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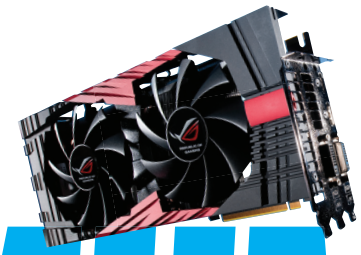

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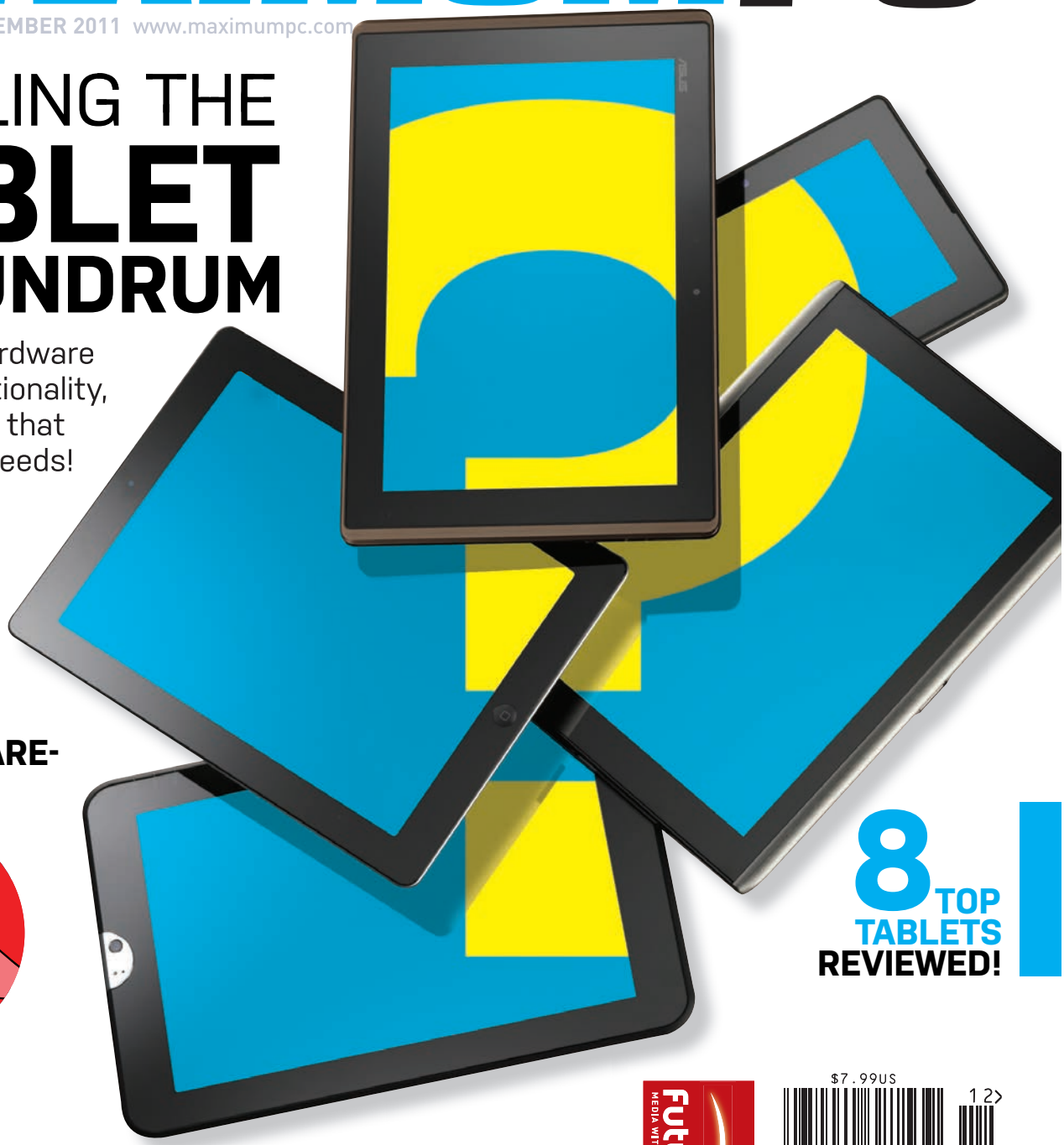

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8 TOP TABLETS REVIEWED!

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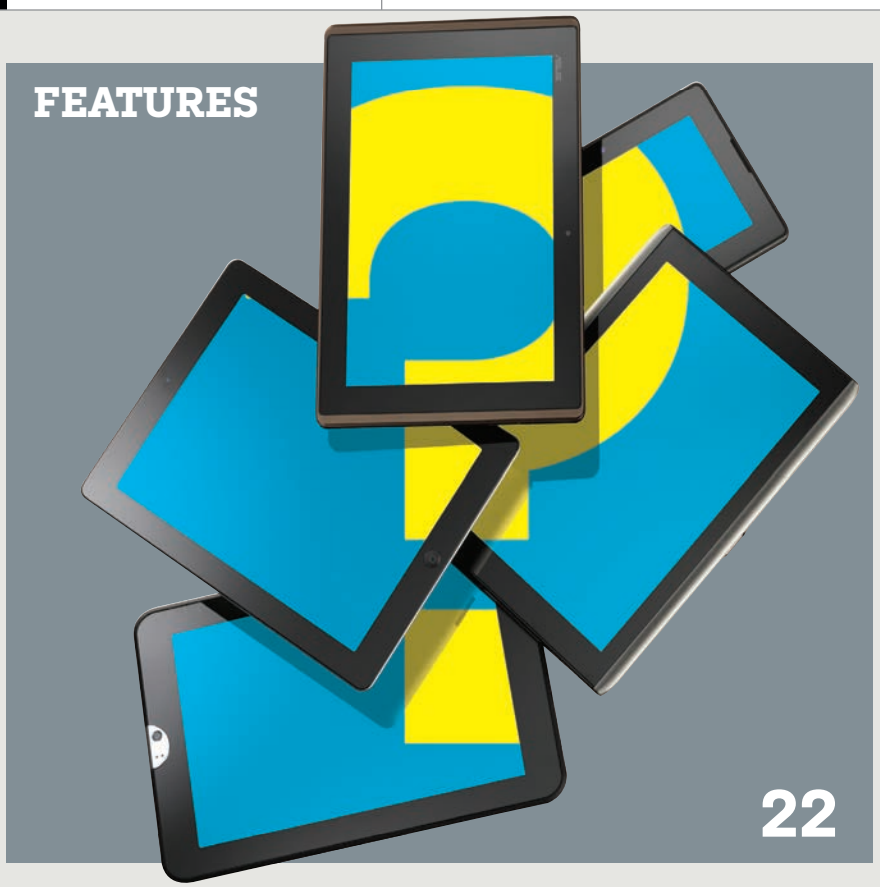
FEATURES



QUICKSTART

ATI Radeon HD 6990

R&D

LETTERS

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4000 Shoreline Court, Suite 400, South San Francisco, CA 94080
Tel: 650-872-1642, www.futureus.com

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Gordon
Mah Ung

GORDON GOES TO APPLE

THERE IS AN ANCIENT Vulcan proverb that says, "Only Nixon could go to China."

Well, I'm going to say something I never thought I would: Apple's iPad 2 offers a superior experience to many of today's tablets using Google's Honeycomb OS. In hardware? Certainly not. In fact, the iPad 2's hardware is clearly *inferior* to that in several of the Honeycomb tablets in this month's cover story—in camera quality, screen quality and resolution, memory card support, GPU, and a number of other areas.

What I'm referring to is the smooth-as-butter interface of the iPad2 that glides along seamlessly without fail. Part of that is a sleight of hand, where Apple would rather sacrifice functionality such as true multitasking to give you a smoother experience. For example, I've been testing a Samsung Galaxy 10.1 for a few weeks now, and while it is generally responsive and smooth, occasional hiccups and lag immediately tell my eyes that it's not as smooth as the iPad 2. That's despite the fact that Tegra 2-enhanced games on the Galaxy look far better than anything I've ever seen on the iPad 2. But what good is that if a jerky lag when switching from a game to the superior browser on a Honeycomb tablet breaks the illusion of smoothness?

That's a topic Intel has been pushing of late: How to measure what people perceive as performance. Intel says that with just a few tweaks to the OS in response and memory bandwidth, it can make an Atom-based tablet seem as fluid as the iPad 2. The company has even built fancy rigs that video how tablets respond to touch to try to generate metrics that it can present to OS makers on how to enhance the user experience. Interestingly, Intel says that the classic minimum frame rate of 60fps for games also applies to tablets.

The upshot is that while the hardware behind Honeycomb tablets has surpassed the iPad 2's, the user experience still ain't there, folks. What's crazy is that there's a company that already understands that a smooth UI is the path to beating Apple's iPad 2 experience: Microsoft. I'm not a Windows 7 phone user, but I've been impressed by its gracefully smooth interaction. Almost, like, well an Apple mobile device—it's no surprise that multitasking wasn't included with Windows 7 Phone initially. But what happens if you take Windows 7, err, 8, and drop that smooth-as-butter experience onto a tablet? You'll have something that I haven't seen yet on a Honeycomb.

Gordon Mah Ung is Maximum PC's senior editor, senior hardware expert, and senior all-around muckraker.

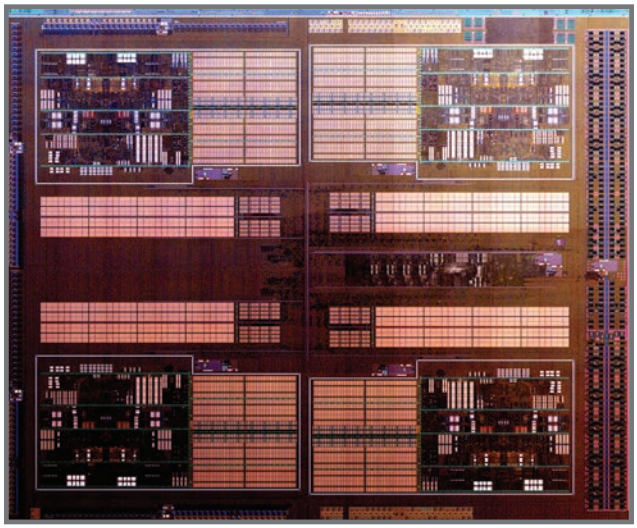
↘ submit your questions to: comments@maximumpc.com

THE NEWS

AMD's Octo-Cores Arrive

AMD's FX represents the first major CPU redesign since the original Athlon 64

AMD's new FX processor will feature the company's new "modules," each of which has two cores with shared resources.



IT'S NO SECRET that AMD's Phenom II cores haven't held up against Intel's onslaught of Core chips, but the company is hoping to gain a firmer footing against Intel's parts when its new FX chips, previously codenamed "Bulldozer," make their debut this fall.

AMD's FX chips are being fabbed on Global Foundries' new 32nm process. Aimed at enthusiasts, FX chips are a big departure from the company's previous CPUs. The most obvious change is in the core count, which increases from six cores in the Phenom II X6 to eight cores in two of the new FX CPUs.

The cores themselves also defy tradition. FX chips are made up of blocks of modules, each of which features components capable of executing two simultaneous threads. The modules share resources, such as the floating-point unit, but have their own L1 data and instruction caches. The design, AMD says, will help with workloads that are not heavily threaded. In those cases, for example, a single-threaded application would be able to use most of the resources of the chip. The company is trying to contrast this with Intel's individual cores using Hyper-Threading. Hyper-Threading creates a virtual processor that shares almost all of the resources of the individual core.

Also new in Bulldozer is an improved turbo mode called Max Turbo. On the FX-8150 chip, the base clock is 3.6GHz and will turbo up all cores to 3.9GHz. On lightly threaded apps, the chip can kick it up a notch, and Max Turbo half of the chip's cores to 4.2GHz. As they are aimed at overclockers, all FX chips will be unlocked. And to prove there's headroom, AMD and a team of expert overclockers set a new Guiness World Record by overclocking an FX to an unprecedented 8.429GHz on liquid helium.

Each chip will be backward compatible with existing AM3+ boards and offer dual-channel DDR3 support. The most jaw-dropping thing about Bulldozer may be the price, though: The company's highest-end 3.6GHz FX-8150 with eight cores will have a volume price of $245.

That will put the chip somewhere between Intel's Core i7-2600K and Core i5-2500K in pricing. But what about performance? AMD says its tests show that the FX-8150 will outgun a Core i5-2500K and give a Core i7-2600K a good run for its money. But what about Intel's six-core beasts, the Core i7-990X or the $600 Core i7-980X? Perhaps the bigger question regards Intel's upcoming Ivy Bridge drop-in replacement for Sandy Bridge and the Sandy Bridge Enthusiast chip. While we don't have numbers, we suspect Intel's premiere chips will outperform FX—and cost a lot more, too.

On paper, AMD seems to have a CPU that's at least competitive with Intel's wildly successful Sandy Bridge CPUs, and the company doesn't seem to be giving up. Next year we'll see Piledriver, and then Steamroller in 2013. The following year will bring Excavator. With each year, AMD is forecasting that it will see from 10 to 15 percent performance bumps either through process changes, clock bumps, or other design tweaks.

–GORDON MAH UNG

AMD'S NEW FX CHIPS AT A GLANCE

Model No.	Base Clock/Turbo/Max Turbo	Cores	L2 Cache	L3 Cache	TDP	Price
FX-8150	3.6GHz / 3.9GHz / 4.2GHz	8	8MB	8MB	125W	$245
FX-8120	3.1GHz / 3.4GHz / 4 GHz	8	8MB	8MB	125W	$205
FX-6100	3.3GHz / 3.6GHz / 3.9GHz	6	6MB	6MB	95W	$175

Microsoft Showcases Windows 8 Tablet

Microsoft's BUILD conference for developers was focused squarely on Windows 8. Given the audience, much of the content was intended to get the coders the tools they need to prepare their applications for the new OS, but there were plenty of interesting tidbits for the rest of us to digest.

The tool making the most noise among BUILD attendees was a Samsung-built tablet loaded with a developer preview of Windows 8 that was handed out to conference goers. Samsung included an assortment of sensors in the tablet—GPS, NFC, a gyroscope, and the like—to give developers an opportunity to test the latest features and APIs included in Windows 8. The tablet is powered by a second-generation Intel Core i5 paired with 4GB of DDR3.

Windows 8 itself is destined to be a love-it-or-hate-it update to Microsoft's flagship product. The radical new Metro UI is certainly an improvement for touch-based input, but traditional software will be relegated to a classic Windows desktop. The preview build of Internet Explorer 10 is a perfect example, as separate versions exist for Metro and standard Windows. Also intriguing is Microsoft's announcement that the Metro version of IE10 will not support plugins, such as Adobe Flash, but will rely heavily on HTML5.

Much will be made of Microsoft's re-entry into the tablet market, particularly with long-time nemesis Apple dominating the space. The comparison will become more interesting on the hardware side of things when Microsoft delivers on its promise to port Windows 8 to ARM chips, enabling more compact form factors and longer battery life. **–TF**

1/3 U.S. Adults Prefer Texting to Talking

If you end up going straight to voicemail when calling a friend or co-worker, it doesn't necessarily mean their phone is dead or even that they're unavailable. They could be screening calls. According to a recent study, nearly a third of adult Americans would rather text message back and forth than actually speak on their mobile device. Pew Research Center's Internet & American Life Project discovered that around 8 out of 10 (83 percent) adult Americans own cell phones, and of those, 73 percent send and receive text messages. Out of that 73 percent, nearly a third (31 percent) say they'd rather text than talk. **–PL**

Gamers Succeed Where Scientists Fail

It took a group of gamers a mere three weeks to solve a puzzle in AIDS research that scientists have been working on for years.

Scientists have been stumped for a decade trying to solve the crystal structure of a retrovirus protein, and so the University of Washington turned to an online folding protein game called Foldit.

"We challenged players to produce accurate models of the protein. Remarkably, [they] were able to generate models of sufficient quality for successful molecular replacement and subsequent structure determination. The refined structure provides new insights for the design of antiretroviral drugs," researchers wrote in a study published in the journal *Nature Structural & Molecular Biology*. **–PL**

Tom Halfhill
Fast Forward

WHITHER APPLE, AFTER STEVE?

APPLE IS PRONOUNCED dead every 10 years or so, inevitably before another miraculous revival. Although Steve Jobs's recent resignation as CEO didn't provoke the same gloomy predictions as the company's previous setbacks, there was widespread moaning about Apple's future. Conspicuously missing was speculation about the ways in which Jobs's diminished role might improve Apple.

To some, any such speculation is heresy. So first, let me affirm that Jobs is perhaps our brightest entrepreneur. His marketing savvy is uncanny. His standards are extraordinarily high, and he has attracted some of the best talent on the planet.

Like everyone, however, Jobs is flawed. One flaw is well known but is mainly an internal company matter. Another is less recognized but eventually will harm Apple's competitiveness.

The famous flaw is that Jobs is a hothead. At times, his behavior exceeds the allowances made for a "tough boss." His abuse can become unprofessional and wouldn't be tolerated at most companies if he were a middle manager. But this character flaw mainly affects the relatively few people immediately around him, so it's tolerable—unless his successors believe it was a key to his success.

His more relevant shortcoming is a blind spot for software development. Unlike, say, Bill Gates, Jobs never made his mark as a programmer. Apple's iOS is a restrictive platform that requires Objective-C, a programming language rarely used elsewhere. Mac OS is more open but heavily favors the same nonstandard language. This complaint may seem trifling now, because Apple's products are wildly popular. Over time, however, Apple's captive developers will defect to platforms offering more choices.

Apple executives proclaim that they will follow in Jobs's footsteps because his DNA is woven into the company. For the most part, I hope they are right. But there is always room for improvement.

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

Thomas McDonald
Game Theory

THE DARK ALLURE OF TRANSHUMANISM

MODIFICATION of the individual has been at the core of the gaming experience since the inception of the role-playing genre. It wasn't until System Shock (1995), however, that designers started probing the deeper issues beneath these newfound powers. System Shock's spiritual descendants—the BioShock and Deus Ex series—continue to explore this nexus point where issues of gameplay intersect with one of the developing moral and ethical issues of our time: what it means to be human.

Humanity finds itself at a crossroads. Humans have always used their free will to alter the world around them, their own views of that world, and even their appearances. The parallel acceleration of genetic research and nanotechnology, however, are opening the building blocks of human life to tampering, from the moment of conception, and before. It's unthinkable that these technologies can be deployed without fundamentally redefining what it means to be human.

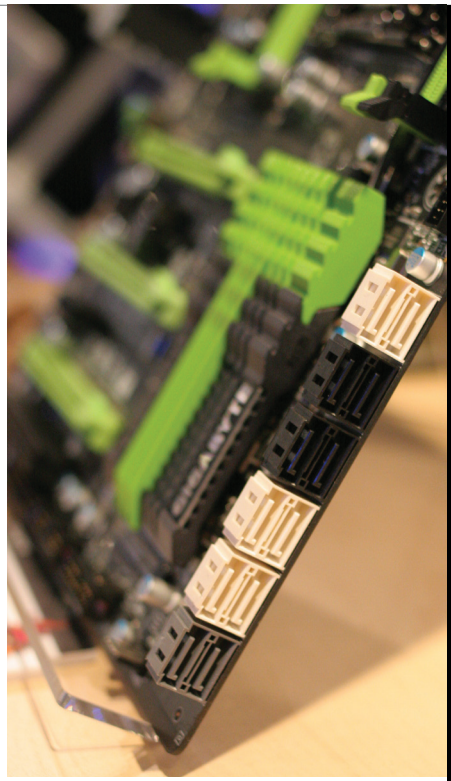
This is the crossroads where Adam Jensen finds himself in Deus Ex: Human Revolution, which takes place only 15 years in the future. The game may try to take a neutral stance on the issue of transhumanism by allowing the player to choose Adam's reactions, but the narrative itself makes hash of this neutrality. These technologies begin with a new golden age in which people are relieved of crippling disabilities, before they fall prey to the same old power plays among governments, corporations, and those who simply refuse to follow the program.

The designers may well be warning about the dangers of transhumanism, but the gameplay itself undercuts this message. After all, your success is based upon Adam getting the best mods for the job. Adam is ultimately allowed some reflection upon just What It All Means, but since he's spent the past 30 hours punching through walls or fading to invisibility, any words of protest against a modified humanity sound a bit hollow.

The fact is, these mods work out pretty well for Adam, as they probably will for any individual. But the chaos engulfing the world of Human Revolution shows us that society is more than the individual.

Thomas L. McDonald can be found online at stateofplayblog.com.

X79 May Disappoint Storage Junkies



Intel's upcoming X79 chipset for its enthusiast CPU might hit all the right marks in RAM and PCIe support, but it could fall flat for storage nuts.

The X79 chipset for LGA2011 CPUs will feature quad-channel RAM and support for 40 PCIe 2.0 lanes, and has been rumored to support up to 10 SATA 6Gb/s ports. But according to some motherboard vendors, the chipset is now slated to offer just a paltry two SATA 6Gb/s ports. In fact, the peripheral controller hub may be essentially the same as that of the Z68 and P67 chipsets, with two SATA 6Gb/s and four SATA 3Gb/s ports. Why just two SATA 6Gb/s? Vendors say Intel pulled SAS, or SCSCI attached SATA, due to potential compatibility issues with budget drives. This will leave the X79 toothless compared to AMD's chipsets, which feature six native SATA 6Gb/s ports.

Intel didn't respond to requests for information on the SATA support, but one thing is clear from talking to multiple motherboard vendors: No one really knows what's going on at this point. **–GU**

GameStop Develops Android Tablet

Game retailer GameStop plans to brand its own line of Android gaming packages featuring a refurbished, third-party Android tablet, preinstalled games, and a controller that GameStop itself has developed.

GameStop president Tony Bartel, in an interview with GamesIndustry.biz, acknowledged that there aren't many existing Android games made for an external controller, but that GameStop will stream big-budget console games—such as Modern Warfare 3—to its tablets, and may partner with developers to make games utilizing its controller. The idea is that tablet gaming will be more immersive with a dedicated hardware controller. Pricing and photos were not available at press time, but GameStop's Android package should be available in early 2012. **–MR**

OCZ Creates Massive Hybrid Drive

Hybrid drives combine large mechanical drives with a small amount of NAND flash as speedy cache for your most frequently accessed files. Seagate makes a notebook drive with NAND built in, and both Silverstone and Intel have roll-your-own solutions. But OCZ Technology's new RevoDrive Hybrid takes a different approach—combining a 1TB 5,400rpm mechanical drive with a 100GB SSD on a PCI Express x4 riser card. The RevoDrive Hybrid uses the same custom SuperScale SCSI controller as the RevoDrive 3 X2, with a custom algorithm to keep frequently used data on the SSD. The RevoDrive Hybrid will sell for $500; we'll have a review soon. **–NE**

GEEK TESTED & APPROVED

ePillow

You know when you're lounging around in your Snuggie messing with a tablet, and your relaxation is hampered by the effort it takes to hold up the device? Enter the ePillow ($30, www.epillow.net). It's the Snuggie of tablet accessories: soft, comforting, excessive. Just the kind of arguably unnecessary luxury that could make anti-consumerists cringe. Well, cringe all you want; the ePillow does what it's made to do, which is to make your laptop-replacing tablet more lap-friendly. It cradles and props up any 10-inch tablet so you can read, browse, email, and watch cat videos in comfort until the tablet battery runs out, and you're forced to turn the TV back on. A strap on the back of the ePillow lets you sling it to the handle of your roller luggage for flights, where the cushion magically does double duty as a... wait for it... actual pillow. **–MR**

PCIe 4.0 to Double Bandwidth, Again

PCIe 3.0 isn't even mainstream yet, but that doesn't mean the spec stands still. The PCI-SIG already has plans to double the bandwidth by 2013 and beyond with PCIe 4.0.

The PCI-SIG recognizes that very few applications today will scale to use the bandwidth available, but some that will include InfiniBand, 40Gb and 100Gb Ethernet, PCIe switches, and SSDs. To try to make it affordable, the PCI-SIG will explore whether the spec can be executed in copper, as opposed to optical fiber, and also look at the possibility of a "pay as you go" model, where the cost of implementation gets pricey only if you need the speed.

The PCI-SIG is also looking at a new external PCIe cable spec that will enable data to move at PCIe 3.0 speeds. Both plans are expected to see adoption in 2013 and beyond. **–GU**

Netflix Spins Off DVD Biz

Hot on the heels of Netflix' new, and overwhelmingly unpopular, price hikes, the company announced another big change that could have even more customers jumping ship. No longer will the DVD-by-mail business operate under the Netflix name. It will now be part of a separate company known as Qwikster. The real kicker is that this divides the DVD and online services into two different accounts for subscribers, including separate websites, queues, rating systems, billing, etc. While pricing for the services will not change, a videogame option will be added to Qwikster for an extra cost that has yet to be announced. **–KS**

Quinn Norton
Byte Rights

MUSIC COPYRIGHT VS. BASIC CS 2

GOOD NEWS, EVERYBODY! The courts have upset music label EMI with a ruling that not only preserves the DMCA safe harbor, but acknowledges basic laws of physics.

EMI was suing Mp3tunes.com, a music cloud service founded by Michael Robertson, who also founded the first music locker, Mp3.com—that one was sued out of existence by Universal Music Group in 2000. Plenty of major players like Amazon, Google, and Apple were watching Robertson's round two after launching their own services. Because moving media from one format to another is a fair use, some cloud services had purportedly stored a copy of the song for every user on the system with that song in their library to protect themselves from labels. Let that sink in for a second: Under this legal theory, if Amazon sold 100,000 of Justin Bieber's "U Smile" for use in its cloud service, it had to keep 100,000 individual identical digital copies on disk at all times.

It doesn't take a lot of tech savvy to figure out why that is insane. It's a misunderstanding of what a digital copy is, as well as 100,000 copies of "U Smile." The court saw this, and ruled in favor of Mp3tunes, decency, and CS 101 classes everywhere.

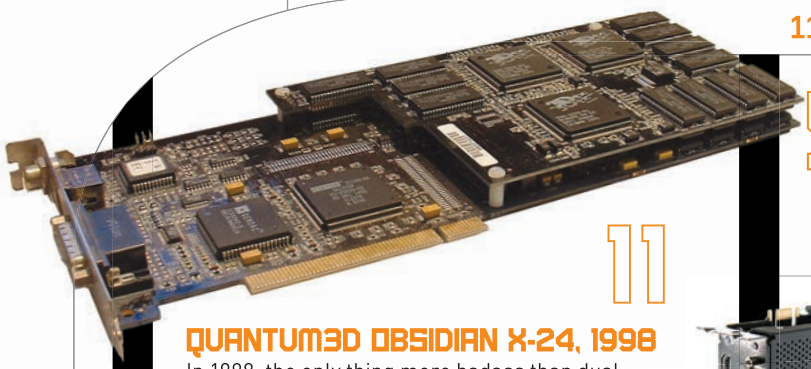
Beyond wanting to require pointless environmental and cultural waste, EMI wanted Mp3tunes to lose its safe harbor on user-uploaded content that might infringe because Mp3tunes didn't proactively filter what people uploaded. The courts did ding Mp3tunes for not doing enough to comply with take-down requests, but still didn't require proactive filtering, since that's the literal opposite of what the law requires.

Robertson's first baby, Mp3.com, was killed by a lack of understanding of digital technology. Eleven years later its much younger sibling was saved by the fact that the justice system can learn.

Quinn Norton writes about copyright for Wired News and other publications.

THE LIST

11 MOST NOTABLE DUAL-GPU CARDS



11 QUANTUM3D OBSIDIAN X-24, 1998

In 1998, the only thing more badass than dual Voodoo2 cards in SLI was the Obsidian X-24, which combined two V2s—each with an incredible 12MB of RAM and a 95MHz clock—in one card!

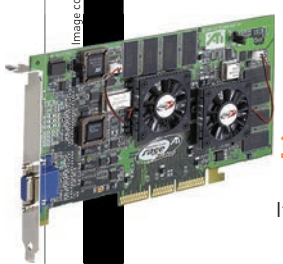


Image courtesy of hothardware.com

10 ATI RAGE FURY MAXX, 1999

It wasn't fast and its drivers were bad, but ATI's Rage Fury Maxx was way ahead of its time. Its dual 125MHz chips each featured an amazing 32MB of SDRAM RAM!

9 3DFX VOODOO 5 5500, 2000

It didn't matter how good this dual-VSA-100 card was, because most folks had already written off 3dfx.

8 NVIDIA GEFORCE 7950 GX2, 2006

Besides packing 1GB of RAM and 500MHz GPUs, this card kicked off the quad-SLI wars.

7 ATI RADEON HD 3870 X2, 2008

Sporting 1GB of GDDR3 at 1,800MHz and 825MHz cores, the HD 3870 X2 paid dividends in ATI's strategy to make slightly slower, but far cooler chips.

6 NVIDIA GEFORCE 9800 GX2, 2008

Striking back a few months later, Nvidia combined two G92 cores to wrest the top-card title with the GeForce 9800 GX2 and its 600MHz GPUs and 1GB of RAM.

5 ATI RADEON HD 4870 X2, 2008

ATI volleyed with the Radeon HD 4870 X2. Faster than the GX2 *and* Nvidia's new GeForce GTX 280, the card's 750MHz GPUs had a whopping 2GB of RAM.

4 NVIDIA GEFORCE GTX 295, 2009

Nvidia's follow-up, the 1.8GB GeForce GTX 295, wasn't a knockout with its 576MHz clocks, but it did the job and most considered it the preferred option.

3 ATI RADEON HD 5970, 2009

Next came the Radeon HD 5970—a respectably fast card even today, with 2GB of GDDR5 RAM and 725MHz cores.

ATI RADEON HD 6990, 2011

After a year-long break, ATI came back with its fast, loud, hot, and hard-to-get Radeon HD 6990.

2

1 NVIDIA GEFORCE GTX 590, 2011

Despite its 607MHz cores and 3GB of RAM, the GTX 590 is well behaved and runs quieter than its AMD counterpart.

DOCTOR

THIS MONTH THE DOCTOR TACKLES...

>SCREWY CPU
>WIRELESS USB
>SSD OVERPROVISIONING

Under-Monitor Desktop

I have a 6-year-old HP DC7100 small-form-factor desktop computer that I'd like to upgrade to 21st century technology. I really like the design of the system, especially the fact that I can place my monitor on top of the case. Ideally, I'd like to upgrade to an Intel Core i7 processor and a kick-ass videocard. For the life of me, I cannot determine if the motherboard is upgradable or if it's a nonstandard part. Can you make any upgrade recommendations?

—Robert Reid

THE DOCTOR RESPONDS: Given the age of the system and that it's more of a business small form factor, upgrading isn't really an option. OEM systems are generally resistant to extensive upgrade surgery, too, as they often use proprietary motherboards and connectors. The good news is that there are plenty of thin workstation cases out there. Since you want a kick-ass videocard, you'll want a case that supports full-height PCIe cards, so that limits how small you can go. You may want to look into an HTPC chassis like the Silverstone Grandia GD06 we use for this month's Build It (page 62). They're small enough to go under your monitor but large enough to hold a modern Core i7 system and a full-size videocard.

Screwy CPU

I'm trying to determine via process of elimination if my CPU is dead. I have an EVGA 680i LT mobo, Intel Core2 Duo E4600 CPU, and 4GB of OCZ DDR2, along with a PowerColor Radeon HD X1950 Pro PCIe card. When I power on my computer, the CPU fan, case fans, power supply fan, and videocard fan start, but nothing else. No beeps, no POST, nothing. I cannot access the BIOS, and my monitor acts like it's not even plugged into a computer.

