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MAXIMUM PC

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Nvidia: It's time to Kill CUDA

The first real 3D accelerator I owned was a 3dfx Voodoo card. This was back in 1995. DirectX and Direct3D had yet to be released to the public, and OpenGL was only used for CAD and scientific rendering apps. Developers wanting to harness the power of Voodoo's hardware had to write games with Glide, 3dfx's own application programming interface. At the time, Glide offered 3dfx a major competitive advantage to help 3dfx sell videocards: If a gamer wanted to see the kick-ass 3D effects in his favorite games, he had to play the game on 3dfx hardware—they were the only boards that accelerated Glide-only games.

The 3dfx/Glide domination ended when id Software and other game developers began releasing titles that used the OpenGL and Direct3D APIs, which didn't require 3dfx hardware (but worked with 3dfx chips through a Glide translation layer). OpenGL and Direct3D opened the door for other 3D chip companies to build competitive products, and thus ATI, S3, Matrox, and Nvidia entered the fray with hardware of their own.

With every new OpenGL or DirectX game released, Glide slowly became a liability for 3dfx. As competitors embraced new technologies and embarked on a period of incredibly rapid improvements, 3dfx remained tied to its Glide past, and, as a result, was slow to embrace new rendering enhancements, such as 32-bit color and antialiasing. Ultimately, this contributed to 3dfx's demise and allowed Nvidia and ATI to flourish.

Today Nvidia stands at a crossroads with two closed, proprietary APIs that have mainstream potential: the general-purpose computing CUDA API, and the PhysX physics-acceleration API, which sits on top of CUDA. These are both promising technologies, but only owners of Nvidia hardware can harness their power. Meanwhile, two emerging open standards mirror what Nvidia is doing with CUDA: OpenCL and Microsoft's general-purpose GPU computing API, which will ship with DirectX 11. A small number of consumer applications use GP-GPU computing today, but the applications for the tech are endless—grossly simplified, these APIs let graphics chips perform CPU-like functions. The question Nvidia needs to ask is simple: Will developers write their GP-GPU computing apps using a proprietary API that works on only a subset of PCs—those stuffed with Nvidia hardware—or will they use an open API that will work on every PC on the market?

Nvidia's path is clear: The GPU giant needs to stop trying to convince us that closed APIs are good and instead embrace OpenCL and Microsoft's solution. It needs to port PhysX to run on one of the open APIs, then use PhysX as a platform to advertise the kind of power that Nvidia delivers to owners of ATI and other GPUs.

By focusing on what it's always done well—building kick-ass hardware—instead of force-feeding us closed APIs, Nvidia will thrive. As for CUDA? It's served its purpose, but its time has passed. It's time to kill CUDA.

Will Smith

DING DONG!

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ZOMBIE TRANSFORMATION
http://tinyurl.com/zombiewill

4ID PC
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LETTERS POLICY Please send comments, questions, and smoked 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

A New Dawn for DRM?

Want to buy movies once and then play them on all your devices? So do we, and so does the DECE —WILL SMITH

Odds are you're carrying at least a couple devices that double as portable media players. We'd also bet that if you've spent any time at all trying to watch video on such a device—be it a cell phone, personal media player, smartphone, laptop, or pretty much anything that's not a DVD player—you've experienced compatibility problems. Right now, you need a thorough understanding of the codec, resolution, and container capabilities of all your devices in order to perform an advanced task like ripping a video for use on an alternate player or streaming content from your PC to, say, your Xbox 360 (by the way, we show you exactly how to do that on page 22).

If you're a savvy user, these issues can be mastered. But what about the other 90 percent of people? What about all the folks who buy DVDs and can't figure out how to convert them to an iPhone-friendly format? That's where the Digital Entertainment Content Ecosystem—DECE for short—comes in. DECE was formed in the summer of 2008 with the sole purpose of creating a standard that allows you to purchase a movie once and play it on all your devices. It sounds simple, but it's actually an incredibly complex problem, both politically and technically. We're excited because DECE says it's going to base its standard on the experience every customer should have instead of profit streams and rights management. "We want to give normal consumers the flexibility to stream content remotely, make copies of content on multiple devices, and even burn physical media," says Mitch Singer, DECE president.

The promise is this: You purchase a movie, whether it's a download to your PC, a DVD or Blu-ray disc, or something you buy on your cell phone. Then, based on that purchase, you unlock the ability to download the same content in different, but similar, formats for playback on all the other devices in your home. If you buy a DVD, you'll be able to download other standard-definition versions to stream to your living room as well as versions suitable for portable devices, like the PSP or iPhone. The unifying idea behind DECE is that buying digital content should be as simple as buying DVDs—you don't need to wonder whether the DVD you bought will work in your player, you know it'll just work.

With the participation of large movie studios such as Sony, Paramount, and NBC Universal, we're optimistic about DECE's plans to make digital content more flexible.

DECE is in the very early stages today. While the promise is exciting, the partner companies—including Microsoft, Intel, Paramount, NBC Universal, Comcast, Samsung, and HP, to name just a few—have barely begun to work on the technical nuts and bolts; the eventual format doesn't even have a name yet. While the DECE has widespread industry support, some heavy hitters are absent from the group, notably Apple. With a large user base shackled to the iTunes Store by hardware and DRM, Apple has a vested interest in maintaining the status quo. We'll keep you updated on DECE news as we hear more from the nascent organization.

FCC to Vote on Filter-Free Internet

Chairman removes porn provisions

Until recently, it seemed like the only way the Federal Communications Commission would act to expand U.S. broadband coverage was if a plan for free nationwide broadband access included filters for porn and other indecent content. Naturally, such provisions have been met with harsh criticism and questions of who would determine the parameters for filtering.

Now FCC Chairman Kevin Martin wants to remove that debate as a roadblock. He's presenting his four fellow FCC commissioners with a free wireless broadband plan that doesn't include any requirements for filtering in the hopes that it will jump-start plans to improve the country's lagging online penetration rate. As Martin said in an interview with tech blog Ars Technica, "A lot of public interest advocates have said they would support this but were concerned about the filter. Well, now… it no longer has the filter."

FCC Chair Kevin Martin wants to see more Americans online.

NATURALLY, SUCH PROVISIONS HAVE BEEN MET WITH HARSH CRITICISM.

The plan would have the FCC auctioning off a large chunk of the 2155-2180MHz band of the wireless spectrum, with the stipulation that the winner of the auction provides free Internet service to 95 percent of the American population within 10 years.

Martin needs the votes of only two of his FCC colleagues (in addition to his own) to move forward with the filter-free plan. **–KS**

GETTING THERE

Google Maps Adds YouTube, Officially

Now that Google has had a few months to work out any potential kinks in the system, Google Maps is officially offering YouTube integration. Once you choose to add the video layer from the More menu (the same one that'll get you to Wikipedia), you can check out any videos that have been geotagged! –AS

FAST FORWARD

AMD Parallels Nvidia

As I've noted before, when you're not playing action games, the killer GPU in your PC is basically a case heater. For the most part, it uselessly sucks power and radiates heat as you perform mundane computing tasks: web browsing, word processing, spreadsheet calculations, MP3 playback. GPUs are the most underutilized resource in PCs.

Finally, that's changing. AMD now bundles its ATI Stream parallel-processing software in the latest ATI Catalyst graphics drivers. As users download and install these free drivers, they automatically prep their systems to run ATI Stream programs that leverage the GPU as a massively parallel processor. Before, users had to download ATI Stream separately. AMD is following Nvidia, which began bundling its CUDA parallel-processing software with display drivers in 2007.

Although ATI Stream and CUDA are for programmers, anyone can use the application software written for these platforms. When you install and run an ATI Stream or CUDA application, it automatically executes on the x86 CPU and on the GPU, which does the heavy lifting. Most people won't notice anything different—except better performance.

Bundling these platforms with drivers helps solve the classic chicken-or-egg problem. Software developers hesitate to write programs for platforms lacking a large installed base, and users hesitate to adopt new platforms for which little software is available. AMD says its new drivers potentially expand the ATI Stream installed base to about two million PCs. Nvidia says 107 million systems can run CUDA, although the actual installed base is smaller.

Developers are heeding the call. The ATI Avivo Video Converter, free from AMD, transcodes digital video among several different formats. A transcoding job that requires three hours, 23 minutes on an Intel Core 2 Duo processor at 3.0GHz takes just 12 minutes with Avivo. Avivo is a preview of a new commercial product called PowerDirector 7 from CyberLink. For Nvidia GPUs, Elemental Technologies has a similar video transcoder called Badaboom. More apps are coming or are already here.

Parallel processing has been around since the dawn of computing but typically has been limited to expensive, specialized systems. Some experts doubted the technology would ever go mainstream. Nvidia and AMD are proving them wrong—using the processor you already have.

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

You Can't Spell Steam Without 'EA'

Electronic Arts has officially joined forces with its old competitor, Steam. Valve's popular digital game-distribution platform will now feature EA games such as Mass Effect, Warhammer Online, and Spore. Recent releases like Dead Space, Command & Conquer: Red Alert 3, and Mirror's Edge will also be available for download. With more than 15 million users and the participation of 20 different publishers, Steam is the undisputed king of the digital distribution market.

Gamers will be happy to know that Steam's influx of EA titles will be available for download without SecuROM DRM. This CD/DVD protection software has caused many games to either occasionally crash or not run at all on both Windows Vista and XP. Valve has confirmed that it will not be using third-party DRM, either. **–BH**

Twitter Gets Hacked

Twitter—social networking's latest wunderkind—lost face this month when a hacker compromised the accounts of some of the services most famous users, including Britney Spears, CNN anchor Rick Sanchez, and 31 others. The hack was noticed immediately when the celebs started making posts that were, to say the least, out of character. For instance, Sanchez's feed briefly read, "I am high on crack right now might not be coming into work today."

How'd the hacker do it? A Twitter employee with admin privileges used the password "happiness," which we're sure sums up what the hacker felt when he ran a simple dictionary attack and uncovered it. The moral of this story? Don't use a dumb password. **-AC**

Electronics VP Caught Stealing

If you're doing something illegal involving millions of dollars in embezzled funds, don't leave the incriminating details lying on your desk unattended. Such a slipup might have caused the downfall of Ausaf Umar Siddiqui, a vice president at Fry's Electronics, who stands accused of embezzling more than $65 million after another Fry's executive discovered a suspicious spreadsheet on Siddiqui's desk.

The coworker turned the spreadsheet over to authorities and now the IRS is accusing Siddiqui of cutting deals with some of Fry's largest suppliers. Siddiqui allegedly bought goods at higher prices in exchange for kickbacks of up to 31 percent of the total sales prices. These kickbacks where funneled into a company Siddiqui set up called PC International, the IRS claims. Siddiqui was arrested at Fry's headquarters on nine counts of wire fraud and money laundering. **–PL**

GAME THEORY

Patent Trolls

So, did you know that Worlds.com invented massively multiplayer gaming and has a pair of patents to prove it?

It came as complete news to me, even though I wrote a column on massively multiplayer gaming back when the genre was just beginning. Apparently, Worlds.com created some kind of branded virtual spaces that used avatars and scalable chat, got somebody in the U.S. Patent and Trademark Office to rubber stamp its nonsense applications, and now is going to sue the entire MMORPG industry into submission, starting with NCSoft, possibly because it has less frightening lawyers than Blizzard.

Just for maximum irritation, Worlds.com filed its claims on December 24. Merry Christmas to you, too!

The relevant portion of its patent reads, to gamers, like a patent for eating. ("A method for intaking nutrients whereby the user opens the user's mouth," etc....) It goes like this:

"A method for enabling a plurality of users to interact in a virtual space, wherein each user has a computer associated therewith, wherein each computer has a client process associated therewith, wherein each client process has an avatar associated therewith, and wherein each client process is in communication with a server process."

Did you catch that? Worlds.com invented the *idea* of connecting computers for online gaming and giving each player a graphical avatar.

This must be news to Steve Colley. Back in 1973, he and some other young programmers interning at NASA created MazeWar, arguably the first "first-person shooter." Not only did you navigate a maze, but each player was represented by an avatar (an eyeball), people could shoot each other, and the whole thing was networked, complete with online chat!

But MazeWar wasn't Colley's work alone. Others had inspired him, and subsequent people built on his work, drawing on the potential of new technology to forge the entire gaming industry. No one person or company can claim ownership of these ideas.

In 1994, Compton's attempted to exercise patent rights it had secured for its CD-ROM encyclopedia, claiming it covered any method of retrieving data from a disc. The company didn't get far before its patent was invalidated. If that doesn't happen, and if Worlds.com can get a precedent, the MMO industry will be its piggy bank.

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

The G1 can now operate on any GSM network.

Google's G1 Opens Up

At launch, the Google G1 was available through only one service provider, T-Mobile. Now, however, you can use the GSM network of your choice—without having to jailbreak your G1 handset. Google is hoping to spur app development for Android, its mobile OS, by making unlocked handsets available to developers who don't want to sign up for T-Mobile service. The good news is that anyone can register as a developer at the Google Marketplace. The bad news is that there's a fee of $25 to register and you'll have to spend $400 on the handset rather than the T-Mobile subsidized price of $180. –TE

Search or Be Searched

Google, Yahoo diverge in approach to user data

With the recent launch of SearchWiki, Google is looking to change the future of searching the web by personalizing searches. Unfortunately, such technology will require access to users' personal data, which can be a security risk. One leading search engine is looking to change that.

Yahoo has introduced a new global data retention policy that will anonymize users' search-log data within 90 days. However, the policy states that there will be specific and limited exceptions to the policy in order to protect users and business partners. This means data can be retained for up to six months in certain cases.–BH

Comcast at the Throttle

After placing a 250GB bandwidth cap on its broadband customers back in October 2008, Comcast is at it again. This time, traffic throttling is the name of the game. Yes, Comcast was already in the business of throttling, but the company's practice of targeting specific types of data, namely torrent packets, didn't go over very well. So now the company is shifting its focus to monitoring the amount of traffic generated by users rather than the type of data that's being downloaded.

Throttling will take place when a user's up- or downstream throughput reaches 70 percent of the outlined bandwidth and will result in a lowered traffic priority. This means your traffic will be delayed, or even dropped, if you're a bandwidth hog.

Don't forget that the 250GB bandwidth cap is still in effect. Your total bandwidth usage is the monthly accumulation of both your upstream and downstream traffic. Comcast is currently working on a bandwidth usage meter so users can keep apprised of their allotment, but no public releases have been made available yet. –BH

BYTE RIGHTS

QUINN NORTON

Texas Messes with Innovation

Since childhood, I've bitterly wondered why I don't have a jet car, or my own robot assistant and constant companion. I would call it Sally, and Sally would keep me organized and help me fight crime at night.

Part of the reason my future has failed me is abuse of the patent system, the part of IP that protects and fosters technological innovation. You can't copyright an idea, but patents give you a limited time to develop and grow an idea yourself. However, the patent system hasn't changed much in 300 years, leaving it flawed and exploitable. Nobody exploits the system better than patent trolls.

Trolls don't make things, they don't create jobs, they just buy up patents (often at bankruptcy auctions) and look for targets to sue, usually filing the suit in Texas.

Now I have to mess with Texas here, or at least a little place I like to call the U.S. District Court, Eastern District of Texas, located in the small town of Marshall.

Marshall is traditional and has a profound and unsubtle respect for property rights. Marshallites seem to take a "Trespassers will be shot" approach to intellectual property, making it patent troll heaven.

It's even got a curmudgeonly old judge with no time for nonsense like comprehensive documentation or detailed oral arguments. Judge T. Ward confesses that his court is "plaintiff friendly"—drawing lawsuit filings from everywhere. The court tends to deny all motions to move cases elsewhere, making Marshall a sucking bog of litigation. Cases rarely reach trial. Defendants see the odds, do the math, and settle. In an age when tech is losing jobs and resources, it's depressing.

But there's a glimmer of hope. In a recent case concerning a Michigan company and an Ohio company, the U.S. Court of Appeals for the Federal Circuit ruled that Judge Ward and Texas had no business with the case and moved it to Ohio. This is the second time such a ruling has been made, and it's beginning to look like cases might get out of Marshall and into more fair venues. You hear that technologists? I'll have my jet car in red and my robot programmed with crime-fighting ninjutsu.

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

THE LIST

10 Websites We Check Every Day

10 GAWKER MEDIA

If *Gossip Girl* doesn't supply you with enough tawdry tidbits, hit Gawker for the latest in public-figure bad behavior. www.gawker.com

9 NEWEGG

The Egg never disappoints when it comes to fulfilling our hardware needs. www.newegg.com

8 HYPE MACHINE

OUR FAVORITE SITE FOR DISCOVERING NEW MUSIC. www.hypem.com

7 SLASHDOT

IT'S LIKE THE MORNING PAPER FOR NERDS. www.slashdot.org

6 GOOD-TUTORIALS

This massive database of tutorials has enough information to keep you busy until the next presidential election. www.good-tutorials.com

5 HULU

Paying for TV is for suckers. www.hulu.com

4 MAPJACK

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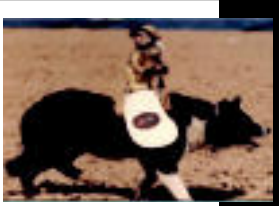

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DEATHMATCH

Netflix Player vs. Blockbuster OnDemand

Netflix and Blockbuster have been at each other's throats in an epic battle to dominate the video-rental market, so no one was surprised when Blockbuster announced plans to offer an Internet-based video-download service.

While you can stream Netflix videos directly to your PC, Roku's Netflix Player ($100) lets you stream them straight to your television. Blockbuster, recognizing that most consumers don't have PCs in their entertainment centers, tapped 2Wire's MediaPoint Player set-top box to do the same for its Blockbuster OnDemand service. The MediaPoint also sells for $100, but Blockbuster—for an undetermined amount time—is offering the device for free if you purchase 25 movie rentals in advance for $99.

So who's got the better product and service? Let's throw these two in the cage and find out! —MICHAEL BROWN

BLOCKBUSTER ONDEMAND MEDIAPOINT PLAYER
$100, www.blockbuster.com

ROUND 1

PRICING

The Roku box costs $100; the MediaPoint is ostensibly free. It's hard to compete with free, but we need to consider more than the price of the hardware. Netflix's least-expensive subscription plan that includes unlimited streaming is $9 per month, but since this limits you to having just one DVD checked out at any given time, most people move up to the $17-per-month plan, which allows you to have three DVDs at a time.

With Netflix's service, you can stream as much video as you'd like at no additional cost. Each video you stream from Blockbuster's OnDemand service costs $2 to $4, but there's no monthly subscription fee. If you watch movies only occasionally, Blockbuster's service is more cost efficient; if you're a movie fiend, Netflix has the better deal.

WINNER: TIE

ROUND 2

CONTENT

We must limit our comparison here to the movies, TV episodes, and other video content that both services offer online. Blockbuster offers much newer movies than Netflix, but licensing restrictions typically force the company to delay renting new movies online until after they've been released on DVD. Christopher Nolan's *The Dark Knight*, for instance, was released on DVD and Blu-ray on December 9, but it wasn't available on Blockbuster OnDemand until December 27.

It's anyone's guess when *The Dark Knight* will be available on Netflix's streaming service, but Netflix was offering hundreds of movies and TV episodes at no additional cost that couldn't be downloaded from Blockbuster OnDemand at any price.

WINNER: ROKU NETFLIX PLAYER

ROUND 3

IMAGE AND SOUND QUALITY

The Roku Netflix Player and Blockbuster OnDemand MediaPoint Player are both equipped with a full complement of analog and digital video and audio outputs (HDMI; S/PDIF; stereo RCA; and composite, component, and S-video), but Netflix and Blockbuster both also bring aggressive compression algorithms to bear in an effort to reduce online bandwidth consumption.

Netflix recently announced the availability of HD content, but the service was offering just 300 of its 12,000 titles in this format at press time—and none of them were movies. Blockbuster wasn't offering any content in HD while we were testing the service, but it plans to offer such content down the road. Based on what was available during our testing, the video quality of Blockbuster's standard-definition video looked far better than what Netflix had to offer.

WINNER: BLOCKBUSTER ONDEMAND MEDIAPOINT PLAYER

ROUND 4

BROWSING AND SELECTION EXPERIENCE

It might sound odd coming from the editors of *Maximum PC*, but our biggest complaint about the Netflix experience on the Roku box is that we have to use a PC to browse Netflix's collection and add movies to our Watch Instantly queue. With Blockbuster's MediaPoint Player, you can sit on your couch, browse through what's available, make a selection, and start watching.

With the Roku Netflix Player, you can only browse the titles that you've previously added to your queue—using your PC. The experience would be so much better if you could browse everything that's available at the moment you're ready to watch something.

WINNER: BLOCKBUSTER ONDEMAND MEDIAPOINT PLAYER

ROUND 5

NETWORK CONNECTIVITY

Both the Roku Netflix Player and the Blockbuster OnDemand MediaPoint Player connect to a network through either a wireless connection or hard-wired Ethernet. But we couldn't coax either device to connect to our wireless network while it was tucked inside the entertainment center in our test environment. The fact that neither device has external antennas that can be oriented for best reception likely contributed to this problem. Fortunately, we have plenty of hard-wired Ethernet ports in the entertainment center, so that's how we proceeded with our tests.

2Wire built two USB ports and a Compact Flash media reader into its MediaPoint Player, but they're all disabled in Blockbuster's configuration. Given that both services anticipate offering high-definition video in the near future, it's disappointing that neither manufacturer offers an 802.11n Wi-Fi chipset; in this round, they're both losers.

WINNER: TIE

ROKU NETFLIX PLAYER
$100, www.roku.com

And the Winner Is...

Blockbuster's OnDemand MediaPoint Player wins two rounds and ties Roku's Netflix Player in two others, leaving the Roku box a winner in just one category. So how can we decree the Roku Netflix Player to be the winner of this Deathmatch? We can't evaluate these boxes without considering the services they're designed to deliver, and since the "content is king" mantra is as valid as ever, the Roku Netflix Player and the Netflix streaming service carry the day.

As much as we like the MediaPoint Player's ability to download and temporarily store videos (there's enough room for about eight feature-length movies), Blockbuster's on-demand library is pathetically thin. But even if Blockbuster beefs up its offerings (we don't doubt that it will), it'll still have a tough time competing with not only Netflix's free service, but also Vudu's fee-based rental service, which delivers far superior resolution, a better browser, and a deeper library.

Our consumer advocate investigates...

Where's Magic ISO?
Dragon NS
Memory Overclocking

No Key for You!

In September, I purchased Magic ISO from www.magiciso.com. I received a confirmation reply with a link to download a temporary license registration key and was promised a real license key in a forthcoming email.

I still haven't received the real license key. I have emailed the company twice but haven't received a reply. Can you please help me get my key?

—Joon Park

As the song says, "The lights are on, but nobody's home…." The Dog has tried to contact Magic ISO for several months, with no luck. With no response from Magic ISO, the Dog contacted SWREG, the order-processing company that Magic ISO's website links to. But SWREG couldn't locate any order information processed under Joon's name or an order number, nor would its reps comment on the company's relationship with Magic ISO. So what gives? Who knows. Magic ISO is registered out of Shanghai; since it's not based in the United States, your best bet is to ask your credit company to reverse the charges on your purchase. The greatest damage you can do to Magic ISO is vent your problem in this space. The Dog is warning all his readers to steer clear of this company. Woof.

One reader says Magic ISO has neglected to send him a key for software he purchased.

New Mobo, New App?

I use Dragon Naturally Speaking, and it's a great tool, especially for those of us with certain limitations. In fact, I'm a repeat customer of the product. Everything was fine until I needed to repair my computer. Having an older system, I couldn't locate identical replacement parts. I installed a new motherboard, which led to a new CPU and videocard, too. Everything else is the same: same hard drives, same soundcard, same everything, right down to the dust in the case, making it the "same" computer.

After the repairs, everything worked fine, except for Dragon Naturally Speaking. It mysteriously said that I needed a secret code to unlock the program. I contacted Nuance (the makers of Dragon) and spoke to customer support, detailing my repair, while informing them that I am still the one and only user on the very same computer (plus repairs). The support person responded by telling me I had to pay for an unlocking code. I emailed back and stated that this couldn't be right as, again, it's still being used by only me, the purchaser of the product. The company didn't respond. I contacted the BBB, and, you guessed it, Nuance never bothered to respond to them, either.

A misinformed customer service rep errantly told a reader he needed to repurchase Dragon after a new motherboard install.

I do not consider myself handicapped, but I do have, let's call them "issues" that make typing not only difficult but painful, too. I suspect that a very large base of Nuance's customers also have issues. That makes me wonder how the company can just turn its back on us.

—Douglas

While Microsoft may tie OEM versions of its software to a particular motherboard, the Dog has not heard of any vendors doing this with retail software. Is it true that Dragon Naturally Speaking requires a new purchase if a new motherboard or CPU is installed?

Absolutely not, said a company spokesperson when contacted by the Dog. The spokesperson said some crossed wires occurred between customer service and technical support. She went on to say, "Douglas contacted our customer service regarding this problem and was told to contact technical support. However, our customer service agent should have pointed Douglas to an article on our Knowledge Base that explains the problem and how to fix it. This was a breakdown on our end, and I sincerely apologize that Douglas was not given the right information when he called. He definitely would not have been charged. Thank you again for bringing this to our attention and for giving us the opportunity to set this situation right."

The Nuance spokesperson said a tech would call Douglas and walk him through the procedure. The Dog later spoke with Doug, who said that Nuance had contacted him and he was up and running again.

