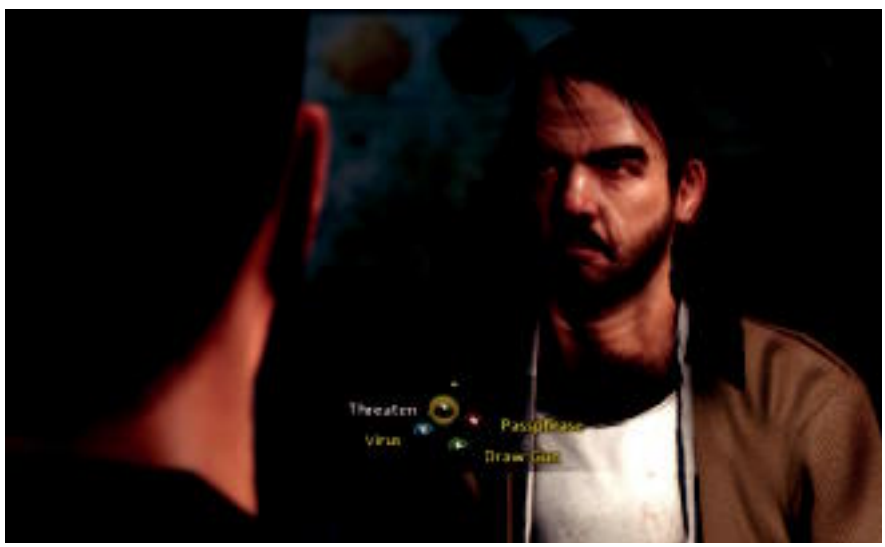
$50 (1 yr, 3 PCs), www.pctools.com

Alpha Protocol

The spy who almost loved me

Let's say someone's just given you a jack-in-the-box. He then motions for you to crank the handle, so you give it a whirl. Round and round it goes until—*boom*—out comes a platter with the world's most delicious cake on it. Awesome! Before long, you want more cake, so you crank the handle again—only this time, a fist rockets out and punches you right in your cakehole. You try again. Another fist. Again. Fist. But then, finally, cake.

That's Alpha Protocol in a nutshell. More often than not, the game rewards your efforts with a frustrating menagerie of awful design choices and glitch-ridden combat. But every once in a while, everything comes together, and you get a tiny, shimmering glimpse of what it might feel like to actually be James Bond or Jason Bourne.



Don't pay attention to the screenshots with explosions and gunfire. This is the fun part.

Alpha Protocol casts you as wise-cracking superspy Michael Thorton. However, unlike other so-called "espionage" games where you're not stepping into a secret agent's shoes so much as you are taking the reins on their trigger finger, Alpha Protocol gives you complete control over Thorton's actions. You sweet-talk potential informants, you cut deals with crafty terrorists, you seduce every pretty lady you come across. In this respect, Alpha Protocol truly succeeds. And as the game progresses, your choices shape everything from the plot to characters' opinions of you to your stats and abilities. With this in mind, the game's conversation system—which gives you only a few seconds to choose your responses—makes other choice-based RPGs seem stilted and awkward compared to Alpha's tense verbal sparring matches.

Alpha Protocol's take on the subtle art of infiltration ranges from serviceable to downright frustrating, and—wouldn't you know it?—makes up the majority of the game. On paper, it's a fascinating fusion of RPG and shooter tropes, but in action, the two mash together with all the grace of a high-speed car wreck. See, everything you do—from shooting to hiding behind walls—is based on behind-the-scenes dice rolls. So yeah, it may look like you squeezed off a skull-shattering headshot, but actually, you missed. Why? Math. It's like elementary school all over again, only it makes even less sense.

Worse still, the enemies in the game are psychic savants. On the one hand, they regularly run face-first into each other and—upon seeing you—often turn and open fire in the opposite direction. But on the other, if one enemy catches even a glimpse of your pinky toe peeking out from around a corner, every guard in the entire building suddenly knows you're there. This, when combined with the game's tendency to suddenly spawn enemies out of nowhere, makes stealth an option reserved only for players willing to memorize enemy placement and spawn points. And even then, an enemy might see you through a wall and make your whole plan worthless.

Games of hide-and-go-seek with Thorton tend to be, for obvious reasons, short-lived.

