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INSIDE

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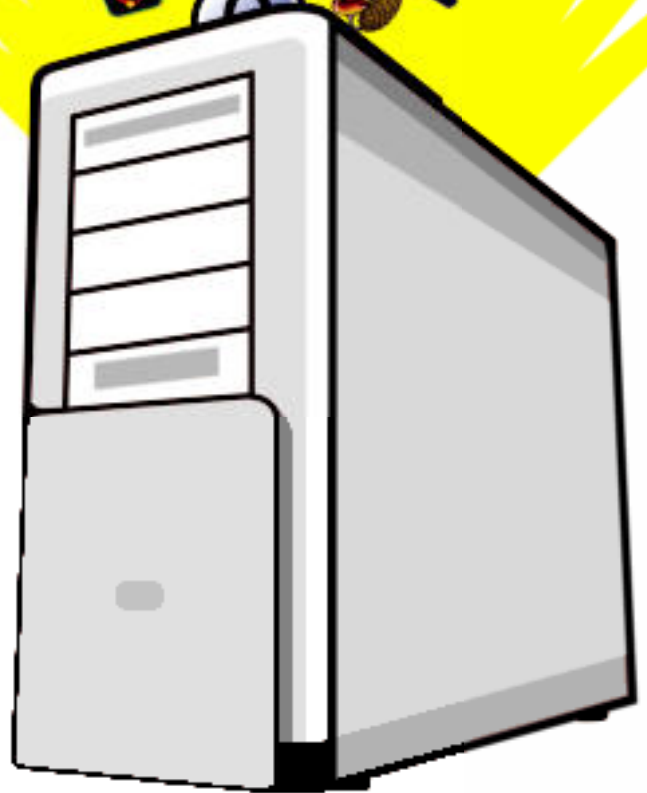
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JUNE

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Notebook Battery Life is a Trap

Battery-life claims never seems to line up with reality. You'd think testing battery life would be straightforward, but benchmark results rarely jibe with real-world results—in part, because there are an infinite number of potential workloads (each tapping power differently), and battery life decays over time. Both Intel and AMD make mobile CPU platforms designed for low power consumption, but due to the massive number of variables involved, I've found it nearly impossible to determine which architecture sucks the least juice.

Think about it. There's a lot of hardware in a laptop that can affect battery life besides the CPU and the battery itself: the LCD screen and backlight, the optical and hard drives, the GPU, chipset, and memory config—to name just a few. The upshot is that if you want to fairly compare Intel and AMD hardware, you really need to test what we'll call *core power draw*, isolating all the other variables. There are just a handful of ways to do this fairly, and each comes with its own problems.

The best approach would be to test notebooks that are identical save their chipset and CPU. Indeed, if there were a notebook family with the same battery, display, drives, etcetera, that came in Intel and AMD flavors, that would be perfect. We would be able to test performance and battery life (and the relationship between the two) for results relevant to both test machines as well as the broader AMD-versus-Intel debate. This would be the best-case scenario, but unfortunately, these machines don't exist.

A slightly more realistic option would be to get reference boards from AMD and Intel and put them in a machine with dual power supplies. The mobo, CPU, GPU, and memory would draw from one supply, and everything else would pull from the other. With this config in place, we'd simply measure the power draw of the PSU connected to the motherboard and the benchmark results of both systems.

This is a totally artificial test, but it perfectly isolates the stuff we want to test. That said, were we to go down this path, we could give readers the wrong impression that the CPU, chipset, and GPU are the only things that matter for battery life. If a reader looks at the benchmarks and thinks, "Oh, vendor A has better battery life," he's going to be pissed when he buys a big desktop replacement with the winning architecture, but also a 17-inch panel and a puny 3-cell battery, and gets just 30 minutes off a full charge.

So, you see the dilemma. This is why I always say that battery-life testing is a trap. Either I test in a way that actually measures the performance of the CPU, chipset, and GPU, or I give readers actionable buying advice. But I don't think I can do both at the same time. What do you guys think? Write an email, or let me know via Twitter (<http://twitter.com/willsmith>).

Will Smith

How-To-A-Palooza

DIY Hackintosh
page 54

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

THE NEWS

Intel and AMD War Goes to DEFCON 1

Latest legal tussle threatens to neuter one of the two chip companies **-GORDON MAH UNG**

Intel and AMD's long-brewing war of words may go nuclear.

The latest battle started early this year when Intel threatened to terminate its x86 cross-license with AMD. AMD fired back its own intercontinental ballistic missile, with company lawyers saying Intel's accusation gives AMD the right to terminate its cross-licenses that cover multicore IP, 64-bit architecture, and integrated memory controllers. If either side wins, it could theoretically render the other unable to make CPUs.

What lit the flame was AMD's decision to spin off its chip fabs as a new entity called GlobalFoundries. Under a 2001 cross-license agreement between AMD and Intel, shared IP could be used by a subsidiary, but only if it meets the criteria of a subsidiary as outlined by the contract. Intel said AMD hasn't put up enough assets for its spin-off to meet the criteria. Intel also alleges that AMD is violating another portion of the agreement but neither company is disclosing the details of that yet.

A redacted copy of the agreement stipulates that either of the companies would have to own, control, or have originally contributed at least 50 percent of the assets in order for a spin-off to share the same intellectual property rights. The spin-off would also not be



that Intel is just trying to distract people from AMD's continuing antitrust suit against the chip giant.

"Should this matter proceed to litigation, we will prove that Intel fabricated this claim to interfere with our commercial relationships and thus has violated the cross-license," AMD said in a statement.

Who is telling the truth? That's for a jury to decide, said Mark Walters, a patent attorney with the law firm Darby & Darby. Walters said the mess seems to

mostly hang on what the agreement meant when the phrase "originally contributed" was written. Intel doesn't think AMD contributed enough and AMD thinks it did, but that seems to be based on when the contribution was

made. AMD's contribution dropped between when the spin-off was started and when it was finalized. Walters said the contract doesn't include specific language regarding how long the contributed assets had to last. If AMD started out with 50 percent in contributions to the new company but that dropped to 30 percent over time, does that count? The contract doesn't say, which is normal in highly contested legal negotiations, according to Walters. Not every scenario can be anticipated and often isn't, especially with deadlines and unfriendly parties negotiating.

There is some good news in all this though; Walters said that predictions that this battle will end with one of the parties prohibited from making or selling CPUs is likely wrong.

"The vast majority [of these disagreements] ends in a settlement," he said.

**WHAT LIT THE FLAME
WAS AMD'S DECISION
TO SPIN OFF ITS CHIP
FABS AS A NEW ENTITY.**

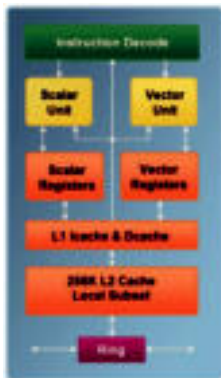
allowed to funnel off more than 70 percent of its revenue to another party.

That's the rub. Intel said AMD's stake in GlobalFoundries isn't enough to fulfill the contract. AMD insists that it is and charges

Larrabee Details Revealed

Intel offers glimpse of the upcoming x86-based GPU

In a briefing at this year's Game Developers Conference, Intel finally revealed how the core architecture of its upcoming x86 GPU is structured. Where traditional pixel pipelines feature a mix of both programmable and fixed-function segments, Larrabee is programmable from start to finish, using a subset of the x86-instruction set. While Larrabee will work with traditional DirectX 9, 10, and 11 code, developers who choose to write custom code for the chip can take advantage of a large number of very wide SIMD (same instruction, multiple data) vector units to run compute intensive operations, such as ray tracing. Intel has yet to release any specifics about the number of



SIMD units or the speeds and feeds of the actual videocards that we'll see released later this year, but developers now have the information they need to write code that will run on the hardware when it is available. —WS

Each Larrabee core features vector units that do the heavy computational lifting, as well as scalar units that handle internal housekeeping.

AT&T Won't Do RIAA's Bidding

Broadband subscribers were rightly nervous when AT&T confirmed in March that it was sending takedown notices to anyone the RIAA believed guilty of music piracy. The concern was that the Internet service provider would abide by the music organization's desired "graduated response" plan, which could ultimately result in suspension or even termination of service.

Those fears were put to rest, for the time being, with a recent statement by AT&T Senior Executive VP Jim Cicconi: "AT&T is not going to suspend or terminate anyone's policy without a court order." According to Cicconi, while AT&T is willing to forward notices, "stronger action has got to rest with the copyright owner." No such definitive statements have been issued by Cox or Comcast, two other ISPs known to be cooperating with the RIAA. —KS



TOM HALFHILL

Intel vs. ARM

Intel, the world's largest semiconductor company, suffers from a Freudian case of appendage envy. The appendage is an ARM.

Simply put, smartphones (and other mobile consumer-electronics gizmos) are the next PCs, and Intel wants them to run on Intel x86 processors. Right now, your mobile phone, MP3 player, or digicam probably has a custom chip with a microprocessor core licensed from ARM. Although most people have never heard of ARM, it makes the most popular 32-bit microprocessor architecture in the world.

Yet ARM doesn't make a single chip. It licenses its 23 different processor cores to other companies that design and make chips. These chips are very different from most of Intel's. They are system-on-chip (SoC) devices—highly integrated chips that surround the processor core with built-in peripherals, memory, I/O interfaces, and application-specific logic.

Intel knows it needs SoCs to conquer mobile electronics. Using separate chips is too costly, burns too much power, and requires too much space. Although Intel makes a few SoCs, it's impractical for one company—even one as large as Intel—to make a different SoC for every gadget.

ARM is much smaller than Intel. But ARM's strength is its global army of licensees, who make an awesome variety of SoCs. Intel fears to license the x86 in the same way. The last time Intel licensed the x86 architecture was in the 1980s—to AMD.

Intel's latest solution? Offer to design Atom-based SoCs for makers of smartphones and other small systems, then use Taiwan Semiconductor Manufacturing Company, the world's largest independent chip manufacturer, to fabricate the chips. Intel will provide design specs and custom logic. TSMC can provide the integrated peripherals, memory, and interfaces. Presto! An x86 SoC.

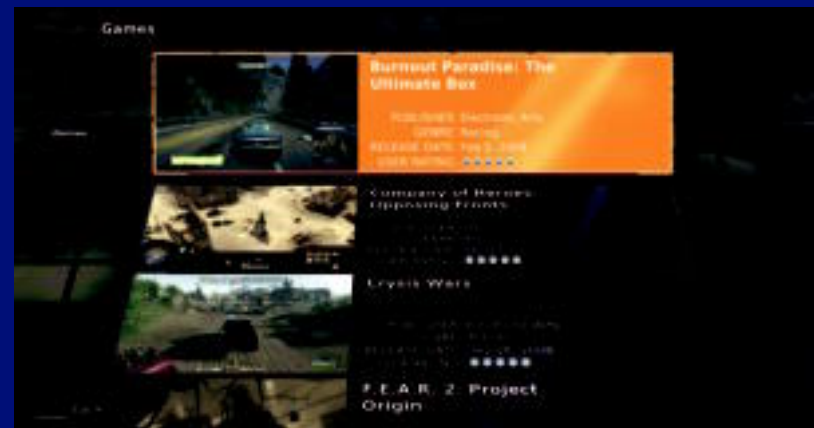
This arrangement isn't as flexible as ARM's licensing, but it's a big step for a company as paranoid as Intel. The big question is whether having an x86 instead of an ARM processor in a mobile device matters to anyone but Intel and ARM. In netbooks, it matters—because netbooks are PCs, and most people want Windows. In an iPhone, who cares? I think Intel will have trouble muscling in on ARM.

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

COMING SOON

Gaming in the Cloud

OnLive is a new "cloud gaming" platform that wants to be the last console you ever buy. Next-gen games are rendered remotely at data centers and then video is streamed to your PC or TV using broadband connectivity, so you never have to upgrade your hardware. Find out more about OnLive at <http://tinyurl.com/dkrvp2>. —NC



The Zune's Uncertain Future

Ballmer: 'I won't say full steam ahead'

After making nary a dent in iPod's market share, Microsoft seems to be rethinking its Zune media player. In an interview with BusinessWeek editor Stephen Adler, Microsoft CEO Steve Ballmer was noncommittal about the company's plans for hardware development, emphasizing the Zune service instead. It could be that the Zune's future is as software in other devices. —KS



Intel Locking Nvidia Out?

Graphics maker claims Intel fearful of a GPU world

In a countersuit filed against Intel, Nvidia is claiming that Intel is so fixated on preventing Nvidia from making chipsets for its new CPUs that the chip giant changed the design of its upcoming Arrandale and Clarkdale CPUs to thwart competing designs.

The claims were made in a wide-ranging response that said Intel is unfairly redefin-

ing what a chipset is in order to prevent Nvidia from making Nehalem chipsets. It further claims that Intel fused the GPU and CPU of the upcoming Clarkdale and Arrandale CPUs to keep Nvidia out.

Intel officials declined to comment on Nvidia's claim and said all they're asking the court to determine is whether Nvidia can make Nehalem chipsets. —GU

College Computer Labs Close

In what could become a trend, the University of Virginia will no longer run any campus computer labs. With 99.9 percent of today's incoming freshman owning a PC (most often a laptop), the University feels it's the right time to shut down its labs, which, according to UVA Vice President James Hilton, cost the school about \$300,000 per year. The amount actually saved will depend on what it costs to provide alternative access to community printers, specialized software, and other services. —PL



Photo by Chris Metcalf (www.chrismetcalf.org)

Boxee, Hulu Reunite with Workaround

Boxee seemed like the perfect application for enjoying all the wonders of the web from the living room, until Hulu blocked Boxee's access to its bounty. Bowing to the demands of its content partners, Hulu limited access to web browsers only, blocking applications such as Boxee from accessing its vast offering of TV and movies.

Not to be deterred, Boxee has responded with a fix. The web-video playback function of the program will now be powered by the XUL framework, the same framework used in Firefox, so Hulu should play in Boxee as it would in any browser.

Also new to Boxee is an overhauled API. It debuts with plugins for Pandora and Radio Time and will likely spur a wave of app development for the Boxee platform. —KS



THOMAS MCDONALD

Designing Down

Empire: Total War and Stormrise are two radically different games with a common core. Developed by Creative Assembly, they give us a rare opportunity to see the stark contrast between what PC and console strategy games can and cannot do.

Empire is a refinement of a revered brand, featuring new elements set within a familiar context. Despite the bugs, it's still a deep, detailed, and beautiful strategy game with a different texture from any other Total War game.

Stormrise severs the 3D tactical element from the Total War series and reconfigures it as a third-person real-time strategy game. The ground-level FPS/RTS hybrid is not the huge innovation trumpeted by Sega. Pandemic's Battlezone II: Combat Commander attempted a similar RTS/FPS mélange 10 years ago, with pretty solid results. But memories are short and hype is powerful in the game world, allowing Stormrise to position itself as "The First Truly 3D RTS Game."

There is indeed innovation on display in Stormrise. I haven't seen a game which forced such a reorientation of my approach to strategy gaming since Homeworld. It offers a large battlefield that has tactically significant verticality—with levels in the air, in and on structures of varying heights, on the ground, and underground—and is controlled from the perspective of individual units.

Unfortunately, this attempt to bring a scaled-down version of the Total War battlefield experience to console systems is ultimately undone by the limitations of console controllers, which make managing the multiple units very tricky.

The PC version of Stormrise (which was clearly an afterthought) is even more unsatisfying. The mouse/keyboard controls that would have been a perfect fit for Stormrise are instead filtered through the confining lens of the console controller, rendering the PC controls extremely cumbersome.

A PC concept has been bounced to the console and back to the PC, and as with any game of "telephone," something is lost in the process. If Stormrise was designed from the ground up for PC control, instead of designed down to the console level, it might have been a classic. In attempting to bring its complex ideas to consoles, Creative Assembly has instead proved why its only true home can be the PC.

Thomas L. McDonald has been covering games for 17 years. He is an editor at large for *Games* magazine.

LaCie iamaKey

Finally, a USB key that lives up to its name! But the fun, novel design of LaCie's iamaKey (\$20/4GB or \$30/8GB, www.lacie.com) is only half its appeal. Though small and slim, the flash memory drive is made of sturdy metal to withstand the rigors of regular use. And its connector is both water and scratch resistant, mitigating the need for a cap—which we'd only lose, anyway! —ks



QUINN NORTON

Unfair All Around

Jeff Koons is getting mixed signals from the American legal system. He's an artist known for "appropriating" pop culture in his art—that's infringing copyright to some, fair use to others.

In 1992 a photographer sued Koons for creating a statue of his photograph of two people with a line of puppies crossing their laps. Koons exaggerated the dogs' features, turned them blue, added flowers, and called it "Banality." The judge didn't buy that this was different enough, or parody, and Koons lost the case along with some of the \$300,000 he'd sold three statues for. It was a mixed verdict for the photographer—he won the case, but legally speaking, it seems his work really was banal.

Then, in 2005 Koons ran up against another photographer, this time over a piece called "Niagara," which used the photographer's advertising image of women with Gucci sandals against a bright and disturbing surreal background. This one passed muster—the judge held that this was transformative enough to be fair use.

So, as Mr. Koons might himself ask, what gives?

Fair use is a strange part of law where judges have to be art critics—and economists, technologists, and historians as well. Like free speech, fair use isn't defined on purpose. You'd no more want a list of "fair uses" than you'd want a list of "free phrases" defining speech, because no one writing a law could anticipate all the uses possible. Instead, the law trusts judges to be smart.

The problem is judges aren't being so smart these days. This is caused by there being so much more to know about art, technology, economics, and so on, and not the result of some popular-but-IQ-reducing robe detergent.

In the last few years judges have decided how small you have to shrink a photo to index it in a search engine, what the market value of Seinfeld trivia is, and even what the literary heart of J.D. Salinger's unpublished letters is. It's too much to ask, and they need help. Fair use is a 33-year-old law, and we've invented a couple things since then—it's time lawmakers got out of the 70s and did some updating.

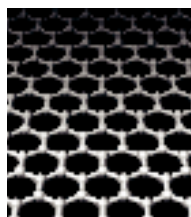
Quinn Norton writes about copyright for *Wired News* and other publications. Her work has ranged from legal journalism to the inner life of pirate organizations.

Graphene Promises 1THz CPUs

Strongest material ever is suited to superfast computing

According to a team of MIT researchers, graphene technology could pave the way to remarkably fast CPUs racing along at 500 to 1,000GHz! As farfetched as it sounds, the terahertz era may be closer than you think.

First identified in 2004, graphene is a form of pure carbon made up of a one-atom thick sheet of carbon atoms. Tests performed at the atomic level have shown graphene to be the strongest material ever discovered, but it's graphene's electrical properties that hold the most promise. While today's silicon-based processors battle with heat dissipa-



Consisting of a single layer of carbon atoms arranged in a hexagonal lattice, graphene allows electrons to move with little resistance.

tion, electrons move around much more freely in graphene, and as a result of this reduced resistance, the substance generates comparatively little heat.

But lower temps are just the beginning. Ultrafast graphene transistors produce much cleaner electrical signals than silicon, making the material ideal for mobile gadgets, where the technology is most likely to show up first. Just don't be surprised if one day soon you look back and snicker at how fast you thought that Core i7 processor was. —PL

WESTERN DIGITAL JOINS SSD FRAY

Company purchases solid state drive maker SiliconSystems

In late March, hard drive manufacturer Western Digital put its hat in the solid state drive ring by acquiring SiliconSystems, maker of the SiliconDrive SSD and embedded flash memory devices. SiliconSystems will become the WD Solid-State Storage business unit, and WD says it will keep all SiliconSystems' employees. SiliconSystems holds many SSD-relevant patents, including technologies to prevent data corruption in the event of power loss, wear-leveling algorithms, and hardware-level security. The acquisition gives WD an immediately profitable division with years of solid state experience, which the company expects to help ramp up its own R&D.

Western Digital is the largest manufacturer of standard hard drives to officially enter the solid state market. We wouldn't be surprised to see a similar effort from Seagate next. —NE

THE LIST

Essential Gear and Gadgets in Our Geek Bag

1 THINKPAD X200

As light as a netbook but with real power—up to a 1.86GHz Core 2 Duo and integrated 3G. \$2,068, www.lenovo.com

2 LEATHERMAN SKELETOOL CX

A great multitool for building PCs and liberating hardware from UPS packages. \$96, www.leatherman.com

3 SHURE SE110MPEA EARPHONES

These superior-sounding buds have an inline mic that's compatible with the iPhone and Blackberry Storm. \$156, www.shure.com

4 KINDLE 2

We don't need a fancy gadget to make reading more enjoyable, but it doesn't hurt. [Review on page 82]. \$360, www.amazon.com

5 MAXTOR BLACKARMOR 320GB HARD DRIVE

Strong hardware-based encryption keeps our data locked tighter than state secrets. \$135, www.maxtor.com

6 CREATIVE VADO HD

Our feats and antics are documented in 720p video with this 8GB USB pocket cam. \$230, www.creative.com

7 CANON POWERSHOT SD990IS

With Canon's Digic 4 chip, this point-and-shoot lets us snap crisp 14.7MP photos of *other* awesome gadgets. \$400, www.powershot.com

8 CALLPOD CHARGEPOD

This modular charger lets us charge six devices from one precious hotel room power outlet. \$40, www.callpod.com

9 SUREFIRE E2D FLASHLIGHT

Use the 5-lumen low-light setting when PC spelunking and the 120-lumen mode for hunting zombies. \$150, www.surefire.com

10 ALIPH JAWBONE BLUETOOTH HEADSET

Effective noise cancellation, slim profile, and a really comfortable fit make this our favorite bluetooth headset. \$130, www.jawbone.com

11 OCZ RALLY2 64GB USB FLASH DRIVE

We keep mobile applications on this USB key, as well as a backup of our entire Steam media collection. \$130, www.ocztechnology.com

12 APPLE IPHONE 3G

To reiterate: We don't hate Apple products—just their overzealous fans. \$299 w/ contract, www.apple.com

13 ACME MADE CLYDE CITY

This nylon shoulder bag has enough pockets to store our many gadgets while remaining sturdy and comfortable to wear. Fits laptops up to 17 inches. \$100, www.acmemade.com

14 MOLESKINE NOTEBOOK

Because handwriting recognition programs will never be able to decipher our chicken-scratch shorthand. \$10, www.moleskine.com

15 PARKER URBAN PEN

A high-end gel pen that smoothly glides over paper—when not just any ballpoint will do. \$20, www.parkerpen.com





This month the Doctor tackles...

▶ Defragmenting Flash

▶ BIOS Lock

▶ Backing up NAS

Does Flash Fragment?

I recall that Maximum PC advises against defragmenting flash drives, such as the ones in an iPod. Does that include solid state drives, like in the Eee PC?

—Aaron

Defragmenting is a process developed for standard magnetic hard drives. Defragmentation tries to put all the data sectors for a file physically near each other on the disk, so the drive doesn't have to seek all over the platter to find the whole file. Flash memory has different architecture, with no moving parts, and defragmenting doesn't help it. In fact, because of the way NAND flash memory stores data (data is stored in blocks, and the whole block must be erased and rewritten to store any data on it), regular defragmentation can decrease the life span of the drive.

So, if your Eee PC has solid state memory, don't defragment it. Diskeeper sells an SSD optimizer, but we haven't yet tested its effectiveness.

BIOS Lock? Crock

I bought a new motherboard, processor, and memory online and put it in a case. I was installing my original copy of Windows XP Pro and before the installation completed my motherboard just locked up. My power supply fan stayed on, and my hard drive LED stayed lit, but my power light was off and nothing would happen.

I exchanged the board for a duplicate.