My RAM Won't Overclock

Let me first say that I am extremely happy with the quality, durability, and customer support from Kingston. I do have one complaint, however, that I have not solved through several emails and calls with the company. I have always searched a manufacturer's website to verify mother-

You'll usually have to go into the BIOS to fully utilize your overclocked RAM.

board and memory compatibility prior to making a purchase. So when I purchased Kingston HyperX 1066 (KHX8500D2K4/4GR) modules for my Gigabyte EX38-DS4 board, I assumed they would run at the right speed right out of box. But the RAM defaulted to DDR2/800 and had to be manually set in the BIOS to run at the advertised speed. Kingston explained that all DDR2 caps out at 800MHz and anything above that is only achieved through overclocking of the memory. The company also said that the onboard SPD chip was set and guaranteed to run at 800MHz for optimal performance. I may be way off here, but if you label a product as 1,066, 800, 667, etc., and it's labeled HyperX, then that's what it should run at without any changes to the BIOS settings.

Am I wrong here or is this false advertisement? Please tell me if I am wrong and why; if I'm correct, please let all your readers know about this so they can make an informed purchase.

—Kenneth J. Thayer

The Dog is actually a little surprised that someone hasn't sued memory manufacturers over their memory clock ratings. Not because they deserve to be sued, but because this is one of those cases in which it would be very easy to convince a judge or jury that what is acceptable industry practice to tech companies and common knowledge to geeks doesn't always make any sense to layfolks. For precedent, you could look at the successful class action suits brought against hard drive manufacturers over the definition of a gigabyte. In this case, your Kingston HyperX 1,066 DDR2 is indeed rated to run at 1,066MHz data rates; it just won't tell your board to do so.

Here's how it breaks down: Modern RAM contains a serial presence detect (SPD) chip that tells the motherboard what kind of RAM it is and what to set the RAM timings and clocks at. All major RAM vendors follow the RAM council's guidelines on programming these SPDs. Since the council, called JEDEC, has not ever approved DDR2 speeds beyond 800MHz, most RAM vendors program the SPDs to JEDEC standards. Kingston is correct, anything beyond 800MHz is technically overclocking since JEDEC won't bless the speeds. Never mind that the actual chips could run at, say, 1,333MHz—there's no official standard, so no one is willing to program the SPDs to default to those speeds.

To actually hit the speeds the modules are rated for, you will, indeed, have to go into the BIOS and manually set the speed to 1,066MHz, the timing to 5-5-5-18, and the voltage to 2.2 volts (JEDEC-spec'd voltage for DDR2 is 1.8 volts).

Why doesn't JEDEC just sanction higher speeds? The JEDEC body (as it pertains to PCs anyway) blesses specs for RAM that is used in hundreds of millions of computers sold every year. You can bet that the overwhelming majority of those users aren't going to run nor need overclocked RAM. It would be like asking the National Highway Traffic Safety Administration to also test and rate cars on how well they drive at 200 mph on the freeway, or how well they can drift race. JEDEC is a body that is lucky just to get the different manufactures in the same room without a fistfight breaking out. Worrying about overclockers is not a priority.

There have been attempts to create an official spec for overclockers. Nvidia tried to do this with its Enhanced Performance Profiles for DDR2 and EPP 2.0 for DDR3 (also known as SLI memory). These profiles created alternative setups in the SPD for the BIOS on boards to recognize how to treat the RAM. Intel also got into the game with its eXtreme Memory Profiles (XMP) for DDR3 RAM. With Nvidia's influence in chipsets waning, Intel seems to be the default winner with XMP. Fortunately, squabbling seems to be at a minimum and XMP even works in some AMD-based motherboards.

Neither standard has or likely ever will get JEDEC blessing, however, so you still need to go into the BIOS with EPP and XMP, but you can accomplish your RAM overclocking in a single step rather than several.

THE GREATEST DAMAGE YOU CAN DO TO MAGIC ISO IS VENT YOUR PROBLEM IN THIS SPACE.

EMAIL THE WATCHDOG If you feel you've gotten a raw deal and need assistance setting a vendor straight, email the Dog at watchdog@maximumpc.com. Please include a detailed explanation of your problem as well as any correspondence you have sent concerning the issue.

RIP YOUR MOVIE DVDs & WATCH THEM ANYWHERE

BY WILL SMITH

It's easy to copy and convert your movies to any format—be it for streaming, watching on the go, or maintaining an archival backup of your movie collection. We'll show you how.

We've become so accustomed to the ease and convenience of iTunes and blink-and-you-miss-'em CD rips that we forget how in the mid-1990s, ripping a CD was a time-consuming process fraught with peril. Shoot, ripping a single disc to a 128Kbps MP3 could take eight hours on a 200MHz Pentium! Fast forward a decade and faster hardware and better software have made CD ripping so mainstream your mom does it.

Now, ripping DVDs is our great challenge. Copying and transcoding the disc's video into more efficient formats involves math an order of magnitude scarier than what's required to rip audio CDs. A machine that will rip the latest Miley Cyrus CD in mere moments could take hours to extract and convert your copy of *Alien vs. Predator* to an iPod-friendly format. But with the right software, a quad-core-equipped PC, and a little know-how, you can cut your disc-rip time from hours to 30 minutes. Plenty of tricks and traps still await first-time rippers, but we'll show you the basics and then walk you through some of the most valuable power-user ripping secrets.

Your first decision is simple: What player are you ripping your discs for? Are you ripping for a portable player, like the PSP or iPhone? Would you rather stream to a device in your living room, like the Xbox 360, PS3, or Popcorn Hour? Or are you simply interested in making archival-quality DVD rips in case you lose your collection? More likely, you're looking for a combination of all three of these things. We'll show you how to rip your DVD to a file suitable for streaming that consumes a fraction of the disk space of a DVD but maintains full video and audio quality. Then you can take that file and convert it for whatever other devices you might have, like a PSP or an iPod.

With the preliminaries out of the way, let's get started.

PHOTOGRAPHY BY SAMANTHA BERG

part 1

RIPPING YOUR DVDS

With the right software, hardware, and understanding of the issues, you can free video from a movie disc to be used any way you choose

WHAT YOU NEED

- Modern PC w/DVD-ROM drive
- AnyDVD ($53, www.Slysoft.com) or
- DVD43 (free, www.dvd43.com)
- Handbrake (free, http://handbrake.fr/)

COMPATIBILITY ISSUES

Several different factors determine the compatibility of your ripped video files. The resolution of the video, the video and audio codecs, the container format used, and even more esoteric things like frame rate can affect whether your video will work on your device of choice. If you just rip discs as you need the content and then delete files afterward, simply rip to the target of choice. However, if you want to build an archive of ripped movies, we recommend that you use open, widely supported codecs and containers at the native resolution of the DVD and then transcode the files to lower resolutions and bitrates as you need them. Naturally, we'll show you how to do this.

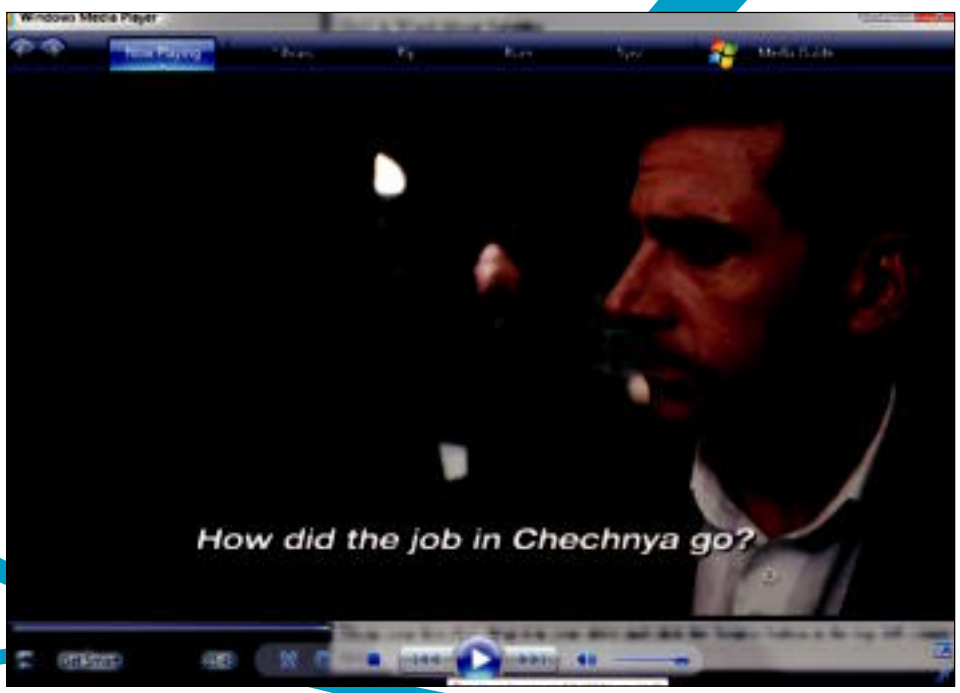
Your player selection also impacts your choices when it comes to audio tracks and subtitle support. While the most common container formats, MP4 and MKV, support multiple track and subtitle streams in one file, few players will work with multiple audio tracks, and an even smaller subset will work with subtitles. That means you need to rip a single audio track—typically the main movie's English soundtrack—and burn the subtitles into the video, rather than leave them as separate streams inside the container.

We recommend ripping to the MP4 container; it's widely supported on both streaming devices and portables. Furthermore, the tools for manipulating the streams within the file are established and easy to use, which makes it easy to transcode your video to a less-supported format for a specific player.

A WORD ABOUT SUBTITLES

Typically, DVDs include multiple subtitle streams that serve different purposes. Nearly every DVD has some English subtitles, even non-foreign-language movies. Most also include closed captions, which are distinct from straight subtitles. Subtitles are simply the dialogue from the movie written across the bottom of the screen. Closed captions include subtitles, but they also include audio cues that help people with impaired hearing enjoy the movie fully.

Often, English-language movies use forced subtitles to show what a character speaking a



English-language movies and TV shows sometimes contain subtitles to translate the speech of non-English-speaking characters.

foreign language is saying. On some discs, these subtitles will be hidden in a separate stream, while in others, they'll be mixed in with the subtitles but marked so that the DVD player only shows the proper captions. Regardless, it's crucial that you get the proper subtitles for all the films you rip. Otherwise, you'll never know what Jabba or Greedo are saying in *Star Wars*, and watching a long expository scene in another language without the benefit of subtitles sucks.

In practice, the first English subtitle track is typically the one that includes subtitles, forced or otherwise, while the second subtitle track is the one that includes closed captions.

BYPASSING COPY PROTECTION

The first thing you'll need to do when ripping a movie DVD is remove the copy protection. Most discs use a variant of the Content Scrambling System (CSS), but many also use other techniques to make it more difficult to extract the video from the disc. Although DVD-ripping apps like HandBrake and AutoMKV can bypass copy protection, they aren't updated as frequently and aren't as successful at defeating new copy protection schemes as utilities that are dedicated to stripping copy protection, such as AnyDVD and DVD43.

Both of these utilities do a fine job, although AnyDVD justifies its high price by bypassing new forms of encryption almost immediately after they appear. Both of these apps serve as on-the-fly disc decrypters, stripping copy protection before your ripping utility or playback software even knows the disc is present. Want to rip an encrypted disc's contents to your hard drive? It's as easy as copying the contents of the disc's VIDEO_TS file to your hard drive once you've installed AnyDVD or DVD43. Regardless, before we continue, you should install one of these apps. AnyDVD is free to try for 30 days, while DVD43 is always free.

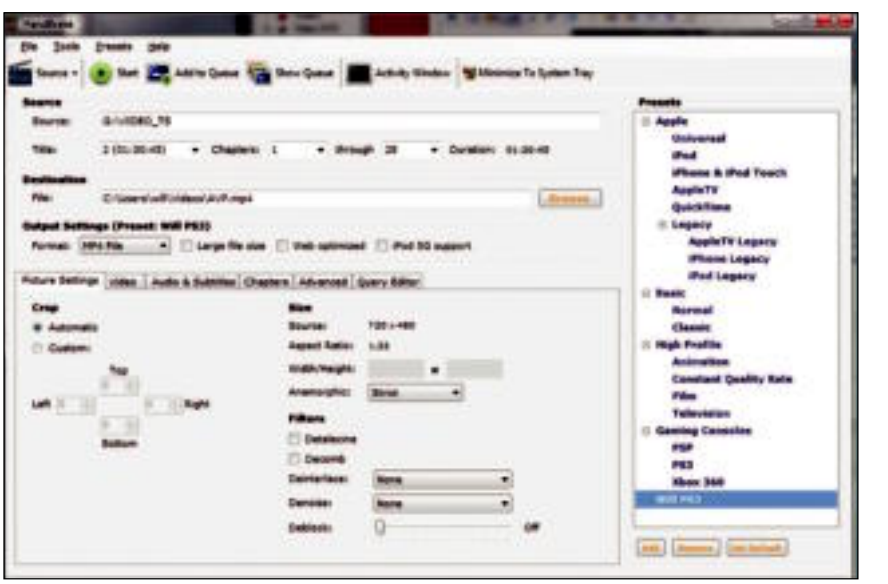
RIPPING YOUR FIRST DISC

For simple, high-quality rips of any kind of content for any type of device, it's tough to beat HandBrake. We like HandBrake for a few reasons: Its built-in presets make it very easy for anyone to use, it does a good job of detecting the proper video, audio, and subtitle selections, and it has never failed to successfully rip a DVD—and we've ripped hundreds of discs.

To rip your first disc, drop it in your DVD drive and click the Source button in the top-left corner of the HandBrake window. Unless you have multiple optical drives, the disc in your DVD drive should be one of the listed Source options. If it's not, select the folder option and navigate to your optical drive. HandBrake will take a minute or two to scan the contents of your disc and will do its best to determine the appropriate titles and chapters on the disc. HandBrake is generally spot-on for movie DVDs, although you'll probably need to manually select the proper chapters and titles for discs that contain TV shows (see sidebar on page 26).

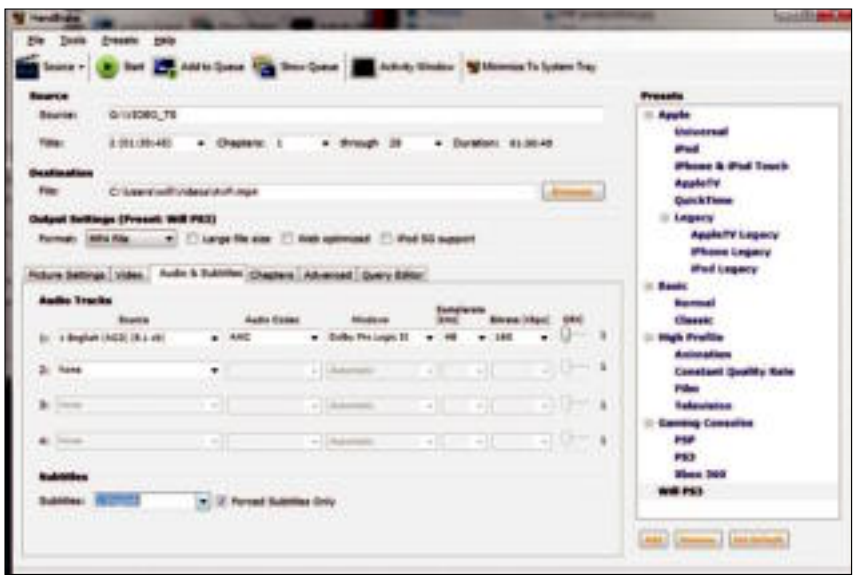
After HandBrake has familiarized itself with your disc, you need to select the proper output preset. For streaming to or playback on most Apple devices, the Apple Universal preset is terrific. It looks great and works well on the iPhone, newer iPod Classics, and the AppleTV. For streaming to the PS3, Xbox 360, or pretty much anything else, we typically recommend a modified PS3 preset. The PS3 preset uses the H.264 video codec in an MP4 container to encode your disc's video at its native resolution using a variable bitrate that's also compatible with the Xbox 360. It automatically downmixes

AnyDVD automatically removes encryption from a movie disc, so you can copy the contents.



HandBrake makes it easy to select ripping and transcoding options that are just right for your purposes.

your disc's 5.1 audio to a 2.0 Dolby ProLogic II stream. Load the default PS3 preset and then enable both the two-pass encode and the turbo first-pass options. Both the Apple Universal and the modified PS3 preset are appropriate for archival purposes.



The Audio & Subtitles tab reveals the tracks that are available to you.

Next, flip to the Audio & Subtitles tab and ensure that the proper subtitle and audio selections are checked. If the movie includes some subtitles, you should select the first English subtitle track and check the Forced Subtitles Only box. If you're not sure, it's best to go ahead and check the Forced Subtitles Only box. Don't worry, if the disc is mastered properly and doesn't have subtitles, it won't affect your rip at all. Once you're happy with your settings, you can press the + button in the preset window to save your profile (we recommend giving it a different default name than the others). Unfortunately, caption settings aren't saved in presets, so you have to manually set them each time you rip another disc.

Before you can start the encode, you need to tell HandBrake where to save the finished rip and what to call it. You can save the resulting file anywhere on your hard drive. Once you've done that, press the Start button to begin the encode. Depending on the number of cores you have and the speed of your processor, encoding can take anywhere from 40 minutes to several hours.

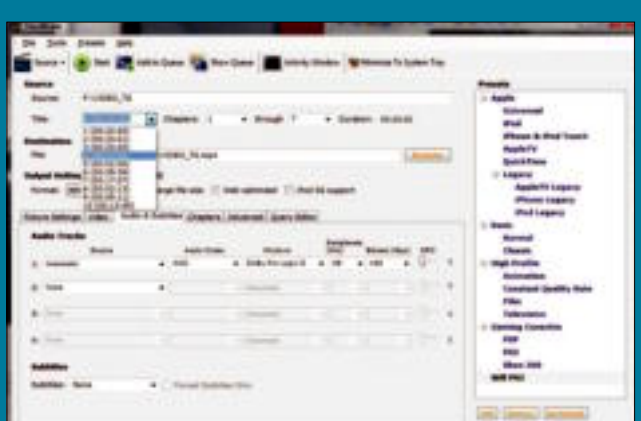
RIPPING MULTIPLE DVDS AT ONCE

Because the transcoding process takes a lot of time and monopolizes your CPU, it's helpful to queue up several discs to be transcoded at a

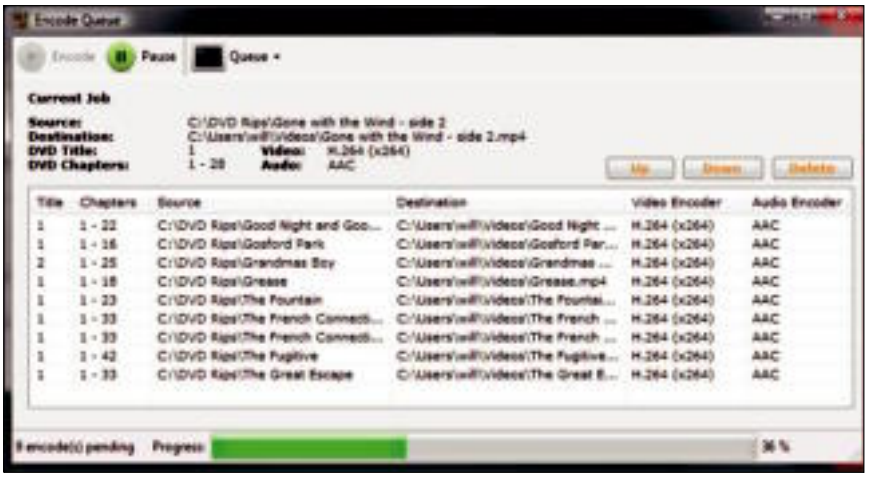
BYE-BYE, BOOB TUBE

Ripping TV Show DVDs

Ripping TV shows is trickier than ripping a single large movie, but it's similar to the procedure we outlined for queuing multiple discs. Different studios use different techniques for organizing chapters, but the basic idea is the same. First, load your DVD in HandBrake; then find the individual episodes in HandBrake's Source section. The easiest way to find episodes is to look at the playtime for each title within the Video_TS folder. Typically, 30-minute TV shows are around 23 minutes long and hour-long shows are about 46 minutes, you can disregard anything that doesn't seem the correct length, unless your disc has double episodes or pilots. Once your settings are right and you've found your titles, you can add each individual episode to the queue. Make sure you assign each episode a unique name, or HandBrake will overwrite the old episodes as you rip new ones. After the episodes have been ripped, you'll need to make sure that each one is properly named; frequently, the first title on the disc isn't the first one that's listed in the menu.



You can determine which files are actual TV episodes by looking at the playtime.



We load up a bunch of video files to HandBrake's queue and let the utility transcode the whole lot of them while we sleep.

time when you're not using your PC. You can do this by copying the full DVDs to your hard disk and then queuing several movies in HandBrake to transcode one after the other.

If you're using AnyDVD, you can start the DVD ripping tool by right-clicking the tray icon and selecting Rip Video DVD to Harddisk. Tell the app where to save the disc's contents and click Copy. You can do this for as many discs as you have hard disk space to hold. Then open HandBrake and click the Source button. Point the app to the folder that you copied your discs to and select the first one. Instead of selecting Start after you've selected the proper profile and tweaked your audio and subtitle settings, click Add to Queue. Repeat this for each disc you've copied to your hard drive and press Encode when you're ready to start transcoding.

part 2

WATCHING YOUR RIPPED MOVIES

Now that you've got all your DVDs ripped and archived, your options for enjoying them are plentiful

CONVERTING YOUR RIPS FOR A PORTABLE PLAYER

So, now you have your DVDs ripped, but you want to convert them for use on your portable devices. Mainly, that means converting to a lower resolution, but it can also mean using less-intensive settings for the H.264 codec or removing support for features like subtitles and chapters. Luckily, HandBrake is more than just a ripper and can also convert video for playback on many common portable players.

The process is simple. Open HandBrake and set the source to File. Browse to the file you want to transcode and then select the preset that matches your hardware. If you want to use hardware that isn't supported with HandBrake, you have a couple of options. You can load the PSP preset and hope that the least common denominator works, or you can hit Google and look for a preset that other people have used successfully with your hardware. Once you're happy with your settings, hit Start and wait.

The current Windows build of HandBrake has a bug that prevents transcoding of the files we're recommending people use. However, by the time you read this, there should be a new version that fixes the problem.

HandBrake makes it easy to convert video to resolutions and codecs suitable for playback on most devices.

STREAMING YOUR RIPPED MOVIES TO YOUR XBOX 360 OR PLAYSTATION 3

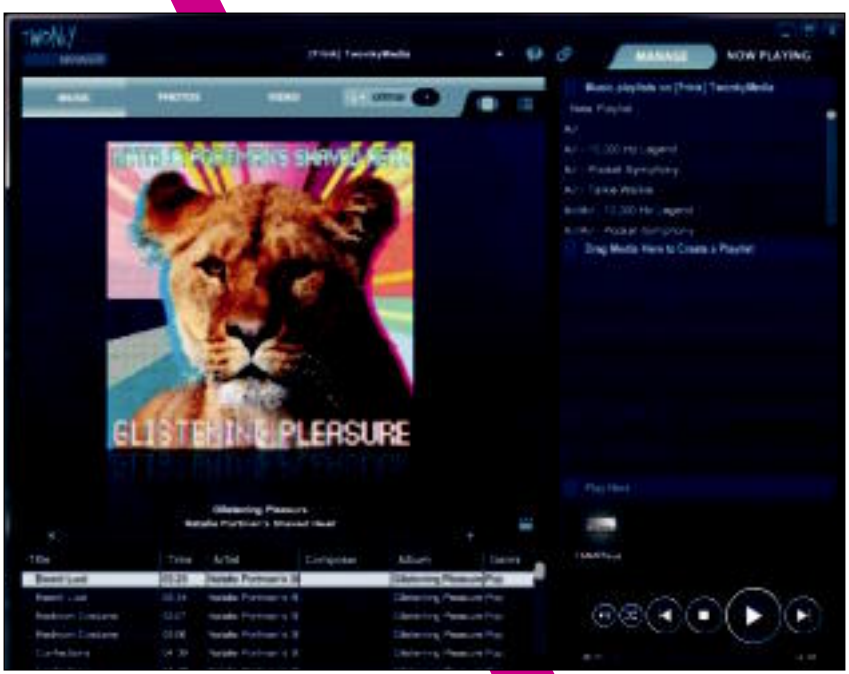
Once you have your DVDs ripped and archived on your PC you can not only watch them there, but also stream any of those movies across your network for playback on any number of devices. All you need is a supported network-connected game console, a DVR, or even a

WHAT YOU NEED

- An always-on PC
- A network-connected Xbox 360 or PlayStation 3
- TwonkyMedia Manager ($40, free 30-day trial, www.twonkymedia.com)

UPNP- or DLAN-enabled TV and you can get streaming. Wired connections are preferred—802.11n should provide enough bandwidth for most video, but 802.11g is probably insufficient. We'll get you streaming to two common streaming devices—the Xbox 360 and the PlayStation 3. Luckily, the software we recommend, TwonkyMedia, works with pretty much every streaming device we've tested.

Before you can stream your media, you need to tell Twonky where it is.



Twonky can stream more than just video—it also knows how to stream music and photos.

First, you'll need to install TwonkyMedia on a PC that will be on 24/7 (or whenever you might want to watch a movie). When the installer finishes, it should open TwonkyMedia Manager, which is the app you'll use to configure the server. In Manager, make sure the proper server is selected in the top drop-down menu; then click the Settings icon to the right (it looks like a pair of gears). In the Content Paths section at the bottom of the screen, you'll need to point TwonkyMedia to the folders that contain the video, music, and pictures you want to stream.

