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inside

JULY 2011

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Illustrated by
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IN THE LAB

MORE +

MAXIMUM PC

George Jones

MY PRIVATE EMAIL HISTORY

MY FIRST ENCOUNTER WITH EMAIL was in my freshman year of college in 1988. I attended Dartmouth, and we had a system named BlitzMail. Every student was granted an email address and access to the system. Like most students, I didn't use it at all. It's hard for even me to believe, but back then I was in the habit of writing letters and postcards.

I vividly recall the tipping point, though. In 1989 in the middle of my sophomore year, I was eating lunch with a few freshmen who were talking about how great email was for chatting up women. I remember being shocked at the notion that these guys didn't have the courage to pick up the phone. Little did I know.

I'd be lying if I said that I took to email the next day. I didn't. It took three more years and my first job in *PC Week's* lab in 1992 to actually start using it. Like a lot of corporate workplaces, email was commonly used for interoffice communications. But the volume was manageable; I remember going two or three hours without new email. That sounds absolutely crazy now, but this was the era before SPAM even existed.

As more friends started working and came online, the postcard- and letter-writing days ended forever. (That lab job was also awesome because after four years of using a Mac in college, I was able to get back to PC gaming—after hours, of course.)

I'll be honest; I still love checking my inbox and discovering email—from friends, family, writers, readers, PR people, whomever—even if it has become a bit overwhelming. Between my work account and my personal accounts, I've never had trouble keeping up. Until now. This is partially what inspired this month's cover story. Over the last 18 months, I've begun to notice that my ability to quickly parse, read, and respond to email just isn't fast enough anymore. I need to develop new systems and shortcuts. I need to change my ways.

I'm curious—are you finding yourself in the same boat as I am? If so, what have you done to better manage your email life? Let me know at George@maximumpc.com.

Contest Winners

Finally, the winners of last month's challenge to identify the fake Google app icon. For those scoring at home, the correct answer was Google Storage. Here are the winners: Keith Lucas (who was the first correct response), Andy Man, Chris Brush, Bruce R., Bill Hortman, Louis Celli, Kyle Irwin, Sean McCormick, Wil Last, and Laura Carlson. Congrats, everyone! We'll have a new contest next month.

George Jones

↘ submit your questions to: george@maximumpc.com

THE NEWS

Windows 8: What We Know

Prerelease versions of Windows 8 have leaked to the web. Here's what they tell us about the upcoming OS

RECENTLY LEAKED BUILDS show that Windows 8 will be a very different OS from its forebears, from the kernel to the cloud. ARM processor support, mobile-device optimization, and system-wide menu tweaks abound. Here are some of the most interesting changes we've spotted so far.

ARM-ament
It's no secret that Microsoft wants Windows on tablets. To get there, Windows 8 will include support for ARM processors, as Steve Ballmer demonstrated at CES in January. That means it could compete with Android and iOS on slim, low-power devices—*if* Microsoft keeps bloat under control.

Windows 8 Explorer menus will apparently feature the same ribbon interface as Microsoft Office 2007 and 2010, though we may have the option of reverting to old-school menu bars.

Touch Optimization
The suckage of Windows touch screen interfaces has been, well, a touchstone of tech reality for more than a decade. But design elements from the login screen, task manager, and browser all point to tight integration of touch controls throughout the operating system. A touch-friendly login screen buried in the leaked code lets you unlock the device using a pattern rather than a password, in the same way Android does. Some short-lived YouTube videos (DMCA'd by Microsoft's legal team) also demonstrated gesture support.

Ribbons Galore
If you were among the throngs who hoped Office's ribbon menus would prove a passing phase, you'll be sorry to note that they're now pervasive in Windows Explorer. The good news is that it looks like you'll be able to revert these menus to a layout more similar to that of Windows 7.

Revamped Task Manager
Managing running applications—and being able to quickly kill resource-hogging tasks—is even more critical on mobile devices than it is on gaming rigs. The reconfigured tool, renamed Modern Windows Task Manager, will give you a single window from which to spot and kill the processes that are slowing down your system by combining the Resource Monitor and the Task Manager together. It also includes tap-friendly kill buttons for tablet users.

Immersive Browser
Some leaked screenshots from the Windows 8 alpha show a simple, full-screen browser that looks identical to the Metro browser included in Windows Phone 7, complete with a mosaic of little blocks for favorites and such. Once again, strong evidence that Microsoft is betting big on tablets as the future home of Windows.

Cloud Integration
At long last, it looks like Windows will get integrated cloud storage synching with Win8. In addition to Windows Live SkyDrive, which you'd expect the next Windows to support by default, it appears you'll be able to add third-party cloud storage services as mapped drives.

Portable Workspaces
The demise of U3 in 2009 left a void in the portable apps market that Microsoft helped to fill by cofounding StartKey in partnership with SanDisk. It now appears that Microsoft is integrating this technology directly into Windows 8 with a feature called Portable Workspace. Leaked screenshots show that USB drives of 16GB or larger will be formatted with a portable image of the user's Windows 8 system.

Of course, predicting final release features based on Windows alphas is always dicey. We need only recall all the cool features Longhorn was supposed to bring us, and then look at the reality of Vista, for a cautionary tale in the hazards of banking on Microsoft's leaked alpha builds. But if Microsoft has the sack to release all the features we're seeing in these early builds, Windows 8 could prove as significant a platform change as Win95.
–Robert Strohmeyer

Today's 32nm transistor passes electricity underneath a gate in a flat plane. On the right is the new 3D transistor which increases surface area, lowers leakage, and increases density.

Tom Halfhill
Fast Forward

HKMG FOR THE MASSES

FINALLY, THE SEMICONDUCTOR industry is catching up with Intel. Now, any chip designer can use transistors with high-k metal gates, which enable higher clock speeds and lower power consumption. It's the biggest advance in transistor technology in 50 years.

Intel announced high-k metal-gate (HKMG) transistors in 2003 and introduced them in 2007 with 45nm Penryn processors. AMD wanted 45nm HKMG, too, but couldn't pull it off. The first AMD chip with HKMG is the Llano Fusion processor, an integrated CPU/GPU. Llano is manufactured in a 32nm process and is finally hitting the market this year.

Now the wait is over. Independent chip foundries like GlobalFoundries (the AMD spin-off) and Taiwan Semiconductor Manufacturing Corp. (TSMC) are rolling out their 28nm HKMG processes this year. Any chip designers willing to pay the price can use HKMG transistors in their new designs. Test chips and engineering samples are looking good, so volume production will ramp up next year. The improved transistors will appear in some consumer products you'll buy in 2012.

Few of those products will advertise HKMG, but the benefits will be higher performance and greater power efficiency. It's coming in time for the next wave of smartphones, tablets, and other mobile electronics.

The "k" in high-k is the dielectric constant, a measure of electrical capacitance. The "gate" determines if the transistor passes current or not. Since the 1960s, transistor gates have been made of silicon materials. As transistors keep shrinking with each generation of fabrication technology, the gates keep getting thinner. Now they're so thin (only four atoms, in some cases) that they're leaking too much current.

Substituting exotic metallic materials for the silicon increases the gate's capacitance, so it's less leaky. Higher capacitance also permits higher drive currents, which allow higher clock frequencies.

The entire semiconductor industry now turns on such microscopic differences.

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

Intel Gets 3D Transistors

New 22nm design due next year in Ivy Bridge CPUs

Announcing a "revolutionary" breakthrough, Intel says its next CPUs will feature a 3D tri-gate design that allows it to pack transistors into less space—and more importantly, greatly increase performance while reducing power consumption.

While today's CPUs flow power through a flat surface, the new 3D tri-gate design builds up and out, much the same way a skyscraper does. By building three-dimensional gates, Intel says it can dramatically improve transistor performance. The upcoming 22nm tri-gate transistor will, for example, offer up to a 37 percent increase in performance over a 32nm planar transistor. The same tri-gate will also reduce power by up to 50 percent when the transistor is switched on.

The upshot is that the next-generation Ivy Bridge CPU (the sequel to Sandy Bridge) is likely to offer higher clock speeds while consuming less power. Or tweaked for a mobile application, Ivy Bridge could offer more performance while consuming less power.

The first Ivy Bridge–based processors aren't expected until the first half of 2012, and they will go into desktops, laptops, and servers. To demonstrate how well the technology is already running, though, Intel showed off an Ivy Bridge–based PC running Windows 7 and Need for Speed via its integrated graphics processor, as well as a server running SUSE Linux.

Perhaps more importantly, the 3D tri-gate when applied to an Atom chip could finally put the little x86 processor on the same power footing as today's very popular ARM chips, which are used in tablets and smartphones. Intel didn't reveal details of when Atom would get the new 3D transistor, but most expect it by 2013 at the latest. **–GU**

An electron microscope image of Intel's new 3D tri-gate transistor shows the gates (in green) with current running through (in white).

Thomas
McDonald
**Game
Theory**

WHEN THE DEALIN'S DONE

ON APRIL 15, thousands of professional Internet gamers were put out of work by the U.S. Justice Department.

You didn't realize there were so many people who derived some or all of their income from online gaming? Well, if poker isn't a game, then I'm not sure what it is. And thousands of people—many of them college students and the unemployed—played poker online to support themselves, right up until the Justice Department decided to pull the plug.

Technically, Internet gambling isn't illegal, or at least not clearly illegal. When the Bush administration rammed through the Unlawful Internet Gambling Enforcement Act of 2006 (the UIGEA) as a last-minute addition to a port security bill, they didn't bother to really define "unlawful Internet gambling." Instead, they opted to deny the financial tools commonly used for e-commerce (extension of credit, electronic fund transfers, etc.) to any enterprise transmitting a wager to any location where that wager is illegal.

But these laws, which are different for each state, simply can't be applied to something like Internet poker. Plus, all of the major poker sites were based offshore, bringing international law into the picture.

President Obama, in his mysterious efforts to cement his reputation as The Second Coming of George W. Bush, decided to pick up the UIGEA ball and run with it. Thus, on April 15, the Justice Department seized the domains for Full Tilt Poker, PokerStars.net, and Absolute Poker; froze billions in assets; and arrested 11 of their executives. These three weren't chosen at random: They are the three largest online poker sites.

If you were a casual online player, you may miss the thrill of playing for real money. But if you relied on that income, you woke up on poker's Black Friday to find your world gone. Rather than taking on the complex task of defining and perhaps even regulating Internet gambling, the government simply destroyed it.

You can follow Thomas McDonald on Twitter at StateOfPlayBlog.

What's in Store for YouTube?

News abounds over the future of YouTube. First came word that Google is developing "channels" for its popular video site, which would be categorized by topic, such as arts or sports, and feature longer-form, professionally produced original programming.

It's a logical move as more people access online content from their living rooms. Successes by Netflix, Apple, and others in this arena are hard to ignore. It would also give YouTube a better chance of selling ads.

In other news, the site is reportedly on the verge of launching a premium movie rental service. Warner Bros., Sony Pictures, and Universal Studios are said to be on board. Fox, Disney, and Paramount are holding out, supposedly over the pirated content YouTube still features. **–KS**

AMD Grabs USB 3.0 Crown

AMD is officially the first vendor to offer native USB 3.0 support with its upcoming A75 and A70M chipsets. The two chipsets were formerly certified by the USB Implementers Forum.

The A75 and A70M are aimed at upcoming Fusion processors and to be used in notebooks. The native support means board makers won't have to pay for and integrate USB 3.0 controllers.

Intel, meanwhile, continues to say it will support USB 3.0 but declined to comment on reports that its new X79 chipset still does not include USB 3.0 support. AMD desktop fans don't seem to fare any better, as the upcoming AMD FX Bulldozer series of motherboards don't appear to have native support for USB 3.0, either. **–GU**

WHS 2011 Gets Drive Extender, Sort Of

Windows Home Server's most popular feature was its Drive Extender technology, which let you combine a number of drives into a single volume. So it made sense that Microsoft would eliminate it from WHS 2011.

But where Microsoft fears to tread, third parties venture. No fewer than three different vendors are now offering Drive Extender–like capabilities in WHS 2011. The three we know of include Drive Bender, StableBit DrivePool, and DataCore. They are all works in progress but could make Windows Home Server whole again.

The removal of Drive Extender from WHS 2011 prompted speculation that the entire OS was slated for termination. Microsoft, itself, said the need for Drive Extender has declined as the size of consumer hard drives has climbed to 3TB. **–GU**

Third-party tools, such as StableBit Drive Pool, promise to replace Drive Extender.

Quinn
Norton
**Byte
Rights**

STREISAND'S HOUSE [PICS!]

THERE ARE SO MANY PLACES where the law doesn't get the net, but few are as extreme as the Streisand Effect. Named for the singer/actress, it's really about how the net responds to censorship. It is insufficient to say the net routes around censorship. The net wedgies censorship and hangs it on the school fence.

In 2003 Barbara Streisand sued a photographer to keep an incidental picture of her house taken during a survey of the California coast off the Internet. The publicity of the suit, along with the net's fascination and ridicule, made the obscure photo ubiquitous. Now if you Google "Streisand," the incident is the third result.

There have been many, often hilarious, Streisand Effect moments: the MPAA/AACS takedown notices for the DVD crypto key that catapulted the key from 9,000 Google results to 300,000 overnight; the takedowns on Diebold documents and Wikileaks.com that lead to massive mirroring; the ruling against linking to DeCSS that resulted in .sig files, T-shirts, tattoos, and, of course, more linking. Most profoundly, Scientology's attempts to censor a leaked internal video created the sometimes lunatic anticensorship community of Anonymous, which has taken the law enforcement headache to a new level.

But the culture of law has doubled down instead of backing off. Recently, the British have become fond of the super-injunction—journalists are ordered by the courts to not report on the injuncted news item, and they're not allowed to say they've been gagged. It's been used by oil companies under investigation, by a bank CEO to gag the media from being mean to him, and celebs and soccer players to protect their sexual proclivities. This only punishes traditional publications, because all these stories are easily Googleable. Legal methods of getting information off the net resemble a guy trying to kill bacteria with a hammer, and I don't see them getting better.

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

Nook Color Gets Better

Barnes & Noble's Nook Color ereader is beginning to look like the best deal going in Android tablets. The $250 7-inch touch screen device recently got a free software update that not only upgrades the OS to Android 2.2 (Froyo), but also adds Adobe Flash support, a full-featured email app, and an app store, which currently features more than 125 applications in the dedicated Nook shop. These additions, along with the Nook Color's expansive selection of digital books and magazines, make the device a feature-packed ereader, to be sure, but also a product worth the consideration of tablet buyers. **–KS**

AMD Boards to Get SLI

Come this summer, AMD fans will no longer be prevented from running multi-GPU Nvidia cards. Nvidia said it has cut deals with motherboard makers Asus, Gigabyte, ASRock, and MSI to add SLI support to new AMD motherboards.

The support will only be featured on new chipsets for the Bulldozer and Zambezi processors, though. Those chipsets will include the 990FX, 990X, and 970 chipsets. Older 980FX chipsets that are currently available will not be included, Nvidia said. Nvidia said it will even enable three-way and four-way SLI on certain motherboards.

The decision by Nvidia officially ends the multi-GPU cold war, where Nvidia and AMD would not enable multi-GPU support on each other's chipsets. **–GU**

Z68 for Sandy Bridge

Can't afford a fat SSD? Intel's new Z68 chipset for Sandy Bridge CPUs promises "SSD-like" responsiveness without the high cost of a large solid-state drive.

Using Intel's Smart Response Technology (SRT), the Z68 lets you combine a small SSD with a traditional hard drive. The drivers cache often-used files on the SSD, so instead of the system having to grab a file from the HDD, it can grab it from the SSD. This will outperform a hard drive by 4x, Intel claims.

In addition, the Z68 allows you to overclock the integrated graphics core in all Sandy Bridge CPUs; and in some motherboards, it lets you use either the integrated or discrete graphics. **–GU**

The upcoming Z68 will let you run discrete and integrated graphics.

THE LIST

THE 9 BEST GAMES FOR FLEXING YOUR PC'S MUSCLES

9 Red Faction: Guerilla
Literally everything in this 3D shooter breaks, making it a perfect demonstration for real-time physics.

4 METRO 2033
The game's locations teem with tiny details—dust flecks floating about, makeshift clotheslines, rotting bar tables, and crowds of people.
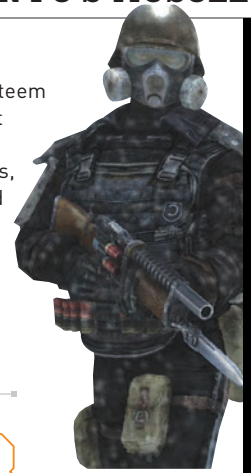
3 TOTAL WAR: SHOGUN 2
This series has always been known for its ludicrously large armies and real-time battles. The latest game doesn't disappoint.

8 FAR CRY 2
Heh heh, fire. Far Cry 2's fire effects are impressive and lifelike and the best we've seen in a while.

2 BULLETSTORM
Colorful, gorgeous, and capable of stretching out your GPU, Unreal Engine 3 throws one heck of a party on your PC.

7 DEAD SPACE 2
A great game for positional audio—the screams, thunks, and more form a haunting aural landscape.

6 JUST CAUSE 2
The winner for best draw distance eschews GPU-protecting fog effects for impressive visual effects.

1 CRYSIS 2
The level of variation in environments elevates this shooter's showcase potential beyond that of its predecessors. It also supports 3D.

5 BATTLEFIELD: BAD COMPANY 2
Great battlefield sound effects. If you want to put your brand-new speakers through their paces, this is the game.
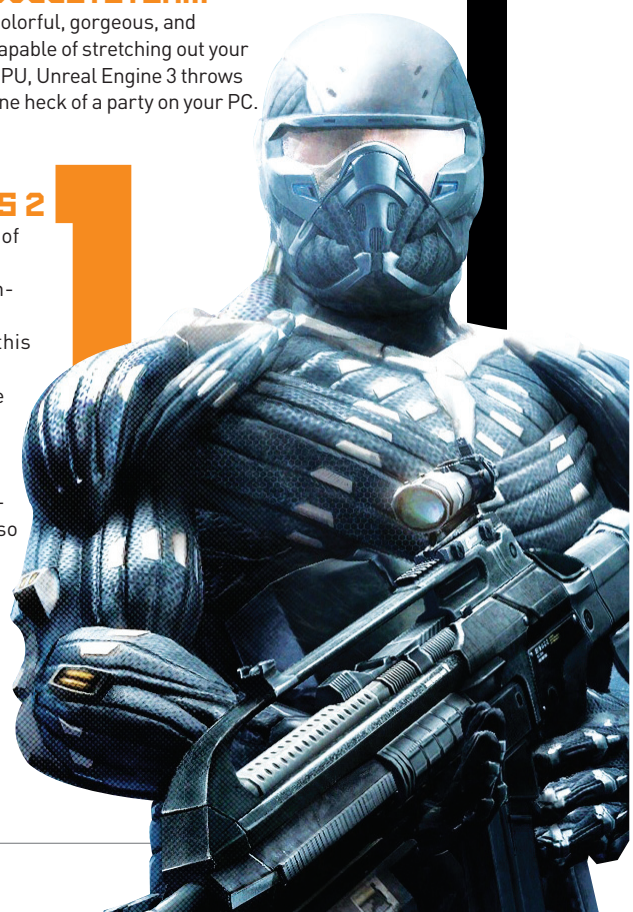
HEAD TO

BY ROBERT STROHMEYER

Dropbox vs. SugarSync

VS.

Now that most of us use more than one PC and juggle any number of smartphones and tablets daily, cloud storage and syncing have gone from a nicety to a necessity. While Dropbox has emerged as the almost universally accepted winner in the cloud storage arena, competitors abound. We decided to pit the old favorite against one of its most formidable opponents, SugarSync.

Round 1: Interface

The user experience differs radically between Dropbox and SugarSync, mostly because the two services evolved along very different paths.

Dropbox is by far the simpler of the two services. You sign up, you download the app, and it creates a Dropbox folder on your hard drive. You can then create subfolders and drop files into them, and everything that goes into these folders will be synced to the website and any other devices you're running Dropbox on.

SugarSync is evolving into a Dropbox-like service, but retains all of the legacy features for syncing your Documents folder, your Pictures folder, or any other folder on your PC. All this added functionality takes its toll on the user experience, and you'll need to think twice before adding your entire photo collection to a free 5GB account.

Winner: Dropbox

Round 2: Mobile Support

Both SugarSync and Dropbox offer great apps for the most popular mobile platforms. iPhone, iPad, Android, and BlackBerry users are handily covered by either service. If, however, you're using a Symbian or Windows Mobile phone, only SugarSync has your back. Frankly, any debate about whether support for either of these two laggard platforms adds much value to a sync service seems pretty much academic to us, but since there can be only one winner, Dropbox hits the mat in this round.

Winner: SugarSync

Round 3: Multimedia

Both Dropbox and SugarSync let you sync pictures and view them from mobile devices, but they approach the problem in distinct ways.

Dropbox treats photos and videos just like any other file, in that it doesn't go looking for them. Its mobile apps include built-in photo viewers, and the web interface includes a gallery view, but otherwise Dropbox makes few overt concessions to photo buffs.

SugarSync not only includes a better web-based gallery layout and good photo viewers in its mobile apps, but, as we've already pointed out, it's designed specifically to share your Pictures folder and add new images as you import them on any of your synced machines.

Winner: SugarSync

Round 4: Sharing

Dropbox gives you a public folder, which will be visible online for anyone with the specific link to a file. Once you remove a file from the public folder, its public link stops working. Alternatively, you can share any given folder in your Dropbox account with any other Dropbox user by clicking Sharing and entering their email address.

SugarSync lets you set any given file as public and enables you to control permissions by setting a file to "read only" for certain users. And you can set passwords for your folders. If you plan to use your cloud storage for sharing files with coworkers, consider a SugarSync Business account, which gives you three logins for a shared 100GB storage capacity for $30 per month.

While we prefer Dropbox's simplicity in overall interface design, we think file sharing demands finer control for security.

Winner: SugarSync
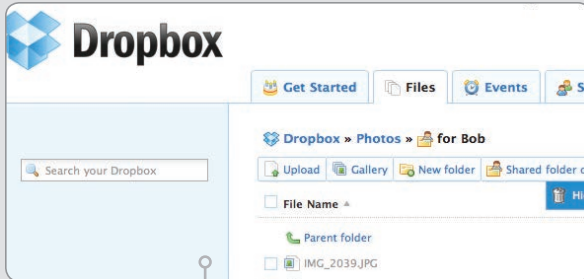
DROPBOX

Free,
50GB for $10/month,
www.dropbox.com
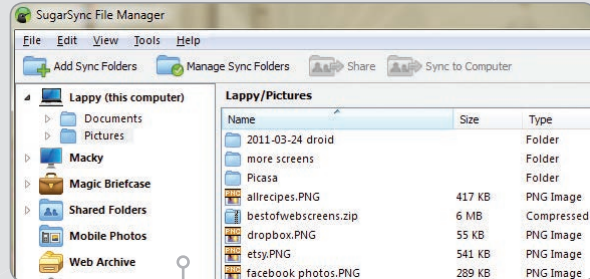
SUGARSYNC

Free,
30GB for $5/month,
500GB for $30/month,
www.sugarsync.com

Round 5: File Protection

Accidentally delete a file you wish you'd kept? Made a big, sloppy change you'd like to undo? Both services have you covered. The difference is in how much data is stored and for how long.

SugarSync stores the last five versions of any file regardless of date modified. Dropbox stores the last month's worth of revisions to all your data. Which approach is best? That depends on whether you'd rather have the ability to revert to a file that's more than a month old or a version that's more than five revisions in the past. We prefer the former, especially for frequently modified files.

Winner: Dropbox

Round 6: Price

Because both Dropbox and SugarSync are freemium services, the price war is waged on how much storage you get for free, how many price tiers the company offers, and how much storage you get for the money.

Dropbox offers only three pricing options: a 2GB free account, which can be upgraded to as much as 8GB if you spam enough of your friends about the service, and a 50GB pro account for $10 per month. The company offers two free months of service if you pay annually.

SugarSync offers 5GB gratis, as well as free upgrades for roping in your pals. Premium accounts start at $5 per month for 30GB and ratchet up to $40 monthly for a whopping 500GB. SugarSync offers twice as many price/capacity tiers as Dropbox, and gives you more storage for the dollar at every tier.

Winner: SugarSync

And the Winner Is...

In four out of six rounds, **SugarSync** triumphs easily over the more popular Dropbox. It's got broader mobile support, cooler multimedia syncing, better sharing controls, and it gives you more gigs for the buck (or even for free). If you don't need more than 2GB, and you're already entrenched in a free Dropbox account, don't sweat it. But if you're thinking of going premium for more capacity, SugarSync is the overwhelmingly superior option.

DOCTOR

THIS MONTH THE DOCTOR TACKLES...

Streaming Music Via Web > SSD Reformat > High CPU Temps

FTP = RIAA?

Would creating an FTP server that contains all my music be a quick way to get a "Go directly to jail" card issued by the RIAA? I really just want to be able to access my data files from any computer; should I leave my music directory out of that?

–Kris Frausto

Sockso lets you create your own streaming music server with ease, so you can access your music from anywhere.

THE DOCTOR RESPONDS: This shouldn't be construed as legal advice, but it is our considered opinion that as long as your FTP server is password protected and accessed only by you, the RIAA has no way of finding out that you're (gasp) downloading your own files from your own server, and it would be hard-pressed to prove infringement if it did.

That said, you might want to check out Amazon Cloud Player (www.amazon.com). It allows you to upload your own files and play them back from anywhere via a web browser or smartphone. You get 5GB free, 20GB free for a year if you buy an Amazon MP3 album, and other larger capacities at a variety of price points.

Or, if you already have the server available, don't trust the cloud, or generally prefer to roll your own, try Sockso (sockso.pu-gh .com). This free app will let you set up a password-protected personal media server/streamer like the one you're talking about, with way more features than a simple FTP, that you can access anywhere via the web. And yes, you can download the tracks, too.

Formatting SSDs

I understand that an SSD should never be reformatted. However, I have a corrupted Windows 7 install and therefore need to reinstall the OS. There are lots of comments all over the web about how to do this and what to do and what not to do—but there seems to be little agreement. So I'm turning to the experts. How do I wipe clean an SSD and reset it so Windows 7 Professional can be reinstalled? I have a Corsair P128 CMFSSD-128GBG2D, but can you offer general guidance?