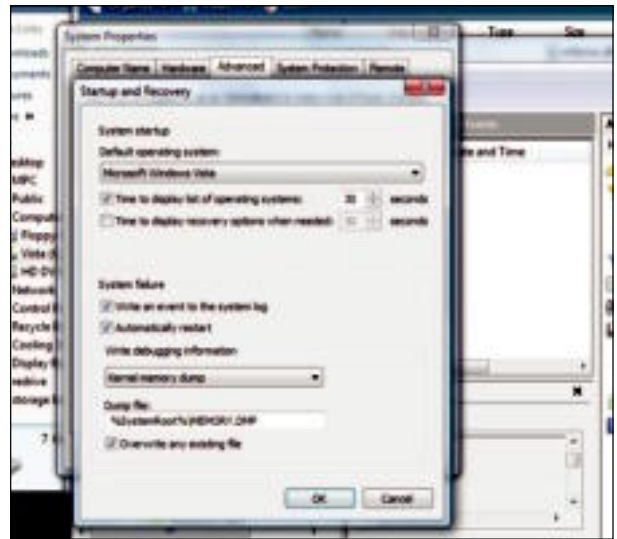
I installed Windows XP Pro and it ran for almost a whole day, but then the same thing happened. I called the store and talked to tech support and was told that I must have a limited copy of XP Pro that will only work with components that were out around the time the OS disc was made, and because I tried to use it with more modern hardware, Windows put a BIOS lock on my mobo. I'd never heard of such a thing, and the only thing I can find online regarding "BIOS lock" is how to set up a password in the BIOS. Is this technician feeding me a line of bull?

—Lee Byrd

The tech is feeding you a big bowl of malarkey. Windows XP does not place any BIOS lock on the hardware. What can happen is that Windows XP Pro will refuse to activate because OEM copies of the OS technically die with the motherboard. So, if you bought an OEM copy of XP for \$120 four years ago and now try to reinstall it, Microsoft could say, "Go buy another copy of the OS." Boxed retail copies, however, may be reinstalled till your face turns blue. You likely have a hardware issue such as bad RAM, a bad motherboard, or even a bad CPU.

RAIDing Spaces

I have RAID 0 on my PC and



Control how Vista responds to BSODs with the Startup and Recovery settings.

store my OS on it. But what else goes there? Do I install my games to the RAID or to my other drive? I also have games imaged so I don't need the CD/DVD. Should those games be on the RAID or not? Are there any apps that would do better on the RAID? As it stands, I install most of my apps to the RAID 0 (Firewall, antivirus, Yahoo!, etc.). Any advice would be greatly appreciated.

—Martin Cates

Martin, the rule we generally follow is that documents, music, movies, etc., reside on a secondary drive. RAID 0 is fast and useful for running your operating system and oft-used programs like games—depending on your RAID controller, you

can nearly double your read and write speeds, offering a big performance boost. But because your data is striped across two drives, the chance of mechanical failure doubles, and RAID arrays are susceptible to motherboard problems too—the last thing you want is a BIOS update destroying your data. So, weigh your options: A RAID 0 array is great if you're chasing speed, but you run a greater risk of data loss, and it's certainly going to be more expensive than buying a single high-performance drive.

Where's My Space?!

I just bought a brand-new Seagate 1.5TB Barracuda 7200.11 and I cannot format the drive. I own a Dell XPS 630 with Windows

Vista Home Edition and I bought the drive to use as a second hard drive to store photos and movies. When I installed the drive I saw that the BIOS was showing the full 1.5TB but when I went into Windows it was showing only 1.37TB. I tried to format the drive by going into Disk Management, but when it's about half way into formatting the drive, it just freezes and stops working. Please HELP!

—Arim Padilla

You're not being ripped off;

the Nvidia 650i chipset in your Dell XPS system.

Download the nForce chipset driver version 15.23 from Nvidia.com and update your motherboard's chipset and you'll be able to format normally.

Welcome Back, BSODer

I just did a Core i7 build for audio/video production purposes and 3D rendering. I'm not a gamer, but I do a lot of heavy-duty audio stuff and 3D rendering with Cinema4D, After Effects,

whenever a BSOD occurs, like I used to with XP. I would imagine that Vista has the same feature; I'm just not sure how to get to it. Can you tell me where to find this or offer some suggestions to help me troubleshoot this?

—Dan Orlando

A BSOD in Vista usually indicates that you have a pretty severe hardware problem. Your hardware list wasn't very specific, so the Doc is going to have to start with generic recommendations. The usual culprit these days is the PSU. The Radeon HD 4870 X2 is a big card that eats a lot of power. You should check ATI's certified list of PSUs for a single 4870 X2 at <http://tinyurl.com/amdcertpsu>. Generically, the company recommends a minimum of 650 watts. If you're using anything less, that's a possible culprit.

The Doctor has also noticed that Core i7 boards tend to be finicky about RAM. You didn't say how much RAM you have, but if you're running 12GB, that could very well be the problem. First, make sure you're running the latest BIOS for the board. Also check what timing/speeds the board is setting for your RAM and use the memory maker's recommended settings and voltage. Finally, you should check your heatsink. Did you seat it properly? Is it possible that you didn't install it firmly?

Vista writes an event log to %SystemRoot%\MEMORY.DMP by default. You can modify this setting, or stop

DRIVE MANUFACTURERS LIST CAPACITY IN DECIMAL NUMBERS WHILE INFORMATION IS STORED IN BINARY.

1.37TB is the correct formatted capacity of a 1.5TB drive. The confusion comes from the fact that drive manufacturers list capacity in decimal numbers (1KB = 1,000 bytes), while information on computers is actually stored in binary, such that 1KB = 1,024 bytes. You're not losing any capacity, it's counted differently. You have 1.5TB of space (1.5×10^{12} bytes), or 1.37 terabytes (binary terabyte; 1.5×2^{40}).

When we originally tested the 1.5TB Barracuda, we ran into the same formatting problems you're seeing. It turns out there's a bug in some older nForce drivers that prevents drives larger than 1TB from formatting. This affects the Nvidia 680i SLI chipset (which was on our motherboard) as well as

Poser, 3D Studio Max, Photoshop, etc. The system is a Core i7-920 with an ATI 4870 X2 and Vista Ultimate 64-bit.

Vista has really started to get on my nerves. I am getting random BSODs, and there is no pattern to when they come (although it seems the computer is usually idle for a little while when it happens). The BSOD message says it's due to a hardware exception, and is always the same. I've done some general diagnostics on the hardware using CPU-Z and SpeedFan, and everything checks out.

I think it may be the result of something as simple as an unseated videocard, but it would be nice if I knew how to access the error log that is written



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



Windows from restarting after a blue-screen (so you can read the error codes), by clicking My Computer, then System Properties. Go to the Advanced tab, and under Startup and Restore, click Settings. Microsoft has a Knowledge Base article on how best to set up and analyze memory dumps (<http://tinyurl.com/kb315263>).

Beefing up for Blu-ray

I need recommendations on building a box that will play Blu-ray discs. My main computer (Q6600, Nvidia 8800 GT, 64-bit Vista, 8GB RAM) plays them fine. My media rig (older AMD, Nvidia 7900, XP Home, 4GB RAM) chokes on Blu-ray discs. When playing Blu-ray, which is more important, videocard or processor? Should I buy a cheaper processor—say, a Core 2 paired with a beefy GTX 850—or a quad-core with a 9500? And should I go Vista, or will XP be fine?

I'm ripping Blu-ray discs to the hard drive and playing them with PowerDVD 8 Ultra.

—Dan Pick

Dan, when playing back Blu-ray content, we recommend a modern videocard with a dual-core processor. Any modern card that can play back H.264 video will work; a good benchmark is that if a GPU is DirectX 10-capable, it should be able to handle a Blu-ray movie; try an Nvidia GeForce 9500 GT or, if you're on a budget, an ATI Radeon 4350. Either XP or Vista will work fine. And make sure your GPU and monitor are HDCP-compliant or you won't be able to play protected content.

Backing up 2TB?

I have 2TBs of movies that I'm afraid I'll lose if the NAS device they're stored

on fails. Is it possible to recover the files on these hard drives by putting them in another device, or do I have to have the same product I'm using now? Making DVDs for 2TB of files is not realistic and I don't really want to buy another 2TB of hard drives just for backup. How long can I expect a typical hard drive to retain data before it fails? One year? Five?

—Norm

This is a problem that's going to crop up more and more often now that storage size is increasing so rapidly—how do you back up 2TB worth of data? Depending on how your NAS formats its internal drives (for example, if they're in a RAID), you might not be able to just stick the hard drives in a different device and expect them to work. If the NAS tanks, rather than the disks themselves, you'd think you'd be able to put the drives in a new unit of the same model, but rebuilding RAIDs on different controllers is an iffy proposition.

We know you don't want to plunk down a few Franklins on backup drives, but we honestly think that's the best course of action—stick a few large drives in your main rig and back up your NAS to them. You can grab a couple 1.5TB drives for about \$130 each; that'll give you room to back up and room to grow. And although it may seem counterintuitive to back up your NAS to your desktop, what else are you going to do?

As to your second question, hard drives can fail at any time, but we usually expect them to last around five years. It's not a bad idea to upgrade every few years anyway, as storage gets faster, better, and cheaper. ☺

Because They're Freaking Awesome!

BY NORMAN CHAN, ALEX CASTLE, AND WILL SMITH

32 essential apps to empower your rig and take your computing experience to new levels—no PC should be without them!

You have to admit, Windows is a pretty bare-bones operating system as it ships. After a fresh install of XP or Vista, you're faced with a barren Start Menu and an empty desktop—beaming with limitless potential. It's up to you to hunt for and download all the applications you need to enhance your day-to-day computing experience. And chances are, it's often difficult to find good software that's also free. That's where this guide comes in.

We've put together a list of what we think are the most essential PC apps for every *Maximum PC* reader. These are all free programs (well, except one) that should be immediately installed after a fresh build or reformat—32 indispensable programs and utilities that we couldn't imagine computing without. From the best IM client to the best FTP browser to a supercharged Notepad replacement, these essentials truly enhance the Windows experience (much more so than Microsoft's own Windows Live Essentials). We're not saying you'd use all 32 entries on our list on a daily basis, but if you are at all serious about getting the most from your PC, these apps will help you along your way.

And at the end of the feature, we'll even show you how to install these apps in one fell swoop. Because if it were up to us, this is software that would be bundled with every copy of Windows.

WINDIRSTAT

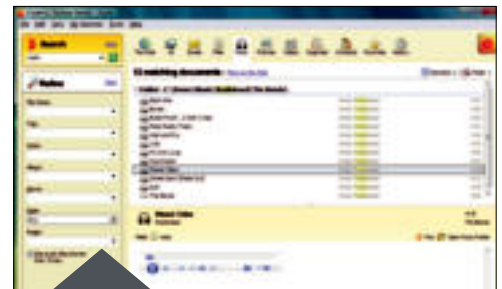
Have you ever sorted a folder by file size, hoping to track down a hard disk hog, only to be frustrated by the fact that Windows doesn't let you see the size of nested folders' contents? So have we, and that's why we make sure we've always got WinDirStat close at hand.

WinDirStat analyzes the composition of your hard drive and presents the information in a size-ordered directory view, or as a colorful map, making it a snap to identify which files are eating up your hard drive space. Once you've figured out which files are filling your drive, you can get rid of them with WinDirStat's built-in deletion tools. <http://windirstat.info>



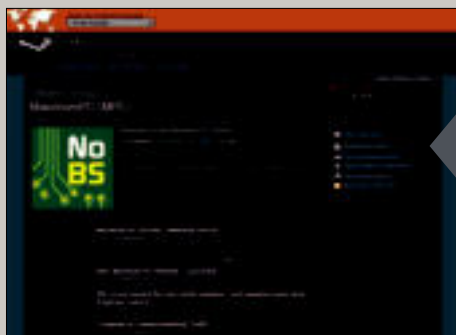
BELARC ADVISOR

For those times when you really, really, really need to know every little detail about every component in your PC, there's one tool for the job: Belarc Advisor. This tiny app interrogates every component to find out everything from the manufactured-on date to the model number to the current firmware. Then it turns its eye to installed software. Need to update your BIOS but can't remember whether you bought the rev A or rev B version of your mobo? Belarc Advisor will tell you, and it won't make you find a flashlight or crawl around under your desk. www.belarc.com



VMWare Server

Virtualization isn't just one of the hot buzzwords in tech, it's a practical way to test software, patches, and operating systems. VMWare is our pick for a robust and easy-to-use virtualization option, and VMWare Server is the company's free product. It runs on top of a host Windows or Linux machine to deploy multiple virtual machines by provisioning your hardware resources. The only big limitations of VMWare Server is that it doesn't currently support 3D acceleration, nor is it "officially" compatible with Vista 64-bit. Still, it's a great way to create and run virtual machines. www.vmware.com



STEAM

Remember when Steam first launched with Half-Life 2 and trolls all over the Internet complained about the service's mandatory online connection? What fools we were. Today, we can't imagine gaming on a PC without Steam. Valve's app isn't just an ultra-convenient online store, it's our preferred method for staying connected to fellow online gamers. Valve cofounder Gabe Newell recently remarked that Steam is more than just about combating illegally downloaded content, the program is Valve's way of catching up to the convenience and instant-access appeal of piracy. We think it's doing a fine job. www.steampowered.com

COPERNIC DESKTOP SEARCH

While we'll concede that Google Desktop Search and Windows Search 4.0 are both vast improvements over the default Windows XP search function (death to that useless dog!), we have to side with Copernic when we want a powerful desktop-search client. Copernic is not only comprehensive in its indexing—it quickly searches emails, Office documents, and web pages—it's also light on system resources and processor utilization. We like its ability to sort, group, and refine searches, which is particularly useful for navigating through densely packed drives. Our only gripe? The newest version of Copernic Free omits real-time results as you type—a feature reserved for the \$50 Professional Edition. www.copernic.com

TrueCrypt

TrueCrypt lets you create and mount an encrypted virtual drive. You can store whatever you want in your drive and it will be completely inaccessible and invisible to anyone who doesn't have the passphrase.

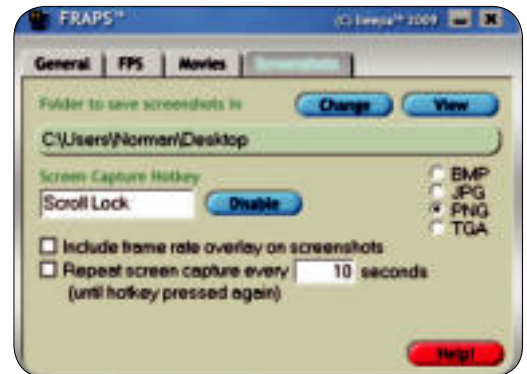
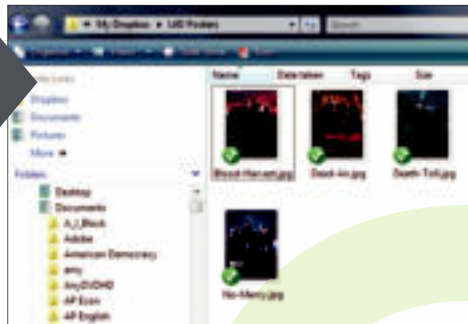
Even if you're not an international man of mystery, you never know when you might want to encrypt

something, whether it's sensitive financial data or a simple list of passwords. Since TrueCrypt is a tiny file (about 3MB) that can be set up to run without installing anything, we feel very comfortable giving it a "download it, keep it on your disk, you never know when you might need it" recommendation. www.truecrypt.org

DROPBOX

Get this: A Windows app that "just works." Yes, we're being serious. Dropbox came out of nowhere last year to stun us with its amazingly intuitive approach to online storage. The program creates a user folder that acts just like a folder on your hard drive. You can drag, drop, copy, and even save up to 2GB worth of files to the cloud (\$100/year for 50GB), while the service works its magic and syncs your documents in the background. The online interface lets you track your file transfer history and download any file remotely, as well as restore any files that may have been accidentally deleted.

You can even create shared or public folders to pass files along to your friends and family. And you don't even have to endure any online ads. Naturally, we're smitten. www.getdropbox.com



FIREFOX

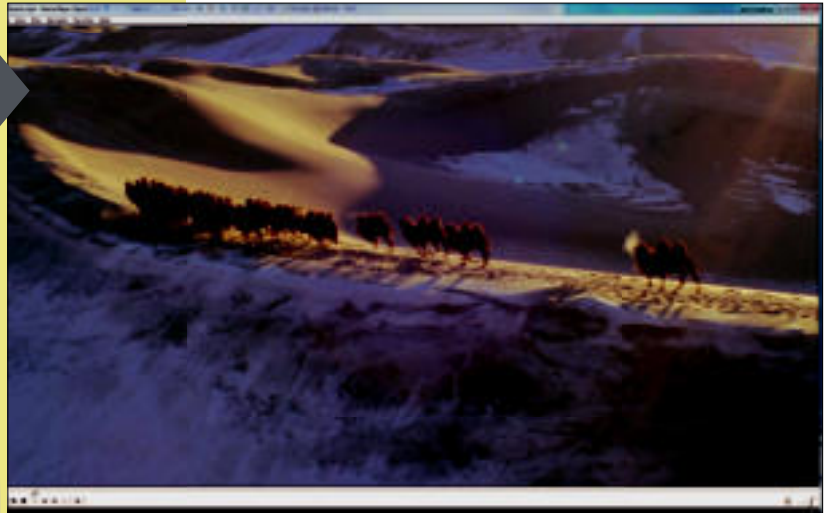
There's not much we haven't already said about Firefox, our current favorite Internet browser. The sheer number of useful plugins available makes it a no-brainer for anyone who spends most of their day on the web. Firefox 3 amazed us with its smart search bar and remained a secure and safe browser choice. It might not be as fast as Google Chrome



in straight rendering tests, but we'll take functionality and unobtrusive features (ahem, Internet Explorer 8) over a minor speed difference any day. www.firefox.com

MEDIA PLAYER CLASSIC + FFDSHOW TRYOUTS

There are lots of different ways to play videos on a PC, but the best and most compatible one-two punch we've tested is ffdshow tryouts and Media Player Classic. There are literally hundreds of different codecs and container formats that the video you want to watch can be trapped inside, and while you could install a codec pack to get support for them, ffdshow tryouts just looks better, performs better, and has fewer problems than other alternatives. While ffdshow lacks in a wide range of playback applications, our favorite of Windows Media Player 6 feature titles, alternate audio tracks, and other features. The ffdshow tryouts are: <http://ffdshow-tryouts.sourceforge.net/projects/guliverkli>



CPU-Z

If you haven't used CPU-Z

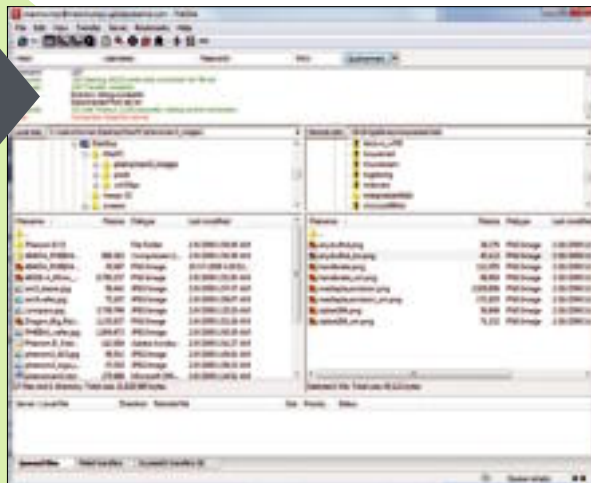
then you need to know for anyone who needs to find out what hardware is hidden in his cousin's PC. CPU-Z will tell you a processor's model, code-name, process, core voltage, stepping, and revision number as well as the core speed, FSB, and multiplier the PC is currently running. You can also find out what speed your DRAM is running at and even check the SPDs on some machines too. Didn't get that?

Just trust us, it's awesome.

<http://tinyurl.com/5anu6>

FILEZILLA

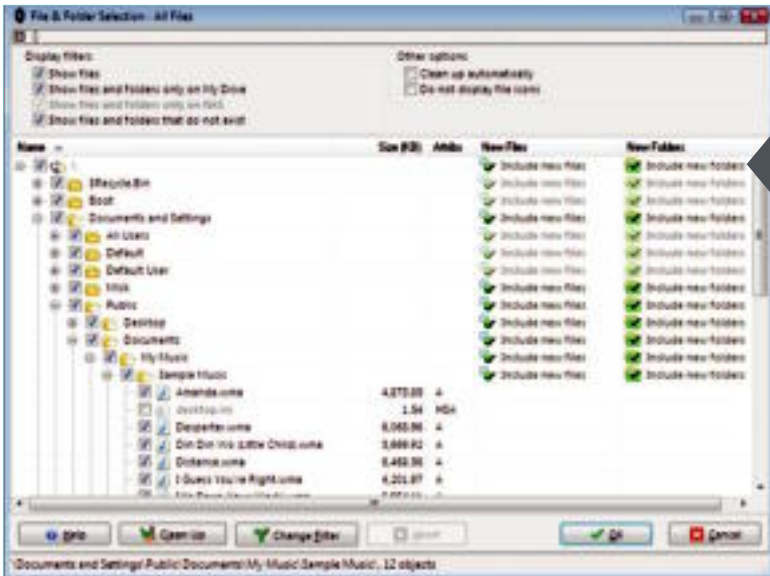
Cloud storage may be the next hot thing, but we still find ourselves using FTP to transfer files across the Internet. And we've found no better way to utilize FTP than with FileZilla, an open source FTP client. FileZilla can maintain connections to multiple servers, drag and drop files from the desktop, and deftly handle large files and large numbers of files. Both client and server versions are free, distributed under GNU General Public License. www.filezilla-project.org



GPU-Z

Sure, you know you have a speedy new GeForce GTX 295 card, but what do you really know about it? If you want something that'll shake down the card for all of its specs, GPU-Z (no relation to CPU-Z) will do the dirty work for you. This handy utility will tell you the important clocks, the card revision, the number of transistors on the card, and the process technology used in the GPU.

www.techpowerup.com

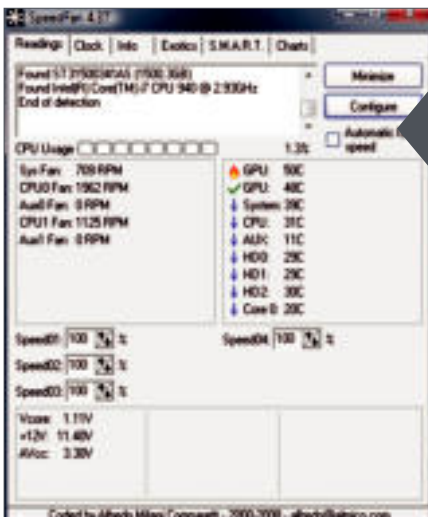


SyncBack Freeware

Though it might be hard to believe, a surprising majority of PC users still back up their files to CD and DVD media. As experienced users, we're a little smarter than that, so we recommend using SyncBack Freeware to back up important documents to more reliable (or at least, more convenient) storage mediums, such as hard disks and network servers. The free version of SyncBack lets you automatically archive copies of your files to any destination (though it won't perform incremental backups), and then restore those files after any unforeseen disaster. A more functional SE version (\$30 or 30-day trial) offers faster backup and versioning, though the free counterpart should be more than enough for most users. And, yes, it does back up to optical media as well. www.2brightsparks.com

KeePass Password Safe

KeePass Password Safe is indeed a password safe—a program that maintains a list of your passwords, strongly encrypted, with a single master passphrase or keyfile. The benefit to using a password safe is that you can use a different, secure password on every site you log in to, without having to write them all down or remember them all. This helps protect you by letting you use multiple strong passwords; it ensures that one compromised password (through a data breach at a website you have an account with, for instance) won't affect all the other sites you log in to. <http://keepass.info>



SPEEDFAN

Most of your PC components include monitoring chips that track their voltages, fan speeds, and temperatures. SpeedFan gives you access to that information by tapping into the sensors of important parts like your CPU and GPU. This free app can also access SMART technology in hard drives to diagnose and warn of potential disk failures. And as the name implies, you can also adjust fan speeds for extra performance or reduced noise. www.almico.com/speedfan.php

ImgBurn



Burning ISO files is a native feature in the upcoming Windows 7, but XP and Vista force disc burners to use third-party apps if they want to mount a disc image on a CD or DVD. For this simple yet essential task, we prefer ImgBurn, a lightweight stand-alone program that provides a no-nonsense interface for burning and reading discs. You just pick the image file location, destination drive, and whether you want to burn as a CD or DVD. We still don't know why this feature isn't bundled in Windows. www.imgburn.com.