If your content is on a network share, you'll need to either map a network drive to that share or change the account the TwonkyServer service uses to one with permission to use the network. Mapping a network drive is simple: In Windows, browse to your file server, right-click on the share you want mapped, click Map Network Drive, assign a drive letter, and make sure Reconnect at Logon is checked. Swapping the account service is a bit more involved but doesn't require drive mapping. Run the services.msc app from the command line and scan the list until you see TwonkyMedia Server. Right-click and select Properties. Go to the Sign-on tab and change the option from Local System Account to This Account. Put your username in there and fill in the appropriate password twice. Press OK and then restart the service by right-clicking it and selecting Restart. If all goes well, your Twonky server should have full access to the contents of your network shares.

Now that the server is set up, head to the living room and fire up your streaming box. On the PS3, you'll need to go to the Video menu, while on the Xbox 360, it's either in the Media blade under Videos or on the My Xbox menu under My Video. On both consoles the server should automatically show up with a name similar to "<servername> TwonkyMedia". Once you're connected, you can browse to any video on the server.

The Twonky setup works great, as long as the videos you're streaming are natively supported by the streaming boxes. If you've got a large collection of unsupported videos, you might have better luck streaming with TVersity. It's more difficult to set up than TwonkyMedia, but it will transcode video from one format to another on the fly. We have a complete TVersity how-to online at www.maximumpc.com/article/streaming.

If you just want to watch your ripped videos on your PC, there are lots of options. If you have a recent version of WinDVD or PowerDVD, either of those apps should play the videos, with hardware acceleration to boot. A good alternative is VLC (http://videolan.org/vlc), which should play pretty much any video file you throw at it.

RIP & COPY BLU-RAY MOVIES

Free your high-definition movies (just like DVDs) with our step-by-step guide

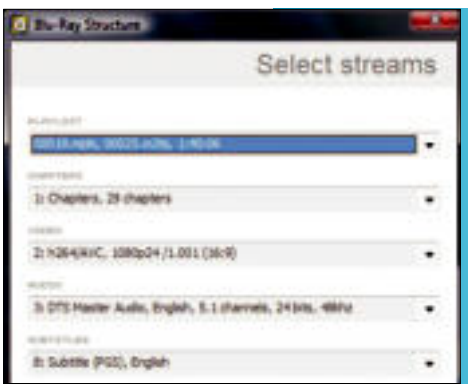
WHAT YOU NEED

- Ripbot264 (free, http://tinyurl.com/7lyvb9)
- AnyDVD HD ($110, http://slysoft.com)
- Quad-core PC with Blu-ray reader
- 50GB+ of free space on your C: drive

Ripping Blu-ray discs to a more portable format is neither easy nor cheap. While there are some free Blu-ray decryption tools, they don't work on newer discs and they require constant fiddling to work. Lucky for you, we've got a Blu-ray ripping solution that produces a 1080p H.264-encoded MP4 file that's around half the size of Blu-ray. But even with our step-by-step instructions, it's not a foolproof process. Rips typically take five hours, and it can take a couple of tries to get perfect results. Still interested? Then let's get started.

First, you'll need to download and install AnyDVD HD, Ripbot264, and the software Ripbot needs to run—if you run Ripbot and your PC is missing the required software, it provides a page with links to the correct versions of MKVSplitter, ffdshow, and Avisynth. If you have any codec packs installed, it's a good idea to remove them before you install ffdshow. In our testing, Ripbot is much more reliable when codec packs are absent.

Once you've installed all the apps, it's time to drop a Blu-ray disc in your drive and get started. Load Ripbot (the version we tested has a bug that requires you to open the ffdshow Video Decoder Configuration app and change the setting for VC-1 on the Codecs menu from libavcodec to wmv9, but this issue should be fixed by the time you read this), click the Add button in the lower-right corner of the app, and browse to your BD-ROM drive. Go to the BDMV/STREAM directory and select the largest *.mt2s file in the folder. Ripbot will parse that file (and all the others on the disc) to find the feature film. Once it's done, check

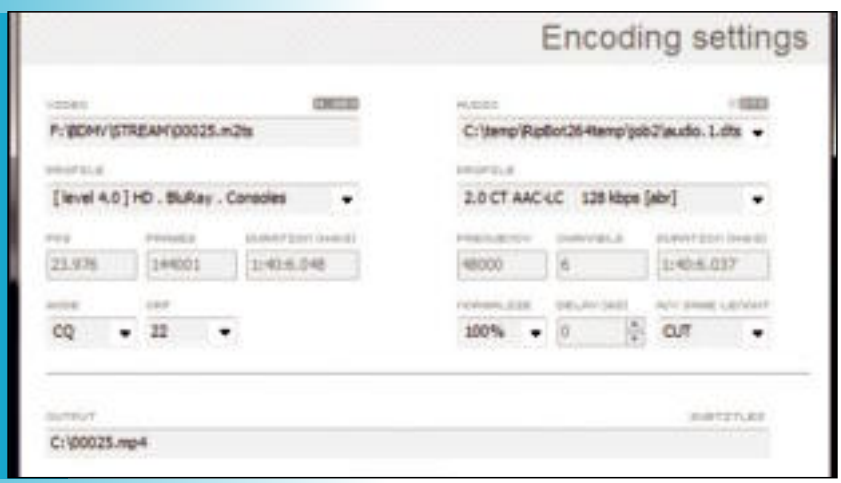


After you point Ripbot at your Blu-ray DVD, you'll need to tell it what video and audio content you want it to extract.

the available options under Playlist and find the one that matches the runtime of your movie. You can usually stick with the default Chapters setting, but you'll want to make sure you have the 1080p selection on Video and the first English language selection on Audio. Subtitles are tricky. Like DVDs, Blu-ray movies use forced subtitles to display English translations of other languages as they are spoken onscreen. If there's more than one English subtitle option for a particular disc, you typically want to use the first one. Once you've made your choices, press OK. Ripbot will extract the files it needs to the hard disk, which usually takes at least 30 minutes.

The next screen lets you adjust the file you're creating. You can tweak everything from the cropping settings to the audio format. We typically use the Console profile for video and 2.0 channel AAC, but if you want to use the file with an Apple device, you'll need to choose the appropriate profile. Default settings are generally fine here as well. Choose your output filename and press the Start button in the lower-right corner of the screen to queue your rip. Once the rip is queued, you can remove the disc from the drive—it won't be needed again.

If you want to convert more than one disc at a time, you can queue more. However, we typically rip one disc at a time. Each disc takes a long time to complete and the entire process can be touchy. Press Start to begin, and in a few short hours you'll have a fantastic-looking (and completely unencrypted) rip of your Blu-ray disc.



The Encoding screen lets you configure the output. Choose your target profile and then tweak the settings to suit your needs.

Phenom: The Sequel

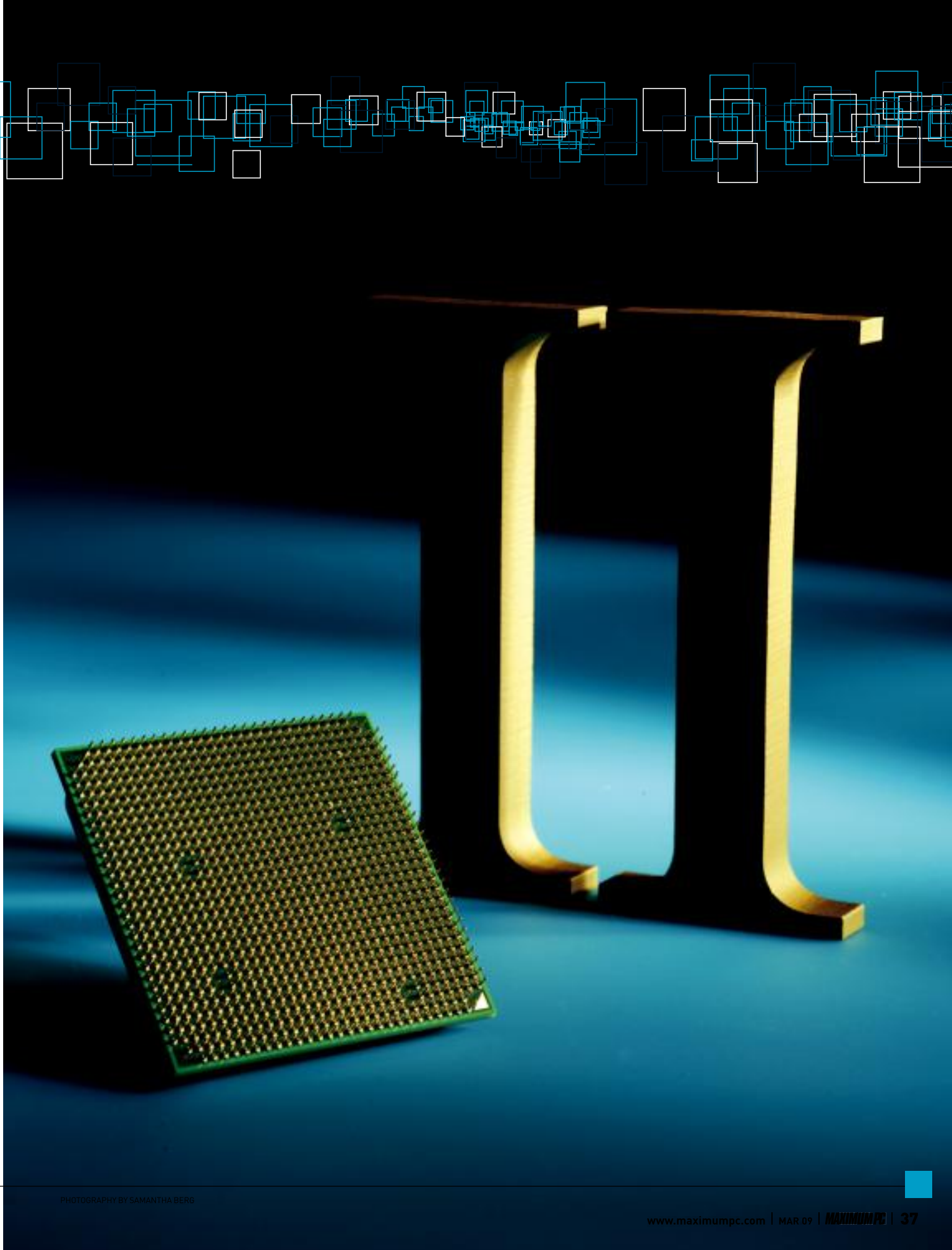
Can AMD's Phenom II make up for the lackluster release of the first Phenom and help the company save face with enthusiasts?

BY GORDON MAH UNG

The production of a sequel typically implies that the original creation is worth revisiting. However, considering that the original Phenom was the hardware version of *Ishtar*, many enthusiasts didn't think AMD's flagship CPU deserved another go-round.

AMD thinks it does—and hopes Phenom II is *Star Trek II: The Wrath of Kahn* to Phenom's *Star Trek: The Motion Picture*. And why shouldn't AMD be able to pull off a reversal of fortune? Phenom II isn't just Phenom joined by a Roman numeral—it's a die shrink with a boatload of additional cache and an improved core. In short, AMD hopes to erase memories of the original Phenom and put smiles on the faces of disappointed overclockers with its reimagined Phenom II chip.

Come with us as we review, critique, and dissect Phenom II and find out how it stacks up against a stack of Intel CPUs.



PHOTOGRAPHY BY SAMANTHA BERG

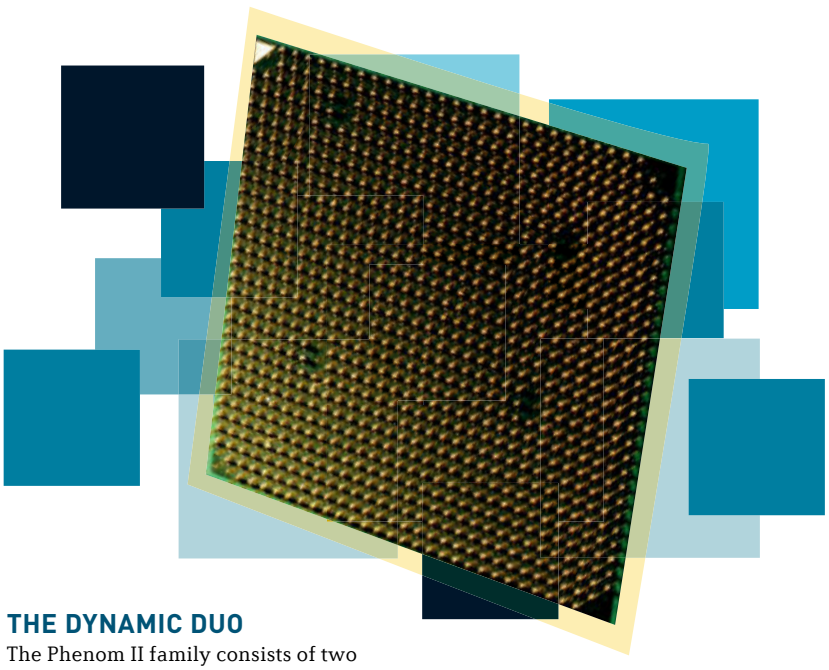
Phenom Reimagined

AMD's trip back to the drawing board

The Phenom launch certainly didn't go as AMD had planned. Rather than christening a new line that would change the company's fortunes, AMD CEO Hector Ruiz broke a bottle of champagne over the bow of a ship that promptly sank beneath the waves—but only after smashing into a nearby pier holding a bait shop and a busload of tourists. Phenom was a year late and had a performance-crippling TLB bug, yield issues, and a performance gap with Intel's older generation of CPUs.

Fast-forward a year and the picture looks far different for the underdog chipmaker. Phenom II is actually ahead of schedule. And doubts about overclocking were quashed months ago when the company invited elite overclockers to its headquarters to get medieval on the new chip with liquid nitrogen and other exotic toys. The result? Overclocking feats that exceeded 5GHz.

Not to belabor the sequel talk, but it's clear that AMD doesn't intend for its pair of new Phenom II chips to be cheesy follow-ups. These CPUs are intended to erase all doubts that the original chip created and help quell uneasiness about the company's ability to make good parts.



THE DYNAMIC DUO

The Phenom II family consists of two CPUs: the 2.8GHz Phenom II X4 920 and the 3GHz Phenom X4 940 Black Edition. Both use the company's new 45nm process and can be paired with the majority of Socket AM2+ boards (and even some AM2 boards.) Both CPUs are native quad-core designs with all four execution cores residing on a monolithic die. AMD will continue its practice of repackaging defective quad-core dies as tri-cores (denoted with X3 rather than X4).

NEW UNDER THE HOOD

For the most part, Phenom II isn't a radical departure from Phenom. It has the same basic core and still features

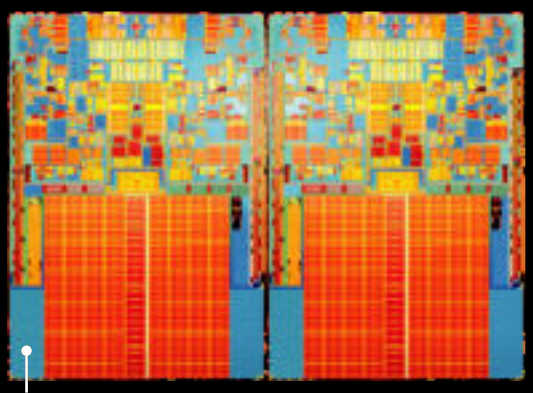
AMD, INTEL CPUS COMPARED

	AMD Phenom II X4 940	AMD Phenom II X4 920	AMD Phenom X4 9950 Black Edition	AMD Phenom X3 8750	Intel Core 2 Quad Q9550	Intel Core 2 QX9770 Extreme Edition	Intel Core i7-965 Extreme Edition	Intel Core i7-920
Clock Speed	3GHz	2.8GHz	2.6GHz	2.4GHz	2.83GHz	3.2GHz	3.2GHz	2.66GHz
L1 Cache (total)	512KB	512KB	512KB	284KB	256KB	256KB	256KB	256KB
L2 Cache (total)	2MB	2MB	2MB	1.5MB	12MB	12MB	1MB	1MB
L3 Cache (total	6MB	6MB	2MB	2MB	N/A	N/A	8MB	8MB
Front-side bus/ Interconnect Speed	3.6GHz	3.6GHz	3.6GHz	3.6GHz	1,333MHz	1,600MHz	6.4GT	4.8GT
Execution Cores	4	4	4	3	4	4	8*1	8*1
Process Technology	45nm	45nm	65nm	65nm	45nm	45nm	45nm	45nm
Transistors	758	758	450	450	820	820	731	731
Die Size	258	258	285	285	214	214	263	263
Wholesale Price	$275	$235	$174	$124	$316	$1,399	$999	$284
Interface	AM2+	AM2+	AM2+/AM2	AM2+/AM2	LGA775	LGA775	LGA1366	LGA1366
TDP*2	125	125	140	140	95	136	130	130
Memory Support	Dual-Channel DDR2*3	Dual-Channel DDR2*3	Dual-Channel DDR2	Dual-Channel DDR2	Dual-Channel DDR2/DDR3*3	Dual-Channel DDR2/DDR3*3	Tri-Channel DDR3	Tri-Channel DDR3

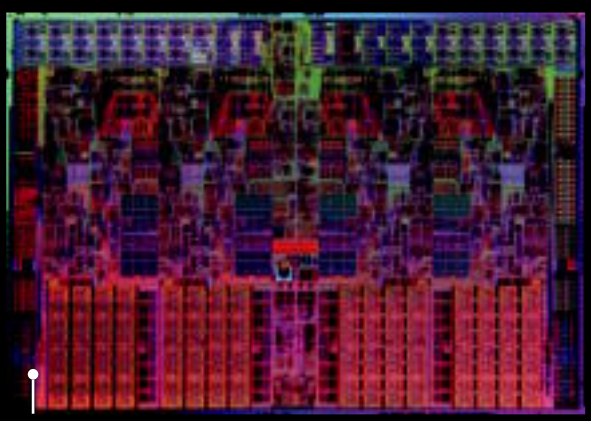
*1 CPU features Hyper-Threading virtual cores. *2 AMD and Intel TDP ratings do not directly correspond *3 Dependent on chipset

BENEATH THE HEAT SPREADER

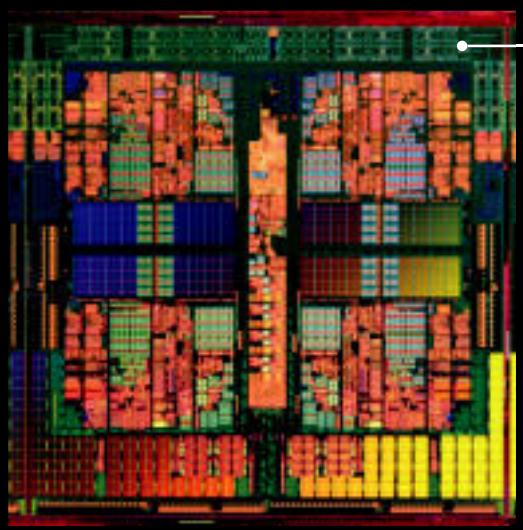
How to Tell the Difference Between the Top Procs



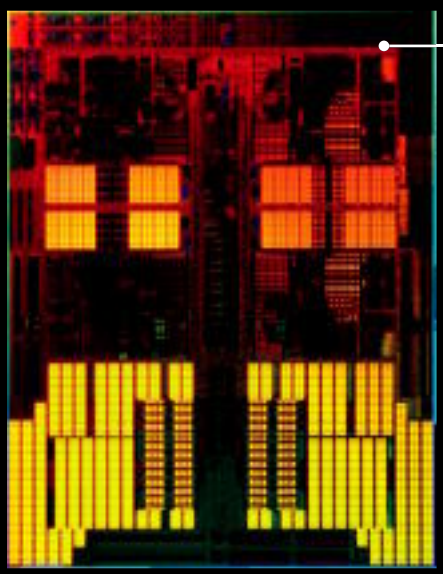
CORE 2 QUAD Intel's quad-core Penryn Core 2 Quad is the only chip here that doesn't use a monolithic design. Instead, these are two separate dual-core CPUs connected via the front-side bus. Note the massive chunks of L2 cache at the bottom of the chip. This L2 cache has helped lessen the advantage that AMD's previous CPUs had in memory performance.



CORE I7 Intel's Core i7 is actually lower in total transistor count than the Core 2 Quad and Phenom II but is second only to the honking-big Phenom in die size. Intel's first monolithic quad-core has been criticized for having meager L2 cache, but it hasn't kept the CPU from being the fastest gun in the west.



PHENOM The original Phenom's 65nm-process made it a huge chip with just 450 million transistors occupying a full 285mm² of die space. AMD now admits that it was a mistake to push for a monolithic quad-core design using a 65nm process, as this chip ran hot and had terrible yields.



PHENOM II Since it's mostly a die shrink, Phenom II is actually very similar to the Phenom die. Overlay the Phenom's die shot with the Phenom II's, and you'll see a lot of familiar structures between the two, with the major difference being the size of Phenom II and the additional fields of L3 cache near the bottom of the die.

an integrated memory controller and HyperTransport connections for chip-to-chip connections. The update does include a few substantial changes, however. The biggest is the move to a 45nm process, which significantly shrinks the size of the chip and results in better yields; additionally, the 45nm-based Phenom II has 758 million transistors but is only 258mm². The original 65nm Phenom has 450 million transistors and measures 285mm².

By shrinking the die, AMD is able to use some of the freed up real estate for more cache. While the L1 and L2 remain unchanged, the L3 goes from 2MB in Phenom to 6MB in Phenom II. This larger cache is also slightly faster than the 65nm Phenom's.

In other good news for enthusiasts, the new chip includes both a DDR2 and a DDR3 integrated memory controller. The bad news is that the first two Phenom II chips will support only DDR2; both DDR2 and DDR3 will be supported with the AM3 revision of Phenom II, which will be released in the next few months.

So why release a version of Phenom II that is limited to DDR2? AMD didn't want to wait the additional months it would have taken to validate the CPUs for both newer DDR3 boards and DDR2 boards. The company felt that to have

a Phenom II that runs at decent clock speeds, overclocks like crazy, and drops into existing boards now was the best way to prove it's back on track.

More importantly, AMD doesn't think people are that hot for DDR3 right now, due to its premium price. To some extent, AMD is right: Two 2GB modules of DDR2/800 will set you back just $28, while a pair of 2GB DDR3/1333 modules costs about $100. And true sticker shock sets in at the highest speeds: 4GB of DDR3/1600 costs about $300 and 4GB of DDR3/2000 is priced around $400.

We would have preferred it if AMD had introduced one CPU that would work with both types of memory, but we understand that due to its position in the market, the company simply doesn't have the luxury of waiting three months to get Phenom II to work with both new DDR3 boards and the older DDR2 infrastructure.

But all you really want to know is whether Phenom II will work with *your* board, right? Minus the missteps with the original Socket 940 and Socket 754 nonsense (well, and Quad FX), AMD has worked hard to ensure that CPU swapouts won't cause havoc. Phenom II will work in almost every board that supports the original Phenom CPU, with the only caveat being boards not designed to handle CPUs hotter than 95 watts. Since both Phenom II CPUs are 125 TDP chips, they likely will not work with those boards.

COOLER THAN EVER

While new manufacturing doesn't always lead to more efficient parts, this die shrink certainly seems to have helped AMD with thermals. For example, the 65nm-based 2.6GHz Phenom X4 9950 BE had a thermal design power rating of 140 watts, while the 45nm-based 3GHz Phenom II X4 940 has a TDP of 125 watts.

AMD also seems to have finally shed the "cold bug" that frustrated extreme overclockers. The original Phenom would overclock to a certain level on air, but when extreme cooling techniques were applied, it wouldn't overclock any further. While cold temperatures aren't a cure-all, most CPUs offer additional headroom at -150 F. But the original Phenom simply hit a wall and no amount of cooling would allow for additional overclocking. AMD set out to prove it fixed this issue in Phenom II by hosting private demos for a group of extreme overclockers. Apparently, no one left the demo unhappy.

PLATFORM SHMATFORM

Every PC is essentially a CPU, a chipset, a GPU, and storage, so you may be confused when you hear the word "platform" thrown around like it's some new type of technology. It's not. It's an artificial way Intel and AMD brand a set of components. For Intel, Centrino is simply the combination of the CPU, chipset, and a Wi-Fi chip. Laptops sold without those three key Intel ingredients are not allowed to use the Centrino sticker. Since Intel advertises the hell out of Centrino, not Core 2 Duo Mobile, most OEMs feel compelled to buy all three parts from Intel.

AMD is not being as Machiavellian with its platform (at least not today), but it is doing some branding around a Dragon theme. Dragon is a combination of the Phenom II, an ATI 790GX or ATI 790FX chipset, and a 4000-series Radeon HD GPU. Does this mean that you can't use a GeForce GTX 295 with Phenom II? No. Everything is as it was before—you can probably even use the Phenom II 940 in some older AM2 boards with the

THE COMPETITION

Intel Hopes You're Ready for Eight Cores

AMD may be gaining ground, but that's not holding back Intel, which will waste no time this year with a new octo-core CPU, a true budget series CPU, and major changes to the world of chipsets and graphics.

Multithread enthusiasts should be pleased with Intel's plans for Nehalem. Although nothing is set in stone, the company is reportedly bringing out a desktop CPU with eight cores. With Hyper-Threading, 16 cores would be available to applications. This thread-monster would be confined to the LGA1366 platform though, and aimed at the highest end of enthusiasts.