I removed every card except the videocard, with the same result. I replaced the videocard with another one that I know works. I even tried both PCIe slots. I removed all the RAM, and tested each stick individually, and I even tried different DIMM slots. I tried a different power supply. I even swapped the motherboard for an identical one, to no avail. The only thing I haven't tried swapping is the CPU, because I don't have another Socket 775 CPU. But I figured a bad CPU would result in a beeping code from the motherboard, and I haven't heard any beeps. Could my CPU be bad?

—Mike Spaeth

THE DOCTOR RESPONDS: CPU death is rare. The Doctor has even seen a user insert a Socket 775 chip rotated 90 degrees and force the load plate closed, without either the motherboard or CPU being damaged. Both still worked once the chip was rotated back into the correct orientation. Nevertheless, CPUs can die.

Assuming that you didn't somehow swap out a bad component that was preventing a POST during all of your swapping, the CPU is likely the culprit. Before you hit eBay for another part, though, you might want to take a look at the bottom of the chip to see if all the contact points are clear of any debris or coatings that might prevent contact with the pins in the socket. That's unlikely, since the pins are designed to dig slightly into the CPU itself, but it's worth a shot. You can even try a fresh pencil eraser to gently remove any residue on the chip.

Holes in the Walls

At the urging of my wife, we recently purchased new furniture for my home office. The layout of the office used to be such that my computer was located near the printer. However, my printer now needs to be located on the other side of the room. It's a Canon MP830 all-in-one. It's a few years old, but it still works perfectly fine, and I use the automatic document feeder on the scanner frequently. There will be no tolerance for wires snaked across the room to reach the new location, so before I start knocking holes in the wall to route the cables behind the drywall, is there a way I can make the printer wireless and still use the scanner and fax functions? A print server seems to only allow you to print; there are a few "wireless USB cable" options, but the reviews are mixed.

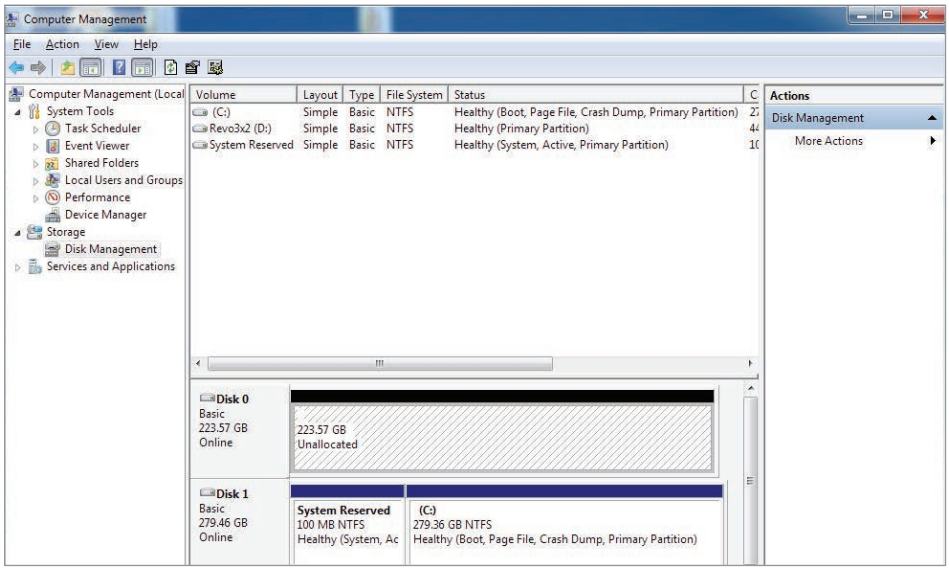
—Bill Selk

THE DOCTOR RESPONDS: Canon actually has a recommended wireless kit for your printer that is made by Silex and supports printing and scanning for $99. That's pretty steep when you consider the price of multifunction printers with built-in wireless these days. It just might make more sense to buy a new printer with Wi-Fi built in. If you have a surplus of ink for the printer you currently own, you might want to opt for another Canon printer that also uses that ink.

Overprovisioning

I normally buy my drives (both SSD and HDD) as OEM models, and then buy external enclosures to use them as portable units. This means I have to initialize them and create partitions manually in Disk Management. How big a partition should I create? Some sources advise leaving a small portion of the

↘ submit your questions to: doctor@maximumpc.com



This SSD at Disc 0 contains 256GB of NAND flash, but 16GB are reserved for overprovisioning, so only 240GB show up. The system counts in *gibi*bytes, though, so that 240GB appears as 223GB. Don't worry, though; you're getting what you paid for.

drive unallocated for use by the drive when bad sectors are found, but a 240GB drive usually has only a maximum partition option of about 223GB anyway. Is there any reason to leave a small section of the drive unallocated when partitioning? Also, is there an advantage to performing a full format on a new solid-state drive as opposed to a quick format?

—Mark S. Donnell

THE DOCTOR RESPONDS: You don't need to leave any portion of the drive unallocated; modern SSDs already overprovision to account for wear leveling and bad sectors. That's all handled at the controller level, and that's separate from the 240GB-becoming-223GB thing. The 240GB capacity shows the drive's space measured in decimal gigabytes, in which a gigabyte is 10^9 bytes (1,000,000,000 bytes), while the actual formatted capacity is measured in *binary gigabytes*, or gibibytes, which are 2^30 bytes (1,073,741,824 bytes). It's the exact same number of bytes, and the exact same capacity either way, just counted differently.

Overprovisioning is separate. The actual NAND on a 240GB second-gen SandForce drive, if you count it up, is 256GB. The extra 16GB are reserved for overprovisioning and wear leveling. The controller handles it automatically. So you should make your partition utilize all the available space. As for your second question, we've never seen a performance difference come from doing a full format on a new drive rather than a quick format. Now, if your SSD has been heavily used and doesn't have good garbage collection built into the controller, sometimes it'll help to zero out the drive, but for a new drive, a quick format is sufficient. Lastly, if you're using SSDs in external enclosures for your mass storage needs, wanna buy us dinner, Uncle Moneybags?

If It Ain't Broke...

I built the Ultimate Gaming PC on the cover of the November 2010 issue, with a few changes. This was my first build and I have been happily upgrading continuously since then! I now have 8GB of memory and a BD burner. The onboard sound is so-so and I am getting ready to install Sound Blaster X-Fi Titanium Fatal1ty. With all the hardware changes, I suspect I should flash the BIOS, since I will most likely be making more changes, and I want this system to last a couple of years before my next build. The P7P55D-E Pro board was shipped with Ver. 1302 BIOS and the current revision is 1602. Can I skip the revision in between (1502) or should I flash that, and then the current? By the way, the rig still runs just fine, even with the changes.

—Mark Beer

THE DOCTOR RESPONDS: The classic advice regarding BIOS updates is that if nothing's broken, you shouldn't update your BIOS, due to the risk of something going wrong and borking your board. So upgrade at your own risk, although we've had few problems updating the BIOS on modern boards. You shouldn't need to flash the intermediate BIOS; you can go right to the most recent. We've found the best way to update the BIOS on Asus boards is to use the EZ Flash 2 utility in the BIOS. Download the most recent BIOS to a FAT32-formatted flash drive, then reboot into the BIOS. Go to the EZ Flash 2 settings and follow the prompts to select your USB drive and the BIOS file you've just downloaded. Let it run (don't screw with anything!) and your computer should reboot when the BIOS is done flashing. If that's too much for you, you can also flash the BIOS from within the OS using the Asus Update utility.

A Nondestructive Restore?

I have a Windows 7 computer that I put together myself around two and a half years ago. Beginning a few weeks ago, whenever I would right-click certain desktop icons, the loading symbol appeared and then I received an error message stating that Windows Explorer had crashed and needed to restart. At first it occurred intermittently, but eventually it started happening more frequently. Both sfc scans and chkdsk found corrupted files, but after running chkdsk, programs like the disk defragmenter and the backup system were no longer functioning. The sfc scan found corrupted files but was unable to repair all the damage. Now the problem is so extensive I can't even run cmd as administrator to access the sfc utility—among other problems. How am I supposed to repair the damage without a repair or clean install?

—Jeffrey Johnson

THE DOCTOR RESPONDS: Assuming you've already tried to repair the damage with a system restore disc (or installation DVD), and it didn't work, our normal advice is to back up your data, take a deep breath, and go for the clean install. That said, there's a way to do a clean reinstall without losing your data. In fact, we just ran a how-to on that subject in the October 2011 issue, which you can find at bit.ly/oX0eqc.

However, you should really be asking why this is happening. These errors rarely just happen once and then stop occurring. This may be a symptom of an actual hardware failure. Is the disk going bad? Is the motherboard starting to fail? Is it a SATA cable, bad RAM, or something else? At a minimum, you should run Memtest86+ (available for free from www.memtest.org) on your system. We'd also check for a cabling issue or even a hard drive problem.

HEAD TO

BY BRAD CHACOS

VS.

Google+

Facebook vs. Google+

A metaphorical boxing match between two 800-pound gorillas is quickly shaping up in the social network arena. In one corner: Facebook, the reigning champion. In the other corner: Google+, a fast-rising up-and-comer with a big name and deep pockets behind it. At stake: the time-deprived attention of millions of social network users. There can be only one victor.

Round 1: User Base

The more users a social network has, the more opportunities there are for its users to get gabby. No social media network in history reached 25 million users faster than Google+, which achieved the feat in its very first month despite being invite-only. It took Facebook three years to reach that total, but since then the service has grown like gangbusters and currently claims an utterly ridiculous 750 million users. Even your grandmother probably has a Facebook account.

Winner: Facebook

Round 2: Privacy

Both services force users to sign up with their real names, a requirement we're uncomfortable with. Facebook's been plagued by privacy concerns for years now, and although changing your privacy settings is easy, its privacy options aren't as robust as Google+'s. G+ not only includes more privacy options, it also lets you choose who can see each post you make and which portions of your profile are visible to the public.

Winner: Google+

Google+

Round 3: Games

Games are a major component of Facebook: More than half of all Facebook users play games, and Facebook's game library spans approximately a gajillion titles. Games showed up late on Google+, but the dedicated games channel and the ability to post high scores are great touches. Google+'s initial games include blockbusters like Angry Birds and Dragon Age: Legends. Unfortunately, at the time of this writing, there were only 16 Google+ games available.

Winner: Facebook

Round 4: Video Chat

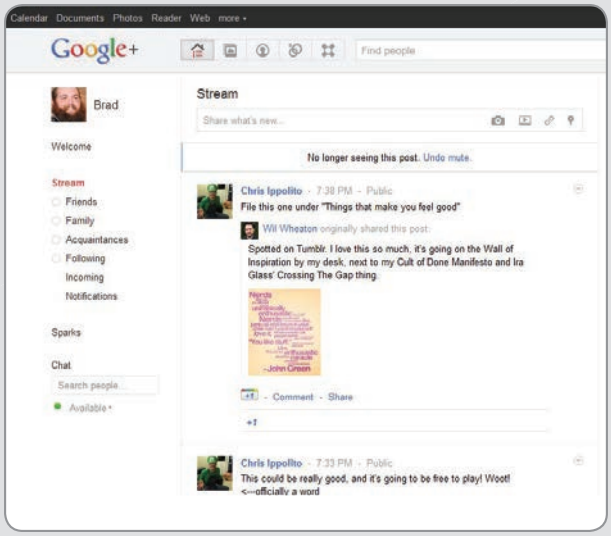
Both networks offer free video chat services that are incredibly easy to use. Facebook's Skype-powered video calling allows you to chat one-on-one with your friends and leave video messages if they aren't online. But it can't hold a candle to Google+'s Hangout, which supports up to 10 people in simultaneous video chat. Plus, it allows you to watch YouTube videos as a group.

Winner: Google+

Google+

HEAD

FACEBOOK



GOOGLE+

Round 5: Mobile Apps

Google+'s mobile app for iPhone and Android devices gets all the basics right, but its highlight is the Huddle feature, a group-chat function similar to the old AOL chat rooms. Facebook countered the threat with its new Mobile Messenger app, which expands upon the features in the standard app. Not only is Facebook's feature set more robust, it's also available for tons of devices—and it isn't plagued by the bugs and crashes that are sometimes found on the Google+ app.

Winner: Facebook

And the Winner Is...

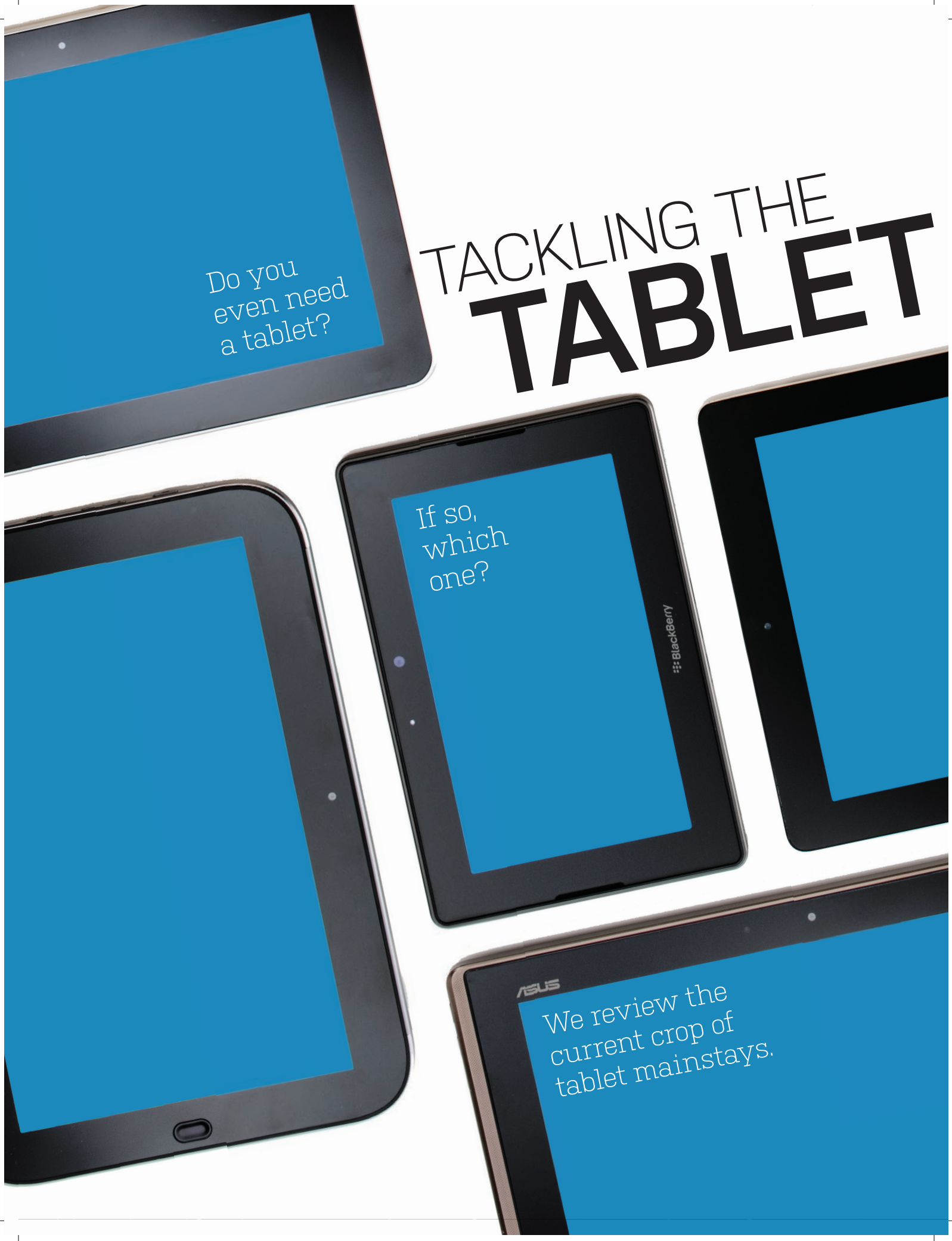
In three out of five rounds, **Facebook** triumphs over Google+. Sure, it may have some privacy concerns, and it doesn't have quite as clean a look as Google+, but when it comes down to brass tacks, Facebook's seniority shows in its deep user base and myriad options. There's a lot to like in Google's fledgling network, but Facebook just makes it easier to be social.

TACKLING THE TABLET

Do you even need a tablet?

If so, which one?

We review the current crop of tablet mainstays.



CONUNDRUM

Follow along as we unravel what tablets are actually good for.

We explain the hardware and OS features that matter the most.

BY JON PHILLIPS

WHEN A CONSUMER electronics category confuses the masses, it's usually because the technology is hard to understand on a fundamental level. Have you ever tried to explain texture fill rates to your GPU-ignorant brother-in-law? Or RAID levels to your mom—who shouldn't even be asking about RAID in the first place?

Videocards and storage devices can confuse the lay consumer, but at least the prospective hardware buyer usually knows he or she needs a videocard or storage device in the first place. Your game won't play at a high resolution? A new videocard is probably the answer. Your hard drive is full? It's time for more storage.

But tablets are different. From a raw technology standpoint, they're not particularly hard to understand. They're closed-box systems, and the specs of competing devices generally fall within a narrow range.

The bigger question concerns whether anyone even needs a tablet. TV commercials, tech pundits, and even the struggling magazine and book industries would have you believe that tablets are essential 21st-century gear. But note-book replacements they are not, and this has to be reconciled before any tablet purchase.

Some *Maximum PC* staffers couldn't live without their tablets, but others show no interest in them whatsoever. It all comes down to individual use cases. No one really "needs" a tablet, but many people are discovering that a tablet is a wonderful supplement to their core hardware arsenals. In fact, Maximum-caliber tech enthusiasts are often the folks best served by tablets. But you need to know what they do well, what they do poorly, and which hardware and software features really matter at the end of the day.

In the following pages, we'll explain all of that, plus review the eight most-talked-about models currently available. Six of the contenders run Google's tablet OS, Android 3.0 (aka Honeycomb). Another, the iPad 2, runs the latest version of Apple's iOS. The final entrant is RIM's oddball PlayBook, which is tied to a software ecosystem so funky, the PlayBook can't really be included in any serious tablet conversation. The most oddball tablet of all—HP's WebOS-based TouchPad—was left out entirely because it was discontinued a few weeks before we started working on this article.

Excited? Anxious? Maybe a little scared? Simmer down, amigo. Tablets are a confusing proposition, but they need not be feared.

TABLET TALENTS AND TABLET FAILS

BEFORE YOU BEGIN COMPARISON SHOPPING, MAKE SURE A TABLET IS RIGHT FOR YOU

We'll get into specific use cases in a moment, but let's first provide an overview of how tablets trump notebooks, their closest hardware cousins.

First, they're imminently more wieldy. By eschewing a hinged clamshell design and mechanical hard drive, a tablet is lighter and less delicate. It's easier to tote in a book bag, and you'll feel more comfortable tossing it on your couch or mattress.

Second, a tablet is the perfect device for "kick-back computing." When you're chilling on your couch, supine and relaxed, you'll probably find it easier to hold and manipulate a tablet than a note-book. And thanks to their virtual keyboards, data entry on a tablet is easier, too—assuming you don't have much to enter (more about that soon). All in all, if you want to perform computer-like tasks while lying on your back, tablets are a goshsend.

Third, apps. Even in the Android Market (whose offerings compare in neither volume nor quality to those of Apple's App Store), there are hundreds of awesome apps that don't have desktop counterparts. Indeed, some of the most interesting software development of the last two years has been focused in the tablet space. These apps make unique use of touch navigation, accelerometers, and location awareness, and will probably never find a home in your Windows computer.

Now let's dig a little deeper into what tablets do—and don't do—well.

[+] CASUAL GAMING Touch controls suck for first-person shooters and action sports games, but you won't find a better platform for card games, casino sims, virtual pool, trivia challenges, and digital versions of Scrabble, Yahtzee, and other "family game night" fare. Tablets are also tailor-made for physics-based games like Angry Birds, Cut the Rope, and Doodle Jump—all use touch controls and accelerometers to fantastic (and addictive) effect. EA just released an iPad version of Tiger Woods PGA Tour 12 (tablets are perfect for golf games), and Gameprom's pinball sims are probably the best tablet games of all. There are currently three tables available for Android tablets, and seven for the iPad. All boast excellent ball physics, and are chock-full of the ramps, targets, and table toys you'd find in a late-model Williams pinball machine.

According to a March 2011 survey conducted by Google's AdMob subsidiary, gaming ranks highest among all tablet use cases. Given the survey's timing, the vast majority of the 1,400-plus queried must have been iPad owners, as Honeycomb-based tablets (the first real Android tablets) weren't yet available. In today's climate, where Android devices reportedly account for one out of every five tablets sold, we might expect games usage to slip just a little—if only because Honeycomb supports fewer killer games, and the platform is decidedly more utilitarian than iOS. All of which leads us to...

Tablets absolutely rock for card and parlor games, sim golf, and pinball—like the feature-filled Navy Seals board, which is part of a $2.99 war-themed pinball pack from Gameprom (iOS only).

TABLETS: 5,300 Years Old and Trendier Than Ever!

With simmering iPad 2 rumors and dazzling Honeycomb previews at CES, it was clear within the first week of 2011 that this would be the year of the tablet. But before you settle down to compose a self-congratulatory tweet on your shiny new slate, consider that this year's models are really the culmination of some 5,300 years' worth of tablet ingenuity. That's right: Our current tablet fever can be traced all the way back to the first people to record history on a slab of hardware—really hard hardware. OMG, indeed. **–MARKKUS ROVITO**

3300 BCE

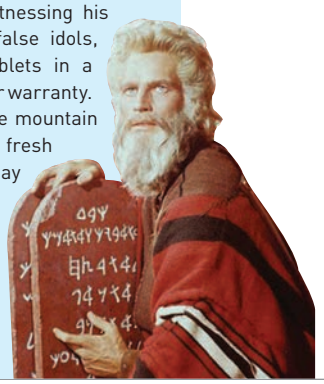
Sumerian Cuneiform Tablets

The Sumerians built one of the first urban societies more than 5,000 years ago in Southern Mesopotamia (modern-day Iraq). And, consistent with urban culture, they had their minds on their money, and their money on their minds. Sumerians first developed their glyph-based writing system with a stylus on a clay tablet in order to document financial transactions. Their system of characters and symbols constantly evolved, and was used as late as the year 100 CE, long after the culture's spoken language died out.

CA. 1300 BCE

The Ten Commandments

The details of Moses's life are, let's just say, highly disputed. Nonetheless, as the story goes, Moses received the Ten Commandments from God at the top of Mount Sinai and transcribed them on stone tablets. Upon descending the mountain and witnessing his people worshipping false idols, he destroyed the tablets in a rage, thus voiding their warranty. Moses returned to the mountain and inscribed two fresh tablets, which to this day continue to arouse mixed feelings.



[+] WEB BROWSING AND EMAIL In the March AdMob survey, participants were asked to name all the ways in which they use their tablets. "Playing games" took the lead with 84 percent, but this was followed closely by "searching for information" (78 percent) and "emailing" (74 percent). What's more, 82 percent said they primarily use their tablets at home.

The usphot? Tablets are ideal for web-surfing and emailing from the comfort of one's couch, bed, or chaise lounge! And this is really how most people—even power users—use their tablets. To wit: A February 2011 In-Stat survey ranked emailing and web-browsing as the top two tablet uses.

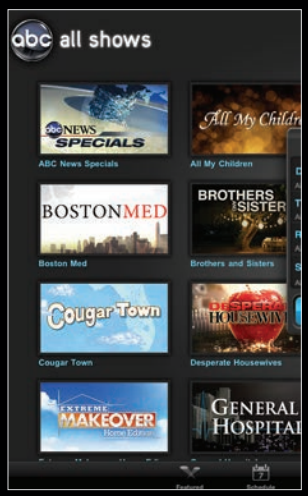
Available for both Honeycomb and iOS, the IMDB app provides access to the world's best database for checking TV and movie information.

Web surfing and email already top the charts of desktop use, and tablets simply deliver those services without the inconvenience of ambulatory visits to a stationary device. So, if you check email about 100 times a day, and are unable to survive without constant fact-checking on Wikipedia, IMDB, and the like, then a tablet might perfectly suit your lifestyle needs. Even better, many notable news, reference, and cooking sites offer slick app wrappers for their web content, providing navigational experiences that better their own web offerings.

[+] SOCIAL MEDIA Social media is all about quick check-ins and look-ups wherever and whenever you want, and tablets suit this activity perfectly. Twitter's eponymous app offers a UI that's vastly more feature-rich and user-friendly than the service's website interface, and it's available for both Honeycomb and iPad.

Face-book makes smartphone apps for both platforms, but hasn't released any versions optimized for the more generous screen dimensions of tablets. The company expects you to use its web interface when posting and liking on tablets, and that's fine by us, as the site renders well in the neighborhood of 10 diagonal inches. And because Face-book activity rarely involves extended data input, virtual keyboards are suitable for anything you may need to post.

On the iPad, you can stream the latest ABC video content—one of a few video streaming services that just isn't available for Honeycomb.



[+] VIDEO You're not going to gather the whole family around a tablet for a night of movies and popcorn, but both Honeycomb tablets and iPads have the rendering power and screen dimensions for satisfying single-person video viewing. Both platforms render onscreen video at 720p, and Honeycomb tablets can output 1080p via HDMI, if you absolutely must assemble the clan around the big screen.

Both tablets have slick YouTube apps, but Team iPad pulls ahead of Honeycomb when it comes to streaming Hollywood movies and TV shows. For example: Netflix subscribers can stream "Watch Instantly" content on their iPads, but the Lenovo IdeaPad K1 is the only Honeycomb tablet to support Netflix streaming without a hack. And then there's HBO, ABC, and Xfinity On Demand. All offer video streaming via iOS apps, but Honeycomb support is nowhere to be found. Both tablet platforms let you rent and

CA. 500 BCE
Greek Wax Tablet
Developing all that democracy and fighting all those Persians required much note-taking. The ancient Greeks' solution? Wooden tablets covered with a layer of wax. Writing into the wax with a stylus took much more pressure than writing with ink on parchment, but wax was all they had, and they used a straight-edge, spatula-like tool to erase.

CA. 1600
Erasable Writing Tablet
In Shakespeare's *Hamlet*, written 1599-1601, the tragic protagonist muses, "From the table of my memory I'll wipe away all trivial fond records..." Metaphorical? Perhaps. Yet also literal. Small, portable writing tablets with erasable pages existed in those times. A mixture of gesso and glue covered the pages to make them erasable when written on with a metal stylus. Very convenient when you want to erase "By Christopher Marlowe" from the title page.

1960
Etch A Sketch
A French electrician in the late 1950s hatched a plan to make a drawing toy with a joystick, glass, and aluminum powder. Several degrees of separation later, the concept ended up in Bryan, Ohio where the Ohio Art Company redesigned and manufactured it. Five decades later, the often used (but rarely mastered) Etch A Sketch continues to thrive.

download content from their online stores, but the offerings in Apple's App Store are vastly better than what you'll find in Android Market.

All that said, Honeycomb tablets do support a wide variety of video codecs, and because they don't interface with the clusterfrack that is iTunes, it's much easier to rip DVDs and quickly place video files in your Android video folder. The end result is a very effective platform for video playback—at home, on an airplane, wherever.

[+] RANDOM NICHE APPS Apple's "There's an app for that" campaign positions the iPad as a platform for sundry lifestyle activities one can only imagine. That's an optimistic promise. If you buy a tablet, you'll find almost all your activity in the realm of gaming, email, and web browsing. Having said that, certain eclectic souls may stumble upon a niche, highly focused tablet app that dovetails just perfectly with their own business or enthusiast needs.

For example, OmniGraffle (iOS only) is perfect for creating flowcharts, diagrams, and other quasi-freehand drawings during business meetings. Or let's say you're a hardcore astronomy nerd. With Star Walk (iOS only), you can point your iPad 2 at the skies for augmented reality overlays of constellation and satellite information. Google Sky Map performs a similar function for Honeycomb, but without augmented reality features. Other apps specialize in music and art creation, medical services, and even credit card processing, so you can use your tablet to collect payments on the road. These are all very niche-use cases—but for the people who use tablets in these ways, the benefits are profound.

Junior astronomers can use Google Sky Map on their Honeycomb devices. Just point your tablet to the heavens, and see what stars lie above!

Are you sufficiently stoked to buy a tablet? Not so fast, laddie. We'll now describe what tablets don't do well.

[-] E-BOOKS There's an undeniable convenience in loading hundreds of e-books into a single hardware device that's already shaped like a book. But, sorry, we're not fans of reading long-form content on tablets. Projected-light displays (like the LCDs found in all tablets) often cause discomfort and eyestrain during long periods of extended, continuous use. So, while we're happy to use tablets to catch up on the latest news headlines, we'll not so happily partake in an all-day George R.R. Martin marathon.

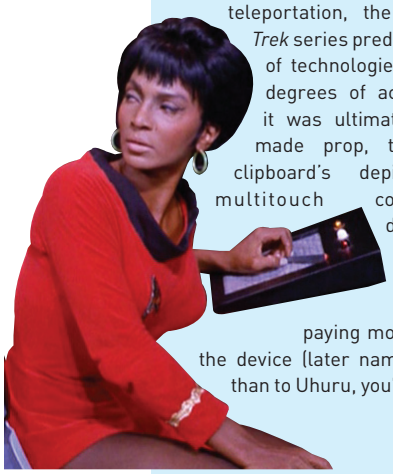
If you really want to get your e-book on, invest in a dedicated e-reader like the Amazon Kindle or Barnes & Noble Nook. Both use E Ink, which displays grayscale text and images with soothing, eyeball-friendly reflected light. Relative to tablets, dedicated e-readers also perform much better in direct sunlight, and are imminently more portable than even the thinnest, lightest tablets, such as the iPad 2 and Samsung Galaxy Tab 10.1.

[-] PHOTOS The best smartphone cameras trump the best tablet cameras. In fact,

If you're looking to read e-books into the wee hours of the night, eschew a tablet for an e-reader like the Barnes & Noble Nook. The "first edition" version displays soothing E Ink for reading, while a secondary screen uses a color LCD for navigation.

1967
Star Trek Electronic Clipboard

While we're still impatiently awaiting teleportation, the original *Star Trek* series predicted a number of technologies with varying degrees of accuracy. While it was ultimately a crudely made prop, the electronic clipboard's depiction of a multitouch computer input device was truly fantastical for the time. And if you were paying more attention to the device (later named the PADD) than to Uhuru, you're a true nerd.



1979
Apple Graphics Tablet

Made for the Apple II desktop computer and Utopia Graphics System software, the Apple Graphics Tablet with wired stylus cost a down-to-earth $650. But it didn't sell well, and Apple discontinued it after the FCC discovered it caused radio frequency interference. D'oh!

1987-2005
Star Trek PADD

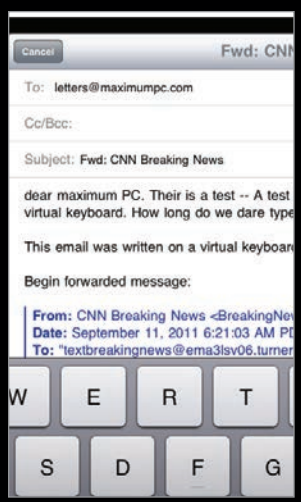
Beginning with *Star Trek: The Next Generation* in 1987, the PADD (Personal Access Display Device) imagined the potential of tablet computing before real-world technology could manifest it. Throughout that series, as well as in *Deep Space Nine*, *Voyager*, and *Enterprise*, the PADDs continued to evolve, as citizens of the United Federation of Planets demanded better push notifications and unlimited data plans.

the camera on the iPhone 4 is one of the best phone cameras available, while the camera on the iPad 2 is one of the worst cameras you'll find on any tablet. That should tell you what the market-leading tablet vendor thinks of cameras on its larger mobile devices.