–Cliff Wilson

THE DOCTOR RESPONDS: Cliff, it's not true that an SSD should never be reformatted. We reformat ours all the time. It's true, however, that an SSD doesn't need to be defragmented, but you shouldn't have any problem reformatting the drive in order to reinstall Windows. We've had success using Windows' built-in Disk Management tool to quick format an SSD. For a deeper cleanse, we've used diskpart.exe to zero our drives.

In your specific case, you have an opportunity to kill two birds with one stone. Depending on when you bought the SSD (either before or after December 2009), you might have a firmware update wait-ing for you. (If your drive has Trim support, it's already been updated.) The firmware update tool for your drive will format your drive in the course of its updating.

Budget AMD Upgrade

My old PC died on me and I need your insight as to what AMD motherboard, RAM, and CPU to buy. I need something that has decent performance and reliability. My budget is $350.

I have four Western Digital Caviar Black 640GB 7,200rpm SATA hard drives I want to run in a RAID setup, one Intel X25-V 40GB SSD, and one combo optical drive. So I will need at least six SATA connections.

I have a PNY Nvidia GeForce GTS 450 1GB (Fermi) and an Antec EarthWatts EA650 650W PSU. The rig will be used for midrange gaming, playing movies, recording TV, streaming music, and surfing the Internet. I'll be running 64-bit Windows Home Premium.

–Ken Ewing

THE DOCTOR RESPONDS: For folks on a budget, MSI's 890FXA-GD65 is a good pick. It's the little brother to our current favorite board, the MSI 890FXA-GD70. It gives you six SATA ports, its AM3 socket is capable of running just about all things AMD, and its street price is about $145.

↘ **submit your questions to:** doctor@maximumpc.com

For what you do, a quad-core Phenom will work fine; at about $140, the 3.2GHz Phenom II X4 955 Black Edition is a good sweet-spot CPU. If you want to just go ahead and use up the rest of your budget, you can actually get a 2.8GHz Phenom II X6 1055T for about $170. We don't think you need the hexa-core, but there's something to be said for bragging rights. The CPU and mobo combined come in under your budget, and the 890FXA-GD65 will supposedly be capable of running AMD's upcoming Bulldozer chip, so you even have an upgrade path.

One final upgrade option: a 2.8GHz Phenom II X4 925 for about $115. With mobo, that's about $260. Take the remaining $90 and buy a 2TB drive to replace your four 640GB hard drives and cut down on your noise, heat, and power consumption.

Too Hot to Handle

I believe there is a problem with the thermal sensor in my CPU, but I'm not sure how to tell. The CPU is a 3GHz AMD Phenom II X4 940. I currently have the multiplier turned up a bit, so it's running at 3.2GHz. I do not have the voltage increased. I'm trying to monitor the temperature, but the numbers seem way off. I can easily get the CPU to read 77 C under partial load.

According to my research, that is way too high for a Phenom II. The chip is currently running Windows 7 and the CPU Monitoring widget says "CoreTemp is not running." This chip was previously on a different mobo and running Linux. Whenever it booted, a message flashed on screen saying something about an invalid thermal sensor. I have had no issues with stability on the machine. All this leads me to believe there is a problem with the sensor. What can I do to confirm this, and how do I gauge safe overclocking levels?
–Jason Sachan

THE DOCTOR RESPONDS:
You are correct, Jason; 77 C is beyond spec for the Phenom II X4. The official max temp is 62 C. However, it's not clear to the

Doctor how you are monitoring the temps on your chip. If you are referring to the cool little All CPU Meter gadget from Addgadget.com, that app requires you to also have Alcpu .com's Core Temp installed for it to register a temperature reading—hence the message you're receiving. Lately, we've been relying on Cpuid.com's HWMonitor to monitor core temperatures. We recommend that you give that a spin to see if the readings match the ones you've been getting.

If HWMonitor's temps match those from the utility you're currently using, you should check a few things in your system. Check that the heatsink fan is spinning and clear of dust. Check that the case's airflow is unobstructed and adequate. Finally, remove the heatsink fan and remove and reapply thermal paste. When installing the heatsink fan, make sure it is firmly attached and flat in the board. Consider updating the motherboard's BIOS and setting the board's values to the default. If the board is too old and does not recognize the CPU model, it could cause issues. If the thermal controls of the board are not set correctly, that could also be an issue. Finally, if the chip is still saying that it's running 77 C with a very moderate load and is stable and not crashing (run a Prime95 stress test on it), it is quite possible the CPU's thermistor is bad. The good news is that the chip is fairly current and likely under warranty from AMD. Contact AMD's warranty service department about a possible replacement for the CPU.

Regarding safe overclocking levels, that depends on how you define "safe"—and how risk–averse you are. Overclocking always has inherent risks of data loss, but mild overclocks such as yours, with a properly cooled processor, should be relatively safe. If you're looking for Green Zone safety, we say that if it's passing a stress test like Prime95 and you aren't adding voltage, you're in good shape. ⏻

BY GORDON GOBLE AND
SEAMUS BELLAMY

THE COMPLETE GUIDE TO EMAIL MASTERY

EMAIL. WE ALL **HAVE IT.** WE ALL **HATE IT**. FROM OUTLOOK TO GMAIL TO THE GREAT EMAIL BEYOND, HERE'S HOW TO MAKE THE MOST OF IT.

THEY SAY THAT THE KIDS DON'T

USE EMAIL THAT MUCH THESE DAYS. DOESN'T THAT SOUND DREAMY? WE ADULTS, UNFORTU-NATELY, HAVE NO SUCH LUXURY. FOR BETTER OR FOR WORSE, EMAIL IS A MAJOR PART OF OUR PER-SONAL AND WORK LIVES.

WE'RE TEMPTED TO JUST LEAVE IT AT THAT. BUT THERE'S NO NEED TO FEEL HOPELESS. WE TOOK A GOOD, LONG LOOK AT THE CENTER OF OUR COM-MUNICATION UNIVERSE WITH AN EYE TOWARD IMPROVING, UPGRADING, AND (HOPEFULLY) DOMI-NATING IT. THE FRUITS OF OUR LABOR ARE ON THE NEXT SEVEN PAGES. ENJOY! (OR MAYBE WE SHOULD SAY, SUFFER LESS?)

Getting Intimate with Outlook

The road to email mastery begins with Microsoft's ubiquitous email application

Photo ID: Microsoft now has its own built-in social connections.

USING OUTLOOK IS ONE THING. EXPLOITING IT TO ITS FULLEST POTENTIAL IS ANOTHER. OVER THE NEXT TWO PAGES, WE'LL GIVE YOU A FEW WAYS YOU CAN DO JUST THAT, AND THEN SHOW YOU FIVE OTHER WAYS YOU CAN EXIST WITHOUT MICRO-SOFT'S SEEMINGLY UBIQUI-TOUS PERSONAL INFORMA-TION MANAGER.

Photo ID
The Microsoft Outlook Social Connector Provider for Face-book, new on the scene but compatible with Outlook 2010, 2007, and 2003, links your Facebook or LinkedIn account to Outlook and helps you keep on top of information you can use to blackmail... er, get fa-miliar with your contacts. Plus, having pics of your peeps helps safeguard against wrongly ad-dressed emails.

Fast-Action Screenshots
In Outlook 2010, you can insert a screenshot in the body of your email message. Click the In-sert tab of the message you've

created and select Screenshot. A drop-down menu appears, from which you can instantly select the current image in any nonminimized window. Even cooler, if you scroll down to the bottom of that menu and click Screen Clipping, you get a chance to crop and select just a portion of that image.

Get Your Xobni On
Xobni ("inbox" spelled back-ward) is an Outlook add-on that appears within the pro-gram as a separate pane and does a bunch of cool stuff that Outlook junkies will eat up. Xobni searches your emails faster than Outlook itself, ex-tracts oodles of information, and features a deep connection with social networking sites. Outlook 2010 now handles the social networking angle itself, yet Xobni continues to maintain its rabid fan base. Check out **www.xobni.com** for more info.

Take Command of Replies
It sucks when you want each of your recipients to Reply to All, and one of them neglects

to do so. But now you can en-sure that the offending party gets with the program. In the message composition screen, click Options/More Options and look for Delivery Options in the drop-down list. Click Select Names and enter those you want to receive all future replies.

Harness Quick Steps
New to Outlook, Quick Steps are a series of macros that conveniently merge several separate actions—as many as 10, actually—into a single but-ton click. And while Outlook's predefined Quick Steps are just peachy, customizing the macros is peachier still. To set up your own Quick Step, click Create New in the Quick Steps group (found within the Home tab), and fill in the blanks.

Seek and You Shall Find
Outlook 2010 offers more search parameters than a Dal-matian has spots. But it also allows you to save your results in fully customizable Search Folders. In the future, you merely access that folder when you need quick access to the results of those keywords and/or criteria. To create a Search Folder, click New Search Folder in the New group of the Folders tab and select from the available options. Or create your own parameters.

Message Recall Isn't All It's Cracked Up to Be
You know that intimate message

you sent to your ex-girlfriend but tragically misaddressed to your new girlfriend? Well... Out-look now has a Recall feature (accessed via Move/Message/Actions) that should, one would think, save your sorry backside. Except it probably won't. You see, Recall will work its magic only if both email accounts are configured using Microsoft's Exchange and only if the mes-sage shows as unread and unforwarded. Moral: Do not misaddress.

Sync Your Team
Avail yourself simultaneously of the calendars of all your team members by creating a Calendar Group. Start by click-ing Calendar just like you've always done, then look for the Manage Calendars group. Then click Calendar Groups and New Calendar Group. Choose a name for your group, then add your contacts.

Clean Up Your Act
Ever notice that 'round about the third or fourth message in a thread (aka "Conversation"), each succeeding message just gets longer and more cumber-some? Now you can do some-thing about it. First, switch to Conversation view by clicking the View tab and checkmark-ing Show As Conversations. To clean up a conversation, go to the Delete group in the Home tab, click Clean Up and then Clean Up Conversation. Voilà, Outlook will take care of the redundancy.
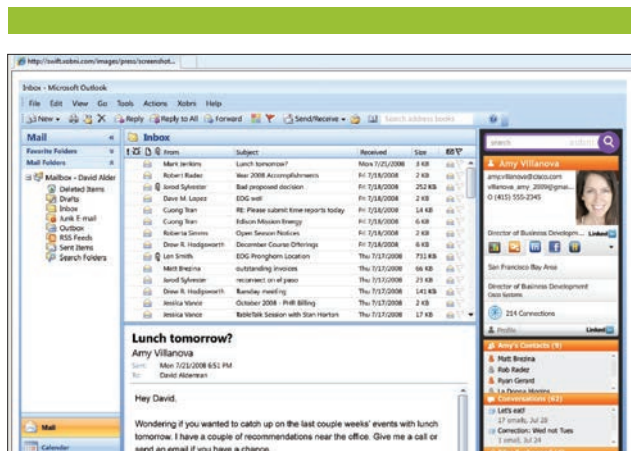
Xobni offers faster Outlook searches and connects to social media.
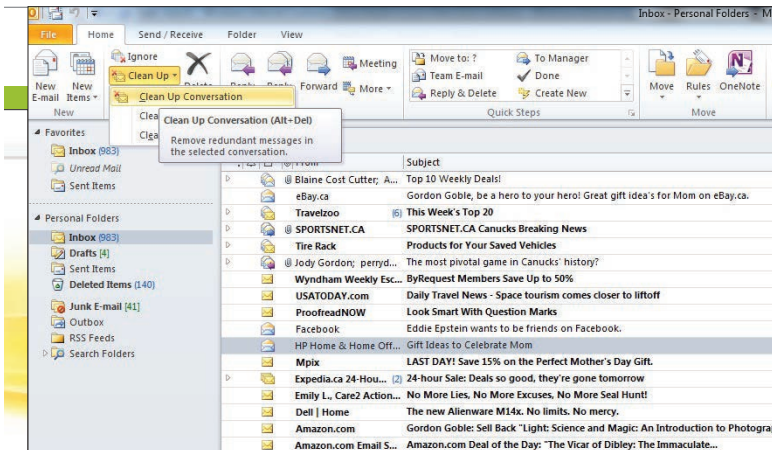
Clean up your act by using Outlook's Conversation view.

Get out of the Import/Export Business

It is not unusual to successfully import and/or export PST files (the critical Outlook file that contains all your irreplaceable personal data) to and from Outlook. Unfortunately, doing so will not only eradicate certain custom elements, but may also set you up for a file corruption or a ghost PST that won't close. We know, it's happened to us. Our advice? Forget about importing and exporting altogether. Instead, close Outlook, find your PST file, and simply copy it to your backup device. To restore your PST file—say, after you've accidentally beaten your PC with a baseball bat—merely find that copied PST, recopy it where it won't cause a conflict, then open Outlook and instruct it to access that file (File/Open/Open Outlook Data File).

Christopher Alden I'd love to have a Gmail-style conversation view.

Robert J. Armitage Better support for showing "new mail" in subscribed folders and sub-folders. For me only the inbox updates properly; I have to manually click others for the new message count to pop up.

Mike Tjepkema Integration of "signature grabbing," where you can double-click someone's signature and dump it into your contacts. It's available in third-party software, but I want seamless integration.

Jp Allen Fix Outlook Web Access for non-IE browsers. Better shared calendar/contacts. Threaded conversation view that doesn't suck so bad it gets turned off. Search that isn't beaten by third parties like the Globetrotters do to the Generals. More granular junk/spam filtering options. A far less bloated archiving option/format.

James Burt The ribbon interface, may it go back to the hell-spawned pit from whence it came. Its inconsistent layout, big buttons, small buttons, icons with no name, etc., are frustrating. Add in the fact that I find myself clicking more to perform tasks that were one or two clicks in the past is irritating.

Cory Notrica Add something like the Lotus Notes Swift-file. It would be so much easier than building rules and clicking twice to file to recently used folders.

Ryan Case My #1 most desired feature in Outlook 2003 and Outlook 2007 is smooth scrolling.

Our Top Five Outlook Alternatives

In the corporate world—and especially in those environments built on Windows—Microsoft's Outlook email client reigns supreme. But once you start poking around, you'll find that Outlook is far from the only game in town. Here, we present five of the most interesting alternatives for home and small business users.

Zimbra Desktop
Zimbra Desktop is open-source software and thus free. That it allows you to access email even when you're disconnected from the Internet and handles calendars, contact lists, and documents in a single application is even more reason to consider it. **www.zimbra.com**

Gmail
Is Outlook's entrenchment the primary reason it still dominates market share? Would web-based Gmail otherwise lead the pack? Truth is that the two offer very different approaches. In an environment where offline Inbox access and Microsoft Office merging capabilities are mandatory, Outlook is king. But Gmail delivers far more mobility, costs nothing, and is seemingly becoming the future right before our eyes. **mail.google.com**

Thunderbird
Fast, very fast, and in a strictly email sense, the equal of Outlook (and perhaps more intuitive to use with its tab-browsing style), Mozilla's long-established Thunderbird runs in any operating system and, like Zimbra, is free. It's also incredibly simple to set up, although add-ons are required to match Outlook's scope. **www.mozillamessaging.com**

Windows Live Mail
Effectively the successor to Outlook Express and Windows Mail—and better than both—Microsoft's Windows Live Mail is a good option for those who run in a Windows environment and don't need the added business-oriented features (and complexity) of Outlook. **explore.live.com**

eM Client 3
Purported to be the fastest email client for Windows, eM Client 3 boasts customers such as Toyota and Oracle. Available in either a no-charge Home or $50 Pro version (which includes backup and syncing to any mobile device). **www.emclient.com**

Suffer Spam No More

Use these antispam tips for junk mail protection worthy of a... Nigerian prince

THE PERCENTAGE OF SPAM OF ALL EMAILS HAS **NOT** INCREASED SINCE THE LAST YEAR

GREAT!!! AND HOW HIGH WAS THE PERCENTAGE LAST YEAR?

100%

THERE'S HOPE

geek and poke

Courtesy of Geek and Poke

Dear friend! I am the son of the late Nigeria's former minister of mines and power in the regime of the late former Nigeria's military Head of State. I have discussed with my family attorney how best to provide for you the information on blocking email spam. To unlock these mysteries, you need only supply $2,500 of your United States dollars. To show you my sincere interest in giving you these antispam treasures, I give you immediately a sampling of suggestions for reducing the amount of spam your inbox suffers.

Use a Complex Email Address
While using yourname@yahoo.com might make it easy for your friends and loved ones to find you online, it also makes it easy for spambots to track you down and pummel you with junk mail. To throw them off your email trail, consider using an address that includes punctuation or numerical values as well.

Check Those Checkboxes
When signing up for a new service, often times, you'll be given the option of opting in or out of mailing lists and additional services. Before finishing your registration, be sure that you're not accidentally signing up for something you're not interested in by leaving checkboxes in their native state. Take the time to do it right.

Use Disposable Email Addresses
If you need to register for something online, consider doing it with a disposable email address, like those available from ser-

> ## "IF YOU NEED TO REGISTER FOR SOMETHING ONLINE, CONSIDER DOING IT WITH A DISPOSABLE EMAIL ADDRESS.

vices like Ten Minute Email (**10minutemail.com**) or GuerillaMail (**www.guerillamail.com**). Doing so will guarantee that your inbox stays spam-free.

Maintain Two Email Accounts
If you prefer to keep a record of what you've signed up for and when, a disposable email address just isn't going to cut it. Instead, consider using a secondary email address solely for the purpose of signing up for online services, such as web communities, Internet shopping sites, and newsletters. The bulk of the spam your online activity generates will be sent to the secondary email address, leaving your primary account relatively spam-free.

Choose ISPs According to Their Spam Policy
Your Internet service provider should be at the heart of your antispam solution, not at the heart of the problem. When selecting an ISP, research its antispam policy: Does it penalize customers who engage in spamming? Does it host spamvertisment sites? How closely does it guard customer information? These are all questions that your ISP's customer service representatives should be able to answer. If you don't like what you hear, take your business elsewhere.

Unsubscribe Is Not Your Friend
Taking the time to unsubscribe from a service you never signed up for in the first place is a sure-fire way of letting spammers know that their aggravating messages are indeed being read by someone. Don't encourage them. Instead, delete the email or...

Use Antispam Software
There are a lot of excellent antispam software packages, extensions, and services out there. Choose one and run with it. Installing antispam software like SpamFighter (free, **www.spamfighter.com**) can dramatically cut down the amount of spam your inbox sees on a daily basis. For the holy grail of Internet privacy, you may also want to consider investing in a computer security suite, such as our favorite, Bit Defender Internet Security 2011 ($50, **www.bitdefender.com**). Along with antispam protection, you'll also get antivirus and antimalware protection, plus a large number of other perks.

Gmail, Pro Style

Trick out your Gmail experience with these 10 pro-level hacks

WHETHER YOU'RE NEW TO USING GMAIL OR A SEASONED VETERAN, WE'RE POSITIVE THAT YOU'LL FIND AT LEAST ONE OF OUR AWESOME GMAIL TIPS TO BE, WELL, AWESOME.

Create Custom Labels

Creating custom labels to organize your Gmail inbox is easy. From the mail menu on the left side of your browser window, click the More link, and then Create New Label. Enter a name for your new label in the field provided. You can repeat this process to create as many labels as you need.

Use Filters to Organize Your Inbox

OK, it's time to put those labels to use. Click any message in your inbox. Locate and click the More Actions button at the top of the message window. Now pick Filter Messages Like These. You can now create a filter that will automatically sort and label your incoming email.

Bookmark Messages for Quick Reference

Find yourself referring to the same email message time and time again? Instead of hunting it down every time you need to take a peek, consider bookmarking the message instead. This trick works in any browser and can significantly increase your productivity if having frequent access to a particular email is mission critical.

Become a Gmail Search Ninja

Gmail's advanced search functionality is a finding-stuff juggernaut. To enable these features, look next to Gmail's search bar and click Show Search Options. You now have access to a number of search parameters that'll make finding a message feel less like rooting through a haystack for a needle. Locating the message you're looking for becomes even easier using this method if you've taken the time to create customized categories, filters, and aliases for your account. If this turns out to be more search functional-
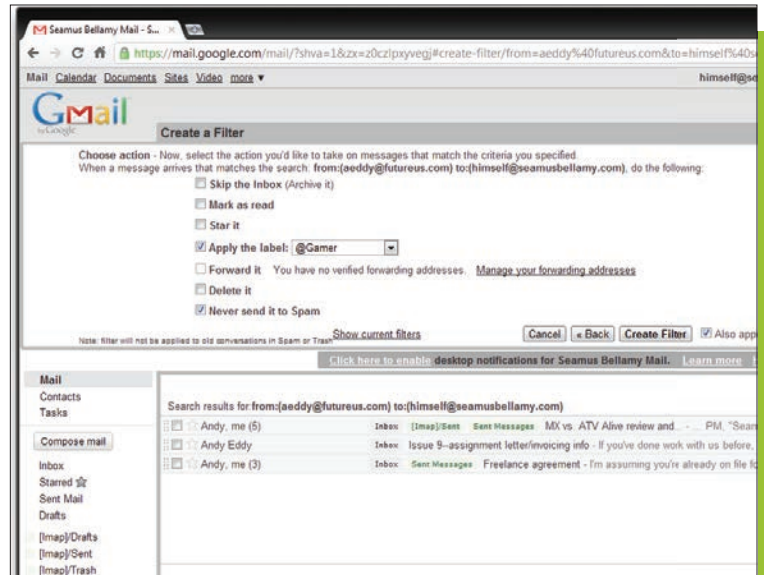
By using custom labels and filters, you can sort and label email.

ity than you can handle, click Hide Search Options to revert to Gmail's vanilla search bar.

One Address, Many Faces

You can use multiple Gmail address aliases to handle incoming mail. Just add a plus sign and a word to your Gmail address—yourname+news@gmail.com, for example—when subscribing to new services. All email sent to the alias will be sent to your inbox where it can be filtered.

Use Gmail Offline

Using online webmail while offline? Insanity! True, but it can be done. Just install Google Gears and restart your browser. Open Gmail, and select Settings, then choose Offline. From here, you can enable offline Gmail access for use on your computer. Now that's sweet.

Enable Free and Easy Gmail Backups

Gmail's great—until it isn't. When the service crashes, it crashes hard. To avoid losing any valuable messages, consider forwarding a copy of every message you send or receive to a secondary email account. To set this up, click Settings and then choose Forwarding and POP/IMAP. Boom! Instant backups.

Watch for Stalkers

To keep tabs on when and from where your account has recently been accessed, scroll to the bottom of any Gmail screen and from the "Last account activity" line, select Details. Doing so will grant you access to a list of locations, login times, and IP addresses that coincide with your Gmail account's most recent activity.

See Who's Sending What

Unsure about the origins of a message sent to you? Click the arrow next to that message's Reply button and select Show Original. Doing this forces Gmail to show you the message's pathing information. Copy the information to your clipboard and then enter the information in a service like MX Tool Box (**bit.ly/3y9AbC**), which will look up the origin of the message.

Send Executable Files as an Attachment

For security reasons, Gmail won't let you send an executable file as an attachment. You can get around this by manually changing the file's extension before attaching it to your email. Provide the message's recipient with instructions for changing the file extension back to its original .exe and Bob's your uncle.
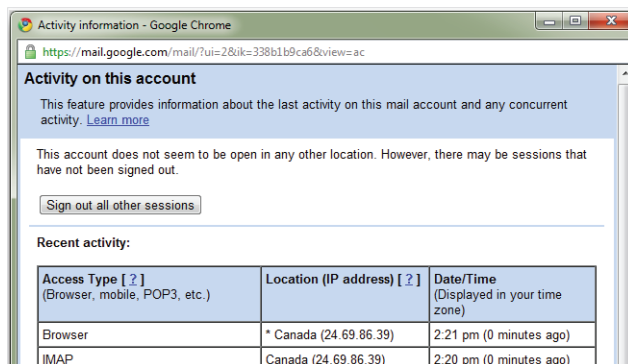
To access a list of recent activity in Gmail, select Details in Last Account Activity.

Set Up a Hosted Email Domain with Google Apps

A personal hosted email domain for the low, low cost of free? **Yes, Please**

DO YOU HAVE YOUR OWN DOMAIN AND/OR WEBSITE? THINK-ING ABOUT SETTING UP PERSONALIZED EMAIL ADDRESSES TO GO ALONG WITH THEM? WELL, YOU CAN PAY YOUR ISP FOR THE PRIVILEGE, OR YOU CAN QUICKLY SET UP A FREE GOOGLE APPS ACCOUNT THAT'LL PROVIDE YOU WITH A GMAIL ACCOUNT BRANDED WITH YOUR WEBSITE'S DO-MAIN, AS WELL AS A NUMBER OF OTHER GOOGLE GOODIES.

Here's How It Works
To set up your account, navigate to the service's home page at **bit.ly/cEETyJ**. Enter your site's domain name. You'll be asked to submit some personal information. You'll also have to choose a user name for your administrator account (yourname@yourdomain .com, for example) and a password.
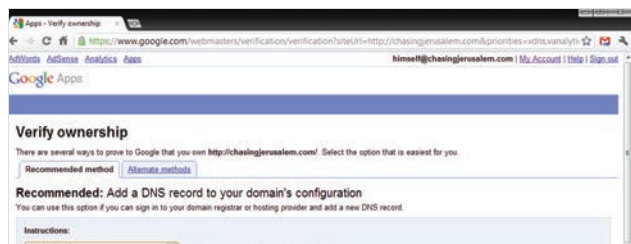
Adding a DNS record to your domain is an easy way to verify your site with Google Apps.

Now, scroll to the bottom of the screen and accept the ser-vice's Terms of Agreement. Before Google will allow you to marry your domain name to your Google Apps account, you'll have to verify that you actually own the target domain. If you agreed to the Terms of Agreement, there'll be a confirmation email waiting in your inbox. The email contains a link that will allow you to continue the setup process. Find it and click it. Doing so will open your default web browser, where you'll be asked to enter the user name and password you selected ear-lier in the setup process.

Once Google accepts your credentials, a Google Apps welcome page will open. Click the Activate Google Apps button. This opens a new page with two tabs: Recommended Method and Alternate Method. We advise using the recommended verification method: adding a DNS record to your domain's configuration.