Later this year, Intel will also introduce its budget LGA1156 processors. Previously known as LGA1160, the chip will feature four fewer pins and one big addition. While in today's computers the PCI Express lanes are controlled by the chipset, Intel's budget quad-core Lynnfield and dual-core Havendale will have PCI Express built directly into the CPU package. A simple Direct Media Interface link will plumb out of the CPU to connect to the lowly SATA, audio, and other low-bandwidth I/O. Both Lynnfield and Havendale will feature dual-channel DDR3 controllers in the die, but Havendale may have the most impact. Havendale should be Intel's first attempt at integrating graphics within the CPU package on a shipping processor. With a GPU talking to the CPU at QPI speeds and with direct access to an on-die memory controller, Havendale may have far more repercussions on the PC world than an eight-core Nehalem. We'll be happy if it just means that Intel graphics won't suck.

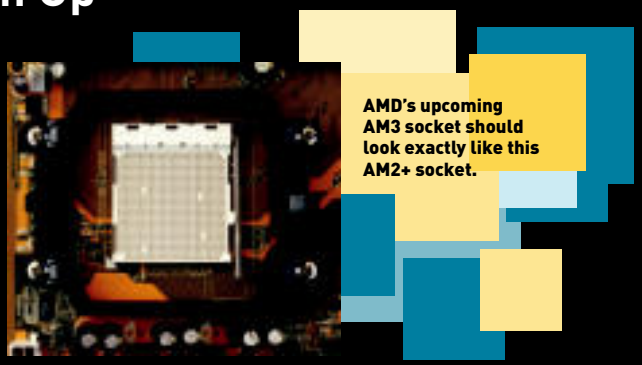
SOCKET TALK

How the Mobos and CPUs Match Up

Anyone who has tried to use a Nikon teleconverter and lens from 30 years ago with a brand-new digital SLR will tell you that compatibility doesn't always mean easy to understand. That is, trying to figure out which 30-year-old lens works with which camera is enough to make you want to buy a modern lens.

The same can be said of AMD's AM2, AM2+, and upcoming AM3 sockets. Physically, the various CPUs will fit in the sockets, but electrically, they won't all work. For example, the 2.8GHz Phenom II X4 920 has a DDR3 and DDR2 controller in it. However, plug the CPU into an AM3 board in a few months and it won't work. For that, you'll need a new AM3 CPU. That new AM3 CPU, by the way, will actually work in most DDR2-based AM2+.

Thoroughly confused yet? We are. As grateful as we are that AMD isn't forcing its customers to buy new boards, the AM2, AM2+, and AM3 thing has thrown us for a loop. Here's how it breaks down.



AMD's upcoming AM3 socket should look exactly like this AM2+ socket.

SOCKET MATRIX

	AM2 MOBO	AM2+ MOBO	AM3 MOBO
AM2 CPU	Yes	Yes	No
AM2+ CPU	Maybe	Yes	No
AM3 CPU	Maybe	Yes	Yes

original Nvidia 590 SLI chipset.

So why bother to push all this platform hooey? Today, it's just a marketing gimmick, but tomorrow it may be far more meaningful. With the functionality of the chipset, CPU, and GPU morphing together, this collection of hardware may indeed be a complete platform that you buy in a few years. That's one thing AMD likes to toot its horn about: Intel has CPUs and chipsets and Nvidia has GPUs and chipsets, but only AMD has all three ingredients.

PRICE MATTERS

CPU companies like to use mysterious model numbers that don't tell you a damn thing about how their chips actually perform. One quick and dirty way to see what the company thinks of a particular chip is to look at its price. AMD's pricing of Phenom II reveals where the company thinks the CPU will compete. For example, the current king of the hill, the Core i7-965 Extreme Edition, is priced at $999. AMD has priced the Phenom II X4 940 at $275, so you can see where the company expects the CPU to fall—it's clearly not intended to take on Intel at the high end.

AMD, however, thinks there's plenty of room to compete in the midrange against Intel's large stable of Core 2 Duo and Core 2 Quad parts.

We put the top-end Phenom II X4 940 against Intel's top-end Core i7 part, the still-shipping top-end Core 2 Extreme Edition part, as well as a lineup of budget Intel and AMD CPUs. The upshot is that AMD fans can take Phenom II as a sign that the company has some magic left. While Phenom was Detroit Lions bad, Phenom II is maybe Oakland Raiders or Green Bay Packers bad. Yeah, it was an ugly season, but you can tell the team is on the right track.

OUR TESTING METHOD

For our CPU showdown, we used a 3GHz Phenom II X4 940 BE on an MSI DK-A790GX board. AMD partisans pitched a fit when we conducted our Core i7 tests with the AMD Phenom X4 9950 BE using "just" DDR2/800 RAM—they believed it was a travesty that we didn't run DDR2/1066. Truth is, the performance difference between DDR2/800 to DDR2/1066 is minimal. In fact, after we published our Core i7 tests we spoke with AMD representatives, who agreed that the small difference in memory bandwidth had virtually no impact on the beatdown Core i7 gave Phenom.

To keep the peanut gallery happy, we tested the Phenom II X4 940 BE with 4GB of DDR2/1066. For comparison, we used a 3.2GHz Core i7-965 Extreme Edition and a 3.2GHz Core 2 Extreme Edition QX9770. We downclocked these parts to simulate the performance of a 2.66GHz Core i7-920 and a 2.83GHz Core 2 Quad Q9550, respectively. We also included the 2.6GHz Phenom 9950 X4 BE in our tests.

For all the test runs, we used the same GeForce 8800 GTX card and Western Digital Raptor 150 hard drive. The Core 2, Phenom, and Phenom II rigs featured 4GB of RAM, while the Core i7 machines had just 3GB of RAM. All tests were conducted using the 64-bit version of Microsoft Windows Vista Home Premium.

Our benchmarks reflect various levels of multithread rendering, video editing, encoding, and 3D rendering. Nvidia likes to say that quad-core CPUs are unimportant, but we're finding a very strong and fast move by application vendors to

support quad core where it's needed. We didn't feature any dual cores in our tests because they simply can't compete against these opponents. However, the majority of today's games exploit two cores at best, so to eliminate graphics as a bottleneck, we ran all of the games at very low resolutions, with all the eye candy turned off. We also ran a set of synthetic memory and scientific and application workload tests to get a balanced picture of how well these quad-cores perform.

ANALYSIS

If you're an AMD fanboy expecting Phenom II to put its bootprint on the hind end of Core i7—any Core i7—prepare to be disappointed. The slowest 2.66GHz Core i7 920 beat the Phenom II by double digits in most of our tests. We saw differences from 11 percent to 27 percent in encoding, and in our WinRar test, the Core i7-920 was 35 percent faster. It wasn't all bad news for Phenom II, though. The chip won the ScienceMark 2.0, Quake 4, and PC Mark Vantage tests, and eked out a win in the Valve map compilation test. However, we're still calling this competition for the i7 920. Of course, the 920's big brother, the 965 Extreme Edition, completely walked away from the Phenom II. AMD, however, isn't concerned that its $275 chip can't beat a $999 one—the company isn't competing at the top end of the market. And even though the 920 is about $300, the price of a new i7 motherboard ($250) and three pieces of required DDR3 ($150) nullifies any performance benefit the i7 has, AMD claims.

AMD is far more interested in how Phenom II does against a Core 2 Quad. The Phenom II actually outscored the Core 2 Quad in our MainConcept encoding test, our ProShow Producer slideshow creation test, and Quake 4, and it just about broke even in our WinRar file compression test. The Core 2 Quad hit back in both 3DMark tests, Premiere Pro CS3, Photoshop CS3, and both of our Valve multithreading tests. Although the Phenom II has a 167MHz advantage, we'd have to call this one a tie.

This, again, comes down to perspective. Intel fanboys can say, "Been there, done that" since AMD's best CPU just barely pulls even with a chip family Intel introduced more than a year ago. But from AMD's perspective, the Phenom II is a big deal. With a down economy, the company believes that people will be looking for performance on a budget, and if Phenom II supplies that without the need for a pricey new motherboard, it's won half the battle.

BENCHMARKS

	3GHz Phenom II X4 940 Black Edition	2.6GHz Phenom X4 9950 Black Edition	2.83GHz Core 2 Quad Q9550	2.67GHz Core i7-920	2.93GHz Core i7-940	3.2GHz Core i7-965 Extreme	3.2GHz Core 2 Extreme QX9770
MainConcept (sec)	1,569	1,867	1,660	1,300	1,190	**958**	1,489
MainConcept Pro (sec)	942	1,124	988	741	679	**608**	889
ProShow Producer 3.1 (sec)	802	1,210	918	670	616	**619**	772
Premiere Pro CS3 (sec)	841	987	771	759	701	**617**	686
Photoshop CS3 (sec)	142	168	124	125	123	**110**	115
Cinebench 10 32-bit	9,791	8,179	10,837	12,632	13,793	**15,398**	12,175
Cinebench 10 64-bit	12,049	10,431	12,288	15,217	16,651	**18,963**	13,849
Valve Map Compilation (sec)	143	167	130	152	141	125	**116**
ScienceMark Overall	1,903	1,609	1,716	1,710	1,885	**2,091**	1,920
ScienceMark Membench	9,198	7,279	7,105	12,737	13,028	**13,312**	8,560
PCMark Vantage x64 Overall	6,447	5,724	5,945	6,616	6,767	**7,510**	6,423
PCMark Vantage Overall	6,085	5,299	5,460	5,347	6,043	**6,705**	5,961
Sisoft Sandra RAM Bandwidth (GB/s)	11.69	9.73	6.9	18.07	18.09	**18.15**	7.4
Sisoft Sandra RAM Latency (ns)	97	95	81	79	78	**77**	79
Everest Ultimate MEM Read (MB)	7,716	6,701	8,006	14,449	14,841	**15,167**	8,252
Everest Ultimate MEM Write (MB)	6,085	4,856	7,075	11,627	14,788	**12,041**	8,490
Everest Ultimate MEM Copy (MB)	9,734	7,760	7,334	15,039	15,011	**15,583**	8,426
Everest Ultimate MEM Latency (ns)	59	65	66	39	37	**39**	67
WinRAR 3.80 (sec)	882	1,091	888	652	645	**584**	837
POV-Ray 3.7 (sec)	570	712	548	498	462	**408**	488
3DMark06 overall	12,018	11,639	12,583	12,407	12,559	**12,859**	12,906
3DMark06 CPU	4,116	3,532	4,276	4,620	5,035	**5,638**	4,717
3DMark Vantage	6,928	7,301	7,459	7,450	7,453	**7,516**	7,588
3DMark Vantage CPU	20,207	26,709	30,615	34,909	35,548	**39,725**	32,446
3DMark Vantage GPU	5,524	5,877	6,034	5,902	5,868	**5,917**	6,044
Quake 4 (fps)	190	152	180	145	156	**228**	207
Valve Particle Test (fps)	85	69	100	131	143	**161**	111
Crysis 1.2 10x7 very low CPU1(fps)	140	112	153	151	155	**164**	153
World In Conflict (fps)	170	136	188	223	232	**250**	220

Bold denotes winner.

MAXIMUM PC's GAMIN

IT'S a tough job, but someone's got to do it. We've spent a good deal of the last 12 months hunkered down at our PCs playing every game that's come our way. The very best of them have pulled us into their imaginary, action-packed worlds and stolen hours of our valuable time—and we love 'em for it! Others, not so much. Here forth is our frank assessment of 2008's most noteworthy games.

BY THE MAXIMUM PC STAFF

G AWARDS 2008

GAME OF THE YEAR: Left 4 Dead

Few things get our blood pumping quicker than blasting the brain pans of a few thousand zombies. But the ritualistic massacre of hordes of infected isn't enough on its own to win our coveted Game of the Year award. Left 4 Dead pushes gaming forward with the one-two punch of visceral co-op gameplay empowered by the AI Director, which dynamically alters the action.

On the surface, popularizing and perfecting cooperative multiplayer might seem to be the biggest contribution to gaming in 2008. Valve made Left 4 Dead co-op both accessible, by building a matchmaking system that makes it easy to play with your pals, and fun, by designing a game that forces people to play together or face certain death.

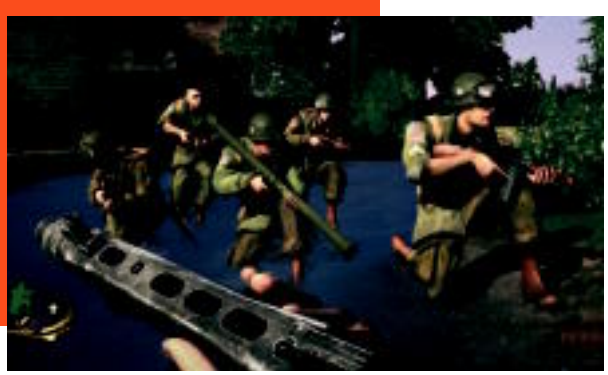
The AI Director monitors your foursome's health, ammo level, and forward progress and then uses that info to spawn baddies, bosses, weapons, ammo, and health to build an intense ebb and flow that's different in every game and perfectly suited for the skill level of your team. Left 4 Dead is an achievement to be lauded.
www.l4d.com, ESRB: M

BEST SINGLE-PLAYER

Fallout 3

Who needs zombies? Or more accurately, who needs to round up three friends for some multiplayer zombie killing? Or friends at all? Or family? Or human contact of any sort. If you have given yourself over to Fallout 3, you know that every phone call, every knock on the door, every unexpected guest only takes away from what is the most immersive game world man has ever set foot in. Within Fallout 3's postapocalyptic wasteland you'll make decisions that will determine whether people—even whole civilizations—survive or perish. And while the story drew us in, the game's combination of fast-twitch action and the more traditional RPG-style VATS targeting system kept us trekking through the seemingly borderless environment, taking on everything a nuke-ravaged Earth could throw at us.

http://fallout.bethsoft.com, ESRB: M



BEST GAME INSPIRED BY A MINISERIES BASED ON A BOOK THAT WAS, IN FACT, BASED ON ACTUAL EVENTS

Brothers in Arms: Hell's Highway

While Call of Duty faithfully re-created the gritty details of the battles brought to life in the epic *Band of Brothers* HBO miniseries (notably, the Brecourt Manor Assault and the Battle of Carentan), it is rival franchise Brothers in Arms that best captures the camaraderie and gut-wrenching emotion of Stephen Ambrose's oral histories. Hell's Highway's moving story and script deftly intertwine action and drama to a point where we actually cared about the fates of the computer-controlled characters fighting beside us.

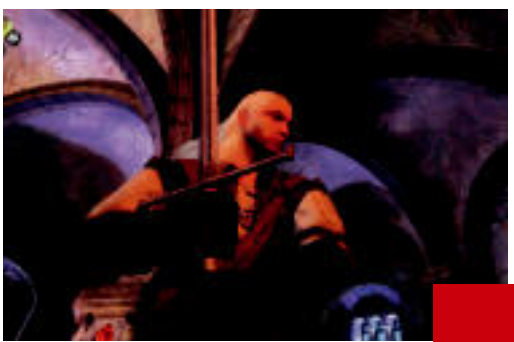
www.brothersinarmsgame.com, ESRB: M

BEST DO-OVER

Witcher: Extended Edition

PC gamers have long had to deal with publishers' "launch now, fix later" mentality, but rarely is it taken to an extent that it was with The Witcher. Developer CD Projekt's dark RPG was released in October 2007, burdened with bugs, shoddy dialogue, and glacial loading times. A year later, the Polish dev house released The Witcher: Enhanced Edition, which addressed nearly all of those problems, and offered it for free to owners of the original game. We don't want to encourage companies to ship slapdash games, but we appreciate CD Projekt's commitment to giving its customers what they paid for.

www.thewitcher.com, ESRB Rating: M



THE BALKI BARTOKOMOUS AWARD FOR THE VERISIMILITUDINOUS DEPICTION OF FAMILIAL RELATIONSHIPS

GTA IV

While GTA IV's debt to *Scarface* is easy to discern, the game owes even more to another '80s-era morality tale. GTA IV is, in fact, a reimagining of the TV docudrama *Perfect Strangers*, a psychosocial investigation into the familial bonds of two cousins who have to learn how to bridge the chasm that developed from being raised in different cultures. In both the game and the show, the cousins travel down a sometimes bumpy road as they learn to accept that while they may have different dreams, when times are tough, blood is, indeed, thicker than water. GTA IV's moral qualms are of a more existentialist nature—should I let this man live or die?; *Perfect Strangers*' less so—what should Balki do after he accidently sets up Lydia with a gigolo… Wait, maybe their ethical dilemmas aren't so different. Well, of course not—don't be ridiculous!
www.rockstargames.com/IV, ESRB: M

WORST CRYSIS SEQUEL

Crysis Warhead

We loved Crysis for its nonlinear level design and unforgiving intelligent enemies, so it's too bad these qualities weren't passed down to its follow-up, Crysis: Warhead. Instead, this nonsequel was hampered by linear missions, dumbed-down AI resistance, and simplistic vehicle chases. Sure, the visual detail was notably improved—especially the explosions—but it also seemed as if the Koreans had crammed TNT into all the jeeps and doused each vehicle with several coats of kerosene since a few shots from an assault rifle would initiate a spectacular fireworks display. Even a pyromaniac would get bored with the overreliance on explosions, à la the new Bruckheimer-esque direction. We can finally stop asking ourselves, "Will it run Crysis?" because who even cares?
http://crysiswarhead.ea.com, ESRB: M

BEST CRYSIS SEQUEL

Far Cry 2

Admit it, you, too, were skeptical when Ubisoft announced it would develop Far Cry 2 in-house after Crytek left the franchise to work on Crysis. But all doubts were assuaged once we ventured through the final product, our brow sweating and sunburned from the African sun and our limbs charred from untamed wildfire. Far Cry 2 fulfilled the promise of nonlinear gameplay introduced in the original by giving us unprecedented freedom in a first-person shooter. Exploration was a necessary part of the experience and our efforts were rewarded with awe-inspiring views of the digital savanna and riveting firefights. And, yes, we could also play lumberjack and shoot down trees, although here, the trees actually eventually grew back. Now that's what we call progress!
www.farcry2.com, ESRB: M

RISK IN SPAAAAAACE

Sins of a Solar Empire

Sure, it's a 4X (eXplore, eXpand, eXploit, eXterminate) space-exploration RTS and plays a lot like a real-time version of the board game Risk, but it's one of the most fun and engrossing multiplayer RTSes we've ever played. The real risk (in space) that developer Stardock Entertainment took was releasing its precious baby with absolutely no DRM. Did it get pirated? Sure. But it also sold more than 500,000 copies. Not shabby for a game with a budget of less than a million bucks.
www.sinsofasolarempire.com, ESRB: T

THE MACGYVER AWARD FOR EXCELLENCE IN IMPROMPTU WEAPON DESIGN

Fallout 3

Although we favor games with a high weapon density, firing the same ARMs, MAC 10s, and combat shotguns we've seen in a do games before soon grows tiresome. Fallout 3 saves the day by le ting you get in touch with your inner weapons designer and cr homegrown killing devices. Everyday objects you'd pass up in games—lunch boxes, soda bottles, crutches—become the com nents for surprisingly effective homebrew weapons. Once you power a bottle-cap mine can dole out, you'll never want to ret **http://fallout.bethsoft.com, ESRB: M**

THE THINKING MAN'S LEMMINGS

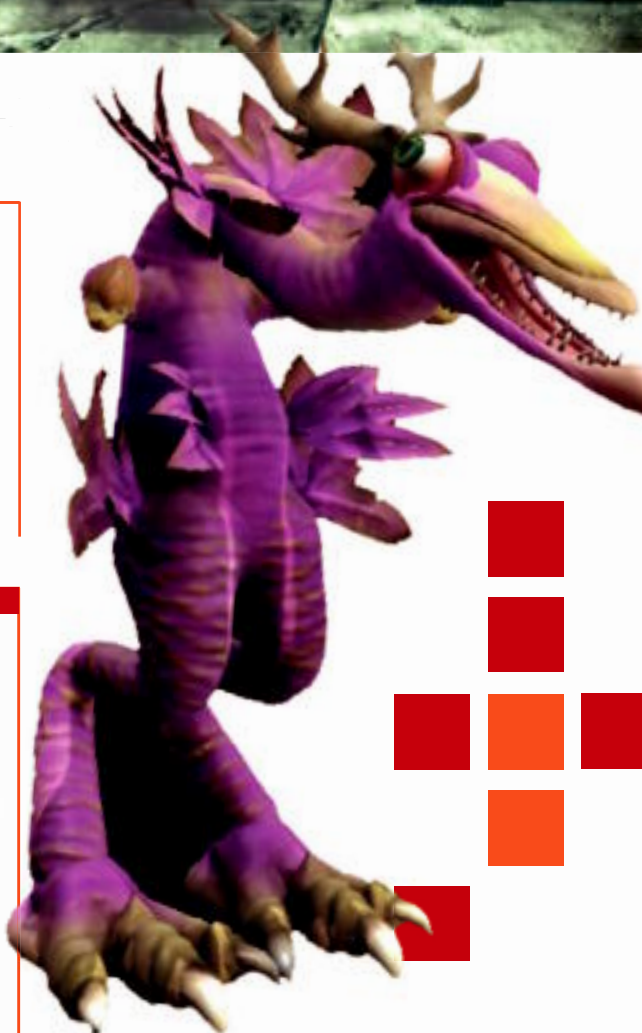
World of Goo

What is it with adorable little simpletons and addictive puzzle g to nerds' latent nurturing instinct or to our desire to play God o gooey critters? In either case, World of Goo is a refreshingly ori year dominated by sequels and spin-offs. With beautifully brig underexplored gameplay mechanism, World of Goo proved th two-man 2D Boy can create a fantastic game, and that "indie" "unpolished." **www.2dboy.com/games.php, ESRB Rating: E**

BEST USE OF B-ACTORS WITH D-CUPS

Red Alert 3

We're not sure what this bevy of vaguely recognizable, babes has to do with the latest Red Alert game—part o real-time strategy series—but we know we're fans. We can stand on its own without this type of puerile titilla the effort. And the eye candy. Even if we only recogni **www.commandandconquer.com, ESRB: T**



BEST EVOLUTION SIMULATION GAME THAT ACTUALLY PROMOTES INTELLIGENT DESIGN

Spore

For years, we heard about a game that would teach kids about science—things like environmental pressures, survival of the fittest, and evolution. That game was Will Wright's Spore. Taking your fledgling species from a single-cell critter all the way to a galaxy-spanning empire has an undeniable appeal. However, in no way, shape, or form does this game educate about evolution. In fact, Spore is an intelligent design sim. Neither the environment nor your play sessions shape your creature's development, no siree. Instead, the loving hand of the player/deity determines the course of each of the millions of creatures that populates the game's nigh-infinite universe. Oops.
www.spore.com, ESRB: E

MOVE ALONG

Nothing to See Here

World of Warcraft is the ne plus ultra of MMOs, claiming an unprecedented 11.5 million players—more than the rest of the market combined. But every year, big-budget titles from major studios pop up, trying to wrest away its crown. For your edification: 2008's three biggest WoW-killers that weren't.

TABULA RASA

Richard Garriott's sci-fi adventure was a welcome break from the swords-and-sorcery norm. But shooter-esque combat and an innovative cloning system couldn't save the game from lower-than-expected subscription numbers—the game will close on February 28, 2009.
www.rgtr.com, ESRB: T

AGE OF CONAN: HYBORIAN ADVENTURES

The first 20 levels of the much vaunted, massively budgeted title were magnificent, polished, and immersive. But bugs and sparse content after level 20 sent players fleeing back to WoW. The game has been steadily improving, but can it attract new players?
www.ageofconan.com, ESRB: M

WARHAMMER ONLINE: AGE OF RECKONING

The most promising of the WoW-killers lured gamers with its vast lore, realm-vs.-realm combat, public quests, and best-in-class in-game progress and knowledge compendium. It's more stable than it was at launch, but it's also much quieter. Warhammer Online seems to be in it for the long haul, though, and continues to add content, but it shows no signs of overtaking WoW.
www.warhammeronline.com, ESRB: T

THERE CAN BE ONLY ONE!