Tablet cameras are generally crappy, suffering from compression artifacting, color shifts, and other image-quality problems. And once you consider the truism that the best camera is the one you have with you, then we have to ask why anyone would ever carry around a big-honking tablet for photo-acquisition purposes. Use your phone instead. It's in your pocket.

Having said that, we'll reserve just a wee bit of respect for the video creation capabilities of any Android device that comes with Google's Movie Studio app. Chasing the action with a 10-inch tablet in your hands may not be easy, but the app lets you quickly grab all the video clips already sitting in your device, edit them with titles, still photos, transition effects, and audio tracks, and then output everything to a single new video in one fell swoop. It's plenty adequate—and quite convenient—for YouTube vlogging and similarly low-level video projects.

[-] TYPING AND OFFICE/PRODUCTIVITY Tapping out sentences on the virtual keyboard of a tablet beats smartphone data input any day, but we don't know anyone who can touch-type on either iPad or Honeycomb tablets. Besides lacking tactile feedback, the auto-correction features of both iOS and Android lead to vexing spelling mistakes. Even worse: Turning off auto-correction leads to text that looks like something Latka Gravas might utter in his native tongue.



The virtual keyboards on tablets offer generous layouts, but you won't receive any tactile feedback—and auto-correction can lead to many mistakes.

Sure, you can buy a keyboard dock for the Asus EeePad Transformer, but you still won't be able to use any Windows apps.

Yes, you can connect to a Bluetooth keyboard (rarely a satisfying or even reliable solution), and some tablets—notably the Asus EeePad Transformer—can be teamed with physical keyboard dock accessories. But to what end? You might be approximating a computer workstation, but iOS and Honeycomb don't support any office, productivity, or serious content creation apps that would make you want to ditch your desktop or even notebook (and don't even mention Polaris on Office, which comes on the EeePad—it's quite vexing in and of itself). The upshot is that neither tablet platform makes sense for extended typing projects, and a tablet just can't serve as your only computing device when you're working out of hotel rooms on the road.

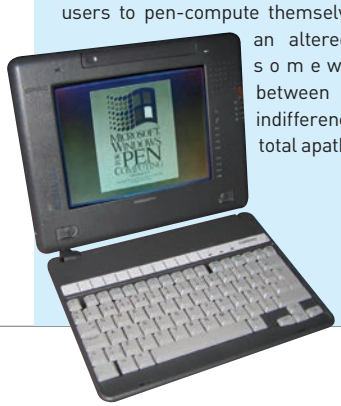
[-] GAMES—REAL GAMES There's no iOS or Honeycomb version of Steam, and you'll find no Dead Island, Portal, or WoW. Get our drift? 'Nuff said.

1989
Grid Systems GridPad

This portable tablet PC (one of the first) had a 10-inch monochrome screen, tethered pen, 1MB RAM, and a price tag of about $3,000, including software. Its 4.5-pound weight was considered svelte, and it sold pretty well while collecting good reviews. But business happens, and after AST took over ownership and tanked in the mid-'90s, the GridPad went down with the ship.

1992
Compaq Concerto

One of the early models to run Windows for Pen Computing (Microsoft's first attempt at a tablet OS), the Concerto cost an intimidating $2,500. Even a $1,000 price drop didn't do the trick, and Concerto fizzled out in 1994. The computer itself is hidden behind the display, so the keyboard can be fully detached, allowing users to pen-compute themselves into an altered state somewhere between blithe indifference and total apathy.



1993
Newton MessagePad 100

Who could forget the Newton OS, Apple's first tablet platform? Its popularity was somewhere between the current Apple iOS and voluntary castration. Although widely considered a failure, the Newton OS hung around for five years after the initial MessagePad 100. After Apple discontinued Newton in 1998, Steve Jobs reabsorbed the technology, and two ex-Newton developers created the OS for the original iPod.

PLATFORM BATTLE:
WHICH OS IS BEST FOR YOU?

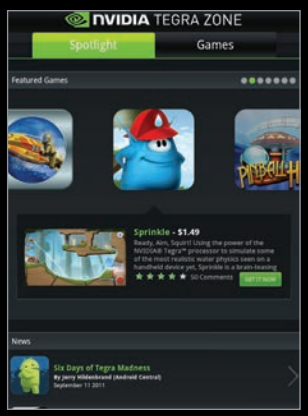
THE DECISION BETWEEN AN IPAD 2 AND A HONEYCOMB TABLET COMES DOWN TO YOUR PERSONALITY TYPE AND YOUR PRIORITIES

Don't worry, we're not going to make you read this whole section just to find out if you should align yourself with iOS or Honeycomb. It basically comes down to this: As a platform, Honeycomb offers greater UI flexibility and user controls than iOS. It also bests iOS in web browsing (perhaps the most important tablet service) and has superior hooks into all Google products, apps, and features. Honeycomb isn't a refined OS, per se, and it does suffer some vexing user experience issues. But it's the OS we recommend for hardcore PC types who value a more Windows-like experience in terms of multitasking, file transfers, and UI tweakage.

The iPad 2, meanwhile, can't be beat for its app support: By huge leaps and bounds, the offerings in Apple's App Store crush what you'll find in Android Market. Apple's iOS is also more intuitive and easier to use than Honeycomb. All in all, if you're a Mac user—or just the type who subscribes to that "let's sacrifice power and flexibility for simplicity" ethos—then get yourself an iPad 2.

With that as a preamble, let's compare iPad 2 with the Honeycomb cartel in five key areas, and we'll also explain why Windows and BlackBerry tablets can't even be considered.

APP ECOSYSTEM The number of apps designed for iPad and iPad 2 so rudely dominates the number of apps designed for Honeycomb, we're almost tempted to say, "Oh, flunk it—just run down to your local Apple Store and throw down." According to a running list on Androidcentral.com, there are currently 292 apps optimized for Honeycomb. The Apple Store, meanwhile, reported 121,807 iPad apps as of 2:15 PST on Sept. 12, 2011.



Nvidia is promoting 19 games in its Tegra Zone app. Not much to see here, folks. But, hey, at least someone is trying to promote gaming on Honeycomb.

Honeycomb's most painful app shortcoming is a dearth of killer games. Nvidia is trying to support Honeycomb as a gaming platform via its Tegra Zone shopping center, but with a current inventory of just 19 games, this gateway to fun isn't really hopping. Adding insult to injury, various Honeycomb apps aren't as polished or complete as their iPad counterparts. For example, there's noticeable ball lag in the Honeycomb version of Pinball HD, and Honeycomb's Xfinity app supports "play now" streaming for only a single device.

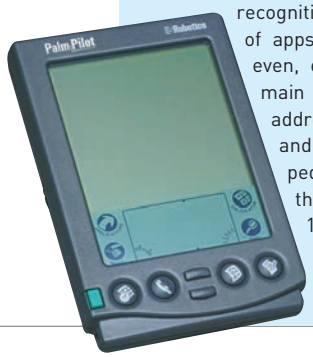
Words of wiz: Check Android Central's Honeycomb app list (**bit.ly/qFgbil**) and also look carefully at the apps that come preinstalled on the Honeycomb tablet you're thinking of buying. If your brain can't resolve the limited offerings of what you find, then buy an iPad 2 instead.

CORE APPS For those people who intend to use their tablets only for email and information searches, Honeycomb might be the better platform. Honeycomb's built-in Browser app is a dead ringer for Chrome, and supports tabbed windows, direct hooks into Google voice search, and (most importantly) Adobe Flash. These three features are missing from the iOS browser.

If you're an iPad user, you can download a third-party iOS browser that supports tabs, but none are very fast or even satisfying. But it's the lack of Adobe Flash that really hurts iOS. Web developers have instituted Flash workarounds in anticipation of all the iOS devices that will access their sites, but we still find web content that won't

1996
USRobotics (Palm) Pilot 5000

Anyone of a certain age remembers when the Palm Pilot had the lockdown on the PDA market and a future filled with nothing but sunny skies. The Pilot 5000 launched in March 1996 (when Palm was a subsidiary of USRobotics). It made waves with its Graffiti handwriting recognition, and adoption of apps before apps were even, err, apps. The four main apps—date book, address book, to-do list, and memo pad—seem pedestrian now, but they were a revelation 15 years ago.



2001
Tablet PC

COMDEX, Fall 2001: Bill Gates delivers his annual keynote speech, unveils a slew of tablet prototypes, and decrees that "Tablet PCs" will rule the landscape in five years. In short order, the industry releases devices like the HP TC-1100 pictured here, and tech geeks discover that Windows XP Tablet PC Edition, which requires stylus-driven text input, isn't really easy to use. Tablets suffer a bad name for approximately seven more years—proving Bill is quite the optimistic soothsayer vis-à-vis when things will rule.

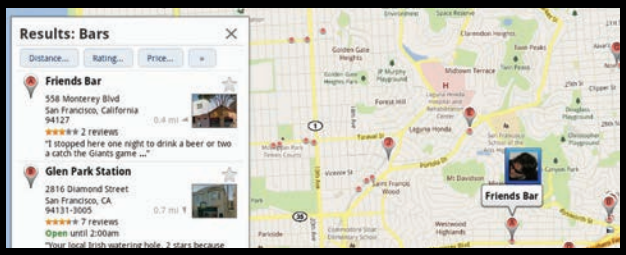
2004
Microsoft Ultra-Mobile PC

Some five years after Bill Gates promised Tablet PC dominance, Microsoft's tablet OS was updated to Windows XP Tablet PC Edition 2005, and slotted for smaller, stylus-dependent touch-screen devices called Ultra-Mobile PCs, or UMPCs. The Samsung Q1 was one of the first, and initially cost $1,100. Sadly, Windows wasn't very well adapted to the tiny screens, and UMPC hardware lacked the juice to power the OS very well.

BLACKBERRY? NO, NOT AN OPTION

Despite rumors that RIM is planning to discontinue its much-less-than-celebrated tablet offering, the BlackBerry PlayBook continues to putter along. This gives RIM's QNX-based OS platform a little bit of breathing room before the inevitable axe falls and provides shoppers in BlackBerry App World with a 7-inch tablet on which to download software.

Yep, 7 inches. That's the size of the current PlayBook, and all indicators suggest a 10-inch version will never be offered. Instead, BlackBerry is working on a dual-core über-phone that would be running the QNX-based OS (a different OS than the one powering current BlackBerry smartphones). So, as a tablet platform, the PlayBook doesn't have legs. And as a current tablet option, the PlayBook really can't be considered. It's too small, its app universe can't compete with iOS or Android, and (worst of all) to access email and calendar, you have to use a wireless tether to your damn Blackberry phone!



Both tablet platforms have a Google Maps app, but the Honeycomb version comes with extra features—like the Places tool, which helps you quickly find food, drink, and other sorts of merriment.

load on our iPads.

The iPad has a fine email app, but like all iOS apps, you have to exit the app and enter an OS-level Settings app to manipulate fine controls (e.g., font size). In Honeycomb apps, all settings are quickly available in the app itself. We also appreciate that Google voice input is immediately accessible in so many Honeycomb apps. Besides using it to dictate browser searches, you'll also find it surfaced in Maps (a much richer Google Maps experience than you'll find on iPad); Talk (an instant messaging client); Navigation (a turn-by-turn directions apps); and on the virtual keyboard itself. Voice control is surprisingly adept at identifying common words, and it takes all the auto-correction pain out of text chat in the Talk app.

FLEXIBILITY AND CUSTOMIZATION The more we use Honeycomb, the more we appreciate the freedom it affords Maximum-caliber power users. As stated above, settings menus are located in-app; no trips to a central Settings app are required. Honeycomb also supports true multitasking, whereas iOS does not. For example, let's say you're rendering a time-consuming video project in Movie Studio. An alert for an important email pops up in your Honeycomb system tray (the system tray is another feature not yet available in iOS), and you can jet on over to your Gmail app to read it—all without suspending the video rendering in progress. In iOS and iMovie, you would never get the alert in the first place, and if you decided to jump over to your Mail app on a lark, your iMovie rendering would suspend until you returned.

And then there are desktop Widgets. Apple doesn't like a cluttered desktop. You can have icons on it or dead space, and that's it. But Honeycomb supports a thriving ecosystem for desktop widgets that show everything from your latest incoming email and tweets, to snazzy graphical representations of the current time, weather, news headlines, and more. It all puts a vibrant, real-time spin on your desktop, and it's a key reason to buy a Honeycomb tablet over an iPad.

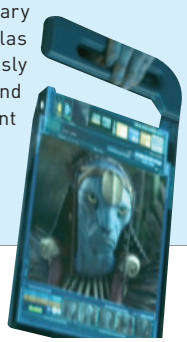
But for true power users, the rebels among us, simply being able to avoid iTunes for file management may be the best reason of all to join Team Honeycomb. Sure, if you've spent your whole life playing in the walled garden of iTunes, you might be OK with the draconian limits and convoluted operating procedures that Apple imposes on music and video transfers. But Honeycomb tablets ain't having none of that—you can simply drag

2007
Axiotron Modbook

It's the touch-screen Mac (yes, Mac) that Apple never made, and probably never will. Axiotron, sick of seeing Windows users have all the Tablet PC fun, created the Modbook, which is basically the guts and OS of a MacBook converted into a touch-screen tablet computer. Axiotron charged $800 in 2007 (and $900 now) to modify a customer's Apple laptop into a tablet. Even today, Mac users who want to get touchy-feely with "real" software rather than just apps have no other options.

2009
The Avatar Tablet

All kinds of anguished teens and other goofs reported being clinically bummed out after seeing *Avatar* because they had to live on Earth rather than Pandora. But the true torment came when tech geeks realized they couldn't have access to RDA Corporation's slick transparent tablet computer. That thing was seriously badass. Full multitouch and brilliant color emanated from a seemingly ordinary piece of Plexiglas powered wirelessly by the pain and suffering of giant blue humanoids.



2010
Apple iPad

Perhaps you've heard of the iPad. Apple has sold 15 million units of the world's first "post-PC" tablet. As the first runaway tablet success in what we'll call the post-PDA world, the iPad set a high bar for the myriad tablet competitors that have come since—or have yet to surface. The iPad's intuitive interface and huge library of third-party apps has endeared it to a huge population of non-computer enthusiasts.

and drop music and video files from your PC to a tablet. It's a revelation. Traveling to Asia? Just rip 18 hours of movies to a compatible codec, drop it on your Honeycomb tablet, and you're good to go.

DISPLAY SUPPORT The size, resolution, and aspect ratio of your tablet's display affect your entire user experience. Right now, we feel that Honeycomb devices have the upper hand in this area. As far as total diagonal inches, they're just a tad larger than the iPad (10.1 inches to the iPad's 9.7).

In Honeycomb, you can fill up to five desktop panels with interactive widgets that update in real-time. It's like viewing an app without loading an app.

But Honeycomb tablets offer a 1280x800 resolution where the iPads clock in at 1024x768. The extra resolution is appreciated for greater pixel density in visual content (132ppi for the iPads; 160ppi for Honeycomb tablets), as is Honeycomb's 16:10 aspect ratio. When you're watching wide-format HD content, Honeycomb tablets don't letterbox nearly as badly as the iPads.

Rumors say the next-gen iPad 3 will have an ultra-high-definition 2048x1536 "retina display." That's peachy, but this pixel grid would appear in the current 9.7-inch screen size. With more than 100,000 apps coded for a 4:3 aspect ratio, it would be madness for Apple to switch to a widescreen format at this late a date, and a display larger than 10 inches would make for an unwieldy beast.

EASE OF USE As we've said before, it's easier to just jab your power button and begin, um, "doing stuff" on an iPad relative to a Honeycomb device. Apple's desktop is cleaner and doesn't suffer much "What am I supposed to do now?" ambiguity. Because it exposes nothing more than app icons, operation is a simple matter of hitting an icon and working within the simple GUI of whatever iOS app you've launched.

Honeycomb, meanwhile, isn't "difficult," per se (and certainly not to Maximum-echelon users), but its interface is more complex, and Android apps tend to be more clumsily designed in general. You're given more user-controlled options across the OS, and this can lead to confusion among newbs. And while it's true that using iTunes for the file-management of your personal media is a PITA, the entire discovery and downloading process of store content is easier in iOS than in Android.

But Honeycomb's biggest user-experience problem is "system fragmentation." Not all Honeycomb updates are available for all Honeycomb tablets at the same time. As a result, the current field of Honeycomb devices is fragmented between OS versions 3.1 and 3.2. Even worse, device support for Honeycomb apps can also be staggered. A glaring example: At press time, only the Asus EeePad Transformer and Lenovo IdeaPad K1 were approved to run streaming video content in the Netflix app.

Bottom line: If you're buying a tablet for a tech-challenged loved one, get an iPad 2.

WINDOWS TABLETS? TOO SLOW, TOO CLUNKY

We sometimes forget there's a tablet version of Windows 7—probably because it's a big, bloated mess when running on the underpowered tablet hardware that suffers the indignity of running it. We've been playing with it on the Viewsonic ViewPad 10, which dual-boots between Android 2.2 and Win7, and the Win7 side of the experience is vexing to no end.

It's difficult to say whether the tablet's 1.66GHz Intel Pine Trail processor is woefully underpowered for the OS, or if touch navigation in Win7 is a rushed-out, kludge job. But the bottom line is that the OS doesn't offer any of the multitouch gestures available in iOS or Honeycomb. Instead, you use your finger to move a cursor, and this operation is both slow and imprecise. And when the tablet is churning away in apps, it just plain chugs.

Forget about Win7. If Microsoft has any future in tablets, it will be tied to Win8.

2010
Samsung Galaxy Tab

While it wasn't the first "serious iPad competitor," the Galaxy Tab was the best of 2010's crop of iPad opponents. It ran Android 2.2, had front and rear cameras, a beautiful 7-inch screen, and a zippy 1GHz Samsung processor. Although the screen still didn't offer enough real estate to make the iPad tremble in its dock and pee a little, it suggested good things to come.

2011
Motorola Xoom

The first tablet to really challenge the iPad, the Motorola Xoom launched a few weeks before the iPad 2 with a 10.1-inch screen and Android 3.0 (Honeycomb). While it has impressive hardware, including much better cameras than the iPad 2, the battle for tablet supremacy may come down to the quality and quantity of available apps. Honeycomb-optimized apps are still extremely sparse, while the iPad counts more than 65,000 native apps.

2011
Apple iPad 2

The second-gen iPad adds front and rear cameras, a dual-core processor, and some new software extras. It's also thinner and lighter. While not an earth-shattering update, the iPad 2 sold out in a day and waiting lists were still up to three weeks long a month after its release. The runaway iPad freight train now simply thrives off momentum. With such a following and a huge, established developer base, it will take a true tablet superhero to derail this baby.

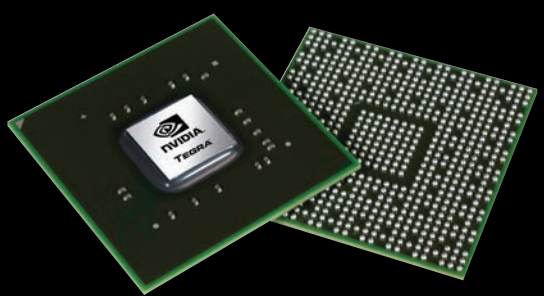
HARDWARE SPECS:
WHAT TO LOOK FOR

YOU WON'T FIND MUCH VARIATION IN INTERNAL COMPONENTS, MAKING HEAD-TO-HEAD HARDWARE COMPARISONS THAT MUCH MORE DIFFICULT

The Toshiba Thrive stands alone in offering both full-size USB and HDMI ports.

OK, so you're sold on buying a tablet, and you've even chosen between the iPad 2 and a Honeycomb variant. Now it's time to arm yourself with specs knowledge for comparison shopping. Most tablets are markedly similar, but here's what matters most.

CPU/RAM Every Honeycomb tablet released thus far contains the same 1GHz Nvidia Tegra 2 chip and 1GB of RAM. This dual-core Nvidia silicon is based on the ARM Cortex A9 architecture. The iPad 2 also contains a 1GHz dual-core chip—the Apple A5—and it is also of the A9 persuasion. The iPad 2, however, comes with just 512MB of RAM. Smartphones are already shipping with 1.2GHz dual-core chips, so expect next-gen tablets to scale accordingly.



Every Honeycomb we've tested comes with the same 1GHz dual-core Tegra 2 chip.

DISPLAY All Honeycomb tablets ship with a 10.1-inch, 1280x800 display—per the Android 3.0 spec. What differs, however, is screen quality. The display of the Samsung Galaxy Tab 10.1 is bright, vibrant, and relatively true. The screen of the Motorola Xoom, meanwhile, is so dim and dull (and fraught with bad off-axis viewing), some critics suspect Motorola is using inferior twisted-nematic (TN) display technology. Bottom line: All Honeycomb tablets bear the same screen dimensions and resolution, so make sure the one you purchase looks great on a pixel-by-pixel basis.

As for the iPad 2, it uses the same 9.7-inch, 1024-x768 display found in the original iPad. Its brightness and color accuracy are laudable, but we prefer the greater resolution and 16:10 aspect ratio of the Honeycomb models.

STORAGE Today's tablets typically offer 8, 16, 32, or 64 gigs of solid-state storage. Want more storage? Then buy a more expensive model. And if you suspect that you'll be wanting a lot of storage space—and storage flexibility—look for a Honeycomb tablet that supports SD cards (giving a second life to all those random memory cards sitting in the bottom of your camera bag). The Toshiba Thrive even supports a full-size SD card, good for 128GB of extra storage.

WI-FI/3G Every tablet includes Wi-Fi support. Some include 3G support as an option, and some (like the Asus Transformer) currently don't offer a 3G version at all. This is our take on tablet 3G service: It's expensive. It can't be rolled up into our existing smartphone data plans. And we already have 3G service built into our smartphones. If we need to check email or look up a piece of information in an area without free Wi-Fi, we'll use our phones. There's no reason to avoid a tablet with 3G support, and it's nice to have that support in a pinch. But if you're pinching pennies, it's probably not worth the investment.

CAMERAS As we stated before, there are very few reasons to care much about camera quality. Still, all modern tablets come with both front- and rear-facing cameras, so you might as well get the best cameras possible. Front cameras are only appropriate for (grainy) video chat, and usually range between 1.2MP and 2MP. Rear cameras typically fall right at 5MP, but we say to focus on image quality instead of cold, hard megapixel numbers. And if you really must give a damn about your tablet's camera, you may as well get one with LED flash.

I/O Android tablets are relatively cookie-cutter—except when it comes to ports, car slots, and power cables. What kind of USB ports does your tablet include—micro, mini, full, or none at all? What about HDMI—micro, mini, full, or none at all? Full-port support for both USB and HDMI are most welcome. SD card support is also a plus. And get this: The Toshiba Thrive has a user-swappable battery.

Unfortunately, all of the tablets we discuss in this article depend on different proprietary power connectors, and none of the tablets with USB ports can charge via these ports. The downside is that you may find yourself powerless and SOL when the inevitable cable misplacement occurs.

CHASSIS We know we'll catch heat for saying this, but we don't think a tablet's weight is that important. Just how weak do you have to be to quibble over the 1.65 pounds of the Lenovo K1 relative to the 1.33 pounds of the iPad 2? We're much more interested in a tablet's thinness (the iPad 2 and Galaxy Tab 10.1 rule this roost), and its backing material. In fact, we rather like the grippy, rubberized back panels of the Toshiba and Lenovo tablets.

The Lenovo tablet has a rubbery back panel that's less cold to the touch and easier to grip than what you'll find on snazzier-looking competitors.

HARDWARE HEAD-TO-HEAD
(to Head, to Head, to Head, to Head, to Head...)

APPLE IPAD 2

iPad Part Deux is the slickest, most idiot-proof, most aesthetically striking tablet around. It hooks directly into the greatest App Store in the world, and software developer support from both big-name studios and indies isn't showing any signs of fatigue. This second iPad version includes a 1GHz dual-core CPU, and comes in a wide variety of storage and data connectivity configurations (16GB, 32GB, or 64GB, with or without 3G support). Hardware-wise, though, all iterations are hobbled by just 512MB of RAM and a rear-facing camera that we find to be craptacular.

The 9.7-inch display is bright and accurate, but its pixel density isn't world-class, and the 4:3 aspect ratio seems oh-so-déclassé. Still, the iPad 2 is one of the thinnest, lightest tablets available (0.34 inches, 1.33 pounds), but you'll pay a premium for its fancy-pants design. You may be better served by waiting for the iPad 3, which could hit retail by November.

VERDICT 8

Apple iPad 2

$500 (16GB, Wi-Fi only) to $830 (64GB, Wi-Fi+3G), www.apple.com

Originally reviewed April 2011

MOTOROLA XOOM

When we reviewed the world's first Honeycomb tablet in March, we gave it a 9 verdict for all the great things that Honeycomb does well. Some five tablets later, however, the Xoom doesn't quite zoom the way it used to. It's been updated to Android 3.1, and there's now a 3G version available, but the base hardware doesn't match up to specs you'll find in newer competitors.

USB is limited to a Micro USB port, the 5MP rear camera isn't as good as those found on competing models, and industrial design is thick and heavy (0.5 inches, 1.6 pounds) compared to tablets that offer more hardware doodads. Most glaringly, the Xoom display is the worst among all Honeycomb devices. It's demonstrably dim compared to the rest of the pack, text rendering is grainy, and off-axis viewing is poor. The Xoom would likely receive a 6 or 7 verdict if reviewed in today's environment.

VERDICT 9

Motorola Xoom

$600 (32GB Wi-Fi+3G version w/o data plan), www.motorola.com

Originally reviewed April 2011

SAMSUNG GALAXY TAB 10.1

Hands down, the Tab 10.1 boasts the most impressive industrial design of any Honeycomb tablet, and its depth and weight (0.34 inches, 1.24 pounds) actually beat the iPad 2—at least in the weight department, which we don't care about much, but still. More importantly, the Tab 10.1 offers the best display in this entire tablet hoedown. Samsung doesn't promote it as one of its extra-fancy "Super TFT" displays, but it's noticeably brighter, more vibrant, and just plain more exciting than any other tablet display we've seen.

If reviewed today, this device (currently running Android 3.1) would still receive the 9 verdict that we awarded it in late June. The industrial design and LCD still garner high accolades. We will note, however, that the Tab 10.1 lacks a few features that make other Honeycomb tablets intriguing. Its rear camera is only 3MP (though image quality doesn't suffer for it), and you won't find built-in USB and SD card ports of any kind.

VERDICT 9

Samsung Galaxy Tab 10.1

$500 (16GB, Wi-Fi only) to $630 (32GB, Wi-Fi+4G LTE), www.samsung.com

Originally reviewed June 2011

ASUS EEEPAD TRANSFORMER

For folks who really think a Honeycomb tablet can replace a note-book, Asus delivers the EeePad Transformer. Paired with an optional keyboard dock ($150 MSRP), this Android 3.2 tablet delivers the tactile response of real-world chiclets, and provides extra battery life, some quick-launch keys, and two USB ports, to boot. After many months of use, we concede that the included Polaris Office suite isn't a viable long-term substitute for MS Office on a Windows note-book, but it's better than nothing in a pinch.

At 0.51 inches thick and 1.5 pounds, the Transformer is thicker and heavier than the iPad 2 and Tab 10.1. And thanks to speakers lodged at opposing ends, it's also longer by about an inch. But have you seen the price? The Transformer is priced to move. Reviewed today, this tablet wouldn't earn a verdict less than an 8, and still may even deserve a 9.

VERDICT 9

Asus EeePad Transformer

$400 (16GB, Wi-Fi only), www.asus.com

Originally reviewed May 2011

In the following eight reviews, some of which appeared in previous issues, we do our best to differentiate among eight popular (or at least talked-about) tablets shipping today. The Honeycomb entries bear exceedingly similar specs, so we did our best to tease out differentiating factors. Please note that at *Maximum PC* we don't update our official review scores, even when revisiting products in more technologically advanced times. You will find, however, that we provide insight on how scores might change.

LENOVO IDEAPAD K1

It may not be the slimmest or prettiest Honeycomb device, but the K1 is packed with useful features. Specs-wise, you get a nice (but not world-class) screen, Android 3.1, a 5MP camera, and microSD and Mini HDMI ports. Weight and width are portly at 1.65 pounds and 0.52 inches, and 3G isn't enabled in the U.S., but we dig the back panel, which is warm and grippy.

The Lenovo is newbie-friendly and comes packed with apps. The home screen is preconfigured with quick-launch buttons for the browser, as well as for email, e-books, and music and video playback. But the pièce de résistance is the preinstalled Netflix app—and this version plays streaming video! That's such a win. The K1 doesn't have full-size ports, and its screen can't beat Samsung's. But we love the software build and can forgive the chub. It only gets a verdict of 8, because Netflix streaming isn't worth a full verdict point.

VERDICT 8

Lenovo IdeaPad K1

$450/$500 (16B/32GB Wi-Fi only), www.lenovo.com

TOSHIBA THRIVE

What we love: the grippy back panel, a user-replaceable battery (buy a second at $90 for double the juice!) and full-size USB, SD, and HDMI ports. That's right: full ports. Now you can drag-and-drop data from USB keys, add up to 128GB of extra flash storage, and hook the Thrive into your living-room TV with no adapters. These are fantastic—albeit heft-enhancing—features.

What we dislike: The chassis is chubby (1.6 pounds, 0.63 inches) and screen quality is just so-so. It's also hard to locate and operate the on/off button and volume rocker without looking straight at them, and the front panel is adorned with annoying LEDs reporting on power, battery, and wireless status. 3G isn't available, and you won't find any interesting apps installed, à la the Lenovo. But port and juice junkies looking for an inexpensive, solid Android 3.1 tablet must consider the Thrive. You can even buy an 8GB version!

VERDICT 8

Toshiba Thrive

$380/$400/$480 (8GB/16GB/32GB Wi-Fi only), www.toshiba.com

ACER ICONIA TAB A500

At this point in the arc of the Honeycomb tablet story, there really isn't any reason to consider the Iconia Tab A500, except maybe its bargain-basement street prices. The tablet is pudgy at 0.5 inches deep and 1.6 pounds. It doesn't have full-size HDMI or SD slots. There's no user-swappable battery. There aren't any special app packages or Netflix streaming support. You get a so-so 5MP rear camera, a pretty standard display, and microSD and Micro HDMI ports. Really, the most "exciting" thing of all about the A500 is its full-size USB port (along with a second Micro USB). And that alone generates about as much excitement as a box of raisins on Halloween.

Industrial design? Meh. Even if you can forgive the porkiness of the chassis, we're left uninspired by the brushed-aluminum strips flanking the top and bottom of the display. The A500 gets points just for playing, but we don't know why anyone would buy one.

VERDICT 6

Acer Iconia Tab A500

$450/$500 (16GB/32GB Wi-Fi only), www.acer.com

RIM BLACKBERRY PLAYBOOK

Can you consider a 7-inch tablet viable in a fight where everyone else is wielding 10-inch devices? And when email is such an essential mobility feature, can you accept a tablet that depends on phone tethering for this service? And can you support an app store that makes even the Android Market look like the Mall of America in terms of inventory volume and variety?

In the case of the PlayBook, we have to answer no to each question. Pixel for pixel, this tablet has a perfectly fine 1024x600 screen, and we even appreciate the speedy, fluid OS (though having to swipe the screen perimeter to return home is an unnecessary affectation). But we still can't find a single reason to recommend this tablet outlier—unless you don't care about apps (especially games) or are some kind of BlackBerry fanboy with a nihilistic urge to support a tablet platform without a future. Revisionist history says the PlayBook deserves a 5 verdict.