You'll note a drop-down menu sporting the names of a num-ber of popular ISPs. If your ISP is on the list, select it and follow the instructions provided. If your ISP is not listed, select Other and follow Google's instructions. You can also verify the owner-ship of your domain by linking your Google Apps account to an ex-isting Google Analytics account, adding a meta tag to your site's homepage, or uploading an HTML file to your server. You'll find those options under the Alternate Methods tab.

After following through on any of these methods, click the Verify button. Within 48 hours your new personalized Gmail address will be ready for action.

Six Great Alternatives to Gmail

Maybe you're a unique and special snowflake that can't bear to use the same email service as everyone else. Or perhaps you just feel like rebelling against something—anything. No matter the reason, you yearn to leave Gmail behind in search of a new webmail service. We're OK with that, and we're not going to try to talk you out of it. In fact, here's a list of six alternatives to get you started. Just re-member to write us once in a while so that we know you're all right, OK?

GMX
If you're looking to break free of Gmail, GMX is a great place to start. Offering users 5GB of email storage accessible via POP or IMAP and the ability to send attached files up to 50MB in size, GMX can hold its own in a blow-for-blow fight with Google's email service. **www.gmx.com**

Hushmail
The folks at Hushmail pride themselves on providing a high-security webmail service to their personal and busi-ness clients. With the Hush Encryption Engine protecting your webmail's privacy, you can be certain that your digital information is in good hands. **www.hushmail.com**

Inbox.com
Much like Google, Inbox.com is a veritable department store of online awesomeness. Aside from offering users 5GB of

free email storage, the service also provides file storage, photo sharing capabilities, a virtual message board, and computer-side email notification and download clients. It's hard to argue with that kind of value. **www.inbox.com**

Windows Live Hotmail
More than 360 million users can't be wrong. Thanks to a number of recently introduced new features, one of the most popular webmail services in the world is now also one of the most versatile. Offering calendar, instant mes-saging, and online storage solutions, Microsoft has done Hotmail some serious justice in recent years.
www.hotmail.com

Lavabit
Sick of spam? So's Lavabit, and it's got an email account with your name on it. By providing clients with an impres-sive mixed bag of antispam technologies, Lavbit makes for a sane email experience that's mostly Viagra- and Nigerian prince–free. **www.lavabit.com**

Zoho
If you rely on your webmail for your business, you're going to love Zoho. Offering a feature set similar to that enjoyed by Google Apps users, Zoho will brand your webmail with your company's domain name, letting you send out emails in style. **www.zoho.com**

How to Have an Empty, Clutter-Free Inbox

Welcome to Inbox Zero, an email management philosophy that could change your digital life

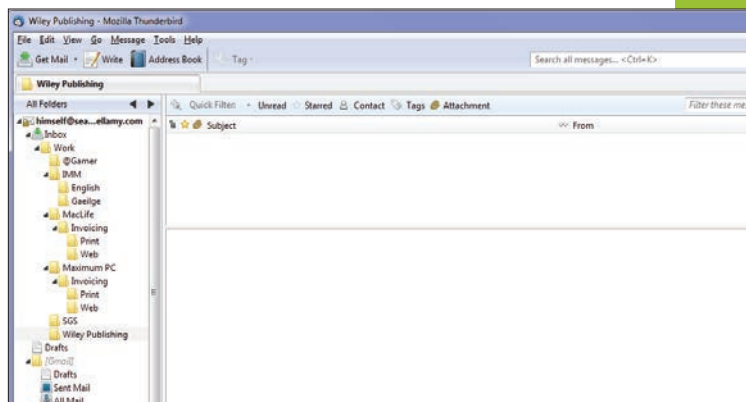Just looking at this cleared-out inbox makes us feel less stressed out.

A 2010 REPORT BY THE RADICATI GROUP ESTIMATED THAT ROUGHLY 90 TRILLION EMAILS ARE SENT PER YEAR. IF YOU'RE LIKE US, YOU KNOW THAT IT CAN FEEL AS THOUGH EVERY SINGLE ONE OF THOSE MESSAGES SOMEHOW MAKES ITS WAY INTO YOUR INBOX IN A BID TO RUIN YOUR DAY OR WEEK BEFORE IT HAS EVEN STARTED. (FOR MANY OF US, THIS PHENOMENON IS CALLED MONDAY.)

Some of us manage the flow in a standard linear fashion. Others have developed complex, byzantine systems of folders, archives, and filters. Neither is right or wrong, but lately we've begun to wonder if we could do things better. Enter Merlin Mann's Inbox Zero philosophy, which purports to help clear the clutter and cut your overwhelming inbox down to a manageable size. We'll explain what Inbox Zero is, how it works, and why you might want to use it. Or not.

Origin Story
The underpinnings of Inbox Zero were culled from a series of articles that first appeared on Merlin Mann's 43 Folders blog (**www.43folders.com**), as well as from the task-management Tao of David Allen's Getting Things Done site (**www.davidco.com**).

Why the name? Because if you're doing it right, every time you open your mail client or browse to your webmail, all new email must be categorized and dealt with, deleted or archived, immediately, leaving you with no messages in your inbox. For those of us who are greeted by thousands of old messages each time we check our email, this is a pretty extreme idea. Inbox Zero operates under the premise that everything in life, email included, can be categorized, and that the number of categories should be as few as possible.

> " FOR THOSE OF US WHO ARE GREETED BY THOUSANDS OF OLD MESSAGES EACH TIME WE CHECK OUR EMAIL, THIS IS A PRETTY EXTREME IDEA.

The Five Categories
To get Inbox Zero neophytes started, Mann suggests five categories that email should fall under:

» **Delete or Archive:** Email that has been read, resolved, or has no sway on your life should be immediately deleted or archived.

» **Delegate:** If an email needs to be forwarded to another person in order to complete a task, forward it. That said, be sure to follow up and make sure the task is being attended to.

» **Respond:** Not all email demands a response. Some can simply be acted upon. Entering a meeting into your calendar is a good example of this. In the event that you do need to send a reply to someone's message, keep it short and to the point. Mann suggests that no email should be longer than five lines in length. While some of your coworkers, friends, or family might think you're being snippy with them, you can deal with this by leaving an explanation for your brevity in an email signature.

» **Defer:** If you don't have enough information to take action on an email, or your response to a message is dependent on the work of others, come back to it later. The Inbox Zero philosophy demands that after you've read a message it be moved out of your inbox in one way or another, so set up a folder for deferred action. And don't let this get out of control.

» **Do:** If you can take care of a task sent to you via email, do so immediately and get it out of the way. Once the task is completed—you guessed it—delete it from your inbox. Or archive it.

That's the bare minimum the Inbox Zero system requires. Depending on your job or lifestyle, you may need to throw a few additional categories or folders into the mix. Mann advises that should this be the case, it's best to keep things as simple as possible. For example, if you feel the need to archive a message, maintain a single archive folder. Complex subcategory-driven filing systems only serve to stymie the email simplicity that this is supposed to achieve. As you receive new mail, each message should be addressed and dealt with immediately by mercilessly jamming it into one of the five Inbox Zero categories and perhaps a few user-created ones.

It's easy to see how this could be an effective weapon in the war against inbox bloat and counterproductivity. By following the rules, users are empowered with the ability to whittle the contents of their inbox down to nil in no time at all. For anyone who receives a mountain of messages on a daily basis, this is a great way to increase your overall productivity, as less time spent on dealing with email means more time that you can spend on higher-priority tasks.

The Inbox Zero philosophy may not be everyone's cup of tea. For starters, if you don't receive large amounts of email on a regular basis, there's little productivity to be gained in clearing out your inbox on a regular basis, as your volume of mail is already manageable. If this is the case, we will gladly trade places with you.

Some detractors argue that taking pause to wipe out the contents of your inbox on a regular basis is a waste of time, with far too many productive minutes lost to the sorting of emails for the sake of categorization. Others, especially those who manage multiple projects or have a number of clients they work for, find that deleting or archiving their messages can cause more harm than good when it comes time to track assignments or create an invoice at the end of the month. Laziness and time are also factors to consider here. No matter how many folders or rules you create to manage your chronically bulging inbox, if you don't have enough drive or hours in the day to enact your organizational scheme, your efforts (or lack thereof) will turn into one big bag of organizational failure.

In the end, the best inbox management system—Inbox Zero or otherwise—is the one that works for you. ⏻
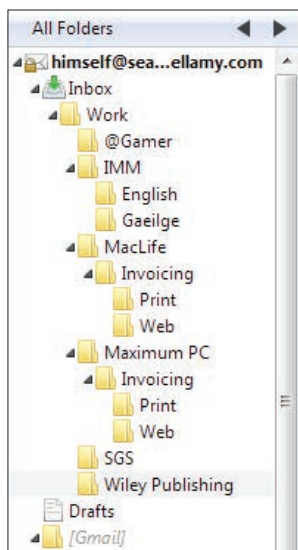
The cluttered, nested-folder hierarchy directly contradicts the principles of Inbox Zero.

The 8 Worst
Email Blunders of All Time

8) Birthday Bitch: London bank employee Lucy Gao was turning 21. A keystone moment in anyone's life, but for Lucy, it was also a reason to demand, in email, that every guest at her birthday celebration treat her like the royalty she wasn't. "I will be accepting cards and small gifts between 9 p.m. and 11 p.m.," was but one of Lucy's many diva-like pronouncements. Soon, several billion people were privy to all of them.

7) Out Damn Spot! Secretary Jenny Amner accidentally spilled ketchup on her boss's pants while they lunched together at a local eatery. The next day, Jenny got an email suggesting she cover cleaning costs. She agreed, again via email, but only after citing the very real fact that her mother had died that same day, then chiding the exec for being such an uncaring tightwad, then telling everybody about it. Jenny's boss resigned soon thereafter.

6) Mmm... Spam: Irish Green Party member Eamon Ryan got serious in 2008, successfully pushing important antispamming legislation through that country's parliament. So how did the Greens commemorate such an accomplishment? By inviting, via email, in spamlike fashion, regional technology bloggers to participate in a "viral video" contest. Sure, we've heard of far worse spam, just not worse-timed spam.

5) Cruel Fool: April 1, 2011: The University of California, San Diego, alerted all 47,000 people who'd applied to the institution that they'd been granted admission—a massive miscalculation of approximately 30,000 potential students. Needless to say, it took days to undo the damage.

"CHUNG IS KING OF HIS DOMAIN HERE IN SEOUL.

4) Poetic Injustice: Britain's Joseph Dobbie met what he felt was the woman of his dreams and soon thereafter adorned her inbox with a highly sensitive and very lengthy expression of his feelings. But Dobbie's would-be princess declined, laughingly forwarding his prose to her sisters, who then reforwarded it to the world. Apparently unfazed, Dobbie has since insisted he's received more overtures than mockery.

3) All Wet: When your country is in the grips of a killer flood, you gotta have a little sympathy, right? Wrong, at least in the case of a certain unnamed employee of Australia's Queensland Health. Seems the insensitive boob emailed a mass memo demanding that absentee staff furnish photo proof they were indeed flood victims.

2) Careless Whispers: Adultery, spanking, force-feeding, tickle torture. An episode of *Criminal Minds*? Well, maybe, but in this instance we're talking about staid old Cornell University. Two Cornell employees, John and Lisa, somehow misdirected their pseudo-BDSM perv-ersation to the entire campus.

1) Wang Chung: Peter Chung, filthy-rich investment banker by day, nonstop stud machine at night. At least that's what Chung led his compatriots to believe in what surely must be considered one of the most pompous emails ever devised. Begging for an additional army of condoms was just the start; Chung bragged openly about virtually every facet of his life. But his bosses weren't nearly so amused. When they somehow received wayward copies of the grandstanding, Chung was canned.

SMALL FORM FACTOR, SURPRISE

BIG

From the caliber of their parts to the breadth of their abilities to their unconventional shapes and sizes, today's small form factor PCs are a tasty treat for power users

BY GORDON MAH UNG

I t has long been considered common wisdom that the smaller the size of a PC, the greater its compromises. Notebooks, no matter how fat, for example, will never touch the power of a desktop machine.

The same held true for small form factor rigs. But is that still the case? To find out how today's SFF rigs compare with their full-size desktop brethren, we tasked five top PC makers with sending us their best and brightest, and, well, smallest machines.

We didn't put any hard and fast limits on size or price. Instead, we wanted the vendors to go nuts with the definition of "small form factor rig." As a result, what we received for our shoot-out was an incredibly diverse assortment of shapes and sizes that completely upended our old notions of the category. It also proved to us that small PCs can pack a mighty punch.

To judge these little wonders, we looked at price, aesthetics, power consumption, acoustics, and, of course, performance. What you'll see is that this contest yielded some unexpected challengers and results.

Falcon Northwest FragBox

Falcon Northwest's FragBox is no new face around here. We've seen various iterations of this SFF over the years, but the latest is perhaps the most impressive. In a chassis that's the second-smallest of the bunch—just slightly larger than Cyber-Power's LAN Party Evo—Falcon manages to jam in not one, but two GeForce GTX 580 cards, along with a 3.4GHz Core i7-2600K overclocked to 4.2GHz.

Storage is handled by Crucial's new 256GB M4 SSD and a 1TB Western Digital HDD. RAM is maxed out on the Asus P8P67M with 16GB of DDR3/1600.

Despite the abundance of hardware in such a confined space, the FragBox is an amazingly well-behaved machine. It stood out in contrast to other boxes in this roundup whose dual videocards were pushed into thermal detonator mode by our gaming benchmarks, forcing the system fans to spool to noticeable or unacceptable levels.

The FragBox exhibited none of that. You could play a game for hours at 2560x1600 resolution and not notice that the machine was working hard.

So what's the FragBox's big problem? It's majorly outgunned by the iBuypower, Origin PC, and AVADirect rigs' four-way GPU setups and higher-clocked or higher-cored CPUs. It also doesn't help that the FragBox is priced at a painful $4K. That's the same as the iBuypower rig, which not only has dual dual-GPU cards, but a Blu-

ray burner and more RAM. Heck, even the Origin PC is $200 less. Ouch.

What the FragBox does bring, however, is a top-notch build quality, acoustic bliss, and performance that's damn respectable considering its displacement of roughly 1,200 cubic inches. By comparison, the three much larger rigs are about 2,000 cubic inches. So, while we can't give the FragBox the nod for breakout performance, it offers the best blend of size and performance in a shape and size that meets the traditional definition of an SFF box.

There isn't much space to work in the FragBox, but that also means it doesn't take up much room either.

VERDICT 9

Falcon Northwest FragBox

$3,975, www.falcon-nw.com

The FragBox is amazingly quiet considering that it packs an overclocked Core i7-2600K and SLI'd GeForce GTX 580 cards.

BENCHMARKS

	ZERO POINT		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
VEGAS PRO 9 (SEC)	3,049	2,528											
LIGHTROOM 2.6 (SEC)	356	300											
PROSHOW 4 (SEC)	1,112	883											
REFERENCE 1.6 (SEC)	2,113	1,722											
STALKER: CoP (FPS)	42.0	83.8											
FAR CRY 2 (FPS)	114.4	179.9											

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

SPECIFICATIONS

PROCESSOR	Intel 3.4GHz Core i7-2600K (overclocked to 4.2GHz)
MOBO	Asus P8P67-M Pro (Intel P67 chipset)
RAM	16GB DDR3/1600
VIDEOCARD	Two GeForce GTX 580 cards in SLI
SOUNDCARD	Onboard
STORAGE	256GB Crucial M4 SSD, 1TB Western Digital 7,200rpm
OPTICAL	LG DVD burner
CASE/PSU	Custom / Silverstone 1,000 watt

AVADirect Compact Gaming PC

For our shoot-out, AVADirect came loaded for bear... as well as grabboid, sandworm, and arachnid, too. Yeah, basically AVADirect enters the scene packing a cartoonish amount of hardware firepower.

In what arguably pushes the definition of a small form factor rig, AVADirect's Compact Gaming PC sports an Intel 3.46GHz Core i7-990X, 12GB of DDR3/1600, and *two* of AMD's Radeon HD 6990 cards in CrossFireX mode.

Also jammed into the Lian Li PC-V354R chassis are an Asus Rampage III Gene X58 board, a 250GB Intel 510 SSD, a 2TB Barracuda XT, and an LG Blu-ray burner.

Interestingly, instead of using a closed-loop liquid cooler, AVADirect cools the CPU—overclocked to 4.4GHz—using a gigantic Prolimatech Megahalem cooler.

This being our first encounter with a Radeon HD 6990 in a shipping system, we were curious to see how the new dual-GPU cards performed. It was hit or miss against the two rigs outfitted with Nvidia's dual-GPU GTX 590 cards. In our Far Cry 2 benchmark, which is mostly a CPU benchmark these days, the AVADirect was even. But in STALKER: CoP, the quad-SLI configs blew the doors off the CrossFireX setup. In the Heaven benchmark, the AVADirect was about 17 percent slower, as well. The AVADirect got within striking distance in 3DMark 2011, but only if you consider a 7 percent disparity close.

In app performance, the AVADirect's hexa-core saves face by acing all other machines in Sony Vegas Pro 9 and also sliding past the Sandy Bridge boxes in our Main-Concept test. The major problem with the AVADirect is acoustics. In CPU-only tasks, there's no problem, but kick on any 3D game at higher resolutions for longer than 15 minutes and the fans in the system begin to howl at intolerable levels. Like ruin-your-music-or-gaming-experience kind of loud.

And that's really a shame because when we originally uncrated the AVADirect box, we were floored by its configuration. Overall, performance, especially in multi-threaded tests, is superb, but in gaming, the CrossFireX takes a back seat to quad SLI. Combined with the noise, it's a deal breaker and a bit of a heartbreaker, too.

Tucked in behind the 1,200W PSU are two Radeon HD 6990 dual-GPU cards and a Prolimatech Megahalem.

AVADirect's SFF is a head-turning rig loaded to the gills with firepower.

VERDICT 7

AVADirect Compact Gaming PC

$4,976, www.avadirect.com

BENCHMARKS

	ZERO POINT											
VEGAS PRO 9 (SEC)	3,049	2,142										
LIGHTROOM 2.6 (SEC)	356	275										
PROSHOW 4 (SEC)	1,112	883										
REFERENCE 1.6 (SEC)	2,113	1,499										
STALKER: CoP (FPS)	42.0	83.1										
FAR CRY 2 (FPS)	114.4	202.2										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

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

SPECIFICATIONS

PROCESSOR	Intel 3.46GHz Core i7-990X (overclocked to 4.4GHz)
MOBO	Asus Rampage III Gene (Intel X58 chipset)
RAM	12GB DDR3/1600
VIDEOCARD	Two Radeon HD 6990 cards in CrossFire X
SOUNDCARD	Onboard
STORAGE	250GB Intel 510 SSD, 2TB Seagate Barracuda 7,200rpm
OPTICAL	LG Blu-ray burner
CASE/PSU	Lian Li PC-V354R / Silverstone 1,200 watt

CyberPower LAN Party Evo

If you stopped a nerd in an electronics store and asked her to describe a small form factor PC, she'd just pull up a picture of Cyber-Power's LAN Party Evo on her smartphone.

In many ways, this is the ultimate evolution of the original SFF design. The LAN Party Evo isn't much bigger than the original SFFs of yesteryear, but peep these specs: a 3.4GHz Core i7-2600K, a GeForce GTX 580 card, a 120GB Intel 510 SSD, and 1TB hard drive.

Cooling is handled by a deftly installed Asetek 550LC. And thanks to the Mini-ITX P8H67-I Deluxe, the sucker boots from dead cold to desktop in 24 seconds.

In performance, there were no surprises. There was no chance the LAN Party Evo could outbox any of the other rigs here considering how the others are loaded to the gunnels with hardware. We won't even bother to get into performance comparisons because there's no need. Certainly overclocking the 2600K could have helped, but you have to remember that you can't really overclock on the H-series chipset, and CyberPower told us there are no P-series chipsets in Mini ITX available today. Turbo Boost 2.0 is still functioning, though, so you do get some clock bumps.

Lest you think the LAN Party Evo is some drag-ass slow system, it's not. With its 2600K part and GTX 580, it's probably faster than 90 percent of standard desktop systems today, and will comfortably play today's

games at 1080p resolutions. In app performance, it really isn't that far behind the other rigs.

But against the hardware in this roundup, it's got no chance of winning any gaming tests. Despite all this, we're really tickled pink by the LAN Party Evo. It's quiet, lightweight, and is even relatively easy on the electricity. Its idle power consumption is a third of some of the machines here. And at half the price of the other rigs (as it should be), it's really a damn spiffy rig.

Overall, the LAN Party Evo is an impressive box. Unfortunately, it's just not as impressive as the others in this roundup.

The Evo can't beat the others here, but a GTX 580 and 2600K in this chassis are impressive nonetheless.

If you look up "small form factor" in the dictionary, you will see a picture of CyberPower's LAN Party Evo.

VERDICT 8

CyberPower LAN Party Evo

$2,100. www.cyberpowerpc.com

BENCHMARKS

	ZERO POINT	
VEGAS PRO 9 (SEC)	3,049	3,030
LIGHTROOM 2.6 (SEC)	356	310
PROSHOW 4 (SEC)	1,112	1,054
REFERENCE 1.6 (SEC)	2,113	2,064
STALKER: CoP (FPS)	42.0	44.8
FAR CRY 2 (FPS)	114.4	109.5 (-4%)

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

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

SPECIFICATIONS

PROCESSOR	Intel 3.4GHz Core i7-2600K
MOBO	Asus P8H67-I (Intel H67 chipset)
RAM	4GB DDR3/1333
VIDEOCARD	GeForce GTX 580
SOUNDCARD	Onboard
STORAGE	120GB Intel 510 SSD, 1TB Western Digital 7,200rpm HDD
OPTICAL	LG Blu-ray combo drive
CASE/PSU	Silverstone SG07 / Silverstone 600 watt

Origin PC Chronos

The Origin Chronos was an early bet on which system would be the fastest here, as we've seen what other vendors can do in Silverstone's fabulous FT03 case.

Despite it having the same volume as the AVADirect and iBuypower machines, the FT03 occupies a smaller footprint than all others here, including the CyberPower LAN Party Evo, yet it accommodates an incredible amount of hardware.

Yeah, we know, it's tall. But for folks who want to stuff their machine under a desk, or even keep it atop a desk, system height is rarely a problem. We can't really see the FT03's height being an issue unless you have to store your rig in a foot locker or a cubby.

Inside the FT03 is a Core i7-2600K overclocked to 4.7GHz, a pair of GeForce GTX 590 cards, and an Asus P8P67-M Pro board. To keep costs low, Origin runs a pair of 64GB Crucial C300 drives (what no M4 available?) and keeps the system RAM to 8GB of DDR3/1600.

The Origin PC's performance is quite competitive. It walked past the others in our ProShow test, but it just couldn't wrest the crown from the wicked-fast AVADirect machine in Sony Vegas and MainConcept Reference.

So it's fast and it's beautiful, there's gotta be a catch, right? Unfortunately, yes. Like the AVADirect, the Origin's fans are tweaked to increase as the system heats up. With Nvidia's GeForce GTX 590 cards producing the heat of a phaser on overload (even with the case drilled out to add ventilation), the Origin PC's case fans spool up to unbearable levels. And due to the pitch of the fans, you get a din that's annoying as hell during gaming. It's as bad, if not worse, than the AVADirect's dual Radeon HD 6990s under gaming loads. To be fair, if the Origin's acoustics could have been better managed, it likely stood a chance of winning this affair—the same goes for the AVADirect. But as it is, they are both too loud.

And that's just a shame. Because, like the AVADirect, Origin's is a majorly fast system that costs even less than the Falcon Northwest FragBox. But it's just too damn noisy for us to recommend it.

VERDICT 7

Origin PC Chronos

$3,800, www.originpc.com

Think of the Origin PC Chronos as the Manute Bol of PCs. It's tall, but really doesn't take up that much room.

19.25"
11"
9.25"

The open access of the FT03 case makes wrenching inside the system a joy compared to the other rigs here.

BENCHMARKS

	ZERO POINT		0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
VEGAS PRO 9 (SEC)	3,049	2.256	
LIGHTROOM 2.6 (SEC)	356	261	
PROSHOW 4 (SEC)	1,112	778	
REFERENCE 1.6 (SEC)	2,113	1,537	
STALKER: CoP (FPS)	42.0	124.6 (197%)	
FAR CRY 2 (FPS)	114.4	203.8	

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

SPECIFICATIONS

PROCESSOR	Intel 3.4GHz Core i7-2600K (overclocked to 4.7GHz)
MOBO	Asus P8P67-M Pro (Intel P67 chipset)
RAM	8GB DDR3/1600
VIDEOCARD	Two GeForce GTX 590 cards in SLI
SOUNDCARD	Onboard
STORAGE	Two 64GB Crucial C300 SSDs in RAID 0, 1TB Western Digital 7,200rpm HDD
OPTICAL	Optiarc Blu-ray burner
CASE/PSU	Silverstone FT03 / Silverstone 1,200 watt

iBuypower LAN Warrior II

Remember those "kids" in Little League who shaved and had college-age girlfriends yet their birth certificates said they were 14 years old? iBuypower's LAN Warrior II is kind of like that.

What else can you say when the LAN Warrior II looks an awful lot like a small mid-tower case. Or maybe a mini-tower. We had a tough time actually figuring out whether the LAN Warrior II even qualified for our SFF roundup. In its defense, the actual volume of the case is roughly 2,000 cubic inches. That's about the same as the Origin PC and the AVADirect, so any bias is strictly superficial.

Like those other two rigs, the LAN Warrior II takes advantage of its volume by packing in the hardware. Its Core i7-2600K is overclocked to 4.6GHz, with Turbo Boost taking it to 4.9GHz for some workloads. In the GPU department, two GeForce GTX 590 cards push the frame rates through the roof, and two 120GB Intel 510 SSDs in RAID 0, a 3TB HDD, and Blu-ray burner fill in the gaps.

To keep the system cool, a massive fan and mesh side keep air moving over those hot-as-hell GTX 590 cards. Originally, we thought the LAN Warrior II's acoustics were excessive when compared with the nearly silent CyberPower and Falcon systems, but actually, the noise level wasn't bad. Noticeable, certainly, but probably only half as loud and half as annoying as the Origin and AVADirect boxes.