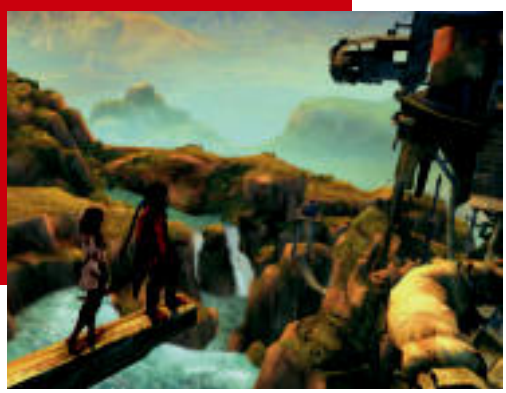
Word of Warcraft: Wrath of the Lich King

How do you keep 11.5 million players happy with a four-year-old game? Release your second expansion pack! With Lich King, Blizzard bumped the level cap from 70 (where it had remained since the launch of the first expansion, The Burning Crusade) to 80, opened up the frozen continent of Northrend, and introduced a new class, the Death Knight. In other words, it pumped the goose that lays golden eggs full of Lupron and Zoladex.
www.worldofwarcraft.com, ESRB: T

THE TRUE FRIENDSHIP TEST

Left 4 Dead

You and your best friend are almost to the safe room, each with a sliver of health remaining and a raging tank hot on your heels. You're limping along, trying to protect each other from grasping infected fingers, when you have an epiphany. If you "accidentally" cripple your pal with a "stray bullet," the tank will have to slow down long enough to finish him off. That should buy you just enough time to make a clean escape. And that, friends, is what Left 4 Dead is really all about.
www.l4d.com, ESRB: M



BEST GAME FEATURING THE CHARACTER FORMERLY KNOWN AS PRINCE

Prince of Persia

In this latest reboot (the third, by our count), the Prince of Persia finally strays from the ridiculous plot lines of The Sands of Time trilogy (i.e., The Dark Prince) and begins a new canon—one in which the protagonist isn't even a true prince! But uncertainties in royal lineage aside, the scrappy hero here is equipped with all the amazing gravity-defying abilities that would be the envy of any parkour enthusiast. The cliff-hanging platforming puzzles and kinetically infused combat are augmented by the inclusion of the Elika NPC character, a welcome innovation to this third-person action staple.
www.princeofpersiagame.com, ESRB: T

BEST CASE FOR WWIII

Call of Duty: World at War

World War II games are so passé that even griping about them is getting old. The Call of Duty franchise rose to new heights with last year's sensational Modern Warfare, but this year's return to the familiar tune of Allies vs. Axis was a letdown—liberating virtual Europe has lost much of its luster. And not to be pessimistic doomsayers, but we're beginning to think that the only way for game developers to stop making World War II shooters is if the world suffers through another global catastrophe. Fallout 3 has the right idea!
www.callofduty.com, ESRB: M

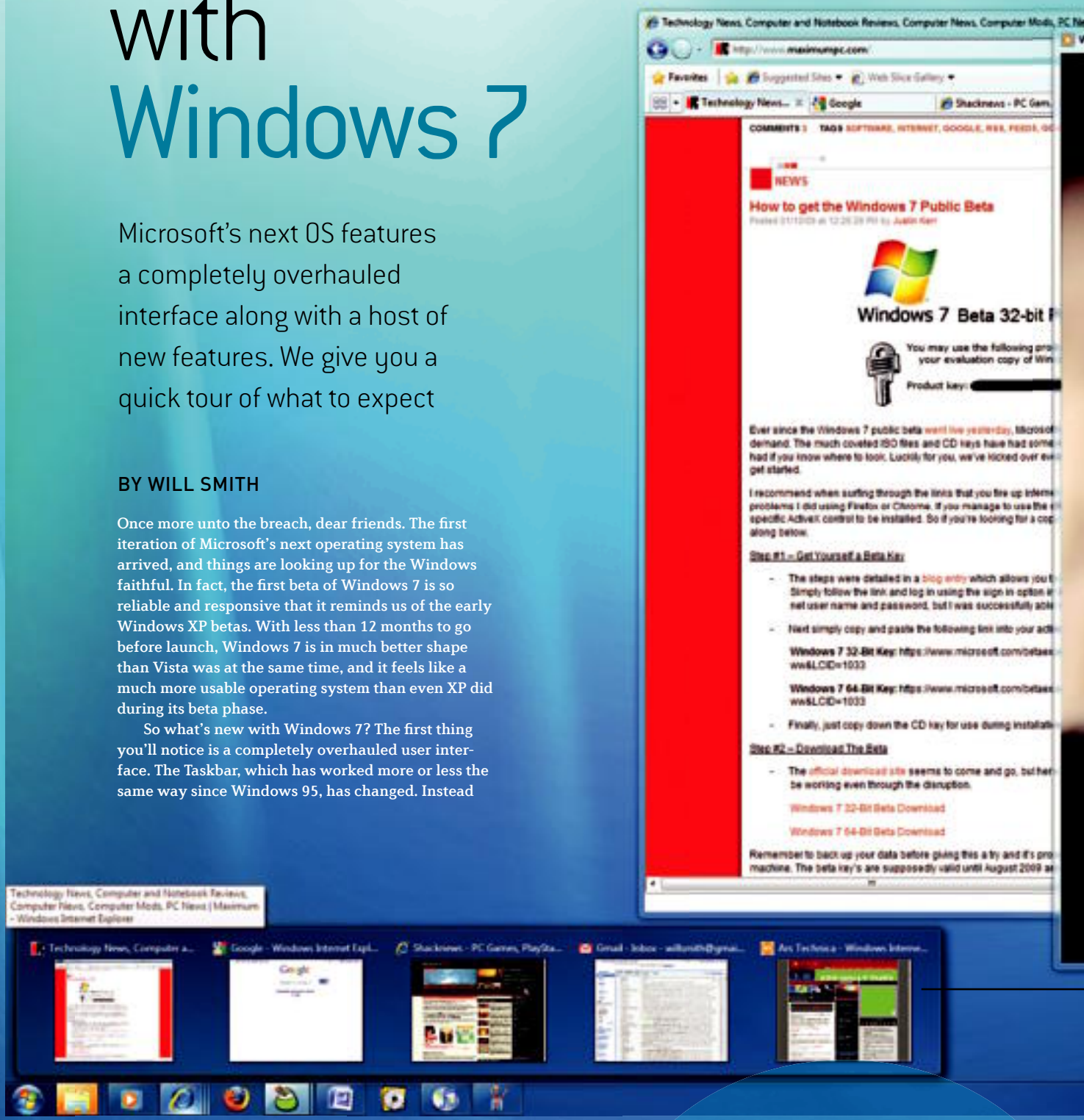
Hands-on with Windows 7

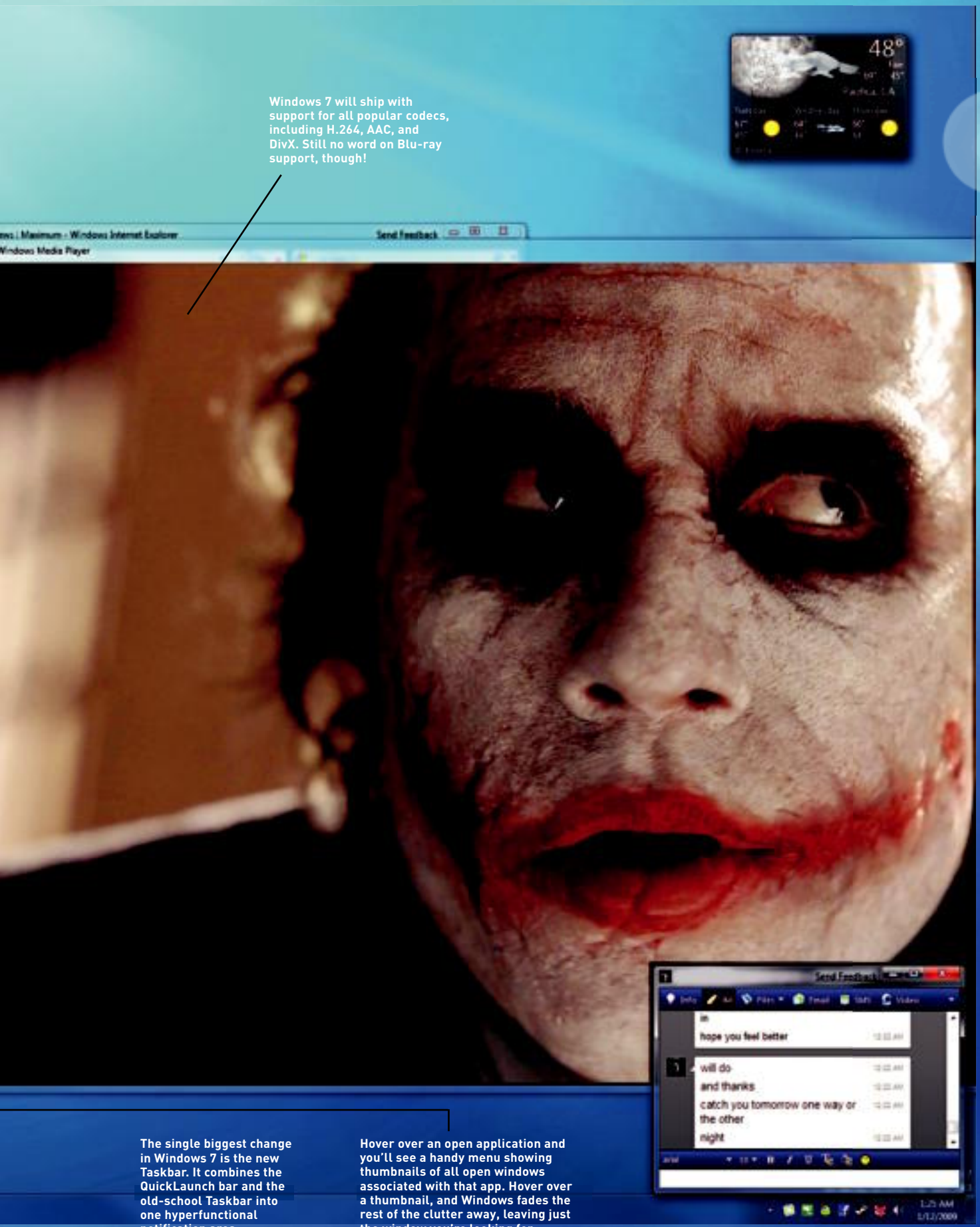
Microsoft's next OS features a completely overhauled interface along with a host of new features. We give you a quick tour of what to expect

BY WILL SMITH

Once more unto the breach, dear friends. The first iteration of Microsoft's next operating system has arrived, and things are looking up for the Windows faithful. In fact, the first beta of Windows 7 is so reliable and responsive that it reminds us of the early Windows XP betas. With less than 12 months to go before launch, Windows 7 is in much better shape than Vista was at the same time, and it feels like a much more usable operating system than even XP did during its beta phase.

So what's new with Windows 7? The first thing you'll notice is a completely overhauled user interface. The Taskbar, which has worked more or less the same way since Windows 95, has changed. Instead

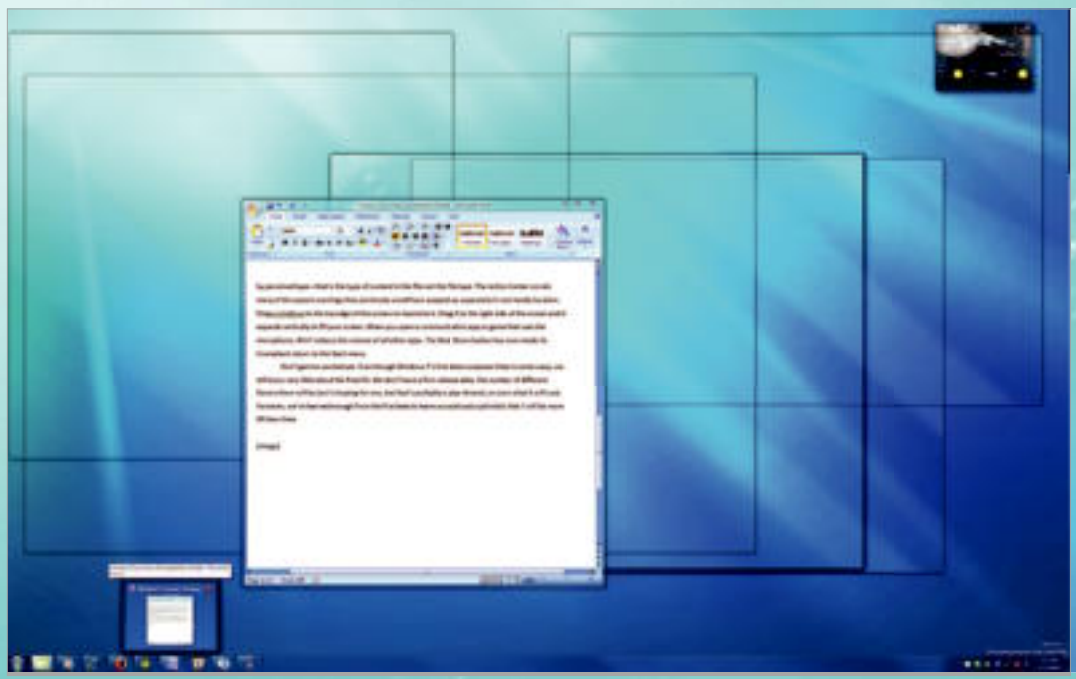




Windows 7 will ship with support for all popular codecs, including H.264, AAC, and DivX. Still no word on Blu-ray support, though!

The single biggest change in Windows 7 is the new Taskbar. It combines the QuickLaunch bar and the old-school Taskbar into one hyperfunctional notification area.

Hover over an open application and you'll see a handy menu showing thumbnails of all open windows associated with that app. Hover over a thumbnail, and Windows fades the rest of the clutter away, leaving just the window you're looking for.

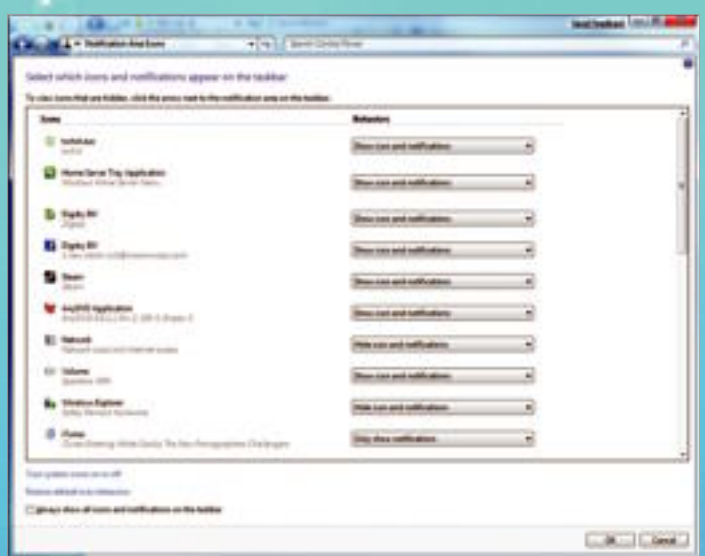


We frequently have five, 10, or even 20 windows open at once. Windows 7 includes much-needed UI tweaks that make it easy to manage tons of open apps and windows. That's perfect for power users and neophytes alike.

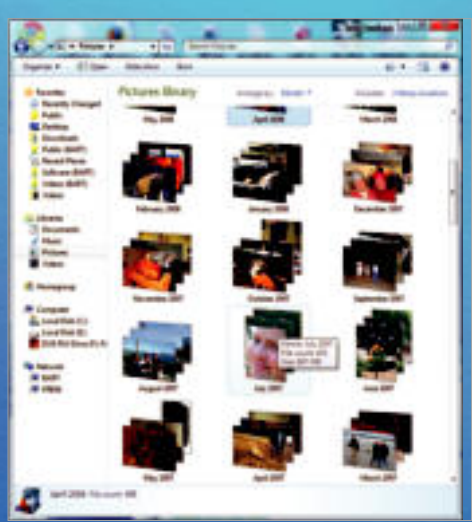
of having separate areas for the Quick Launch toolbar and running applications, the new Taskbar combines the two in a way that's similar to OS X's Dock. Start an app, and its icon will show up in the Taskbar. Hover over it, and you'll see a ton of useful info about it, including recently opened files and thumbnails of all the open windows. Move your mouse over a thumbnail and everything else on the screen except that window fades out, making it simple to find things on even the most cluttered desktop. Say you like having your favorite apps in the Quick Launch area—with Windows 7, you can pin apps to the Taskbar, and they'll remain there whether they're running or not.

What else is new? Homegroups make sharing printers and files between the computers on your network dead simple, without mucking around with NTFS permissions and user accounts. Libraries let you collect all your important files in one place. The new navigation column in Windows Explorer gives you speedy access to the locations on your PC and network that you use most. Gadgets embed directly on the Desktop instead of the Sidebar. The notification area on the Taskbar (where all the small icons for running applications show up) puts spammy or misbehaving apps in a holding pen where they won't annoy you. Oh, and UAC is much less annoying—we're even using it.

Additionally, there are dozens of small tweaks to the OS that, taken alone, don't amount to much but combined make a significant impact on your end-user



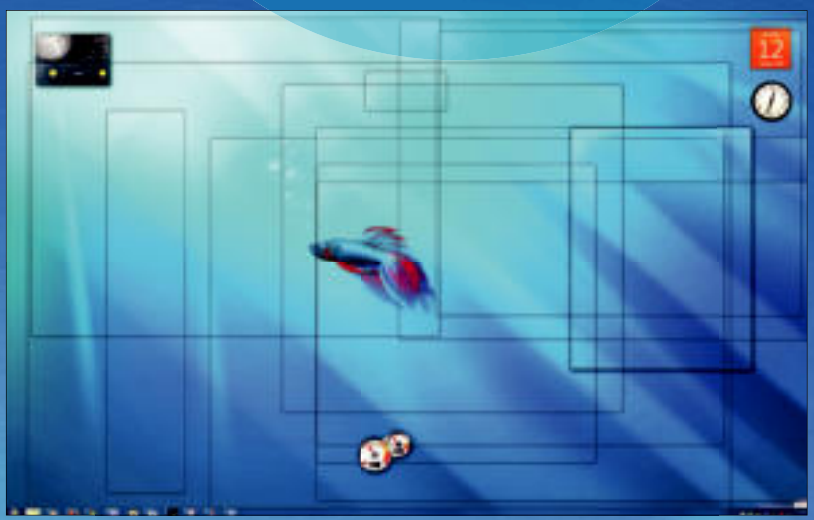
While we'd prefer an OS that let us control whether system notification apps run at all, this is the next best thing. Now you can hide notification apps entirely, see notifications from them, or treat them exactly as you did in Vista or XP.



Libraries allow you to combine the contents of multiple folders on your hard drive into a single folder analog for convenience. You can create your own Libraries and even save files to them (they'll show up in a folder you specify).

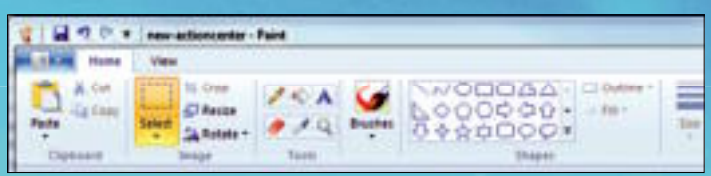
experience. For example, Windows 7 will ship with an array of common audio and video codecs, including H.264, AAC, and DivX. Also on the media front, the built-in streaming server can handle all the formats that the Xbox 360 uses. You can sort and search your files by perceived type—that is, the type of content in the file rather than the file format. The Action Center corrals many of the system warnings that previously would have popped up in disparate locations; drag a window to the top edge of the screen to maximize it. Drag it to the right side of the screen and it expands vertically to fill your screen. When you open a communication app or game that uses the microphone, Win7 reduces the volume of all other apps. The Shut Down button has even made its triumphant return to the Start menu.

Don't get too excited yet. Even though Windows 7's first beta surpasses Vista in many ways, we still know very little about the final OS. We don't have a firm release date or even know the number of different flavors there will be (we're hoping for one, but that's probably a pipe dream) or what it will cost. However, we've learned enough from the first beta to feel cautiously optimistic that Windows 7 will be more XP than Vista.



Want to take a quick peek at the Gadgets embedded in your desktop? Just hover your mouse over the lower right corner of the screen. Software widget enthusiasts will be pleased to know that Windows 7 moves Gadgets from Vista's Sidebar to the Desktop.

The new Action Center puts all the assorted warnings, alerts, and other operating system noise in one convenient location. In addition to more info, you can also choose to archive or ignore annoying messages.



The apps that remain integrated with Windows (Mail, Photo Gallery, Messenger, and Movie Maker are now part of the downloadable Windows Live Essentials) all got the Ribbon treatment, à la Office 2007.

Jump lists give app developers a way to show context-sensitive information about their apps directly on the Taskbar. For example, Word displays a list of recently accessed files.

WHITE PAPER

The Memristor

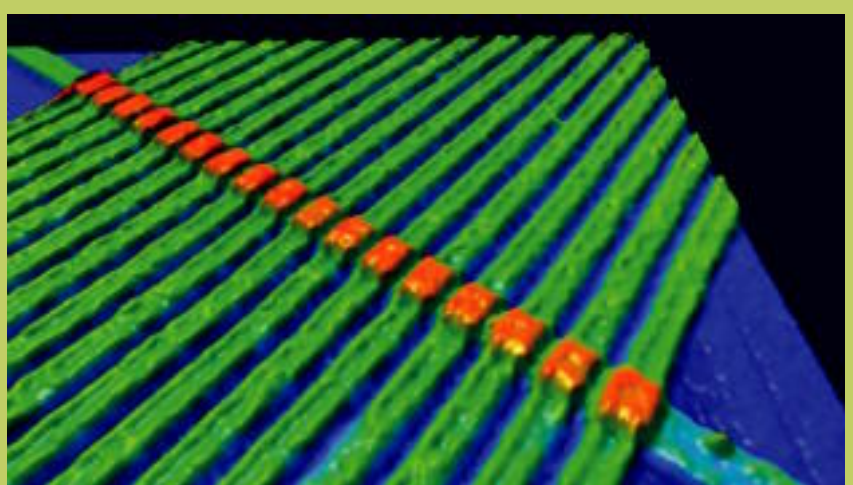
This new scientific discovery could fundamentally change integrated-circuit design —MICHAEL BROWN

Integrated-circuit design is currently based on three fundamental elements: the resistor, the capacitor, and the inductor. A fourth element was described and named in 1971 by Leon Chua, a professor at the University of California, Berkeley's Electrical Engineering and Computer Sciences Department, but researchers at HP Labs didn't prove its existence until April 2008. This fourth element—the memristor (short for memory resistor)—has properties that cannot be reproduced through any combination of the other three elements.

Chua first theorized the memristor's existence based on symmetry. There are four fundamental circuit variables—current, voltage, charge, and flux (changes in voltage), but until now, relationships had been defined for only three of those variables: A resistor opposes the flow of an electric current, so it relates voltage to current; a capacitor stores energy in an electric field between two conductors, so it relates charge to voltage; and an inductor stores energy in a magnetic field created by the electrical current running through it, so it relates flux to current. Chua believed that there must be an element that relates charge to flux, and he dubbed this undiscovered element the memristor because it would "remember" changes in the current passing through it by changing its resistance.

HOW IT WORKS

Memristors Up Close



This image, captured by an atomic force microscope, shows one of the first memristor circuits ever synthesized. There are 17 memristors on this die; each wire is 50 nanometers—about 150 atoms—wide.

THEY'VE ALREADY CREATED A MEMRISTOR DEVICE CAPABLE OF STORING 100 GIGABITS OF DATA IN A ONE SQUARE CENTIMETER DIE.

RESISTANCE IS FUTILE

A memristor is an element in which the magnetic flux between its two terminals is a function of the amount of electrical current that passes through it. If a charge flows through a memristor in one direction, the memristor's resistance increases; if the charge flows through in the opposite direction, its resistance decreases. And if the charge is removed altogether, the memristor retains whatever level of resistance it exhibited when the current was present.

A memristor operates on the principle of hysteresis: Its rate of change increases as it moves from one state to another, i.e., from "on" to "off" and back again. This phenomenon has been observed and even used for commercial purposes, although engineers didn't thoroughly understand why it happened. The propensity of titanium dioxide to change its resistance in the presence of oxygen, for example, led to its use in the manufacture of oxygen sensors.

An HP research team led by R. Stanley Williams used what was known about titanium dioxide as a jumping-off point to develop the first memristor. The researchers passed an electrical current through a thin film of titanium dioxide that they'd doped to be missing some oxygen atoms. The current pushed the holes created by the missing atoms from one side of the film to the other. Passing a charge in the opposite direction pushed the holes back through to the other side. Repeating this process essentially turns the memristor on and off, changing its state from one to zero, but the key is that when electricity stops flowing through the memristor, the memristor remains in its current state.

NO FLASH IN THE PAN

Since a memristor doesn't depend on the presence of electrical current to maintain

its state, it is widely expected that one of its first commercial uses will be in the manufacture of non-volatile memory—perhaps as a replacement for flash memory. HP's team has already created a very simple memristor storage device capable of storing 100 gigabits of data in a one square centimeter die. A single flash memory chip, in comparison, is capable of storing just 16 gigabits. Memristors could also eventually replace DRAM, leading to the development of instant-on computers. A computer using memristors instead of DRAM would need to load its operating system only once—the first time it's powered up. You'd be able to power off the computer for the night and all your application software and work in progress would be waiting for you when you powered it up the next morning.

Chua noted that the properties of a memristor are very similar to those of synapses, the junctions between nerve cells in the brain. When there is a smaller change in charge, there is a smaller change in resistance. Chua and Williams predict that memristors will eventually be used to manufacture new types of devices that no one has yet thought of. If you used memristors to build an analog computer, for instance, you'd have a computational device that instead of relying on just ones and zeroes could utilize all the values in between.

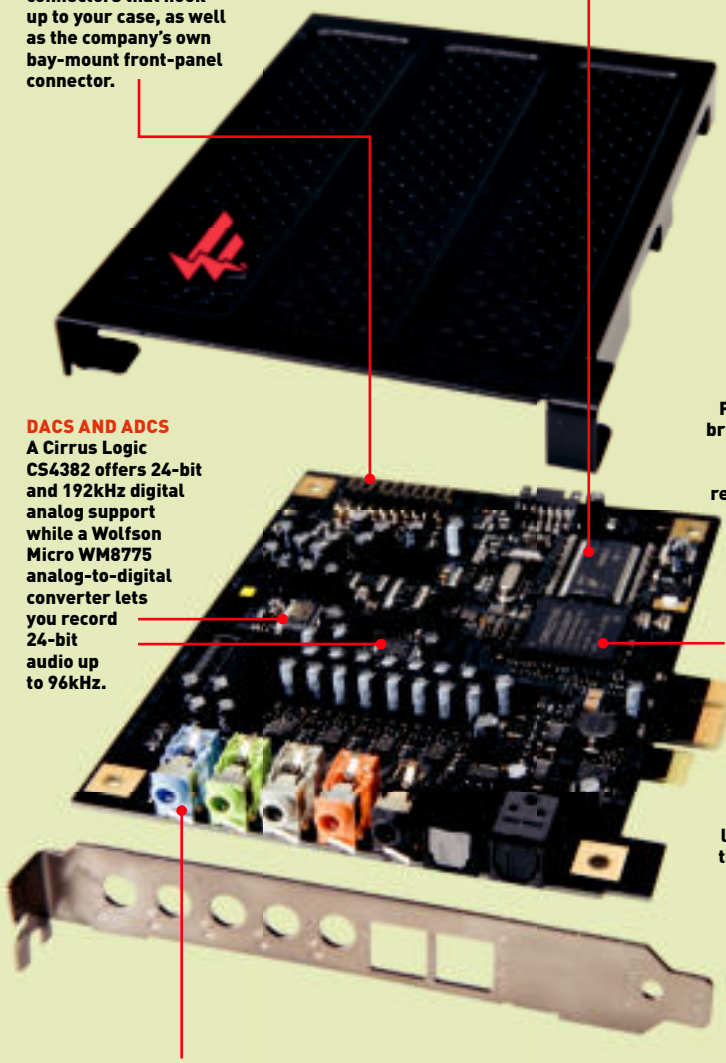
I SEE, THEREFORE I AM

One application for such a device, according to Williams, would be to build computers capable of making decisions based on size comparisons, pattern recognition, and similar forms of analog input. Digital computers are capable of doing this today, but the task consumes prodigious amounts of processing power. And unlike today's computers, a memristor-based computer would be able to learn from experience because it's capable of retaining the information it acquires.