VERDICT 6

RIM BlackBerry PlayBook

$500, $600, $700 (16GB/32GB/64GB Wi-Fi only), www.blackberry.com

Originally reviewed June 2011

HOW TO RID YOUR PC OF MALWARE

Four steps that will keep your PC happy, healthy, and crap-free!

By David Murphy

MALWARE SUCKS. In the best-case scenario, it craps up your system with unwanted files and occasionally makes itself known in the form of a persistent pop-up window or annoying browser-based toolbar. In the worst-case scenario, malware completely takes over your desktop or laptop and ruins your life.

Your system slows to a crawl. You can't even boot into Windows in the time it takes you to walk to the kitchen and back. Your data gets sent off to a faraway Internet land or, worse, your actual keystrokes are recorded for some unsavory individual to see. Malware locks down your browser, making you unable to actually do any browsing without being carted off to some bogus domain. You can barely run a program in Windows without getting bombarded by fake advertisements, programs, and dancing people on your desktop.

We can't make this stuff up.

So what's a computer enthusiast to do? Step zero: Read this guide, because we're going to walk you through all the key details you need to know to both rid your computer of this junk and keep it free of downloaded nasties forevermore.

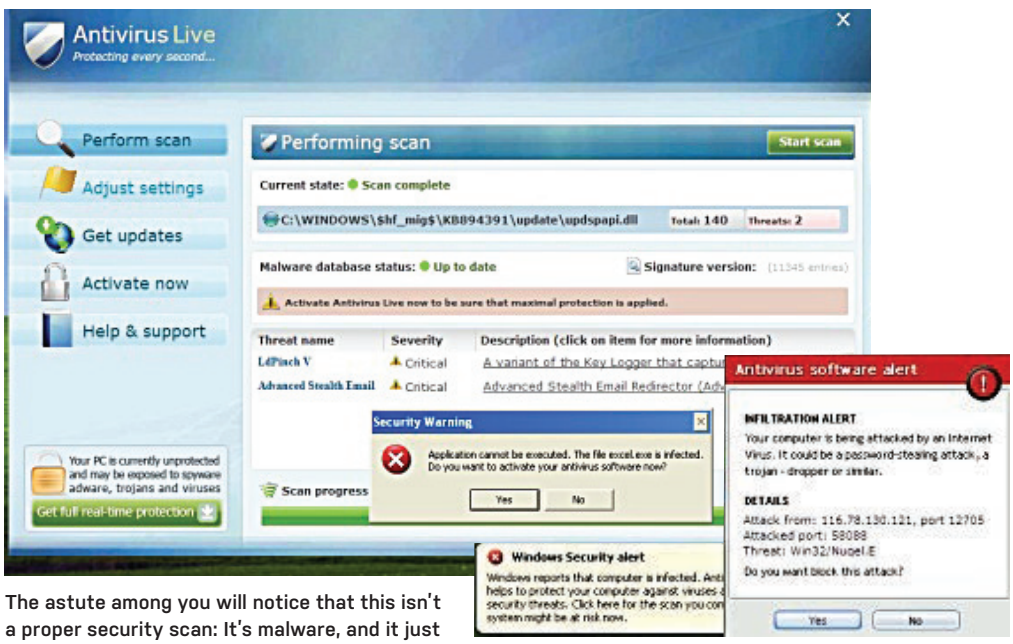
1 Don't Browse Blindly

WHAT'S THAT? The first step doesn't inolve files to download or utilities to blast malware from your system? Exactly. The most important thing you have to realize in order to fight the great malware war is that you, and you alone, are the first line of defense. You have only yourself to blame if your computer is completely overridden with problem-causing, yet preventable, programs.

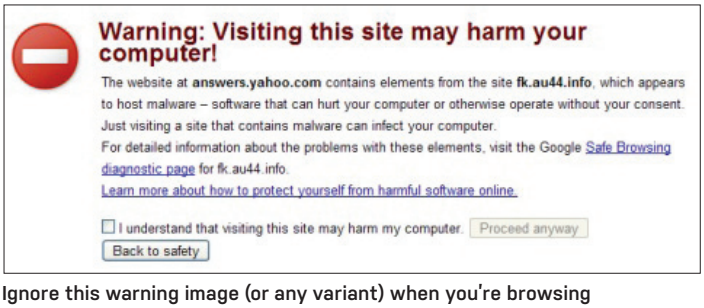
Much of the more annoying malware that you can accidentally befriend requires your cooperation in order to get on your system in the first place. You have to download and run an unknown file or agree to have a toolbar placed on your system as part of a software installation routine. You have to accept certain kinds of JavaScript or be fooled by scam websites that claim to be running a virus scan on your system (to name one such harrowing tale).

In short, you have to let your guard down.

So how do you protect yourself against your own habits? Keep in mind this rule of thumb: If it's too good to be true, if it looks strange, or if it's completely unknown to you, don't run it. Don't install it. Don't accept it, don't hit "yes" to it, and don't let it get anywhere near your system. Google, Bing, and Yahoo are your friends. Use them to find more information about a given program before you agree to let it do anything on your system. Don't surf the Internet blindly, assuming that everything on a website is safe for your system to digest.

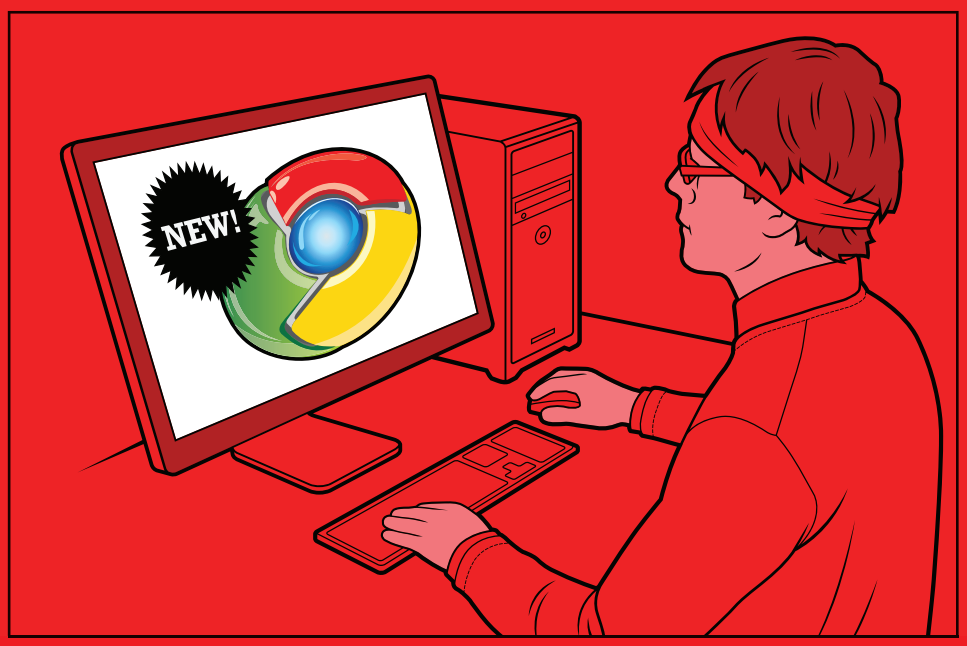


The astute among you will notice that this isn't a proper security scan: It's malware, and it just made life very difficult for this system's user.



Ignore this warning image (or any variant) when you're browsing the Internet, and you could be in for a world of digital hurt.

2 Batten Down Your Browser



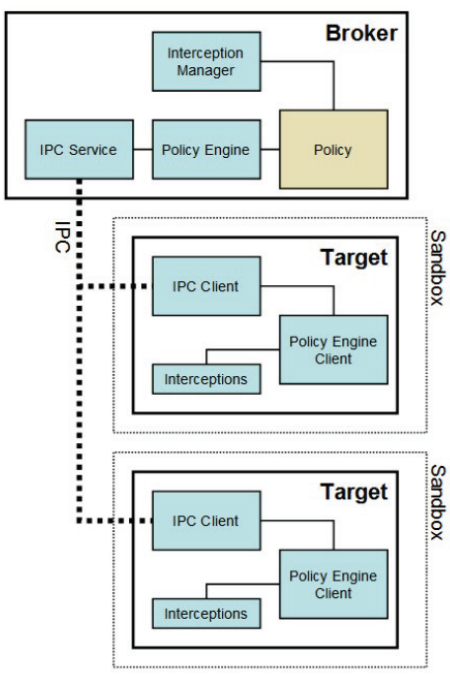
WE MENTIONED that a bunch of malware can come through your browser—'tis a shame, we know. Vulnerabilities in browsers and plugins (and user error) can bring your system to its digital knees faster than you can spell the word "crap" in "crapware." So let's start with the simplest step: Stop using an outdated, insecure browser. Make sure you're at least sporting the latest version of one of the Big Three: Internet Explorer, Firefox, or Chrome.

But which? Various research reports have dubbed each of these three browsers as the "best in class" against malware and other social-driven attacks. Our personal preference when it comes to safety is Google's Chrome browser for three reasons: First, it's the only browser to use sandboxing as its primary defense mechanism. This method combines a JavaScript virtual machine with an OS-level sandbox to prevent successful attacks against the browser's rendering engine from affecting a user's file system. Second, Chrome has been, hands down, the hardiest survivor of each year's Pwn2Own hacking contest at the CanSecWest security conference: Talk about a real-world verification of its security capabilities, eh? Third, Google updates the Adobe Flash and Acrobat Reader modules itself. So if you're running the latest version of Chrome, you're running the latest, most secure versions of Flash and Acrobat Reader available (click the wrench icon and About Google Chrome to verify that you're running the latest updates).

Firefox's NoScript add-on is an excellent tool for preventing page plugins from running on untrusted sites.

But we're just getting started. JavaScript vulnerabilities—including blatant attacks that rely on a user's cooperation to work—can just as easily affect your browser. If you're rocking Firefox, grab an extension called NoScript, which will allow you to disable a page's plugin elements (including JavaScript and Flash!) by default, unless you trust the site enough to give 'em a go. Chrome doesn't have an add-on for the same feature, but you can disable JavaScript by default in the browser's Under the Hood settings section. And if you want to specifically allow a site's JavaScript to function, just click the associated X icon in the browser's address bar to set up site-specific trust. Or, if you don't mind using a slight variant, you can do your best to mimic NoScript-like control using the NotScripts add-on.

Other extensions and add-ons worth wielding to fight the malware fight include Web of Trust, KB SSL Enforcer, Adblock, and HTTPS Everywhere.



Google Chrome uses a sandbox to better protect you from web attacks. And based on the limited number of successful hacks over the years, it's worked!

3 Use Software Safeguards

RUNNING A PERFECT browser setup only goes so far in the battle against malware: Remember, you are your own worst enemy. Assuming that malware could slip through the gates at some point, what are some of the free software tools you can use to equip your system with powerful protection before a rogue app gets out of hand?

First up, you'll want a comprehensive scanner running day in and day out to make sure that each and every bit of software you slap onto your computer gets a quick check. For that, we turn to none other than Microsoft's own Security Essentials app (bit.ly/f0WWra). Our reasons are simple: It's free and it works. Is it as comprehensive as a premium paid solution? No, but our rationale here is that it's better to have free AV that has updated definitions than a paid AV suite with a lapsed subscription.

Install Security Essentials and you'll get instant access to frequent Microsoft virus and spyware updates, in addition to a real-time scanning mechanism that protects your system from anything you download from the Internet (or, if you're fancy, anything on a USB device from the moment it's jacked into your system). MSE schedules nightly scans to run by default, but feel free to reschedule these for any time that suits you. Additional options let you set the exact parameters for when the scanning should start, which include the ability to restrict virus and malware hunts to periods when your CPU use is below a certain threshold.

Some of the very best anti-malware apps on the market can be had for free, but with an asterisk: We're talking, of course, about SuperAntiSpyware (www.superantispyware.com) and Malwarebytes' Anti-Malware (www.malwarebytes.org). We're fans of Malwarebytes' offering, mainly because the freeware version of its powerful antispyware app gives you a few more features to tinker with than SuperAntiSpyware's. The hitch with both? No real-time protection, so make sure you set a mental task for yourself to run these apps on a daily or weekly basis.

If you want to get truly hardcore, be sure to grab ComboFix (www.combofix.org), as well. This app, often considered the "nuke it from orbit" option for certain nefarious bits of malware, uses the Windows Recovery Console to find and eliminate annoying malware. It doesn't protect your system up front, but it's a great tool to have in your back pocket when disaster strikes.

EXTREME PRECAUTIONS

So you're paranoid. We get it. There's nothing wrong with wanting even stronger security measures than those we've mentioned in this article. For the best-in-class prevention against debilitating malware and viruses, you have two options: a virtual machine or a "live CD."

A virtual machine is exactly what it sounds like: a pseudo operating system that runs within your existing operating system. Think *Inception*. Anything that happens to your OS-inside-an-OS cannot break out of the dream. Applications, malware, drive formats, you name it: That which transpires within the virtual machine's operating system will never affect your actual operating system running one layer above it. Beware, though: Some malware can tell if it's running on a VM and won't activate if it is. This can make compromised software seem harmless, and could get you to lower your guard and install it on your real machine, where the malware will activate.

Our recommendation? Check out VirtualBox (www.virtualbox.org), a totally free VM that lets you install any Windows version you want.

You can also super-protect your primary system (or browsing experience) by running your actions off a live CD. A live CD is typically a version of the Linux operating system that's been installed on a physical disc or USB key. Restart your computer and boot off a live CD, and you'll find yourself within a self-contained OS that's free of malware and other problems the second you boot. Once you're finished, presto: Your changes can disappear and you'll be back to a brand-new version of the OS to boot into the next time you need it.

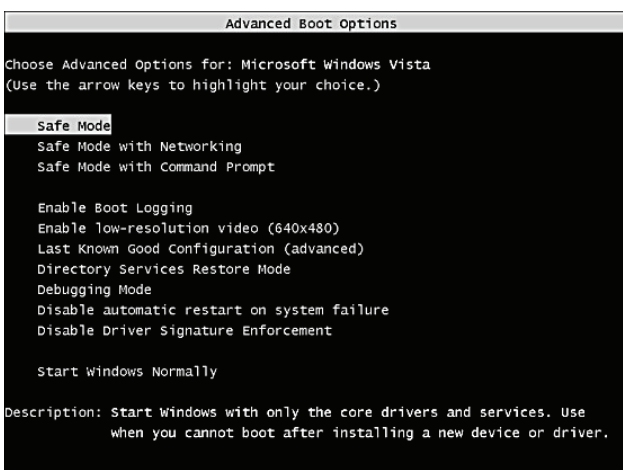
Our recommendation? Check out Xubuntu (www.xubuntu.org). It's not as graphically interesting as other Linux "buntus," but it does give you a bit more flexibility for running the operating system on lesser systems—like those with anywhere from 256 to 512 megabytes of RAM.

4 Recover from Disaster

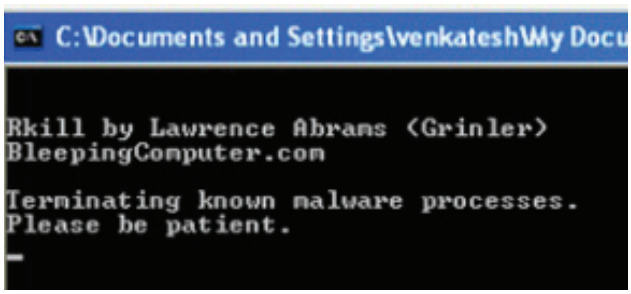
SO YOU'RE INFECTED. Shucks. Malware comes in different forms and annoyance levels, depending on just how well the particular piece of offending software has entangled itself into your operating system. This makes it difficult for us to deliver a fix that fits every situation. However, we can at least give you a few helpful suggestions for freeing your PC from malware's clutches.

First off, see if a simple scan from Windows Security Essentials stops your issue dead in its tracks—likely not, but it never hurts to try the simplest solution before you start rolling up your sleeves a bit more. Update your definitions and select the full-scan option, and then sit back and hope that Microsoft's scanner can fix your problem. No luck? Next, fire up Malwarebytes' Anti-Malware, make sure your definitions are updated, and run a full scan on your system. If it catches an issue, great; if not, and your malware problem persists, it's time to get a little more creative. Fire up the utility RKill (www.bleepingcomputer.com), and use it to try to force-stop any malware processes that happen to be running in your system's background. Run a full scan with Malwareybytes' Anti-Malware one more time.

If you're still out of luck, you'll want to reboot your system into safe mode (keep pressing F8 as the BIOS loads until you're given the option for safe mode) and repeat the same RKill/Malwarebytes' Anti-Malware step as before. You're doing this in an attempt to unhook whatever malware's plaguing your PC from the operating system itself: It's not getting wiped out because it's still active (and possibly protecting itself from your removal tools).



Booting a system into safe mode is a useful technique to prevent malware from starting—and to ensure that your antimalware apps catch it.



RKill is an excellent tool for detaching malware that won't stop running on your system: If it's running, it's not getting deleted by your antimalware apps.

Still hurting? Fire up ComboFix and let the scanning and removal tool work its magic—if, for some reason, it can't remove whatever's affecting your system, you'll get a lengthy log that you can post on one of ComboFix's associated web forums for further assistance from qualified log parsers. At this point, it might be worth your while to check out other scanning tools not explicitly mentioned in this article, which range from Spybot Search&Destroy (www.safer-networking.org), to McAfee Labs Stinger (bit.ly/fLQZGQ), to GMER (www.gmer.net), to Sophos Anti-Rootkit (www.sophos.com), and the list goes on. And you might also benefit from grabbing a few live CDs, like AVG's Rescue CD (bit.ly/duJOqW) or Hiren's BootCD (bit.ly/atD4Cz), for malware and virus removal.

There are nearly as many tools for removing malware as there is malware to infect you. The better you can protect your PC up front, including training yourself to recognize potential malware when it presents itself and keeping it off your system to begin with, the less you'll have to fool with potentially complicated removal techniques later.

But if you have to go down this route, and simple scans aren't getting the job done, don't forget to try ripping active malware processes out of your operating system and booting your PC into safe mode. After that, exorcising these software demons from your system is all up to your tenacity, your search engine research skills, and your knowledge of third-party removal apps—Or, if worse comes to worst, your backup schedule. You know, a clean install is but a few clicks away!

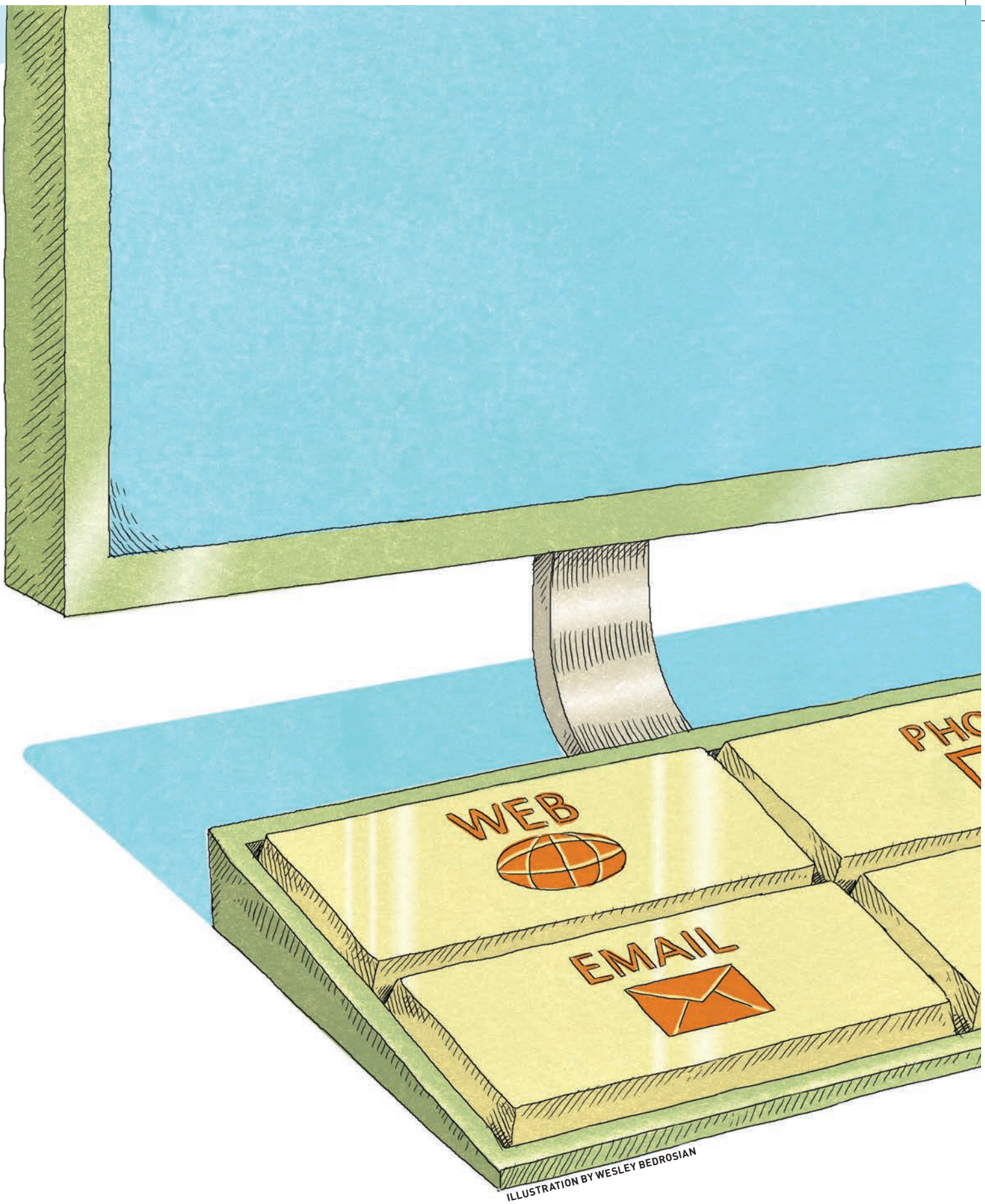
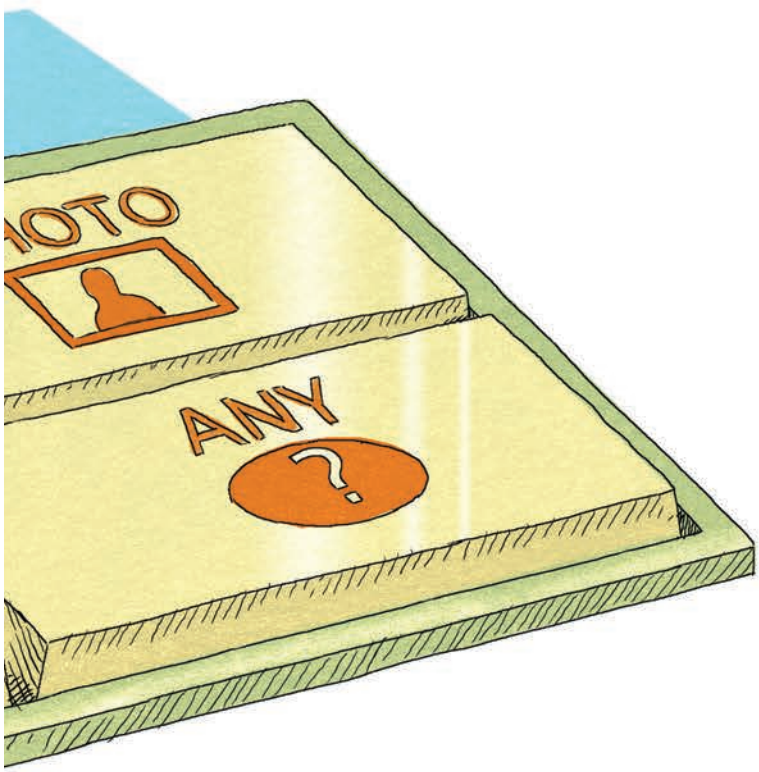


ILLUSTRATION BY WESLEY BEDROSIAN

EASY DOES IT

HOW TO SET UP THE COMPUTER-PHOBE IN YOUR LIFE WITH TROUBLE-FREE COMPUTING



ARE YOU READY FOR THAT 3 A.M. PHONE CALL?

No, not the call from JSOC hoping to get approval to chopper in DEVGRU to take out a Tier 1 operative (what that means even we don't know). What we're talking about is that 3 a.m. call from your sobbing parent, sibling, or acquaintance desperately asking for your help with a computer.

It. Gets. Old.

Let's admit it, for those computer-phobes, a personal computer with a fully featured and robust operating system isn't right for either them or you. As wonderful as a PC with a real operating system is, there's maintenance to be done, patches and drivers to be installed, and enough dials, knobs, and gauges that a computer-phobic cyberklutz can really bork things up faster than you can say right-click.

But in a world where not having access to email, Facebook, and the Internet puts you as far off the grid as the Unabomber, is there a way for these folks to have an easy, trouble-free computing lifestyle?

To find out, we looked at three machines—the Telikin Touch, the Samsung Series 5 Chromebook, and Apple's iPad 2—that just might be idiot-proof enough to keep even a complete computer-dufus from screwing things up.

BY GORDON MAH UNG

TELIKIN TOUCH

IT FEELS A BIT LIKE A COMPUTER KIOSK, BUT THAT'S FOR YOUR PROTECTION

The Telikin Touch features a touch screen and a custom Linux UI and is built with seniors in mind.

THE TELIKIN IS BILLED AS "quite possibly the world's easiest computer." And we can see why. Originally aimed at non-tech-savvy elderly folk who want a computing experience without having to dial-a-nerd every day, the Telikin offers a custom-designed OS to do just a few things, but do them easily.

The Telikin Touch itself is an off-the-shelf, 18-inch MSI all-in-one with a dual-core Atom, a 320GB hard drive, 2GB of RAM, and Wi-Fi. The Telikin's performance isn't horribly slow, but it's certainly not as responsive as the other two devices we're reviewing here and can lag on occasion. The Telikin's main selling point is its ease of use and senior-friendliness. The unit comes with a USB keyboard sporting very large letters, and there is an option for a keyboard with even larger letters. The OS itself is a variant of Linux that's been tweaked to display big, friendly buttons on one side for email, browsing, and games.

The buttons are large enough that the screen's touch capability works surprisingly well. The touch screen doesn't support flick-based scrolling, but the big buttons and a UI that's never hidden ensure that the newb can't get lost.

The Telikin supports Skype, Facebook, and POP- and IMAP-based email systems. We did hit a snag here: We let the Telikin configure our Hotmail account, but it biffed on the outgoing mail port. We corrected it easily, but this would leave a computer-newb stumped for months. The iPad 2 got this right, while the Samsung Series 5 Chromebook didn't have native client support for Hotmail.

Another big fail for the Telikin came soon after our first boot: a LibreOffice fatal error and occasional hard locks. The error message itself is enough to send a computer-phobe cowering in a closet, but the hard locks? Inexcusable. We thought it was all over for the Telikin but a call to the company resulted in a tech logging into the machine remotely and applying a quick patch. From that point on, the error messages and lockups went away. We almost wondered if the company planned this as a way to showcase its tech support—but no, that's too Machiavellian even for us. The machine comes with free 60-day VIP support, whereby you don't have to wait in the queue to have issues fixed. After the 60-day period is up, you can still get free support and a tech will still remote in, but you have to wait longer on the phone. There's also the ability to back up your data remotely to Telikin's servers for $10 a month, and that includes the VIP support treatment.

Maintenance of the unit should be fairly painless, as updates are pushed out by Telikin as needed, and the company promises to offer updates for the life of the unit.

In ease-of-use, the Telikin is extremely simple—perhaps easier than the iPad for some. In our attachment test, we could open PDF and Word files without issue, but Zip files confused it.

The Telikin's main weakness is in gaming. There are a handful of games that come installed with the OS, but the rest will have to be Flash-based. That's not bad for a casual gamer, but the optimized iPad 2 games are far stronger. The machine has its strengths, though. The 18-inch screen is certainly easier for folks with vision issues, and the real keyboard is appreciated.

In video consumption, we could watch Flash-based videos on Vimeo and YouTube, but sadly, the Telikin failed on both Netflix and Hulu.

We're still a bit leery about the initial error and locks, but frankly, this isn't a bad solution for a senior who wants a bigger screen, full keyboard, and doesn't mind something that's not as polished or extensible as the iPad 2.

PROS: Large screen with touch capability; friendly to those with vision issues; easiest photo handling of the three.

CONS: Scary out-of-the-box errors; pricey; multimedia buttons on keyboard don't work.

BEST FOR: Senior computer-newbs; people with vision problems.

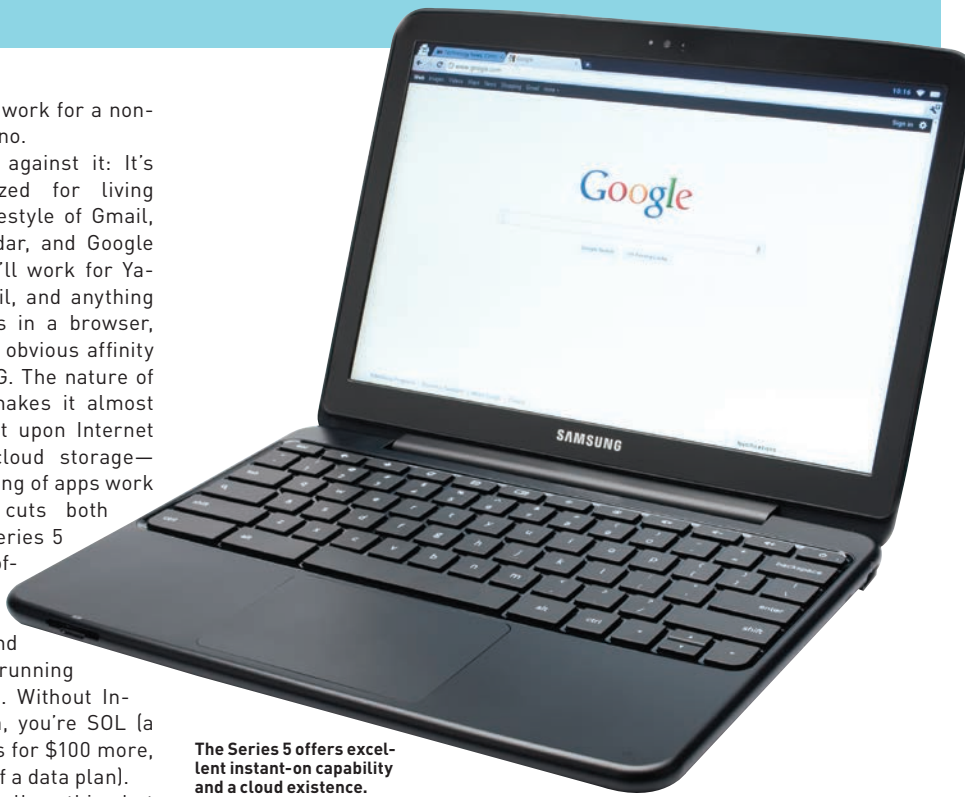
Telikin Touch

$700, www.telikin.com

AD

SAMSUNG SERIES 5 CHROMEBOOK

IT'S AIMED AT NERDS, BUT COMPUTER-PHOBES WILL FIND SOLACE IN THE SIMPLE BROWSER INTERFACE



The Series 5 offers excellent instant-on capability and a cloud existence.

OF ALL THE DEVICES here, people likely have the most difficulty understanding the Samsung Series 5 Chromebook. Running Google's Chrome OS, the Series 5 looks like a netbook, but it's not. The secret sauce is Google's Chrome OS. Built around a very lightweight Linux core, Chrome OS is just enough OS to talk to the hardware, run a browser, and that's it. There's no desktop and no icons to be tapped or dragged—it's all browser, all the time.