It's a shame, too, because some of the game's unlockable abilities and specializations are really interesting, as is customizing guns and armor. At the end of the day, though, bells and whistles don't mean squat if they're attached to a broken bicycle. It breaks our hearts, because there really is a lot to love in Alpha Protocol. Sadly, for every one thing the game gets right, it gets many others wrong. The question, then, is this: How many punches to the face are you willing to take for a bite of that cake? **–NATHAN GRAYSON**

VERDICT **6**

ALPHA PROTOCOL

+ GOLDENEYE	– SPY KIDS
Fast-paced, fascinating conversations; tons of customization and cool abilities.	Glitchy, inconsistent stealth and combat; uneven enemy AI; annoying minigames.

$47, www.sega.com/alphaprotocol, ESRB: M

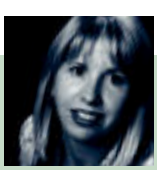
LAB NOTES

Dream Machine's Dual History

Throughout the years, multiproc configs have figured prominently

GORDON MAH UNG
SENIOR EDITOR

If you've been reading *Maximum PC* since it's beginning, you'll know that this isn't the first dual-processor Dream Machine. Far from it, in fact. I looked back over all 15 Dream Machine issues (there have actually been 19 DM models in total, including this year's) to see how many relied on two processors. Turns out there have been five DP rigs—the 1998 machine had a DP board but only one 400MHz Pentium II in it. The first true DP DM came in 2000, and featured—wow—dual 1GHz Pentium III chips. Those chips weren't even rated to run in SMP but they worked fine. The next two were Dream Machine 2001, featuring dual 1.2GHz Athlon MP chips, and Dream Machine 2005, with dual 2.2GHz Opteron 275 CPUs. The year 2008 saw Dream Machine equipped with dual 3.2GHz Core 2 Extreme QX9775 procs. Interestingly, I suspect that Dream Machine 2010 has more computing power than all of those machines combined.



KATHERINE STEVENSON
DEPUTY EDITOR

Reviewing iBuypower's Armada Touch MT20X made me realize how impractical multitouch is on a conventional laptop for most everyday chores. As long as the physical keyboard is still the primary means of interfacing with the device, it doesn't make a lot of sense to retrain yourself to perform just a select set of functions on the touch screen.

ALEX CASTLE
ONLINE MANAGING EDITOR

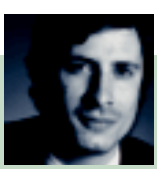
Last week I spent an entire night camped out in front of the mall, surrounded on all sides by the Apple-loving *enemy* for a chance to be one of the first to get my hands on an iPhone 4. Why would I do such a thing? These are the sacrifices I make for you, readers, so you might have the timeliest of reviews on MaximumPC.com.

MICHAEL BROWN
REVIEWS EDITOR

The 23 Ethernet drops I had installed when I built the home we call Maximum PC Lab North came in handy as I was testing all-in-one PCs for this month's roundup. I benchmarked one rig on the kitchen counter, two on my wife's desk, a fourth at the wet bar, and another in the laundry room. My wife is extremely tolerant.

GEORGE JONES
EDITOR-IN-CHIEF

I've been testing two interesting mobile devices. The first, the HTC Incredible, is a peppy Android smartphone. After years of using a Blackberry, I'm intrigued by the apps, the performance, and the multitasking environment. The second, Nokia N900, feels like a small piece of unobtanium. The Linux-based Maemo OS is malleable, and the 600MHz ARM Cortex 8 CPU is overclockable up to 850MHz. Full report to come.



NATHAN EDWARDS
SENIOR ASSOCIATE EDITOR

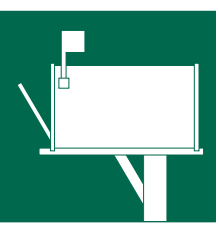
For some reason, we couldn't get good RAID 0 performance on the Dream Machine from our two SSDs via the SR-2's onboard Intel RAID. Since we didn't have a spare PCI-E slot for an add-in RAID card (we couldn't drive our sweet, sweet speakers with onboard audio), we opted to run a single Vertex 2 for our boot drive and to run games and other programs on the other.

We tackle tough reader questions on...

Display Calibration Settings

IPv5

Faygo Fan Speaks Out



Are All TV Controls Useless?