Op

We've one of the must-have source applications for your PC. Simply put, it's as close to Microsoft's Office suite as you're going to get without plunking down a small fortune. Its design is similar enough to Office that you'll feel instantly comfortable with its word processor, spreadsheet, and presentation apps. Best of all, it works with all the popular formats—including Microsoft Office formats and PDF. www.openoffice.org



HANDBRAKE

HandBrake makes ripping DVDs a lead-pipe cinch, especially when paired with AnyDVD (see page 34) or DVD43 (a free, 32-bit-only competitor: www.dvd43.com). Whether you're ripping for archival storage, for streaming to your living room, or in order to watch *Enchanted* on your pink iPod Nano, HandBrake's excellent preset system makes ripping easy enough that anyone can do it. Just point HandBrake to your DVD drive and it scans the disc and automatically selects the settings necessary to ensure you get the best possible playback on the device of your choice. Heck, it will even help you avoid potential pitfalls, like proper subtitle rendering. The next version will even include preliminary support for Blu-ray rips, so what's not to like?! www.handbrake.fr



DIGSBY

First there was instant messaging, and that was pretty cool. But before long, we started asking questions like, "Why can we only talk with people using the same client?" Thus, the first multiplatform clients, such as Trillian, were born. And those too were cool. But soon after that, we started asking, "Why can't we use our IM client to check our email? And our Facebook account? An how come, if I log in on another computer, all my preferences carry over?"

And then there was Digsby, which does it all. We're not thrilled that the app tries to install a bunch of crappy search bars onto your computer, but if you pay attention during the install and press the Decline option you can get off clean. www.digsby.com



NOTEPAD++

Windows Notepad is as competent as the most basic text editor, but if you're a programmer or even casual website designer, you'll be able to appreciate the wide variety of languages that Notepad++ supports. With support for HTML, Java, and more than 40 other languages, Notepad++ makes parsing code easy with clear syntax highlighting and auto-completion intelligence. The program is compact but has no-brainer features like tabbed documents and plugin support. Think of it as the Firefox of text editors. <http://notepad-plus.sourceforge.net>



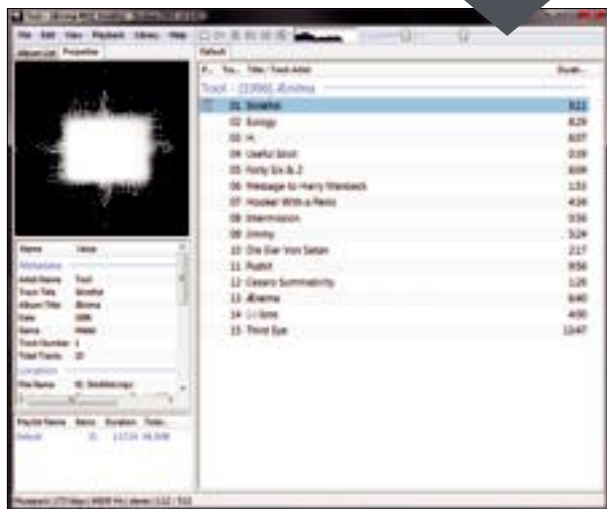
UTORRENT

BitTorrent may be the software pirate's preferred method of conducting illegal downloads, but the protocol has also been adopted for legitimate software distribution, such as game patches and large open-source programs. When we need to tap into legal

peer-to-peer downloads, we use uTorrent, a 250K application that lets you oversee bandwidth allocation, file selection, and peer/seeder connections with ease. You don't even need to install the program—uTorrent runs fine from its executable. www.utorrent.com

FOOBAR2000

The days of Winamp are long past. For audiophiles with massive music libraries, foobar2000 is the preferred alternative to the memory-intensive iTunes organizer. Created by a former Winamp developer, foobar2000 has won the hearts and minds of savvy album collectors with its highly customizable interface, comprehensive audio format support (including OGG, FLAC, and AAC), and gapless playback. There's even a rich SDK for third-party coders to tinker with to add more functionality. Sure beats sorting through all your music in a long playlist. www.foobar2000.org



glance, you might be i Avira's AntiVir as nothing more than a run-of-the-mill virus scanner with a feature set that's as meager as its price. The sparse interface certainly won't wow any power users, but it would be a mistake to cast AntiVir aside based solely on its appearance. A tiny checkbox in the upper-left corner of the configuration screen unlocks the program's Expert mode, and with it a heap of options previously unavailable. You're given enough control to not feel cheated, even for software you didn't have to pay for. However, AntiVir's biggest strength lies in its detection rate. It's the only scanner in our antivirus roundup (January 2009) to triumph with a near clean sweep during Virus Bulletin's latest testing, and it did so without reporting any false positives. That's impressive.

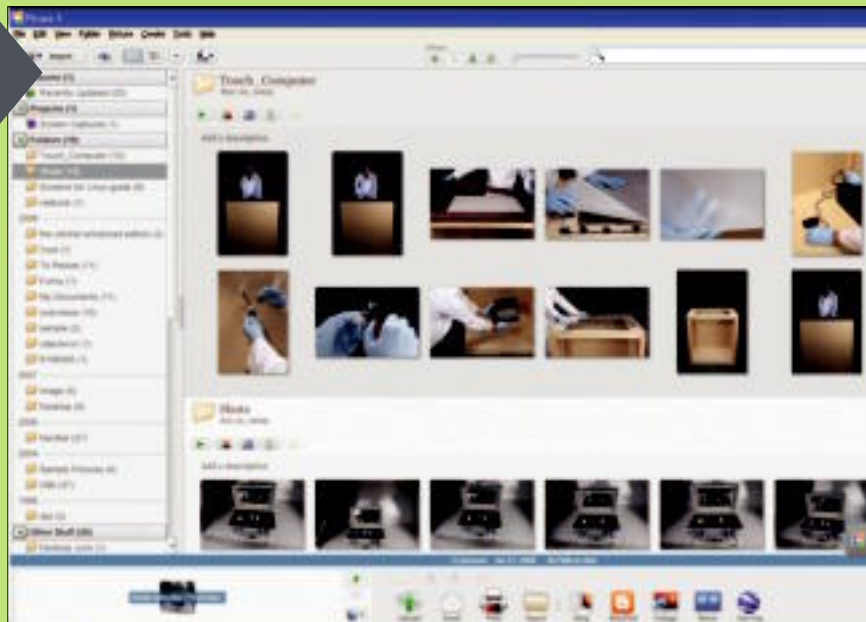
www.avira.com

MALWAREBYTES ANTI-MALWARE

For even the savviest of PC users, it's a real challenge to go very long without picking up some sort of malware. A good antivirus program and firewall are important for keeping the baddies at bay, but when you do get an infection, it's important to have a strong anti-malware program at hand. It's a broad field, and some nasties need more than a single program, but for most simple cleaning tasks Malwarebytes Anti-Malware should be all you need. www.malwarebytes.org

PICASA

If you're a photographer, you know that it's easy to amass gigabytes upon gigabytes of photos. But if you're like us, you don't want to sort through photos with Windows Explorer. Google's Picasa 3 is an all-in-one monitoring service for your photo folders. It offers less overall editing functionality than alternatives like XnView and Photoshop Lightroom, but comes packaged in an easier-to-use interface with tons of options for Internet-related tasks. For example, you can add geotags to your photos using Google Earth or have Picasa 3 automatically upload your shots to the web. Picasa 3 also interfaces with online shops for easy photo printing, and can turn your images into collages, movies, and screensavers. Included backup functionality helps keep your precious photographic memories safe from hard drive failure (provided you configure it, of course). But our favorite feature, by far, is Picasa's ability to search through your photographs by dominant color. www.google.com/picasa



Secunia PSI

Every geek knows to make sure that the OS and browser are updated, but what about the Flash, Java, or Quick-Time versions you're running? Not to mention the dozens of other applications you have installed. Have no fear, Secunia.com's Personal Software Inspector tracks a massive number of security exploits in applications, and will monitor your PC for susceptible apps. If it finds one, it will point you to the appropriate patch. We have yet to find a machine that PSI didn't find at least one or two affected apps. And like the other apps on this list, this one is free.

www.secunia.com

GIMP

When it comes to high-end image manipulation, there are really only two options right now: Photoshop and GIMP. GIMP doesn't quite capture the usability and polish of Adobe's offering, but it's totally free and open source. It's a whole lot easier on the pocketbook than the \$700 or so that a legal copy of Photoshop will run you. And even if it's not totally perfect, GIMP is full-featured enough for almost any photo manipulation needs you might have.

www.gimp.org

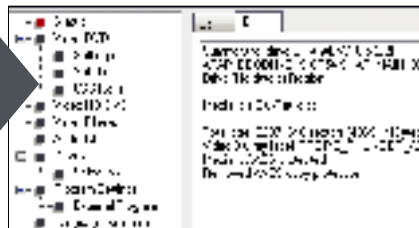
7-ZIP

Just about any operating system nowadays comes with built-in support for the ZIP archive format, which has been around since the 80s and generally does a good enough job of making things smaller and tidier. So do we really need an archiver program on this list?

Of course we do. We don't just use ZIPs, we need support for RARs, CABs, JARs, DEBs, and whatever else we can think up, and we want it all open source. And for all that, there's 7-Zip: an elegant, open source file archiver that can handle just about any compressed file you throw at it. www.7-zip.org

AnyDVD

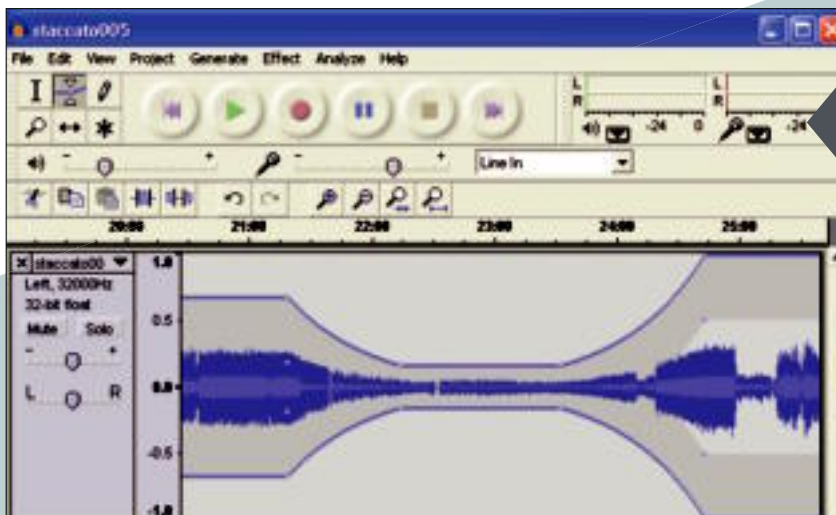
For hassle-free rips of DVD, Blu-ray, and even HD-DVD content, there's no simpler app to use than AnyDVD. Unlike more traditional DVD ripping tools, AnyDVD decrypts, unlocks the region code, and even removes annoying ads and that pesky FBI warning on the fly. It's not free, but it's well worth the cost for anyone who wants to exercise his fair use rights on Blu-ray or DVD discs. Typically the brain trust at Slysoft manages to disable new copy protection tricks mere moments after they go public, which is more than worth a few bucks a year. And AnyDVD works on 64-bit Windows, to boot! (Standard version is 50 EUR for two years, HD edition is 79 EUR for two years.) www.slysoft.com



Audacity

Planning on recording your own podcast (and who isn't these days?) or creating a customized ringtone from your favorite dance song? You'll need Audacity, the best free audio editor on the Internet. Audacity's multitrack editor lets you drop in audio files of any format (or record from a handy hardware source) to cut, copy, and add to an unlimited number of tracks to mix. Built-in effects and pitch adjustment let you manipulate your samples, and you can output your compositions at up to 96kHz. Sounds good to us.

<http://audacity.sourceforge.net>



Install all Your Apps at Once

With InstallPad, you select the programs you want installed, and then sit back while the app does all the work for you

No list of essential apps is complete without the addition of InstallPad, which does something very simple and very useful: It installs applications for you. You just feed the program a list of links to setup files online, and it takes care of the rest. There are other programs, such as AppSnap, that do essentially the same thing, but we're sticking with InstallPad because it's dead-simple to use. Read on to download our InstallPad essential applications list, and learn how to use it.

2 GET THE MAXIMUM PC ESSENTIAL INSTALLPAD APPLICATION LIST

InstallPad comes with a default list of software, but it's not nearly as complete as ours and is badly outdated, besides. We'll replace it with a custom list, created from the apps on our Essential 32 list.

Unfortunately, because some companies make their setup files inaccessible to direct links, not every app on the list works with InstallPad. Still, almost all of the apps do work, and you can download the list here: <http://dl.maximumpc.com/MaxPCAppList.zip>. That archive contains two list files. The file called MaxPCAppList.XML is set to try to install the files in silent mode, meaning you won't see the installer, and default settings will be used. This makes for a much faster install of multiple programs, but at the cost of some control. If you'd rather run the installers normally, use the other file, called MaxPCAppList-nosilent.XML.

Extract whichever list file you choose to the directory containing the InstallPad executable.



1 GET INSTALLPAD


Even installers need to be installed, so we'll take care of that first. The app can be found in the download section of InstallPad.com. It requires the Microsoft .NET framework 2, which you can get at the InstallPad website if it's not already on your system. InstallPad was written for XP, and is not guaranteed to work with Vista, though we were able to run it on a Vista box with no major problems.

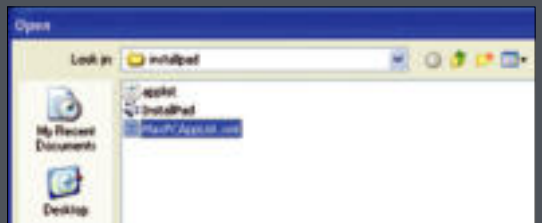
There's no installation necessary beyond unzipping the InstallPad .zip file somewhere on your drive. Make sure to remember the location, because we're going to put another file there later on.



3 RUN INSTALLPAD

Now that you've got all the files you need, it's time to start InstallPad. Run the executable, and a Window will pop up showing the default software list. We don't want any of that business, so click the "Open an application list" text in the bottom-left corner. In the browser that pops up, select the application list file that you downloaded (either MaxPCAppList.xml or MaxPCAppList-nosilent.xml).

That's pretty much all there is to it. Now InstallPad should show a list of applications from our list. You can check whichever ones you want, and then press the "Install Checked" button in the bottom right to automatically download and install them all. 



Browsers: Under the Hood

Whether you prefer a minimalistic interface or a near-endless array of customization options, there's a browser tailor-made just for you. We look at all the major ones, including upcoming releases, and lay it all out on the line

BY PAUL LILLY

Anyone who thought the death of Netscape would signal the end of the browser wars was mighty mistaken. In fact, it could be argued that Netscape's ignominious demise marked the beginning of the real browser war. It didn't take long for Mozilla's Firefox to emerge from Netscape Navigator's ashes, and over time, win over enthusiasts with a potent combination of speed, security, and an unprecedented level of customization.

But what started as a mere skirmish is quickly growing into an all-out war. Prepare to be overwhelmed by an onslaught of new browser releases in the coming months as Microsoft, Mozilla, Apple, Opera, and Google all vie to provide your vehicle for navigating the web. Each competitor brings something new to the table, whether it's blazing-fast performance or a unique feature set. Don't worry if you haven't been paying attention—we jump in the trenches with the whole lot of them and get to know each one on a personal basis. We're not going to tell you which one is right for you—that's for you to decide—but we will tell you everything you need to know so you can make an informed decision.

Internet Explorer

After a five-year browser-development hiatus, Microsoft jumped back into the game with Internet Explorer 7 and hopes to build on the momentum with its recent release of IE8



It took several years for Microsoft to update Internet Explorer to version 7, but decidedly less time to make the jump to IE8. This aggressive release schedule represents a change in philosophy for Microsoft, which sat idly on IE6 for several years and allowed other browsers to eat away at its market share.

RENDERING ENGINE

Microsoft has been using the closed-source Trident framework since IE4 (Trident 1). Trident's main advantage is IE's market share, so even though other rendering engines are more compliant with web standards, the overwhelming majority of users are surfing the net with Trident.

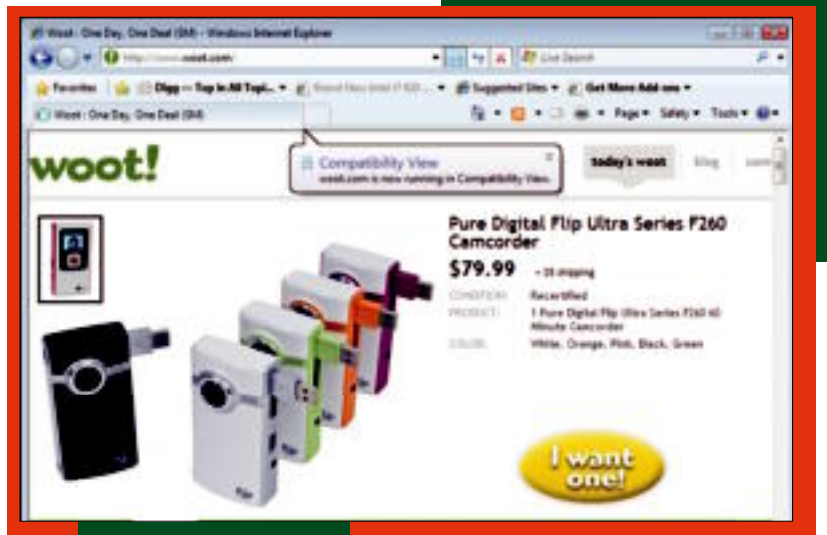
IE8 brings with it another version of Microsoft's core rendering engine. Now in version 4.0, the latest Trident iteration puts an even greater focus on standards. There has been so much tweaking under the hood that thousands of popular websites (2,400 and climbing) that formerly ran fine on IE no longer render correctly with IE8.

USER INTERFACE

Not a lot has changed in IE8's layout compared to IE7. A new Favorites bar finds its way onto IE8, as does a new Safety menu option, and the Read Mail button is now displayed on the toolbar by default.

Microsoft has added a Smart Location Bar to IE8 similar to Firefox's Awesome Bar. As you type in URLs, IE8 combs through your bookmarks and recently visited sites to try to guess your destination. But unlike Firefox, IE8 groups your search results, sifts through RSS feeds, and lets you delete entries to prevent them from showing up again.

Also new is IE8's tab-grouping feature, called Groups. Opening new tabs from within a tab places them all next to each other in a color-coded group. You



If you encounter a site that doesn't render properly on IE8, a quick click of the Compatibility View button forces IE8 to emulate IE7.

can then ungroup individual tabs, close out an entire group, or move tabs from one group to another.

ADD-ONS AND THEMES

Both IE7 and IE8 support a limited number of uninspired add-ons, but we're much more jazzed about two features called Accelerators and Web Slices available only in the new browser. Accelerators make it a cinch to access an online service, such as driving directions, from any page just by highlighting text. Web Slices let users track changes to subscribed sites, like an eBay auction, all through the Favorites Bar.

WEB STANDARDS COMPLIANCE

Standards compliance has never been IE's strong suit. Even after the overhaul, IE7 still fails the Acid2 test—a test designed by the Web Standards Project (WaSP) to expose flaws in the way a browser renders properly coded web pages. And IE7 musters a miserable

12/100 on the newer, and more stringent Acid3 test. IE8 fares marginally better and does pass the Acid2 test, but its 20/100 score on the Acid3 test suggests there is still much work to be done.

SECURITY AND PRIVACY

As the most targeted browser on the planet, the onus falls on Microsoft to ensure IE doesn't leave millions of users as sitting ducks. IE7 marked the beginning of a defensive mind-set that was sorely lacking in previous versions. For the first time, browsing on IE felt secure.

In IE8, even more safeguards are in place. Phishing and malware protection has been revamped with a new SmartScreen Filter. When visiting a known phishing site, the entire browser window turns red. Should you click through anyway, the address bar remains red until you leave for safer servers.

The most talked-about new feature, though, is the InPrivate browsing mode. InPrivate browsing lets you browse without storing traces of your browsing session, such as cookies, cached files, browser history, or other "incriminating" evidence.

Firefox

Mozilla's Firefox browser has become so popular that Firefox 3 holds the Guinness World Record for largest number of software downloads in a 24-hour period



Originally intended as a "fast track" update to 3.0, the next version of Firefox was recently promoted from 3.1 to 3.5, but we still don't know when it will be released. That means IE8 will have shipped long before then, and that's just fine with Mozilla, which contends that it's more concerned with getting the new browser right than beating Microsoft to the punch.

RENDERING ENGINE

Netscape may have died an untimely death at the hands of Microsoft, but its soul lives on. We're talking about the open-source Gecko rendering

Firefox breaks down site safety levels into four colors. Green indicates a fully verified website where you can safely enter your personal information.

tially supercharged Firefox 3.0's SpiderMonkey engine by adding native-code compilation and optimizations called "Trace Trees." Frequently executed code is traced and compiled, and the next time that same code is called upon, the compiled version is used. This tracing technique has already shown impressive performance gains and looks to get even better over time.

USER INTERFACE

Mozilla made only subtle changes to Firefox's layout in 3.5, most of which aren't evident at a glance. Dig a little deeper, however, and you'll notice that when you drag a tab, a semi-transparent thumbnail appears under the cursor. If you drop the tab outside of the tab bar, the page instantaneously appears in a new browser window without having to reload.

Firefox 3.5 sports an even more awesome Awesome Bar. The core functionality remains the same, but in 3.5 you can customize the search results using different tags. If you start a search with ^, Firefox will only look through history. Other tags include * (bookmarks), + (tagged pages), @ (URLs), and # (page titles only).

WEB STANDARDS COMPLIANCE

One of Firefox's claims to fame is that it has always been much more standards-compliant than Internet Explorer. HTML, XML, XHTML, SVG 1.1, CSS, ECMAScript, DOM, PNG images with transparency, and several other web standards have been implemented in Firefox, and support has gotten even better in version 3.5. The latest beta



build scores 93/100 on the Acid3 test, compared with version 3's score of 71/100. Both browser versions pass the Acid2 test with ease.

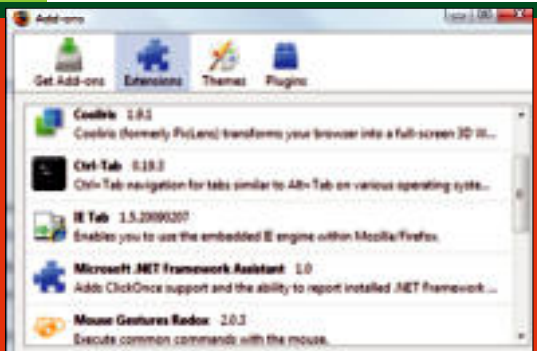
ADD-ONS AND THEMES

Simply put, no other browser boasts the same level of versatility and customizability as Firefox. To date, there are more than 6,000 add-ons available and more than 600 themes to choose from. Expect to see a few incompatible add-ons when 3.5 first ships, but popular extensions are usually patched shortly after each browser update.

SECURITY AND PRIVACY

Many of the same core security components in Firefox 3.0 find their way into 3.5. Phishing attempts are still blocked and clicking a website's favicon brings up a security report. The More Information button reveals whether the site is storing cookies on your PC, if you've saved any passwords for the site, and how many times you've visited that web page in the past.

In Firefox 3.5, you can initiate Private Browsing mode from the Tools menu to cover your online tracks. Only the files you choose to download and bookmarks you create are saved; everything else vanishes as if the session never took place. (Kind of like the Detroit Lions' 2009 season.)



We love building our own PCs, and Firefox's overflowing repository of extensions gives us that same feeling when personalizing our browser.

engine, which started life at Netscape in 1997 and has been used with every version of Firefox. Firefox 3.5 upgrades the Gecko engine from 1.9.0 to 1.9.1, bringing with it a few key changes that belie the incremental numbering scheme. As expected, there is improved compliance with web standards, but the update also ushers in support for border images, a private browsing mode, and enhancements to the Awesome Bar.