Frankly, that's what we thought made the Chromebook the perfect computer-phobe tool. He or she can't get lost in some menu or goof up a setting because there are very few options to tweak, and you can't exit from the browser. Even though Intel's lowly dual-core Atom powers the Series 5, the Chromebook has a responsive feel to it and will boot in four seconds—on the rare occasions that it even powers down. Most of the time it'll be in instant-on mode, which works wonderfully.

With its nice, spacious keyboard (which lacks a Caps Lock key, apparently to prevent SHOUTING on the Internet), the Series 5 is a truly unique piece of mobile hardware for someone with basic needs. But will this nerdware work for a non-nerd? Yes and no.

One knock against it: It's really optimized for living the Google lifestyle of Gmail, Google Calendar, and Google Docs. Yeah, it'll work for Yahoo or Hotmail, and anything else that runs in a browser, but it's got an obvious affinity for all things G. The nature of Chrome OS makes it almost entirely reliant upon Internet access and cloud storage—just a smattering of apps work offline. That cuts both ways. If the Series 5 eats a cup of coffee, no data is lost. Buy another one and you're up and running in 60 seconds. Without Internet, though, you're SOL (a 3G model sells for $100 more, plus the cost of a data plan).

Since it's really nothing but a browser, it's not surprising that the Series 5 offers excellent browsing and webmail support. We were able to watch videos on Netflix, YouTube, and Hulu without hitches, but not on Vimeo. Video chat is limited to Google Talk, so Skype lovers need not apply.

Casual gaming on the Series 5 is actually pretty good. It's certainly better than on the Telikin, which is limited to a few built-in games, as well as Flash- and Java-based games. Google has been pushing more Chrome-based games, and it shows with such winners as Angry Birds. Still, the selection pales in comparison to the iPad 2's rich experience.

Media handling on the Chromebook is disappointing. Chrome OS can now read an SD card in the Chromebook's slot, but we could only upload the files to Picasa. People have figured out ways to creatively move files to the SSD, but that definitely ain't an undertaking for newbs.

We did a simple attachment test to see how well the Series 5 could handle a Word, Zip, and PDF file attachment in a mail file when viewed from, say, Hotmail and not Gmail. The Series 5 handled the PDF just fine as an attachment download, but the Zip and Word files threw it for a loop. To open the Word file, you'd need to upload it to Google Docs—not exactly newb-friendly.

We don't discount the Series 5's usefulness, though. It's maintenance free, with updates pushed out automatically by Google, but the Series 5 is probably suited for slightly more advanced computer-phobes, if not outright nerds.

PROS: Fast boot; instant-on; very responsive; full-size keyboard, very long battery life; zero maintenance.

CONS: Interface is just plain boring; gaming is good but confined to a browser; media handling is poor.

BEST FOR: The computer-phobe who is willing to live an online, Google lifestyle.

Samsung Series 5

$400, www.samsung.com

APPLE IPAD 2

THOUGH A BIT HEAVY, IT OFFERS COMPUTER NEWBS THE RICHEST EXPERIENCE

The iPad 2's unparalleled extensibility through applications gives it a leg up over its competitors.

THE SHINING SYMBOL of the "post-PC" era is the tablet, and its most prominent representative is Apple's iconic iPad 2. That's one of the reasons we picked the iPad 2 as the tablet to test in this showdown over more feature-rich, but also more complicated Android tablets. We had high expectations that the iPad 2 would solve our computer-phobe problems. Part of that comes from a user interface so easy even a Mac user can handle it.

Right out of the gate we hit a snag: setup and maintenance. You don't just start using your iPad 2, you must connect it to a PC with iTunes running. What if you don't have a PC or Mac? You're SOL.

Far worse is the iPad 2's need to continually run home to mommy. Updates, for example, can only be applied through iTunes, and for us that was problematic. We eventually gave up trying to download a 647MB patch, leaving the iPad open to a very serious security certificate hack. Sigh. Fortunately, Apple is hoping to fix the iPad's reliance on another computer for future updates, but at press time, no such fix was available.

As is, though, the iPad 2's polish makes it a serious contender for computer-phobes. It's easy to set up for email, the browser is fairly powerful, and the extensibility through apps for just about anything you want to do makes it the most feature-rich device in this roundup. Out of the box, for example, you can't open Zip files or do video Skype, but a few free apps later, and your problems are solved. The killer feature of the iPad 2 is in gaming, though. A computer-phobe may check email or browse a bit, but the games are likely to suck them in. With its vast application bazaar, the iPad 2 is one of the strongest casual gaming platforms available today.

So what doesn't work for a computer-phobe? While it's a good media consumption device, you can't copy photos to it without either using a computer or paying for a special adapter. The lack of a real keyboard is also going to deter those who want an email device more than a browsing or gaming device. A Bluetooth keyboard can be added, but that increases the cost.

And for the computer-phobe who wants to use a device for long stretches of time, the iPad 2 can be a bit heavy to hold and the 9.7-inch screen a bit small—although the font size scales up nicely for those with vision issues. The screen's relatively low 1024x768 resolution also offended our high-tech tastes but a computer-phobe is unlikely ever to notice. Plus, the iPad 2 has the advantage of being more agnostic when it comes to web services, unlike the Samsung Series 5.

Yes, there's a lot of win for the iPad 2 here. From its super application bazaar, to its offline capability and its overly simplistic interface, the iPad is clearly the leading device for a computer-phobe—if Apple could, um, actually not require you to own a PC to use this, um, post-PC device.

PROS: Huge application offering; super-simple interface; easy email setup.

CONS: Requires a PC for setup and maintenance; form factor is not ideal for heavy use; users cannot easily copy photos to it.

BEST FOR: A computer-phobe with light usage patterns and access to a real PC.

Apple iPad 2

$500, www.apple.com

THE EASY ANSWER

THERE MIGHT NOT BE ONE PERFECT SOLUTION, BUT THERE IS A CLEAR WINNER

Let's be straight, there isn't a device here that we didn't find wanting in some capacity or another. From the Samsung Series 5's mediocre handling of media, to the iPad 2's requirement that you use another computer just to turn it on, to the Telikin's out-of-the-box error messages, not one of these machines is the perfect solution for the computer-phobe in your life. Let's face it, if completely trouble-free computing existed, there would be no computer-phobes.

Still, these devices do get closer to trouble-free computing than a full-fledged PC, each in its own way. The Telikin Touch seems perfect for the audience it was originally created for: computer-newb seniors who want a mouse and keyboard and access to a tech who can fix any issue remotely. The Samsung Series 5 is fast, responsive, and likely impossible to break, and it's a good compromise for the phobe who wants a keyboard, mobility, and zero maintenance. The iPad 2, for its part, offers portability and the offline functionality that the Series 5 can't, and its gaming and extensible app support is superb.

So can we declare a winner? Honestly, we think we can. Keep in mind that each solution has serious faults, but we think the all-around computer-phobe is best served by the iPad 2. We make that decision based on its agnostic web services support, its rich gaming, and its ability to meet a computer-phobe's evolving needs—because let's face it, the more comfortable a person gets with computing, the more they tend to want to do. For example, on the iPad 2 you can edit photos and video locally; not so on either the Telikin Touch or Series 5. And let's not forget the generous functionality offered through apps. The iPad 2's extensibility (with the help of an optional Bluetooth keyboard, of course) gives it a leg up over both the Series 5 and the Telikin. The only big fail for the iPad 2 where computer-phobes are concerned is that they may have to come to your house to update their devices on your PC once every few months. Still, that's a hell of a lot better than regular 3 a.m. phone calls.

FEATURE COMPARISON

> IF COMPLETELY TROUBLE-FREE COMPUTING EXISTED, THERE WOULD BE NO COMPUTER-PHOBES

	TELIKIN TOUCH	SAMSUNG SERIES 5	APPLE IPAD 2
Skype	Yes	No	Yes
Hulu	No	No	Hulu Plus only
Netflix	No	Yes	Yes
YouTube	Yes	Yes	Yes
Vimeo	No	Yes	
Maintenance	Automatic updates	Automatic updates	PC and iTunes required
Setup	Moderate	Easy	Easy but PC required
Email	Fair	Good	Excellent
Browsing	Good	Very Good	Good
Social Networks	Fair	Good	Excellent
Photo Viewing	Fair	Very Good	Very Good
Photo Import	Good	Bad	Needs adapter
Gaming	Mediocre	Fair	Excellent
Startup	Average	Excellent	Excellent
Responsiveness	Fair	Very good	Very good
Shutdown	PC-like	Excellent	Excellent
Typeface size	Excellent	Good	Very good
Native PDF	Yes	Yes	Yes
Native Word	Yes	No*	Yes
Native Zip	No	No	No**
Multiple Accounts	Yes	Yes	No
Price	$700	$400	$500

*Must upload file to Google Docs to view or edit

** Must download free .zip app to open

WHITE PAP

By BILL O'BRIEN

Micro-Holographic Disc Technology

GE promises to deliver 500GB on a single optical disc

General Electric garnered attention recently by announcing plans to deliver a micro-holographic disc product capable of storing 500GB of data on a CD-style disc that will operate at the speed of today's Blu-ray drives. As amazing an achievement as that might seem, it's certainly feasible within the boundaries of current technology. So rather than ask, "Is it possible?" the better question might be "Is it practical?"

CURRENT DISCOGRAPHY

Conventional optical discs—those used for DVD or Blu-ray tasks—use a 4.75-inch platter (a 12-inch platter is also part of the specification) with either one or two layers of substrate. (The technology actually defines up to four layers, but design complexities and costs have limited commercial designs to two layers.) A laser is used to alter the reflectivity of the substrate, emulating the pits and lands that are present in commercially pressed discs.

Each additional substrate adds storage capacity, but each subsequent layer also adds complexity. No matter how tightly focused the laser, and regardless of whether it's the standard red or the narrower blue type, the beam will disturb the upper layer as it passes through to reach the one below it. This disturbance results in undesirable signal deviation—aka noise—when the disc is read. Electronics inside the disc drive can compensate for this noise by filtering it out of the signal, but each additional layer can compound the noise until it swamps these filters.

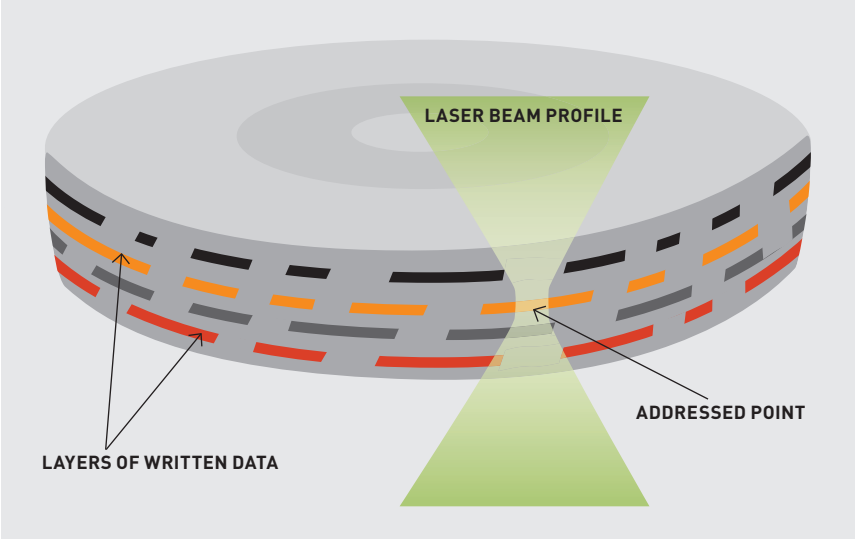
THE GE PLAN

GE Global Research, the technology development arm of the General Electric Company, announced in 2009 that it had developed a substrate, which it dubbed "micro-holographic storage material," that was capable of holding 500GB of data. But GE's technology doesn't rely on layered media for this tremendous leap in capacity.

Instead, as the "holographic" portion of the name implies, GE's technology creates a three-dimensional image *within* a layer by writing at controlled depths using overlapping blue lasers. Coherent light from the two sources (one a reference beam and the other a signal beam) causes an interference pattern within the media. If there is constructive interference between the two, electrons can be coerced to move from the material's valence band (the highest range of electron energies) to its conduction band.

Electrons in the conduction band will encounter two opposing forces that determine how they move. The first is an attractive force created between the electrons and the positive holes they've left behind. Depending on the balance between the two, an electron will either remain where it is, return to its point of origin, or spin off. The second is a diffusive force that promotes the electrons moving into areas populated by fewer electrons, known as dark areas. The manner in which the immobile or roving electrons interact with these attractive and diffusive forces both determines the hologram's strength and changes the disc's refraction index.

Only one laser (the reference beam) is needed to read information *back* from the holograms. The refractive-index changes in the material splits the beam in two, one of which follows the beam pattern as it was originally created.



As the disc spins, a pair of overlapping lasers alters the reflectivity of the disc's substrate at multiple depths along a concentric track to create a three-dimensional image to represent bits of data.

ER

SPEED BUMPS

GE appears to be keeping its promise to deliver usable discs by 2012. It has also promised that its micro-holographic disc players will be backward compatible with older optical technologies (existing CD, DVD, and BD drives won't be capable of reading the new media). Still, GE's technology must overcome two significant challenges before it will gain widespread acceptance.

The first is the operational speed. Whether anyone could think that writing data "as fast" as a BD drive is a good thing probably depends on the available alternatives. A BD drive can write to a BD disc at about 4.5MB per second at 1x and up to about 54MB/s at 12x. While GE has been somewhat coy about exactly what "Blu-ray speed" means, opinions will depend on whether they're talking minutes, hours, or days to fill a 500GB disc.

The second challenge is pricing. We haven't heard about pricing for the drive, but some experts are talking about media costs approaching $50 per disc. In a world in which $55 buys a 1TB internal hard drive with twice the capacity and many times the write speed, a micro-holographic drive just doesn't sound competitive.

Speaking of hard drives, Hitachi has just introduced a single-platter, 1TB version of its Deskstar series. With one platter and reduced heat and noise from a lower component count, Hitachi's drive is sure to catch on in the same commercial markets at which GE is aiming its micro-holographic disc technology. And then there's the cloud. If the industry can resolve the security issues inherent in cloud computing, that market could kill any large-scale corporate appetite for micro-holographic drives and discs. Without those deep-pocketed customers to pay back GE's R&D investment, this technology might never become cheap enough to reach the consumer market.

Despite great initial buzz, GE might very well find itself with a solution looking for a problem. To keep that from happening, micro-holographic technology will need a rapid development path and affordable pricing right out of the gate.

autopsy

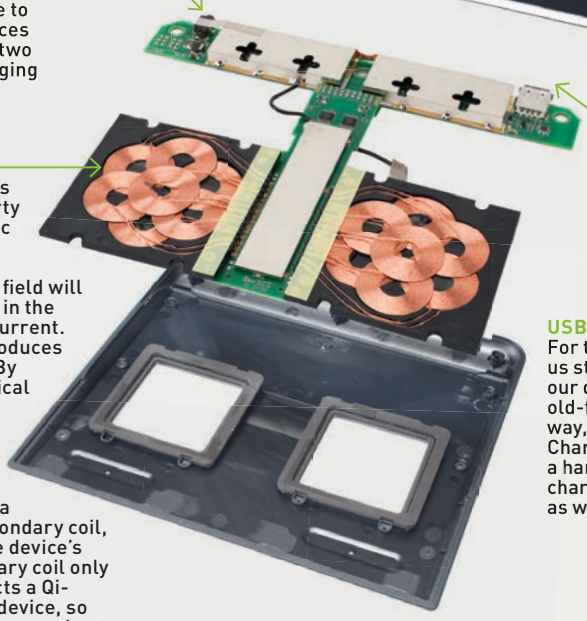
Energizer Inductive Charger

Proponents of inductive charging claim that the semi-wireless technology is the future of charging. Some current iterations are more gimmick than gimme, but inductive charging does show promise—provided device manufacturers can be convinced to integrate it into their products. The Wireless Power Consortium hopes its Qi standard will be the one the industry rallies around. But how does inductive charging work? We took apart Energizer's Inductive Charger to find out.

SECONDARY COIL The secondary coil is housed in the device to be charged—in this case, a backplate for the iPhone 4. The primary coil induces a current into the secondary coil, which plugs into the iPhone via its connector dock to charge the phone. Future Qi devices will have the secondary coil built in, so they won't rely on aftermarket backplates or cases.

RECEIVER Devices using the Qi wireless charging standard use a standardized protocol to communicate charge status and other information between charger and device. The transmitter pings the receiver to determine if it's present, and then the receiver tells the transmitter its charge status and power requirements. Once the device is fully charged, the circuit shuts off.

AC JACK The charger's wall wart turns AC power into delicious 9V 2.3A DC power, which gives enough juice to charge three devices simultaneously—two via inductive charging and one via USB.



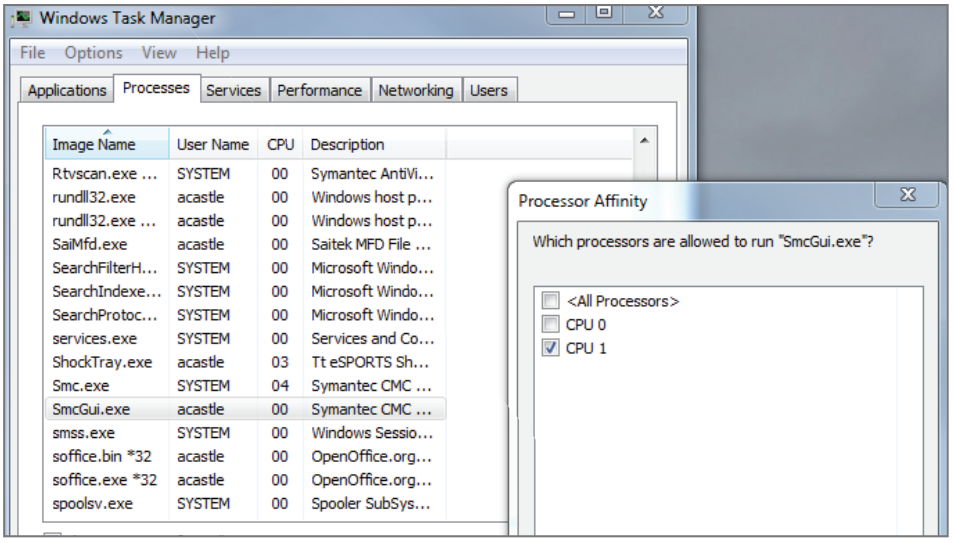
PRIMARY COILS Inductive chargers exploit the property of electromagnetic induction—that is, a change in an object's magnetic field will produce a change in the object's electric current. And electricity produces a magnetic field. By running an electrical current through the primary coil, the charger creates an electromagnetic field that induces a current in the secondary coil, which charges the device's battery. The primary coil only turns on if it detects a Qi-enabled receiver device, so you don't have to worry about nuking your keys or pocket change if they fall on the transmitter.

USB PORT For those of us still charging our devices the old-fashioned way, the Inductive Charger includes a handy USB charging port, as well.

HOW TO

STEP-BY-STEP GUIDES TO IMPROVING YOUR PC

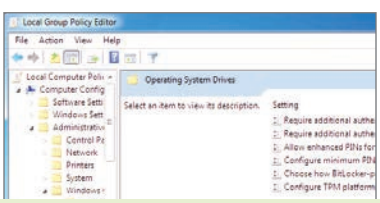
WINDOWS TIP OF THE MONTH



MICROMANAGE YOUR PROCESSES

IS YOUR MASSIVELY MULTICORE PROCESSOR CAUSING PROBLEMS WITH LEGACY APPLICATIONS? YOU CAN RELEGATE A PROCESS TO A SINGLE CPU CORE BY OPENING THE TASK MANAGER, RIGHT-CLICKING A PARTICULAR PROCESS, AND SELECTING SET AFFINITY.

MAKE - USE - CREATE



ALEX CASTLE
ONLINE MANAGING EDITOR

GET THE FEATURES OF WINDOWS 8 RIGHT NOW

AT THE BUILD CONFERENCE, Microsoft announced some new features of Windows 8. And although I'm as excited as the next guy about the follow-up to Windows 7, not all of the new features look quite so... new. Here are three features of Windows 8 that you can have today:

Ambient Data: One of the coolest features of the new Metro UI is tiles that display constantly updated data. Windows has tooled with this before with desktop widgets, but if you want real power, you'll have to check out a third-party solution like Samurize (www.samurize.com).

Cloud Sync: Microsoft is fully embracing cloud sync in Windows 8, but there's no reason you shouldn't already be using cloud sync services like Dropbox (www.dropbox.com)or SugarSync (www.sugarsync.com).

New, Ugly Windows Explorer: Just kidding—they can keep that one.

↘ submit your How To project idea to: comments@maximumpc.com

CREATE A FLEXIBLE WEBSITE WITH DRUPAL GARDENS

–Seamus Bellamy

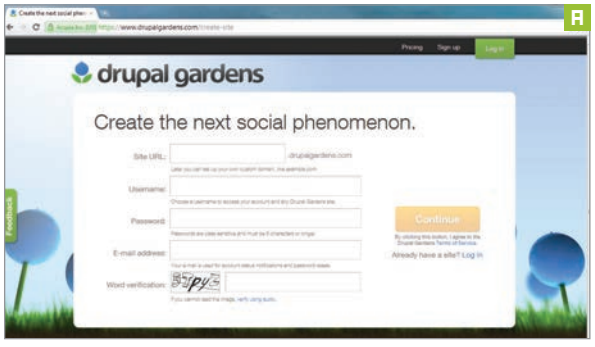
> WITH DRUPAL GARDENS, THERE'S NO NEED TO WORRY ABOUT PAYING SCADS TO A TALENTED WEB DESIGNER

IN A WORLD WHERE most of us have turned to expressing ourselves in snippets through the use of services like Twitter, Facebook, and Google+, there's still a place in this world for websites. After all, 140 characters might be enough to push out a message concerning how much you drank last night and where you think you left your pants, but unless you're a MAG Poetry Prize winner, you might have some difficulty expressing the emotions you felt in seeing the Grand Canyon for the first time on your summer vacation. And it goes without saying that for businesses, in particular, having a website to showcase or offer support for your products is a no-brainer.

These days, folks looking to build their own site are spoiled for choice. For those who just want to throw their pictures and videos up online without worrying about anything more than what template to use and an occasional bit of spellchecking, Tumblr, Blogger, and Windows Live Spaces are all great ways to go. If you demand more control over your site's look and functionality, you can rely on open-source content management systems like Joomla, Drupal, or WordPress. Unfortunately, to get the most out of these, users often need to be prepared to fulfill the role of not only content creator but also backend site administrator, dealing with frustrations such as choosing a reputable ISP, setting up your home computer to act as a server, deciding whether or not to download new versions of the program, and dealing with PHP databases.

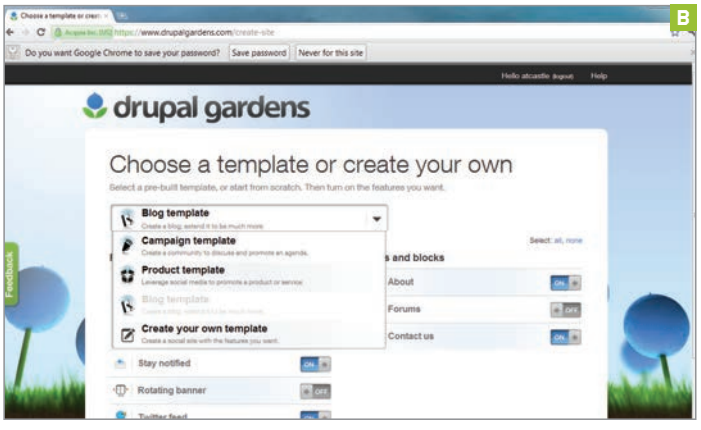
Isn't there a happy middle ground?

There is. Drupal Gardens takes the power and flexibility of the open source Drupal 7 content management system and combines it with turnkey-style site management, allowing users to go from nil to an up-and-running site in well under an hour. With Drupal Gardens, there's no need for worrying about backend administration, working with frustrating FTP uploads, or paying scads to a talented web developer for his years of dedicated technical education. Simply sign up for an account, set up your site, and get posting. How do you get started? Glad you asked.



1 SIGN UP First, visit the Drupal Gardens website (www.drupalgardens.com) and click Create a Free Site. You'll be taken to a sign-up page that asks for a site URL **(image A)**. As Drupal Gardens is a relatively new service, chances are you won't have too much difficulty snagging a domain name that works for you. Once you've settled on your credentials, click the Continue button.

2 CHOOSE YOUR WEAPON While a blog might be great for keeping a concise online record of your cat's busy life, it doesn't do much if you're trying to promote a product or service. Fortunately, Drupal Gardens accounts for this by offering a number of stylistic alternatives, including a template optimized for promoting a product or service and another designed to help groups discuss or push their agenda forward **(image B)**. If none of Drupal Garden's basic templates do it for you, there's also the option to create a template to meet your particular needs. Must-have features like a rotating banner, an area for your Twitter feed, and feedback and contact forms can all be turned on or off with push-button simplicity. When you're satisfied with the type of site and feature set you've selected, click Continue.



3 RETICULATING SPINES At this point, as you will see by the progress bar you're presented with, your Drupal Gardens site is well on its way to being set up. Check your inbox: Acquia will have sent you an email when your site is ready to go. When it shows up, click the link to complete the setup process. You have seven days to click the link before your Drupal Gardens site and account are both deleted. Now, let's move on. This is where things get interesting.

4 WELCOME HOME While it might not be much to look at yet, your new Drupal Gardens digs are set up and ready to be tweaked **(image C)**. Where services like Tumblr leave you to your own devices, Acquia has been good enough to provide a few sample posts and other filler content to all new Drupal Gardens sites in order to give users a feel for the template they've chosen. Had enough of a feel? Good—time to make it your own.

C

5 MASTER YOUR DOMAIN Drupal Gardens, like Drupal 7, can be controlled and manipulated via the administration toolbar at the top of your browser. Only users who have signed into the service can see or interact with the administration toolbar—it's not visible to anyone else. Here's the lowdown on its various functions.

» **Dashboard:** Clicking this link provides you with an overview of the latest updates to your Drupal Gardens site.

» **Contents:** Shows a list of your entire site's content, as well as who posted it. Here, an administrator can create, publish, unpublish, edit, or delete any of the site's posts.

» **Structure:** Essentially, the structure link lets you decide what appears on your site and where it shows up. From here, you can configure your Drupal Gardens site's data structure, content types, menus, and taxonomy. This is also where you can create simple content lists.

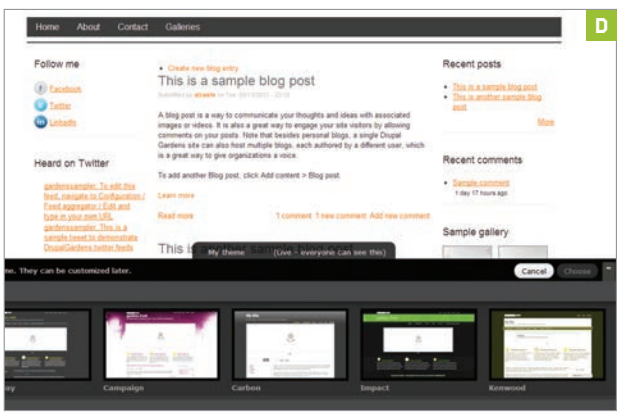
» **Appearance:** With the options available via the Appearance link, you can pimp out your site to your heart's content, changing the site's layout, color palette, logo, font customization, page borders, themes, and more **(image D)**. For the skilled (or adventurous), there's also an option to putter about with Cascading Style Sheets.

» **People:** From here, you can invite new people to your site under a wide variety of permissions levels. If anyone gets out of line, the People overlay also provides the ability to block or delete users.

» **Modules:** With Drupal, Modules make the magic happen. Nothing on your site happens without them. The Modules link makes it a cinch to enable or disable modules, adding or taking away functionality with just a few mouse clicks. While some of the modules must be enabled at all times, Drupal Gardens provides you with a wide variety of additional modules to help you customize your site's look and feel.

» **Configuration:** As the link's name suggests, from here users are able to configure a wide variety of their site's functions, including account settings, content authoring defaults, how media such as photos, audio, and video are presented, language settings, and a number of administrative functions.

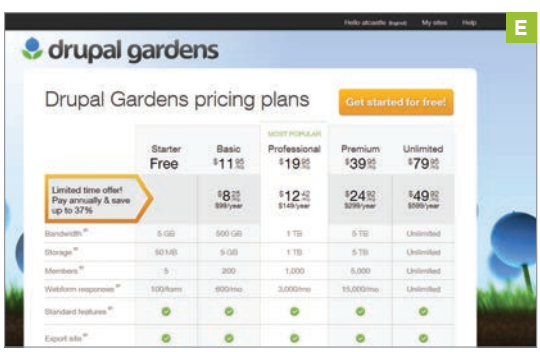
» **Reports:** With this link, you can check on your site's stats, recent log messages, and other important site information. For individuals looking to leverage their website for sales, media relations, or product information, these metrics are vital.



D

6 UPGRADE While Drupal Gardens' free offerings will sate the website-building appetite of most users, Acquia also offers a number of tiers of additional service that allow for a variety of finishing touches, like additional storage, one-on-one technical support, additional responses for any of your site's web forms, and the use of a custom domain name **(image E)**.

Now that your site is up and running, don't be afraid to tinker! Drupal's reputation as a flexible, durable CMS is well earned, thanks to the hard work of countless developers volunteering their time over the years. The chances of you breaking anything are pretty minimal. If you do find a way to flummox the works, don't fret: The helpful folks in the Drupal Gardens forums are standing by to help you unbugger just about anything you accidentally bugger up.



E

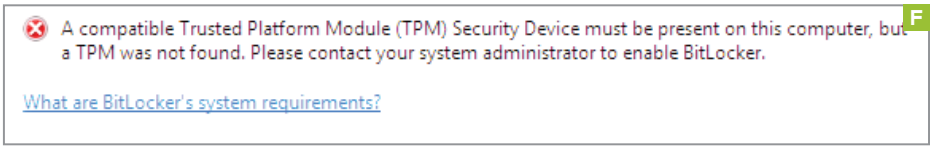
PROTECT YOUR BOOT DRIVE WITH BITLOCKER

–Alex Castle

When it comes to protecting the data on your computer, you can't do better than strong encryption. Properly encrypted, your files are safe even if a ne'er-do-well gains access to your computer, either physically or through a network. In the past, we've discussed how to use various encryption tools to encrypt individual files or create virtual, encrypted drives. Now, we'll look at how to get maximum security by encrypting your boot disk using the BitLocker full-drive encryption system that's built into Windows 7 Ultimate and Enterprise.

1 ASSESS YOUR SYSTEM Ideally, you have a motherboard with a Trusted Platform Module (TPM) chip. A TPM chip securely stores cryptographic keys, which BitLocker uses to access your boot drive before Windows even loads. The TPM also detects any early boot files that have been modified, protecting you from rootkits and other low-level malware. You can check with your motherboard manufacturer to see if you have a TPM, or you can just attempt to go straight to Step 3. If you don't see a message that looks like **image F**, you're good to go. Otherwise, you don't have a TPM and you'll need to continue to Step 2.