In performance, the LAN Warrior II does quite well. It's a pinch behind the very fast Origin system, in most of the app tests and gaming. The LAN Warrior II's lone win was an oddly fast score in our Lightroom test. Considering the similar clock speeds of the systems tested, the only thing that might explain that result is the storage subsystem and choice of SSDs.

Frankly, the LAN Warrior II's form factor and performance would have put it in second place to either the AVADirect or Origin machines, but with those two rigs' intolerable acoustics, the LAN Warrior II leaps to the front of the line by easily clipping the Falcon's wings in pure frame rates and app performance.

If you don't mind the nontraditional SFF shape, the LAN Warrior II's performance, stellar price, and configuration make it the contender to beat.

Air blown directly onto the GPUs seems to tame the noise of the GTX 590 cards.

VERDICT 9

iBuyPower LAN Warrior II
$4,000, www.ibuypower,com

It might look like a mini-tower, but the LAN Warrior II actually offers no more internal space than the AVADirect rig.

15.75"
18.25"
7"

BENCHMARKS

	ZERO POINT												
VEGAS PRO 9 (SEC)	3,049	2,376											
LIGHTROOM 2.6 (SEC)	356	233											
PROSHOW 4 (SEC)	1,112	829											
REFERENCE 1.6 (SEC)	2,113	1,595											
STALKER: CoP (FPS)	42.0	122.9 (193%)											
FAR CRY 2 (FPS)	114.4	190.9											

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

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

SPECIFICATIONS

PROCESSOR	Intel 3.4GHz Core i7-2600K (overclocked to 3.7GHz)
MOBO	Asus P8P67-M Pro (Intel P67 chipset)
RAM	16GB DDR3/1600
VIDEOCARD	Two GeForce GTX 590 cards in SLI
SOUNDCARD	Onboard
STORAGE	Two 120GB Intel 510 SSDs in RAID 0, 3TB Western Digital 7,200rpm HDD
OPTICAL	Optiarc Blu-ray burner
CASE/PSU	NZXT Vulcan / Corsair 1,200 watt

Small Form Factors: The Final Analysis

How a controversial winner emerges from a field full of surprises

BELIEVE IT OR NOT, a showdown of full-size super PCs can get pretty boring. What you usually end up with is five systems all packing the same internal components.

But a contest among computer makers that restricts physical size? Now that seemed bound to yield some interesting results. Just as any race sanctioning body, such as NASCAR or FIA, sets weight limitations or adds restrictor plates, we thought that by limiting vendors to the simple term "small form factor," we'd rein in the out-of-control system specs and benchmark-crushing performance that we see with full-size systems.

Our plan worked and it didn't. It worked because we received an incredibly diverse set of machines that show what can happen when you're thermally and spatially constrained by a SFF rig. Our plan didn't work because the machines we got blew our mind in specsmanship. We really did not think it was possible to cram as much hardware into such small machines as the vendors did here.

CyberPower's LAN Party Evo impressed us with its size, power consumption, and capability. It actually serves as a good zero-point for the kind of performance you get out of the prototypical small form factor machine. As we said in our review, it's enough firepower to keep most of us happy, and when you consider its small footprint, who can complain? And yet it gets no cigar and shouldn't. The other rigs' performances were simply superior.

Next we had Falcon Northwest's FragBox. It's not much bigger than the CyberPower machine, yet it packs GTX 580s in SLI and its P-series chipset allows for some overclocking. Its main limitation is its size. Like the CyberPower, the size imposes a thermal ceiling on the rig. There's no thermal headroom to run this generation of dual-GPUs in the FragBox, nor crank the processor clock very far. While we feel the Falcon is the best of bunch for folks who are severely space-constrained, the quad-GPU configs rip up the GeForce GTX 580s pretty handily. Of course, Falcon could have opted to add more fans and increase airflow, but we're kind of glad it didn't.

That's perhaps a lesson that AVADirect and Origin PC should have taken to heart. Instead, we suspect the builders decided to throw caution to the wind in their pursuit of victory. In performance, both boxes are certainly fast—fast enough to put some full-size boxes to shame.

AVADirect's use of the overclocked 990X is perhaps that machine's most eyebrow-raising feature. Well, that and the use of the Radeon HD 6990 cards. The HD 6990 cards have a reputation for being loud—a reputation that's well deserved, we discovered. Ultimately, that cost AVADirect serious points.

Similarly, acoustics were a serious failing with Origin PC's Chronos, which was even more obnoxiously loud. Part of that may come from the innovative Silverstone case. With the AVADirect, the loud-as-hell 6990 cards at least have the audio directed out the back. With the Silverstone, the audio emanates from the top and the side panels, which makes it sound even louder.

With Origin and AVADirect penalized for audio, that left iBuypower's LAN Warrior II as the last man standing. From what we can see, the GeForce GTX 590s can be kept running at lower fan speeds if you have enough fresh air moving over them. With the NZXT Vulcan case, a massive 20cm fan ducts external air directly onto the GTX 590 cards. The LAN Warrior II is certainly not quiet, mind you—especially when compared to the CyberPower LAN Party Evo or Falcon Northwest Frag-Box—but the fan whir is fairly low-pitched and more comparable to a standard full-size gaming machine.

The LAN Warrior II's performance numbers are certainly all smiles. It's a smidge slower than the Origin PC Chronos in the Heaven 2.5, STALKER: CoP, and 3DMark 2011 benchmarks. Application performance is also competitive, but not the best.

The only issue we have with the LAN Warrior II is its size and shape. Even though it has the same volume as the AVADirect and Origin PC rigs, its shape is closer to a mini-tower than a small form factor. In that respect, is it a fair competitor to the more conventional Falcon and CyberPower SFFs? In the end, we decided that philosophical arguments aside, the fact remains that the iBuypower LAN Warrior II is not only a fine machine but the overall winner in this contest. ⏻

SMALL FORM FACTORS COMPARED

	Falcon Northwest FragBox	AVADirect Compact Gaming PC	CyberPower LAN Party Evo	Origin PC Chronos	iBuypower LAN Warrior II
CHIP	3.4GHz Core i7-2600K	3.46GHz Core i7-990X	3.4GHz Core i7-2600K	3.4GHz Core i7-2600K	3.4GHz Core i7-2600K
CPU CLOCK	4.4GHz	4.4GHz	3.4GHz	4.7GHz	4.6GHz
RAM	16GB DDR3/1600	12GB DDR3/1600	4GB DDR3/1333	8GB DDR3/1600	16GB DDR3/1333
MOTHERBOARD	Asus P8P67-M Pro	Asus Rampage III Gene	Asus P8H67-I Deluxe	Asus P8P67-M Pro	Asus P8P67-M Pro
SSD	Crucial 256GB M4	Intel 250GB 510	Intel 120GB 510	64GB Crucial C300 RAID 0	Intel 120GB 510 in RAID 0
HDD	1TB	2TB	1TB	1TB	3TB
ODD	DVD burner	Blu-ray burner	Blu-ray combo	Blu-ray burner	Blu-ray burner
GPU	GeForce GTX 580 in SLI	Radeon HD 6990 in CrossFireX	GeForce GTX 580	GeForce GTX 590 in SLI	GeForce GTX 590 in SLI
PSU	Silverstone 1,000	Silverstone 1,200	Silverstone 600	Silverstone 1,200	Corsair 1,200
PRICE	$3,975	$4,976	$2,303	$3,800	$4,000
VEGAS PRO 9 (SEC)	2,528	**2,142**	3,030	2,256	2,376
PROSHOW PRODUCER (SEC)	883	883	1,054	**778**	829
MAINCONCEPT (SEC)	1,722	**1,499**	2,064	1,537	1,595
STALKER: COP (FPS)	83.8	83.1	44.8	**124.6**	**122.9**
FAR CRY 2 (FPS)	179.9	**202.2**	109.49	**203.78**	190.9
LIGHTROOM 2 (SEC)	300	275	310	261	**233**
3DMARK 11 EXTREME	X3,695	X5,140	X1,995	**X5,577**	X5,496
HEAVEN 2.5 (FPS)	32.4	41.1	16.6	**50.8**	**49.7**
IDLE POWER (WATTS)	140	218	**85**	190	176
CPU LOAD POWER (WATTS)	281	385	**173**	368	356
GPU + CPU LOAD (WATTS)	500	715	**320**	750	750
WEIGHT (LBS)	24.6	30.7	17.05	32.9	30.7
HEIGHT (INCHES)	8*	12.5	7.5	19.25	15.75*
WIDTH (INCHES)	10.25	10	8.75	9.25	7
LENGTH (INCHES)	15	16	14	11	18.25
DISPLACEMENT (CUBIC INCHES)	1,230	2,000	919	1,958	2,012
ACOUSTICS	Very Good	Poor	Excellent	Poor	Fair
APPEARANCE	Very Good	Very Good	Good	Very Good	Good

Best scores are bolded. *Does not include handle.

SFF VS. FULL-SIZE DESKTOP: FIGHT!

Can small be the new standard for power users?

If you've seen the specs on the machines in our roundup, you know that you can indeed stuff a lot of hardware into a smaller-size machine. But is it enough to sway you from building a full-size desktop for your next build?

We'd say probably not. We have much respect for the vendors' ability to cram all manner of performance parts into these machines, but there are still compromises inherent to SFFs.

The most obvious are thermals. The two smaller SFF rigs here don't have the thermal chops to run dual-GPU cards. And two of the three machines here had to run their fans at such excessive speeds that it's not worth it.

But what about performance? We decided to compare the SFF rigs against the Maingear Shift Super stock—a state-of-the-art desktop that's reviewed on page 70. With its CPU running at 5GHz, the Shift SS is faster than the fastest of the SFF machines, from 5 percent to 10 percent.

Even better, the Shift SS is very well behaved. The machine can run two dual-GPU cards without having to crank the fans to maximum speed.

Noise and performance aren't the only things to consider when looking at a desktop though. There's also serviceability—how easy a machine is to work in. The Origin PC Chronos is actually very serviceable, but the rest of the SFFs here have so much hardware crammed into such a small space that wrenching on them is a major undertaking.

The final category is obvious: expandability. All of the SFF machines are pretty much maxed out on hardware. There's no option to add a soundcard, additional hard drive, or secondary optical drive.

A full-size desktop machine has space to grow into. Let's not even mention that finding Mini-ITX or microATX motherboards with enthusiast features is very difficult. Yes, SFFs certainly have power and capability previously unimagined, but they still aren't as versatile, powerful, or serviceable as that dinosaur, the desktop PC.

Multiscreen

> **THREE OF THE MORE HARDCORE GAMERS** ON STAFF **SERVED AS** OUR INTREPID **TESTERS.**

Madness
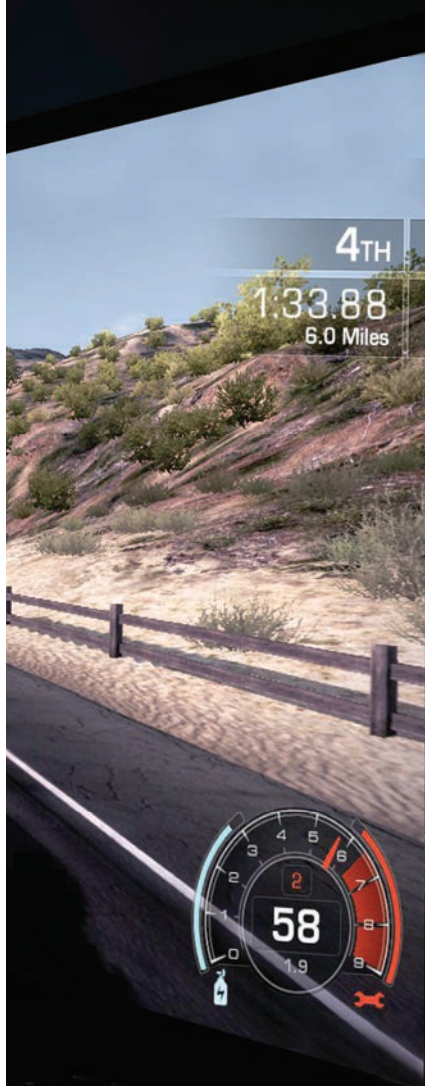
BECAUSE **ONE SCREEN** IS NEVER ENOUGH! WE **SET OUR SIGHTS** ON FINDING THE BEST MULTISCREEN **SETUP FOR GAMING**

BY AMBER BOUMAN

LAST MONTH'S REVIEW of Samsung's MD230X6 six-screen Eyefinity display got us thinking big. We were awestruck by the majesty of so much screen real estate—particularly in games, where a screen config of massive proportions provides a level of immersion that a single screen, or even two screens, can't come close to matching. But the MD230X6 wasn't perfect, as our review revealed. This got us wondering: Would just three of the 23-inch displays side-by-side make for a more satisfying all-around experience? Would it be as encompassing in games? What if we could take three large displays and turn them vertical? And hey, while we're imagining the possibilities, what would gaming be like on three gigantic HDTVs? What, after all, could be more maximum than that?

We knew of no better way to answer these pressing questions than with a Maximum PC Challenge. We grabbed three of the more hardcore gamers on staff to serve as our intrepid testers: Online Associate Editor Alan Fackler, Senior Associate Editor Nathan Edwards, and Senior Editor Gordon Mah Ung.

We had each editor play three distinctly different game types—Need for Speed: Hot Pursuit, Call of Duty: Black Ops, and World of Warcraft—on our four test setups: Samsung's MD230X6 with all six screens, the MD230X6 with just three screens, three of NEC's new PA301Ws 30-inch screens vertically oriented, and three NEC E461 46-inch HDTVs.

We were looking for the perfect combination of screen real estate, game immersion, and functionality across multiple game types. Which config would prevail? We needed to find out—even if it took hours and hours of gameplay (oh, how we toil!).

While our primary objective in this challenge was to identify the most awesome screen setup for games, we also include a sidebar on which GPU/s will produce the best frame rates and quality settings in each multiscreen scenario.

Now, with that out of the way… *Game on!*

Six 23-inch Panels

SAMSUNG'S MD230X6 IS NICKNAMED "THE BEAST," BUT IS IT THE BEST?

Samsung's MD230X6 brings a whopping 5760x2160 resolution to the table.

SAMSUNG'S MD230X6 is particularly suited to a six-screen setup, with super-slim bezels that minimize disruption between screens and a solid setup. While the Beast (our pet name for the monstrous display) isn't hard to screw together, it's a pain to keep track of all the wires coming out of the back. It also takes up significant desk space, and its weight makes it susceptible to some wobbling. Intended for the über-productive user or the intense gamer, the Beast earned a 7 verdict in last month's review—in large part because of the horizontal bezel running through the middle of the display, which made aiming in first-person shooters (such as Call of Duty) frustrating and difficult. While bezel correction is an option in the Catalyst Control Center, we couldn't enable it with this setup, since the monitors had varying display identification data. Unable to aim or see his team or user tags, Gordon declared first-person shooters on the MD230X6 a "waste of time." And while Alan said he felt "enveloped" by the display, he also declared it nearly impossible to aim. Nathan said straight-out he'd prefer a smaller screen.

The Beast fared much better in WoW, where the bezels didn't interfere with gameplay but did cut our avatars oddly in half. Surprisingly there was almost too much screen real estate—both Alan and Gordon found it difficult to swing the mouse through six screens to get to the menu icons, and Nathan disliked having to turn his head to view the chat window and controls—although all agreed that the "panoramic view of the world was encompassing."

All three editors found the MD230X6 most gratifying in a racing game. Nathan summed it up best during his Need for Speed test with the declaration, "This I can get behind!"

Three 23-inch Panels

IS HALF A BEAST TWICE AS NICE?

THE OBVIOUS SOLUTION to the bezels running through the center of the MD230X6 was to remove the top three displays and rerun our gaming tests on just the bottom three displays—essentially making it an MD230X3. Scaling back to just the three displays—for a combined resolution of 5760x1080—provided a whole new set of challenges. Nathan thought they seemed too low and said the setup felt "squat," and that there was still too much horizontal real estate. "I still have to look too far to the right or the left to see vital informa-

tion." While the aiming in the FPS was easier, as the bezel issue had been removed, the images being displayed were problematic. The settings in Call of Duty seemed off, as though the aspect ratio was incorrect, and the character models and weapons were oddly expanded across the screens. Gordon kept saying, "Something is not right here," and despite lots of fiddling with the aspect ratio and field of view, never quite got it tuned to his liking.

These issues were characteristic of the first-person point of view and cropped up to a lesser extent in Need for Speed. World of Warcraft, on the other hand, elicited a positive response from all the editors. While Gordon lamented that the three panels weren't as "in your face" as the six-display setup, he preferred the three screens to a single display and found WoW to be "totally playable" and "a better experience than racing or FPS," adding that a nice wide peripheral view of the world is much better suited to a third-person perspective.

By far the least outrageous configuration of our challenge, three 23-inch LCDs are hardly pedestrian.

DESPITE THE PITFALLS of the MD230X3, we weren't convinced that multiscreen bliss couldn't be found with three monitors. Enter NEC's spanking-new PA301Ws—professional-grade 30-inch screens with a price tag to match at $2,300 each. Besides each boasting a 2560x1600 native resolution, the PA301Ws offer the unique ability among 30-inch monitors to pivot into portrait mode. Set side-by-side in this fashion, you're looking at a wall of 4800x2560 unabashedly color-accurate pixels. True, the PA301Ws lack the Samsung screens' dainty bezels, but that didn't prove to be a problem, as the bezels didn't cross our primary focal point. As it happens, we could enable bezel correction with this setup, but we had mixed feelings about the results. Images appeared less "split" by the bezels, but a great deal of information was lost in the process.

Either way, the editors unanimously found this setup to be un-equivocally awesome. Gordon quickly declared it the "best of both worlds" between the previous six- and three-panel setups, and "a superior experience." Alan called his Call of Duty testing "intense, crazy immersive," and Need for Speed "freakin' sick." Nathan said of World of Warcraft, "Rad! It's like I'm peering through a window to another world."

All were in favor of the "vertical improvement" over the other three-panel config and the lack of a horizontal bezel. Gordon was impressed by the details during his Call of Duty run (although he was concerned the frame rates wouldn't hold—see our GPU guide, "What Videocard Do I Need?" page 48), and he called Need for Speed "ideal," stating that the PA301Ws was "in all ways better than the six panels."

Three 30-inch Panels

LET'S TRY THIS ONE MORE TIME WITH FEELING (AND PORTRAIT MODE)!

NEC's PA301W professional-grade 30-inch monitors overshadow a triad of 23-inch LCDs in resolution, image quality, and girth.

LESSONS LEARNED

THERE'S MORE TO USING A MULTISCREEN SETUP THAN JUST PLUGGING IN THE DISPLAYS

SO YOU'VE CLEARED OFF a huge swath of desk space, and you have your multiple large screens arranged just so. Now what? If you're using an AMD graphics card, you need to pay a visit to the Catalyst Control Center. Getting your displays to work in concert isn't a totally obvious process. You'll see all your monitors represented by icons, but no standard menu option for extending the desktop. Rather, you need to select one monitor, then use a drop-down arrow in the upper-right corner of the icon to span a group of your choosing.

In the Nvidia Control Panel, you might think you can take care of the job in the "Set up multiple displays" tab, like you would with two screens. But if you're using more than one GPU—in either a single- or double-card config— you actually need to go into the "Manage 3D settings" tab to get three or more screens working together.

While gaming can be glorious across three or more large screens, some games are more adaptable to that format than others. In our tests, for example, we found that Call of Duty: Black Ops assumed an unnatural aspect ratio and field of view when we ran it on three 1080p LCDs (with a combined resolution of 5760x1080). But there is a way to compensate for these issues. A free third-party app called Widescreen Fixer (www.widescreenfixer.org) will adjust the aspect ratio to suit your screen setup. It requires that you install a separate plugin for each game you want to adjust—plugins are available for many popular FPS titles, including the Battlefield and Call of Duty franchises, BioShock, and Ghost Recon.

Another issue we encountered involved the placement of various maps, menus, toolbars, etc., in a massively multiplayer game, such as World of Warcraft. By default, this information occupies the far edges of your display, out of the way of the action. But when using an array of large screens, you find yourself having to crane your neck from side to side to access that information. Fortunately, there are a ton of custom interfaces that move those elements to alternate parts of the display. A multitude of custom UIs for WoW can be found at Wowinterface.com. –KATHERINE STEVENSON
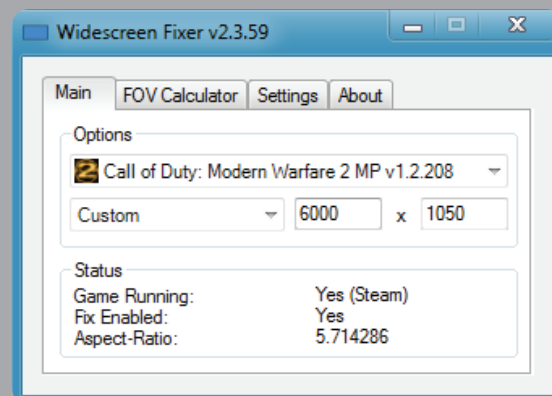
With Widescreen Fixer, you can adjust the aspect ratio of select games for improved playability across multiple screens.

WHAT VIDEOCARD DO I NEED?

A MULTISCREEN SETUP CALLS FOR ROBUST GRAPHICS. HERE'S A QUICK GUIDE

GAMING ON THREE or more monitors is no easy feat. Pushing that many pixels is hugely demanding on a GPU. So if you want to get the most from your multiscreen setup, you'll need to pair it with adequate graphics power. Using our challenge scenarios as examples, we examine what kind of GPU/s you will need to achieve adequate frame rates and quality settings.

The Wall of Six

AMD likes to tout the ability of its GPUs to handle up to six LCD panels simultaneously. You'll need a special Eyefinity Edition card, complete with six Mini DisplayPort connectors, if you want to drive six panels with one card, based on the previous-generation Radeon HD 5870.

The problem is that the HD 5870 doesn't really have enough gas to drive six 1080p panels with decent frame rates in many games. You'll either have to significantly dial down the eye candy or reduce resolution—which defeats the purpose of having six panels. You'll see better performance if you pair up two Radeon HD 6970s. Even then, you'll need to sacrifice some high-end features.

If you want to go all out and drop in a pair of Radeon HD 6990 dual-GPU cards (assuming you can actually find them), then you can get pretty decent frame rates.

You can theoretically drive six panels with Nvidia-based cards, but you'd need either three cards in triple-SLI mode or two GTX 590 dual-GPU cards. It's unclear, however, whether driver support is really there to deliver the same level of experience.

Triple HD Desktop Monitors

For more practical gaming, three 1080p LCD monitors is probably the sweet spot right now. You can drive three 1080p monitors with a single high-end, single-GPU card like the Radeon HD 6970 and get decent frame rates at the full 5760x1080 resolution. You will need to sacrifice some detail settings in some games. And there will be a few titles, like Metro 2033, that won't be playable at these resolutions with a single card.

If you're willing to go with two cards or a dual-GPU card, the field opens up. Either Nvidia or AMD can run a triple HD desktop display with either dual-GPU cards or two discrete cards. If you're willing to go with the high midrange—Radeon HD 6950s for

Configuration 4

Three 46-inch TVs

TIME TO GO BIG OR GO HOME!

SO FAR, SO GOOD. So... what else? Three big HDTVs! The idea started as almost a joke by Gordon, but then germinated into a why-the-hell-not proposition. After all, if we want to be immersed in gameplay, what better way than by planting ourselves within a fortress of three giant 46-inch LCD screens. We turned to NEC's E461s, and we got busy. After some (pretty extensive) troubleshooting, we were ready to press Play.

The E461s obviously eat up huge amounts of space, and while this was easily the most unrealistic of the configs we tested, we had to see how it would play out. Like the three 23-inch panels, the HDTVs, which are 1920x1080 each, had a combined resolution of 5760x1080. But unlike the 23-inch panels, no one was complaining that the display felt too squat. Unfortunately, the aspect ratio and field of view issues that arose in Call of Duty with the other 5760x1080 setup remained.

Need for Speed was the biggest hit on this setup. Nathan's initial impression in the game summed it up nicely: "This is madness." Alan felt similarly, declaring that the peripheral view of the road rushing past made the game feel faster. Gordon, actually preferred Need for Speed on the TVs to the 30-inch screens, saying it felt like he was really driving and that the horizon appeared as large as in life.

World of Warcraft produced some complaints about the extensive screen real estate: "Turning my head to view data on the side screens destroyed the feeling of immersion and also took my eyes off my character," said Nathan. Gordon wasn't bothered by that so much, but did find WoW's relatively low-res textures to be unusually noticeable on the all-encompassing displays. During Alan's testing of World of Warcraft, Nathan declared it "more impressive looking" from further back. In fact, one of the drawbacks to using such large screens is that it's difficult to find a position that's close enough to feel immersed but not visually overwhelmed; Call of Duty caused dizziness during one portion of our testing.

NECs E461s offer a standard 1920x1080 resolution with a 120Hz refresh rate.

AMD or GeForce GTX 560 Tis for Nvidia—then you can probably get decent frame rates.

The 30-inch Solution

Assuming you have the monitors and the necessary stands, you can get an awesome experience from three 30-inch panels in portrait mode. That translates to 4800x2560 resolution, or 12.3 million pixels. You can go with a single AMD card, but don't expect a good gaming experience. What you really want is a pair of high-end, dual-GPU cards. If you've got the cash, you might be able to hit good frame rates with two Radeon HD 6990s. That's a lot of cash, but then you're driving a lot of pixels. Remember, three of these 30-inch panels are really only about 150,000 pixels less than six 1080p panels. So in terms of GPU horsepower, you need about the same performance for a three-panel, 30-inch setup as you'd need for six 1080p panels—but it will probably look better.

Triple HDTVs

What if you want to hook up three HDTVs? That's the same resolution as three 1080p desktop panels, and the performance requirements are the same. However, unique problems exist. For one thing, you'll want three HDMI connections. That's not as hard as it sounds, though. If you're going with Nvidia, you'll need two cards (or a single GTX 590) and three DVI-to-HDMI cables. With AMD cards, you'll want DisplayPort-to-HDMI adapters. Both of these solutions exist, thankfully.

The other issue you'll run into is overscan—where the signal extends beyond the visible boundary of the display—although this problem crops up less with the newer HDTVs. If you're hooking up older TVs, however, overscan can be enough to make you tear out your hair. In that case, you'll definitely want a third-party solution, like PowerStrip ($29.95 for a single license, http://bit.ly/kpehC1). But that's not a solution for the faint of heart. **–LOYD CASE**

To get the best gaming experience on a six-screen setup, you need two Radeon HD 6990 videocards—if you can find them.