Garnering a lot of attention on the web is Mozilla's new TraceMonkey JavaScript engine. Mozilla essen-

Performance

It's one thing to talk the talk, but who walks the walk? We benchmarked each browser to separate the pretenders from the contenders, and offer up our own hands-on impression

SUNSPIDER JAVASCRIPT BENCHMARK

According to Apple, Safari 4's new Nitro engine lives up to its name by running JavaScript up to 30 times faster than IE7 and three times as fast as Firefox 3. We put these claims to the test with the SunSpider JavaScript benchmark, which benchmarks only the core JavaScript language. When the dust settled, Safari 4 certainly lived up to the hype, but the situation turned much more competitive when throwing Firefox 3.5 and Chrome into the mix.

TIME IN MILLISECONDS

IE7	27,760
Firefox 3.0.6	1,949
Opera 9.63	2,492
Chrome 1.0	693
Safari 3.2.2	2,368
IE8	3,356
Firefox 3.5	857
Opera 10	2,128
Safari 4	612

Lower score is better

CELTIC KANE JAVASCRIPT BENCHMARK

In addition to JavaScript performance, Celtic Kane's benchmark also sprinkles in a little bit of DOM and rendering testing. And here again Apple's Safari 4 leads the pack, though the gap between it and IE7 isn't as dramatic this time around. You might wonder why, at least according to this test, Safari 4 performs 50 percent better than Chrome when both are WebKit-based browsers. At least part of the difference can be attributed to using different JavaScript engines (Chrome uses V8, Safari 4 uses Nitro).

TIME IN MILLISECONDS

IE7	550
Firefox 3.0.6	218
Opera 9.63	17
Chrome 1.0	130
Safari 3.2.2	151
IE8	343
Firefox 3.5	247
Opera 10	154
Safari 4	67

Lower score is better

REAL-WORLD IMPRESSION

Running web benchmarks only tells part of the story. So many variables are involved that it's impossible to come up with a completely reliable performance yardstick. Will your web browsing experience really be improved threefold (or more) on Safari 4 than IE7?

In our testing, the answer is no. However, we did notice a difference between browsers, just not as pronounced as the benchmarks indicate. Safari 4 and, to our surprise, Internet Explorer 8 felt the snappiest, though neither version of Firefox ever felt slow by comparison.

Opera

Feature-rich and fast right out of the box, it's no wonder Opera users take exception when people refer to Opera as an alternative browser



Opera 9.6 has been touted for its combination of speed, standards compliance, and robust functionality, and Opera 10, due out in the second half of 2009, looks to improve on all three. It's also one of only two browsers to score a perfect 100 on the brutal Acid3 test.

RENDERING ENGINE

Opera 9.6 continues to use the closed-source Presto platform first released in November 2002. Presto powers a number of licensed third-party apps and devices, such as the Nintendo DS's browser and Wii's Internet Channel. Opera 10 makes the jump from Presto 2.1.1 to 2.2, which purportedly delivers a 30 percent performance boost on some websites.

Both Opera 9.6 and 10 also use an ECMAScript/JavaScript engine called Futhark. Futhark balances speed with memory usage, which has allowed other next-gen browsers to surpass Opera in terms of raw performance. However, the Opera team is already working on a new JavaScript engine called Carakan, which it says is two-and-a-half-times faster than Futhark.

USER INTERFACE

Out of the box, no other browser sports the same level of customization as Opera. Several toolbars and panels are at your disposal, and little nuances like the camera icon in the lower right-hand corner add to Opera's appeal. By clicking the camera, you can choose to disable all images, which could come in handy if your Internet is on the fritz or you still roll old-school with dial-up.

There's also a fit-to-width button, which squishes an entire page into your browser's frame to eliminate horizontal scrolling. This can come in particularly handy on smaller displays or when some inconsiderate cretin posts an obscenely long link in a forum thread, breaking the tables.



WEB STANDARDS COMPLIANCE

Consider Opera the Michael Jordan of web standards compliance. One of the first browsers to support Cascading Style Sheets, the Opera browser has since added a plethora of open and published standards to its repertoire. Opera was also the first Windows browser to pass the Acid2 test, and if that weren't enough, Opera 10 was one of the first to score a perfect 100 on the unforgiving Acid3 test.

ADD-ONS AND THEMES

Instead of integrating with the browser, as Firefox's add-ons do, Opera's catalog of Widgets run outside of the browser in a separate window. Once installed, Widgets are accessible by clicking "Widgets" in the Menu bar.

While you can't customize Opera's core functionality, you can change its skin. There are roughly 1,000 skins to choose from, which you can browse based on a number of factors.

SECURITY AND PRIVACY

Because of its low market share, Opera doesn't often find itself the center of

security attacks. Nevertheless, the Opera team has generally been lightning-quick to plug security holes and vulnerabilities.

There hasn't been a whole lot said about the security in Opera 10, but widgets no longer have network access turned on by default. In theory, this new security model should help prevent hackers from exploiting errors in widgets.

Neither Opera 9.6 nor the new Alpha build offers a true private browsing mode, though that could change as development continues on Opera 10. For the time being, users can cover their tracks by clicking "Delete Private Data" in the Tools menu. The downside is that all your data will be eradicated—not just the cookies and history generated during the current browsing session—making it an all-or-nothing affair.

By disabling images, not only will websites load faster, but you can finally read those Playboy articles without being bothered by sultry images.

Chrome

Google surprised everyone when its Chrome browser arrived on the web unannounced. While there's clearly much work to be done, there are enough innovations to hold our interest



Having just recently graduated from beta status to version 1.0, mum's the word on when Chrome 2.0, already in pre-beta development, will go live. But we're not complaining, considering that Google has built a reputation for keeping its projects in beta far longer than most other developers.

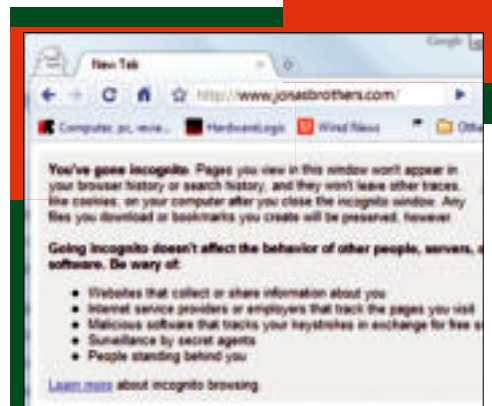
RENDERING ENGINE

The future looks bright for WebKit, the open-source rendering engine used by Google's Chrome browser. The WebKit platform has already found a home on Google's Android platform, Palm's

USER INTERFACE

Given the buzz that surrounds Google, we'd venture to guess you've already played around with Chrome. And if you're like us, you retired the minimalistic browser after the geek factor wore off. When we say minimalistic, we're not referring to Chrome's feature-set, but the sparse UI. All the navigation buttons—Back, Forward, Refresh, and Home—sit to the left of the

Don't want anyone to know you're a Jonas Brothers fan? We don't blame you. With Chrome's Incognito mode, nobody has to know what lame bands you're following.



ADD-ONS AND THEMES

What do Chrome add-ons and the Tooth Fairy have in common? Both offer the promise of big rewards, but neither one exists. However, this most likely won't always be the case (for Chrome, anyway). In a design document, Google developers outlined plans to add extensions to Chrome sometime in the future, and if Chrome is to compete with Firefox, it will need to follow through with that promise.

SECURITY AND PRIVACY

In Chrome, running processes in a permissions-based sandbox keeps malware isolated from the OS. In this multiprocess architecture, each tab is treated as a separate process, none of which are given rights to write files to the hard drive or pluck information from sensitive areas. An added benefit to this approach is that if poorly written web code causes a crash, it should only affect the individual tab it was loaded in, not the entire browser.

Like IE8 and Firefox 3.5, Chrome includes a private browsing option called Incognito. With Chrome's Incognito option, you can surf wherever you want on the web in a new browser window that runs in read-only mode. Once you close the window, all traces of your activity are wiped out.

Address bar. Almost all other controls lie buried beneath a pair of icons to the right. It's the perfect layout for neat freaks and anyone whose mantra is "less is more."

Google still has some work to do with how Chrome handles a large number of tabs. Once the tab bar is filled up, Chrome will squish new tabs to make them fit instead of creating a new row or making the overflow accessible via a pull-down menu. After a while tabs become so small that even the favicon disappears, creating a not-so-fun game of "find the lost tab."

WEB STANDARDS COMPLIANCE

In theory, Google's Chrome browser should have an advantage right out of the gate. Google says that within 20-30 minutes of each new browser build, it can be tested on tens of thousands of different web pages because of Google's massive web crawling infrastructure. In reality, Chrome is a fairly standards-compliant browser, scoring a 79/100 on the Acid3 test, enough to come out on top of IE7 and Firefox 3.



Third-party theme managers like XChrome address Chrome's glaring lack of official support for themes or skins.

webOS, and Apple's iPhone and iPod Touch. There's even been talk of Microsoft switching to WebKit in future versions of IE, along with unsubstantiated murmurs of Firefox following suit (Mozilla says otherwise). While not as standards compliant as Presto, the WebKit framework is considered fast and highly versatile.

For JavaScript duties, Google developed the open-source V8 engine written in C++. Not only has V8 been tuned for speed, but according to Google, the JavaScript engine handles resource management exceptionally well by reclaiming memory used by objects that are no longer required in a process.

Fringe Benefits

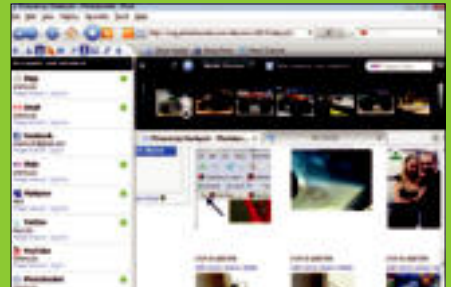
Some of the lesser-known browsers sport unique features that the big boys lack

FLOCK-The browser for social networkers

Some ideas are ahead of their time, and while that may have just barely been the case for Flock when it was first released in 2005, the browser is clearly in its element now. Billed as a social web browser, Flock claimed more than 4.5 million downloads in 2008, netting a four-fold increase in active users. Flock is also quick to point out a 92 percent satisfaction rating among its users, and as we can attest, any time the talk turns to browsers, someone inevitably brings up Flock.

Flock owes its ongoing success to its integration with several social networking sites and web

applications. Maybe you have a group of friends who mingle on MySpace while a separate clique stays connected through Facebook, and yet another does most of its talking through Twitter. Flock offers seamless integration with all of these, as well as various media-sharing outlets like Flickr, Photobucket, and Picasa. A bevy of blogging tools and easy webmail access are the icing on a multilayered cake. Or perhaps it's Flock's UI, which lets you upload photos just by dragging them, that's the icing. Either way, Flock is the most delectable browser for anyone with a heavy appetite for social networking.



Flock's media bar makes updating all of your online profiles incredibly easy.

MAXTHON - Internet Explorer for power users

Old-school browser aficionados will remember Maxthon by another name: MyIE. Renamed Maxthon after the abandoned browser was picked up by another developer, the IE shell came as a boon to users who wanted the compatibility of IE6 but with the advanced features of Firefox. Maxthon brought tabbed browsing, mouse gestures, plugin support, and other modern amenities Microsoft had ignored before IE7. By doing so, Maxthon has built a following that's millions of users strong (according to number of downloads), and is particularly popular in China.

Now in version 2, it wouldn't be fair to still refer to Maxthon as an IE shell, though it does use the same rendering engine. Maxthon manages to separate itself with some unique features, like split-screen browsing support, advanced drag-and-drop controls, URL hotkeys, the ability to give URLs an alias, and a built-in screen capture. But Maxthon's biggest challenges in the U.S. market are that Firefox boasts an almost endless feature-set thanks to its extensions support, and the American audience can't harness much of Maxthon's extra power when many of its addons lack an English title or description.



Viewing two tabs side-by-side in split-view mode is just like having two monitors, but without the added cost or power consumption!

TOR BROWSER BUNDLE-A browser for the paranoid or oppressed

Whether you're a secret agent whose confidential research holds the fate of the free world in your hands or you're simply looking to anonymously flame someone on an online forum, it doesn't get any easier than with The Onion Router (Tor). Tor itself is not a browser, but a combination of security software and an open network of volunteer-run relays to bounce your connection around the world and keep snoops off of your tracks.

The Tor Browser Bundle is a pre-configured version of Firefox Portable Edition with Tor already set up and ready to go. There's nothing to install, so you can run it from a USB key or

other portable media. That also means it won't interfere with your main installation of Firefox, although you will have to close down any other versions of Firefox while running the Tor-based browser.

Because Tor tunnels your traffic all over the globe, websites are often slow to load. This makes it a poor daily browser. Another downfall is that a ne'er-do-gooder operating an exit node can potentially eavesdrop on your communication. That's because exit nodes decrypt the tunneled traffic before it reaches its final destination. ☹



Even accessing a server a mile down the road will first have your packets traveling around the globe. Too bad you can't rack up frequent flier miles while using Tor!

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BUILD *your own* Hackintosh

Why should Apple-loving weenies be the only ones with access to OS X? We show you how to run Apple's OS on real PC parts

BY ROBERTO BALDWIN

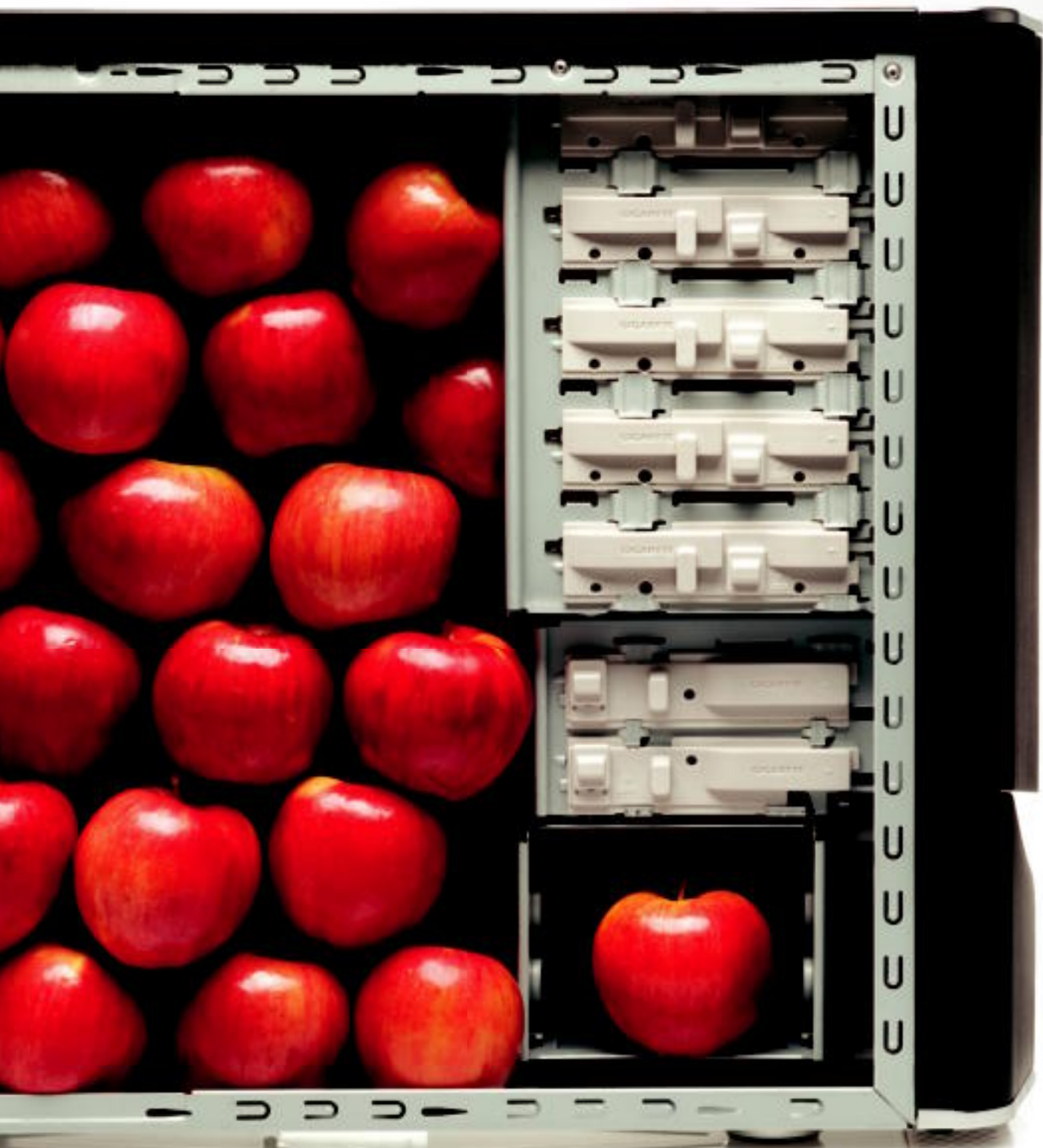
OS X is out there. You've seen it in coffee shops, on TV, in the laps of hipsters at the local taqueria. There's no shame in wondering what all the fuss is about. Hell, it's healthy to mix it up a little bit. If only the idea of sending Steve Jobs and the rest of Apple, Inc. thousands of your hard-earned dollars didn't send you into a cold sweat that only a game of Left4Dead can cure. Still, OS X is the subject of many glowing reviews. Even hardcore PC users are singing its praises. If you have the itch to try out OS X, but you're not down with shelling out the cash for a new Mac, we have one word for you: Hackintosh.

When Apple announced the move to Intel processors for its computer lineup, the search was on for a practical way to install OS X on non-Apple hardware. Over the years, the best way to achieve this feat was to patch a retail version of the OS X install from Apple. Users would scour the Internet for the patches—always hoping that what they downloaded was indeed the correct patch, and not some virus or trojan horse ready to wreck havoc on their PCs.

But these days the quest for OS X needn't be so perilous. Read on to see how an inventive little USB device can let you easily dual boot OS X on non-Apple hardware, using a legitimate copy of OS X.



PHOTOGRAPH BY MARK MADEO



The Heart of the Hackintosh

The EFI-X USB dongle ultimately makes our Hackintosh possible, but your other PC components matter as well

EFI-X USB DONGLE

The EFI-X dongle (\$235, <http://efixna.com>) is the Hackintosh builder's dream. The device, which plugs into a motherboard's USB port, works by creating a full EFI environment inside a tiny USB microcomputer. EFI, or Extensible Firmware Interface, was created by Intel to replace the aging BIOS on PCs. Apple's Unix-based Macs use EFI instead of BIOS. The EFI-X gives users the ability to run EFI-based and BIOS-based operating systems on one machine. The module contains the hardware drivers of all the equipment on its hardware list. The EFI-X bootloader screen gives you the option to pick which operating system you would like to load at startup. Once you have OS X installed on your machine, the EFI-X must be connected to your machine at all times. If you want to build two Hackintosh systems, you need to purchase two EFI-X dongles.

The EFI-X isn't without its drawbacks. You can't just throw any hardware in a tower and start playing with iChat and Final Cut



Pro. You need to be sure you use only hardware that has pre-installed drivers on the EFI-X. EFI-X has a complete list of compatible hardware on its site; below we tell you the parts we chose.

CPU

Like the current Macs on the market, the EFI-X works with Intel Core 2 processors. AMD fanboys can complain about Intel's market share, its lack of innovation, and aggressive plots to remove all its competitors until the cows come home—it's not going to change the fact that you can't build a Hackintosh with an AMD CPU. In our machine we used a 2.67GHz Intel Core 2 Duo.

MOTHERBOARD

Because the EFI-X comes with pre-installed drivers for hardware, the list of compatible motherboards is necessarily limited. EFI-X supports Gigabyte P35, P45, and X48 chipset boards, with support for Gigabyte X58 boards reportedly coming soon. Or you can choose from one of two DFI P45 chipset motherboards. We went with DFI's LanParty DK P45-T2RS Plus (\$160 street, www.dfi.com.tw).

VIDEOCARD

To help you see all your beautiful OS X goodness on screen, ATI and Nvidia cards are supported by the EFI-X. While EFI-X supports the ATI Radeon HD 3870 and Radeon HD 2600 XT cards, ATI knows that Apple is best buds with Nvidia and cautions that ongoing support of these cards is uncertain. Compatible Nvidia cards include the 7000, 8800, and 9800 series graphic cards. We went with a two-year-old PNY XLR8 GeForce 9800 GTX (\$140 street, www.nvidia.com) because it's cheap and readily available.

STORAGE

We initially started our project with a SATA hard drive and an IDE optical drive. The EFI-X kept hanging on the OS X install disc, so we switched over to a SATA optical drive and that solved the problem. In order to build a multi-OS machine you'll need a SATA HDD for each OS. We installed OS X Leopard on a 1.5TB drive and Windows Vista on a 1.5TB drive. If we plan on adding another OS, we'll have to throw another SATA drive in our rig. Partitions and Apple's Boot Camp don't work with the EFI-X device.

THE OSES

It Takes Two to Tango

Your Hackintosh will be a dual-boot machine, meaning it will run both Windows and OS X. We recommend installing whatever flavor of Windows you prefer before beginning your journey into the world of Mac. We attempted several OS install scenarios and found the path of "regular Windows install, followed by Hackintosh" yielded the best results. We installed Windows Vista in our machine, against the warning of Justin Long.

Now, even if you hate Apple, Inc. with all your heart and soul, you need to purchase a retail copy of OS X (\$130, www.apple.com) for every machine you install it on. If you plan on making Macs and/or Hackintoshes a family affair, you can purchase a family pack for \$200 for use on five machines. Apple doesn't require validation codes or a call in to their HQ for verification. Please don't abuse Apple's trusting nature.



Building the Hackintosh

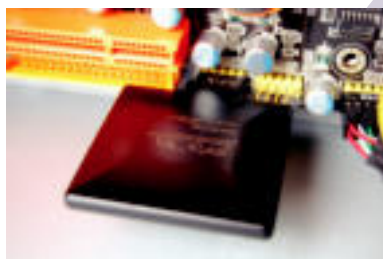
Follow these steps to get OS X up and running on your PC

Before we begin, we need to chat about the law and EULAs. Installing OS X on non-Apple hardware, while probably not technically illegal, does violate Apple's End User License Agreement (EULA). Will Apple hunt you down and kidnap your pets until you remove OS X from your Hackintosh? It's unlikely.

Apple isn't too concerned with the little guy tinkering with his computer, and will have a pretty challenging time tracking you down if you go out and purchase a legal copy of OS X for your project. On the other hand, if you want to base a business around building Hackintoshes, expect a visit from Apple's

crack team of lawyers.

With that out of the way, let's start building. We'll give you specific instructions for the DFI board we used; if you're using a different (but compatible) motherboard, you'll need to adapt our instructions for your hardware.



1 INSTALL THE EFI-X DONGLE The EFI-X dongle is the secret sauce that makes OS X think your awesome PC is a craptacular, but Apple-approved Mac. Think of the EFI-X module as Clark Kent's glasses—when they're on, no one has a clue that he's Superman. Installation is simple, you just need to plug the EFI-X into a vacant USB header on your motherboard. The dongle comes with an extension cable if you have trouble squeezing the device in between the other components on your rig. Make sure to avoid plugging the dongle into the FireWire header—that would torch your \$250 device.

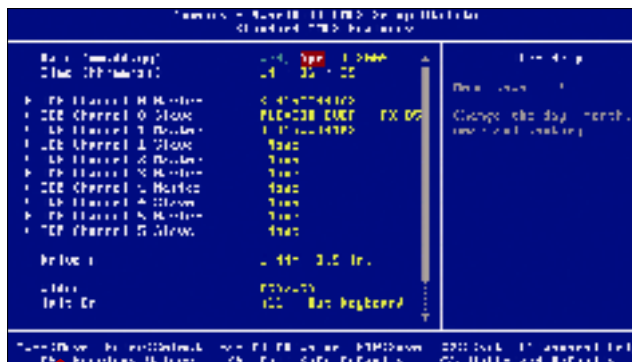
2 CONFIGURE THE BIOS Next up, we need to adjust BIOS settings to work with the EFI-X device and the OS X installer. Rather than list a series of options and the correct settings, we're going to just show the appropriate BIOS screens, with everything set to the correct settings, and we'll note anything you need to tweak on sub-screens. But, before you can do that, you'll need to enter the BIOS by mashing the Del key as your PC boots.