Integrated-circuit designers are excited about one other characteristic of memristors: Memristance exhibits a tendency to become stronger as circuits become smaller. That's one reason so much time passed between Chua's theory and Williams's discovery: No one was building devices small enough for the phenomenon of memristance to manifest itself sufficiently enough to not be dismissed as an anomaly. Since conventional circuits experience more problems with power leakage and heat as they're shrunk, memristor technology should enable the development of ever-smaller microprocessors for a long time to come; it could also prove to be a key milestone in the development of commercial nanotechnology.

PCI Express Soundcard

It's no longer in vogue to flash your bare chips to the world, so we cracked open a Creative Labs Sound Blaster X-Fi Titanium Fatal1ty PCI-E soundcard to see just what's hiding inside this audio powerhouse.



FRONT-PANEL CONNECTORS Creative now offers standard HD Audio front-panel connectors that hook up to your case, as well as the company's own bay-mount front-panel connector.

X-RAM Although we don't know who the hell actually uses it, Creative continues to put 64MB of RAM in its premium soundcards. This "X-RAM" can be used by games to store audio samples.

DACS AND ADCS A Cirrus Logic CS4382 offers 24-bit and 192kHz digital analog support while a Wolfson Micro WM8775 analog-to-digital converter lets you record 24-bit audio up to 96kHz.

DSP This is one of the few DSPs that still actually does the computational math for game audio. Instead of using a simple PCI-to-PCI Express bridge chip, Creative avoided compatibility issues by redesigning the DSP to be native to PCI-E. The new CA20K2 features all the EAX 5.0 beauty of the PCI CA20K1, but in an x1 PCI Express package. The CA20K2 is built on a 130nm process, and features an internal RISC processor to compensate for latency issues with the faster but more latency-prone x1 PCI-E.

REAR CONNECTORS Standard mini connectors give up to 7.1 analog output and line/mic-in, while a pair of optical connectors give you TOSLINK-in and -out.

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

Keep Your Electronics Cool in a Closed Cabinet

Protect your hardware from heat exhaustion by following our step-by-step guide to fan installation —WILL SMITH

TIME = 118 MIN

WHAT YOU NEED

- 4.5-INCH (114MM) HOLE SAW
- POWER DRILL
- 12CM THERMALLY CONTROLLED, LOW-SPEED FAN
- 110V-TO-12V DC INVERTER
- #10 FAN SCREWS AND NUTS
- NEOPRENE WASHERS

We love having tons of cool electronics hooked up to the big-screen TV in our living room—who doesn't? But if you're like us, your significant other isn't keen on seeing all that black plastic and shiny metal. Your solution to this dilemma was probably the same as ours: You bought a piece of mass-produced furniture that has doors. And what do those doors do? They create pockets of electronics-killing heat that will shorten the life of your gear.

Fear not, heat haters. We tested our cooling fix with two of the hottest pieces of hardware we could find: an Xbox 360 and an Apple TV. Before we installed our cooling solution, the internal temperature of our cabinet hit 130 F. But after we mounted our heat-triggered fan, internal temperatures hovered a scant two degrees above room temperature.

Collecting the right gear is crucial to the success of this project: You want to add a near-silent fan that will move enough air to keep your electronic components cool. We chose a low-rpm thermally controlled fan that activates when the temp reaches 75 F and maxes out at 800rpm as the temperature rises. Our $20 fan included an AC-to-DC adapter, but any low-speed 12cm fan will do. In addition to the fan and the AC/DC inverter, you'll need appropriate-depth #10 self-starting screws and four washers. Ready to cool things down? Strap on your tool belt, it's time to drill.

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

CLEAN UP THE MESS

1 Phase one of our operation consists of removing the various electronics and peripherals from the cabinet and exploring some different options for the blowhole's placement. After consulting the Internet and refreshing ourselves on the basic rules of physics—heat rises, who knew?—we decided to place the blowhole on the back wall of the cabinet at the top of the enclosure.

After a little experimentation, we realized that separating the components from their respective power bricks and supporting gear let us move the hotter components to the top shelf of our cabinet. Keeping the hot gear on top keeps the area with the other gear cooler and makes the whole cabinet looking neater. Before we started cutting, we ran our cables to make sure that everything would reach and tested the temperature of the cabinet with everything running. We didn't bother to dust inside our—admittedly filthy—cabinet, as it was going to get a whole lot messier once we busted out the hole saw.

DRILL, BABY, DRILL

2 If you've never used a hole saw before, it can be a little tricky. Most entertainment centers are made of pretty thin wood, so you don't need to do anything complex, such as drill sawdust channels. That said, we do recommend holding a large block of wood at the hole's exit point—this will help prevent unsightly splintering; however, since we are drilling through the back of our cabinet, which goes against the wall, we aren't particularly concerned about marring the finish a bit. Alternately, you can start the hole on one side and then switch to the other. Use a relatively low speed and pull the hole saw back regularly to remove sawdust buildup. This will prevent the blade from binding.

Next, you'll need to drill the four holes you'll use to mount the fan to your cabinet. We used the fan's grille as a template, but you can also make a template with a piece of paper, some tape, and a pencil. Tape the template to the back of your cabinet and mark the four holes. We used a 1/4-inch bit to drill the four holes. Align the drill so it's perpendicular with the wood; otherwise, your holes will be crooked and you'll have a hard time getting the screws aligned with the fan.

MOUNT THE FAN

3 Before you can mount the fan to your cabinet, you'll need to determine which direction it blows. Typically, a diagram on the side of the fan shows the direction of the airflow. If your unit doesn't have a diagram, you can plug it into the power brick to see which way the air flows. You'll want to mount the fan itself inside the cabinet but orient it so it blows warm air out of the enclosed area. Once you've figured out the fan's orientation, you should screw the included grille to the side of the fan that will be inside your cabinet. The grille will prevent any stray wires inside your case from blocking the fan and make installation much easier.

Next, it's time to actually attach the fan to your cabinet. You'll need a helper for this part—unless you've got incredibly long arms. Line up the fan on the inside of your cabinet with the four holes you drilled on the outside. Slide the #10 screws through the rubber washers, which will protect the cabinet if you overtighten the screws. Now tighten the screws. We used a drill to speed up the process, but it's important not to overtighten the screws. Leave them loose to start, so there's a little wiggle space in case one of your holes doesn't line up. Once all four screws have been started, tighten them down in a diagonal pattern. Once the fan is mounted, you can connect it to power and give it a test spin. Hook it up to your power brick, close the cabinet door, and enjoy your new, longer-lasting, properly cooled components!

THE WAY THE WIND BLOWS

How Fast and in What Direction Should the Fan Spin?

When we started this project, we were curious to find out how fast a standard 12cm fan needed to spin in order to make a difference in a hot cabinet filled with an Xbox 360, a Wii, some networking gear, and a small, low-power PC. After all, boring through a piece of furniture and then sticking an ear-splittingly loud fan in the hole is likely to test the strength of any marriage.

After doing some testing with a variable-speed fan and a remote thermometer, we discovered that a fan blowing cool air into the cabinet produced tons of noise but had little impact on internal temperatures; however, an exhaust fan spinning at about 800rpm made little noise but kept our components well chilled. Pretty cool, indeed!

This month the Doctor tackles...

- 64-bit operating sytems
- Squeal of death
- Booting from USB

Out of Order

In Win XP, folders automatically display in Explorer in alphabetical order. I want to order folders chronologically by calendar month, i.e., January, February, March, etc., but Explorer displays them alphabetically. Is there a way to change the order that folders are displayed?

—Dave Schaffer

You'd think so, Dave, but we've found the easiest way (and the way we use on our production server) is to simply put each month's numerical value before its name, thus: 01 January, 02 February, 03 March. It's not fancy, but it works.

Use BartPE to create a streamlined Windows XP install on a flash drive or optical disc; it's perfect for emergency maintenance!

Need More Power, Cap'n!

I have a Soyo A7V Dragon Plus motherboard, AMD Athlon XP 1800+, VisionTek ATI Radeon 1600 X1600XT Extreme Gamer Edition, Creative Extreme Gamer Fatality Pro, Adaptec Duo Connect, and Linksys Standard Ethernet Card.

A week ago, my 425W RaidMax power supply started shooting sparks and fried a capacitor. I swapped it out with a 300W Skyhawk PSU. Now my computer keeps locking up with a high-pitched squeal, and the only thing I can do is push the reset button or unplug my computer. Often it will lock up within five or 10 minutes after rebooting. It happens when I'm listening to music, playing games, or watching movies, both online and off. Sometimes it locks up after Windows starts. It doesn't lock up with that squeal all the time, only most of the time. I believe it probably has something to do with my audio card, but then it just might be as simple as my power supply lacking sufficient power.

I've looked online and could only come up with answers for the audio card and nVidia-related hardware; my problem is conveniently named the "Squeal of Death." Is there any way I can fix this with my current hardware configuration? Or will I have to get new hardware?

—Kavan Scott

Kavan, there are a few possible fixes for your issue. The first is that the 300W PSU you're using is simply not powerful enough to run your system, which you used to run on a 450W PSU. That's a big decrease in wattage. Try a new PSU at or above 450W—that should solve the problem. The other possibility is that your old PSU's explosive death fried one or several of your computer parts. Try removing the audio card and running your computer with onboard sound instead. Same goes for the videocard—try swapping in an old card to see if that solves the problem. Before you swap out all your hardware though, start with the PSU.

Boot XP from USB?

How can I make a bootable copy of my XP Pro operating

system on my 16GB USB 2.0 flash memory stick? Many of the OS files cannot be copied from my computer using Windows Explorer because they are in use. I have tried just about everything.

My computer has an option for USB booting and I would like to have the emergency boot stick as a backup.

—Phil Barnes

Phil, although it's possible to boot a vanilla install of Windows XP from a USB flash drive, we think it's more trouble than it's worth, for a number of reasons—performance foremost. We prefer to use Bart's PE Builder (www.nu2.nu/pebuilder) to create a custom streamlined XP install, with plenty of built-in tools to help diagnose, repair, and retrieve data from your computer in case of an emergency. The result is a build of XP that looks a little different than you're used to, but is perfect for what you need. And you can even include utilities and plugins such as virus scanners and other tools to maximize the usefulness. You will need a legitimate XP install disc, but the detailed documentation on BartPE's website will have you rockin' your bootable XP flash drive in no time.

No Way, AutoPlay!

With viruses spreading on USB drives like they used to with floppies, is there a way to prevent Windows from automatically running the executable when you plug in the USB drive? I would rather be safe than have Windows automatically launch programs on USB drives, DVDs, etc.

—Kevin Campbell

It's not clear from your question whether you're running XP or Vista, so to cover our bases, we'll discuss both. In XP, you can use the Microsoft PowerToy called TweakUI (http://tinyurl.com/2meyw); in TweakUI's drop-down menu you can find AutoPlay. Select Drives and uncheck your optical drive and any USB drive letters.

In Vista, go to the Control Panel (the Control Panel Home screen, not Classic View); under Hardware and Sound, click Play CDs or Other Media Automatically. Then uncheck the box at the top marked Use AutoPlay for All Media and Devices. If you don't want to disable AutoPlay completely, you can chose options for specific media types from that menu, too.

THE DOCTOR HAS BEEN RUNNING 64-BIT VISTA ON HIS HOME COMPUTER FOR NEARLY A YEAR WITH NO ILL EFFECTS.

32 to 64

My current PC, which has Windows XP professional 32-bit installed, is dying. I have begun ordering hardware for my new rig from Newegg. I am a college student and recently found out that I can get a student discount from Microsoft on a Windows Vista upgrade. Can a 32-bit version of XP be upgraded to a 64-bit version of Vista? If so, what's the best way to do so? I know I will have to call Microsoft for a new XP keycode, as my hardware will be entirely different, but I've gone through that process before.

—Kevin White

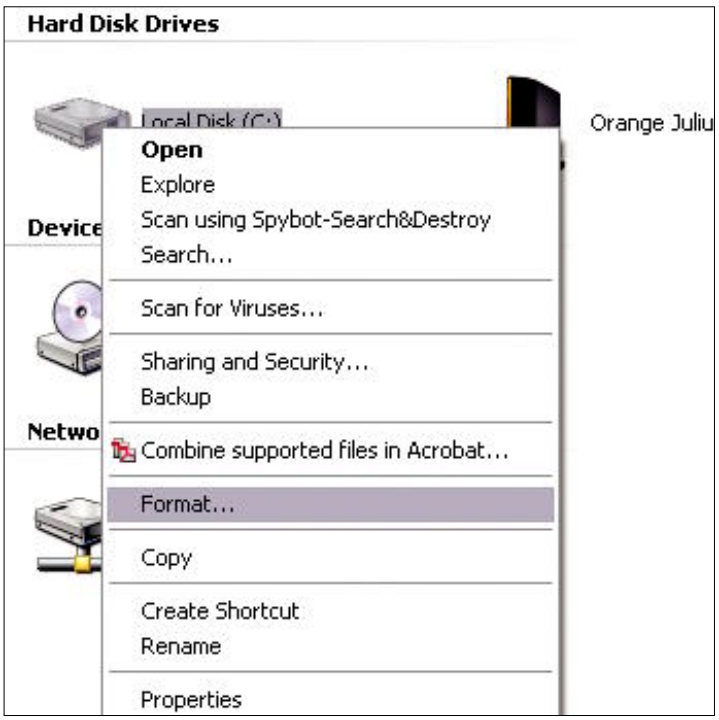
According to Microsoft, you can't upgrade a 32-bit version of XP to a 64-bit version of Vista. However, you *can* install a clean 64-bit Vista OS from an upgrade disc. But since you're building a new rig, that shouldn't be much of an issue; you'll want a clean install anyway. You'll have to start the install process from the Vista DVD, as the 64-bit installer will not run on your old 32-bit Windows install. And, of course, be sure to back up all your documents and data before you start.

Add/Remove Windows Components lets you reinstall games and utilities your OEM might not have included.

Whither Minesweeper?

I'm using a 2.8GHz PC with 1.5GB of memory and WinXP SP3. Rather than include a licensed CD in case I ever need to reinstall the OS, the OS installs from a hard drive partition. I've reinstalled Windows twice now and all is well.

Recently I bought another system that has Windows XP on it, but several items weren't selected when it was installed. As a result, it has no games, and many other pro-



Under no circumstances are you to format your Windows drive from within Windows.

grams aren't installed, but it does have a license key sticker on the case.

Do you know of any way I could access the partitioned files on the first system so I could reinstall XP on the other system? The only option I know of is to buy the XP upgrade at Wal-Mart for about $100 and then go through the Win98 installation and the WinXP upgrade processes.

I've thought about just installing Win98 or ME, but then I'd have to search for drivers that might not exist for some of the hardware. I could also just go out and get Vista, but as a regular reader of *Maximum PC*, I've decided Vista is just a headache waiting to happen to someone who doesn't know better.

—Mike Hammond

First, Mike, although we gave Vista a hard time when it first came out, it's actually improved significantly since its release. The Doctor has been running 64-bit Vista on his home computer for nearly a year with no ill effects.

On to your problem: You should be able to install the missing Windows components by going to the Control Panel, then Add or Remove Programs, and clicking Add/Remove Windows Components in the left-hand menu. From there you can click each individual component's section. Double-clicking Accessories and Utilities will bring up the Accessories and Games folders, and you can click on those to add specific components. You'll be sweeping mines in no time.

64-Bit Choice

I'm currently debating whether to install XP x64 or Vista x64 on my main rig. I will be playing a lot of games, including Counter-Strike, Left 4 Dead, and Far Cry 2, and doing some video editing with Sony Vegas and Adobe After Effects. I've tried Vista x64, but issues with Creative soundcards have haunted me for the past week and a half. I still haven't tried XP x64, but I've heard that there's less support for it compared to Vista x64. I've already confirmed that some of my crucial programs do run on XP x64, but what about devices like the printer and camera? I have an E8400 overclocked to 4GHz, 8GB of G.Skill RAM, and an ATI Radeon HD 4850.

—Miguel Bagara

Despite our misgivings with Vista in the past, many of us, including the Doctor, have been impressed by the improvements to the OS in the past year. 64-bit XP never really got the support it deserved from software developers and hardware makers.

64-bit Vista, on the other hand, has much better device support, is more stable, and came out at a time when 64-bit processing had become much more mainstream. And although Creative hasn't been great about Vista 64 drivers, the company released a beta driver with Vista 64 support in late November. You should check the manufacturer websites for your printer and camera to make sure they have 64-bit Vista drivers. Given your 8GB of RAM and DirectX 10-capable videocard, as well as the games you like to play, the Doctor thinks you'll really benefit from Vista 64.

Oh Say Can You C:

I'm having trouble formatting my C: drive. When I right-click my drive and try to format it, I get an error telling me that it can't format when other applications are running. I've uninstalled everything that I could and it still won't let me format. Is my hard drive shot or just corrupt? I don't have my restore disc.

—K. Payne

Your hard drive is probably neither shot nor corrupt. Formatting overwrites all the data on a disc (or more accurately, erases its headers so it can be written over). If you format your C: drive, the one Windows is installed on, you'll lose everything on it, including Windows. Windows cannot delete itself while Windows itself is running; you should format from a bootable disc—either a Linux LiveCD, like Knoppix or Ubuntu Live, or a Windows Preloaded Environment disc like BartPE (discussed above).

You shouldn't format your primary drive, though, if you have no way of reinstalling Windows, or if you want to keep any of the data on it. Since you don't have a restore disc, that probably isn't your best option. If you do find your restore disc, or another copy of Windows, you can reformat during the reinstall process. If you're just trying to improve your drive's performance, defragment it with Window's default defragmenter.

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.

REVIEWS

Tested. Reviewed. Verdictized

INSIDE

ONLINE

- DELL XPS ONE
- D-LINK MEDIA CENTER EXTENDER
- GYRATION GYROSCOPE-BASED MEDIA CENTER REMOTE CONTROL
- HAWKING TECHNOLOGY HOME REMOTE PRO
- FOCAL IS IPOD SPEAKER SYSTEM
- NUMARK IPOD TURNTABLE

PLUS Best of the Best, Editors' Blogs, and the No BS Podcast

Nvidia GeForce GTX 295

The boys in green strike back at the 4870 X2

We've made no secret of the fact that we love the pulse-pounding speed that ATI's Radeon 4870 X2 boards deliver, but there's a new speed king in town—the GeForce GTX 295. On paper, the two GPUs on the 295 fall somewhere between the GTX 260 and GTX 280, but this board delivers a crushing performance blow to ATI's fastest part.

The GTX 295's GPUs feature 896MB of GDDR3 memory and the full complement of 240 shader cores previously seen only on GTX 280 boards (current GTX 260 boards have just 216 shader units). However, the core and memory clocks are a touch below those of the single-GPU GTX 280 boards—576MHz and 999MHz, respectively. Additionally, the new GPU is Nvidia's first to step down from a 65nm process to a more efficient 55nm process. The benefit? Mega-speed in one double-wide card. Even with the process-size shrink, the card requires a new mid-mounted cooler—that's right, the heatsink and fan are sandwiched between two boards, each with its own GPU and memory.

Naturally, the card is outfitted with all the accoutrements we've come to expect, including a pair of dual-link DVI ports and a single HDMI port. Like the rest of the cards in the GeForce G200 series, the GTX 295 also supports general-purpose GPU computing, using both the open OpenCL platform as well as Nvidia's proprietary CUDA platform. While we're optimistic about the promise of general-purpose GPU computing, we don't see any proprietary API gaining enough traction with consumers and developers to make a long-term impact. The same is true for Nvidia's PhysX accelerated physics API. With just a handful of games supporting PhysX acceleration, and then only for superficial eye candy, we'll continue to base our purchasing recommendations on performance in popular games rather than proprietary APIs that may or may not gain mainstream popularity.

So where does that leave the GeForce GTX 295? With this board, Nvidia has shown that it can build kick-ass technology and doesn't need to hide behind proprietary APIs to protect and expand its market. The GTX 295 is demonstrably faster than the Radeon 4870 X2 in every benchmark we use. And that makes our recommendation easy, without even considering PhysX or CUDA. **—WILL SMITH**

BENCHMARKS

Driver	181.2	8.12	180.48
Crysis 4X AA, Very High (fps)	**30.1**	29.6	18.35
Crysis No AA, Very High (fps)	**36.83**	31.6	22.28
Call of Duty (fps)	**115.5**	106.5	68.09
Vantage Game 1 (fps)	**28.98**	19.2	17.32
Vantage Game 2 (fps)	**21.86**	18.9	13.11
Far Cry 1920x1200 High Quality, No Physics, No AI (fps)	**80.9**	68.48	52.2
Far Cry 1680x1050 High Quality, No Physics, No AI (fps)	**87.7**	72.15	58.7

Best scores are bolded. Benchmarks are run on an Intel Core 2 Quad Q9770 Extreme, with 4GB of memory running Windows Vista. 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.

MAXIMUMPC KICK ASS!

VERDICT 9

NVIDIA GEFORCE GTX 295

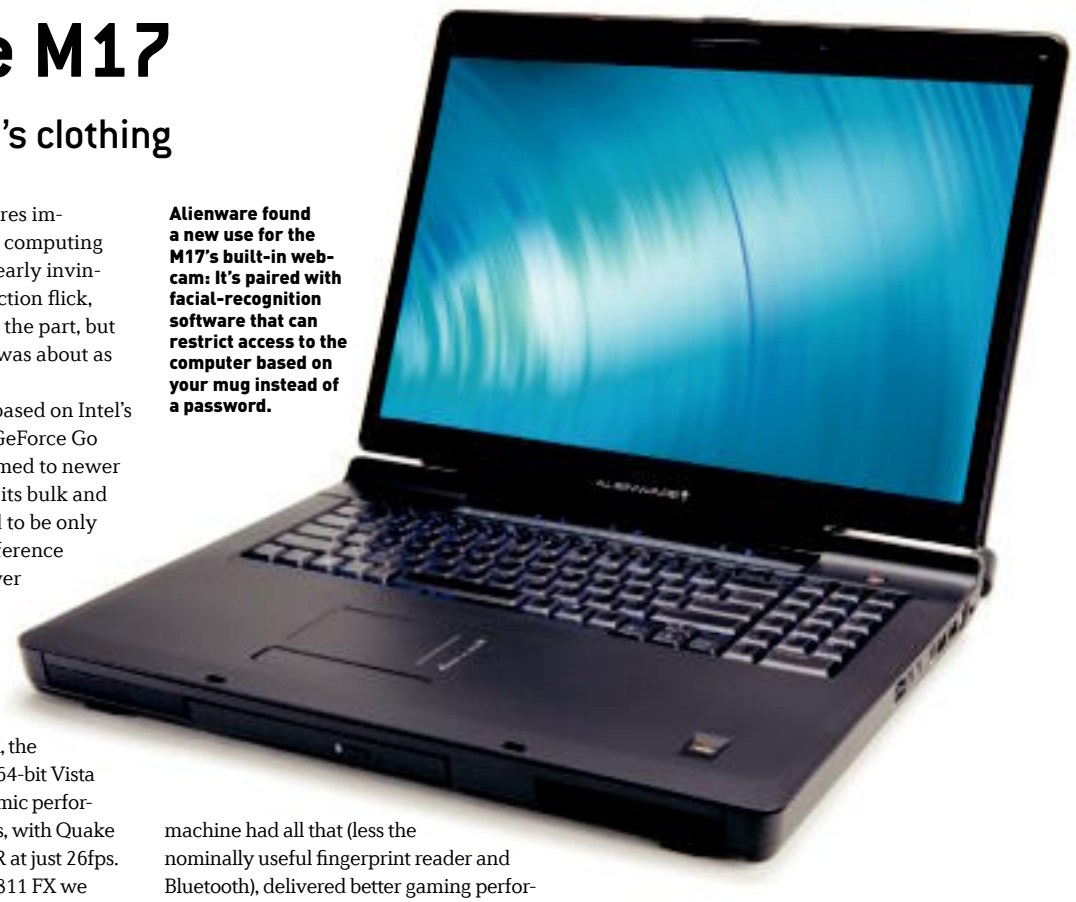
+ LITA FORD	− EDSEL FORD
Blazing speed in a single double-wide card.	PhysX support still basically superfluous.

$500 (street), www.nvidia.com

By sandwiching the cooler between two individual PCBs, Nvidia was able to juice top-class performance from the GeForce GTX 295.

Alienware M17

An E.T. in Predator's clothing



Alienware found a new use for the M17's built-in webcam: It's paired with facial-recognition software that can restrict access to the computer based on your mug instead of a password.

The Alienware brand conjures images of powerful and elite computing hardware—think of the nearly invincible antagonist from the 1987 action flick, *Predator*. Alienware's M17 looks the part, but the unit we received for review was about as dangerous as E.T.