F



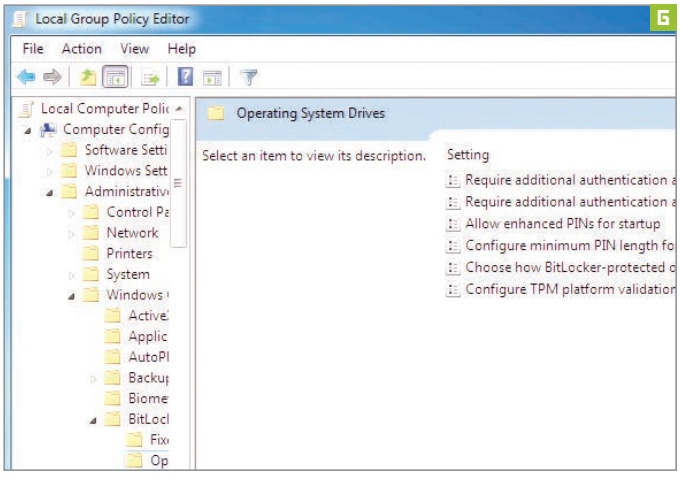
You'll also need an additional, small partition on any boot drive you wish to encrypt in order to use BitLocker. Windows creates this extra partition by default during installation, but even if you don't have one, the BitLocker software can create it for you.

2 ENABLE USB KEY STORAGE By default, BitLocker requires a TPM chip to work. To change this, open the group policy editor by bringing up the Run menu (press Win + R) and then typing gpedit.msc.

Navigate through the hierarchy on the left side of the group policy editor, selecting the following folders, in order: Computer Configuration > Administrative Templates > Windows Components > BitLocker Drive Encryption > Operating System Drives **(image G)**. Once you've found the right folder, double-click "Require additional authentication at startup" to edit that policy entry.

In the policy editor, all you need to do is click the radio button marked Enabled. In the bottom-left, a checkbox labeled "Allow BitLocker without a compatible TPM" should already be checked. If it isn't, check it. Click OK and exit the group policy editor.

G



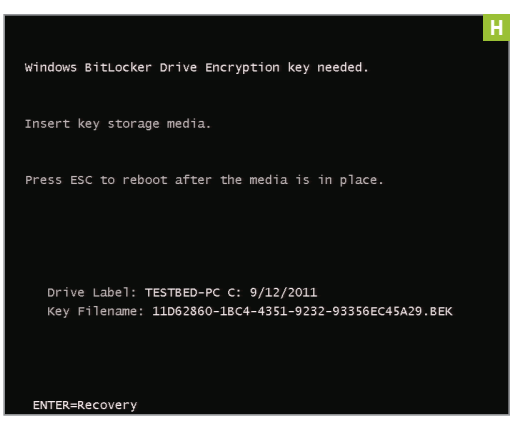
3 ENABLE BITLOCKER The actual process of enabling BitLocker is straightforward: You can right-click a drive in Explorer and click Turn On BitLocker, or you can go to the BitLocker section of the control panel and enable it on any drive from there.

As long as you've followed the previous two steps, you should see a screen asking you for your BitLocker startup preferences. If you have a TPM, you have three options. If you select "Use BitLocker without additional keys" your startup process will be basically unchanged. Someone with access to your computer will be able to get at your data, but you'll be protected from rootkits and from people accessing your data remotely. Alternatively, you can choose to enter a PIN every time you log in.

If you're using the USB method, you only have access to the last option, "Require a Startup key at every startup." With this method, you'll only be able to boot your computer while you have a USB drive with a startup key inserted in the machine.

Once you select an option, you'll be asked to insert a USB drive to use as the key, and you'll choose where to store your recovery key, which you'll need if you want to decrypt your data on a different computer, or if the TPM detects a problem. It will take some time for BitLocker to encrypt your drive, but once it's finished, your data is safe. Anyone attempting to boot from your drive without the proper key won't even get to the Windows boot screen **(image H)**.

H



BUILD IT

NATHAN EDWARDS **SENIOR ASSOCIATE EDITOR**

Get Gaming on an HTPC

I don't want to watch cable TV. I don't want to use a controller. I just want to watch 3D Blu-rays and frag people with a mouse and keyboard, all on a box that fits on my entertainment center. Is that too much to ask?

LENGTH OF TIME: **2 HOURS** | LEVEL OF DIFFICULTY: **INTERMEDIATE**

THE MISSION We've built our fair share of home theater PCs in the past, with all sorts of different use cases in mind. Our August 2010 HTPC was a stunner built for 3D, with passively cooled GPU, CPU, and PSU, as well as a four-channel CableCard tuner and Blu-ray 3D support. In June 2011, Gordon tried to make a small-form-factor HTPC that could cut out the previous build's bulk (and CableCard) while still supporting Blu-ray 3D. Both of those rigs handled their respective tasks well, but what if I don't care about cable but do care about gaming? This month's task is to create a kick-ass gaming rig in an HTPC form factor—one that can handle modern games, as well as 3D Blu-ray and Dolby TrueHD audio, without sounding like a jet engine.

The Right Tools for the Job

WHEN BUILDING A PC for the living room, the first thing to consider is the chassis. After testing many cases, including Lian Li's PC-P50 and Silverstone's oldie-but-goodie CW02, I settled on the Silverstone GD06, a microATX case with three 12cm cooling fans, front-panel USB 3.0 ports (with internal header!), and two hot-swap SATA bays. The other cases were roomier, but I wanted to keep the footprint as small as possible.

The videocard needs to be able to handle Blu-ray 3D and support HDMI 1.4a for true lossless HD audio. That's the easy part. It also has to have the power to play today's games, and the GTX 560Ti has that. MSI's Twin Frozr II version is speedy, factory-overclocked, quiet, and doesn't draw a lot of power. For Blu-ray playback, we're hitting up an old favorite: Plextor's PX320-SA.

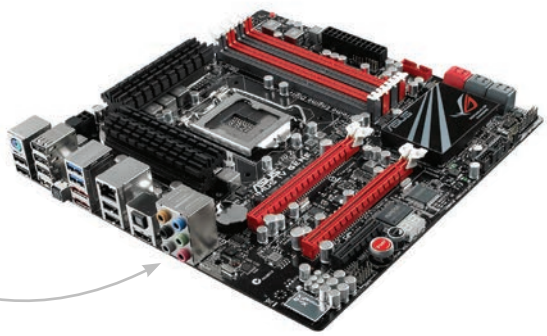
We're not crippling this rig with an Atom or Fusion board. Asus's Maximus IV Gene-Z combines a powerful Z68 gaming platform with easy overclocking, two PCIe x16 slots, onboard 6Gb/s SATA, and X-Fi-branded onboard audio using Realtek codecs. Intel's Core i5-2500K brings four unlocked processors at 3.3GHz.

I picked a speedy 6Gb/s SATA SSD for an OS drive, and a large-capacity drive for media storage. The case's front hot-swap SATA bays make it easy to add more storage later.

The GD06's front panel latches when not in use to prevent miscreants from waltzing off with your drives.

INGREDIENTS

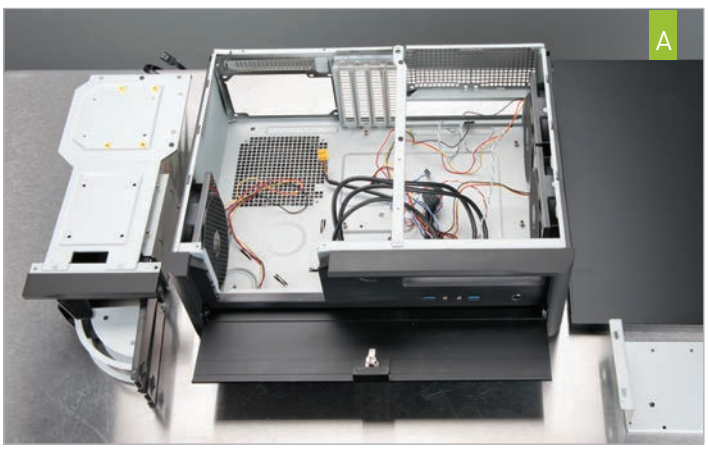
PART/URL	PRICE
Case Silverstone GD06 www.silverstonetek.com	$130
PSU Silverstone Strider Essential ST70F-E 700W www.silverstonetek.com	$85
Mobo Asus Maximus IV Gene-Z usa.asus.com	$180
CPU Intel 3.3GHz Core i5-2500K www.intel.com	$220
CPU cooler Stock Intel www.intel.com	$0
GPU MSI Twin Frozr II GTX 560 Ti us.msi.com	$240
RAM (2x) 4GB Corsair Dominator DDR3/1600 www.corsair.com	$100
Blu-ray combo drive Plextor PX-B320SA www.plextor.com	$110
SSD 120GB Corsair Force GT www.corsair.com	$220
HDD 3TB WD Caviar Green www.wdc.com	$115
OS Windows 7 Home Premium, 64-bit OEM www.microsoft.com	$100
TOTAL	$1,500



Putting It All Together

1 PREP THE CASE

REMOVE THE THREE SCREWS securing the top cover of the GD06, then slide the cover off of the case. Unlock and open the front-panel bezel. Take out the four little screws securing the optical drive bay, and remove the bay. Do the same with the four screws holding the HDD trays. Lift out the bays and set them aside **(image A)**.

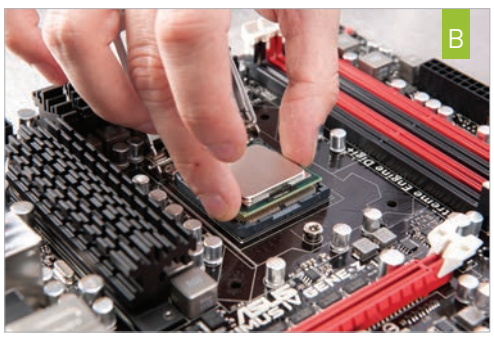


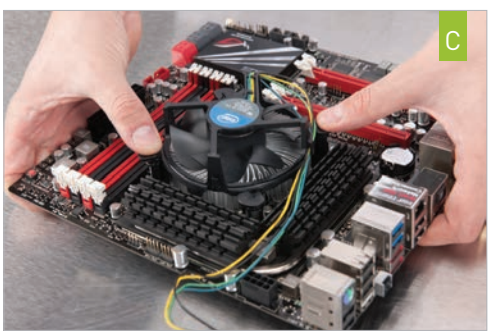
2 INSTALL THE PSU

STICK THE FOUR RUBBER FEET that ship with the case onto the underside of the PSU (the side with the intake fan). Mount the PSU with the fan pointing to the bottom of the case.

3 INSTALL THE CPU, COOLER, AND RAM

OPEN THE CPU GATE and remove the plastic socket protector. Align the CPU with the socket and gently lower it into place **(image B)**. Lower the gate and secure the CPU. Since we're using the stock cooler, all you have to do is remove the plastic cover, make sure the stock thermal pads are in place, and align the four posts on the heatsink with the mounting holes in the motherboard. Press down firmly on two opposite pins at a time until you hear a firm click, then repeat for the other two pins **(image C)**. Make sure the cooler is firmly attached; it shouldn't wobble. Connect the CPU fan to the CPU_FAN header. Mount the RAM in either the red slots or the black slots.





4 MOUNT THE MOTHERBOARD

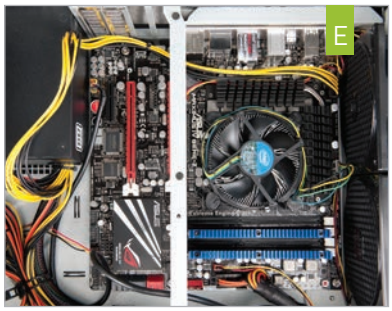
INSTALL THE MOTHERBOARD I/O shield in the case, then put a motherboard standoff into the rightmost center hole (when viewed from the rear of the case)—this is the only standoff you need for microATX that isn't preinstalled in the chassis. Slide the motherboard into the case **(image D)**, aligning the I/O ports with the I/O shield, and screw the motherboard screws into the standoffs.

5 CONNECT CABLES

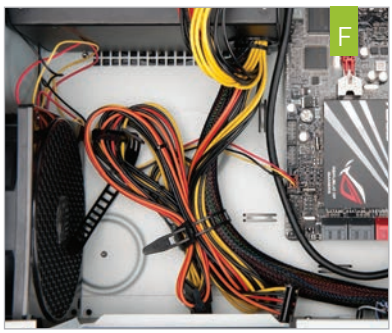
THE TRICKIEST PART of this build is the wiring. As you perform each step, keep the next steps in mind. Plan ahead and make sure to coil excess cable and secure it to tiedowns when possible.

Connect one end of a black SATA cable to one of the four gray SATA ports on the motherboard. Connect the PSU's 24-pin ATX power connector to the board. Run the 8-pin ATX power cable along the bottom edge of the motherboard, and then up behind the I/O ports to the AUX input **(image E)**. Set aside a SATA power cable, the dual-6-pin PCI Express power cable, and a 4-pin Molex power cable, and tie the remaining PCI Express and SATA power cables down in front of the motherboard **(image F)** using the cable ties included with the case.

Coil the front-panel connectors until they're just long enough to reach the pins, then connect them to the motherboard's pinout. Install the pinout onto the board **(image G)**. Tie down the excess cable. Attach the front-panel audio and USB 3.0 headers, pulling excess cable below the optical drive bay. Plug the system fans into fan headers on the motherboard.


E


G


F

6 INSTALL THE GPU

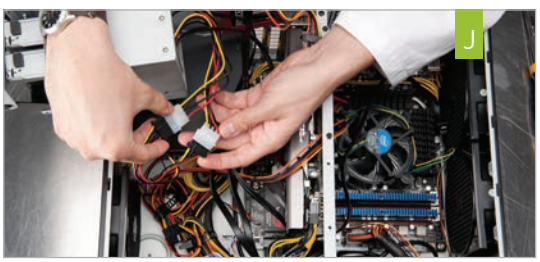
REMOVE THE TWO PCI expansion slot covers closest to the I/O ports and install the GPU, making sure to run the ATX auxiliary power cable beneath it. Plug the two PCI-E 6-pin plugs into the ports on the end of the card **(image H)**.


H

7 INSTALL THE DRIVES

ATTACH THE SSD to the underside of the hard drive bracket using the four SSD screws **(image I)**. Plug a 6Gb/s SATA cable into the SSD. Plug the two SATA cables from the hot-swap bays to two of the mobo's gray SATA ports, and attach the other end of the SATA cable from the SSD into one of the red ports. Attach the two 4-pin Molex connectors from the hot-swap bays to two of the 4-pin connectors from the PSU **(image J)**. Attach the end SATA data connector from the cable you moved over earlier. Replace the hard drive tray and reattach the four screws that hold it in place. Slide your mass storage drive into one of the hot-swap bays and close the door.


I


J

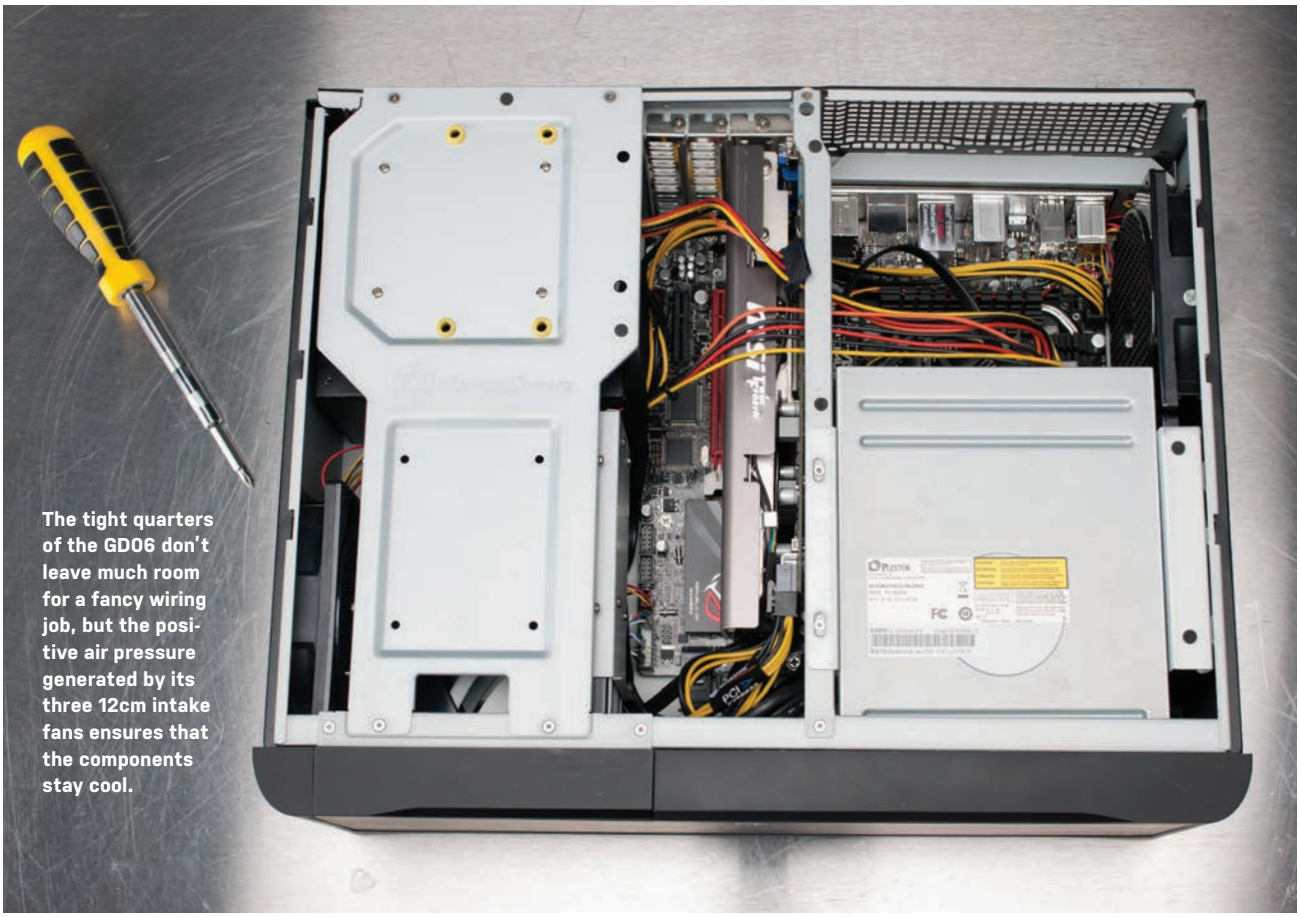
8 INSTALL THE BLU-RAY DRIVE

ATTACH THE OPTICAL drive to the optical drive tray **(image K)**, making sure the mounting holes on the drive are aligned with the front set of mounting holes on the tray. Attach with four optical-drive mounting screws and plug in the SATA power and SATA data cables you previously routed to the area. Reinstall the drive bay using the four screws you removed in Step 1.


K

9 WRAP IT UP

SLOT THE STORAGE DRIVE into one of the front hot-swap bays, and then replace the case's top cover. Install OS and drivers, and away you go!



The tight quarters of the GD06 don't leave much room for a fancy wiring job, but the positive air pressure generated by its three 12cm intake fans ensures that the components stay cool.

IT'S GOT GAME!

I WORRIED THAT AN ACTIVELY cooled gaming rig in an HTPC chassis would be too noisy, especially compared to passively cooled rigs like our August 2011 machine. But all builds involve compromises, and I wasn't willing to give up gaming performance in exchange for a few decibels. Fortunately, the GD06's fans are pretty quiet, and MSI's Twin Frozr II cooler makes the GTX 560 Ti run quietly, as well. The rig only really got loud when I was installing driver updates from the optical drive. The drive runs much more quietly when playing a movie.

And to my relief, the system is pretty speedy. Our zero-point machine is an aging-but-still-powerful overclocked Core i7-920 with a dual-GPU videocard. The Sandy Bridge processor and GTX 560 Ti helped the gaming HTPC hold its own reasonably well in the benchmarks despite a stock-clocked processor sans Hyper-Threading.

The rig plays 3D Blu-ray and offers a protected Dolby TrueHD audio path via the videocard's 1.4a-compatible Mini HDMI port—essential elements in a home theater PC. If you must have cable, you can drop in Ceton's InfiniTV tuner and a CableCard. If you must have a dedicated soundcard, you can add in one of those. If you're really crazy, you can add both. I prefer to go without either and save the $650. I still have access to Netflix, Hulu Plus, and anything I can stream over my home network.

It's also great for games. Some of us like gaming on a giant screen, and we want to use a mouse and keyboard when we do. And now we can, with a box that's far more powerful than any console.

If you're curious about the rest of an HTPC setup—recommended remotes, peripherals, sound systems, TVs, and more—check out our guide to the Ultimate 3D HTPC from last year (bit.ly/nvnfdw). The peripheral recommendations still stand, though 3D-compatible TVs have only gotten easier to come by.

There's more than one way to skin a cat (eww), and my gaming HTPC isn't the same as yours. What would you change? What essential part did I miss? What totally unnecessary expense did I incur? Email your critiques, build suggestions, and more to comments@maximumpc.com!

BENCHMARKS: GAMING HTPC RIG

	ZERO POINT	
Vegas Pro 9 (sec)	3,049	3,411 (-11%)
Lightroom 2.6 (sec)	356	312
Proshow 4 (sec)	1,112	986
Reference 1.6 (sec)	2,113	2,258 (-6%)
STALKER (fps)	42.0	34.1 (-19%)
Far Cry 2 (fps)	114.4	91.9 (-20%)

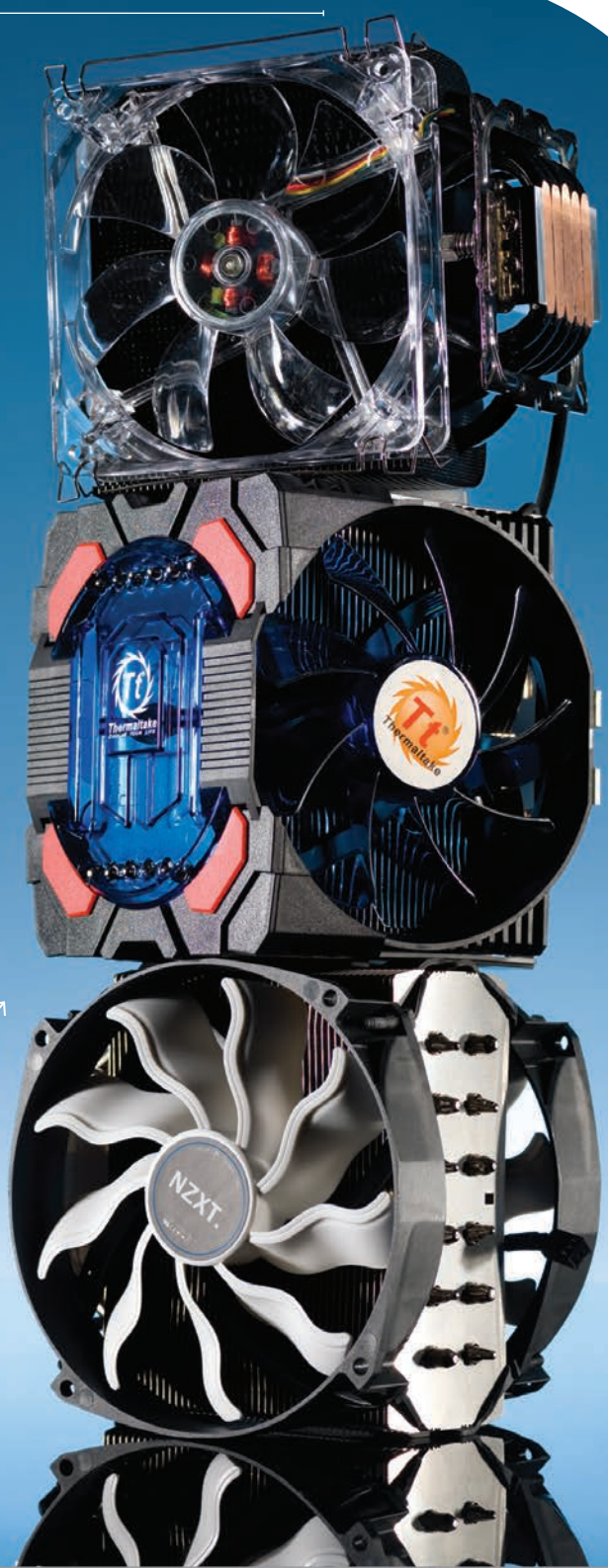
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our current desktop test bed consists of a quad-core 2.66GHz Core i7-920 overclocked to 3.5GHz, 6GB of Corsair DDR3/1333 overclocked to 1,750MHz, on a Gigabyte X58 motherboard. We are running an ATI Radeon HD 5970 graphics card, a 160GB Intel X25-M SSD, and 64-bit Windows 7 Ultimate.

REVIEWS

TESTED. REVIEWED. VERDICTIZED.

INSIDE



COOLER ROUNDUP PAGE 80

AVADirect Custom Gaming PC

AVA finds a way to mix performance and silence

Despite its beefy GTX 580 GPU, this is the quietest gaming rig we've ever not heard.

IN OUR WORLD, performance and silence go together about as well as Aliens and Predators. Each one has its appeal, but put them together, and you generally get a turd.

That's a fact AVADirect has set out to disprove with a PC apparently named by U.S. Army logistics command: Custom Gaming PC, Silent PC, Low-Noise Custom Computer System. Despite its funktastic name, the AVADirect PC doesn't disappoint and seems capable of creating its own alternate reality where performance commingles harmoniously with peace and quiet.

Sure, Puget System's virtually silent Serenity Mini that we reviewed in our August issue was certainly fast with its 3.3GHz Core i5-2500K overclocked to 4.5GHz, but its Radeon HD 5750 didn't have the ponies for heavy gaming tasks at high resolutions.

AVADirect took gaming to heart with its silent PC. Besides overclocking its 3.3GHz Core i5-2500K to 4.7GHz using a Prolimatech Megahalems cooler, AVADirect matches that chip with Asus's three-slot ENGTX580 card. With its beefy build and giant fans, the *yuge* ENGTX580 is generally intended for overclocking, but if you don't overclock, you can run the card quietly. So damn quiet, in fact, that the fans on the ENGTX580 don't spool up to any noticeable level.

There's something cool about running tri-SLI or quad-SLI, but it's also pretty cool—nay, *way* cool—to run the Unigine Heaven benchmark at 2560x1600 and not hear the GPU make a peep. We're so used to noise, either very loud or low-level system noise, during gaming tests that the AVADirect's silence is a bit unnerving, in the way hybrid cars can sneak up on you at the crosswalk.

The rest of the machine's specs are laid bare in our spec chart, but the highlights include an Asus P8Z68-V Pro board, 8GB of G.Skill DDR3/1600, a 120GB OCZ Vertex 3, and a 2TB WD Caviar Green. The Caviar Green is already silent, but to make sure you can't hear the HDD at all, AVADirect seals it up in an enclosure for extra measure. The NZXT H2 itself is an interesting take on the standard bearer of quiet cases: Antec's P180 series. One thing we like is the three-position fan controller that lets you toggle the speeds without having to reach in back. The NZXT case doesn't have the fancy baffles of the P180, but it will take a full-size ATX board while still being almost as small as the microATX Mini P180 case.

In performance, the AVADirect doesn't break any records; in fact, many of the small form factor boxes we reviewed in August (including AVADirect's shriektastic entry) are faster. But none of them are as quiet, either. And a Core i5-2500K at 4.7GHz with a GTX 580 is certainly no slouch, no matter how you cut it.

OK, so the AVADirect won't take any records, but it wins in the one area the company was shooting for. So brew yourself a cup of organic herbal tea, burn some incense, and start grenade spamming and sniping away in blissful serenity. –GORDON MAH UNG

VERDICT **9** KICK ASS!

AVADirect Custom Gaming PC

+ ALIENS Amazingly quiet gaming performance.

– AvP Spooled-up optical drive gets too loud.

$2,135, www.avadirect.com

BENCHMARKS

	ZERO POINT	
Vegas Pro (sec)	3,049	2,611
Lightroom 2.6 (sec)	356	280
Proshow 4 (sec)	1,112	774
Reference 1.6 (sec)	2,113	1,717
Stalker: Cop (fps)	42.0	43.9
Far Cry 2 (fps)	114.4	109 (-5%)

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

Our current desktop test bed consists of a quad-core 2.66GHz Core i7-920 overclocked to 3.5GHz, 6GB of Corsair DDR3/1333 overclocked to 1,750MHz, on a Gigabyte X58 motherboard. We are running an ATI Radeon HD 5970 graphics card, a 160GB Intel X25-M SSD, and the 64-bit version of Windows 7 Ultimate.

SPECIFICATIONS

Processor	3.3GHz Core i5-2500K @ 4.7GHz
Mobo	Asus P8Z8-V Pro
RAM	8GB G.Skill DDR3/1600
Videocard	Asus ENGTX580
Soundcard	Onboard
Storage	OCZ 120GB Vertex 3 SSD, WD 2TB Caviar Green
Optical	LG WH12LS30 BD burner
Case/PSU	NZXT H2 Classic / Seasonic X-660

Asus Mars II

Two GTX 580s, one gargantuan videocard

IMAGINE A GRAPHICS CARD weighing 5.25 pounds with three (yes, *three*) 8-pin PCI Express power connectors. Now imagine this card taking up three PCI Express slots and almost sucking the life out of an 850W power supply.

That may be one reason Asus named this card after the Roman god of war. It's probably the most powerful single graphics card we've tested, but that power comes at a substantial cost. You'll need the right type of motherboard and case, too—one where you can install a three-slot-wide card that's 12.25 inches long and 5 inches tall.

Did we mention that it also costs $1,400?

Now that you've recovered from the heart palpitations induced by the price, let's talk about the real meat of this card. What Asus engineers have done is build a full GTX 580 SLI combo on a single card. We're not talking about a namby-pamby GTX 590, which sacrifices clock speed to get a reasonable-size card. The Mars II is a pull-out-the-stops, full-steam-ahead GTX 580 SLI on a stick. And the cores aren't just any 580 cores, either; they're top-binned GPU dies that run at 782MHz—faster than run-of-the-mill GTX 580 chips. The 3GB of GDDR5 ticks along at 1,002MHz.

Asus built the card using its DirectCU thermal system with a pair of 12cm fans. Despite the monster nature of the card, it was surprisingly quiet under load—somewhat noisier than the GTX 590, but notably less so than the Radeon HD 6990. The card uses 21-phase power. As with the Matrix GTX 580 we reviewed last month, the card ships with Asus's GPU Tweak utility, one of the easiest tools we've used for GPU overclocking.

So if this monster can actually run, then it should run at full SLI speeds. (Asus claims that the binned GPU parts can run even higher—above 800MHz—but given that we nearly melted the PSU in our test system, we avoided pushing the card.) As is, it's no slouch in performance, but we were anxious to put it against a GeForce GTX 590 and AMD Radeon HD 6990.

The mythical Radeon HD 6990 won in just two areas: power consumption and Just Cause 2. The GTX 590 eked out a single benchmark win in Battle Forge, which is likely CPU-bound, since the differences overall are small. The Mars II swept the field in everything else. So you really can get SLI on a single card, if you're willing to pay a premium.

That premium, by the way, includes the right power supply and case. Our Corsair TX850W survived the experience, but the 785W that the Mars II consumed under load set a Lab record for a single graphics card.

Clearly this card isn't for everyone. The massive size, power draw, and price will discourage all but the most fanatical gamers. But the Mars II will appeal to those with the moolah, the system to handle it, and the desire to have the shiniest toy. But get in line—Asus will only make about 2,000 of these behemoths. **–LOYD CASE**

BENCHMARKS

	Asus Mars II	Asus GTX 590	XFX Radeon HD 6990
3DMark 2011 Perf	**10,328**	8,421	8,863
3DMark Vantage Perf	**31,536**	28,261	28,075
Unigine Heaven 2.1 (fps)	**85**	54	50
BattleForge DX11 (fps)	143	**147**	99
Far Cry 2 / Long (fps)	**154**	149	149
HAWX 2 DX11 (fps)	**201**	186	145
STALKER: CoP DX11 (fps)	**110**	86	89
Just Cause 2 (fps)	62	60	**72**
Aliens vs. Predator (fps)	**83**	67	78
F1 2010 (fps)	**100**	82	87
Metro 2033 (fps)	**48**	39	39
System Power @ idle (W)	189	174	**156**
System Power @ full throttle (W)	785	515	**501**

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 a TX850 Corsair PSU. The OS is 64-bit Windows Ultimate. All games are run at 1920x1200 with 4x AA unless otherwise noted.