INTEGRATED PERIPHERALS Navigate to the Integrated Peripherals option, and then to the OnChip IDE Device screen. For SATA Mode, choose IDE. The EFI-X doesn't support RAID. AHCI should be turned off during the install process. You can turn it back on after you've finished the install. Press Enter to save your settings.

Next, navigate to LEGACY Mode Support, select Enabled and press Enter to save your setting. For the Onboard JMB363 option, select Native IDE and press Enter.

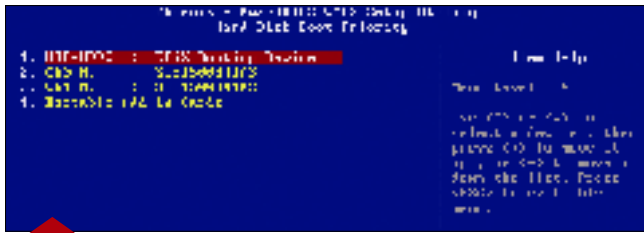
Press Esc to return to the Integrated Peripherals main screen.



STANDARD CMOS FEATURES Enter the Standard CMOS Features screen. Navigate to Halt On, press Enter, and select All, But Keyboard. Press Enter to accept your bold new setting and then Esc to return to the Main BIOS screen.

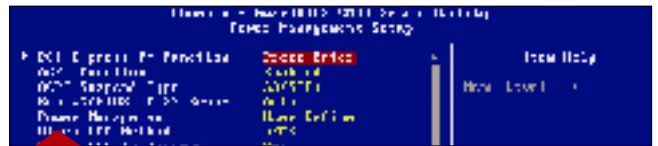


USB DEVICES While still in the Integrated Peripherals screen, navigate to the USB Device Setting page and hit Enter. Make sure the controllers and functions are all enabled. Navigate to USB Mass Storage Device Boot Settings. You should see the EFI-X Booting Device 1.0 option. Select it and press Enter. Select the HDD Mode option and press Enter to save your setting.



ADVANCED BIOS SETTINGS From the main BIOS screen navigate to the Advanced BIOS Settings option and press Enter. Select Hard Disk Boot Priority. Move the USB-HDD0 : EFI-X Booting Device to the top of the list by selecting it and pressing the plus (+) button until it's on the top of the heap. Smack Esc to return to the Advanced BIOS Settings main screen.

Navigate to the First Boot Device. Select CDR0M from the list of boot devices. Press Enter to save your setting. Change the Second Boot Device to Hard Disk using the same method. Press Esc to return to the glory of the main BIOS screen.



POWER MANAGEMENT Navigate to the Power Management Setup screen. Go to ACPI Function, select Enabled and press Enter to save your choice. Navigate to ACPI Suspend Type, Select S3(STR), and press Enter. Press Esc to return to the main BIOS screen.

Navigate to Save & Exit Setup and press Enter. The machine will now reboot with all your new BIOS settings. It's almost go-time with your Hackintosh.

3 THE EFI-X BOOTLOADER When your machine reboots, you should see "EFI-X V1 Loading Please Wait" on the screen. If you don't see this text on your screen, you've totally screwed up. Don't go blaming us—just reboot, begin mashing the Del key to enter the BIOS, and double-check your settings.

If you do see the "EFI-X V1 Loading..." text, way to go. The EFI-X Bootloader screen will appear. You will be presented with what looks like trash cans from the future. Don't be alarmed if the trash cans have an X or Window icon on them. Even if you haven't installed an OS on your drives yet, the EFI-X recognizes the format of the SATA



drives attached to the rig. You may see two Windows choices; don't worry. Once you reformat one of the drives to Mac OS Extended (Journaled), it'll have X on it. For now, just ignore those glowing trash cans with company logos and choose the trash can with DVD on it to access your OS X install disc. Press Enter.

4 INSTALLING AND CONFIGURING OS X If all goes to plan, you should see a startup screen. It's different from the usual OS X startup screen. Don't worry, that's the EFI-X startup screen. As long as it doesn't hang, you're doing fine. While installing, if your SATA drive is formatted FAT, you're going to have to reformat it to Mac OS Extended (Journaled). Don't worry, the OS X installer is pretty much idiot-proof; it will warn you if the drive is formatted incorrectly. If it is formatted FAT, select Options, and a drop-down menu will appear with Mac OS Extended (Journaled) already selected. Click Erase. Be careful not to nuke your Windows

You'll get a green arrow on your hard drive signifying it's ready for OS X. You will also be warned that your data will be erased on that drive. Make sure you don't have anything on that drive you'll need later, like your vast database of Caprica Six images or your banking information. Click Continue.

Now take a deep breath. You're about to do something that's a little crazy. Click Install on the next screen, and away we go. You have about 30 to 45 minutes while the installer does its magic, so go grab a bite to eat or wash your hands to get all that icky OS X install pixie dust off of them.

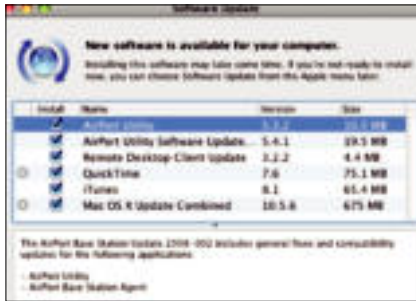
After you've installed OS X, you have to fill out the Apple setup/registration form. Whatever name you choose at this point will be the name of your user account on your Mac. Entering "Amanda Huginkis" will definitely come back to haunt you here. You'll also be prompted for a password and information regarding your network. OS X takes all

the information you enter to configure your computer's settings. Even the registration page information will be used to identify you in the OS X Address Book app. Just do what Mac users have been doing forever: once the setup asks for you to actually register, choose the Register Later option. Steve already knows too much about us.

Your desktop will now shine brightly with the glimmer of the Leopard desktop image. Take it in. It's OK, no one is going to hurt you. Leopard is your friend.

5 UPDATING OS X Now, the moment of truth—updating OS X on your Hackintosh. Remember, Hackintoshes with patched kernels are unable to be updated. It's their Kryptonite. But the EFI-X allows you to update your Hackintosh because it's fooling OS X into believing it's a legit Mac. We recommend applying all the updates available, as there are some significant fixes between 10.5 and 10.5.6. You can apply updates by choosing the Apple Menu in the upper-left corner of the menu bar. Choose Software Update. A window will pop up with the available updates Apple thinks you need. Click Install.

OS X Leopard downloads updates and then asks to be restarted so it can install updates without interruption from applications and processes. When you click Restart, the computer will display a light-



blue screen and will begin the installation process. Don't worry, this is normal. The machine will restart once it's finished installing. You may have to do this a few times to get all the updates available.

Now that your

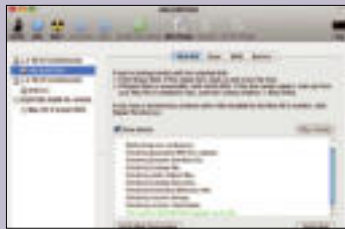
Hackintosh is updated to the most recent Apple goodness, it's time to check out the specs of your new machine. Go to the Apple in the top-left of the menu bar and select About This Mac in the drop-down. You'll see the processor and the amount of RAM in your rig. For even more information, click More Info.... The System Profiler will give you all the information you need about your machine. If your machine is giving you any problems, this is a good place to see which startup items are causing issues or to make sure your USB Device Tree is recognizing a device. Most peripherals are plug-and-play with OS X, but not all. A quick Internet search will usually find the drivers you need. Just like with a PC, but with an added touch of smugness. ☺

The Care and Feeding of Your Hackintosh

Now that you've entered the strange and exciting new world of OS X, here are a few tips to a happy OS X experience

DISK UTILITY

If your machine is acting wonky, check out the Disk Utility, found in Applications → Utilities. From there you can repair disk permissions and repair disks that have are having issues. If you're curious about how you defrag within OS X, not to worry—OS X defrags drives overnight.



KEYBOARD SHORTCUTS

If you're using a Windows keyboard with OS X, you'll use the Windows key (the one with the Windows logo) instead of the Ctrl key as the basis for your keyboard shortcuts. For example, Windows+S to save. All the most common functions such as copy, cut, paste, new, print, etc., use the same letter as in Windows (C, X, V, N, P, respectively). If you have a Mac keyboard lying around, you'll be using the Cmd key for keyboard shortcuts.

INSTALLING APPS

Many applications are just drag-and-drop. Yes, it sounds crazy, but all you have to do is drop the app into the Applications folder and, *bam*, it's installed.

RIGHT CLICK

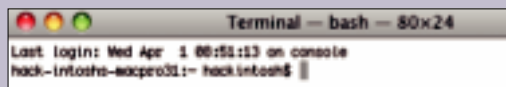
There's a rumor out there that OS X doesn't have right-click capability. But actually, OS X has had the ability to use a two-button mouse since its inception. Just plug in your favorite two-button mouse and carry on.



TERMINAL

OS X is a Unix-based system. If you feel like messing around with the innards of OS X, go to Applications → Utilities, where you'll find the Terminal app.

Brush up on your Unix commands and start tinkering.



SYSTEM PREFERENCES

It's the OS X version of the Control Panel in Windows. In System Preferences you'll find Networking, Security, Accounts, and other preferences for OS X. When in doubt, you can use the search field in the upper-left corner to find what you're looking for.



WHITE PAPER

HDMI

Dive into the details of this high-definition video interface -MICHAEL BROWN

HDMI (the acronym stands for High-Definition Multimedia Interface) is one of the consumer electronics industry's more remarkable innovations. This de facto HDTV interface enables the transmission of high-definition digital video, up to eight channels of digital audio, HDCP encryption, the Consumer Electronics Control (CEC) protocol, and five volts of electrical power over a single cable.

HDMI 1.0, introduced in December 2002, had all of these features. The latest version, HDMI 1.3c, boasts several more, including support for Deep Color, auto lip sync, and the two high-definition multichannel audio formats used in Blu-ray discs. Let's take a look at how HDMI accomplishes all this while remaining backward-compatible with the earlier DVI standard.

AS THE VERSION TURNS

As with DVI, HDMI relies on Transition Minimized Differential Signaling (TMDS) to encode and transmit digital video, but HDMI uses TMDS to encode and transmit digital audio as well. TMDS uses a technique called differential signaling to reduce electromagnetic interference, which enables signals to travel faster with less chance of error.

The sending device—a Blu-ray disc player, for instance—encodes the digital signal and transmits it along with an inverse copy using

two separate bundles of copper wire (as with Cat-5 Ethernet cables, HDMI uses twisted-pair wiring to reduce noise. Noise induced in one half-twist has a propensity to cancel noise induced in a neighboring half-twist). The receiving device—an HDTV, for example—decodes the signal, measures the difference between it and the inverse copy, and uses this information to compensate for any in-transit signal loss.

Each new version of the HDMI standard has used the same basic type of cable and the same 19-pin connector, but each iteration has increased the standard's bandwidth capabilities and introduced new features (some of which are optional). HDMI 1.0, for instance, supported a maximum pixel clock rate of 165MHz (4.95Gb/s of bandwidth), which was sufficient for delivering HDTV at 1080p at a 60Hz refresh rate and WUXGA resolution (1920x1200), also at a 60Hz refresh rate.

HDMI 1.1 added support for DVD Audio and HDMI 1.2 added support for Super Audio CD. HDMI 1.3 more than doubled the pixel clock rate to 340MHz (bandwidth of 10.2Gb/s), which enabled even higher-resolution displays, such as WQXGA (2560x1600), using a single digital link. Type A HDMI connectors (the most common)

and Type C connectors (designed for digital camcorders) use single links; a Type B HDMI connector uses a dual link, but since the single-link connectors are capable of such

HDMI 1.3 ADDED SUPPORT FOR DEEP COLOR AND THE xvYCC COLOR SPACE

high bandwidth, Type B connectors are not currently in production.

HDMI 1.3 also added support for Deep Color and the xvYCC color space. Deep Color describes a method of using an extremely high number of shades, hues, and luminosity to increase the number of colors that can be displayed from millions to billions. Deep Color utilizes 30-, 36-, or 48-bit depths, compared to the 24-bit color on tap in HDMI 1.0. The xvYCC color space, also known as x.v.Color, represents color using the full range of values (0 to 256) in an 8-bit space. RGB colors are represented by a subset of the values (16 to 235) in an 8-bit space in order to compensate for the limitations of analog displays.

AUDIO ENHANCEMENTS

HDMI 1.0 supports eight channels of LPCM (linear pulse code modulation) encoded at

SUPPORTED FEATURES	HDMI VERSION				
	1.0	1.1	1.2, 1.2a	1.3	1.3a, 1.3b, 1.3b1, 1.3c
Standard RGB Color Space	Yes	Yes	Yes	Yes	Yes
YCbCr Color Space	Yes	Yes	Yes	Yes	Yes
36-bit Deep Color	No	No	No	Yes	Yes
48-bit Deep Color	No	No	No	Optional	Optional
xvYCC [aka x.v.Color] Color Space	No	No	No	Optional	Optional
1920x1200 resolution at 60Hz using a single link	Yes	Yes	Yes	Yes	Yes
2560x1600 resolution at 60Hz using a single link	No	No	No	Yes	Yes
Auto Lip Sync	No	No	No	Yes	Yes
DVD_Audio (DVD-A)	No	Yes	Yes	Yes	Yes
Super Audio CD (SACD)	No	No	Yes	Yes	Yes
Eight-channel LPCM audio (192kHz/24bit)	Yes	Yes	Yes	Yes	Yes
Dolby TrueHD/ DTS-HD Master Audio	No	No	No	Optional	Optional

Western Digital VelociRaptor 3000BLS

Solid state drives are creeping toward affordability (and decent write speeds), but for all-around performance, there's still no beating an old-school hard drive. The fastest one out there is the Western Digital VelociRaptor. Here's what makes it tick.

sampling rates up to 192kHz and with 24-bit resolution. HDMI 1.3 added support for eight-channel surround-sound streams encoded using the lossless compression algorithms Dolby TrueHD and DTS-HD Master Audio. All HDMI versions carry the older Dolby Digital and DTS lossily compressed bit streams, too.

Complex video processing can sometimes cause latency, resulting in the audio signal arriving at its destination before the video signal does. When this occurs, the actors in the movie will look as though they're speaking a different language and the soundtrack was poorly dubbed. HDMI 1.3 added a feature called auto lip sync that can automatically prevent this from happening.

All HDMI versions support a set of control functions known as CEC (Consumer Electronics Control) commands, although the specifications for the commands themselves weren't completely spelled out until HDMI 1.2a was finalized. CEC commands utilize HDMI's capacity for bidirectional communication to permit a single remote control to operate multiple devices connected with an HDMI cable. One-touch play, for instance, will automatically trigger the necessary commands for the entire home-theater system to power up and begin playing when the Blu-ray disc player's Play button is pushed. The addition of a few CEC commands and a few arcane details are all that distinguish HDMI 1.3 from HDMI 1.3a, 1.3b, and 1.3c.

KNOW YOUR OPTIONS

When shopping for HDMI equipment, be aware that some features—including support for Deep Color, the xvYCC color space, and even Dolby TrueHD and DTS-HD Master Audio—are optional. Although the HDMI spec does not spell out a maximum cable length, there are two types of HDMI 1.3 cable: Standard, or Category 1, cable has been tested to perform at speeds of 75MHz, which is the equivalent of a 1080i signal. Such cables typically max out at about five meters (16 feet) and are manufactured using 28 AWG copper wire, although neither of these factors are part of the official HDMI 1.3 spec.

A cable certified as High Speed or Category 2 has been tested to perform at speeds of 340MHz and can handle 1080p signals and increased color depths. High Speed HDMI cables can also accommodate higher-resolution displays (e.g., 2560x1600). These cables are manufactured using heavier gauge wire—26- or even 24 AWG—and are capable of running longer distances.

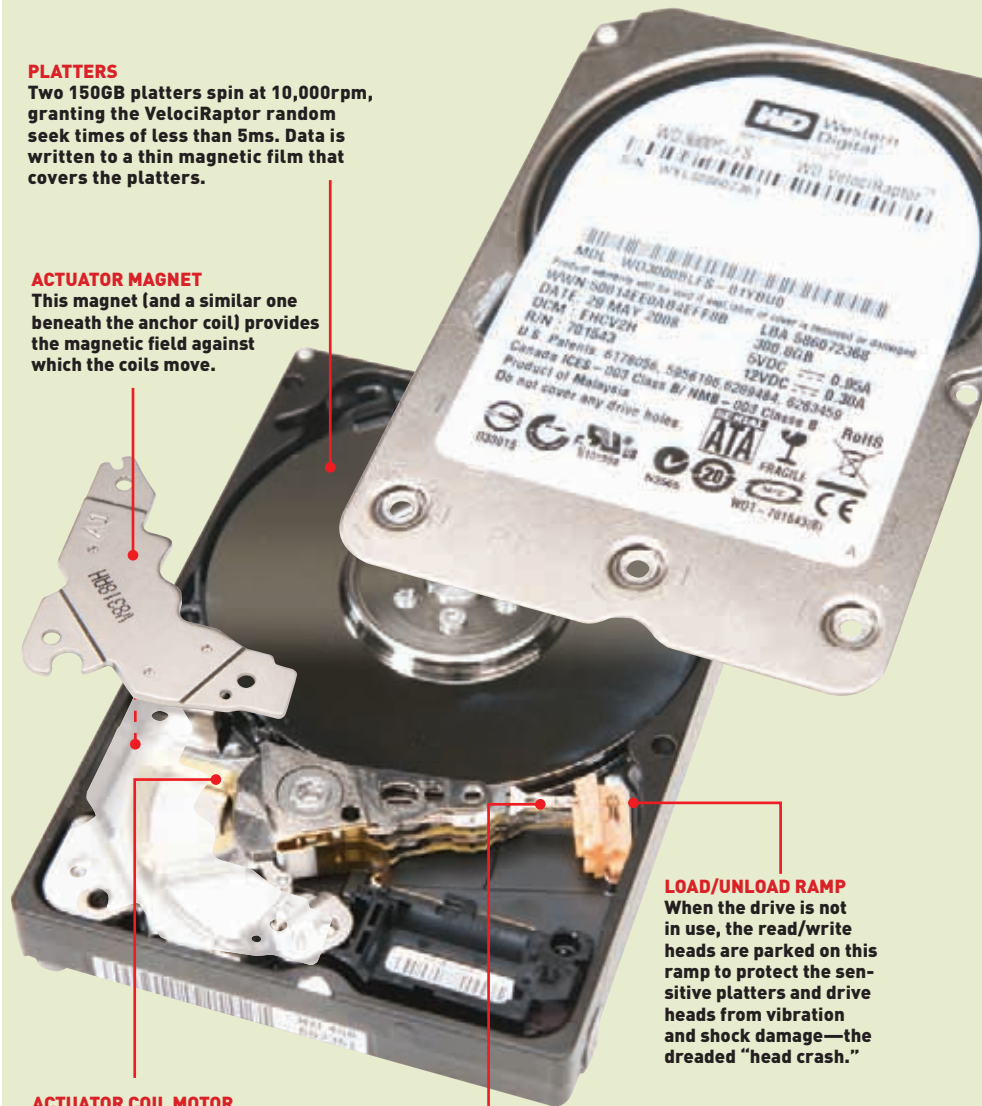
Longer cable runs can be achieved by using repeaters, which use electrical power to boost the HDMI signal; "active" cables, which operate in a similar fashion; and extenders, which use fiber-optic or Cat-5 cable. ⚡

PLATTERS

Two 150GB platters spin at 10,000rpm, granting the VelociRaptor random seek times of less than 5ms. Data is written to a thin magnetic film that covers the platters.

ACTUATOR MAGNET

This magnet (and a similar one beneath the anchor coil) provides the magnetic field against which the coils move.



LOAD/UNLOAD RAMP
When the drive is not in use, the read/write heads are parked on this ramp to protect the sensitive platters and drive heads from vibration and shock damage—the dreaded "head crash."

ACTUATOR COIL MOTOR

Varying the current in these copper coils causes their electromagnetic fields to interact with the magnetic fields of the rare-earth magnets surrounding them, moving the actuator extremely rapidly across the surface of the platters.

READ/WRITE HEADS

Situated at the end of the actuator arm, these heads (one set for each side of each platter) skim along just a few microns from the platter surfaces.



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

HOW TO

Step-by-Step Guides to Improving Your PC

THIS MONTH

64 INSTALL LINUX ON YOUR PLAYSTATION 3

66 HACK YOUR GMAIL ACCOUNT

COMMAND-LINE KUNG FU

Desktop shortcuts are a welcome and necessary convenience for accessing your programs, but overreliance on these executable links will leave you oblivious to many of Windows' lesser-known functions.



NORMAN CHAN
ONLINE EDITOR

That's why I prefer to use the command prompt when I want to run diagnostic tools or even common Windows functions with additional extensions and variables.

For example, whenever I need information about my network connection, I hit Windows Key + R to bring up the Run window, enter `cmd` to launch the command-line interface, and type `ipconfig`. Other useful commands include `shutdown` (to turn off your computer), `tasklist` (shows running processes), and `ping` (displays latency to a remote address). My favorite recent discovery has to be `net stop wuauserv`, which disables the Restart warning that pops up after every Windows update. Of course, you should do a little bit of research about each command before you start liberally running them—misuse can muck up your PC.

Know any cool Windows commands? Send them to norman@maximumpc.com!

WINDOWS TIP OF THE MONTH



System Shutdown Shortcuts

Safely turn off your computer by creating a shutdown shortcut on your Windows Desktop.

Right-click on the desktop and click New → Shortcut. When prompted for the location, type: `shutdown -s -t -60 -c "Computer Will Shut Down in One Minute."` Clicking this shortcut opens a countdown timer and warns you that your system will turn off. You can also create a shortcut to abort the shutdown procedure: `shutdown -a`.

SUBMIT YOUR IDEA

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

Install Ubuntu Linux on Your PlayStation 3

If you're only using your \$500 PlayStation 3 for console gaming, you're missing out on a powerful feature: the ability to use it as a fully functional PC! Inside that shiny plastic shell resides some respectable computing silicon, just waiting to be released from its undeserved console shackles. And while Windows Vista and OS X are no-goes due to compatibility issues, there's no reason not to dual boot into a perfectly serviceable Linux platform when the need arises. And while Ubuntu for PlayStation has a few functional limitations, you can find myriad excellent applications to enjoy from the comfort of your own living room, including VLC for video playback, AmaroK to blast your digital music library, and some classic 8-bit emulation software that you can play using your PS3's controller! -CHRIS COMISKEY

What you need:

- PlayStation 3
- PC with a CD/DVD burner and burning software
- Kboot and Ubuntu 8.10 .ISO image
- USB keyboard and mouse
- External USB hard drive or USB thumb drive for data backup
- Router with an active Internet connection

1 DOWNLOAD AND BURN THE UBUNTU/KBOOT PACKAGE

Naturally, this entire process starts with locating and burning the Linux distro itself. Grab the PS3 Ubuntu 8.10 Intrepid Ibex ISO from Ubuntu.com (<http://tinyurl.com/d8784m>). After the download has completed, burn the ISO image to a blank disc.



Once the ISO disc has been created, set it aside, and move on to the next step. If you have trouble with a failed Ubuntu install later in the process (usually the result of one or more corrupted files), consider slowing the burn speed of your disc to 24x or 12x. We're shooting for reliability here, not speed.

2 BACK UP SYSTEM-CRITICAL FILES

Save that PS3 data! Even if you don't plan on upgrading your PS3's HDD, you'll still have to reformat and repartition the existing drive, and all game saves and stored content such as music will be deleted. Don't worry about your PS3 account info and profile data though: that's all bundled on a separate flash drive along with the PS3's native operating system, called XMB. Also, games purchased from the PS Store online may be downloaded again for free.