SEEING IS BELIEVING

OUR PICK FOR THE BEST MULTISCREEN SETUP FOR GAMING

IN THE END, the PA301Ws won the votes of all three of our testers—the combination of pristine images spread across increased vertical landscape was just too good. Hey, anything that makes curmudgeonly Gordon utter "ideal" or "bingo" is definitely noteworthy. It's also one of the more practical setups (while the models themselves might be prohibitively expensive, the configuration is what impressed us); the sheer space that six panels or three HDTVs take up already puts both into the realm of fantasy for most users.

But this challenge wasn't about being realistic; it was about putting our fantasy multiscreen configurations to the test in games—and in that respect, the PA301Ws were the overall winner. While the three E461s did well in World of Warcraft and excelled in Need for Speed, they left us cold during Call of Duty. The six-panel MD230X6 display tripped over its own toes with the bezel issue, and its three-panel sibling wasn't grand enough to fulfill our desires and struggled with first-person point of view.

While all of the configurations required a considerable amount of setup and troubleshooting, the three vertical displays were ready to go with the fewest difficulties.

Additionally, the three vertical displays could easily be utilized for any other productivity task—from web design and photo and video editing to PowerPoint and Excel, it's hard to imagine a task this setup couldn't tackle with ease and aplomb. ⏻

With a combined resolution of 4800x2560, three 30-inch LCD monitors offer grandeur and detail without requiring an outrageous amount of desk space.

WHITE PA

BY BILL O'BRIEN

802.11ac

With eight transmitting antennas and theoretical data transfer rates of 1Gb/s, Wi-Fi is about to become turbocharged

Not much has happened to good old Wi-Fi since 802.11n arrived on the scene about six years ago, but a new protocol that the 802.11 WG (Working Group) is currently stirring up might turn out to be much bigger and way faster than 802.11n. It's called 802.11ac, and it promises a whopping 1Gb/s throughput by improving modulation and extending 802.11n's MIMO scheme to extreme levels. The only real bad news is that we may have to wait a while to experience it. We'll explore the specifications of this budding standard and its potential availability below.

THE CURRENT STATE OF AC

Where 802.11n offered a dual-band solution (2.4GHz and 5GHz), 802.11ac operates solely in the 5GHz (VHT, or very high throughput) band. This is still considered a cleaner spectrum than 2.4GHz, despite its use in 802.11n, because few 802.11n access points actually use much of the higher band.

The basic specifications for 802.11ac, as currently defined, are as follows:

Wider channel bandwidths: 80MHz and 160MHz channel bandwidths (vs. 40MHz maximum in 802.11n). The 80MHz channel is mandatory for stations (STAs); 160MHz is optional.

More MIMO spatial streams: Support for up to eight spatial streams (vs. four in 802.11n).

Multiuser MIMO: Multiple stations (STAs, typically handheld or mobile devices), each with one or more antennas, can transmit or receive independent data streams simultaneously. Downlink MU-MIMO (a single transmitting device with multiple receiving devices) is an optional mode within the specification. The upside of these multistation enhancements is that routers or host computers will be theoretically capable of streaming HD video to multiple clients throughout a networked environment.

Space Division Multiple Access (SDMA): Streams of data are resolved spatially as opposed to by frequency. This is similar to 802.11n's MIMO approach and boosts throughput while also ensuring signal strength and fidelity.

Modulation: 256-QAM (quadrature amplitude modulation), rate 3/4 and 5/6 is used to carry data, as opposed to 64-QAM, rate 5/6 in 802.11n. The result should be considerably improved throughput. (This is not the same as the digital television QAM standard.)

Other features include improved beamforming, which will enable the multiple signal emissions to work together, and MAC modifications to support the multiclient changes noted above. The standard as currently specified is also backward compatible for 20/40/80/160MHz channels as well as 802.11a/b/n devices.

It's worth noting that while 802.11ac's goal is to produce transfer rates as high as 1Gb/s, rates will vary depending on the exact scenario. We'll insert our usual caveat here: Real-life transfer rates are always lower than theoretical throughput rates—sometimes embarrassingly so. 802.11ac will be faster than 802.11n, but probably not as fast as the throughput rates claim. For example, 802.11ac will probably operate in the 350Mb/s range, not 1Gb/s—which is still a huge step up from 802.11n's 160Mb/s (or so).

This said, given the use of multiple signals, it's theoretically possible that 802.11ac might even be able to exceed the maximum given exaggerated MU-MIMO conditions. At the very least, this architecture will permit much faster file synchronization and backup, and may even permit direct transmission of wireless video signals.

Scenario	Typical Client Form Factor	PHY Link Rate	Aggregate Capacity
1-ANTENNA AP, 1-ANTENNA STA, 80MHz	Handheld	433Mb/s	433Mb/s
2-ANTENNA AP, 2-ANTENNA STA, 80MHz	Tablet, Laptop	867Mb/s	867Mb/s
1-ANTENNA AP, 1-ANTENNA STA, 160MHz	Handheld	867Mb/s	867Mb/s
2-ANTENNA AP, 2-ANTENNA STA, 160MHz	Tablet, Laptop	1.73Gb/s	1.73Gb/s
4-ANTENNA AP, 4 1-ANTENNA STAs, 160MHz (MU-MIMO)	Handheld	867Mb/s to each STA	3.47Gb/s
8-ANTENNA AP, 160MHz (MU-MIMO) —1 4-ANTENNA STA —1 2-ANTENNA STA —2 1-ANTENNA STAs	Digital TV, Set-top Box, Tablet, Laptop, PC, Handheld	3.47Gb/s to 4-antenna STA 1.73Gb/s to 2-antenna STA 867Mb/s to each 1-antenna STA	6.93Gb/s
8-ANTENNA AP, 4 2-ANTENNA STAs, 160MHZ (MU-MIMO)	Digital TV, Tablet, Laptop, PC	1.73Gb/s to each STA	6.93Gb/s

The chart above describes a series of possible 802.11ac usage scenarios based on device and network configurations.

PER

PRETENDER TO THE THRONE

As if we haven't had enough of competing standards over the years, the 802.11 Working Group is also working on an 802.11ad specification that operates in the 60GHz bandwidth spectrum. Fortunately, it and 802.11ac are not competitive. They can, in fact, be used in complementary situations. For example, using both 5GHz and 60GHz interfaces, it's possible to carry typical network data on the 802.11ac portion throughout the house while using the 802.11ad specification for streaming media within rooms. Assumptions, at this point, indicate that 802.11ad and its potential 6Gb/s transfer rate should be able to handle as many as three HD videos simultaneously.

The semi-bad news is that 802.11ad parallels WiGig's goals. And while 802.11ad is still to come, WiGig already enjoys support from Atheros, Broadcom, and Intel. Despite the considerable stature of these three companies, this is only semi-threatening to 802.11ad because support and alliances are routinely abandoned and/or assimilated with frightening regularity for a variety of reasons.

As always, backward compatibility is a mixed bag. Its presence is understandable, but insisting on it often ensures that weaknesses built into prior technology limits performance. With 802.11n equipment already in use, it would be interesting to see the spec architects draw a line in the ether and offer a fresh starting point for a new class of WLAN. This is not likely.

WHEN IS IT COMING?

Assuming that the ISPs don't start throttling bandwidth—a valid concern given the recent data limit edicts by AT&T—the implications of real-world data transfer rates of 350Mb/s are potentially revolutionary, particularly when used in tandem with 802.11ad devices. Video transmission, networked virtualization, remote control, and basic large-file transfers all suddenly become much more practical.

So when will we get our hands on 802.11ac tech? The sad answer is not anytime soon. The standard will likely be finalized in late 2012. Assuming this is the case, Working Group approval probably won't come until a year or so later in late 2013, which means we probably won't see the release of officially sanctioned 802.11ac consumer devices until then.

But, just like with 802.11n devices, it is likely that we'll be faced with confusing standards before the final 802.11ac spec is approved. Remember "draft-n" and its variants? We'll probably face the same coin toss with the same probability of buying noncompatible gear. Our take is that it's a small price to pay for doubling our wireless transfer rates. ⏻

autopsy

NZXT SENTRY LXE FAN CONTROLLER

Fan controllers don't just control fans—although they do that, too. High-end ones, like the NZXT LXE, show case temperatures and fan speeds, not to mention add a bit of flair to the outside of your case. Most mount in fan bays, but the Sentry LXE stands alone outside the case, attached by a cable, so the information and controls are always within reach. Here's what's inside.

RESISTIVE TOUCH SCREEN
The Sentry LXE's 5.27-inch touch screen rests above the actual LCD display; a faint grid of dots allows the touch screen to interpret finger location; that information is fed via ribbon cable to the fan controller.

LCD SCREEN
The custom LCD isn't fully pixilated; instead it consists of a number of individual segments that show fan speed, temperatures, and other data.

PCI EXPANSION BOARD
The business end of the Sentry LXE, the PCB fits in a spare PCI expansion slot. The actual fan controller is on this PCB, as is the CMOS battery that enables it to store preferences, as well as the leads for the five temperature probes and five 3-pin fan connectors.

8-PIN CONNECTOR
An 8-pin cable carries power and data from the PCI expansion board to the external screen.

MICROCONTROLLER (NOT SHOWN)
An Elan EM78P520N 8-bit microcontroller on the underside of the PCB is the brains of the operation. It contains a timer, LED driver, LCD driver, display RAM, and more, all on a tiny chip.
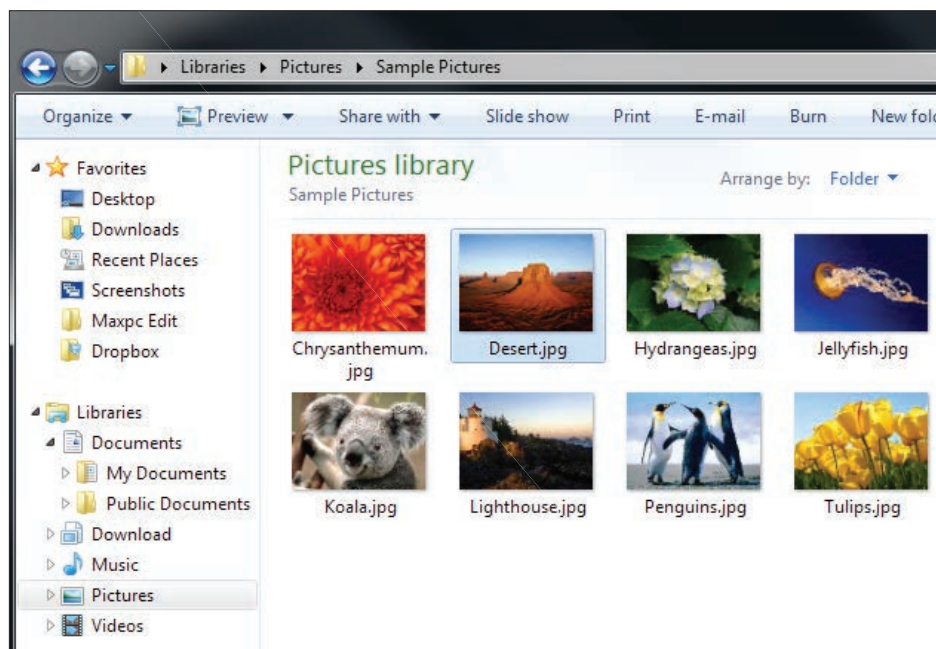
TEMPERATURE PROBES
These five bimetal probes can be attached anywhere inside your chassis and can measure temperatures between 0 C and 99 C.

HOW TO

STEP-BY-STEP GUIDES TO IMPROVING YOUR PC

WINDOWS TIP OF THE MONTH

ALEX CASTLE
ONLINE MANAGING EDITOR

LESSER-KNOWN BROWSER SHORTCUTS

IN THE PAST I've written about all the general-use shortcuts that can make your Windows experience faster, but I've never focused on just those that work in your web browser before. Since you likely spend a big chunk of your computing time using a browser, it's worth memorizing these lesser-known, time-saving shortcuts:

ALT + D: Move the cursor to the URL bar, and highlight everything.

ALT + ENTER: With an address entered in the URL field, open that page in a new tab, leaving the old one intact.

CTRL + PLUS OR MINUS: Increase or decrease zoom on a web page.

CTRL + SHIFT + T: Reopen the most recently closed tab. The number of tabs "remembered" differs from browser to browser.

PREVIEW YOUR FILES IN WINDOWS EXPLORER

IF YOU'RE SORTING PHOTOS, MUSIC, OR OTHER MEDIA AND WANT A LITTLE EXTRA DETAIL WITHOUT ACTUALLY OPENING THE FILES, JUST PRESS CTRL + P. THIS ENABLES THE EXPLORER PREVIEW PANE, WHICH LETS YOU VIEW MEDIA, DOCUMENTS, AND MORE RIGHT IN THE WINDOW.
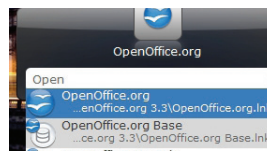
MAKE - USE - CREATE

54 Make the Start Menu Obsolete

56 Use Multiple Desktop Wallpapers

58 Create Win7-Integrated Virtual Desktops for Free

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

Make the Start Menu Obsolete with Launchy

Forget about clicking—Launchy lets you start programs as fast as you can type –Seamus Bellamy

> " FORTUNATELY, LAUNCHY HAS BEEN HELPING WINDOWS USERS GET BACK UP TO SPEED SINCE 2007.

FROM WINDOWS 95 right on through to Windows 7, the Start Menu has always been just a wee bit short of perfection. Requiring users to seek out content through an endless series of nested drop-down menus and folders with company names you can't remember having ever seen before, it's a user interface element that was designed to make our lives easier, but in actuality slows our workflow down to a crawl. Fortunately, Launchy has been helping Windows users get back up to speed since 2007.

For those of you not familiar with this fabulous free utility, Launchy is a Start Menu alternative that provides you with wicked-fast access to every file, bookmark, and program on your PC, using nothing more than a few keystrokes. Once you've installed and configured it, you'll wonder how you ever got along without it.
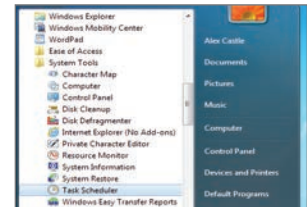
With hundreds of nested folders and files, finding things in the Start Menu can be a nightmare.

1 INSTALL LAUNCHY You can snag yourself a copy of Launchy's .exe file at **www.launchy.net**. As of press time, Launchy comes in two different flavors: a stable version (version 2.5) and a beta (version 2.6). While we're all for progress, this how-to is supposed to stress how Launchy can improve your PC productivity, not slow it down to a glitch-filled crawl, and we've heard reports of instability in the beta version. With this in mind, we recommend downloading the utility's stable version.

» It's worth mentioning that while Launchy works like a charm with Windows 7 32-bit, it can have issues with Windows 7 64-bit. In our experience, you can install Launchy on a 64-bit system and index everything your PC is rocking without any issues, but should you try to launch any 64-bit applications through the utility, you'll be rewarded with a hot, steaming plate of fail. So we recommend you avoid Launchy for now if you're running a 64-bit OS, or you can check out the Launchy forums, where members occasionally post 64-bit versions of the Launchy software. Now, with the fine print out of the way, we can get down to the nitty-gritty of getting Launchy up and running.

» Once you've downloaded Launchy, open it up and begin the installation. You'll be asked to jump through the typical hoops that come with any software installation, including identifying the folder location, agreeing to Launchy's software license, and choosing whether you want to see a shortcut added to your desktop as part of the installation process.

2 CONFIGURE LAUNCHY By default, Launchy will index the programs in your Start Menu automatically, making it possible to locate and start any of them with just a few keystrokes. For example, if you want to start up Firefox, you can do so by typing
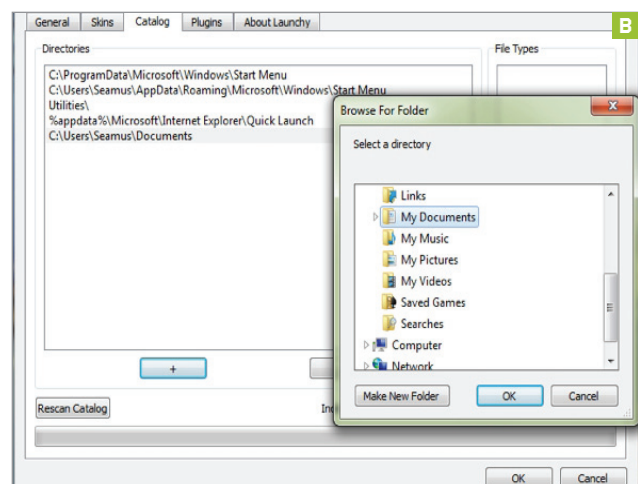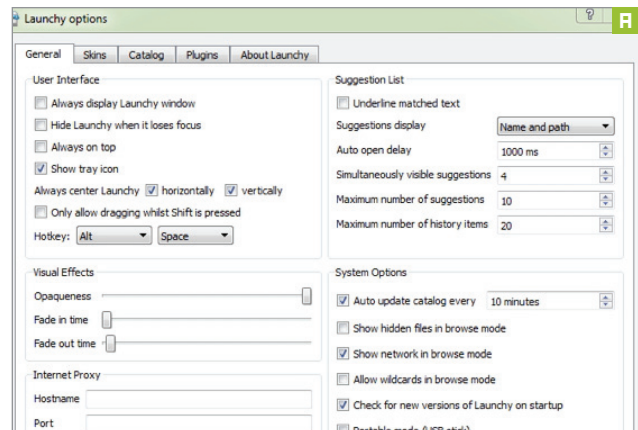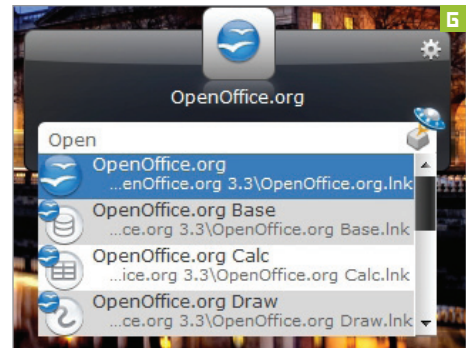
in the first few letters of the browser's name. Launchy allows you to extend this same keystroke-easy search functionality to just about any other file or program on your PC, as well. In order to do this, however, you'll need to point Launchy in the right direction. Look to the Options pane **(image A)** and click the Catalog tab. See that button all gussied up with a + symbol? Click it.

» You'll be rewarded with the ability to hunt down additional folders and files from your PC's internal or external storage locations to include in Launchy's catalog **(image B)**. Once you're done, click OK. If you're fussy about what kinds of files get thrown into your Launchy search catalog, you can even specify which extensions and executables should be included by using the File Types dialogue located on the right-hand side of the Catalog options pane **(image C)**.
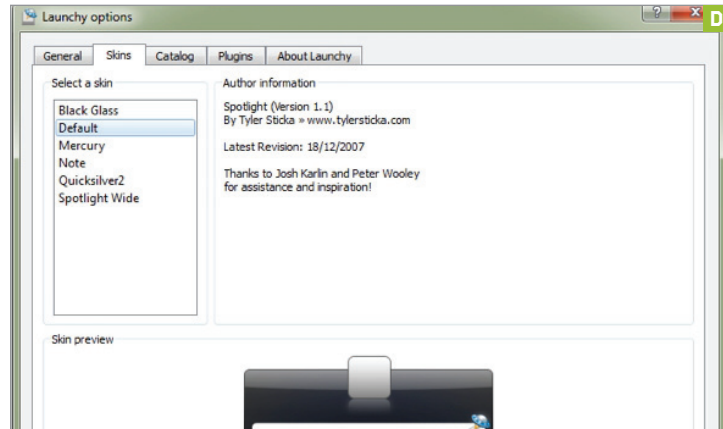
» When you've located the files or folders that you want to include in your Launchy catalog, click the Rescan Catalog button. Boom: The folder or file you selected has been added to Launchy's index. You can repeat this process for as many folders or files as you want. Sure this is a little more work than any of us might actually want to do, but it'll pay off huge dividends in the end.

3 **CUSTOMIZE LAUNCHY** Since you're already customizing your PC to make hunting down applications and files a whole lot easier, you might as well take a little time to customize your customization. If you look at Launchy's Option panes, you'll notice a tab for Skins and another for Plugins. We won't insult your intelligence by explaining what purpose each of these serves. Select a skin (or, if you feel like being difficult, don't), for your Launchy interface **(image D)**. Now, turn your attention to the Plugins tab.

» Launchy comes with six plugins baked right in, and they're enabled by default **(image E)**. In our opinion, the best of the bunch is one named Controly, which makes it possible for Launchy to add Control Panel items to its search index. If you don't think that's huge, just consider how many times a week you're forced to jump through fire to access a single Control Panel function. Yeah, now you're getting the idea. There's some other great plugins here as well, including one that allows Internet searches from right inside of your Launchy interface, user command-line access, and even a calculator capable
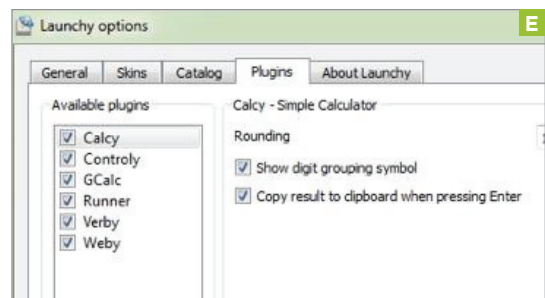
4 **PUT LAUNCHY TO WORK** You've installed Launchy, skinned it and tweaked it. Now it's time for the easiest part of this tutorial: using it. To access Launchy, press your keyboard's Alt key and spacebar at the same time. Your freshly skinned Launchy interface will pop up on the desktop, just begging for some text input **(image F)**. Go ahead and give it a try. Based on what you've entered in Launchy's text field, you'll be presented with a number of search results **(image G)**.

» Just use your keyboard's arrow keys to navigate to the program or file you're looking for, hit Enter, and Launchy will launch it. Using just the keyboard, Launchy is pretty much the fastest way to launch programs—in no time at all, you'll be using it like a pro and wondering why anyone would ever want to do anything as old school as open up their Start Menu.

of doing some pretty complex number crunching. If for some reason, you feel like this is all too much awesome for you to handle, the plugins can be turned off with the click of a checkbox. Oh, and if you've got a hankering for additional plugins, you can find them on the official Launchy webpage.

Use Multiple Desktop Wallpapers Without Extra Software

Spruce up your multiple desktops –Alex Castle

RUNNING MULTIPLE MONITORS has become something of a necessity for serious PC users. You don't have to take it to the sort of extremes we do in this month's display challenge (page 44), but anything less than two monitors is risking serious damage to your nerd cred.

Unfortunately, running multiple monitors can make it difficult to keep your desktops looking nice with custom wallpapers. If you're running displays of two different resolutions (a laptop display and a 24-inch monitor, for instance), you're likely to end up with a wallpaper that looks good on one, but ugly on the other **(image H)**.

So how can you solve this problem and get good-looking backgrounds for each of your displays? The functionality is built into several free and commercial multi-monitor management programs, such as DisplayFusion (**www.displayfusion.com**), but that involves installing one more bit of software on your computer. It's not hard to do it manually, with an image editor. We'll show you how.
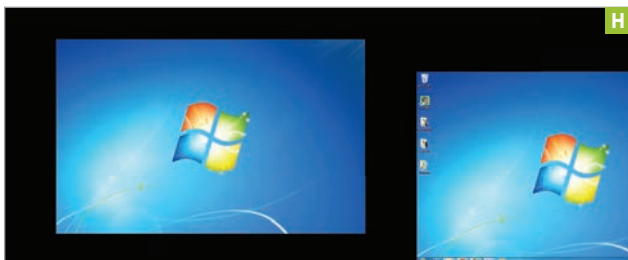
1 TAKE SOME MEASUREMENTS To begin, remind yourself what resolution both of your monitors are running at by right-clicking the desktop, and selecting Screen Resolution from the context menu **(image I)**. Write down the resolution of each of your monitors, and note their relative position (vertical and horizontal). While you're at it, calculate the combined horizontal resolution of all displays. You'll need that later.
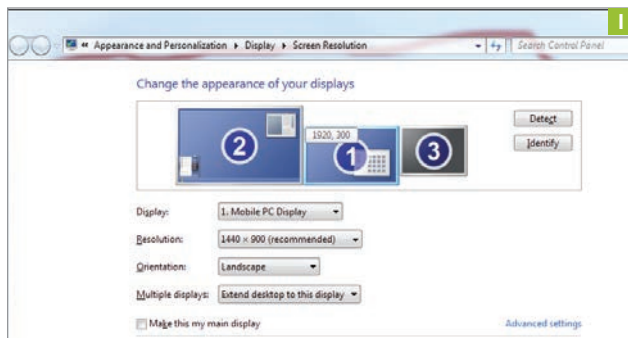
2 FIND YOUR WALLPAPERS Now, for the fun part. Hunt down wallpapers in the proper resolution for each desktop. If you're having a hard time finding images in the proper resolution, check out Desktop Nexus (**www.desktopnexus.com**) or InterfaceLift (**www.interfacelift.com**), or go to Google Image Search and use the Advanced Options to specify the resolution you're looking for. If you have a single, large image you'd like to use on both desktops, open it up in an image editor, and crop out sections that are exactly the right size for your monitors.

3 STITCH THEM TOGETHER Now, for the trickiest part: stitching together the two images. Windows will only accept a single image to use for its wallpaper. It will, however, paste that single image all the way across multiple monitors, if the size is big enough. The trick is to create a large image that fits across your display collection like a glove.

» Here's what to do: Open the wallpaper that will go on your primary monitor in Photoshop or any other competent image editor. When applying a wallpaper, Windows will always treat the main monitor as if it were on the far left, no matter how your monitors are arranged in the screen resolution options menu. Therefore, we want to extend the canvas (in other words, increase the image size by adding blank space) to the right, so that the total canvas size is equal to the combined horizontal resolution of all displays, and the vertical resolution of the tallest monitor **(image J)**.