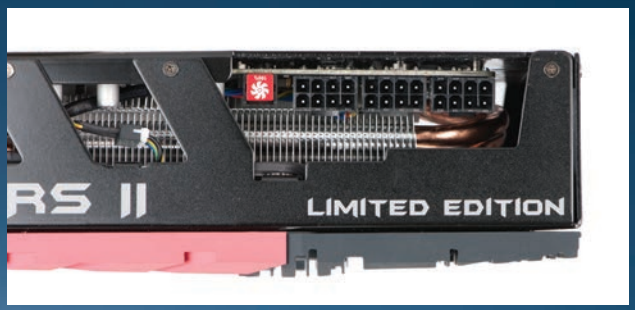
VERDICT **9**

Asus Mars II

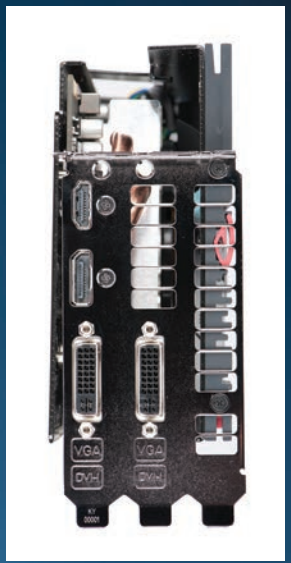
+ GOD OF WAR It's damn fast, surprisingly quiet, and appealing in a monster truck kind of way.

– THE TRICKSTER The price is stratospheric; huge power draw; massive size.

$1,400, www.asus.com



You'll need a PSU that can supply three 8-pin power plugs to run the Mars II. The little red button manually forces all fans to full throttle.



Double-wide GPU? That's for wimps. The Mars II will swallow three slots on your motherboard.

The gigantic Mars II packs two 12cm fans and set a new record in our Lab for power consumption.

Admittedly, the Toshiba R830 is no paragon of industrial design, but it's damn portable—without sacrificing power.

Aluminum-alloy hinges, titanium-alloy display latches, and a rubber bumper around the screen are just some of the touches that make the HP 2560p good for rough-and-tumble computing.

Business-Portable Power Play

Two premium thin-and-lights go toe-to-toe

IF INTEL HAS ITS WAY, we're about to be overtaken by a wave of "ultrabooks" sporting performance specs (including next-gen Sandy Bridge CPUs, natch) in a MacBook Air–style package that costs less than $1,000. Until that happens, the most attractive performance/portability option for power users is a business-class ultraportable such as one of the two models we review here. **–KATHERINE STEVENSON**

TOSHIBA PORTÉGÉ R830

There was a time when Toshiba's line of Portégé business ultraportables was the epitome of sleek utility, particularly in the days of the R500 and R600. Samsung stole some of that show when it released the Series 9 (reviewed in July)—the closest a PC has come to a MacBook Air to date. But while the Portégé R830, much like the R700 before it, won't win any design contests, it offers many useful amenities in a very-portable package.

Costing exactly the same as the Series 9, the 13.3-inch R830 trumps that fancy lad with a much faster processor—a 2.7GHz Core i7-2620M vs. a 1.4GHz Core i5-2537M—a DVD burner, USB 3.0, and eSATA, while still measuring little more than an inch at it thickest.

Naturally, the extra 1.3GHz of the R830's CPU produced benchmark results that were substantially superior to those of the Series 9—ranging from 42 percent better in Quake III to 112 percent better in MainConcept. Against our ultraportable zero-point notebook (last year's HP 2540p), the R830 also fared quite well. Its 98.9 percent win in Photoshop not only illustrates the benefits of a Sandy Bridge proc over Arrandale, but also the boost that comes from a solid-state drive. Its read speeds are likely four times those of the 5,400rpm hard drive in our zero-point. That plus an SSD's less delicate nature helps counterbalance its modest 128GB capacity.

Could you upgrade to a larger-capacity drive in the future? Actually, no. The drive bay is accessible enough through the bottom of the notebook. What we found in it, though, wasn't your typical SSD, but rather a proprietary drive with an unusual ribbon connector. Interestingly, the bay seems large enough to have accommodated a standard thin-profile 2.5-inch drive, which would have been a really nice feature.

The memory bay is also accessible. Toshiba ships the R830 with one 4GB stick of RAM, and you can clearly see the results of that single-channel config in our Quake III benchmark—the only benchmark where the R830 was bested by the zero-point, which has a dual-channel config. Older games really respond to more memory bandwidth when you're running integrated graphics. In fact, when we added a second stick of RAM to the R830, our Quake III score nearly doubled. Even Quake 4 saw a 25 percent performance boost from the upgrade. The nice thing is

that the R830 offers two easy-to-get-at RAM slots, if gaming is a priority.

Speaking of RAM, it's a little odd that our review unit shipped with a 32-bit version of Windows 7 Professional, since that renders 1GB of the memory unusable. We advise anyone purchasing this notebook to go with the 64-bit option.

Despite its minor quirks, we're still very impressed with the R830. We don't know of a lighter, more powerful laptop, and its battery runtime of almost seven hours is a Lab record.

VERDICT 9

Toshiba Portégé R830

$1,650, www.toshiba.com

HP ELITEBOOK 2560P

To call HP's 2560p an "ultraportable" is pushing it. It has a slightly smaller footprint than the Toshiba R830, with a screen size of 12.5 inches, but it's heavier by more than a pound. With its power brick, you're looking at more than five pounds, including a battery that protrudes a full inch from the back of the notebook's body. This is no dainty package.

Of course, it feels like a machine that can take its licks. HP likes to point out that the notebook is designed and tested to meet Mil-Spec standards for drops, temperature shock, and altitude changes, among other stressors.

Nestled within the 2560p's island keyboard is a pointing stick (a la Lenovo's ThinkPads), which, along with an additional set of right and left mouse buttons below the spacebar, lets you control the cursor without moving your hands from the keys. It's a nice feature for folks who roll that way, but if you're partial to using a touchpad, you might resent how the additional mouse buttons encroach on the pad's surface area. We also found horizontal and vertical scrolling on the touchpad to be erratic.

In performance, the 2560p is solid. It features a 2.6GHz Intel Core i5-2540M to the Toshiba's 2.7GHz Intel Core i7-2620M, and the two trade benchmarks win within fairly close proximity, save Premiere Pro, where the HP was 21 percent faster than the Toshiba. Like the Toshiba, the HP features single-channel RAM and thus scored lower than our zero-point in Quake III.

Upgrading the HP 2560p is supremely easy, as the entire underside slides off without removing a single screw. Inside, you'll find a 2.5-inch drive bay presently occupied by a 160GB SSD, an empty RAM slot, and an open Mini PCIe slot.

Another nice feature is the Elite Premium Support that comes included with the purchase of this notebook. It entitles owners to free 24/7 tech support from a dedicated Elite team, although it's anyone's guess what happens to that should HP actually spin off its computer division.

In our battery rundown test, the 2560p lasted four and a half hours playing a video file in a continuous loop. That's a decent runtime, but a far cry from the Toshiba's showing.

With its sturdy build, strong performance, and upgrade-friendliness, the HP 2560p is certainly appealing. But when it comes to performance *and* portability, we're partial to the Toshiba R830's lighter carry weight, longer battery life, and lower price.

VERDICT 8

HP Elitebook 2560P

$1,800, www.hp.com

BENCHMARKS: TOSHIBA PORTÉGÉ R830

	ZERO POINT	
Premiere Pro CS3 (sec)	1,260	949
Photoshop CS3 (sec)	183.6	92.3
Proshow Producer (sec)	1,533	1,035
MainConcept (sec)	2,530	1,720
Quake III (fps)	191.7	155.8 (-18.7%)
Quake 4 (fps)	17	39.9 (+134.7%)
Battery Life (min)	240	380

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

Our zero-point ultraportable is an HP EliteBook 2540p with a 2.13GHz Intel Core i7-640LM, 4GB of DDR3/1333 RAM, integrated graphics, a 250GB 5,400rpm hard drive, and Windows 7 Professional 64-bit.

SPECIFICATIONS: TOSHIBA PORTÉGÉ R830

CPU	2.7GHz Intel Core i7-2620M
RAM	4GB DDR3/1333 in single-channel mode
Chipset	Intel QM67
Display	13.3 inch,1366x768 LCD
Storage	128GB SSD
Optical drive	DVD burner
Connectivity	HDMI, VGA, Ethernet, USB 3.0, two USB 2.0 (one with eSATA), Express Card slot, headphone out, mic in, 6-in-1 card reader, Bluetooth, 802.11b/g/n, webcam
Lap/Carry	3 lbs, 0.8 oz / 3 lbs, 13.5 oz

BENCHMARKS: HP ELITEBOOK 2560P

	ZERO POINT	
Premiere Pro CS3 (sec)	1,260	780
Photoshop CS3 (sec)	183.6	96.3
Proshow Producer (sec)	1,533	1,009
MainConcept (sec)	2,530	1,721
Quake III (fps)	191.7	134.6 (-29.8%)
Quake 4 (fps)	17	37.2 (+118.8%)
Battery Life (min)	240	273

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

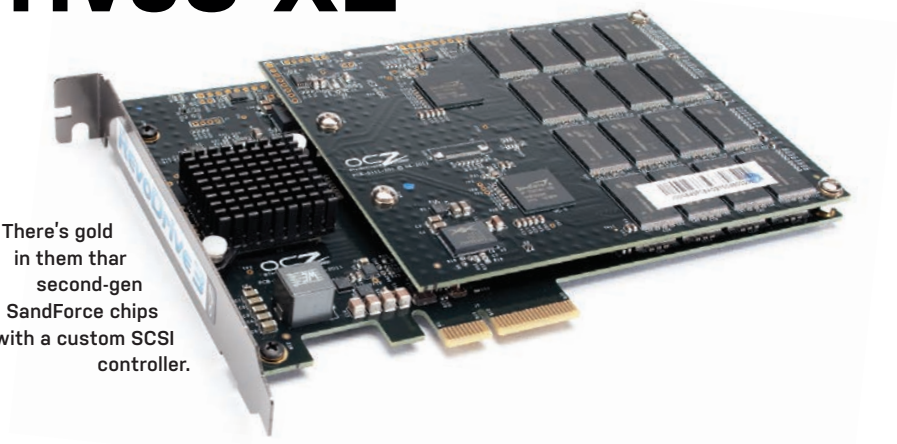
Our zero-point ultraportable is an HP EliteBook 2540p with a 2.13GHz Intel Core i7-640LM, 4GB of DDR3/1333 RAM, integrated graphics, a 250GB 5,400rpm hard drive, and Windows 7 Professional 64-bit.

SPECIFICATIONS: HP ELITEBOOK 2560P

CPU	2.6GHz Intel Core i5-2540M
RAM	4GB DDR3/1333 in single-channel mode
Chipset	Intel QM67
Display	12.5 inch,1366x768 LCD
Storage	160GB SSD
Optical	DVD burner
Connectivity	VGA, DisplayPort, Ethernet, modem, two USB 2.0, one USB 2.0/eSATA, Express Card slot, headphone/mic, SD/MMC media reader, Bluetooth, 802.11b/g/n, webcam
Lap/Carry	4 lbs, 4.8 oz / 5 lbs, 2.6 oz

OCZ RevoDrive3 X2

Absurd speed—for an absurd price



There's gold in them thar second-gen SandForce chips with a custom SCSI controller.

OCZ JUST KEEPS PUSHING the envelope on its PCI Express SSDs. The first RevoDrive contained two 60GB SF-1200-powered SSDs in RAID 0, with a Silicon Image PCI-to-SATA controller. The RevoDrive X2 kept the same architecture, but added a second PCB with two additional controllers and two more 60GB sets of NAND. OCZ's RevoDrive3 X2 updates the platform to second-generation SandForce, but the new SSD controller isn't the only change.

The OCZ RevoDrive3 X2 contains four second-gen SandForce SF-2281 solid-state drive controllers, each with 16 8GB Micron 25nm asynchronous NAND modules. The RevoDrive3 X2 is, then, essentially four 120GB OCZ Agility 3 drives in RAID 0. But in place of the Silicon Image controller that powered the first two RevoDrive generations, OCZ has opted for a custom "OCZ SuperScale" SCSI controller. The company has declined to disclose which OEM is building the new controller, but it puts out a lot more heat than the old Silicon Image chip; in fact, OCZ slapped on a heatsink to prevent it from overheating.

Earlier RevoDrives were marketed to enthusiasts, but you'll find the RevoDrive3 X2 under the "Workstation" category on OCZ's website—with good reason: SandForce drives are already optimized for frequent small-file random reads and writes at high queue depths, and the RevoDrive3 X2's four-drive RAID takes that to absurd levels. Sustained reads and writes are impressive: We clocked sequential reads at 771MB/s and writes at 553MB/s in AS SSD. The same goes for single-queue-depth random access IOPS, but the higher we pushed the queue depths on our 4KB random-write tests, the more the RevoDrive3 X2 liked it. At a queue depth of 64 in AS SSD, we clocked 4KB write IOPS over 100,000. The RevoDrive3 X2 is a fantastic SSD for servers or workstations tasked with constant database access.

The 3 X2 did extremely well in each of our benchmarks, far outpacing not only the previous-gen RevoDrive X2, but also a pair of 240GB Vertex 3 drives in RAID 0 using Intel's 6Gb/s SATA ports. This was the case in every metric except sustained reads and writes, in which the Vertex RAID clocked close to 900MB/s reads and 550MB/s writes. In PCMark Vantage's HDD subtest, the 3 X2 scored more than 84,000 PCMarks—that's nearly twice the score of a single 6Gb/s SATA SSD. Its PCMark 7 secondary storage score, meanwhile, is the highest we've seen from anything other than Vertex 3 drives in RAID.

We had no trouble installing or booting from the RevoDrive3 X2, although we still had to go through the Device Manager for the former and use F6 drivers for the latter. Once installed, the Revo set a new standard for speed on our system

So does the RevoDrive3 X2's absurd speed justify its $1,700 price tag? Yes, for workstation and database use, and maybe for bleeding-edge enthusiasts. If you just want 480GB of lightning-fast storage, two 240GB Vertex 3s in RAID 0 on Intel's native SATA 6Gb/s ports will perform nearly as well for less than $900. That said, if you absolutely need the fastest consumer-level SSD, but you're on Sandy Bridge and don't feel like using up both your native 6Gb/s SATA ports on a two-disk RAID; or if your motherboard doesn't have good native 6Gb/s SATA support; or if you don't want to spend more dough on a hardware RAID controller; or you just really hate money, the RevoDrive3 X2 could be for you. –NATHAN EDWARDS

VERDICT 9

OCZ RevoDrive3 X2

+ DEVO Absurdly fast, especially in 4KB random reads and writes; great real-world results.

– DEVIL Absurdly expensive: half again the price of Vertex 3s in RAID.

$1,700, www.ocz.com

BENCHMARKS

	OCZ RevoDrive3 X2	OCZ RevoDrive X2	OCZ Vertex 3 (RAID 0)	OCZ Vertex 3
AS SSD				
Seq. Read (MB/s)	771.9	631.6	**923.7**	506.2
Seq. Write (MB/s)	**553.1**	273.8	527.8	280.19
4KB Read (IOPS)	**6,462**	5,693	5,935	5,539
4KB Write (IOPS)	13,494	12,233	12,926	**14,263**
ATTO				
64KB File Write (MB/s)	**888.43**	545.08	760.54	505.38
64KB File Read (MB/s)	**855.56**	571.73	611.15	446.47
IOMETER				
4KB Random Write, 32QD (IOPS)	68,344.71	52,603.55	52563.7	**85,144.43**
Max Access Time (ms)	**46**	48	69	61
Premiere Pro Encode/Write (sec)	**417**	423	419	422
PCMark Vantage x64 HDD	**84,861**	48,471	45,081	59,978
PCMark 7 x64 Secondary Storage	5,481	5,330	**5,602**	5,285

Best scores are bolded. Our current test bed is a 3.1GHz Core i3-2100 processor on an Asus P8 P67 Pro (B3 chipset) running Windows 7 Professional 64-bit. All tests used onboard 6Gb/s SATA ports with latest Intel drivers, unless otherwise noted. PCIe SSDs tested in x16 slots.

Rosewill Thor

Literally the coolest case we've tested this year

The Thor's interior is roomy but a bit confusing at first due to the abundance of fan control leads.

LIKE THE GOD OF THUNDER for which it is named, Rosewill's Thor is a mighty full-tower chassis, with phenomenal cooling capabilities and enough power to smite the competition.

The Thor is a steel chassis with plastic trim along the sides of the front and top of the chassis. The front fan filter and optical drive bezels are black mesh, and the top of the case includes plastic vent fins that can be opened and closed using a sliding mechanism. If that seems familiar, Alienware offered a similar, though powered, venting system on some of its Aurora PCs. The plastic trim on either side of the six 5.25-inch bays slides out to enable removal of the mesh bezels, so you don't need to remove the entire front panel to get to your drive bays.

The design aesthetic might not resonate with everyone, but it looks like badass Nordic armor to us.

The inside of the case is cavernous, and the motherboard tray has standoff mounts for FlexATX, ATX, microATX, and E-ATX form factors—even XL-ATX boards like the Gigabyte G1.Assassin. The Thor's 10 PCI expansion slots have mesh covers. No need to fret if you've got a jumbo GPU—we were able to seat a 12-inch card without moving a thing.

The six steel hard drive trays require a simple pinch to remove, and they can be attached to your drives via rubber vibration-damping mounts in the bottoms of the trays. It's kind of a bummer they're not toolless, but they're still easy to use.

Wiring the Thor is easy enough. The motherboard tray features 10 rubber-grommeted cutouts (that *aren't* glued in, FYI, so be careful, as they come out easily) for cable management, and a cutout for the 8-pin ATX power cable, which is nearly too small. The Thor's fan controllers (more on them below) make a clean wiring job trickier, but still possible.

The Thor ships with four fans: a 14cm rear exhaust fan, a 23cm top exhaust fan, and 23cm intake fans in the front and left side panels. The generous loadout pays off; under load, the Thor is exceptionally cool—our average core temperature was 55 degrees Celsius, which barely edged out the Thermaltake Level 10 GT's 55.75 C average, officially making the Thor the coolest case we've tested all year.

The handsome brushed-metal top panel features two USB 2.0 ports, two USB 3.0 pass-through ports, an eSATA port, and two fan controller knobs designated A and B, which each control up to three case fans. The front fan includes red LEDs that dim or brighten in relation to fan speed—a nice touch. It's a shame there's no clear plastic window on the side panel to show off your innards—Rosewill opted to feature a mesh side panel with mounting holes for up to four 12cm fans, for additional cooling.

We're quite impressed with the Thor: It supports many mobo form factors, has lots of expansion slots and drive bays, and offers exceptional cooling with its stock fans, as well as plenty of additional fan mounting options. At just $150, it rivals cases that are twice the price. If you dig the aesthetic, the Thor is an obvious buy. **–ALAN FACKLER**

VERDICT 9

Rosewill Thor

+ MIGHTY THOR Phenomenal stock cooling; tons of cable cutouts; innovative optical drive access; aesthetically different.

– UNSIGHTLY BORE Wiring can be a little confusing at first; tiny 8-pin power cable cutout; rubber grommets fall out easily.

$150, www.rosewill.com

NZXT's Havik 140 marries two 14cm fans with six heat pipes and a passel of fins.

The EVGA Superclock's direct-contact heat pipes can't make up for its single fan. It pales in comparison to the dual-fan competition.

Turn Down the Heat

Three new CPU coolers face off in our hottest test bed yet

ONE OF THE WONDERFUL THINGS about modern CPUs is that they overclock extremely well without putting out much heat. Modern Sandy Bridge processors overclock higher and more easily than first-gen i7 chips, while drawing less power and putting out less heat. But even Socket 1366 parts overclock well—they just get hotter, so you'll need a more powerful cooler. We recently got our hands on three coolers marketed directly to overclockers, so we clocked our 2.8GHz Core i7-930 up to 3.9GHz and hit it with Intel's internal stress-testing utility, which has been known to physically damage motherboards and fry CPUs if used improperly. We cranked up the utility until our Hyper 212 Plus (our favorite inexpensive cooler) could barely keep up without throttling, and used that as our baseline. Can any of these coolers beat the heat? –NATHAN EDWARDS

NZXT HAVIK 140

NZXT is new to the cooler game, but if the Havik 140 is any indication, the company isn't being dumb about it. The Havik 140 is a hefty cooler in the stacked-fins "sky-scraper" style, with six copper heat pipes rising from the heat exchanger through 4.25 inches of nickel-plated-copper heat-dissipation fins. Two 14cm fans with white, wavy blades and black casings are strapped to the front and back faces of the heatsink in push-pull configuration using rubber-band-like straps, which are easier to use than the standard wire clips. The fans use 3-pin power connectors, and the cooler ships with a Y-cable to connect both fans to the mobo's fan headers.

The cooler stands more than 6.25 inches high from heat exchanger to the ends of the heat pipes, 5.25 inches across, and (with both fans strapped on) 4.75 inches deep. Installation uses a now-familiar system—a universal backplate with four posts mounted in the appropriate holes for the socket and plastic spacers on the other side of the motherboard, upon which rest two mounting bars. A second bar runs between those two mounting bars and secures with spring screws, pressing the heat exchanger against the CPU. NZXT's version of this mounting system isn't as solid or as easy to use as Prolimatech's, which remains the gold standard by which we measure CPU mounting systems, but it's hardly the trickiest install we've ever done.

Once mounted, the Havik performed admirably, besting the Hyper 212 Plus in our stress test by nearly 18 degrees Celsius and slightly outcooling the Prolimatech Armageddon, our Best of the Best air cooler. And it didn't sound like a jet turbine doing so—the fans were remarkably quiet. At $75, we'll accept the slightly cheap-feeling mounting bracket. NZXT's first cooler is great for overclocking.

VERDICT **9**

NZXT Havik 140

$75, www.nzxt.com

EVGA SUPERCLOCK

NZXT isn't the only company branching into CPU coolers. EVGA—better known for videocards and motherboards—recently released its Superclock cooler, with five direct-contact copper heat pipes, one clear 12cm fan with red LEDs, and a sharp-looking black finish to its skyscraper-style copper cooling fin stack.

The Superclock rises to just less than 6 inches high, a little over 5.25 inches wide, and (with the fan attached), more than 3 inches deep. The black-plated copper fins are crimped down at the ends and around a hole in the center, channeling airflow only to the areas of the fins near the heat pipes.

Like most coolers these days, the Superclock's mounting system uses a universal backplate with tall, threaded posts. Four metal nuts are used as spacers behind the motherboard, and four in front of it. The Superclock's top mounting bracket is preinstalled around the heat exchanger and is secured with six spring screws—one at each corner and two holding the center pressure bar against the back of the heat exchanger.

The 12cm fan is held with wire clips, which attach to the heatsink and clip to the fan (instead of the other way around). For some reason, the heatsink fins are shaped asymmetrically, so you can only mount a fan on one side—there's no way to secure a fan to the other side for push-pull cooling.

That's a shame, because the Superclock would benefit from another fan. Or from a quieter fan. The fan uses a 4-pin PWM connector, and at full blast during our stress test, it got *loud*. The Superclock's one 12cm fan also couldn't quite hang with the NZXT Havik or Prolimatech Armageddon, both of which use two 14cm fans, though the Superclock bested the Hyper 212 Plus by 10 degrees C.

At $50, it's around the midpoint of CPU cooler prices, and the performance is decent at high overclocks. Despite its name, the Superclock runs a little too warm and loud for really high overclocks, at least on Socket 1366. For Sandy Bridge overclocks or stock-clocked chips, it's quite good, but it can't compete with heatsinks that offer push-pull configuration with larger fans. Still, it's good value for the money if you don't mind a little noise or plan on replacing the fan with your own.

VERDICT 7

EVGA Superclock

$50, www.evga.com

The Thermaltake Frio OCK's fan mounting clip is one of the best we've ever seen. It's easy to attach and remove.

THERMALTAKE FRIO OCK

We have to hand it to Thermaltake: Nearly everything about the Frio OCK is well thought out. The two 13cm fans are secured in a black, red, and blue cowling that clips on and off of the heatsink with ease, eliminating many of the installation frustrations inherent in two-fan (or one-fan) heatsinks. The mounting system—a standard universal backplate, tall posts, plastic spacers, crossbars, and spring-screw mounting clips—is packaged in a little box with all parts clearly labeled, something we hope becomes a trend.

The six heat pipes go up into two separate stacks of cooling fins, which rise (with fans attached) 6 inches high and more than 5.5 inches wide and deep. The sides of the cooling fins are crimped down around the edges to form a tunnel, maximizing cool airflow over the heat fins. The Frio OCK's two 13cm fans are mounted to a plastic shroud that slips over the cooling fins and clips into place, making the pair of fans easy to install and remove. This greatly increases ease of use, and we wonder why more cooler manufacturers don't include this sort of thing as a standard feature.

The fans on the Frio OCK are connected to a single 3-pin connector and a variable speed dial, rather than being motherboard-controlled, so you can only control them by opening up the chassis. At full bore, they're incredibly effective, cooling our overclocked processor to within a degree of the Prolimatech Armageddon. They're also incredibly loud, to the point where we didn't really want to be in the room with our PC at all. That's a pity, because otherwise this cooler is solid: The install process isn't terrible, the performance is great, and the fan shroud is, frankly, the best we've seen.

If you're not rocking an over-the-top overclock, and can therefore set the Frio OCK's fans to somewhere below full blast, you'll find it a fine choice. But it's just too loud to run at full volume all the time.

VERDICT 8

Thermaltake Frio OCK

$80, www.thermaltakeusa.com

BENCHMARKS

	NZXT Havik 140	EVGA Superclock	Thermaltake Frio OCK	Prolimatech Armageddon	Hyper 212 Plus
Ambient (C)	24.1	24	23.8	**23.2**	**23.2**
Idle (C)	42	43.5	41.75	**41.5**	44.75
100% Burn (C)	**73.75**	81.75	75.5	74.5	92

Best scores are bolded. Ambient represents ambient air temperature in the Lab at time of testing. All coolers tested with a Core i7-930 overclocked to 3.9GHz on an Asus P6X58D Premium motherboard in a Corsair 800D chassis with stock fan, 6GB DDR3 RAM, and a Radeon HD 5850 GPU. Clock frequencies measured with TMonitor; temps with HWMonitor. Stress tests performed with Intel's internal testing utility running at 70 percent load.

IoSafe Rugged Portable SSD

Waterproof, shock-resistant, and sandstorm-proof, but not sledgehammer-proof

A thing of beauty is a joy forever, though a few trips down the stairwell will scuff the aluminum on the Rugged Portable a little bit.

THERE'S A HIDDEN PART of each of us that revels in destruction. That part of us sees a piece of technology billed as "rugged" and vows to destroy it. Granted, most rugged hard drive enclosures are a joke—a thin layer of rubber over a standard plastic chassis; or a thin aluminum shell, if you're lucky, with a 2.5-inch drive held inside. They're meant to survive a drop from a desk to the floor, or sometimes just to look cool. IoSafe, on the other hand, is serious about the "rugged" label, and the Rugged Portable SSD is among the toughest external drives you can get. Challenge accepted.

The Rugged Portable consists of a two-part, milled-aluminum chassis. Its only external features are a USB 3.0 SuperSpeed port (a FireWire model is coming soon), a status LED, and a Kensington lock port. Four Phillips-head screws and a rubber gasket seal the two sides together, and the chassis is rated for up to three days of submersion in 30 feet of water. It can withstand a dunking in 12 feet of diesel fuel for up to an hour—great news for those of us who work near open vats of fuel. It meets military sandstorm, altitude, and temperature specs, and can withstand a drop of 20 feet onto concrete, as well as over 2,500 pounds of crushing pressure. We've blasted it with birdshot, crushed it in a vise, thrown it down a concrete stairwell, hit it with a claw hammer, run over it with an SUV, and submerged it in an aquarium—all without it skipping a beat.

The SSD version ships with an Intel 320 Series SSD inside. We're not sure whether it's the onboard SATA-to-USB 3.0 controller or the USB 3.0 controller on our test motherboard (Asus P8P67 Pro), but we noticed about a 50-60MB/s slowdown on sequential tests using the Rugged Portable SSD versus a bare Intel 320 Series SSD. Still, with sequential read speeds around 200MB/s and sequential writes around 130MB/s, the Rugged Portable is darn fast.

The base model, with an aluminum chassis and 120GB SSD, is $500, or about $300 more than a 120GB SSD and basic enclosure, but you get what you pay for. For all normal use cases and some extreme ones, the Rugged Portable is nigh indestructible. We managed to completely break ours with a 20-pound-head sledgehammer (well outside the Rugged Portable's rated tolerance), but even if you manage the same, the Rugged Portable comes with a one-year, no-questions-asked warranty and up to $5,000 worth of data recovery service, like the previously reviewed SoloPro (which we set on fire).

The Rugged Portable is available in capacities up to 600GB, and for just $1,000 more than the aluminum version, you can get a model with a titanium chassis that's rated for 5,000 pounds of crush resistance.

It's not cheap or light, but if you need a rugged hard drive, they don't come much more rugged than the IoSafe Rugged Portable SSD. Just don't hit it with a sledgehammer. What kind of monster are you? **–NATHAN EDWARDS**

VERDICT 9 KICK ASS!

IoSafe Rugged Portable SSD

+ CAPTAIN HAMMER Speedy, beautiful, and virtually indestructible; one year of free data recovery.

– DOCTOR HORRIBLE Expensive, especially titanium version; not actually indestructible.

$500, www.iosafe.com

D-Link's DIR-657 is pretty enough, but its performance leaves us cold.

Prefer to lay your router flat? Too bad! The base on Belkin's N750 DB is permanently attached.

Router Wrangling

Different tools for different tasks

Looking to replace your aging wireless router? We benchmarked three brand-new models at Maximum PC Lab North, but each one is so different from the others that this shouldn't be considered a three-way comparison. Belkin's N750 DB is a dual-band model promising throughput of 300Mb/s on its 2.4GHz radio and 450Mb/s on its 5GHz radio, while D-Link's DIR-657 is a more conventional single-band (2.4GHz) model claiming throughput of 300Mb/s. And Trendnet's EW-692GR is the first dual-band router to deliver three 150Mb/s spatial streams (450Mb/s in aggregate) on both its 2.4- and 5GHz radios. –MICHAEL BROWN

BELKIN N750 DB

Belkin's N750 DB offers a better-than-average feature set, but the router's performance is a mixed bag. At most of our test stations, it delivered very good performance from its 5GHz radio but mediocre throughput from its 2.4GHz radio. Belkin arrives at the N750 model number by adding the 300Mb/s theoretical throughput on its 2.4GHz radio to the 450Mb/s theoretical throughput of its 5GHz radio. This is nonsense, of course, because you can't bond the two together to achieve throughput that even approaches 750Mb/s.

The features include dual USB 2.0 ports to enable network sharing of both a printer and attached storage (drives can be formatted with either FAT16/32 or NTFS). Belkin provides software that will automatically back up the hard drives on attached clients. The N750 DB supports a guest network, too, which gives you the power to share your broadband connection while barring guests from accessing other computers or storage on your network. The guest network, however, operates on only the 2.4GHz band.