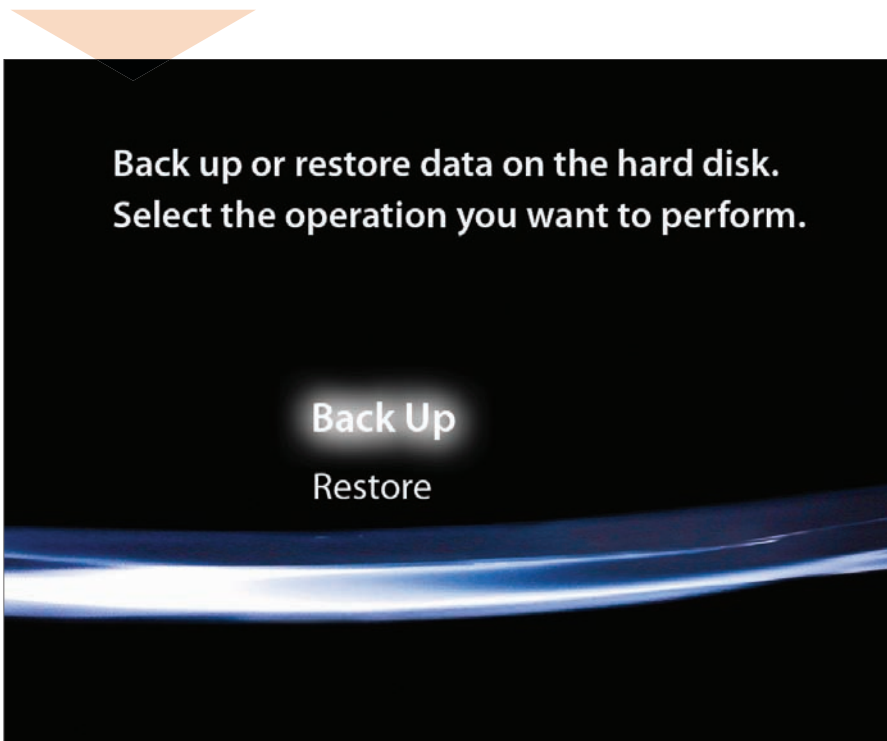
To save your current data, do the following: Start your PS3 without a game or movie disc to boot into XMB. From here, navigate to Settings > System Settings > Backup Utility.

Select Backup Utility and then hit Backup, and finally confirm Yes. Select the device where you plan to store the data (e.g., a flash drive or external hard drive), and let the console run through the backup process.

3 PREPARE A PARTITION FOR UBUNTU

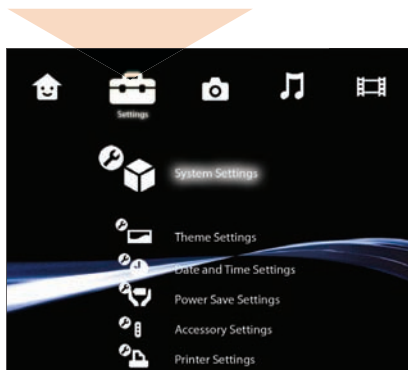
Now it's time to get Ubuntu up and running (even if your PS3 has just formatted your new HDD, you must still follow this step). First off, the default PS3 Wi-Fi Internet connection has been known to cause errors with the Ubuntu installation program. To avoid any road bumps, it's best to plug in a standard Ethernet cable from your router directly into your PS3.

Find your way back to the root of XMB and navigate to the following: Settings > System Settings > Format Utility.



Select Format Utility and enter Yes when prompted. From the partition menu, select Custom. Now select Allot 10GB to Other OS

4 INSTALL UBUNTU
Now that we have 10GB allotted for Ubuntu, it's time to insert the burned ISO disc. Go ahead and plug your keyboard and mouse into the console. After doing so, navigate to Settings > System Settings > Install Other OS.



After the system has scanned the ISO, highlight and select Start. The PS3 will pre-scan the Ubuntu installation, but it won't actually launch it. To do that, you'll need to go to Settings > System Settings > Default System.

Change the default setting of PS3 to Other OS. When prompted, select Restart. The PlayStation 3 will turn off for a few seconds and then reboot. Don't panic: When the system restarts there might be a small delay until you start seeing the Linux gears turn. Let the data compile until the final line

eventually ends with Kboot and a friendly blinking cursor.

If at any time the install gets stuck, it's not the end of the world. Just shut down the PS3 and when you restart, hold down the power button for about 10 seconds until you hear a second beep. Release the button and you'll be forwarded to XMB where you can start the journey again.

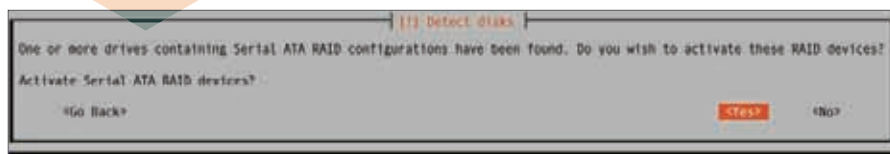
Continuing on from the cursor on your screen next to Kboot: If you're utilizing an old-school CRT TV, type Install. However, if you've moved past 1998 and you're running an HDTV, you'll want to take note of your monitor's native resolution and type out the following string: `install video=ps3fb:mode:X`, where X is one of the following values: 1, 2, 3, 4, or 5—to denote 480i, 480p, 720p, 1080i, 1080p, respectively. Thus, if you have a 1080p TV, the text should look like this: `install video=ps3fb:mode:5`. Now hit Enter.

After you've started the setup, you'll be asked a few questions as the install progresses. Here are our suggested answers:

- If possible, choose Ethernet as primary instead of wireless. If running an Ethernet cable from your router to the PS3 is totally

out of the question, then go ahead and highlight wireless instead. Be aware, however, that Ubuntu isn't the best of friends with WPA encryption, and this might confuse the installer and result in an error. A WEP key is a better bet.

- Give yourself a network host name. Or, if your imagination has run hopelessly dry, you can just use the default "Ubuntu" and hit Continue.
- When asked whether to enable Serial ATA RAID, select Yes.
- To tell the OS how to partition the hard disk, select "Guided—use entire disk," and then Continue.
- Give your new Ubuntu install a login name and a password.
- When asked whether to set up an encrypted file directory, enter No.
- Leave the Http: Proxy field blank when prompted and continue.



TIPS!

Make the Most of Your Ubuntu Install

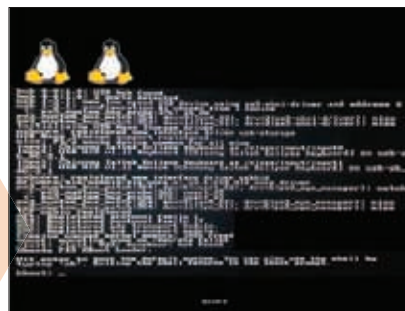
- The terminal is your friend, especially for app installations. To open it, go to Application → Accessories → Terminal.
- To immediately enable multimedia codecs (MP3, etc.), go to the terminal and type this string: `sudo apt-get install ubuntu-restricted-extras`, followed by Enter.
- Firefox comes pre-bundled. Use it!
- In case you missed it: To boot back into XMB, shut down the PS3 from within Ubuntu. Once the console has powered off completely, hold down the power button for about 10 seconds until you hear a second beep. Release the power button and you'll be forwarded to the PS3's primary OS. Conversely, to load Ubuntu, just follow the prior instructions on changing the PS3 default OS, and then hit Enter after the text screen loads.
- By default, the Ubuntu / Kboot loader will set up PCM audio, which is an audio codec suitable for most HDMI and optical connections. We were able to get sound right from the get-go using both an HDMI cable connected to an LCD's integrated speakers as well as an optical cable hitched to a Dolby Digital external receiver. Just make sure Ubuntu's sound isn't muted; to check, double-click the speaker icon in the upper right-hand corner of the desktop and make sure the duo sliders are raised midway up the level bar, not on the very bottom.

The main software installation will now begin. This is the long leg of the journey, and can take 45 to 60 minutes, but luckily, it shouldn't require any input on your end. For some setups, you might notice that the progress meter gets stuck around 6 percent, but give it about 15 minutes and it should soldier onward. If you receive an error message, or if the 6% stays in place for over an



hour (as it did with us the first go around), you probably have a corrupted ISO disc and need to re-burn the ISO file at a slower speed.

Once the installation has finished, go ahead and set your system clock when prompted. After that, you'll be asked to remove the install disc. Do so, and then click Enter. Enter your user name and password into the following splash screen, and presto, you're now surfing Ubuntu Intrepid Ibex from the cozy confines of your gigantic plush beanbag!



Read more about using Ubuntu on your PS3, including running media files and emulated games, at <http://tinyurl.com/cm453x>.

Hack Your Gmail

Chances are you know what Gmail is and have been using it for quite some time, even though Google's service is still in beta. But did you know that Gmail can be used for many practical functions other than sending and receiving email? With the appropriate extensions and setting hacks, you can make Gmail do things that other web-based email services, and even some desktop clients, cannot. Here are a few of our favorite Gmail tricks.

—JOSH KAMPSCHMIDT

1 USE GMAIL AS A HARD DRIVE

Gmail Drive is a simple shell extension that creates a virtual file system using your Gmail account storage. Since Gmail's storage has steadily increased, this gives you a good-size flash drive. Right now Gmail offers around 7GB of free storage.

Download Gmail Drive from this link: <http://tinyurl.com/6uekb>. Save the file to your Desktop. Unzip the download and double-click the Setup file to begin the installation.

If you get a window that says navigation to the website was canceled, ignore it. You'll know the program was set up correctly if the drive appears under My Computer.



Double-click the Gmail Drive system folder. It will prompt you to log in, so enter your username and password for your Gmail account. We also suggest that you click the box next to Auto-Login so you do not have to repeat this process in the future.

After Gmail Drive logs into Gmail, you can start dragging and dropping files on to this virtual drive. Gmail will upload the files to your inbox, so make sure you are connected to the Internet.

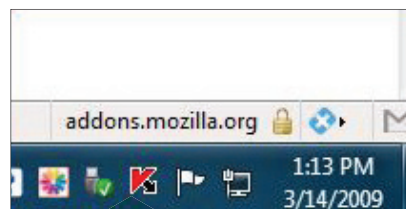


When you log in to your Gmail account, you will notice the uploaded files look similar to regular emails. If you want, you can create a filter so these attachments go to a designated place, but more on filters later.

2 MANAGE MULTIPLE GMAIL ACCOUNTS

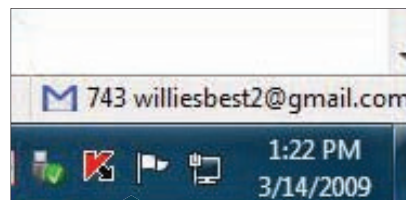
Gmail Manager is a Mozilla Firefox add-on that allows you to manage multiple Gmail accounts without having to log in to each of them individually. Since most of you probably have more than one Gmail account, this will be a very useful Firefox add-on.

Download Gmail Manager from Mozilla's website. Click the Add to Firefox button and install the add-on as you would any other add-on. After Firefox restarts, click the M in the bottom right-hand corner of the screen.



Click the Add button to add a Gmail account and type your email address and password into the dialog box. When the program returns to the main screen, select "Automatically login to this account at startup" and click the Apply button.

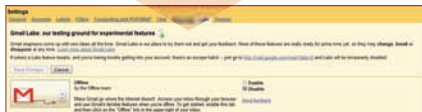
If you have another Gmail account, click the Add button again and enter the email address and password for that account. After you're done adding your Gmail accounts, click the OK button. When you open your web browser, the bottom right-hand corner will display the number of unread email messages in your Gmail account. Hover over



the area to view a summary of your unread messages. To change which Gmail account is displayed, right-click on the account name and select another account.

3 USE GMAIL OFFLINE

If you have ever feared not having Internet access and not being able to get to that one important email, this tip is for you! To enable this feature, you need to log in to Gmail and click the Settings button in the top-right corner of the screen. Now click the Labs tab. Locate the Offline lab feature. Click Enable and select Save Changes.



The page will refresh and go back to your Inbox. In the top-right corner of the screen, you will now have a new option called Offline. When you are ready to download the messages to your computer, click the Offline button. When the pop-up comes up explaining what Offline Gmail is, click the Install button. It will open a new window to the Gears web page. Gears is the application that lets you store your email on your local computer. This is a required download.

Install offline access for Gmail

Offline Gmail gives you access to your most recent emails when there is no internet connection.

This feature will download your email messages onto this computer. **Please make sure it is not a public or shared computer.**

You will need Gears for offline access, and the installer will restart your browser.

[Learn more](#)

When Gears is done installing, you will have to restart the web browser; click “Restart Browser Now” when you’re ready. When you re-open Gmail, you will get a security warning stating that Gmail is trying to use Gears. Put a checkmark in the box next to “I trust this site. Allow it to use Gears” and click the Allow button. It will also ask if you want to create a shortcut on your Desktop, Start Menu, and

Status: Synchronizing...

Finished downloading messages, 157 attachments still to be downloaded

Your recent mail is being downloaded to this computer.

You may continue using Gmail as you normally would.

If you have a slow or unreliable internet connection you may want to try using Flaky Connection Mode.

If you disconnect now, you will have access to mail back to March 2, 2009.

[Go into Flaky Connection Mode](#)

[Show actions](#)

Quick Launch bar. We recommend you create one of these shortcuts; put a checkmark in the appropriate box. Gmail will start synchronizing your email to your computer, please be patient. When you’re offline, just click the appro-

appropriate shortcut and Gmail will open with all of your email up to your last synchronization. Gmail will automatically synchronize when you log in to Gmail on this computer, so no need to worry about manually synchronizing.

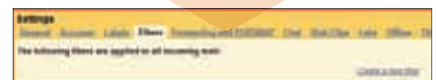
4 FILTER FRIENDS AND FOES

Filtering is one of the best features included with Gmail. With proper configura-

tion, you can categorize your email, automatically delete unwanted messages, and even flag emails for review based on any set of criteria.

One interesting way of implementing filters is to use the plus sign to create email aliases. For example, if our Gmail account was maximumpc@gmail.com, we could set up an alias maximumpc+spam@gmail.com that we would use on sign-up forms where we could expect to receive spam. Similarly, we could configure a maximumpc+friends@gmail.com alias that we would share with friends so their emails would automatically get filtered away from the rest of our daily mail.

To get started, we first need to actually define the rules and stipulations of the filter, so log in to



your Gmail account and click the Settings tab at the top right-hand corner of the screen. Now click the Filters tab and hit the “Create a new filter” link.

Let’s assume you want to make a filtering alias to give out to sites that could potentially spam you. You don’t know what address they’re going to be sending from or what text will be in the spam’s subject line, but you do know the email alias you plan on giving them (maybe to claim a snazzy freebie). So in the “To” field, type your alias:



youremailhere+spam@gmail.com. Click “Next Step.”

This next page will let you choose what action to perform on filtered emails for this particular rule. Since our example is with spam, we want to check the “Delete it” button to automatically dump it in the trash. For your friends filter, you can mark their messages with stars or give them special labels. Click “Create Filter” to finish.

Find more Gmail hacks and recommended Labs add-ons at <http://tinyurl.com/dgjght>.

REVIEWS

Tested. Reviewed. Verdictized

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- EVEN MORE REVIEWS!
- BEST OF THE BEST
- EDITORS' BLOGS
- THE NO BS PODCAST



Hewlett-Packard Firebird

Run silent, run green

Can a PC be scary? Hewlett-Packard's Firebird is. Why? The Firebird could very well offer a glimpse of where enthusiast computing is headed—and it's not a future we're particularly looking forward to.

The Firebird looks like a lap poodle version of HP's Blackbird 002, but the similarities are only skin deep. While the Blackbird 002 was a traditional meat-and-potatoes performance PC with industry-standard parts, tons of slots, and the power consumption to match, the Firebird is none of those things. It's silent instead of loud, diminutive instead of imposing, and offers minimal upgrade options.

The Firebird is more of a hybrid between a gaming notebook and a desktop machine—a gametop, maybe. It has 2.5-inch notebook hard drives, a slimline optical drive, two notebook GeForce 9800S GPUs in SLI, and an ExpressCard slot. Heck, the machine doesn't even have a PCI Express card slot. The only internal expansion options are two PCI Express Mini Card slots, for frak's sake. And here's the ultimate snub to power computing: the machine packs a water-cooled 2.83GHz Intel Core 2 Quad Q9550 and but two DDR2 slots. Why no Core i7? HP points to the CPU's lack of hybrid SLI support—it's only available on Nvidia chipsets currently. The CPU is at least a standard LGA775. HP also managed to

get a real hardware X-Fi in the unit. The power brick—not an internal PSU—is a 350-watt unit.

As you might guess, the performance is nothing to text home about. It holds up well against our zero-point rig, but the Firebird gets shot down by just about every PC we've reviewed since last July. Next to the Core i7 boxes, the Firebird is sucked into a jet intake and spit out featherless.

So what's so scary about that? Isn't the Firebird's performance something to snicker at? Perhaps in the same way you'd snicker at a Toyota Prius as you watch it shrink in the rear-view mirror of your Hemi Cuda. That, ultimately, is the scary part of the Firebird to us.

On the pro side, it's dead silent thanks to a water-cooled GPU, CPU, and fanless power brick. Power consumption is exceptional for the performance you get, too. At idle, the rig draws less than 90 watts. With all four of the Firebird's cores going, or with a game running, you'll typically see power consumption below 190 watts. By comparison, a 3.2GHz Core i7-965 with SLI'd GeForce GTX 280 cards, an Intel SSD, a 300GB VelociRaptor, and 6GB of RAM uses more power than that at idle and climbs up over 650 watts under heavy loads.

Beyond just the *Mad Max* world we're hurtling toward where everyone has to knife fight for a liter of gasoline, this could very well be the future of high-end computing. PCs have grown smaller over the years and add-in cards fewer. With external graphics on the way, it's quite possible the Firebird is a precursor of what an enthusiast PC will look like in 2013.

In the here and now though, is the Firebird right for you? For the person pursuing a silent and green computing experience with fair gaming and application performance, it is. For the power user/upgrader, it most certainly is not. The machine is just a generation behind

SPECIFICATIONS

Processor	Intel 2.83GHz Core 2 Quad Q9550
Mobo	Proprietary design using nForce 760S chipset
RAM	4GB DDR2/800
Videocard	Two GeForce 9800S in SLI
Soundcard	Creative Labs X-Fi
Storage	Two 320GB Hitachi TravelStar 5K320 (5,400rpm)
Optical	Optiarc Blu-ray BC-5600S
Case/PSU	Custom / 350 watt external

BENCHMARKS

	ZERO POINT		
Premiere Pro CS3	1,260sec		940
Photoshop CS3	150 sec	155 (-3%)	
Proshow	1,415sec		1,415
MainConcept	1,872 sec	1,872	
Crysis	26 fps	26	
Unreal Tournament	83 fps		83

Our current desktop test bed consists of a quad-core 2.66GHz Intel Core 2 Quad Q6700, 2GB of Corsair DDR2/800 RAM on an EVGA 680 SLI motherboard. We are running two EVGA GeForce 8800 GTX cards in SLI mode, a 150GB Western Digital Raptor and a 500GB Caviar hard drive, an LG G6C-H20L optical drive, a Sound Blaster X-Fi soundcard, and a PC Power and Cooling Silencer 750 Quad. OS is Windows Vista Home Premium 64-bit.



The Firebird may portend a reimagined future for "performance" computing.

the power curve for our tastes and the proprietary parts hurt. But ask us the same question in four years when the Firebird Mk. IV is out, and we may have a different answer.

—GORDON MAH UNG

■ ■ ■

VERDICT

7

HP FIREBIRD 803

<p>+ PONTIAC</p> <p>Sips power and is dead silent given its power envelope.</p>	<p>- EDSEL</p> <p>Disconcerting mix of proprietary parts and last-gen hardware.</p>
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\$2,100, www.hp.com

Asus Radeon EAH4890 TOP

ATI refreshes it's fastest single-GPU board

The videocard industry typically works on an 18-month cycle for each GPU design. Last year, Nvidia released the GT200 and ATI launched the RV770. Both are speedy, DirectX 10-capable parts, packed with shader processing power and capable of running the most demanding games at top speed. We tested Nvidia's first refresh of the GT200 last month (the GeForce GTX 285); now it's time to put ATI's first re-spin of RV770 under the microscope, with Asus's Radeon EAH4890 TOP.

The 4890's RV790 GPU is built on a 55nm process, just like its predecessors; however, ATI made fairly significant tweaks to the GPU's structure in order to accommodate higher clock speeds. Asus's stock overclock is a testament to that revamp. The Asus board's stock clock is 900MHz (the default stock clock for 4890 boards is 850MHz). Likewise, the board's quad-pumped GDDR5 memory sits on the same 256-bit bus but runs at 1,000MHz (the stock speed for 4890 boards is 950MHz). The star of the Radeon 4890's show remains the GPU's 800 shader units, which handle the heavy lifting in shader-heavy modern games, such as Crysis.

Like the RV770-powered boards, the Radeon 4890 supports DirectX 10.1, a feature absent from comparable Nvidia parts. As is the case with Nvidia's PhysX physics-acceleration tech, there's a dearth of DirectX 10.1 games available today, and even fewer that you'd actually want to play. We really enjoyed Far Cry 2, but not enough to consider DirectX 10.1 a key differentiator. (For what it's worth, we don't consider PhysX support a key differentiator either).

While the 4890 is definitely faster than the Radeon 4870, it's not stellar, especially in bandwidth-limited bench-

marks, such as Call of Duty 4. In Crysis, which is typically limited by the performance of your card's shader units, we saw the 4890 eke out a win against Nvidia's highest-end single-GPU board, the GeForce GTX 285. However, the GTX 285 cleaned the 4890's clock in every other test we ran, from 3DMark Vantage to Far Cry 2. The Far Cry 2 score is especially perplexing. We expected better performance from the 4890, since Far Cry 2 is one of the few DirectX 10.1 titles available today.

The Asus board offers a special tweak that helps differentiate it from typical reference

designs. Using the included Smart Doctor software, you can tweak the GPU's voltage—something that's traditionally been difficult to do. The tool allows you to overvolt the GPU from 1.31V to 1.4V, which was enough for us to get the core to 1GHz, good for an 8 percent boost in most benchmarks.

The 4890 is a capable DirectX 10 card priced about \$100 less than the GeForce GTX 285 we reviewed last month. However, the best value at this price range remains the Radeon 4850 X2 series of boards.

—WILL SMITH

BENCHMARKS

	Asus Radeon 4890	GeForce GTX 285	Radeon 4850 X2
Driver Version	8.592 RC1	182.08	8.12
Crysis 4X AA/Very High (fps)	21.4	20.3	12.4
Crysis no AA/Very High (fps)	24.9	24.8	27.9
Call of Duty (fps)	62.5	74.6	80.7
Vantage Game 1 (fps)	15.69	19.45	17.54
Vantage Game 2 (fps)	12.04	14.3	14.3
Far Cry HQ, 1920x1200, no physics, no AI (fps)	51.33	57.91	60.31
Far Cry HQ, 1680x1050, no physics, no AI (fps)	55.72	65.11	64.88

Best scores are bolded. Benchmarks are run on an Intel Core 2 Quad Q9770 Extreme with 4GB of memory running Windows Vista Home Premium. Crysis and 3DMark Vantage are run at 1920x1200 with 4x AA and 8x anisotropic filtering, unless otherwise noted. Call of Duty is run at 2560x1600 with 4x AA.

Under the custom Asus heatsink is a GPU primed for overclocking. Crank the voltage up and watch this baby purr.

ASUS RADEON EAH4890 TOP

VERDICT 8

+ THE HOLD STEADY	- THE SHINS
Great performance for less than \$300; low power requirements; great overclocker.	Slower than the GTX 285.