Your "Display Myths Shattered" article in the August issue was informative. It's always nice to see something that tells me a lot I don't know, especially when it isn't new tech. The part about the motion smoothing hit home, as I had trouble with an option called "Digital Clear Motion." It was supposed to help with games, but all it did was cause a severe audio/video synch problem on inputs. But I'd be careful about saying controls are useless. Of the ones you named on page 66, some of them may not be of benefit, but I suspect some of them may adjust color temperature, which can be important if properly done. The names may just be user-friendly. And others may provide subjective improvements. One, the Blue Only Mode, can presumably be used for optimizing Hue and Chroma. Otherwise, you need a blue filter. This is something referenced on two respected calibration discs that I've used.

Oh, and thank you for not saying that sets should be professionally calibrated. It might be true, but I find it offensive that a brand-new set costing thousands should require that right out of the box, at a cost of several hundred more.

—Mike Sock

Author Dr. Raymond Soneira Responds: The controls that I mention as useless shouldn't be there as consumer controls. In fact, high-end professional studio monitors don't have these controls either, except for a couple for pros to use with instrumentation. The Blue Only Mode that you mention was great for techs to use for adjusting CRT analog displays but is unnecessary for digital displays and will actually result in an incorrect calibration if the primary chromaticities or the Gamma Transfer Function are not per the Rec.709 standard. In my opinion, HDTVs should arrive accurately calibrated from the factory with no user adjustments needed other than setting the backlight brightness (for LCDs) and maybe a personal preference setting of the Color Saturation control. If people had to tweak and tune-up a brand-new car they would be furious—the same should apply for HDTVs.

Isn't Boxee Open Source?

I was reading your HTPC article (August) and I agree with most of what you said, except for a small part on page 38, where you said, "Boxee is a closed-source variant." I have to point out, in the name of clarity, that Boxee is, in fact, open source. I even verified it with a team member of Boxee via email some time ago. The Teiresias platform is open source.

—Allen N.

Senior Associate Editor Nathan Edwards Responds: Most of Boxee's code is open source, including its application framework and the core media playback software (which is a fork of the open-source XBMC). Boxee does release most of its source code under the General Public License and encourages developers to develop plugins using its application framework. But the Boxee executable code does contain proprietary and closed-source code (specifically libboxee, the social networking part of the program, which is what makes Boxee Boxee), and as such is not considered fully open source.

Revisiting the M11x

I just checked on the Dell India website and found out

CUTCOPYPASTE

▶ In the August issue, we mistakenly identified the AMD processor at the core of our Home Theater PC build as an AMD Athlon II X4 640e. The actual processor is AMD's Athlon II X4 610e.

NOW ONLINE

The iPhone 4, Reviewed

The iPhone 4 release was a little too late to make it into this issue, but that hasn't stopped us from posting an exhaustive review online. If you want to know if Apple's latest smartphone is the new king of the pocket-computer hill, check it out: http://bit.ly/bAEAZx.

that the Alienware M11x now has Intel core ix processors and Nvidia Optimus graphics. You just reviewed the notebook in July, so I was wondering if you will publish another review. I really hope you do because I'm sure it would perform much better. Since one of your problems was that the notebook had the "old-style" graphics switching and that it didn't perform very well in everything except for games with the Core 2 Duo, I think it might manage a 10/Kick Ass verdict.

—Jay Vaidya

Deputy Editor Katherine Stevenson Responds: I agree with your assessment that the more streamlined Optimus graphics technology and better processor likely make the M11x an even stronger machine. It's possible I will evaluate a new config of the M11x in the future, but it isn't likely to happen soon. There are simply too many other new notebooks that haven't been reviewed at all that we need to get to first. Plus, it would be unfair to other vendors whose notebooks I didn't revisit and re-verdictize once their configs were updated.

Don't Dismiss Faygo!

I've been reading the magazine for eight years. I'm a fan of the quirky juxtapositions that give name to the positives and negatives in product reviews. But your associating Faygo with the minuses in a review (July 2010, pg 84, "(+) 7-UP, (-) Faygo") is both offensive and an inaccurate analogy. Here in Michigan we're proud of Faygo. It's a Detroit company and is a little guy hanging in there versus the big boys of its industry. Beyond that, using Faygo as a counterpoint to 7-UP is inaccurate. Faygo is an entire line of products. It would have been more appropriate for your analogy to be something like, "(+) Faygo, (-) PepsiCo" (which nobody would argue with) or perhaps "(+) 7-UP, (-) Sprite" since those two are direct taste competitors (a competition where Sprite always has been the poser to 7-UP).