» Though Windows disregards the horizontal layout of your monitors, it does pay attention to the vertical layout. So if your two monitors are aligned along the bottom, you'll want to stitch together the two wallpapers with the bottoms aligned. If the displays are aligned at the top, the wallpapers will need to be aligned at the top.

» So drag the second wallpaper into your image editor, align it with the first appropriately **(image K)**, and save the product. Right-click the desktop again, select Personalize, and set the desktop background to the stitched-together image you just created. Make sure to set the position setting to Tile, and you'll be good to go.
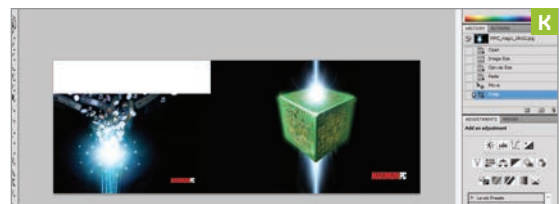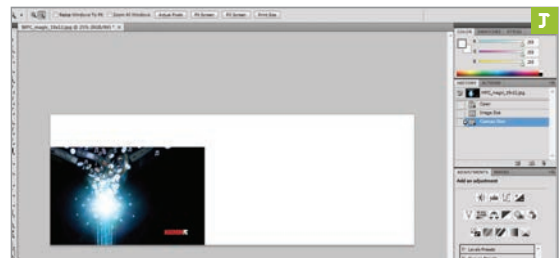
Use Dexpot for Free, Windows 7–Integrated Virtual Desktops

The next best thing to an extra display –Alex Castle

IN THE PREVIOUS HOW-TO, we discussed multiple monitors as a great tool for increased efficiency. However, sometimes multiple displays just don't work in a certain environment. Fortunately, there's still a way to get some of the efficiency benefits of having multiple desktops without needing two displays: virtual desktops.

Dexpot, a free program that lets you set up multiple virtual desktops, integrates with the Windows 7 taskbar, offering live previews of your desktops and jump-list support.

1 SET UP DEXPOT Dexpot's installation procedure is about as easy as it gets. Just download the installer from **www.dexpot.de** and run it, making sure not to install the toolbar that it tries to bring with it.

» Once it's installed, run Dexpot, and check out your new virtual desktops. You can switch between desktops by clicking the Dexpot icon in the taskbar and selecting one of the other virtual desktops **(image L)**. If you want more or less than four virtual desktops, you can change that and other basic options in the Settings menu, which you access by right-clicking the Dexpot taskbar icon.

3 KEEP YOUR DESKTOPS ORGANIZED WITH RULES One of the hard things about using multiple desktops is keeping your applications sorted properly. Dexpot makes this a little easier by allowing you to set up rules that define which desktop certain applications live on. For instance, here's how to make it so that Outlook always stays on Desktop 2:

1. Right-click the Dexpot icon and choose Desktop Rules.
2. Click the button marked Assistant.
3. Give the rule a name, and click OK.
4. Under Condition 1, click the drop-down menu to select "Executable is," then click and drag the crosshairs icon onto the Outlook application. This should automatically enter outlook.exe into the final input field. Click Next.
5. For the Action 1 drop-down field, select Move, and then choose which desktop you want Outlook to move to. Click next, and then Done.

» By learning to use the rules system, you can give your virtual desktops structure, which keeps them tidier and you more productive. ⏻

2 NAVIGATE YOUR DESKTOPS There are several ways to navigate between your virtual desktops. The easiest is what you've been doing already—clicking the Dexpot icon and choosing a different desktop. To move a program from one desktop to another, you can right-click the program window, and then use the Dexpot context-menu item to send it to whichever window you want **(image M)**.

» Unfortunately, both of those procedures are on the slow slide, negating some of the efficiency benefits you gain from multiple desktops. To get the most out of Dexpot, you need to learn to use one of the other methods for navigating desktops. Here are three different ways to navigate:

Hotkeys: The fastest way to change desktops is with hotkeys. By default, use Alt + the number keys to switch between desktops, and Alt + Shift + the number keys to transfer the currently active window. You can rebind those actions, and find even more in the Controls section of the settings menu.

Mouse Control: If you want to be able to switch between desktops without using the keyboard, you can turn on Mouse Switch in the Controls section of the Settings menu. This allows you to switch between desktops by moving your mouse to the far edge of the screen.

Full-Screen Preview: A function of Dexpot allows you to see all of your desktops on screen at once, arranged in a Brady Bunch-esque grid **(image N)**. If you've forgotten where a window is, this is the fastest way to find it. You can launch it quickly using the hotkey Win + F3.
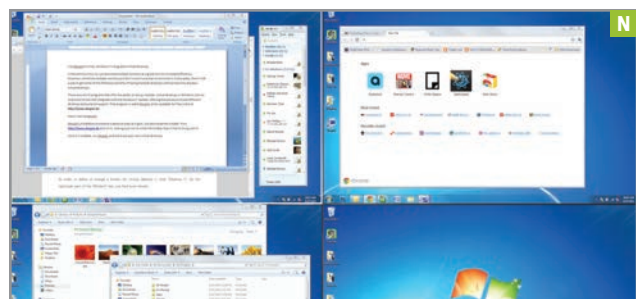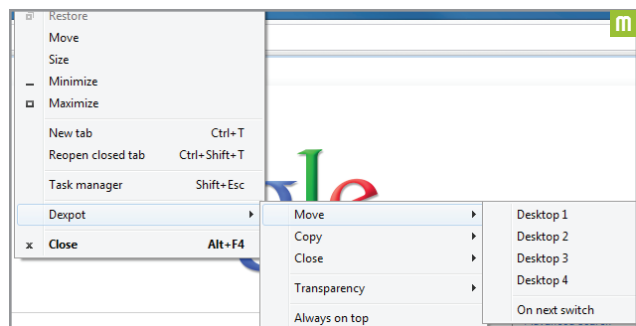
BUILD IT

DAVID MURPHY **CONTRIBUTING EDITOR**

A See-Through PC

When all of the walls of a system are transparent, where do you hide the cables? Answer: behind all the awesome insides

LENGTH OF TIME: **12 HOURS** | LEVEL OF DIFFICULTY: **EXPERT**

THE MISSION Were there a Mount Everest of PC builds, the see-through PC would likely be it. The difficulties are great, and the possibilities for failure high, but there's nothing that gets me more excited than the opportunity to crack my knuckles and customize the lighting and electrical setup of a transparent desktop system.

The most fearsome part of this build is the acrylic case I'm using: There's nowhere to hide any mistakes. Nor can I just stuff a mass of cables in some secluded area of the case and call it a day. Every bit of this build has to be focused on aesthetics, so I'm grabbing my toolbox and busting out a ton of different tricks to make sure this system can stand up to scrutiny.
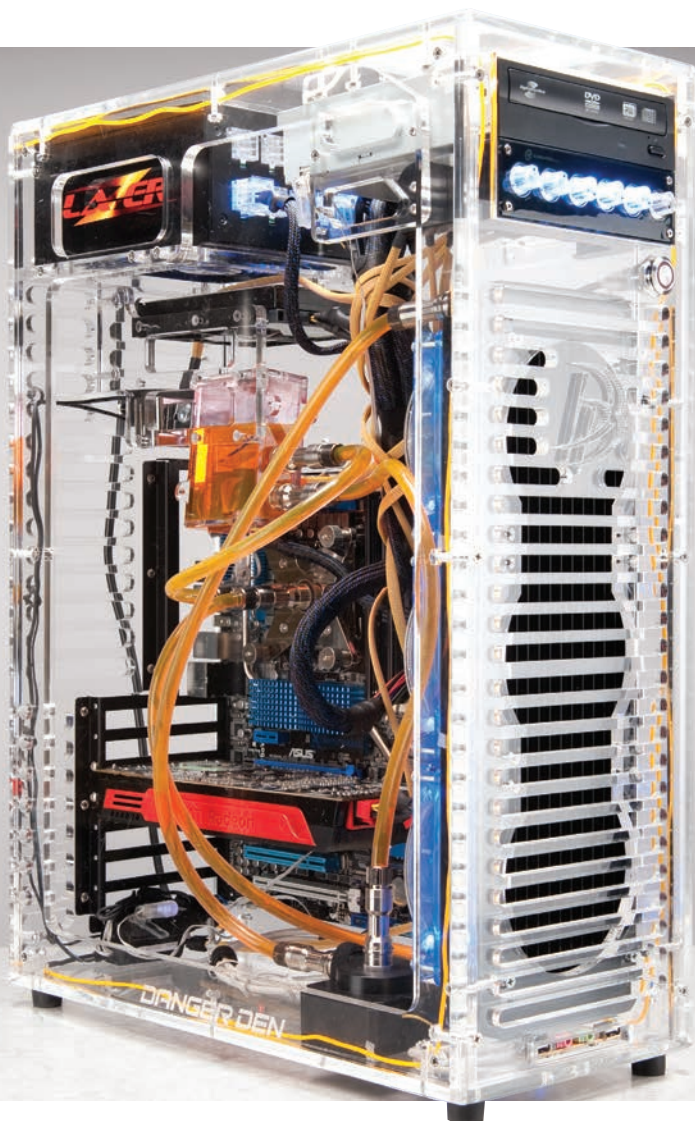
INGREDIENTS

| PART/URL	PRICE
Case DangerDen DD Tower-21 www.dangerden.com	$210
PSU Kingwin LZG-1000 www.kingwin.com	$170
Water Block Koolance CPU-370 www.koolance.com	$85
Reservoir Swiftech MCRES Micro Rev2 www.swiftech.com	$26
Pump Swiftech MCP35X www.swiftech.com	$110
Radiator Black Ice GT Stealth 360 X-Flow www.dangerden.com	$70
Tubing Tygon 3/8-inch ID tubing (5 feet) www.frozencpu.com	$10
Fluid Feser One, UV orange www.frozencpu.com	$20
Fans 3x Yate Loon 12x2.5cm UV-reactive LED fans www.frozencpu.com	$21
Fan Filters 3x ModRight FilterRight 12cm filters www.frozencpu.com	$18
Switch UV-illuminated Bulgin-style "Momentary" Vandal switch, Lamptron EZ Bulgin switch cable www.frozencpu.com	$21
Connectors 8 pairs Koolance Quick Disconnects (VL2N-MG and VL2N-F06S) www.koolance.com	$101
Mobo Asus P6X58D Premium www.asus.com	$280
CPU Intel Core i7-950 www.intel.com	$270
RAM Corsair TR3X6G1600C7 DDR3/1600 6GB kit www.corsair.com	$75
Optical Drive Lite-On iHAS424-98 DVD burner us.liteonit.com/us/	$25
Hard Drive 1TB Western Digital Caviar Black 7,200rpm www.wdc.com	$80
GPU AMD Radeon HD 6850 www.amd.com	$180
OS Windows 7 Home Premium 64-bit (OEM) www.microsoft.com	$99
Lighting Mutant Mods EL wire, yellow (10 feet) www.jab-tech.com	$12
Lighting UV Flexiglow Lazer Beam LED kit www.directron.com	$5
Fan Controller Sunbeam Rheobus Extreme 6-channel fan controller www.frozencpu.com	$35
Sleeving Flexo (UV Jester) and black heat-shrink www.frozencpu.com	$22
Total (customizations only)	$945
TOTAL	$1,945

SELECTING THE RIGHT HARDWARE to make a system look good is the most important part of a transparent PC construction. That's why you'll see that my parts—a number of which were donated to the cause by on-line retailer FrozenCPU—are more focused on the system's appearance than its actual performance. Feel free to use whatever components you want. I'm using the same standard parts I've used for my previous case builds.

The case is a no-brainer: acrylic. DangerDen graciously sent over a version of its acrylic case that hides the hard drive underneath the power supply, lest I be tempted to bust out the Dremel and construct a window within the drive itself. The two-bay cutout on the front of the case is criti-cal, too, providing just enough space for an optical drive and a series of switches that I'll use to power and control the system's lighting.

Also critical: the modular power supply (provided by Kingwin). If you haven't noticed by now, the name of the game here is cable manage-ment. Specifically, I need to use as few cables as possible inside the case, as there's no great way to conceal them.

I'm packing a 3/8-inch water-cooling setup to give the inside a bit more visual flair. The reactive fluid should look extra special combined with blue lighting from the radiator fans and separate UV spotlights. And to complete the *Tron* motif, I'm outlining the exterior of the case with yel-low electroluminescent wire.
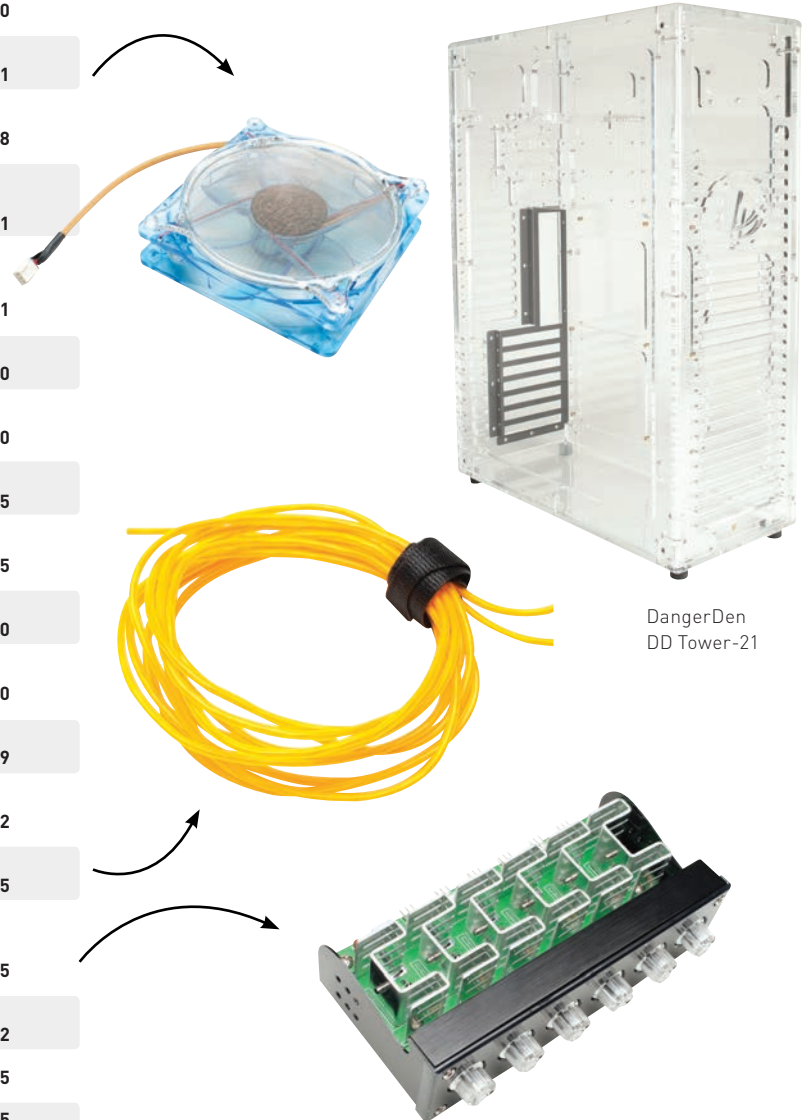
DangerDen
DD Tower-21

1   BUILD THE CASE

THE DANGERDEN acrylic case I'm using, the DD Tower-21, comes fully disassembled. The process for assembling your flat-packed parts into a mighty chassis will vary with whatever case you've purchased, but two key pointers will always stay the same.

First, take precautions to minimize fingerprint smudges. Wearing a pair of soft gloves or using a cloth barrier between you and the panels can keep things clean **(image A)**.

Second, don't use power tools—no battery-powered screwdrivers, no drills, nothing. Over-tightening screws can lead to cracked acrylic, which defeats the entire purpose of having a see-through case to begin with. I love how the design of the DangerDen case makes it so I don't actually have to hold nuts in place while attaching screws **(image B)**.

2   ATTACH THE RADIATOR

THERE'S ONLY ONE place to attach a radiator on this case, and it's on an acrylic panel that sits directly behind the case's front. Since I knew I wanted to run EL wire to outline the front of the chassis, this secondary panel had to be in position prior to setting up the case's lighting. This point illustrates the reason why you should inventory and strategize a case build before you start slapping things together.

I used smaller screws to attach my Black Ice GT Stealth 360 X-Flow radiator to the acrylic panel. I then flipped the panel over and used longer screws to attach a combination of three UV-reactive Yate Loon 12cm fans and three ModRight FilterRight fan filters **(image C).** I then slid the secondary panel into place and screwed it into the case **(image D)**.
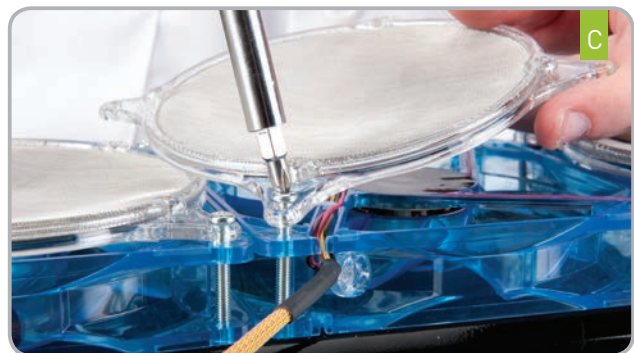
3 INSTALL THE EL WIRE

EL WIRE, or electroluminescent wire, is thin copper wire that glows a particular color (thanks to a phosphor coating) when you run current through it. After mounting the primary inverter to the rear of the case **(image E)**, right around the hard drive (for maximum concealment), I ran the black wire cabling for my two strands of EL wire through the holes in the rear of the case. I then looped each 5-foot strand of wire around the bottom, front, and top of the case, securing it to the case's sides using clear adhesive tape **(image F)**—any other method would disrupt the strand of light.

4 ADD PSU AND HARD DRIVE

I NEXT DECIDED to throw in my Kingwin LZ-1000 modular power supply and 1TB Western Digital Caviar Black hard drive, because I wanted to get a feel for how the system's primary components would affect the placement of the other aesthetically oriented parts I had in mind. I also wanted to start testing out my system's lighting setup by connecting an Antec power supply tester to my PSU, which would generate juice for anything attached to its wires. Both the power supply **(image G)** and hard drive **(image H)** slid right in without difficulty, and I hand-secured them with a smile.
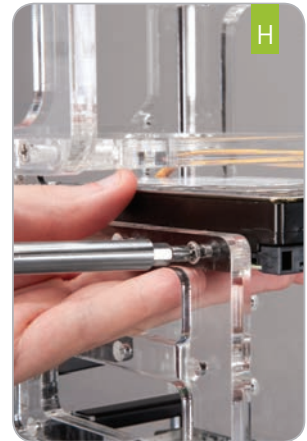
5 ASSEMBLE THE WATER COOLING

TO ASSEMBLE the water-cooling apparatus, I began by attaching Koolance Quick Disconnects to my various water-cooling parts **(image I)**; these would come in handy for adjustments and spill prevention later. My plan was to run 3/8-inch tubing from my Swiftech MCP35X pump (overkill in power, but extremely small and easy to position) to the Black Ice radiator, which would flow out to my Koolance CPU-370 water block, up to a Swiftech MCRes Micro Rev2 reservoir, and back down into the pump.

We've said it once and we'll say it again: Test your loop away from expensive components before you put it in your rig. I tested the whole setup using UV-reactive Feser One cooling fluid **(image J)** before cracking open a cold one and pondering just how I was going to get this into the case—and look good, to boot. I decided to delay this decision a bit and proceeded to install the system's motherboard into the case using the provided standoffs and screws, followed by the graphics card.

6 INSTALL WATER COOLING

I DECIDED to mount the reservoir right below the hard drive, using a mechanism that would allow me to run the reservoir itself parallel to the case. I screwed a mounting bar into a hole previously designed for a hard drive, then screwed a mounting bar attached to the reservoir into the first mounting bar **(image K)**. The way I attached the reservoir meant that the tank could conceivably pivot on an axis, so I made sure to tighten the screw and nut combinations as much as possible to lock the entire contraption into place **(image L)**. Attaching the pump to the case was much easier: I just used velcro, adhered to the case itself **(image M)**.

7 CONNECT THE CABLES

TO MINIMIZE cabling and maximize my ability to control lighting brightness and fan power, I connected all the case fans and lighting equipment (including a 12-inch UV cathode) to a Sunbeam Rheobus Extreme six-channel fan controller **(image N)**. The controller provides up to 30 watts of power per channel, meaning that no connected device would need a secondary connection to the power supply.

I cut off these secondary connections and, if a device didn't come with a 3-pin connector, I split its cable and the cable of the fan controller's included 3-pin wire, then connected these two halves by twisting the wiring and covering the connection with electrical tape **(image O).**

After I plugged in all the cables to the controller, I installed the system's optical drive over the top of it—both to hide the cabling connections and because it would have been a real pain to try and hook them up with a huge optical drive in the way.
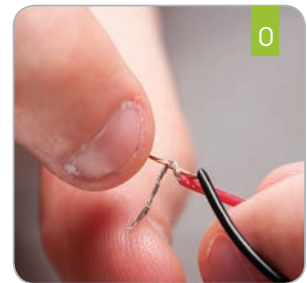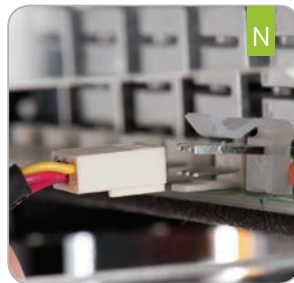
8 TIDY UP

FOR ANY SMALLER cables that didn't come presleeved, I used Flexo Pet sleeving to wrap the cables in a colorful, UV-reactive exterior. Heat-shrinks and—in some cases—velcro strips were used to hold the sleeving in place **(image P)**. I used these same velcro strips to bind all of the power supply's black-sleeved cables together, and then wove all UV cabling around the exterior of this mass, akin to vines around a tree trunk **(image Q).** It might not look that interesting with the lights on, but the UV-reactive cabling looks striking in the dark—and with my UV spotlights on, of course.

I finished out the system build by connecting all the associated power and data cords, including the tiny wires used by my third-party, UV-glowing system switch. The last part of the puzzle involved finding the perfect place to mount my three UV-LED spotlights, which deliver focused light over a good chunk of the case's now-glowing parts.
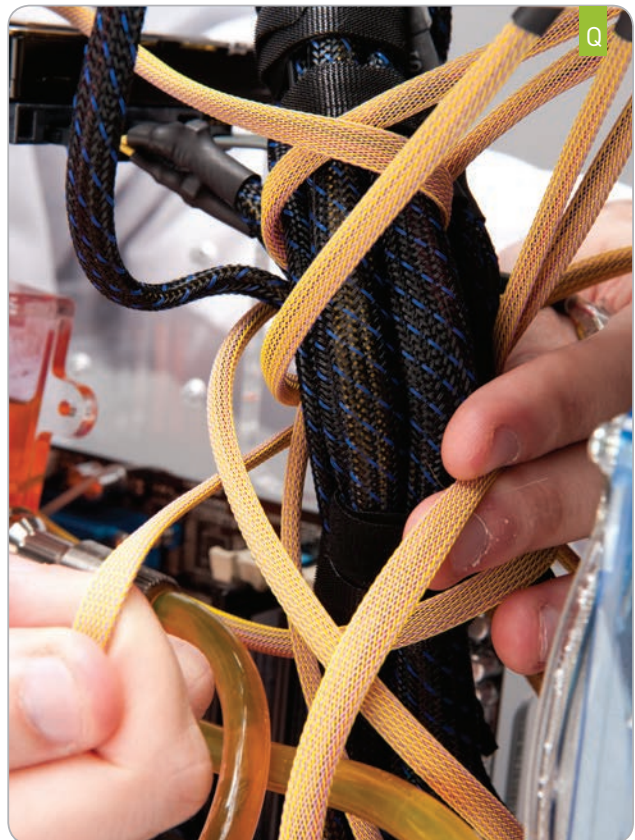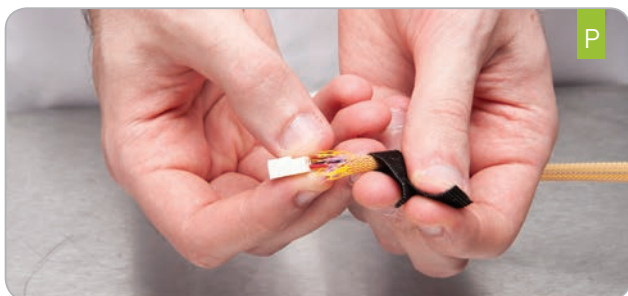
1 THE BRAIN
This build would not be possible without this rig's six-channel fan controller. Every light and fan in the case (save for the PSU's) is adjustable (and powered) using this simple series of switches.

2 COOL IT
In addition to providing better cooling than air, a liquid-cooling setup provides visual flare, especially with UV-reactive coolant.

3 SIMPLICITY, SIMPLICITY
I didn't just pick Koolance's CPU-370 for its prowess. The water block is also a snap to install, requiring very few parts, headaches, or wizard swears in order to firmly attach the block over one's CPU.

4 ARTIFICIAL WALLS
Use elements like your lighting inverter or your water-cooling pump to wall off cabling where possible. It's a lot easier to keep a cable in place with a rigid device blocking its path than with a ton of Velcro and twist ties.

LOOKING THROUGH THE RESULTS

IT SURE LOOKS EASY on paper, doesn't it? In practice, the physical construction of the see-through PC was a multiday build involving several trips to the hardware store to deal with a variety of issues. The biggest hurdle in working with a case that you build yourself is that not everything always goes according to plan. Some screw lengths don't fit the predrilled holes in the chassis; some unexpected twists have to be navigated (the first UV-reactive coolant I used looked less than impressive); some dents, dings, and cracks find their way onto the chassis no matter how careful you are.

If I could offer one piece of advice to instill courage in folks looking to follow in my transparent footsteps, it would be this: over plan. Take your time. Don't order a mess of components at once with some grand vision in your head of how they're all going to come together, because you'll be amazed at some of the new ideas you'll come up with once you actually have a huge acrylic case sitting on your coffee table. You can just wing it with a conventional build, but acrylic cases require a lot more TLC.

Had I the time, opportunity, or work setup, I would have loved to craft some acrylic frames for both the power supply and the optical drive. That's not the kind of deal that one just budgets an hour for, and it does pose some risk that a newbie with a Dremel could send his or her expensive components off to the scrap heap. Still, see-through is see-through, and see-through devices, where possible, would have been a nice touch.