Belkin describes its Video Mover feature as an app that enables you to "play videos from your library on your TV—wirelessly—through devices like... a DLNA-compliant Blu-ray player," but the N750 DB itself is not DLNA certified, and the router is very light in terms of quality-of-service features. There are no provisions for shaping network traffic to assign audio and video streams higher priority than a torrent, for example. And while it does have a UPnP server, none of the server's features are exposed to the end user for tweaking.

Belkin ships the N750 DB with channel bonding disabled on its 2.4GHz radio to eliminate the chance it might stomp on your neighbor's wireless network. Since we don't have any neighbors, we turned it on for our tests. Channel bonding is enabled on the 5GHz radio, which operates on a much less crowded frequency (actually, Belkin doesn't give you a choice in the matter).

The N750 DB would be a much better value if it delivered faster performance on the 2.4GHz frequency band. As it stands, it's a good choice for inexperienced users with simpler needs, or if you just need a router that can share a printer and network storage. Advanced users will want something that delivers faster throughput and more freedom to tweak.

VERDICT 7

Belkin N750 DB

$100 (street), www.belkin.com

D-LINK DIR-657

D-Link markets this single-band (2.4GHz) router as particularly well suited for gaming and media streaming, and it is endowed with very good quality-of-service features, but QoS can't magically render the 2.4GHz frequency band any less crowded. And given our relatively pristine test environment, the best word to describe the DIR-657's range and TCP throughput is pathetic.

And while we realize that our room-within-a-room home theater presents a significant challenge to most 5GHz routers, the 2.4GHz DIR-657 could barely send *music* streams there wirelessly; streaming video to our TV was a nonstarter. The router couldn't connect to the client located in our second outdoor test location at all—it's been a long time since we experienced that problem with a router operating on the 2.4GHz frequency band.

D-Link's DIR-657 is certified by the

Wi-Fi Alliance, too (as is Belkin's N750 DB), so the D-Link (and the Belkin) ships with channel bonding disabled. We turned it on for our tests—and then triple-checked it to make sure it was actually on, because the numbers we got were so low: just 48Mb/s with the client sitting a mere 10 feet from the router. Performance curiously jumped by more than 20Mb/s when we moved the client to the kitchen, doubling the distance and putting a wall in between the router and client, but it went off a cliff—to just 11Mb/s—when we moved the client out to the patio.

D-Link deserves credit for going to the trouble and expense of obtaining DLNA certification. This interoperability standard has proliferated throughout the consumer electronics industry during the past couple of years, providing confidence that your computers, TVs, media streamers, and other networked devices will play nice together. The DIR-657 is also outfitted with a USB slot for sharing mass storage devices on your network, and it has an SD Card slot to make it easy to transfer your digital photos, movies, and music to other devices on your network. The aforementioned quality-of-service features come courtesy of Ubicom, which has long delivered the best automatic QoS tools in the industry. If you want to tweak these settings on your own, D-Link provides 10 sets of controls for doing so.

Perhaps a firmware update will change our opinion of the DIR-657, but we can't recommend this product in its current state.

VERDICT 6

DLink DIR-657

$100 (street), www.dlink.com

TRENDNET TEW-692GR

Trendnet was first-to-market with a dual-band USB adapter capable of supporting three 150Mb/s spatial streams on both the 2.4- and 5GHz frequency bands, and now it's first-to-market with a router that does the same.

If you're just looking for a fast wireless router, the TEW-692GR is a good choice and it's priced right, too. But if you want a speedy wireless router that boasts all the latest bells and whistles, keep looking: This one doesn't have a USB port, it provides very little in the way of quality-of-service tweakage, and we don't like the way Trendnet implements guest networks.

Actually, the missing USB port doesn't bother us all that much. If you want storage attached to your network, a NAS box or a home-brew rig running Windows Home Server are vastly superior alternatives to plugging a USB drive into your router. And if you need to share a printer on your network, networked inkjets are incredibly cheap these days.

Some of the other missing features are more serious: The router has the typical UPnP server, for instance, but it doesn't come with the peace of mind that DLNA certification provides. And while you can set up multiple guest networks by establishing up to three additional SSIDs on each band (assigning them separate logins and passwords, or leaving them open, if that's how you swing), but Trendnet doesn't provide any means of restricting guests to Internet access—leaving your network somewhat insecure.

Aside from a stunted feature list, it's hard to argue with this router's wireless performance. At the time of our review, the TEW-692GR was street-priced just $5 more than our current favorite, Netgear's WNDR-3700, and it was considerably faster on both frequency bands—at least at close range. Netgear's product boasts many more features, however, and it delivers slightly better range.

If you're willing to give up a few features, Trendnet's TEW-692GR delivers plenty of speed.

VERDICT 8

Trendnet TEW-692GR

$135 (street), www.trendnet.com

BENCHMARKS: BELKIN N750 DB

	2.4GHz Band		5GHz Band	
	Belkin N750 DB	Netgear WNDR3700	Belkin N750 DB	Netgear WNDR3700
Bedroom, 10 feet (Mb/s)	76	**101**	**135**	109
Kitchen, 20 feet (Mb/s)	46.3	**85.8**	100	**103**
Patio, 38 feet (Mb/s)	61	**67**	61.4	**65.9**
Home Theater, 35 feet (Mb/s)	**41.2**	38.2	0.6	**6.4**
Outdoors, 85 feet (Mb/s)	**7.3**	4.2	N/C	**5.3**

BENCHMARKS: DLINK DIR-657

	2.4GHz Band	
	D-Link DIR-657	Netgear WNDR3700
Bedroom, 10 feet (Mb/s)	48	**101**
Kitchen, 20 feet (Mb/s)	69	**85.8**
Patio, 38 feet (Mb/s)	11	**67**
Home Theater, 35 feet (Mb/s)	1.9	**38.2**
Outdoors, 85 feet (Mb/s)	0.1	**4.2**

BENCHMARKS: TRENDNET TEW-692GR

	2.4GHz Band		5GHz Band	
	Trendnet TEW-692GR	Netgear WNDR3700	Trendnet TEW-692GR	Netgear WNDR3700
Bedroom, 10 feet (Mb/s)	**121**	101	**141**	109
Kitchen, 20 feet (Mb/s)	**99.4**	85.8	103	103
Patio, 38 feet (Mb/s)	55.1	**67.0**	53	**65.9**
Home Theater, 35 feet (Mb/s)	31.9	**38.2**	4.9	**6.4**

Best scores are bolded. TCP throughput measured using JPerf. N/C indicates no connection at that location. Additional benchmarking methodology at http://bit.ly/16w270.

LG E2370v

Detail so razor-sharp it'll cut you

The E2370v is well worth its price tag, producing exceptional detail and clarity.

BACK IN DECEMBER, we reviewed LG's E2350v—a serviceable display that featured a two-way stand and an energy-efficient design but had poor-quality black reproduction and a frustrating menu experience—so it was with a skeptical eye that we tackled its big brother, the E2370v. An IPS display with a slim, brushed-aluminum bezel, the E2370v is nothing like its little brother.

At 23 inches and running a standard resolution of 1920x1080, the E2370v also features LED backlighting, two HDMI inputs, one DVI and one VGA input, and a remote. That's right—a remote. Used to control brightness, volume, inputs, aspect ratio, picture-in-picture, Thru Mode (to optimize reaction time of video content while gaming), and more, the remote is a nice touch. While some reviewers have said the stand feels cheap and wobbly, we didn't experience any troubles with it while testing, although we were disappointed in its range of movement: The E2370v tilts back a bit but does not swivel left to right, adjust for height, or go into portrait mode (Why? Why, cruel world?!). It also lacks a DisplayPort and USB input.

Fortunately, its performance far makes up for any lacking features—from start to finish, the E2370v offered a superb image in both clarity and color. It aced the majority of our DisplayMate tests, doing a superb job in color tracking, primary color reproduction, color scales, and color purity and uniformity tests, which all indicate true, accurate color representation. However, it stumbled some during the grayscale tests, specifically the 256-intensity-level ramp, where there was some vertical banding, which could produce lines or streaking through images—however, we didn't see that problem reproduced in our Blu-ray or game testing. The E2370v also produced a true, deep black without any significant loss of detail—a major win, especially considering that the display suffers from some light leakage in the corners.

The crisp, sharp images, super color representation, and solid black made for a quality experience while watching *V for Vendetta*, where it handled dark scenes and action scenes effortlessly and produced amazing brightness and clarity. While playing Batman: Arkham Asylum, the E2370v never stuttered, providing us with a solid gaming experience with no ghosting (and we never even turned on the Thru Mode).

Overall, the E2370v gave us a stunning image with colors that popped and impressive details in dark scenes. Although it has its drawbacks—the light leakage and stingy range of movement among them—they never interfered with the user experience in real-life video watching or gameplay. Indeed, this is a worthy contender and a significant improvement over the E2350v. More importantly, with a street price of $240, it's difficult to see buying a TN panel when such a good IPS is available for just a little more. **–AMBER BOUMAN**

VERDICT 9

LG E2370v

SWITCHBLADE Incredible clarity, detail, color, and black representation; cheap for an IPS.

BUTTER KNIFE Lack of movement; no DisplayPort or USB input.

$280, www.lg.com

Creative Sound Blaster Recon3D

Creative hedges it bets

IS CREATIVE buying into the notion of the post-PC world? The Sound Blaster Recon3D is a powerful USB audio device based on Creative's all-new Sound Core3D chip. But you can also connect the Recon3D to an Xbox 360, PS3, or even an Intel-based Mac. Creative tells us the Sound Core3D doesn't boast the naked power of the company's previous-generation audio processor, but that it *is* extremely efficient—it draws all the power it needs from a single USB port.

The Recon3D has an optical S/PDIF input, a 1/8-inch audio output to drive a pair of speakers or headphones, and a 1/8-inch input to support a wired headset's microphone. It can also be upgraded to support Creative's new Tactic3D Omega wireless headset. All the cables you might need are included in the box.

We found that the Recon3D delivers plenty of bang for the buck, especially for gaming. While it's technically not a soundcard—the Sound Core3D chip at its heart consists of several digital signal processors; a 24-bit, six-channel DAC (digital-to-analog converter); and a four-channel ADC (analog-to-digital converter), but no waveform generators—the Recon3D can perform amazing tricks with whatever audio you feed it. Creative, for its part, describes the device as a "USB audio enhancer."

The Recon3D can decode a Dolby Digital bit stream, and it runs several audio-processing programs, including THX TruStudio Pro, Crystal Voice, and Scout Mode. THX TruStudio Pro is a software suite consisting of programs for producing virtual surround sound on stereo devices, such as headphones; for enhancing the sound of compressed audio material, such as iTunes tracks and MP3 files; for enhancing the dialog in movie soundtracks; and for boosting bass response for playback on small speakers. Crystal Voice is great for online games and VoIP calls. It has a noise-reduction algorithm that we found to be extremely effective at blocking background noise—from cooling fans to keyboard taps—from being picked up by our headset mic. An echo-cancellation feature prevents echoes during Skype sessions, and if you swing from speaking in hushed, tense whispers to violent outbursts, Smart Volume will equalize your voice so that it comes across at a consistent level. Lastly, there's a real-time effects mode that can transform your voice to match your character—your game character, that is.

Scout Mode is one of the Recon3D's most original features. Designed primarily for FPS players, this algorithm boosts faint sounds in games—such as the footsteps of an enemy sneaking up on you. We found the effect somewhat noticeable, but not immediately useful. Pro gamers looking for the slightest edge might find Scout Mode more satisfying, but regular Joes shouldn't expect it to deliver miracles.

We like the audio-processing suite, and if you're using onboard audio, you'll absolutely hear a difference when you plug in the Recon3D. Onboard audio has improved considerably over the years, but we still prefer discrete hardware. And on that score, a true soundcard—such as Creative's X-Fi Titanium Fatal1ty Pro—doesn't cost much more, provides most of the same features, and delivers slightly better sound quality.

But if your primary computer is a laptop, or if you frequently game on a laptop, Recon3D is a great choice. The same goes for PS3 or Xbox 360 gamers and those who play on both PCs and consoles, because it's possible to create user profiles on the device that work on both platforms.

All that makes it difficult to assign a final verdict, so you should consider this a qualified buy recommendation. The Recon3D is a solid audio solution; but if you have an open PCIe slot in your machine, stick with a true soundcard. **–ALEX CASTLE**

VERDICT **9**

Creative Sound Blaster Recon3D

+ MASTER BLASTER Solid sound enhancement at a low price; powerful hardware; works with both PCs and consoles.

– AUNTY ENTITY No support for 5.1-channel speakers or headphones; less potent than an internal soundcard.

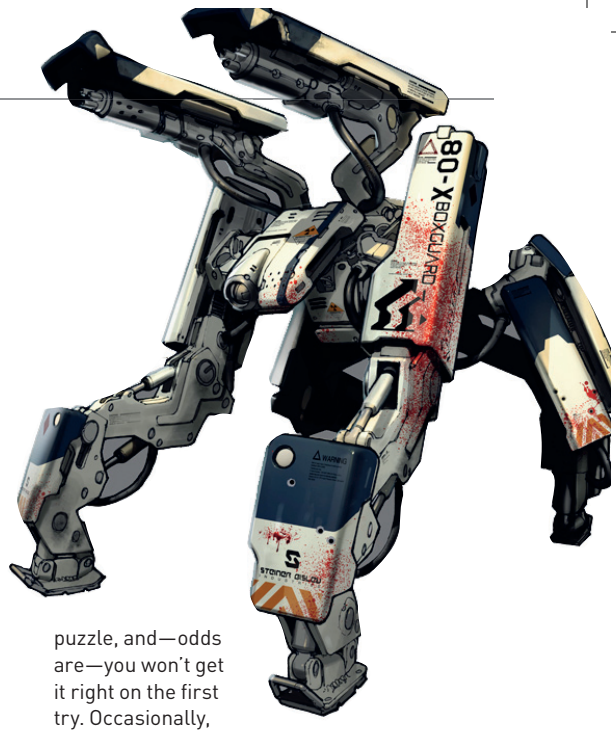
$130, www.creative.com

You can customize your audio profile with the included software, and then use that profile on any device—no drivers necessary.

The Recon3D puts basic controls—like volume control, mute, and mic volume—close at hand.

Deus Ex: Human Revolution

Not quite a revolution, but pretty damn close



DEUS EX: HUMAN REVOLUTION gave us a game-over screen seconds after the opening credits, and we loved it. We were about to tiptoe into our first mission—deftly defusing a hostage crisis—when we encountered a trio of friendly SWAT guards. "Good guys," said our brain. "No can hurt," it concluded in caveman. There is, however, a certain comedic appeal in watching large objects bounce harmlessly off people's faces, so we assisted a nearby garbage can out of earth's pesky gravitational pull. THWACK. Immediately, the three future musketeers whipped out their firearms and turned us into cybernetically enhanced Swiss cheese. That's when we knew: It was love at first murder.

Human Revolution may sport a shiny, modern coat, but make no mistake: Underneath all the pretty lights and robo-sunglasses beats the heart of PC gaming's most revered classic. See, unlike other shooters, Human Revolution actually assumes you have a brain. So let's say the obvious paths to your goal—stealth, hacking, shooting, talking, punching holes in walls, and about a million other things—just aren't panning out. Well, why not try making your own Tower of Babel out of boxes and awkwardly scrambling right over your troubles? Where other games reply, "Invisible wall, filthy ground peasant," Human Revolution politely says, "Go right ahead."

Really, that's Human Revolution in a nutshell. Sure, it's a series of linear missions—separated, mind you, by a few absolutely gorgeous hub areas—but you're granted an almost absurd degree of freedom within those bounds. Most games try to erect a giant baby pen around the experience—to say, "No, don't do this crazy/stupid/everyone's-on-fire thing because it's not precisely how *we* want you to play the game." Human Revolution, on the other hand, *assumes* that you will be crazy and stupid and set everything on fire. It gets you drunk on power, rolls out its finest red carpet, and says, "Here, vomit all your zaniest plans onto this."

And then everything goes horribly wrong. Even with solid shooting, a generally excellent cover system, and a dazzling array of super-powered "augments" to suit just about any play style imaginable, you'll still find yourself cornered and "augmented" with a few hundred extra subcutaneous bullets. In fact, truth be told, there's quite a bit of trial-and-error in Deus Ex. Each area is basically an extremely open-ended puzzle, and—odds are—you won't get it right on the first try. Occasionally, it's genuinely frustrating. A large part of the game's excellence, though, stems from that experimental spirit. Sure, you died, but what did you *learn* in the process? What did your brain sponge up—aside from bullets?

Hell, even Human Revolution's conversations will have your mind firing on all cylinders and your heart thumping out of your chest. These aren't simple "good or evil or snarky" affairs. You have to get inside people's heads—understand where they're coming from—or else, say, an innocent civilian might get their head blown off. In a way, these wars of words are almost boss fights, which makes the game's inclusion of actual boss fights all the more perplexing. Really, those four infuriating, keyboard-flinging encounters are the ugliest blemishes on an otherwise incredible game—especially if you're normally a stealth player. Other flaws like inconsistent AI and occasionally silly writing look positively minor by comparison.

That particularly painful belly flop aside, though, Human Revolution is one of our favorite games to come along in quite some time. It's that rare franchise revival that manages to nod knowingly in its predecessor's direction while boldly blazing new trails of its own. Gaming industry, take note: More of this, please. **–NATHAN GRAYSON**

Augmented arms? Awesome. Augmented eyes? Excellent. Augmented salivary glands? Ewwwww.

VERDICT 9 KICK ASS!

Deus Ex: Human Revolution

NEUROMANCER Tons of freedom to play however you please; augmentations for every occasion; incredibly interesting, well thought out world.

NEUROLOGICAL DISEASE Terrible boss fights; all-over-the-place AI; some silly writing and voice acting.

$49, www.deusex.com, ESRB: M

LAB NOTES

BY NATHAN EDWARDS **SENIOR ASSOCIATE EDITOR**

The Parts That Wouldn't Fit

Combo GPU/cooling system gets left behind for another build

THIS MONTH'S GAMING HTPC (BUILD IT) IS COOL, but there's one component that didn't make it into the config. To max out the rig's gaming potential while keeping noise and heat to a bare minimum, I had hoped to use PNY's all-in-one liquid-cooled GTX 580 with CPU cooler. This Asetek-powered dreamboat combines the water-block, dual fans, and radiators from Corsair's H70 liquid cooler with an additional heatsink for the GPU.

Alas, this would have meant a much larger chassis, so I reluctantly left the PNY card behind in favor of a midrange GTX 560Ti. Never fear, though—I'll find some place for that card/cooler combo in a future rig. Provided, that is, that next month's review of the part doesn't reveal some sort of fatal flaw in the card or cooling. Stay tuned!

Markkus Rovito
Features Editor

As a favor to a friend, I looked up a way to post simultaneously to Google+, Facebook, and Twitter. You can add SGPlus to Chrome, Firefox, or Safari, and after some initial setup, I'm happy to report that people are now ignoring my posts across all three social networks. It can also post to LinkedIn, but... please. Get it at www.sgplus.me.

Amber Bouman
Online Features Editor

Finally, a music service I actually like! That's right, Spotify is my new best buddy. I've only been using it for about two weeks, but I've found it invaluable for checking out new bands, streaming old music that I no longer have (ahem, 1990s), and giving a listen to new albums from artists I already dig. Spotify, all the way.

Alex Castle
Online Managing Editor

This month I officially switched my e-reading loyalty. Although I'm already fairly invested in the iBooks platform (and I do like the virtual page-turning), I've found that the Kindle reader is just a superior experience. The service works better over multiple devices, and the selection and prices are better. Now, if only I could make purchases in-app on my iPhone....

Gordon Mah Ung
Senior Editor

If the desktop is so dead, how come I'm tingling with delight at getting AMD's FX, aka Bulldozer, and Intel's Sandy Bridge E into the Lab for testing? Yeah, I'm pretty sure we'll see a quad-channel, six-core or eight-core chip in an ultra-thin notebook or tablet any day, right? As they say, when pigs fly out my butt.

Alan Fackler
Online Associate Editor

I've been putting together a web story featuring innovative laptops that have either been recently released (e.g. the Acer Iconia dual-touch screen laptop) or show tremendous promise in concept form. It also looks back at some of the more groundbreaking innovations from the mid 90s—it's scary and eye-opening to see just how far we've come, and how fast.

LETTERS

WE TACKLE TOUGH READER QUESTIONS ON...

> GPU Categories
> Smartphones
> Online Video

Where's My Volume Icon?

I have tried Alex Castle's tip to improve the audio icon (How To, October 2011) by downloading SndVolPlus and copying it to the startup directory.

After I used it, I realized that it does not give me anything I need, so I wanted to delete it. Not only can I not delete it, as it is running all the time, but it still appears in the notification area, and the original icon for the volume is gone and I don't know how to bring it back.

–Uriel Berchin

ONLINE MANAGING EDITOR ALEX CASTLE RESPONDS: I've been getting some good mileage out of SndVolPlus, but I know how frustrating it is to have software running on your computer that you'd rather wasn't. Fortunately, SndVolPlus doesn't do anything insidious when it installs, so you don't have to use MSConfig, Revo Uninstaller, or any of the other big guns to remove it. Just end the process using the task manager (save time by using Ctrl + Shift + Esc instead of Ctrl + Alt + Del) and then remove SndVol.exe from the Startup folder. Startup is a hidden system file in Windows 7, but you can get to it easily by finding it in the Start menu, right-clicking the folder icon, and choosing Explore.

To get your old volume icon back, right-click the taskbar and choose Properties, then select the Taskbar tab and click the button labeled Customize. Here you can choose which icons always appear in the taskbar. If your sound icon is missing entirely, you can get it back by clicking "Turn system icons on or off."

GPU Price Categories

I find your Best of the Best categorization system a tad deceiving. The best "budget GPU"—the XFX Radeon HD 6870—costs $190 street (isn't an HD 6450 at 50 bucks more like budget?). Yet the best "midrange GPU"—the MSI NGTX560 Ti—costs $220 street? For relatively similar performance and prices, it's odd how you group them in such different categories.

–Dave Contarino

CONTRIBUTING WRITER LOYD CASE RESPONDS: For some of us, a $30 difference isn't much. For others, that $30 difference would make a system beyond reach. When you're pinching pennies, every buckazoid counts. The other issue is, of course, where do you draw the line? We draw it at $200. Does that mean a $199 card is a budget card and a $201 one isn't? Things can get a little gray right at the borders. But a difference of plus or minus $20 is significant.

Smartphone Feedback

I have read every issue from *boot* #1 until now and have never been disappointed with what you have covered. Even if I wasn't that interested in the article or feature, it still conformed to what the magazine was designed for.

Your October issue gave us 16 pages (a couple of which were ads) of smartphone coverage. Since when is the magazine called *Maximum Smartphone*? I thought you all had spun up another magazine for gadgets, which this article would've been much more suited for. I haven't subscribed to that one yet because I'm not that interested in that side of things. It seems that there could've been something PC-related to take up some of those pages, right?

–Derek C.

DEPUTY EDITOR KATHERINE STEVENSON RESPONDS: Sorry you didn't like the smartphone feature, Derek. While our primary focus is always on PCs, we know that many PC enthusiasts use smartphones—essentially miniature computers—and approach the topic with the same interest and curiosity they have about the tech in their desktops or laptops. We don't intend to make smartphones a regular part of our monthly coverage, but we will continue to delve into it them, along with other peripheral subjects of interest to PC power users, from time to time. Not to pick nits, but if you review some of your old issues of *boot*, you will see that PDAs—the smartphones of their day—were featured prominently in the mag. We even devoted a cover story to PDAs in *boot* #8.

F'real?

I recently read Gordon Mah Ung's article about

↘ submit your questions to: comments@maximumpc.com

SINCE WHEN IS THE MAGAZINE CALLED *MAXIMUM SMARTPHONE*?"

Facebook's servers ("The Power User's Guide to Social Media," November 2011). Toward the end of the article he breaks down the number of servers being added daily to Facebook's Pineville, Oregon datacenter. I can't imagine how this number could possibly be correct. He says each and every workday four trucks arrive and each truck carries 13 racks and each rack holds 90 servers. That means each workday Facebook gets 4,680 servers. Assuming 250 (rounding off) working days a year, that would equal 1,216,800 servers just this year. I can't conceive how those numbers are correct.

–Scott Barton

SENIOR EDITOR GORDON MAH UNG RESPONDS: Facebook is happy to open up its server designs with the public, but it is keeping the total number of servers a secret. We can say that the numbers we reported weren't a typo. Now, whether that's actually how many servers Facebook installs a year, I don't know, and it's possible that Facebook is intentionally fuzzing the numbers to keep it inexact. One thing I do know is that I got the location of the datacenter wrong. It's actually Prineville, Oregon.

No More Video?

I'm a fan of the videos that you all used to post on your website. Any chance you'll post some more anytime soon? I notice that some of you are a little shy in front of the camera; is that why videos have not been posted?

–Vino

SENIOR ASSOCIATE EDITOR NATHAN EDWARDS RESPONDS: We would like to do more videos in the future, but they're time-intensive to edit, and we've been running short-staffed for a few months. Once we staff up again we'll be able to do more videos, and even improve our camera charisma a bit.

CUT, COPY, PASTE

The How To in our October issue titled "Transfer Your Game Data to a New Hard Drive" was misattributed. It was written by Brad Chacos.

[NOW ONLINE]

THE 11 MOST INNOVATIVE NOTEBOOK CONCEPTS YET

For all its crazy improvements in speed and power, the desktop computer has had basically the same form factor for the past two decades or so. The same can't be said of the laptop computer. From its bulky, barely portable origins to the sleek ultrabooks of today, the laptop has always been a breeding ground for innovative hardware. And while sometimes those innovations have stuck (the clamshell design and trackpads, for instance), others have been a little bizarre. We've collected 11 of our favorite outrageous laptop concepts into one gallery at bit.ly/qmkVqk.

[NEXT MONTH]

COMING IN MAXIMUM PC's NAUGHTY *AND* NICE HOLIDAY ISSUE

2012 Technology Preview

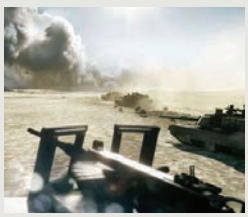
Don't buy a new PC until you read this story! We'll dish details on Intel's new Sandy Bridge Enthusiast chip and AMD's Bulldozer part, and give you the full rundown on the state of the art of PC technology.

Annual Antivirus Roundup

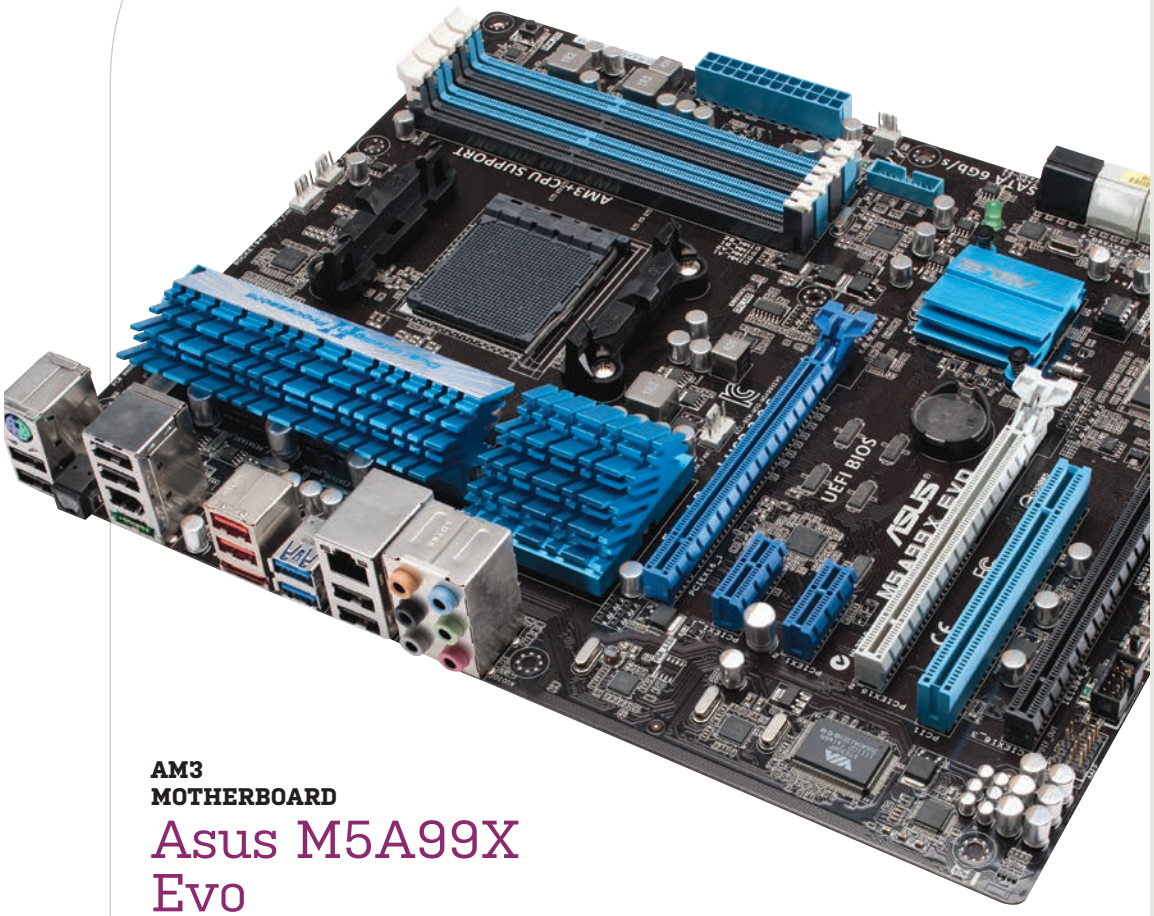
At this moment, we are busy testing all the top AV apps—both paid-for and free—so you can know which ones do the best job of keeping a PC safe!

Battlefield 3 PC

We're going to show you how to build a rig that can play BF3 at 1920x1080 and high quality settings for as little dough as possible.



HARDWARE



AM3 MOTHERBOARD

Asus M5A99X Evo

With AMD's new FX just about here, we're going to update our AM3+ board to something that will work out of the box with "Bulldozer," as well as support SLI. Asus's M5A99X Evo fits the bill with its AM3+ socket, SLI, and UEFI support. It's not that we're saying SLI is preferred over CrossFireX—we're saying that we'd like the freedom to make that decision on our own. We don't know how long the M5A99X Evo will stay on top, as we have a spate of 990FX boards that may well bump the 990X-based M5A99X from our list. But for now, it's our pick. www.asus.com

THE REST OF THE BEST

High-End Processor
Intel 3.46GHz Core i7-990X
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www.intel.com

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Intel 3.3GHz Core i5-2500K
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Asus P8Z68-V Pro
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OCZ Vertex 3 100GB
www.ocztechnology.com

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Hitachi Deskstar 7K3000 3TB
www.hitachigst.com

Air Cooling
Cooler Master Hyper 212 Plus
www.coolermaster.com

High-End Cooler
Prolimatech Armageddon
www.prolimatech.com

Blu-ray Drive
Plextor B940SA
www.plextor.com

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

Mid-Tower Case
Corsair White Graphite Series 600T
www.corsair.com

Midrange Display
LG E2370v
www.lg.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.

GAMES WE ARE PLAYING

Deus Ex: Human Revolution
www.deusex.com

Portal 2
www.thinkwithportals.com

Minecraft 1.8
www.minecraft.net

Team Fortress 2
www.teamfortress.com

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