—David Romas

Senior Associate Editor Nathan Edwards Responds: I bear no ill will toward the Faygo line or to the fine metropolis of Detroit. Its use as a negative was based on a thoughtless correlation between Faygo and another Detroit export that has adopted the drink as part of its shtick. The corrected plus/minus for that article should read (+) Magnets, (-) ICP.

What Happened to IPv5?

I just read the interesting article on IPv6 in your July issue (White Paper). Sounds like a soon-to-be-necessary step up from IPv4. But I was wondering throughout the entire read: What happened to IPv5? Why the jump from 4 to 6? Was there ever a v5, or are these guys' math skills subpar?

—Steve G

Reviews Editor Michael Brown Responds: In the 1970s, researchers developed an experimental protocol for transmitting voice and video over the Internet. They dubbed it Internet Stream Protocol (ST), and it was unofficially considered to be IPv5. Development work on ST was eventually abandoned, however, and it never became an official Internet protocol. The successor to IPv4 was officially named IPv6 in order to avoid any confusion with the abandoned ST protocol.

One More (Bad) Upgrade for the Road

It was my first home-built PC, back in the day. A 486 DX 33 powerhouse. In my eagerness to put together my Christmas present, I failed to double-check all the wires prior to turning it on for the first smoke-test. I turned it on, but BIOS didn't see a hard drive. So I turned it off and checked my wires. By mistake, I'd flipped the IDE cable over AND shifted it one set of pins down from where it was supposed to be. I reset the cable and powered up the machine again. It started, but I ended up having to split the drive into about four partitions, two of which were 100% bad spots, for DOS to even recognize the drive.

—Charles Moore

LETTERS POLICY Please send your questions and comments to comments@maximumpc.com. Include your full name, city of residence, and phone number with your correspondence. Letters may be edited for space and clarity. Due to the amount of mail we receive, we are unable to respond personally to all queries.

NEXT MONTH

COMING IN

MAXIMUM PC's PLEASE LET IT BE THE SWIMSUIT EDITION

OCT ISSUE

Essential PC Skills

We detail more than 20 valuable skills every power user should possess. Your PC cred will be affirmed or sent packing by this story!

Motherboard Shootout

The Maximum PC Lab is torture-testing the latest batch of AM3 and X58 motherboards. Next month we'll deliver the results.

The Power Users Guide to Android

In addition to being an interesting counterpoint to the iPhone, Google's emergent mobile platform is incredibly malleable. We're going to show you how to bend this new mobile OS to your will.

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GAMING MOUSE

Mad Catz R.A.T. 7

It's not that often that something in the field of gaming peripherals takes you totally by surprise, and when it does, it's frequently a gimmick or too off-the-wall to be taken seriously. The R.A.T. 7 might look a little odd, but it's the real deal. Between its original shape, customizable to fit any hand, excellent sensor and button selection, and exciting new features, the R.A.T. 7 is the first mouse in a long time to get us really excited. See the full review on page 80 or check out the extended review online at http://bit.ly/dtgtXD.

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Capacity Hard Drive
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www.wdc.com

Performance Storage
OCZ Vertex 2 100GB SSD
www.ocz.com

DVD Burner
Samsung SH-S223
www.samsung.com

Blu-ray Drive
Plextor B940SA
www.plextor.com

Full-Tower Case
Corsair 800D
www.corsair.com

30-Inch Display
NEC LCD3090
www.nec.com

Speakers
Bowers & Wilkins MM-1
www.bowers-wilkins.com

Games we are playing

Assassin's Creed II
www.pixelassassination.com

The Settlers 7: Paths to a Kingdom
http://thesettlers.us.ubi.com

Mass Effect 2
www.masseffect.bioware.com

Battlefield: Bad Company 2
www.badcompany2.ea.com

For even more Best of the Best entries, such as more speakers and budget components, go to www.maximumpc.com/best-of-the-best.

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