\$270, www.asus.com

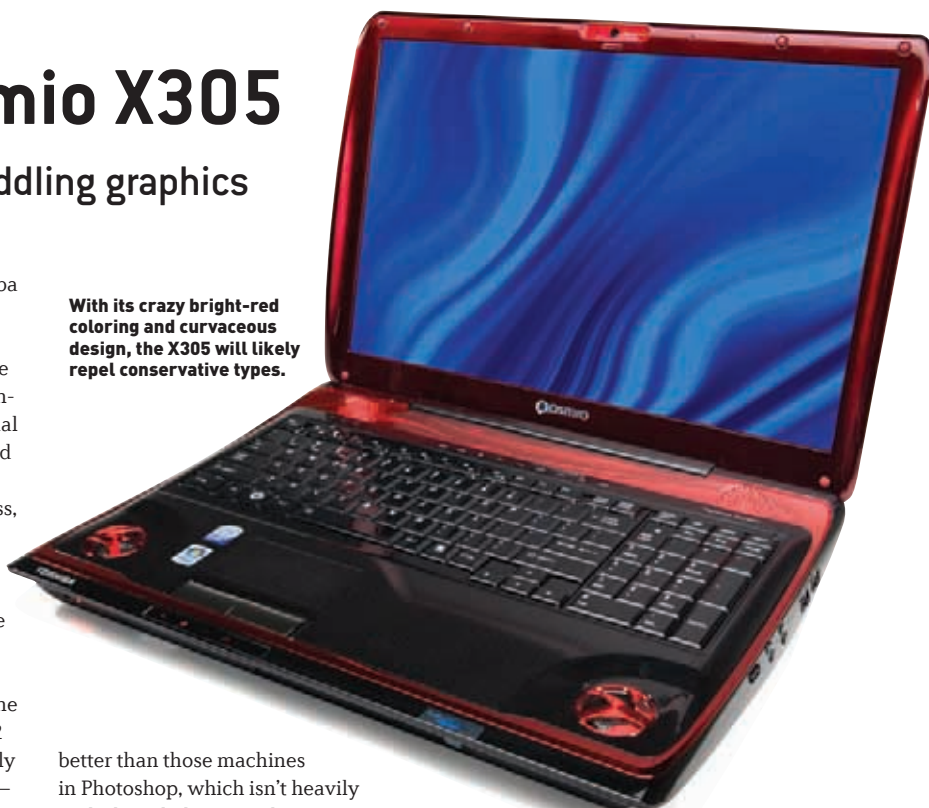
Toshiba Qosmio X305

A quad-core CPU and middling graphics

Normally, aesthetics are a secondary part of a notebook review, but Toshiba forces the issue with the Qosmio X305's wild design. Seriously, the lid's audacious three-tone, metallic-red paint job alone is enough to challenge the interest of a potential buyer, but the X305 also sports an unusual formfactor involving curves and lips that add to both the machine's footprint and height. And like the majority of notebooks in its class, the 17-inch X305 is heavy—although, with a carry weight of approximately 11 and a half pounds, it's still more than a pound lighter than the CyberPower Extreme M1 we reviewed last month.

Of course, there's more to the Toshiba X305 than its physical spectacle. The machine has the distinction of housing a 2GHz Core 2 Quad Mobile Q9000 processor, making it only the second quad notebook we've reviewed—the first was Lenovo's Kick Ass ThinkPad W700 (<http://tinyurl.com/al9wijn>). Those two extra cores gave the X305 a healthy advantage over its higher-clocked, dual-core competitors in our application benchmarks. In Premiere Pro CS3, ProShow Producer, and MainConcept Reference, which are all heavily multithreaded, the X305 surpassed all the dual-core rigs we've reviewed over the last several months—including the 2.8GHz HP HDX 18 we reviewed in January—by greater than 50 percent, in most cases. Interestingly, it also scored much

With its crazy bright-red coloring and curvaceous design, the X305 will likely repel conservative types.



better than those machines in Photoshop, which isn't heavily multithreaded. We attribute it more to the X305's hard drive configuration: a speedy Toshiba 64GB SSD is dedicated to the OS, while applications write to a virtually empty 320GB HDD.

In gaming, the X305 is not as impressive. The machine had no problem pummeling our GeForce Go 8600M-equipped zero-point rig in the game benchmarks, but it was no match for the dual ATI Radeon HD 3870 cards in last month's CyberPower Extreme M1. The X305 suffered a 12 percent loss against that rig in Quake 4 and more punishing losses of 52 percent and 41 percent in UT3 and Crysis, respectively. The X305 also fared worse than old-fave Gateway P-7811 FX (October 2008), with its GeForce 9800M GTS; the X305's 9800M GTX runs 100MHz slower (500MHz vs. 600MHz), making for a six percent disadvantage in Quake 4 and a 26 percent loss in UT3. The X305 managed a 10 percent win against the Gateway in Crysis, thanks to its shader-core advantage (112 vs. 64), but it's a bittersweet victory as neither rig is capable of

playable frame rates in that game at high settings, even at 1024x768 resolution.

Toshiba positions the Qosmio as a multi-purpose entertainment machine. To that end, the X305 sports good audio capabilities—the 4.1 Harman/Kardon speakers get plenty loud and maintain good midrange. The glossy surface on the 17-inch screen adds vibrancy to both movies and games. (Interestingly, the screen's native resolution is 1680x1050, while most other notebooks of this size are 1920x1200.) An HDMI port lets you connect to a high-def display. Plus, the X305 offers three USB ports (one of which doubles as eSATA), a 5-in-1 media reader, and an ExpressCard slot, along with Windows Vista Ultimate 64-bit.

While the X305's application performance is certainly commendable, its outrageous looks, lackluster gaming performance, and paltry battery life (one hour, eight minutes on power-saving mode) should consider its cons before making a purchase.

—KATHERINE STEVENSON

SPECIFICATIONS

CPU	Intel 2GHz Core 2 Quad Mobile Q9000
RAM	4GB DDR3/1,066MHz
Chipset	Intel PM45
Hard Drive	64GB Toshiba THNSO64GE4BBDC SSD, 320GB Hitachi HTS723232L9A360 (7,200rpm)
Optical	Pioneer DVRTO8L DVD-RW
GPU	Nvidia GeForce 9800M GTX
Boot/Down	62 sec / 20 sec
Lap/Carry	9 lbs, 5 oz / 11 lbs, 8.4 oz

BENCHMARKS

	ZERO POINT		
Premiere Pro CS3	1,860sec		1,080
Photoshop CS3	237 sec	153	
Proshow	2,416sec		1,228
MainConcept	3,498sec	2,340	
FEAR 1.07	14 fps		58 [314.3%]
QUAKE 4	29.1 fps		124.6 [328.2%]

Our current desktop test bed consists of a quad-core 2.44GHz Intel Core 2 Quad Q6700, 2GB of Corsair DDR2/800 RAM on an EVGA 680 SLI motherboard. We are running two EVGA GeForce 8800 GTX cards in SLI mode, a 150GB Western Digital Raptor and a 500GB Caviar hard drive, an LG G6C-H20L optical drive, a Sound Blaster X-Fi soundcard, and a PC Power and Cooling Silencer 750 Quad. OS is Windows Vista Home Premium 64-bit.

VERDICT

8

TOSHIBA QOSMIO X305

<p>+ ROSÉ</p> <p>Beats dual-core rigs in multithreaded apps; 4.1 speakers rock.</p>	<p>- ROSACEA</p> <p>Gaudy aesthetic; unimpressive gaming; piss-poor battery life.</p>
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\$2,700, www.toshiba.com

MSI DKA790GX Platinum

A budget board with enthusiast touches

The four horsemen may be saddling up and Gozer the Gozerian might soon appear, but that doesn't mean it's all bad news. With people digging in the couch crevices for dropped coins to build a new system, AMD's back on the menu again. Don't believe us?

We recently added up the cost differential of building a Core i7 machine versus a Phenom II rig and the AMD system saved us at least \$200. Sure, the Core i7 will whup any Phenom II up and down the block, but \$200 gets you a hell of a lot more video-card, hard drive, or power supply. If you're thinking, "Why not Core 2?" our reasons are simple: legs. We don't have faith Intel will push out faster and better Core 2

procs, but AMD will support AM2+ for at least 12 months through newer and faster AM3 CPUs.

Thus, we dusted off our benchmarks to look at MSI's DKA790GX Platinum. The board features integrated graphics with the option for hybrid CrossFire mode. Unfortunately, the add-in card must be equally as weak as the integrated part, so don't expect miracles. It's like combining one poke in the eye with a second poke to see if it really hurts that much.

Compared to the Gigabyte MA 790GP-DS4H (<http://tinyurl.com/d9xr5w>), the DKA790GX Platinum has a superior SATA port layout. Other enthusiast-like touches MSI included are PCB-mounted switches and

a fully heat-piped south bridge. We also favor MSI's excellent Live Update feature that checks for newer BIOSes, utilities, and drivers for the board.

Performance is good, but both the MSI and the Gigabyte 790GX board are aced by Asus's 790FX-based M3A32-MVP board. As with a lot of modern motherboards, however, performance really isn't the make-or-break issue. It's about features and amenities. In this respect, MSI's board is better than Gigabyte's. The integrated graphics are a joke, but the 790GX boards tend to sell for \$50 less than 790FX boards, with the graphics thrown in for free.

—GORDON MAH UNG

BENCHMARKS

	MSI DKA790GX	Gigabyte MA790GP-DS4H
PCMark06 Overall	8,223	8,223
PCMark06 RAM	4,613	4,783
3DMark06 RAM	11,617	11,571
HD Tach Avg.	77.5	59.3
ScienceMark 2.0 Overall	1,500	1,581
ScienceMark 2.0 Mem	6,190	8,105.5
Valve Particle test	73	66
UT3 (fps)	79	76
FEAR (fps)	193	173
Quake 4 (fps)	160.5	166
UE Mem Copy (MB/s)	8,462	8,652
UE Mem Latency	55.8	60.1

Bold denotes winner. We tested with an AMD 2.5GHz Phenom X4 9850, 4GB of Kingston Hyper-X DDR2/1066, GeForce 8800 GTX, WD 150GB Raptor, a PC Power and Cooling 1200 PSU, and Windows XP SP3.

VERDICT 8

MSI DKA790GX PLATINUM

<p>+ GOODWILL</p> <p>Well-furnished board at a budget price.</p>	<p>- AIG</p> <p>Free integrated graphics are still a joke.</p>
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\$130, www.msicomputer.com



Budget buyers rejoice! MSI's Phenom II board will get you through the slump.

Asus Eee PC 1000HE

Faster. Better. Longer-lasting

Asus's Eee PC kicked off the netbook craze in 2007, and now the grandmaster of small-and-shiny returns with its best Eee ever. The 1000HE combines the 901's extra-long battery life with the power and capacity of the 1002HA (which we reviewed in March), and throws in a nearly MacBook Pro-style full-size chiclet keyboard.

The 1000HE is the first netbook we've reviewed with Intel's new Atom N280 processor, which kicks up the clocks from 1.6GHz to 1.66GHz, and the front-side bus to 667MHz from 533MHz. Other than that, it's virtually the same hardware as Asus's other 10-inch models, like the 1002HA. The 1000HE trades the 1002HA's brushed-aluminum exterior for glossy fingerprint-prone plastic, with the chiclet keyboard supplanting the 1000HA's more standard keys.

While not as large or as comfortable as the keyboard on the HP Mini 1000, the chiclet keys on the 1000HE are a close second. Battery life is superb, too; we got more than five and a half hours on our standard full-screen video battery test—same as the Eee PC 901, which used solid-state storage, and a full two and a half hours longer than the 1002HA.

The slight front-side bus speed increase didn't affect performance as much as we'd anticipated; the 1000HE matched the 1002HA's Photoshop CS3 time without exceeding it. But that just means it's tied for first place.



The Asus Eee PC 1000HE is the new standard for netbook excellence.

SPECIFICATIONS

Display	10.2 TFT WSVGA@1024x600
Processor	1.66GHz Intel Atom N280
Chipset	Intel 945GSE
Graphics	Intel GMA50
RAM	1GB DDR2/667
Storage	160GB Seagate Momentus (5,400rpm)
Ports	Three USB, audio in/out, multcard reader, VGA out, SD Card, Ethernet
Wireless	Bluetooth, 802.11b/g/n
Lap/Carry	3 lbs, 2 oz / 3 lbs, 10 oz

BENCHMARKS

Photoshop (sec)	690
Battery (hrs:min)	5:35
H.264 playback	Yes
Quake Live capable	Yes

By our measure, the 1000HE does nearly everything right: roomy 160GB hard drive, three USB ports, 802.11n Wi-Fi, and an SD card slot. The DDR2 RAM slot is easily accessible, too; making it easy to replace the computer's single 1GB SO-DIMM with a

2GB module for \$20 and five minutes' effort.

The Elantech touch pad is one of our few complaints about this netbook: it's prone to momentary hitches, especially at high sensitivity. We do, however, appreciate its convenient multitouch commands.

Even with the sometimes-wonky touch pad, the Asus Eee PC 1000HE is a great netbook. Indeed, the 1000HE exceeds its rivals in everything but the touch pad, aesthetics, and the keyboard (where the HP Mini 1000 still reigns supreme), but it's certainly no slouch in those categories. Yes, this is the new netbook to beat. —NATHAN EDWARDS

■ ■ ■
VERDICT **9**

ASUS EEE PC 1000HE

<p>+ HEART</p> <p>Great battery life; comfortable keyboard. Speedy and roomy.</p>	<p>- ONO</p> <p>Glossy finish attracts fingerprints; the touch pad is occasionally wonky.</p>
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\$400, www.asus.com

CoolIT Domino A.L.C.

Entry-level water-cooling at a competitive price

CoolIT is somewhat notorious for enormous but effective closed water-cooling systems: its Boreas (<http://tinyurl.com/awk2hj>) and Freezone Elite (<http://tinyurl.com/aj43kc>) kick the pants off of conventional air coolers and are much more user-friendly than piecemeal water-cooling setups. Now CoolIT wants to bring self-contained water-cooling to the masses with the Domino Advanced Liquid Cooling.

The Domino eschews both the large heatsinks and the Peltier thermoelectric coolers of its predecessors in favor of a radiator and single 12cm fan, which gives the Domino less oomph than the Boreas or Freezone Elite, but confers several advantages to the water-cooling newb.

First, the Domino costs a cool \$80, compared to \$600-plus for the Boreas and \$350

for the Freezone Elite. Second, the Domino is much smaller and easier to install; CoolIT boasts that an amateur with no CPU-cooling experience can install it in 10 minutes.

Installation is refreshingly simple, though it does require a backplate for LGA 775/1366. Once the backplate is installed, you simply screw the CPU heat exchanger mount into the backplate and mount the radiator module in your case's rear 12cm fan mount. The included rubber fan mounts make it an easy and screw-less affair.

The Domino's fan module includes an LED that displays fan and pump speeds, coolant temperatures, and system alerts, as well as a button that lets you toggle between three fan speeds: Quiet, Performance, and Full. Quiet keeps fan speeds low and noise minimal, while Full roars up to 3,000rpm

COOLIT DOMINO A.L.C.

+ DOMINO (X-FORCE)

Easy install, good performance, fantastic price.

- DOMINO (MOVIE)

Switch/LED blocked by side panel; inferior to other water coolers. Loud at top speed.

\$80, www.coolitsystems.com

VERDICT **9**

for maximum cooling power. In Performance mode, the fan speed varies between 1,100rpm and 2,500rpm, depending on the CPU temperature. Unfortunately, to switch speeds, you'll need to open your case's side panel, or leave it off.

In Quiet mode, the Domino matched our stock cooler's idle temps, while at Full it was cooler by 13 C. In both Performance and Full modes, the Domino outperformed our favorite air cooler, the Zalman CNPS 9900, by two and six degrees, respectively. But the Zalman still reigns at idle, and in Full mode the Domino is louder than the Zalman.

The CoolIT Domino is an excellent first water-cooling kit for beginners, and though performance can't match that of its bigger brothers, the Domino makes up for that in price and ease of installation. And its cooling easily matches the best air coolers we've tested.

—NATHAN EDWARDS

BENCHMARKS

	Domino (Quiet)	Domino (Performance)	Domino (Full)	Zalman CNPS9900	Stock Cooler
Idle (C)	37.5	34.2	33.7	31.7	37.5
100% Burn (C)	55.5	50.5	46.25	52.25	68.75

Best scores are bolded. Idle temperatures were measured after an hour of inactivity; load temperatures were measured after an hour's worth of CPU Burn-In (four instances). Test system consists of a stock-clock Q6700 processor on an EVGA 680i motherboard.



The CoolIT Domino A.L.C. can't match the power of its bigger siblings, but its size and price make it a perfect first step into water-cooling.

Kindle 2

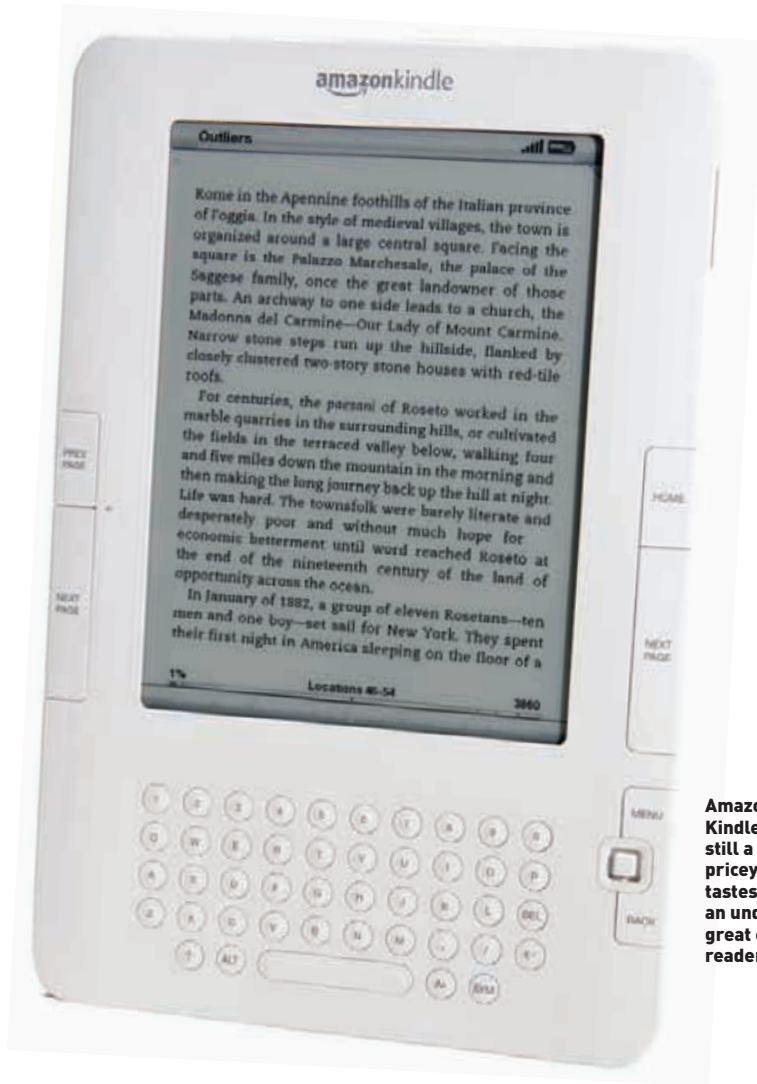
Faster refresh rate, easier navigation and .mobi support

Normally, we lead off reviews with the relevant speeds and feeds, but in the case of an eBook reader, like the Kindle, that's not necessary. The Kindle 2 is about the same thickness as this magazine and the size of a trade paperback, but packs enough internal memory to hold an incredible number of books—between 1,000 and 2,000, depending on the length of the books. But that doesn't really matter. What matters is that the Kindle 2 is a great way to read and purchase books.

The star of the Kindle's show is its improved black and white, six-inch E-Ink screen. E-Ink replaces backlit LCDs with millions of tiny black and white capsules suspended in a clear fluid. The white capsules are positively charged, while the black caps have the opposite charge. By changing the electric field in different parts of the screen, the E-Ink is able to display 16 shades of gray, without a backlight. This effectively eliminates eyestrain as a problem, even during epic reading sessions. The use of E-Ink also greatly improves the device's battery life—we got roughly a week of use out of a single battery charge, with wireless on. By disabling the wireless functionality, we were able to double that battery life. The downside to E-Ink is that it's currently only available in black and white, which limits the Kindle to text-heavy books, magazines, and blogs. Sorry *Italian Vogue* fans.

Our second-favorite thing about the Kindle 2 is its wireless connection to Amazon's Kindle store. By pairing the hardware with a no-monthly-charge cellular data connection, the Kindle effectively puts Amazon's entire library of digital books just a few clicks away, anywhere that Sprint has a wireless data network. Find a book, read the sample chapter, and if you like it, you can download the complete contents in about a minute. If you aren't in a covered area, you can download books using a computer, then transfer them to the Kindle using the included USB cable.

We're still concerned that your purchases on the Kindle are tied to Amazon's proprietary file format; however, the addition of a free Kindle app for the iPhone adds another option for viewing content should your Kindle die after the warranty expires. Even better, books for the Kindle are automatically synced to the spot you left off at if you have the client on your iPhone.



Amazon's Kindle 2 is still a bit pricey for our tastes, but it's an undeniably great eBook reader.

While Amazon wouldn't confirm any plans, we expect that there will be similar apps for additional smartphones and similar devices in the future.

The new Kindle repositions and shrinks the next-page buttons and the faster refresh on the new E-Ink obviates the need for the LCD cursor on the first device. At \$350, it's still an expensive update for spendthrift bookworms, although speed readers could quickly recoup the cost by purchasing cheap, subsidized books from Amazon (see <http://bit.ly/4Xw3> for more info). The Kindle 2 isn't a required upgrade for original Kindle users, but the new slimmer formfactor and faster screen make it the most compelling eBook reader we've tested. —WILL SMITH



VERDICT **9**

AMAZON KINDLE 2

+ ANATHEM

Great screen for reading; tiny size; hundreds of thousands of books instantly available.

- DA VINCI CODE

Too expensive; screen is black and white; proprietary book format.

\$350, www.amazon.com

Three out of five editors picked the Essence STX over other soundcards.

Asus Xonar Essence STX

Headphone audiophiles rejoice

There are a few dirty secrets in the tech industry, and one of the best-guarded among them regards multichannel audio—everybody wants multichannel audio but almost no one actually runs the speakers to use it.

Sure, we all cheered when PC audio went from 4.1 to 5.1, and then from 6.1 to 7.1, but who actually runs that many satellites around his or her PC? That's why Asus's Xonar Essence STX is a soundcard that's long overdue. Instead of pushing pointless multi-satellite specs, the Essence STX is aimed at folks who spend more money on a set of headphones than some people put out for an entire surround sound set.

The card shares the same audio processor and PCI-E bridge chip as the budget Xonar DX card, but the similarities stop there. Asus polished the PCB and components for the stereo and headphone crowd. Headphoneophiles will be especially pleased with the isolated power sources for the headphone and line out.

Also catering to the audiophile crowd are replaceable opamps to let you tune the "color" of the audio. It's not the first time this has been done, but it's a nice touch. The card features Burr-Brown digital-to-analog converters and is rated at 124dB signal-to-noise ratio out the headphone jack. In addition to the 1/4-inch headphone jack, a pair of RCA outputs, a 1/4-inch line out, and a combo optical/coax SPDIF round out the card's options (Dolby Digital Live is supported in digital).

We performed close listening tests using Dolby lossless TrueHD and a set of Etymotic ER4 earphones and found the audio to be clean and crisp. We also did an A/B Pepsi Challenge between the Essence STX, an X-Fi Titanium Fatal1ty, and a laptop, using 24-bit/96KHz PCM audio, and the Essence STX was preferred by three of the five test subjects.

Though the Essence STX is not pushed as a gaming card, we did play a handful of games with the card and found the sound

to be quite good. Although EAX5 is not supported, Microsoft Vista and sparse title support has mostly nullified the X-Fi API advantage today.

The upshot is that the Essence STX is a hell of a good card. Hardcore gamers will still want a real X-Fi, but for folks who are interested in getting the most from their earphones, the Essence STX is your choice.

—GORDON MAH UNG



VERDICT **9**

ASUS ESSENCE STX

+ PINK FLOYD

Clean and pure sound output and control over headphone impedance.

- PINK

Pricey and lacks full EAX support.