One final word to the wise: EL wire is both a blessing and a curse. Get the longest single strand you can purchase. Here's why: The more strands of EL wire you connect to a converter, the dimmer the strands become in total. Depending on the brand of inverter and wire you've chosen, the inverter itself can also emit a loud, high-pitched whine. It's a rookie mistake, but one that could easily scuttle the dreams of those looking to turn their mid-tower desktops into a device out of *Tron: Legacy*.

Building a see-through PC is like the sword in the stone of computer construction: Once you've mastered the sleeving, electrical, and liquid-cooling challenges of a transparent build, you can accomplish great things. May your lights shine bright, aspiring builder. ⏻

maximumpc.com | JUL 2011 | MAXIMUM**PC** | **65**

REVIEWS

TESTED. REVIEWED. VERDICTIZED.

INSIDE

MAINGEAR SHIFT SUPER STOCK PC, PAGE 70

Maingear Shift Super Stock

A bronze statue of power

The Shift sports a well-tamed quad-SLI setup.

HOW FAR CAN YOU TAKE a Sandy Bridge processor? We've heard that even extreme overclockers seem to hit a wall just beyond 5GHz with Intel's darling new chip.

Whatever the limitations, Maingear seems content to take its Shift Super Stock to the brink of madness by clocking the 3.4GHz Core i7-2600K to 5GHz.

The company credits some of that high overclock to its new partnership with CoolIT and the use of a massive and exclusive 18cm EPIC cooler. EPIC, in this case, stands for Enhanced Performance InterCooler. Perhaps even more impressive, you can't even find the cooler in the Shift SS.

When we cracked open the case, we scratched our heads as we searched for the new cooler. It happens to be hidden away between the bottom of the hard drive cage and the case frame's center support. While inside, we also saw the reason the Shift SS's two GeForce GTX 590s run so quietly: an 8cm fan sits atop the quad-SLI setup and blows cool air directly onto the GPUs. Another aid to system cooling is the inverted motherboard that allows air to rise straight up out of the case. Any hot air that doesn't intend to leave is forced out by another large 12cm mounted at the base of the cards.

The case itself is Maingear's custom Silverstone enclosure with an attractive paint job applied. It's not the most refined we've ever seen, but it's certainly good and sets the machine apart from the standard black or off-the-shelf aluminum systems. The case interior is wired tight and two sets of LED interior lights are tastefully set into the rig.

Performance is what you'd expect of a Sandy Bridge rig running at 5GHz with a pair of GTX 590s. In our Vegas Pro 9 test, it was fastest of the Sandy Bridge–based boxes that we've tested to date. However, our Vegas Pro 9 test favors threads, so the record continues to be held by the hexa-core Velocity Micro rig we reviewed in March. The Maingear set the record in our Pro-Show Producer benchmark. It also smashed right through the record that had been held by—believe it or not—a Digital Storm system we reviewed back in May 2010. In our STALKER: CoP benchmark, the quad-SLI GTX 590s still couldn't muscle past AVADirect's monstrous machine from our Holiday 2010 issue. That rig used two Xeons paired with four GeForce GTX 480 cards. The Shift SS is close, very close, but it's still a couple frames behind. Against our zero-point, a 2.66GHz Core i7-920 overclocked to 3.5GHz, it's a slaughter, of course. Basically, expect tasks to take half the time with the Shift SS and games to run, well, from 90 percent to 213 percent faster.

The only serious ding against the Maingear Shift SS is its price: At $5,640, it's a big chunk of change. Especially when you consider that the CPU is the bargain burner Core i7-2600K. Much of the price comes from the GPUs—a $1,500 commodity. But the paint job, a $650 option, is also to blame. This is all academic, though. If you're the kind of person that can even consider buying a custom-built, tuned-to-the-max gaming rig, you're probably not the kind of person to quibble too much over price. **–GORDON MAH UNG**

VERDICT

9 KICK ASS!

Maingear Shift Super Stock

➕ PC GAMING Two GeForce GTX 590s, two Vertex 3s, and a 5GHz 2600K!

➖ CONSOLE GAMING Pricey; paint job has a couple of rough spots.

$5,650, www.maingear.com

BENCHMARKS

	ZERO POINT											
VEGAS PRO (SEC)	3,049	2,079										
LIGHTROOM 2.6 (SEC)	356	261										
PROSHOW 4 (SEC)	1,112	757										
REFERENCE 1.6 (SEC)	2,113	1,451										
STALKER: CoP (FPS)	42	131.4 (+213%)										
FAR CRY 2 (FPS)	114.4	217										

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

Our current desktop test bed consists of a quad-core 2.66GHz Core i7-920 overclocked to 3.5GHz, 6GB of Corsair DDR3/1333 overclocked to 1750MHz, on a Gigabyte X58 motherboard. We are running an ATI Radeon HD 5970 graphics card, a 160GB Intel X25-M SSD, and the 64-bit version of Windows 7 Ultimate.

SPECIFICATIONS

PROCESSOR	3.4GHz Core i7-2600K (overclocked to 5GHz)
MOBO	Gigabyte GA-P67A-UD7
RAM	8GB Patriot DDR3/1866
VIDEOCARD	Two GeForce GTX 590s in SLI
SOUNDCARD	Onboard
STORAGE	Two 120GB OCZ Vertex 3 SSDs in RAID 0, 2TB Samsung F4 5,400rpm
OPTICAL	LG Blu-ray burner
CASE/PSU	Custom Silverstone / Silverstone Strider 1,200 watt

Samsung Series 9

A bold move into Apple territory

SAMSUNG HAS ONLY BEEN selling its laptops in North America for the last few years, and while those machines haven't been bad, they haven't been remarkable either. But with the Series 9, the company is putting forth a laptop that demands notice. From its sub–three pound, super-slim, and sexy chassis to its spare, sophisticated style, it looks like nothing so much as a MacBook Air. It's a bold, high-profile move by a company that's been firmly rooted in the mainstream.

While the comparison to a MacBook Air is inevitable, the Series 9 features some distinct design touches. The exterior of the 13-inch laptop is black duralumin, a strong but lightweight aluminum alloy with a brushed-metal look. Inside, glossy black plastic surrounds a backlit keyboard and an antiglare screen. A unified click pad, similar to a Mac's, provides a roomy surface that works well for multitouch and feels smooth and responsive. From the side, the laptop's 0.64-inch profile is accented by an arching curve. To maintain the slim dimensions, as well as the sleek aesthetic, Samsung hides the laptop's ports behind pop-out bays on either side. You're given USB 2.0, USB 3.0, Mini HDMI, a mic/headphone jack, a MicroSD card reader, and Ethernet by way of an included dongle.

While Apple's Air, along with most other MacBooks, are living in the past with Core 2 Duos, the Series 9 sports a new Sandy Bridge Core i5-2537M. The low-voltage chip is clocked at a modest 1.4GHz, although it has a maximum

The 13-inch Series 9 has a duralumin exterior that makes it sturdy, lightweight, and aesthetically pleasing all at once.

Turbo frequency of 2.3GHz. Still, it's at a disadvantage against our ultraportable zero-point, an HP 2540p that features a last-gen Core i7-640LM, clocked at 2.13GHz. The benchmarks tell the story, with the HP holding substantial leads in the CPU-bound tests, including Quake III. In the more graphics-dependent Quake 4, the Series 9 prevails—a testament to the improvements in Intel's new integrated graphics, which are integrated graphics nevertheless.

An even better comparison for the Series 9 is the Toshiba R700 that received a Kick Ass award in our December 2010 issue. The R700 also featured a 13.3-inch, 1366x768 screen, weighed less than three pounds, and cost nearly the same as the Series 9 at the time of its release. But the R700 had a 2.66GHz Core i7-620M and consequently even better benchmark results than the HP zero-point. Also, by foregoing an extreme aerodynamic aesthetic, the R700 managed to squeeze in an optical drive and a greater array of ports—while being every bit as portable as the Series 9.
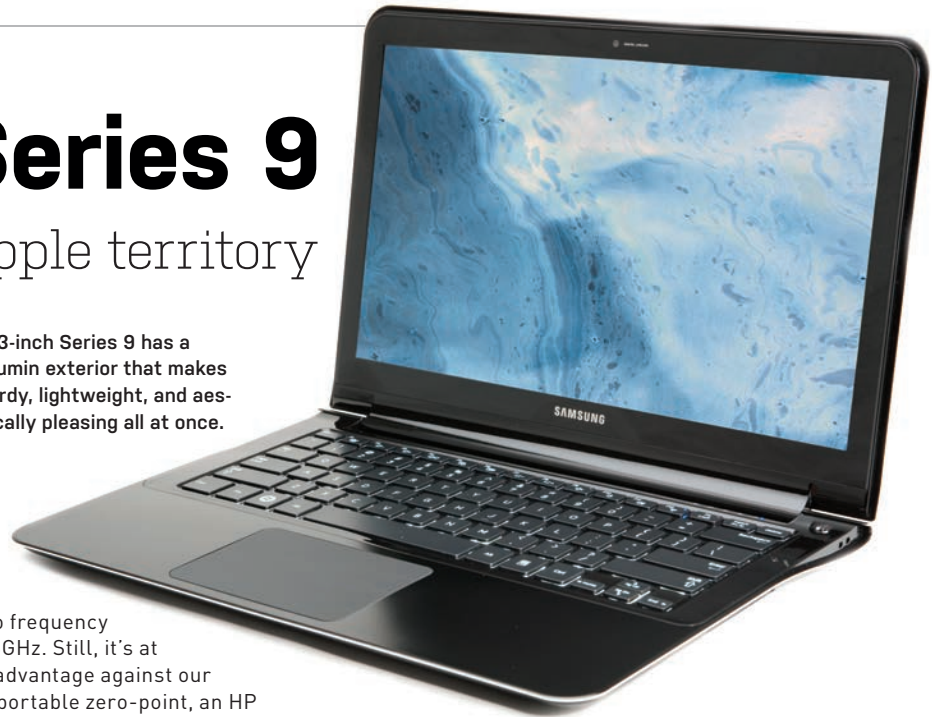
This raises the question of values. If a stylish, stand-out design is of paramount importance, the Series 9 brings it—more so than any other ultraportable PC around—while offering respectable features and performance. But better features and performance can be found in an ultraportable form factor that makes less of a fashion statement. **–KATHERINE STEVENSON**

VERDICT

9

Samsung Series 9

➕ **CATCHING AIR** Apple-esque style on a PC; Sandy Bridge CPU with improved integrated graphics; good battery life.

➖ **CATCHING A COLD** Design costs a premium; other ultraportables offer better performance.

$1,650, www.samsung.com

BENCHMARKS

	ZERO POINT	
PREMIERE PRO CS3 (SEC)	1,260	1,686 (-25.3%)
PHOTOSHOP CS3 (SEC)	183.6	193.6 (-5.2%)
PROSHOW PRODUCER (SEC)	1,533	2,105 (-27.2%)
MAINCONCEPT (SEC)	2,530	3,660 (-30.9%)
QUAKE III (FPS)	191.7	109.2 (-43%)
QUAKE 4 (FPS)	17	21.6
BATTERY LIFE (MIN)	240	259

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

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

SPECIFICATIONS

CPU	1.4GHz Intel Core i5-2537M
RAM	4GB DDR3/1333
CHIPSET	Intel HM65
DISPLAY	13.3 inch,1366x768, LED-backlit, antiglare screen
STORAGE	Samsung 128GB SSD
CONNECTIVITY	Mini HDMI, Ethernet, USB 3.0, USB 2.0, headphone/mic, MicroSD reader, Bluetooth, 802.11b/g/n, webcam
LAP / CARRY	2 lbs, 14.9 oz / 3 lbs, 5 oz

3TB Hard Drive Hustle

The competition among ultralarge-capacity drives spins up

AFTER A LONG STAY at the 2TB high-water mark, manufacturers finally started trickling out 3TB drives in late 2010. For a quick recap of the 2TB bootable partition–size limit and the factors necessary to surpass it (64-bit OS, GPT partitions, UEFI), see our review of the 3TB Caviar Green (http://bit.ly/dYo2Fs). Since that drive came out, the Sandy Bridge platform has eliminated a big barrier to entry for 3TB bootable drives by offering UEFI. And now 7,200rpm 3TB drives have arrived. Here we pit Hitachi's 3TB Deskstar against Seagate's Barracuda XT 3TB to see which is most worthy of your dollars and data. –**NATHAN EDWARDS**

HITACHI DESKSTAR 7K3000 3TB
Alas, poor Hitachi; we knew him well, Horatio. Hitachi's Global Storage division might have been gobbled up by Western Digital, but it's still putting out product, at least for now. Hitachi's latest addition to the Deskstar line is a five-platter, 3TB, 7,200rpm drive with 64MB of cache and a 6Gb/s SATA interface. Yeah, we can deal with that.

Hitachi's Deskstar ships with a piece of paper directing users to download the Hitachi GPT Disk Manager from Paragon Software. The boot solution for legacy users seems to be to just divide the disk into separate partitions. We expect *Maximum PC* readers can manage the same with Windows' built-in tools—although we're not sure how many *Maximum PC* readers want to boot from a 3TB partition in their desktop rigs.

On our Sandy Bridge test bed, which has UEFI, we had no problem creating a 3TB bootable partition and installing 64-bit Windows 7; we didn't even need to load F6 drivers. We ran our standard mechanical-drive benchmarks on the Deskstar and found average sustained read speeds of around 119.5MB/s and write speeds around 118.5MB/s. In both our Premiere Pro encoding test, which writes a 20GB uncompressed AVI to the disk, and the PCMark Vantage HDD subtest, the Deskstar performed faster than the Barracuda XT, despite having largely the same specs and despite the Barracuda's faster average read and write speeds. The Deskstar's random-access speeds were fully 2ms faster than the Barracuda's.

With an MSRP of $250 and faster real-world scores than the Seagate Barracuda XT, the Hitachi Deskstar 7K3000 is a real winner.

VERDICT 9	Hitachi Deskstar 7K3000 3TB
	$250, www.hitachigst.com

SEAGATE BARRACUDA XT 3TB
Seagate's Barracuda line has long been a contender in the 7,200rpm drive space and—7200.11 firmware snafu notwithstanding—has generally vied with WD's Caviar Black line for the 7,200rpm crown. The Barracuda XT 3TB is a five-platter 7,200rpm drive with 6Gb/s SATA and 64MB of cache, just like the Hitachi Deskstar 7K3000. So what's the difference?

Like the Hitachi drive, but unlike WD's Caviar Green, the Barracuda XT ships sans hardware adapter, instead offering a link to rebranded partitioning software. In this case, Seagate offers the Seagate DiscWizard, powered by Acronis. Again, it doesn't offer much functionality beyond that provided by Windows, but it is easier for novice users. Those with 64-bit operating systems, UEFI-enabled motherboards, and GPT partitions won't even need that.

In our low-level disk benchmarks, the Seagate Barracuda XT offered sequential read and write speeds exceeding 120MB/s, while random-access times lagged a few milliseconds behind both the Hitachi Deskstar and WD Caviar Green 3TB drives. In Premiere Pro and PCMark Vantage, though, the Barracuda's scores were slightly slower than those of the Hitachi Deskstar—12 seconds slower in Premiere Pro and around 600 PCMarks (whatever those are) behind the Deskstar.

The Barracuda XT is a wicked-fast drive with a helpful software wizard for legacy users. But with an MSRP of $270 and real-world scores slightly lower than those of the cheaper Hitachi Deskstar 7K3000, it's not necessarily the best bang for your buck.

VERDICT 8	Seagate Barracuda XT 3TB
	$270, www.seagate.com

BENCHMARKS

	Hitachi Deskstar 7K3000 (3TB)	Seagate Barracuda XT (3TB)	WD Caviar Green (3TB)
HDTUNE 4.01			
Avg Read (MB/s)	119.5	**124**	101.5
Random-Access Read (ms)	**15.7**	17.2	**15.7**
Avg Write (MB/s)	118.5	**122**	96.9
Random-Access Write (ms)	15.7	17.3	**15.6**
Burst Write (MB/s)	**315.6**	284.8	183.1
PREMIERE PRO ENCODE (SEC)	**435**	447	530
PCMARK VANTAGE	**7,663**	6,975	4,910

Best scores are bolded. All drives tested on our hard drive test bench: a stock-clocked Intel Core i3-2100 CPU on an Asus P8P67 Pro (Rev 3.1) motherboard with 4GB DDR3, running Windows 7 Professional 64-bit. All tests performed using native Intel 6Gb/s SATA chipset with IRST version 10.1 drivers.

Ooh, Barracuda! Seagate's biggest fish isn't neces-sarily the meanest in the sea, but it's close.

Hitachi's Deskstar slightly edges out Seagate's Barracuda—but how long will the Hitachi hard drive brand last?

Sony Vaio F21

Beautiful 3D laptop with mediocre graphics performance

WHAT YOU DO ALONE in your man cave is your business. If you want to put on a pair of 3D glasses and practice the Na'vi language, more power to you. Sony's F Series Vaio 3D can make that dream a reality in style, but it lacks the graphics power to deliver first-class stereoscopic 3D gaming.

If you're not piloting the Mars Rover or doing endoscopic telesurgery, you probably want stereoscopic 3D technology for two main purposes: watching movies and playing games. Now that 3D TVs are becoming widespread, there are lots of 3D Blu-ray discs available, and the Vaio 3D delivers an excellent 3D movie experience. The 16-inch, 1920x1080 display supports full HD resolution and a 240Hz refresh rate. The included active shutter 3D glasses give a ghost- and flicker-free 3D viewing experience that's probably better than you'll find at the local cinema. The speakers are also fine-tuned to turn this laptop into a mini home-theater.

We cannot recommend this system, however, for playing stereoscopic 3D games. The visual quality is excellent, but the performance just isn't there to deliver a smooth gaming experience. Playing games in 3D is easy enough; a little button above the keyboard lets you turn on and off stereo 3D, and many games are compatible out of the box. The problem is that to display a game in stereo 3D, the graphics card has to render each frame twice, cutting the frame rate in half. Nvidia's midrange GeForce 540M

If you're willing to wear the glasses, this notebook plays high-quality 3D movies but lacks the power for serious stereo 3D gaming.

with 1GB of dedicated memory produced choppy results, except at the lowest resolutions. For instance, running our Far Cry 2 benchmark without stereo 3D at 1680x1050, the system delivered 24.7fps; in stereo 3D mode, it only managed 11fps. Dropping down to 1280x720 helped a little, resulting in 17fps, but that's still not playable.

The system performed much better in our other benchmarks, blowing through the CPU-intensive tasks thanks to the 2GHz Intel Core i7-2630QM CPU (with Turbo Boost), 6GB of DDR3/1333MHz memory, and a 640GB, 7,200rpm hard drive. Battery life was also good for a machine in this class, lasting 123 minutes on full-screen DVD playback.

This big, shiny, black Vaio includes a backlit keyboard with a separate numeric keypad. The touchpad is textured, which we like, and looks slick integrated into the palm rest. There are two USB 3.0 ports and one USB 2.0, IEEE 1394,

HDMI 1.4, and VGA-out. The HDMI port can be connected to a 3D-capable TV, letting you play games or display 3D movies on the big screen.

Overall, we're not convinced the stereo 3D on this system goes much beyond novelty. We doubt any serious gamer is going to take the performance hit to play games while wearing 3D glasses. The multimedia features work well, but it's probably not worth the extra expense. **–KEN FEINSTEIN**

VERDICT 7

Sony Vaio F21

+ DEPTH PERCEPTION Slick industrial design; excellent 3D movie playback; fast on CPU-intensive tasks.

– OFF THE DEEP END Underpowered graphics can't deliver smooth stereo 3D at high resolutions.

$1,800, www.sony.com

BENCHMARKS

	ZERO POINT		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
PREMIERE PRO CS3 (SEC)	899	600											
PHOTOSHOP CS3 (SEC)	131	106											
PROSHOW PRODUCER (SEC)	876	641											
MAINCONCEPT (SEC)	1,782	1,276.6											
FAR CRY 2 (FPS)	48.5	24.7 (-49.1%)											
CALL OF DUTY 4 (FPS)	62.2	31.8 (-48.9%)											
BATTERY LIFE (MIN)	96	123											

Our zero-point notebook is an Asus G73Jw-A1 with a 1.73GHz Intel Core i7-740QM, 8GB DDR3/1066, two 500GB Seagate 7,200rpm hard drives, a GeForce GTX 460M, and Windows 7 Home Premium 64-bit. Far Cry 2 tested at 1680x1050 with 4x AA; Call of Duty tested at 1680x1050 with 4x AA and 4x anisotropic filtering.

SPECIFICATIONS

CPU	2GHz Intel Core i7-2630QM
RAM	6GB DDR3/1333
CHIPSET	HM65
DRIVES	640GB 7,200rpm Serial ATA
OPTICAL	Blu-ray ROM drive
GPU	Nvidia GeForce GT 540M
SCREEN	16-inch, 1920x1080 LCD
CONNECTIVITY	HDMI, VGA, Ethernet, two USB 3.0, one USB 2.0, FireWire, Bluetooth, Wi-Fi, headphone, mic, line-in, media reader, webcam
LAP / CARRY	7 lbs, 1 oz / 8 lbs, 11 oz

Among the Playbook's few redeeming features is its gorgeous—albeit smaller—screen.

Blackberry Playbook

Pretty impressive—if you don't like email, apps, or games

FOR THE RECORD, the Maximum PC Lab keeps both feet planted squarely in the present tense. We don't believe anyone should buy hardware based solely on its future potential. So what then to make of RIM's nascent and decidedly half-baked Blackberry Playbook? Unless you're 1) a Blackberry owner, 2) don't care about apps or games, or 3) a devoted BB fanboy, the answer is: not much.

By the time you read this, it's possible that the Playbook might be more complete via OS updates. The release version, however, omitts some basic functions. It has no native email client and no native calendar app. To access either, you need to bridge your existing Blackberry to the Playbook. What's that? You don't have a Blackberry phone? Or your Blackberry isn't near your tablet? Well then you get no email. RIM says a pending update will deliver stand-alone email.

What else is missing? There's no 3G or 4G wireless connectivity. There is a dearth of apps, including no Amazon Kindle, no Netflix, no Hulu, and no audio/video marketplace. (In Kindle's place is the surprisingly excellent Kobo Books app and store.) There are poorly designed buttons, including an oddly placed power switch. There is buggy, crash-prone desktop client software. And the OS is, well, it exhibits the kinds of bugs any 1.0 release does: flickering screens, unreliable syncing, and so forth.

It's not all bad, however. Given RIM's propensity for building underpowered smartphones, we were surprised to discover that the hardware itself exceeded our expectations. The 1GHz dual-core ARM Cortex A-9 CPU and PowerVR SGX540 GPU offer impressive heavyweight performance that the OS actually appears to take advantage of. Almost everything—downloads, web browsing, and the ability to multitask music, movies, camera functions, and even games—feels snappy.

The 1024x600 capacitive touch screen LCD is a gem. It's spectacular enough that we deem it king of all tablet displays—including the iPad 2. And the Playbook's battery life holds up fairly well, easily going several days in a row before needing a charge when performing basic functions. This may prove to be an illusion, however, once we see more CPU-intensive games and apps.

Finally, we found ourselves appreciating the OS interface the more we used it. It's a significant departure from Android and Apple in that it relies entirely on gestures instead of buttons to navigate between apps and the home screen. It's simple and we like it. And truth be told, even the email client is solidly functional—provided you can get into it.

But this is the big problem with the Playbook. For now, it's all if, then, and when. Awesome HD video viewing? Great, but there's no streaming content. Multi-

tasking? What are we going to multitask? Front-facing camera? That's cool, but no apps make use of it.

Unless and until RIM finishes fleshing out the Playbook, there's no reason to buy it. After that, this tablet might be onto something. **–GEORGE JONES**

VERDICT

5

Blackberry Playbook

➕ **RIM SHOT** Awesome screen, snappy performance, great camera.

➖ **RIM'S OUTS** No email/calendar/contacts without bridge; no app support.

$500 (16GB); $600 (32GB); $700 (64GB), www.blackberry.com/playbook

SPECIFICATIONS

CPU	Dual-core 1GHz ARM Cortex A9
SYSTEM MEMORY	1GB
STORAGE CAPACITY	16, 32, or 64GB
SCREEN	7-inch, 1024x600 LCD capacitive multitouch display
CAMERAS	5MP rear-facing; 3MP front-facing
GPU	PowerVR SGX540
DIMENSIONS	5.1x7.6x0.4 inches
WEIGHT	0.9 pounds

Sapphire's Radeon HD 6790 is surprisingly capable, but still an oddball GPU.

Zotac's take on the GTX 550 Ti hits the sweet spot for HTPC systems, but gaming performance is lackluster.

Attack of the $150 GPUs

AMD and Nvidia offer up new videocards for budget buyers

NOT CONTENT TO VIE only for the top of the graphics card heap, Nvidia and AMD are both racing to capture the $150 GPU market. Nvidia's GeForce GTX 550 Ti is a new chip aimed squarely at the budget GPU market. Zotac takes the 550 Ti, beefs up the clock speed, and ships a digital media–savvy version of the card, well suited for home theater PC enthusiasts. AMD responds with the Radeon HD 6790—Radeon HD 6870 salvage parts, with half the functionality and higher clock speeds. Sapphire's Radeon HD 6790 targets the hearts and minds of budget gamers. –LOYD CASE

SAPPHIRE RADEON HD 6790

Remember the Radeon HD 5830? That videocard filled a certain price point, but it was actually the same GPU used in the high-end HD 5870, with a large chunk of the die disabled. The net result was a graphics card that was physically bigger than the intermediate HD 5850 and used more power. And although it cost less, performance really wasn't up to snuff for the target price point.

Enter the Radeon HD 6790. At first blush, it's similar in concept to the HD 5830. AMD took its Barts GPU (used in the Radeon HD 6870 and 6850) and disabled a big chunk of it. Voilà: the

Radeon HD 6790. The card requires two 6-pin PCI-E power connectors, while the beefier HD 6850 only needs one. AMD told us this was necessary due to the HD 6790's higher core clocks and voltages.

We're being a little unfair, though, because AMD (and Sapphire, which makes this particular model of the HD 6790) is setting a more appropriate price for the performance, particularly when compared to its direct competition, the Nvidia GTX 550 Ti.