Our zero-point notebook is based on Intel's Core 2 Duo E6700 and Nvidia's GeForce Go 8600M, so we've grown accustomed to newer challengers gutting it. But for all its bulk and menacing looks, the M17 proved to be only slightly faster than that aging reference rig, and it was considerably slower in our nongaming benchmarks than the HP HDX 18 we reviewed in January.

Despite the presence of two ATI Mobility Radeon HD 3870 GPUs running in CrossFire X, the M17, which came equipped with 64-bit Vista Home Premium, turned in an anemic performance in our gaming benchmarks, with Quake 4 clocking in at 119.2fps and FEAR at just 26fps. Compare that to the Gateway P-7811 FX we examined in our October issue, which pumped out Quake 4 at 133fps and FEAR at 108fps.

We knocked the HDX 18 for its portly proportions, but the M17's lap weight is more than half a pound heavier, despite having a single 160GB hard drive to the HP's dual 320s, 3GB of DDR3 memory to the HP's 4GB of DDR2, and a 17-inch screen compared to the HP's monstrous 18.4-inch display. Could the extra GPU really weigh that much?

Outfitting this particular M17 with middle-of-the-road components—including an Intel Core 2 Duo Mobile P8400 and an 8x DVD burner—enabled Alienware to price this review unit at $1,750. You do get a long list of features for your dough, including a seven-in-one media card reader, an 802.11n Wi-Fi adapter, Bluetooth, eSATA, a webcam, a fingerprint reader, and HDMI, but the aforementioned Gateway machine had all that (less the nominally useful fingerprint reader and Bluetooth), delivered better gaming performance, and cost $350 less.

This being a desktop replacement, we didn't have high expectations for the M17's battery life, but we were surprised that its nine-cell crapped out after just one hour and 38 minutes. The six-cell battery in HP's HDX 18 outlasted it by a full 10 minutes. And it's a shame that the M17's speakers sound so absolutely dreadful, because this system runs almost silently.

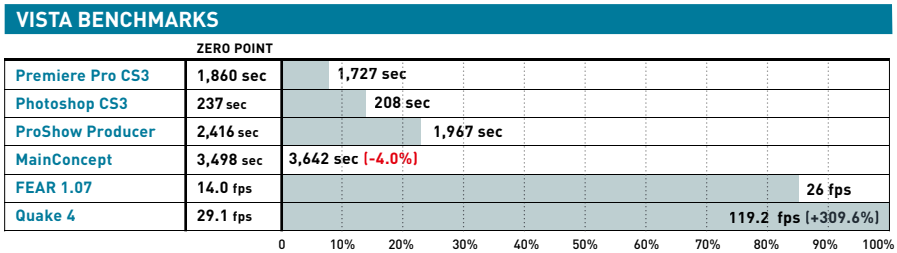
We do, however, dig the Alienware's finish. The glossy piano black that's so popular these days looks sexy—until you handle the device, and then every scratch, smudge, and fingerprint shows up like a cold sore. The M17 is wrapped in a matte black, rubberlike material that rejected our every attempt to muck it up; at least until we rummaged through a bag of greasy potato chips. Even then, it took nothing more than a dry tissue to restore its luster.

As configured, this Alienware M17 doesn't serve any particular mission well: It's too heavy for frequent road trips, it's not powerful enough for hardcore gaming, and without a TV tuner or Blu-ray drive, it's not much of a media system. —MICHAEL BROWN

SPECIFICATIONS

CPU	Intel 2.6GHz Core 2 Duo P8400
RAM	3GB DDR3 SDRAM
CHIPSET	Intel PM45
HARD DRIVE	160GB Seagate Momentus (7,200RPM)
OPTICAL	Optiarc AD-7590S DVD RW
GPU	Dual ATI Radeon HD 3870 (CrossFireX)
BOOT/DOWN	73 sec/21 sec
LAP/CARRY	9 lbs, 8 oz/11 lbs, 6 oz

VISTA BENCHMARKS



Our zero point notebook uses a 2.6GHz Core 2 Duo E6700, 2GB of DDR2/667 RAM, an 80GB hard drive, GeForce Go 8600M and Windows Vista Home Premium.

VERDICT **5**

ALIENWARE M17

+ ETHEL M	− COLD ETHEL
Hip finish, luscious display, cool backlit keyboard.	Heavy, unimpressive gaming performance, terrible speakers.

$1,750, www.alienware.com

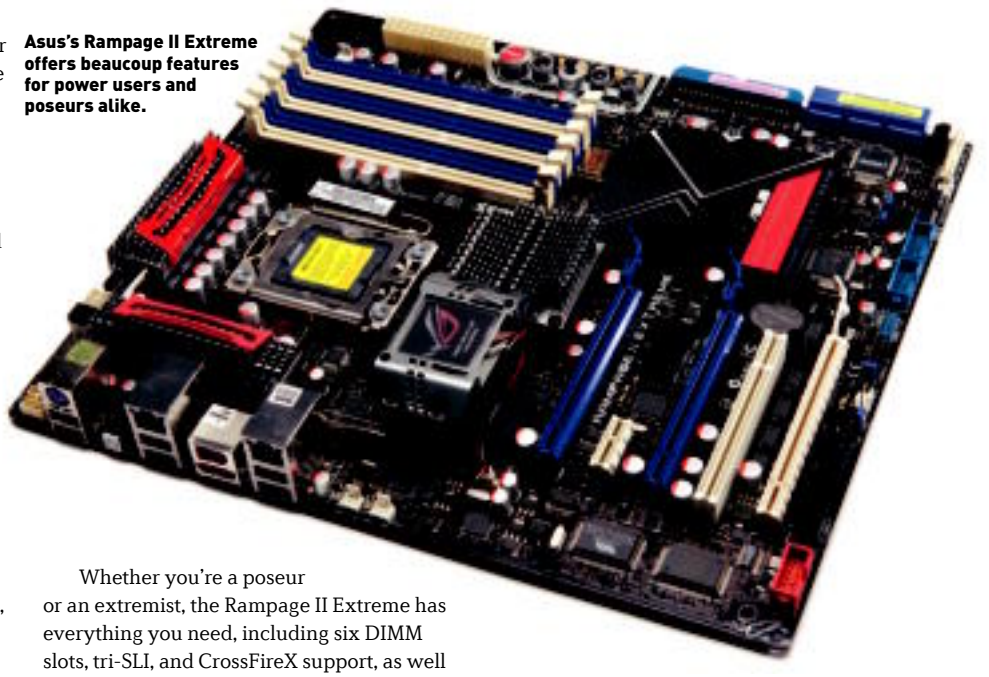
Asus Rampage II Extreme

Asus takes extreme to, well, the extreme

To run Asus's $400 Rampage II Extreme board you'd have to be either extreme or the world's biggest poseur. How extreme would you have to be? You'd have to be the type of person who boils liquid helium atop his CPU to keep it cool. And because you can't waste time overclocking from within the OS, you'd want to reach your hands into the guts of your case and use the board's PCB-mounted controls that let you check and change voltage, fan speeds, and temps on a tiny one-line LCD external display.

In fact, you'd be so damn hardcore, you wouldn't even fully trust those voltage readings from the board. Instead, you'd want to hook your Fluke meter directly to the available ports on the board to check the voltage of the CPU, the PCI Express lanes, and the north bridge directly. That's how badass you'd be.

OK, but what if you're just a poseur? Don't worry, you're set, too. Just fire up the OS applet, set your 3.2GHz Core i7-965 to "i7-crazy-4.0," and you're good to go. Now people will think you're an extreme overclocker when all you did was let the board do the work for you.



Asus's Rampage II Extreme offers beaucoup features for power users and poseurs alike.

Whether you're a poseur or an extremist, the Rampage II Extreme has everything you need, including six DIMM slots, tri-SLI, and CrossFireX support, as well as licensed Creative audio support that gives you up to EAX4. There are some problems, however. Our biggest issue is that Asus still can't seem to get Turbo mode to work correctly. You should be able to set Turbo mode based on the thread load on the CPU, but Asus only lets you overclock all cores simultaneously. We also felt overwhelmed by the applets on the board. Between the controls for AI Suite, TurboV, TweakIt, and EPU-6, we couldn't keep straight what each tool did, and ultimately ignored them all.

You can manually set voltages and fan speeds and check the temps on various parts of the Rampage II Extreme right on the board.

As we've noted in previous reviews, differences in how motherboard vendors treat their BIOSes and Core i7 overclocking options make it difficult for us to run an exact apples-to-apples comparison among boards. For what it's worth, though, the Rampage II Extreme fell right into the middle of the pack in our benchmarks. With BIOS updates for i7 boards arriving on a monthly schedule, it's clear that third-party boardmakers are still trying to get a handle on the brave new world of Core i7.

So, say you're not *that* extreme nor do you want to appear to be, well then, we think you're probably better off with a different, less expensive board. **—GORDON MAH UNG**

BENCHMARKS

	Asus Rampage II Extreme	Intel DX58SO / 403
PC Mark Vantage x64	**7,117**	7,082
ProShow (min:sec)	9:36	**9:12**
MainConcept (min:sec)	**17:25**	18:00
3DMark Vantage CPU	**48,329**	45,424
HD Tach (MB/s)	**220**	185
Valve Particle test	**168**	155
Quake 4 low	**246**	224
Everest Ultimate Copy RAM (MB/s)	**20,232**	19,182
Everest Ultimate Latency RAM (ns)	32.4	**31.9**
Sisoft Sandra RAM (GB/s)	**27.3**	26.3

Best scores are bolded. Our test bed consists of a Core i7-965 Extreme Edition CPU, 6GB of Corsair DDR3/1600, an EVGA GeForce 280 GTX videocard, a PC Power and Cooling TurboCool 1200 power supply, a WD Raptor 150GB drive, and Vista Home Premium 64-bit. HD Tach scores were achieved using an Intel X25-M SSD.

VERDICT 9

ASUS RAMPAGE II EXTREME

+ CORVETTE	− CHEVETTE
If you like adjusting BIOS settings such as CPU Differential Amplitude, the Extreme is for you.	Turbo mode doesn't work correctly, and the toggle switch is difficult to use.

$400 (street), www.asus.com

Hardcore Reactor

Can the most radical PC in years live up to the hype?

With all this oil, the Reactor could double as a deep fryer!

We've never—ever—seen a PC like Hardcore Computer's Reactor. Who the hell, after all, would dunk a CPU, GPUs, SSDs, a proprietary motherboard, and a power supply in non-conductive oil? We've seen submerged PC projects since as early as 1998, but they've always looked like a PC that ran *Titanic*-style into an iceberg, with half the components sinking to the bottom of the tank.

The Reactor, however, feels solid. It's made of fabricated heavy-duty aluminum and is so stunningly gorgeous that it could easily be dropped onto a movie set as a nuclear-powered PC from 2112.

Heck, there are even some hardware exclusives here. The Reactor is the first machine to have a full, real EAX5-capable X-Fi chip in it. And in another first, Hardcore somehow managed to use *three* of Samsung's new 256GB SSD drives—that's 768GB of fast solid state storage, kiddies. In graphics, we didn't get Nvidia's latest GTX 295s, but Hardcore does manage to stuff in three GTX 280 cards. All this was fitted to the custom nForce 790i SLI board with Intel's previously top-of-the-line 3.2GHz Core 2 Extreme Edition at 4GHz. And, of course, almost all of it was sunk in heat-conductive oil.

So how does a small company with some 30-odd employees build a completely custom machine without problems? It doesn't. And frankly, we're not surprised. There's a reason large OEMs stick with off-the-shelf parts: There's little that can go wrong and little extra engineering required.

When pushed hard at 4GHz, one of the Core 2 Extreme's cores would error out in Prime95. Other rigs have failed the same test, including the Uberclok Fury that we reviewed in January, but Uberclok was able to correct the problem by having us add additional core voltage to the CPU—and its rig was *air cooled* and used the far cheaper Core 2 Quad Q9650. No amount of voltage would fix the Reactor's error, despite the rig's exotic oil cooling.

And then there's performance. The record holder for the bulk of our application benchmarks is Velocity Micro's Core i7 Raptor Z90 (Holiday 2008). The Reactor couldn't come close to its scores. In fact, the Reactor ran in the middle of the pack when compared with other 4GHz Core 2 boxes. This rig isn't slow, but it didn't whip the snot out of, say, the AVA Direct PC that we reviewed in December or January's Uberclok PC.

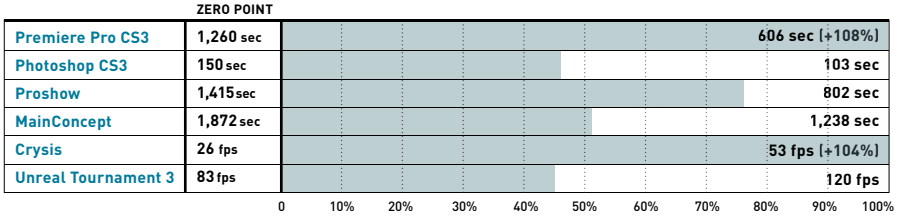
That left us a little uneasy. As glorious as its design is and as frakking cool as it looks, where exactly is all this amazing technology paying dividends? Not in overclocking and not in performance.

As disappointed as we were, we still think there's hope. There is a hell of a lot to get wrong when you reinvent the wheel, the spoke, and the ground it rolls on. Hardcore should still be applauded for trying to move the PC forward. Let's just hope Reactor 2.0 moves it even further along. —GORDON MAH UNG

SPECIFICATIONS

PROCESSOR	Intel Core 2 Extreme QX9770 (3.2GHz@4GHz)
MOBO	Custom-designed Tyan using nForce 790i SLI
RAM	4GB DDR3/1600
VIDEOCARD	Three GeForce GTX 280 SLIs in tri-SLI
SOUNDCARD	Custom integrated X-Fi
STORAGE	Three Samsung 256GB SSDs in RAID 0, two 1TB Samsung F1s in RAID 1
OPTICAL	Sony slot-load Blu-ray combo drive
CASE/PSU	Custom

VISTA 64-BIT BENCHMARKS



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 run two EVGA GeForce 8800 GTX cards in SLI mode, Western Digital 150GB Raptor and 500GB Caviar hard drives, LG GGC-H20L, Sound Blaster X-Fi, and PC Power and Cooling Silencer 750 Quad. OS is Windows Vista Home Premium 64-bit.

VERDICT 6

HARDCORE REACTOR

+ ANCO WIPERS

Will make your friends think your PC is from the future.

– RAINX WIPERS

Heavy and doesn't overclock as well as you'd expect it to.

$10,785, www.hardcorecomputer.com

The CSX 128GB SSD's potential is marred by severe write-speed issues.

CSX 128GB SSD

Great read speeds, but a terrible Achilles' heel

As the price of NAND flash memory drops to record lows, more and more hardware vendors are getting into the solid state drive business—and why wouldn't they? A standard hard drive has lots of moving parts, but a solid state drive is nothing more than a few NAND flash modules, a controller chip, some PCB, and an enclosure. CSX is well known in Europe as a producer of aftermarket RAM for Apple products, and its Diablo gaming RAM has started making waves in the United States. But this 128GB multilevel cell (MLC) SSD marks the company's first foray into the solid state market.

Single-level cell (SLC) SSDs typically have better write speeds than multilevel cell drives, but MLCs are more common because they're much cheaper. We've tested a few standout MLCs, including Intel's X-25M, but most of the multilevel cell drives we've benchmarked have suffered from poor write speeds.

The CSX SSD's read performance of 114MB/s is second only to that of Intel's X25-M, which clocked in at 206.6MB/s. However, write performance, at 25.58MB/s, is only slightly better than that of bottom-of-the-barrel drives from RiData and Super Talent (reviewed as part of our SSD roundup, http://tinyurl.com/9qvwyd). It's no match for SLC drives like Memoright's MR25.2-032/64S (http://tinyurl.com/9jnjqg), but, more importantly, it doesn't come close to reaching the 100MB/s write time the company's literature claims the drive can achieve.

The CSX garnered the worst Premiere Pro score of any SSD we've tested and a PCMark Vantage score that puts it firmly in the middle of the pack—it's better than RiData's Ultra-S Plus and Super Talent's MasterDrive DX, worse than the other drives in our roundup, but not even close to our reigning champion: the Intel X-25. Large-file (greater than 504MB) random-access write times were similarly poor at 107.7ms, with max latency at nearly a full second and average large-file latency hitting 218.8ms. The Intel X-5-M, by contrast, has an average random-access write speed of just .09ms.

A peek under the hood of this drive revealed the same JMicron JMF602 controller that's used in other write-crippled drives, such as Super Talent's MasterDrive DX and OCZ's Core. Most SSD manufacturers have stopped using this controller; we hope CSX will do the same in future iterations of the drive.

—NATHAN EDWARDS

BENCHMARKS

	CSX 128GB SSD	Intel X25-M	Western Digital Velociraptor
Capacity	128GB	80GB	300GB
Average Sustained Transfer Rate Read (MB/s)	114.56	**206.65**	**98.31**
Average Sustained Transfer Rate Write (MB/s)	25.58	64.30	**98.22**
Random Access Read (ms)	0.18	**0.12**	7.24
Random Access Write (ms)	107.7	**0.09**	3.42
Premiere Pro (sec)	708	621	**383**

Best scores are bolded. All drives were tested on the same machine; a stock-clocked Intel Q6700 on an EVGA 680i SLI board with SATA II connections, using h2benchw, HD Tach Raw 3.0.1.0, Premiere Pro CS3, and PCMark Vantage 2005.

VERDICT 4

CSX 128GB SSD

+ FEAR	− LOATHING
Takes second place in read performance. Decent price/capacity ratio.	Unacceptable latency cripples write performance.

$290, www.csx-memory.com

NEC EA261WM

You spin me right round baby, right round

Our initial impression of NEC's widescreen 26-inch EA261WM LCD monitor was overwhelmingly positive, primarily due to the thought put into its ergonomics. What puzzles us most about monitor design is why—even with obscenely expensive panels—user comfort is so often overlooked. If you're planning on shelling out a load of cash for a monitor, something as simple as height adjustment (rather than the default homebrew solution of piles of books) seems like an obvious feature. The EA261WM includes not only height adjustment but pivot, tilt, and swivel adjustments as well, making it easy to share information on your screen with coworkers or even switch to a portrait configuration, should the need arise.

The EA261WM is also one of only 26 monitors to achieve EPEAT's gold rating, the highest standard for environmental friendliness. To further emphasize its green attributes, the monitor includes an ECO mode, which lowers power consumption, and a carbon-footprint reader tells you just how much you're doing to save the planet by lowering the brightness on your monitor.

While we're all for good industrial design and eco-consciousness, we're not interested in gaining these attributes at the cost of performance, and we continued to be impressed by the EA261WM after we loaded up a collection of high-res images. During our high-def side-by-side image comparisons, we were happy with the panel's ability to display deeply saturated colors which, while rich, never slipped in to the realm of cartoonish. But while we found the monitor's color depth top-notch, the EA261WM had serious issues differentiating grayscales at the dark end of the spectrum. We observed a strong loss of detail in both black-and-white and color photos. In portraits, people's hair lacked detail, looking like a single-colored mass, where other displays showed off more texture and slight changes in color. Similarly, the tree line in a sunset landscape looked like a solid mass rather than the individual tress that appeared on other monitors.

This same issue presented itself in our movie test—some particularly dark scenes in *V for Vendetta* came across as a mass of black, rather than a range of black and grays. Utilizing the monitor's video mode helped with this issue by increasing the contrast ratio; however, the preset also ratcheted up the brightness so much as to make some night scenes look as if they were taking place in the daytime.

NEC's EA261WM offers a wealth of ergonomic adjustment options.

Our DisplayMate (www.displaymate.com) tests backed up what we saw in our real-world benchmarks. The EA261WM performed admirably at the white end of the suite's grayscale test, showing good distinctions between colors almost to the end of the scale; however, at the dark end of the spectrum, the monitor failed to shine, showing little differentiation through eight steps in the test.

With its wealth of ergonomic adjustments, we could see the EA261WM being a hit in the workplace, particularly if you need to share what's on your screen with people close to you; however, while the panel's rich colors impressed us, we found its trouble with darker shades to be an issue, making it a poor choice for people working with photos or video. —TOM EDWARDS

SPECIFICATIONS

VIEWABLE AREA	26"
PANEL TYPE	TN
RESOLUTION	1920x1200
INPUTS	DVI-D, VGA

VERDICT 7

NEC EA261WM

+ RATT	− RATS
Great ergonomic options; eco friendly.	Poor performance in grayscale testing

$600, www.nec.com

Zalman CNPS9900 LED

Another copper-finned masterpiece

When Zalman told us its new CNPS9900 LED was the best CPU air cooler ever, we took the news with a grain of salt. For more than a year, the company's CNPS9700 LED had been our top air cooler, until Thermaltake's DuOrb usurped Zalman's place at the top of the heap in our July 2008 issue. Can the CNPS9900 retake the cooling throne for Zalman?

In a word, yes. This copper-finned monster outperforms the Thermaltake DuOrb across the board, keeping our test bed's CPU an average of three degrees cooler than the DuOrb was able to at both idle and full burn, making it the best CPU air cooler we've ever tested.

Each of Zalman's CNPS9000 series coolers has been larger than the last, and the CNPS9900 is no exception—at 3.7"x5.5"x6.24", it's about half an inch wider than the 9700 and almost three-quarters of an inch taller. That's big, all right, but still not the largest air cooler we've tested—not by a long shot. The CNPS9900 is instantly recognizable as kin to the rest of the CNPS9000 series, although this time its trademark copper radial-finned heatsinks are on either side of the 120mm blue LED fan, with two in the front and one in the rear. A plastic shroud surrounds the fan and gives your fingers a safe place to grasp, but it can be removed for better performance, though doing so increases the risk of chopping up errant cables or fingers. The CNPS9900 is slightly louder than the CNPS9700 at full bore, but certainly not deafening.

Installation is easier than it was with the CNPS9700, although if you're on a Socket 775 or 1366 board you'll still have to remove your motherboard to install the back plate. Be warned, however: Like its predecessors, the CNPS9900's fins are apt to draw blood from the careless installer. But given this cooler's performance, we figure maybe the CNPS9900 simply requires a blood sacrifice to kick-start whatever unholy deal it made in exchange for ultimate cooling power. And we're OK with spilling a little blood to get top-notch performance. —NATHAN EDWARDS

BENCHMARKS

	Zalman CNPS9900	Thermaltake DuOrb	Stock Cooler
Idle (C)	**29.8**	33	37
100% Burn (C)	**46.8**	49	68

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.

MAXIMUM PC KICK ASS!

VERDICT **9**

ZALMAN CNPS9900 LED

+ HEINZ	− HUNT'S
Powerful performance, slightly easier install. Includes Socket 1366 bracket.	Intel install still requires mobo removal; fins may draw blood from careless users.

$90, www.zalman.com

The big, bold Zalman CNPS9900 takes the air-cooling crown.

Asus Eee 1002HA

This netbook hits the style/performance sweet spot

A netbook that's stylish and quick on its feet.

The latest in Asus's ever-expanding line of Eee netbooks is a welcome addition to the fold, and much more to our liking than the 901 model we reviewed in December.

Eschewing the previous model's unremarkable white plastic exterior for a brushed aluminum shell is a smart move on Asus's part. This changed aesthetic adds legitimacy to the product: The 901's finish made the device feel disposable, while the 1002HA feels like a real computer.

More importantly, the 1002HA Asus sent us forgoes the pair of low-performance, ultra-low-capacity solid-state drives that bumped up the Eee 901's price while wreaking havoc with its Photoshop performance (owing to the poor write speeds of cheap MLC SSDs). Instead of SSDs, the 1002HA sports a much more generous 5400rpm 160GB standard hard drive. And it really pays off: The 1002HA breezed through out Photoshop benchmark in just 690 seconds—40 seconds faster than the Acer Aspire One, our prev-ious champion, and less than half the 1,530 seconds the Eee 901 took to accomplish the same task.

With a 10.2-inch screen and a 2 lb, 12 oz lap weight, the 1002HA is on the larger end of the netbook spectrum, and the keyboard, thankfully, is much less cramped than the 901's, although it's still janky—after only a few hours of use, our backspace key began squeaking and our left arrow key clicked loudly.

In fact, the only thing we miss about the 901 is its six-cell battery. We're not complaining too much, though; even with a two-cell battery, the 1002HA lasted for more than three hours on our video rundown test. That's a 50 percent improvement over any three-celled netbook we've tested, if not quite the six hours its predecessor boasted.

The rest of what Asus packed under this puppy's hood is so standard as to nearly go without saying: a 1.6GHz Intel Atom processor with 1GB of RAM, an integrated webcam, and Windows XP. Nothing we haven't seen five times before. Asus has integrated its multitouch trackpad again, which is nice—a two-finger dragging gesture means you'll never miss your scroll wheel, while a three-finger tap is a right-click.

We dig the Eee 1002HA's newfound sense of style, more comfortable keyboard, great battery life (for a two-cell), and kick-ass Photoshop scores. We still think the Acer Aspire One is a cheapskate's best friend and the HP Mini 1000's keyboard is beyond compare, but we wouldn't hesitate to recommend this Eee to anyone who wants a hard-working, long-lasting netbook.