\$200, www.asus.com

Silverstone Fortress FT01

Solid, competent, and classy, but not flashy

Silverstone is well-known for releasing a few solid chassis every year, usually rehashes of its Temjin full-tower line. But this year has already brought two excellent cases that mark departures from the tried-and-true: the full-tower Raven RV01 (reviewed in our March full-tower roundup) and the mid-tower Fortress FT01.

The Fortress FT01 is a solidly constructed aluminum unibody case that just screams attention-to-detail. Mid-tower cases often lack the amenities of their full-size cousins (compare Silverstone's own Kublai line with its mighty full-tower Temjin series), but the Fortress handily escapes that trap.

After the chunky, plastic, stealth-bomber-like trappings of the RV01—which we dug, don't get us wrong—it's nice to see Silverstone back to the classy brushed-metal look it's known for. The Fortress's side panels and front bezels are black brushed aluminum, while the rest of the machine has a dusty matte-black finish, with a bit of wicked-looking mesh covering the intake fans.

Yes, intake fans, plural. Silverstone's big idea here is filtered positive air pressure that keeps the warm air moving out and keeps dust from getting in (mostly). Two filtered 18cm fans pull cool air into the case—a fan in front pulls air over the hard drives and along the video-cards, and a fan on top brings cool air over the RAM and north bridge. Warmed air leaves via the 12cm rear exhaust fan as well as through vents in the back panel and PCI slot covers.

Inside, the FT01 boasts five tool-free optical slots, with the push-button locking mechanism familiar from the Raven, as well as seven slide-in hard drive trays mounted perpendicular to the optical drives. The FT01, like the Raven and TJ10, includes just one CP05 hot-swap SATA cable; more will run you about six bucks each. The FT01's front connectors, found in a pop-up compartment

on top, are Silverstone's usual: two USB ports, one FireWire, and audio jacks. The only LED to be found is the one that lights up the power button. Like we said, classy.

Although the FT01 is a mid-tower, we had no problem installing our test setup—and we verified that both the GeForce 8800 GTX and GeForce GTX 280 will fit. We do have a few gripes, however. First, there's not a whole lot of room between the motherboard and the hard drive bays, and folks with side-mounted SATA ports will find plugging them in awkward, though not impossible. The black interior paint, though high-quality, was applied a little liberally; we had trouble screwing in the motherboard standoffs at first.

Although the FT01 has cutouts in the motherboard tray for cable routing, the foam padding on the inside of the side panels leaves little room for cable management without squashing some foam. For the money, Silverstone should include at least two CP05s, too. Finally, the filter for the top intake fan is hard






The Fortress FT01 brings back the brushed-metal, no-nonsense exterior that Silverstone is renowned for.

to remove due to a clip holding the front-panel wires to the top of the case.

The Fortress FT01 is a great-looking, well-constructed case with plenty of features for the computer enthusiast. And barring a few modest complaints, there's a lot to love about it. —NATHAN EDWARDS



A fine interior finish and plenty of drive bays ensure a warm welcome for the FT01.

		VERDICT	9
SILVERSTONE FORTRESS FT01			
 FORT APACHE	 FORT WAYNE		
Solid construction, great looks, plenty of hard drive bays. Quiet, effective thermals.	A tad expensive, a bit cramped for side-mounted SATA ports. Only one SATA hot-switch plate.		
\$230, www.silverstonetek.com			

Logitech G9x

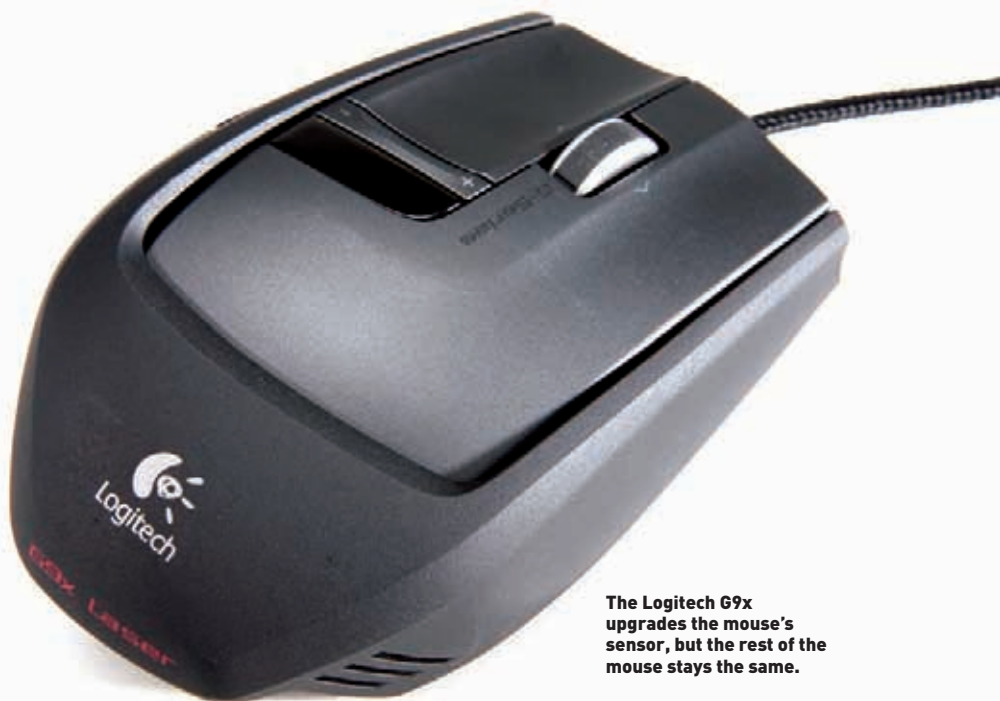
We didn't like the original G9, but we were wrong

When we first reviewed the original Logitech G9 (November 2007), we didn't like it. Specifically, we thought it was uncomfortable to hold, using either of the removable shells. In fact, we described it as "not particularly comfortable for day-to-day mousing" before complaining that it was unsuitable for people who use a traditional palming grip.

We were wrong. After we made a few small adjustments to our grip, we fell in love with the G9—at least when using the grippy palm-friendly Precision body. We still don't like the smooth grip—dubbed Wide Load—and we're generally not fans of having to adjust our grip to suit a mouse, but the smooth response and power-gamer-friendly features that the G9x delivers make this mouse the best we've ever tested.

For the most part, the G9x and the original G9 are identical. The removable shells are the same, the internal weighting system accommodates up to 28 grams of weight, the onboard memory stores up to five profiles, and the scroll wheel switches between crazy-fast click-free scrolling to a more traditional click-to-click scroll at the press of a button. The only difference between the original G9 and the new G9x is its enhanced laser sensor.

Replacing the original G9's variable-sensitivity, 3,200dpi laser sensor is a 5,000dpi laser sensor, for true twitch gamers. At the



The Logitech G9x upgrades the mouse's sensor, but the rest of the mouse stays the same.

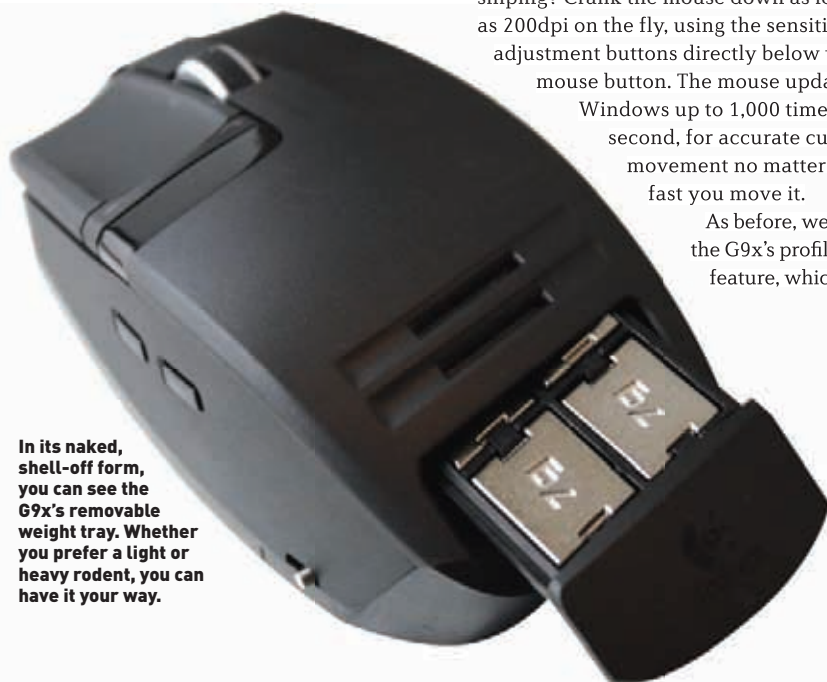
highest sensitivity settings, moving the mouse a fraction of an inch will blast the cursor across the screen—giving you an edge in fast-paced shooters or RTS games where you need to cover a lot of ground quickly. Want to slow it down for a little sniping? Crank the mouse down as low as 200dpi on the fly, using the sensitivity adjustment buttons directly below the left

mouse button. The mouse updates Windows up to 1,000 times per second, for accurate cursor movement no matter how fast you move it.

As before, we love the G9x's profile feature, which lets

you switch between pre-configured profiles on the fly on any PC, whether you have Logitech's software installed or not (you will need to have Logitech's software installed to configure the profiles initially, though). The on-mouse LEDs change color based on the profile you're using, so you won't accidentally find yourself in your RTS shooter profile when you fire up Left 4 Dead.

As with the G9, the seams between the G9x's removable shells and the main mouse body get pretty crusty over a long period of time. But everything else about this mouse—from the braided cord to its pair of thumb buttons—is awesome. —WILL SMITH



In its naked, shell-off form, you can see the G9x's removable weight tray. Whether you prefer a light or heavy rodent, you can have it your way.



VERDICT **10**

LOGITECH G9X

+ REMY

The best sensor we've ever tested. On-the-fly sensitivity adjustment. Driver-less profiles.

+ STUART LITTLE

The satiny texture of the Wide Load shell gets sweaty & gross after long sessions.

\$100, www.logitech.com

Tom Clancy's H.A.W.X.

Best played to the tune of Kenny Loggins's Danger Zone

Despite what you see in the screenshots in this review, H.A.W.X. is as much a flight simulator as Burnout Paradise is a driving sim. Ubisoft's latest liberty with the Tom Clancy franchise is more akin to Descent or Wing Commander than it is to Microsoft's Flight Simulator X. It's an arcade shooter that cares more about maintaining a high explosion-per-minute ratio than realism or even proper physics. That means fighter jets with 200-plus capacity payloads, a dearth of takeoffs and landings, and an army of AI-controlled enemy units that are more than willing to fly straight into your missiles for the greater pyrotechnic glory.

As David Crenshaw, former leader of the Air Force's elite H.A.W.X. squadron, you've now turned to the private sector to pay the bills and catch the thrills. In the first half of the game, Artemis Global Security hires you to guard oil refineries and bomb military bases for the highest bidder, which—shocker—eventually has you at odds with the U.S. government. Ever the patriot, this twist sends you back into the arms of Uncle Sam and you spend the rest of the game defending America from an all-out invasion.

The missions, which range from aerial escorts to bombing runs, each last about 20 minutes, and have you taking on enemies from land, sea, and air. Wiping out waves of tanks, boats, and patrolling helicopters becomes brutally mundane, since these enemies never pose a real threat to you and are easily dispatched with auto-locking missiles. Dogfights



Weaving between the skyscrapers of downtown Chicago is possible but not recommended.

with other jets fare much better, as we actually had to evade homing missiles or out-flank ace pilots with fancy flight maneuvers.

But the real fun comes from the varied locales where we conducted our fiery aerial ballets. Our hearts raced as we jetted across the skies over Cape Canaveral to ward off dozens of bogies threatening an in-progress space shuttle launch, and a desperate defense of Air Force One after the battle for Washington DC was nothing short of epic. We didn't mind that the story was farfetched; the gripping urgency and deft dramatic flair packed into these scenarios reminded us of a nail-biting episode of

television's 24—from one of the good seasons.

The later scenarios also featured interesting challenges to keep us on our toes. One assault on a series of broadcast towers, for example, required that we fly below a certain altitude to avoid radar detection. Having a low flight ceiling forced us to adjust our speed and use evasion as opposed to direct engagement.

We played the game with both a gamepad and joystick, and the latter is definitely our preferred control system. Hardware buffs will be bummed though, because even though you can unlock aircraft ranging from Cold-War era MIGs to fifth-generation jets like the F-22 Raptor and F-35 Lightning II, they all handle the same. A third-person perspective mode lets you staff for "advanced" flight tactics, but we still enjoyed playing from the non-functioning virtual cockpit more. But even given all that, H.A.W.X. is a pretty enjoyable action game—we just know it could be so much more.

—NORMAN CHAN



The arcade physics lets you fly straight down toward a battleship and bank up just before you hit the deck.

VERDICT 7	
TOM CLANCY'S H.A.W.X.	
AFTERBURN	SUNBURN
Fast-paced action, exciting mission scenarios, and maps that use satellite imagery.	Dumb opponents, unrealistic physics, unrewarding unlock system.
\$50, www.hawxgame.com , ESRB: T	

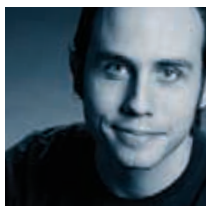
LAB NOTES

Hands On

How we built a multitouch PC from parts

For one of April's big website features, I researched and put together a Surface-esque multitouch table PC for the office (<http://bit.ly/wlIA>). It was definitely the most ambitious construction project I've ever worked on. But you know what? It went off without a hitch—it was an easy, fast build! Oh wait, that's a total lie. The build was anything but flawless. There were false starts, deadlines were missed, a Dremel rotary tool met its maker, and some caustic chemicals were applied in an unventilated room.

Still, in the end, everything worked out. The table is cool to look at, fun to play with, and really shows off what you can accomplish with some elbow grease and a healthy do-it-yourself spirit. I think there's a lesson to be learned in there somewhere, but I wouldn't really know; I've had a hard time learning lessons since that caustic chemicals incident.

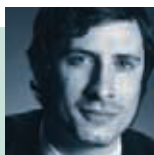


ALEX CASTLE
ASSOCIATE ONLINE
EDITOR



GORDON MAH UNG
SENIOR EDITOR

For a Pepsi Challenge among soundcards, I threw a 16-bit/48KHz laptop into the mix with an Essence STX and X-Fi soundcard and was surprised at how good the laptop sounded. That is, I expected to be able to easily pick out the ThinkPad T60 as the worst of the three, but it sounded far closer than I expected, at least with speakers. With headphones the difference was more pronounced.



NATHAN EDWARDS
ASSOCIATE EDITOR

After putting seven netbooks through their paces, I finally found one I liked enough to buy for myself. The Asus Eee 1000HE has a decent chiclet keyboard, a big-ol' hard drive, 802.11n, a 160GB hard drive, and oh yeah: a battery that lasts more than five and a half hours playing full-screen DVD-quality video, and even longer doing normal tasks. I've already put Windows 7 on mine!



WILL SMITH
EDITOR-IN-CHIEF

'Tis the season to show off new hardware! This month, I had a ton of meetings with vendors showing off new gear, from Marvell's tiny PC in a power plug to new videocards from all the major vendors to stuff that I still can't talk about. Keep your eyes peeled though—there's new hardware on the horizon that will shake up some major PC part categories.



NORMAN CHAN
ONLINE EDITOR

This year's Game Developers Conference felt decidedly low-key and left me unimpressed. The much-talked-about OnLive service, however, did capture my interest, especially after some hands-on time. I've already made bets with several skeptical colleagues who don't believe this kind of service is technically possible, let alone playable. We'll find out when OnLive launches its public beta this summer.



KATHERINE STEVENSON
DEPUTY EDITOR

Following advice we doled out in our "50 Things Every Geek Should Know" article in the April issue, I've been experimenting with all the manual options a DSLR camera offers and taking my digital photography skills to a new and exciting level. It's all in preparation for an upcoming trip I'm taking to Death Valley, where I hope to capture the nuances of the otherworldly landscape.

We tackle tough reader questions on...

▶ Home Wiring

▶ Capacity Storage

▶ FLAC Support

Wiring Your Home with Ethernet

Thanks for the excellent article on geek skills in the April issue ("50 Things Every PC Geek Should Know").

One of the skills mentioned is the ability to run Ethernet cable, which showed a picture of wires running through electrical cable mounts attached to wood. Having run cable for quite some time now, there are some better ways to keep this cable mounted.

For most buildings with wood, it's recommended you use drive nails, with zip ties if you need to fasten the cable to the drive nails. The drive nails allow you to run extra cable along the same path if you ever decide to add additional cable. Furthermore, this also makes it easier if one day you need to upgrade your cable (e.g., CAT5 to CAT6). If you need to replace any old cable, you can simply tie the old cable to the new cable and pull the new cable along the same path of the old cable.

I hope this information helps!

—Mark Harrer

Deputy Editor Katherine Stevenson responds:

Thanks for the tip, Mark. We welcome any advice that makes the task of wiring a home easier.

Gone but Not Forgotten

I just got my newest issue of *Maximum PC* and there's no

Rig of the Month in it! That's one of my favorite features in your mag. Please tell me why it's not in there and if for some unknown reason you're going to actually stop that feature.

—John

Editor in Chief Will Smith

Responds: We recently closed the book on the magazine's Rig of the Month department. We needed a large, high-profile spot for the return of a reinvigorated Best of the Best (a department that apparently has even more fans than ROTM). Space issues aside, we were also responding to the fact that the quality of ROTM submissions had been steadily declining over the last six months. We went from receiving three or more worthy rig contenders

each month to getting just a single "maybe." So, rather than let the section begin to suck, we retired it in its prime. That said, we've kept the submission email open (it's rig@maximumpc.com), and will continue to post the best submissions we receive online and in features in the magazine. This is just the end of the monthly column.

FLAC Support

I'm looking for a kick-ass MP3 player that also plays FLAC files. I've looked all over but am having a hard time finding one. I'm sure I'm not the only person that's looking for such a gadget, but every time I look in your Best of the Best section for such an animal, all I see are players that play every type of file except FLAC.

Am I wasting my time searching for a player that plays FLAC? If there are portable products out there that support FLAC, what are they?

—Craig Garcia

Editor at Large Michael Brown responds:

I'm a big FLAC fan, too. Although the files are large, there's just no comparison between music encoded with a lossless codec like FLAC and a lossy one like MP3. Although I haven't reviewed it for *Maximum PC*, I listen to Cowon's O2 digital media player when I'm on the go. It has 8GB of memory, a slick touch-screen display, and it sounds fabulous. I believe all the other players in Cowon's lineup also support FLAC. There have also

■ ■ ■ NOW ONLINE

The Beginner's Guide to Linux

There's no point in denying it, we know that you're at least a bit curious about running Linux on your home computer—we certainly are. After all, we did declare that this would be the year of the Linux desktop (The List, February 2009). So, to help get this prophecy rolling, we've posted a comprehensive beginner's guide to installing and running Linux, which you can find at <http://bit.ly/17eKX>.



been positive reviews for iRiver's LPlayer, which supports FLAC, too, although I don't have personal experience with it. Heck, even the iPod will play FLAC files—if you're willing to swap out its firmware for Rockbox.

MaximumPC.com for Kindle

I'm a longtime reader, but recently I had to stop my subscription to *Maximum PC* because I'm disabled and can no longer turn pages. I started using an Amazon Kindle 2 in order to be able to

order to display properly on the Kindle. That said, if sales of the web edition skyrocket, we'll definitely reconsider doing the work to make a Kindle edition of *Maximum PC* magazine happen.

Who's on Second?

Page 12 of your April 09 issue states that large numbers of Seagate Barracuda 7200.11 drives, including the 1.5 TB model, have failed due to faulty firmware. Page 96 of the same issue lists the Barracuda 1.5 TB as the Best of the Best. What drive do

and the 1.5TB Barracuda still offers the best price/capacity/performance ratio of any drive we've tested.

If the bad press surrounding the 7200.11 models is making you wary, however, there are other options. We're poised at the edge of a precipice here: In the next few months, we'll see plenty of contenders for the capacity crown, but for now, options are fairly limited. Samsung's three-platter 1.5TB drive hasn't shipped as of this writing, and Western Digital's 2TB Caviar Green is the only widely available 2TB drive. If capacity is more important to you than speed, the 2TB Caviar Green is your best bet for now. Alternatively, Seagate's newest generation Barracuda, the two-platter 7200.12 1TB, is the fastest terabyte drive we've ever tested, and seems to have none of the problems of the last generation.

People usually have strong preferences about hard drive brands, nearly always because of negative personal experiences with other brands. And *that's* where Seagate's recovery will be rough—fixing the problem was the easy part. Fixing the *perception* will be tricky. ☹

you consider second-best for capacity storage, and what reservations do you have about recommending it?

—Mark Coverson

Associate Editor Nathan Edwards responds:

While it's true there have been 7200.11 failures, the actual percentage of drives affected by faulty firmware issues is actually quite small. None of the drives we've personally tested or used have been affected,

IN THE NEXT FEW MONTHS WE'LL SEE PLENTY OF CONTENDERS FOR THE CAPACITY CROWN.

read easily again.

I was disappointed to find *Maximum PC* isn't available on the Kindle. Do you plan to be available on it in the future?

—Shaun Barnes

Editor in Chief Will Smith Responds:

We've already set the wheels in motion to get MaximumPC.com content on the Kindle store. We don't have any plans to release a Kindle edition of the magazine itself, though. Formatting our web content for the Kindle is relatively simple, but the magazine's a different story. Because we use a graphically intense design, it would require a significant amount of work in



CUTCOPYPASTE

In the May 09 issue a line was dropped from the "Maximum TV" story on page 24 about where to find right-angle SATA cables shorter than 18 inches. We found them at Newegg.com. Sorry for the mix-up



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

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BUDGET CPU

Phenom II X4 940



TTrue, AMD's Phenom II X4 940 now has more competition from Intel's Core 2 Quad lineup than it did last month, but the Phenom II X4 940's price-to-performance-to-clock-speed ratio still makes it our budget pick. This budget quad-core is built on AMD's new 45nm process, packs 2MB of L2, 6MB of L3, and has a maximum thermal rating of 125 watts. Of course, it features an integrated memory controller, too. At a mere \$225 street for a 3GHz quad core, the Phenom II gives you megabang for your buck. Considering the excellent assortment of low-cost AM2+ boards, we don't expect the Phenom II to be pressed hard at budget prices until Intel introduces lower-cost Core i7 parts. www.amd.com

THE REST OF THE BEST

■ **Extreme Processor**
Intel Core i7-965
Extreme Edition
www.intel.com

■ **LGA 1366 Motherboard**
MSI Eclipse SLI
www.msi.com

■ **Socket 775 Motherboard**
Asus Striker II Extreme
www.asus.com

■ **Socket AM2 Motherboard**
MSI K9A2 Platinum
www.msicomputer.com

■ **High-End Videocard**
Nvidia GeForce GTX 295
www.nvidia.com

■ **Low-End Videocard**
ATI Radeon 4870
www.ati.com

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7200.11 1.5TB
www.seagate.com

■ **Performance Storage**
Western Digital
VelociRaptor
www.wdc.com

■ **DVD Burner**
Samsung SH-S223
www.samsung.com

■ **Blu-ray Burner**
LG GBW-H20L
www.lge.com

■ **Monitor**
Gateway XHD3000
www.gateway.com

■ **Mid-Tower Case**
NZXT Tempest
www.nzxt.com

■ **Air Cooler**
Zalman CNPS 9900NT
www.zalman.com

■ **Gaming Mouse**
Logitech G9x Laser Mouse
www.logitech.com

■ **Keyboard**
Microsoft Natural
Keyboard 4000
www.microsoft.com

■ **Wi-Fi Router**
Linksys WRT600N
www.linksys.com

Games We're Playing

■ **Team Fortress 2**
www.teamfortress.com

■ **Fallout 3**
fallout.bethsoft.com

■ **Left 4 Dead**
www.l4d.com

■ **The Path**
[tale-of-tales.com/
ThePath/](http://tale-of-tales.com/ThePath/)

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