—NATHAN EDWARDS

BENCHMARKS

PHOTOSHOP (sec)	690
BATTERY (hrs:min)	3:04
H.264	Yes
QUAKE LIVE	Yes

SPECIFICATIONS

DISPLAY	10.2" TFT WSVGA @1024X600
PROCESSOR	1.6GHz Intel Atom N270
CHIPSET	Intel 945GSE
GRAPHICS	Intel GMA50
RAM	1GB DDR2/667
STORAGE	160GB Seagate Momentus 5400rpm
PORTS	Three USB, audio in/out, multicard reader, VGA out, Ethernet
WIRELESS	Bluetooth, 802.11b/g
LAP/CARRY	2lbs 12 oz/3lbs 4oz

VERDICT 8

ASUS EEE 1002HA

+ HONDA	− BISON
Stylish, high-performing netbook with a roomy HDD, and three USB ports.	Still on the pricey side. Keyboard no match for the HP Mini 1000's.

$500, www.asus.com

The PX-850SA's 22x write capabilities are lost on today's 16x media.

Plextor PX-850SA

A better ripper than a writer

Last month we reviewed our first 22x DVD burner, Samsung's SH-S223; this month, Plextor presents us with a challenger in the form of the PX-850SA—a similarly spec'd drive that rises to the occasion in some respects, but falls short in others.

Like Samsung's new burner, the PX-850SA boasts an industry-leading 22x speed rating for DVD+/-R media. It lacks, however, the Samsung's over-speed feature, which helped that drive eke out a 4:46 (min:sec) Lab record when writing 4.38GB of data to a single-layer DVD+R disc. By comparison, the Plextor took 5:36, never breaching the 16x speed limit imposed by our Verbatim media.

The difference between the two drives' performance with double-layer media was more expected. After all, Plextor's PX-850SA is rated at just 8x when writing to DVD+/-DL, compared to the Samsung drive's rating of 16x. In practical terms, this means Plextor's drive took 16:33 to fill an 8GB disc versus the Samsung drive's time of 13:13.

But the Plextor PX-850SA did have its triumphs. As a new addition to our optical drive benchmarks, we test a drive's ability to rip the contents of a double-layer DVD to a hard drive. The PX-850SA had an average rip time of 10:43, while Samsung's drive was about 50 percent slower, with an average rip time of 15:26. We must note that Samsung's drive redeemed its ripping reputation—and then some—with a firmware hack, but Plextor's PX-850SA gets props for being the faster drive out of the box and for being competitive at rips against a host of other drives.

The Plexy also gets props for its good looks. The drive's stylish, shiny faceplate stands out against the generic facades of its peers. The PX-850SA further differentiates itself by coming bundled with Roxio Creator 10 CE as opposed to Nero's package of DVD playing and burning apps, although the two suites are pretty comparable.

In the end, we're talking about a solid-performing drive, but the PX-850SA still takes a backseat to Samsung's SH-S223.

—KATHERINE STEVENSON

BENCHMARKS

	Plextor PX-850SA	Samsung SH-S223
DVD+R Write Speed Average	11.81x	**14.94x**
DVD+R Read Speed Average	12.16x	12.16x
Access Times (random/full)	**113/175ms**	117/204ms
DVD+DL Write Speed Average	6.99x	**9.12x**
DVD Ripping (min:sec)	**10:43**	15:26

Best scores are bolded. Our test bed is a Windows XP SP2 machine using a 2.66GHz Intel Core 2 Quad Q6700, 2GB of Corsair DDR2/800 RAM on an EVGA 680 SLI motherboard, one EVGA GeForce 8800 GTS card, a Western Digital 500GB Caviar hard drive, and a PC Power and Cooling Turbo Cool PSU. All tests were conducted using Verbatim media and Nero CD DVD Speed, except the ripping test, whereby we time how long it takes to copy the contents of a double-layer DVD to a Velociraptor hard drive.

VERDICT **9**

PLEXTOR PX-850SA

+ OREOS	− HYDROX
Good DVD+R writes, competitive rips, SATA interface, good looks.	Adheres to 16x DVD+R media speed despite 22x write rating.

$75, www.plextor.com

D-Link DGL-4500 Xtreme N Gaming Router

A dual-band router in name only

Looking for a dual-band router so you can run two independent Wi-Fi networks, using one frequency band for data and the second for streaming media? Scratch the DGL-4500 off your list, because D-Link's definition of "dual-band" means operating on either the 2.4GHz band or the 5.0GHz band—not both at the same time.

When we think of a dual-band router, we envision something like the Linksys WRT600N we've been using as a reference point. That device has separate 802.11n Draft 2.0 radios that enable us to run two independent wireless networks. That's not to say the DGL-4500 is a lousy router; in fact, it delivered far superior performance at long distances than the WRT600N. Where the Linksys box is nearly useless when our Wi-Fi client is outside our test home—delivering throughput of just 0.7Mb/s at one exterior location and 1.2Mb/s at the other—the D-Link delivered exceptional throughput of 18.0Mb/s and 6.44Mb/s, respectively.

The DGL-4500 is also much easier to configure for use with Windows Home Server. While we had to manually configure port forwarding on the WRT600N in order to enable access to our server remotely from the Internet, the configuration wizard in Microsoft's consumer server OS was able to set everything up automatically on the DGL-4500. And gamers will appreciate D-Link's proprietary GameFuel technology, which analyzes network traffic and assigns higher priority to packets it identifies as being associated with games.

Although the DGL-4500 is equipped with a USB port, it's useful only for adding wireless clients using Microsoft's Windows Connect Now technology. Unlike the WRT600N, you can't plug a USB drive into the port and have the router serve double duty as a NAS box. The DGL-4500 exhibited impressive range and its gaming-oriented quality-of-service settings are handy for gaming, but that's not enough to dislodge the WRT600N as our favorite router. —MICHAEL BROWN

BENCHMARKS

Kitchen, 20 feet (Mb/s)	99.9	**105.0**
Patio, 38 feet (Mb/s)	65.3	**74.3**
Bedroom, 60 feet (Mb/s)	**50.4**	42.2
Media Room, 35 feet (Mb/s)	20.3	**29.8**
Outdoors 1, 90 feet (Mb/s)	**18.0**	0.7
Outdoors 2, 85 feet (Mb/s)	**6.4**	1.2

Best scores in each scenario are bolded. A detailed explanation of how we test Wi-Fi routers can be found online at http://tinyurl.com/8864wm.

VERDICT 7

D-LINK DGL-4500 XTREME N ROUTER

+ FAKIR	− FAKER
Excellent range, useful gaming-oriented QoS settings, informative display.	Not a true dual-band router, display automatically shuts off.

$170, www.dlink.com

The DGL-4500's OLED conveys much more information than the typical row of blinking LEDs, but the light show lasts only about two minutes before going dark. You must press a button to bring it back.

Flip MinoHD

Is that HD in your pocket?

We're big fans of Flip Video's incredibly easy-to-use pocket-size video cameras, but it's been difficult to wholeheartedly recommend them given the superior video capabilities of today's point-and-shoot digicams.

Flip's new MinoHD changes that. This svelte camera is the same size as the standard-def Mino (4"x2"x.06") but can record an hour of H.264-encoded 1280x720 720p video. The quality of the video ranges from fair to good, with noticeable video compression occurring on occasion. The MinoHD puts digicams and other SD-resolution microcams to shame; however, it's not the right choice for enthusiasts who put a premium on image quality. Footage shot with an HDV 1080i or even 720p cam will easily outclass the MinoHD.

But that's not what the MinoHD is about. This camera is all about spontaneity—the ability to whip out a camera at a moment's notice in order to capture HD video and share it. While larger-format cameras certainly produce better-quality video, they won't satiate the needs of your inner voyeur. Want to grab video of your buddy falling down a flight of stairs and get it on the Internet ASAP? The MinoHD will record the event in all its HD glory, and you can upload and edit your mini masterpiece from any computer with an Internet connection.

Once you've shot your video, flip out the built-in USB port, plug it into a PC, and you can upload the video as fast as your Internet connection will allow. The built-in app even has rudimentary titling and trimming capabilities. There are a few downsides, however: The camera is in bad need of a stabilizer and the composite-out video is a disappointment, but these issues don't outweigh the fun you'll have with this camera. **–GORDON MAH UNG**

The Flips MinoHD's miniature size and fairly good HD video make it the class leader for gonzo video.

FLIP MINOHD

VERDICT 9

+ THE WILD BUNCH	– THE BRADY BUNCH
Super portable and spontaneous HD video in your pocket.	Needs stabilization and HDMI port.

$230, www.theflip.com

LAB NOTES

Operation Firepower

Maximum PC teams up with generous vendors to build a war-ready machine

GORDON MAH UNG
SENIOR EDITOR

You'd think that with M2 Bradleys, up-armored HMMWVs, and MRAPs, the 4th Infantry Division would be set for firepower, but Uncle Sam neglected to provide the troops with one crucial piece of machinery—a loaded-out PC to enjoy in their off time.

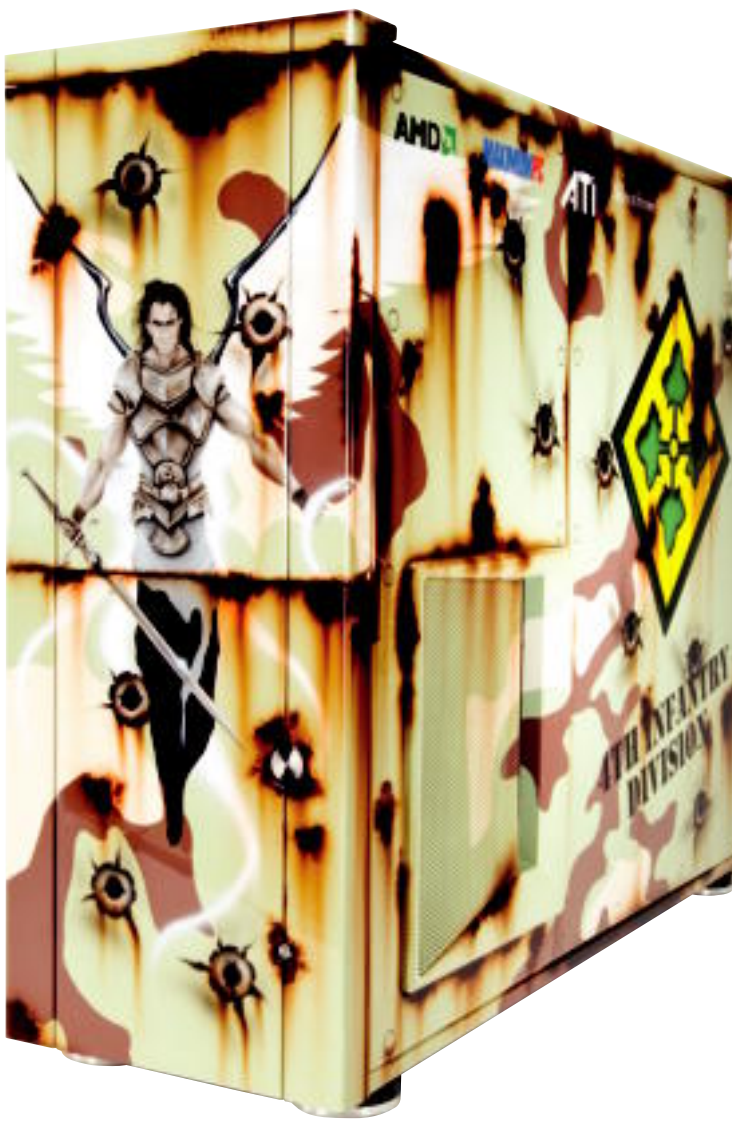
That's why Staff Sgt. Thomas Breen of the 4ID, 1st Battalion, 66th Armored Regiment decided to call on PC vendors and *Maximum PC* to help bring a little cheer to some grunts' holiday. Breen had originally hoped that vendors would simply supply some components for him and his buddies to build a gaming machine in Iraq, but seeing as how they have enough on their plates, we built the PC for them using donated world-class parts. Thanks to the help of Smooth Creations, Corsair, ATI, AMD, Western Digital, SilverStone, Asus, LG, Gateway, ThermalRight, Razer, and our sister mag, *PC Gamer*, we sent a serious kick-ass rig to the sandbox.

Our top-secret 4ID machine began its life as a SilverStone TJ10 case. That's nice enough for most people, but then Jim Sailing at Smooth Creations got into the act. Sailing applied one of his signature custom paint jobs to the TJ10 to turn the case into a truly one-of-a-kind machine with distressed rust, bullet holes, and unit art. Sailing used images of the unit's battle-scarred APCs and dusty HUMVEEs as inspiration for the paint job.

Once the painted case arrived at Maximum PC's Lab, we went to work. With help from Robert Pearce at Corsair, we assembled the rig using parts that would make the Dream Machine jealous. We started with Intel's top proc, the 3.2GHz Core i7-965 Extreme Edition. This continues to be the Godzilla of CPUs and leaves all other chips looking about as menacing as Mothra. We dropped the CPU into an Asus P6T Deluxe along with 6GB of Corsair Dominator DDR3/1600 RAM; a ThermalRight Ultra-120 was pressed into service for cooling. Next, we added a pair of dual-GPU ATI Radeon HD 4870 X2 cards, a 1,000-watt Corsair PSU, two 300GB Western Digital VelociRaptor drives, and a 1TB WD Caviar Black for backup. To finish it off, we added LG's GBW-H20L Blu-ray drive, Windows Vista Ultimate in 64-bit, a 24-inch Gateway monitor, and a Razer gaming mouse and keyboard. To help keep the troops entertained, *PC Gamer* stepped in with a big, fat bag of games. Just before Christmas, the machine was boxed up and sent off to Iraq, where it hopefully won't be crushed by a pallet of MREs.

Once there, the PC will be raffled off and the proceeds will be donated to Sgt. Luis Rosa-Valentin, who lost two limbs and his hearing to an IED attack last year. Breen tells us the PC should brighten someone's day, considerably.

Breen says the unit has seen some serious action lately—four



PC vendors and *Maximum PC* sent a little extra firepower, in the form of a kick-ass gaming PC, to the men and women in the 4ID.

members have been killed in action and 20 have been badly wounded during the group's 15-month rotation. Lately, the unit has been assisting Iraqi police in patrols; activities have ranged from clearing weapons caches to assaulting known enemy locations. The unit has also been patrolling areas that are known for lobbing rockets into nearby U.S. bases. The days technically end at 8 p.m., but more often than not, the unit will get called out on night missions, thus, "Sleep is like gold," Breen says.

So what games do they like to play in the Mechanized Infantry? Breen said most like to play Call of Duty 4 and COD: World at War. Go figure.

The artwork for the 4ID PC was inspired by the actual battle scars received in the field. Here, an M2 Bradley shows battle damage from an Explosively Formed Penetrator. Fortunately, the IED's damage was defeated by the Bradley's reactive armor and no one was injured.

Mechanized infantry patrol an Iraqi street, a dangerous assignment even with a Bradley backing you up.

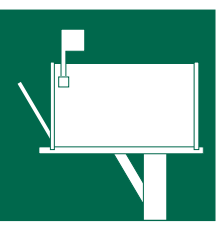
How cool is the 4ID PC? Former San Francisco 49er and three-time Super Bowl running back Roger Craig gives it the hang-loose sign after seeing the PC just before it shipped out from Corsair's headquarters.

***Maximum PC*'s own Gordon Mah Ung (stricken with the flu, no less!) and Corsair's Robert Pearce assemble the 4ID PC in the Maximum PC Lab positive-pressure clean room.**

We tackle tough reader questions on...

Norton Internet Security Fanboys

What's the deal with the blue gloves?



Is Norton AV Really Any Good?

I just read the January 2009 issue of *Maximum PC*. Once again, your magazine has given Norton Internet Security a 9 rating and a Kick Ass award. Of course, you're not alone in this area. Several other PC magazines have also rated NIS very highly. And all of these magazines, including yours, have done so in the past few years.

As a computer professional and a member of several computer groups, I know that real-world experience for a large majority of technicians reveals that NIS is a horrible program. It's a resource hog, it's not effective in preventing infections, it's a pain to navigate, it's even worse to try to remove, and it's the source of many other computer issues. Maybe Symantec has totally rewritten its product for 2009, but I will never recommend NIS for my clients ever again, based upon its shoddy performance the past several years.

When the techs in the trenches are grumbling and complaining and know that it just doesn't work, I cannot understand how PC magazines can highly recommend such a product.

–Scott A. Hartley

Contributing Editor Paul Lilly Responds: Actually, *Maximum PC* hadn't reviewed a Norton AV product in years; the most recent review we found was from 2005. Traditionally, we've ignored Norton because of its poor reputation. The best way to accurately gauge a security suite's protection level is to bombard the app with a multitude of viruses and other malware. Rather than try to accomplish this all on our own, we turned to an independent testing lab, Virus Bulletin, and scrutinized its results. We then subjected each security suite to our own collection of malware gathered from the wild, while also enlisting the help of Spycar.org and Eicar.org, a pair of websites that mimic spyware- and virus-like behavior with a collection of test files and scripts.

While ESET Smart Security passed our performance tests with flying colors and also earned a 9/Kick Ass award, the majority of reader comments called attention to Symantec's NIS 2009. While I can relate to your frustration with previous iterations of NIS, we review software objectively, free of any baggage previous editions may have had. With that in mind, we evaluated each of the products in our AV roundup with a fresh, unbiased eye, and Norton performed extremely well across the board. As power users, we can understand the skepticism, but give the 15-day free trial a spin and

CUTCOPY**PASTE**

In the comparative feature chart for our January antivirus roundup, we incorrectly noted that PC Tools lacks heuristics and email scanning. The free app contains both of these features.

NOW ONLINE

Become a Linux Netbook Power User

So you caved during the holiday season and decided to buy a netbook; unfortunately, you picked up a model that comes bundled with a bare-bones Linux OS (or worse yet, Windows XP). However, you can upgrade to a more versatile and powerful Linux distribution that's customized specifically for ultra-portables. Find out how in our guide to becoming a Linux Netbook Power User: http://tinyurl.com/88bseb.

I think you'll find this isn't like any previous Norton product you may have used in the past.

Free vs. Not Free

Why, in the January 2009 edition, did you choose to compare a free download version of Avast to the paid suites of other products? Why didn't you compare one of the most popular and highly regarded suites like Zone Alarm or Viroot?

—Roy Humphreys

Deputy Editor Katherine Stevenson Responds: We made a concerted effort to include free AV apps in our roundup because we know that many users who are aware of potential computing risks and use safe computing practices don't require the all-out protection of the paid suites or care for the bloat that can accompany the large packages. By comparing the paid apps to the freebies, we're able to tell you exactly what you sacrifice (if anything) when you decide to save a few bucks on your antivirus app. Since we couldn't cover the gamut of free apps available, we selected four we thought would have the most appeal to *Maximum PC* readers.

Boy, I'm a Big Fan

I don't understand what is going on with AMD these days. I'm a huge fanboy and I really liked the Thunderbird chips back when AMD was still king. Granted, that was a long time ago, but come on, AMD! Take the budget label off and start kicking ass again!

—Rio Acosta

Senior Editor Gordon Mah Ung Responds: You know, you don't actually sound like a fanboy. You're just very brand loyal to AMD, which is nothing to be ashamed of, especially with Phenom II here. A real fanboy would be espousing theories of an Intel conspiracy/bribe/death threat keeping people from knowing that Phenom is actually faster than Core i7. A real fanboy would crow about AMD being faster in one benchmark and then a month later, when Intel is ahead in the same test, explain how that benchmark is meaningless—and believe it. In short, a true fanboy is as unreasonable as a Mac user but at least has the common decency to use a PC.

THE GLOVES DON'T MAKE YOU LOOK GEEKY, THEY MAKE YOU LOOK LIKE A FREAKING SMURF.

Making the Digital Switch

For several months, there have been endless TV alerts and commercials about the government switching to digital broadcasting in February. I was wondering if there are any reviews or upcoming articles about things related to digital broadcasting (digital antennas, TV tuner cards and dongles, TVs, set-top boxes, etc.). I'm looking for either a tuner card or dongle to watch digital feeds and record them onto my hard drive or NAS.

–Edward

Editor in Chief Will Smith Responds: It's funny, for almost exactly the same reasons you listed, I've given up on the PC as a TiVo competitor. The switch from analog to digital is fraught with peril for the homebrew PVR builder. There's no good solution for HDTV capture other than over the air, and the big five networks simply don't have enough programming to make the hassle of setting up a DVR PC worth it. With CableCard effectively denying cable high-def to the homebrew builder, we don't see much reason to put a tuner card in your PC anymore. That said, there are still plenty of good reasons to have a PC in your living room. We'll be talking about the best way to put a PC in your entertainment center over the next few months.

Introducing the Blue Nerd Group

First, let me say how much I enjoy all aspects of Gordon's in-depth nuts, bolts, and guts hardware articles. I look forward every month to learning something new. But you have got to lose the blue gloves. You're working on a computer, not someone's brain. The gloves don't make you look geeky, they make you look like a freaking Smurf. Keep the great articles coming, but lose the gloves.

–Doug Hitch

Art Director Natalie Jeday Responds: There are two reasons I make everyone wear the blue gloves in photos. First, they provide better contrast than naked hands, so the hardware stands out better in photos with the gloves. However, the main reason I make everyone wear gloves in photo shoots is the abominable state of the editors' hands. No matter how much I've pleaded, I can't persuade them to get manicures. Much to my dismay, our editors don't see the value of a well-moisturized hand with properly trimmed cuticles and nicely shaped nails. The gloves are to spare you, the reader, from the ghastly site of their ragged paws. Sigh.

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.

COMING IN

MAXIMUM PC's APRIL ISSUE

BRIMMING WITH BUBBLY EFFERVESCENCE!

50 Requisite Geek Skills

Not just anyone can call himself a geek. The label implies a degree of inquisitiveness, knowledge, and ability not shared by average folk. Next month, we'll lay out the 50 skills that any real geek must have. Will you make the cut?

Core i7 Overclockers Guide

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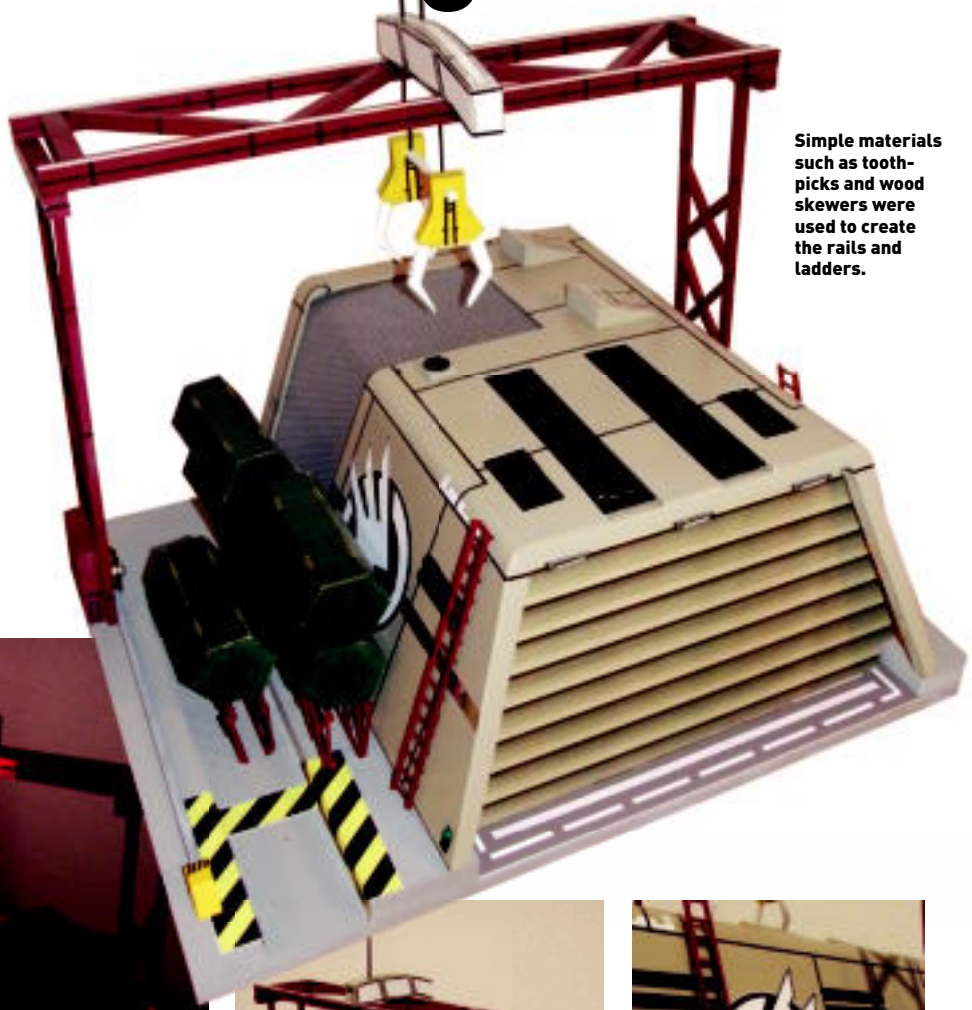
POWERFUL

GDI War Factory

When the Brotherhood of Nod crippled the forces of the Global Defense Initiative, Joyce Khowdee decided to take matters into her own hands and rebuild the faction from scratch. Well, not really, but we couldn't help but admire her efforts with this awesome mod.

This rig is modeled after her favorite game, Command & Conquer 3: Tiberium Wars, and all the components are housed in a Plexiglas frame replicating the GDI War Factory. From custom GDI logos to the side ladders and rails, every aspect of the structure was re-created in full detail. Hovering above the War Factory is a free-moving crane constructed of wood. In addition to this masterpiece, Joyce built a second structure to house the PSU: an Ion Cannon (not pictured). Don't be surprised if the GDI is using this kick-ass rig as part of its next attack.



Simple materials such as toothpicks and wood skewers were used to create the rails and ladders.

Red LEDs found on the Crucial Ballistix memory sticks illuminate the structure.

A meshed side was included to provide extra ventilation for the AMD Phenom 9600 and GeForce 9600 GT.

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