The problem, however, isn't how it fares against the 550 Ti. Rather, it's the fact that for a few dollars more, you can get faster cards. On the one hand, you can find Rad-

eon HD 6850 cards, which typically require only a single power connector, for about $20 to $25 more. On the other hand, you can still find 768MB Nvidia GTX 460 cards for around $160—just a $10 increase.

It's worth noting that the Zotac GTX 550 Ti used in our comparison is factory overclocked to 1GHz—fully 100MHz higher than the factory default. (Does "factory default" even have a meaning anymore?) The Sapphire card is running at the stock 840MHz.

When you look at performance, the Sapphire looks like a pretty decent choice, particularly for single 1080p displays. At 1920x1200, with 4x AA enabled, it managed respectable frame rates in some games, and generally overpowered the overclocked Zotac. It does use a little more power at idle, but is more efficient at full throttle, which is pretty typical of AMD parts. The 6790 seems a bit bulky for its class, but should fit in most PC cases. The Sapphire HD 6790 ships with two DVI ports (one is single-link), one

full-size DisplayPort 1.2 connector, and an HDMI 1.4a port. The card can fully support three displays, though if you want three 30-inch monsters, they'll need DisplayPort 1.2 capability.

In the end, Sapphire's Radeon HD 6790 offers decent enough performance in its class, but bear in mind, for just a few bucks more, you can pick up an HD 6850.

ZOTAC GEFORCE GTX 550 TI AMP EDITION

The Zotac AMP edition of Nvidia's new budget GPU, the GTX 550 Ti, pushes the clock speeds to a full 1GHz—more than 10 percent higher than the default 900MHz. It amounts to a $150 card with 1GB of GDDR5 memory that performs moderately well in modern games, if you're willing to dial down features like antialiasing. When you compare the performance to Sapphire's Radeon HD 6790, the GTX 550 Ti falls a little short on the gaming side, despite the beefed-up clock speeds.

However, Zotac doesn't seem to be aiming this card at gamers, but rather at digital media junkies and home theater PC enthusiasts. Inside the box, you'll find software offers, including 30 percent off vReveal (a GPU-accelerated package for cleaning up shaky-cam video footage), 20 percent off Nero Vision, and promos for XBMC (the popular HTPC front end) and CoolIris (a 3D-accelerated media browser).

The card itself is quite compact, at just 7.5 inches long, and only requires a single PCI-E power connector. It still takes up two PCI-E expansion slots, but at least the big fan keeping the overclocked GPU and memory cool is relatively quiet. Unlike a number of Nvidia-based cards, the Zotac ships with a native, full-size DisplayPort connector. Other attachments include a pair of dual-link DVI ports and an HDMI output with full support for HDMI audio.

Despite requiring only a single power connector, Zotac's 550 Ti card consumes more power than the Radeon HD 6970 in our demanding full-throttle test, in which we run the Unigine Heaven benchmark at 2560x1600 with 4x AA and extreme tessellation settings. However, it also generated a higher score than the AMD part in that particular test. The GTX 550 Ti fared less well in other games compared to Sapphire's $150 card.

If you're looking for a relatively low-power, compact card for a home theater PC that can still handle games at HD resolution, the Zotac may be just what you want. It's short, quiet, and has the chops for GPU-accelerated media transcoding. Gamers on a budget might look instead to Sapphire's HD 6970.

BENCHMARKS

	Sapphire Radeon HD 6790	Zotac GTX 550 Ti	Asus ENGTX 460 TOP 768MB	XFX Radeon HD 6850 1GB
STREET PRICE	$150	$150	$160	$170
3DMARK 2011	3,216	2,779	3,201	**3,596**
3DMARK VANTAGE PERF	13,315	12,559	13,737	**14,292**
UNIGINE HEAVEN 2.1 (FPS)	14	16	**18**	16
CRYSIS (FPS)	20	17	19	**24**
BATTLEFORGE DX11 (FPS)	31	31	**38**	36
FAR CRY 2 / LONG (FPS)	68	77	**88**	85
HAWX 2 DX11 (FPS)	62	83	**85**	68
STALKER: COP DX11 (FPS)	26	25	25	**28**
JUST CAUSE 2 (FPS)	26	29	**30**	**30**
ALIENS VS. PREDATOR (FPS)	22	19	21	**23**
F1 2010 (FPS)	39	33	36	**46**
METRO 2033 (FPS)	11	6	**15**	9
SYSTEM POWER @ IDLE (W)	137	132	**128**	133
SYSTEM POWER @ FULL THROTTLE (W)	226	263	248	**218**

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

SPECIFICATIONS

	Sapphire Radeon HD 6790	Zotac GTX 550 Ti	Asus ENGTX 460	Radeon HD 6850
DIE SIZE	255mm²	238mm²	332mm²	255mm²
TRANSISTOR COUNT	1.7 billion	1.17 billion	1.95 billion	1.7 billion
MEMORY BANDWIDTH	134.4 GB/s	98.5 GB/s	192 GB/s	128 GB/s
STREAM PROCESSORS / SHADER PROCESSORS	800	192	336	960
TEXTURE UNITS	40	32	56	48
ROPS	16	24	24	32
CORE CLOCK	840MHz	1,000MHz	675MHz	775MHz
GDDR 5 MEMORY CLOCK	1,050MHz	1,100MHz	900MHz	1,000MHz
MEMORY	1GB GDDR5	1GB GDDR5	768MB GDDR5	1GB GDDR5
POWER CONNECTORS	2x 6-pin	1x 6-pin	2x 6-pin	1x 6-pin

Note: Nvidia and AMD shader units are not directly comparable.

Sentey Arvina GS-6400

Big form factor, big value

SENTEY'S ARVINA GS-6400 has a lot of things going for it, especially given its $89 price tag. The question is whether a bunch of fans and a ton of space are worth the inclusion of some cheapo parts and a somewhat tacky appearance.

Sentey calls the GS-6400 a "high tower," but we call it a mid-tower. The Arvina has a steel frame and side panels, with plastic trim and a mesh front panel. The front panel is removable, exposing a 14cm front intake fan and four optical drive bays. Up top, you'll find the power switch, four USB 2.0 ports, audio jacks, and a set of four fan-control buttons.

Speaking of fans, Sentey says that the Arvina is made for gamers, and it packs plenty of cooling. Out of the box, the GS-6400 comes with six LED fans—two 8cm side intake fans, one 12cm rear exhaust fan, two 12cm top exhaust fans, and the aforementioned 14cm front fan. That's a lot of stock fans for a case, at any price point.

The five hard drive bays, seven PCI expansion slots, and four 5.25-inch bays all feature plastic latching mechanisms that, while tremendously easy to use (particularly those for the hard drive bays), feel a little cheap and fragile.

Inside, the GS-6400 is extremely roomy for a mid-tower chassis, though at 8.4 inches wide, 20.5 inches high, 21.65 inches deep, and weighing more than 27 pounds, it's a little big for its class. So maybe there is something to this "high tower" concept.

The space inside is much appreciated, however—you can easily install a 12.2-inch GPU without removing any hard drive bays, and the extra room allows for more airflow. The motherboard tray, which supports ATX, microATX, and E-ATX motherboards, also features five cutouts for cable management inside the case, which made our test build easy and organized. There are two grommeted cutouts in the back for liquid-cooling tubes.

We're not sure how we feel about the GS-6400's looks. From a distance, with the side panels on and the fan LEDs active, we must admit that the Arvina looks pretty beastly. The design of the trans-lucent side-panel window is very unique, and latches make removing the side panels a snap. The case still looks sleek upon closer inspection, but the large swaths of glossy, fingerprint-catching plastic on the top and front panels make the case look cheap. We're not thrilled, either, that the toolless drive bay and expansion slot brackets are all made of flimsy plastic.

We have a couple more minor problems with the Arvina. If you're looking for USB 3.0, you're going to have to look elsewhere, though we haven't yet come to expect USB 3.0 integration at this price point. What we have been getting used to, however, is the inclusion of drop-down SATA docks, which are becoming more and more commonplace in this price range. The Arvina doesn't include this, though it does have a top eSATA port and a full SATA data and power pass-through that requires an included cable. The case gives you an integrated multiformat card reader.

For an MSRP of $89, you get a solid, well-ventilated case that is quick and easy to build into and looks decent—albeit a little low rent. We've never been huge fans of plastic components, but we can't help but be impressed by what Sentey has put together for such a low price. If your next build is a simple one and you're looking to cut costs, the Arvina is worthy of your consideration. —**ALAN FACKLER**

VERDICT

8

Sentey Arvina GS-6400

➕ **LEDs** Lots of cooling; tons of space; toolless bays.

➖ **IEDs** Very heavy; no USB 3.0 support; flimsy securing mechanisms; glossy trim.

$89, www.sentey.com

The Arvina has a lot of space for a mid-tower chassis, though we're curious if that's worth its 28-pound heft.

The hard drive trays are handy and colorful, but feel flimsy.

The two 8cm side intake fans cool the GPU area.

With the steel side panels on and the LEDs powered, the Arvina is a pretty sleek-looking case, although opinions about its appearance were mixed in the Lab.

Intel 320 Series 300GB SSD

One of the best 3Gb/s SATA drives we've tested

IN LAST MONTH'S ROUNDUP of solid-state drives, Intel's entrant bore Marvell's 9174 6Gb/s SATA controller, rather than an Intel one. While the Intel 510 SSD performed respectably among its 6Gb/s SATA peers, it's not the top-to-bottom Intel drive fans have been waiting for. That drive is finally here, and despite the Intel 320 Series nomenclature, this is the third generation in Intel's X25-M series of mainstream solid-state drives. But is a drive with a 3Gb/s SATA controller really going to cut it in 2011?

Intel's previous consumer solid-state drives were known for three things: rock-solid reliability, fast random-access and sequential read speeds, and relatively slow sequential write speeds—often less than half the speed of the competition. With the 320 Series, Intel keeps the first two and eliminates the third; the 320 Series SSD's sequential write speeds are, finally, competitive with other 3Gb/s SATA drives.

The 320 Series is Intel's first with 25nm-process NAND flash memory—Intel's own, of course. The drive also adds AES encryption. What it doesn't add is a new controller. That's right; the only difference between the controllers of the 320 Series and X25-M G2 is the firmware.

The 300GB version of the 320 drive gave sequential read speeds of 272MB/s and sequential write speeds of 221MB/s, as tested in CrystalDiskMark. The previous-generation X25-M G2 posted a similar read speed but only a 103.6MB/s sequential write speed. The X25-M G2 posted significantly higher random-write speeds than the 320, both in single-threaded and 32-queue-depth tests. And, of course, OCZ's Vertex 3, even in 3Gb/s SATA mode, far outperformed the 320 Series SSD—and all others—in 4KB random writes.

The Intel 320 Series SSD holds its own with top-tier 3Gb/s SATA drives like those powered by the SandForce SF-1200 controller—or Samsung's 470 Series, for that matter—with sequential read and write performance near the 3Gb/s SATA bandwidth limit. Intel is aiming the 320 Series drives at the 3Gb/s SATA install base, which it calculates at over a billion computers. For the 6Gb/s crowd, Intel offers the previously reviewed Intel 510, based on the Marvell controller. We're happy to see Intel finally offering a third-gen mainstream drive, especially

with decent capacities—up to 600GB. The 300GB version we reviewed goes for $540, significantly cheaper than the $600 Intel asks for its 250GB 510 drive.

If you have native 6Gb/s SATA and have to have the fastest drive you can get, the Intel 320 Series isn't for you. You're better off with the OCZ Vertex 3 or another SF-2281-powered drive. But for the many, many people still rocking 3Gb/s SATA, the Intel 320 series offers performance near the top of that particular heap, plus Intel's vaunted reliability, at a very attractive price point. **–NATHAN EDWARDS**

The Intel 320 is more than just a spiritual successor to the X25-M series—it shares the same chassis and processor.

VERDICT
9

Intel 320 Series 300GB SSD

➕ **360** Competitive read/write performance; good pricing; robust.

➖ **180** Limited by 3Gb/s SATA; late to the game; random-write IOPS lag behind leaders.

$540, www.intel.com

BENCHMARKS

	Intel 320 Series SSD (3Gb/s SATA)	Intel X25-M G2 (3Gb/s SATA)	Intel 510 (6Gb/s SATA)	OCZ Vertex 3 (6Gb/s SATA)
CAPACITY	300GB	160GB	250GB	240GB
CONTROLLER	Intel	Intel	Marvell 9174	SF-2200
CRYSTALDISKMARK				
Sustained Read (MB/s)	272.9	264.2	480.1	**485.5**
Sustained Write (MB/s)	221.1	103.6	**328.9**	289.8
AS SSD				
Seq. Read (MB/s)	263.9	253	483.6	**506.2**
Seq. Write (MB/s)	186.8	80.25	**308.03**	280.19
4KB Read (IOPS)	4,901	**16,089**	4,674	5,539
4KB Write (IOPS)	8,343	8,482	9,923	**14,263**
Read Access (ms)	0.073	**0.062**	0.207	0.157
Write Access (ms)	0.11	0.118	**0.095**	0.222
IOMETER				
4KB Random Write, 32QD (IOPS)	16,595	28,888	12,123	**85,144**
Max Access Time (ms)	68	273	318	**61**
PREMIERE PRO ENCODE/ WRITE (SEC)	437	484	424	**422**
PCMARK VANTAGE X64 HDD	37,720	33,635	39,053	**59,978**

Best scores bolded. Our current test bed is a 3.1GHz Core i3-2100 processor on an Asus P8 P67 Pro (B3 chipset) running Windows 7 Professional 64-bit. All tests used onboard 6Gb/s SATA ports with latest Intel drivers, except 3Gb/s SATA tests, which used onboard 3Gb/s Intel SATA ports.

The VAIO L Series is wall-mountable, making it a perfect media viewing station.

With a 2.8GHz Core i7-860 under the hood and 3D Blu-ray support, MSI's Wind Top has some muscle.

Three Cheers for All-in-One

These systems possess surprising polish, but can their innards meet our lofty expectations?

USB 3.0? Sandy Bridge? 3D Blu-ray movies and games? Subwoofers? It looks like the lowly all-in-one PC is finally maturing into a class of system that we can get behind. Historically, these rigs have been relegated to KP duty for simple web-browsing and TV viewing, but we have higher ambitions for them. Why can't we, for example, boot Total War: Shogun 2 and play a few turns while dinner is being prepared? We had this in the back of our head as we put these three new systems through the ringer. –GEORGE JONES

SONY VAIO L SERIES VPCL214FX/W

Aesthetically, Sony's VAIO L Series all-in-one pleased us the most. Its sides and back are white plastic, the new "in" look for PCs this year, and the matching keyboard and mouse make this system a nice fit in any environment.

If only the hardware and performance matched the sleek exterior. Sandy Bridge chip or not, the mobile 2.1GHz Core i3-2310 part left the VAIO L Series hunched over gasping for air throughout our tests. Because all-in-one systems trade performance for form factor, we use our 2007 benchmark suite to test them, but that mattered none here. Sony's performance was slow, taking 100 percent to 200 percent longer than the other two systems reviewed here to move through our ProShow Producer, MainConcept Reference, and Photoshop tests. And Sandy Bridge's integrated graphics were no match for Call of Duty 4, putting up single-digit frame rates. If you're looking for a web browser or media player, that's no problem, but for more GPU- or CPU-intensive tasks, you'll need more muscle.

The VAIO L ships with a Blu-ray player, Wi-Fi, two USB 3.0 ports, three USB 2.0 ports, a TV tuner, and a webcam on the front. We appreciate the presence of an HDMI-out port on the back of the unit. The 24-inch (1920x1080) LED-backlit touch screen bears special recognition; large, vibrant, and without much bezel, it's everything we want in an all-in-one display.

While the hardware is underwhelming, the $1,400 price does make this a more affordable option for modest, everyday usage.

VERDICT 6

Sony Vaio L Series
VPCL214FX/W

$1,400, www.sonystyle.com

MSI WIND TOP AE2420 3D

With built-in 3D support and some serious muscle under the hood, MSI's Wind Top AE2420 3D offers a tantalizing view of the future of this form factor. A 2.8GHz Core i7-860, 4GB of RAM, an ATI Radeon Mobility HD 5730 graphics part, Wi-Fi, and 1TB of SATA2 storage make this a solidly conceived all-in-one PC, even if it feels a wee bit unpolished.

As an example, this was the only system we tested without an integrated Bluetooth keyboard and mouse—we had to plug in the included USB dongle to connect the mouse and keyboard. That's a little rough around the edges. More frustrating was the fact that the mouse wouldn't automatically wake up upon touch; every time we wanted to use the system after it had gone to sleep, we had to hit the connect button on the bottom of the mouse.

In terms of performance, the MSI flexed some muscle, running a close second to HP's very fast TouchSmart. The Core i7-860's four cores and eight threads powered their way through ProShow Producer, and the presence of ATI's mobile Radeon HD 5730 allowed it to post frame rates in the high 30s for our

HP's Touch Smart is fast, polished, and has a nice screen. It's also the only system of the batch that tilts up and down.

Call of Duty 4 test, which is the fastest of the three systems reviewed here. What's that, you say? You think 35 frames per second for a 3-year-old game isn't all that great? Well, welcome to the world of all-in-ones. Practically speaking, the Wind Top feels snappy, and while the processor speeds allowed us to play Total War: Shogun 2 in campaign mode, when the time came to fight it out on the game's 3D battlefields, we were disappointed.

The Wind Top comes with two USB 3.0 ports, five USB 2.0 ports, HDMI-in, S/PIDF-out, a coaxial-in port, and a web-cam. The inclusion of a stylus surprised us, but hey, it's not mandatory and it's not hurting anyone, right? MSI's Wind Touch OS layer deserves special mention—it provides a fairly straightforward way to access media solely through the touch screen.

While not as nice as Sony's VAIO L Series, the 23.6-inch screen puts out pretty decent visual quality. And, as far as we know, this is the only all-in-one that allows you to watch 3D Blu-rays and play 3D games. It even has a built-

in emitter and comes with a pair of active shutter 3D glasses.

Overall, this is an above-average showing. And if you want 3D content, this is the only gig in town.

VERDICT 8

MSI Wind Top AE2420 3D
$1,800, www.msi.com

HP TOUCHSMART 610

It's clear that HP sees the value in this category. The PC maker's new TouchSmart is sleek, polished, and is the first all-in-one we've ever seen to feature a subwoofer-out jack. HP makes a subtle but valid point here: The truth about these systems is that, regardless of where we set them up—kitchen, living room, garage—we find ourselves frequently using them as music stations, so why not aim for higher audio fidelity? Conveniently, HP has also integrated Monster's (and Dr. Dre's) Beats environment, allowing the TouchSmart 610 to pump out impressive enough

sound to make people do a double-take.

Beats notwithstanding, HP also packs some beef into this system, with a 2.93GHz Core i7-870, a full-size 2GB ATI Radeon HD 5570, 8GB of DDR memory, a 1TB 7,200rpm drive, a Blu-ray player, Wi-Fi, a TV tuner, and two USB 3.0 and two USB 2.0 ports. As far as CPUs go, the Core i7-870 is a little old, but the higher clock enabled it to blaze through our CPU-intensive tasks, beating out MSI's AiW by 20 percent in most tests and almost 50 percent in our Photoshop benchmark. It's not Sandy Bridge, but it's speedy. And, given the use of discrete graphics, Sandy Bridge is not necessary.

Game performance was another story, however, as MSI's 5730 Mobility Radeon part bested the 5570 by a few frames per second in Call of Duty 4. Again, you're not going to wow your friends by turning up the detail on Shogun 2's battle scenes, but you will be able to play through campaign mode without the CPU's turns taking days.

We like the 24-inch screen on the TouchSmart 610. It's not as nice as Sony's, but is still satisfying. We absolutely love the vertical slider on the back of the system, which allowed us to easily recline the screen into multiple positions. It is also wall-mountable. One other nice touch is the new version of its TouchSmart OS layer, which optimizes media chores and other OS functions for touch. As if to underscore the gaming potential of the 610 (and possibly the entire all-in-one category?), HP includes a free touch-enabled copy of the real-time strategy game Ruse.

This excellent, professionally crafted system demonstrates that while we're not quite in the position of being able to play power games on all-in-one systems, we're getting close.

VERDICT 9

HP TouchSmart 610
$1,790, www.hp.com

SPECIFICATIONS			
	Sony VAIO L Series VPCL214FX/W	MSI Wind Top AE2420 3D	HP TouchSmart 610
PRICE	$1,400	$1,800	$1,790
CPU	2.1GHz Core i3-2310M	2.8GHz Core i7-860	2.93GHz Core i7-870
GPU	Integrated (Sandy Bridge)	ATI Radeon Mobility 5730	ATI Radeon 5570
RAM	2GB	4GB	8GB
HDD	450GB (7,200rpm)	1TB (7,200rpm)	1TB (7,200rpm)
SCREEN	24-inch	23.6-inch	24-inch

BENCHMARKS			
	Sony VAIO L VPCL214FX/W	MSI Wind Top AE2420 3D	HP Touch-Smart 610
PROSHOW PRODUCER (SEC)	1,470	686	**567**
MAINCONCEPT (SEC)	2,542	1,389	**1,109**
PHOTOSHOP CS3 (SEC)	166	150	**85**
PREMIERE PRO CS3 (SEC)	1,380	660	**600**
CALL OF DUTY 4 (FPS)	6.8	**38.0**	35.8

Best scores are bolded.

Logitech Z906 5.1 Speaker System

A few key features shy of stellar

The Z906's satellite cabinets rest at an angle to direct the sound straight at your ears.

LOGITECH'S Z-5500 5.1-channel speaker system was legendary for its beefy amp and beastly subwoofer, its plethora of optical and digital input options, and its ability to decode popular surround-sound codecs. The 5.1-channel Z906 speaker system taking its place at the top of Logitech's audio lineup is every bit its equal.

The Z-5500, however, hit the market in 2004. In the intervening seven years, HDTV, Blu-ray, high-definition surround sound, and Class D amplifiers have elevated our expectations. We've grown accustomed to consumer electronics that deliver price/performance ratios that were unimaginable in 2004.

Our chief criticism of the Z906 is that Logitech positions the system as a suitable companion for a Blu-ray player, and we think a PC with a Blu-ray drive and an HDMI videocard fits that definition. But the Z906 doesn't provide HDMI pass-through, and it can't decode the Dolby TrueHD and DTS-HD Master Audio soundtracks that make Blu-ray movies sound as glorious as they look.

The Z906 *is* outfitted with three 1/8-inch analog stereo inputs, so you can still get HD audio if you connect the system to a PC or a Blu-ray player with discrete analog outputs, but that's messy and not all Blu-ray players have those outputs. The Z906 also has three S/PDIF-outs (two optical and one co-axial), and it is capable of decoding DTS and Dolby Digital soundtracks, adding DVD players and videogame consoles to its list of supported devices.

Logitech puts long speaker cables in the box (12 feet for each of the front channels and 24 feet for each of the surrounds), but you can substitute your own because the Z906's subwoofer and satellites are equipped with binding clips. The Z906's seven-channel Class-D amp directs 67 watts to each of its five satellites and 165 watts (bridging two channels) to the 8-inch woofer in the sub. As with the Z-5500, the satellites are equipped with 3-inch, one-way drivers that must produce both high and midrange frequencies. Two-way configurations with discrete tweeters and midrange drivers, such as you'll find in Corsair's 2.1-channel SP2500 system, almost always deliver a more satisfactory sonic performance.

The Z906 delivered rock 'em, sock 'em performance with first-person shooters and other games, and it did a good job of filling our home theater with Blu-ray movie soundtracks. The limitations of those one-way drivers, however, surfaced as soon as we turned our focus to music. Listening to "If This Is Good-bye," from the Mark Knopfler, Emmylou Harris collaboration *All the Roadrunning*, the Z906 rendered Ms. Harris's angelic vocals with a slightly harsh edge. By the same token, the delicious piano work that figures so prominently in Julianna Raye's "Slowly," from her *Dominoes* album, came across as overly bright and brittle.

So the Z906 is a worthy successor to the vaunted Z-5500. It's great with games and good with Blu-ray movies, but its weak musical performance, lack of HD-audio support, and the absence of HDMI pass-through deny it a Kick Ass award. –MICHAEL BROWN

VERDICT

9

Logitech Z906 5.1 Speaker System

⊞ **HDMI** Surround sound, a beefy subwoofer, and plenty of inputs.

⊟ **TMI** Satellites have one-way drivers; no HDMI pass-through; can't decode Dolby TrueHD or DTS-HD Master Audio.

$500, www.logitech.com

SPECIFICATIONS

SATELLITE SPEAKERS	3-inch full-range fiber composite with synthetic rubber surrounds
SATELLITE ENCLOSURES	ABS plastic
SUBWOOFER	8-inch side-firing fiber-composite driver with foam surround in ported MDF enclosure
AMPLIFIER	Class D (seven channels, with two bridged channels driving the subwoofer)
STATED POWER RATING	500 watts RMS total: 67 watts to each of five satellites, 165 watts to subwoofer
INPUTS	Six channel analog (three 1/8-inch analog stereo), three S/PDIF (two optical, one coaxial), two RCA analog stereo, and one 1/8-inch analog stereo
OUTPUTS	1/8-inch headphone; binding clips for speakers

Zalman CNPS11X

Flying V: Great guitar. Gimmicky hockey maneuver. Underwhelming cooling configuration

Sometimes looks matter more than performance. Not in a CPU cooler, however.

JUST FIVE MONTHS AGO, we reviewed Zalman's superb CNPS9900Max, which marked a return to the circle-of-fins look that has marked the big Z's best-performing CPU coolers of the past half-decade or so. The CNPS9900Max resuscitated our faith in Zalman's heatsinks, which had dwindled in the wake of skyscraper-style coolers and Zalman's disappointing CNPS10X Extreme, a cooler that was larger and more expensive than its more effective competitors. Now Zalman gives us the CNPS11X, with yet *another* new cooling-fin configuration.

The CNPS11X is a skyscraper-style cooler, 6.3 inches high by 5.25 inches wide by 3.75 inches deep, with five nickel-plated heat pipes rising into two sets of aluminum heat-dissipation fins. The fin stacks are arranged in a V formation, with a 12cm blue LED fan across the top of the V, forming a triangle with the fan as the hypotenuse. The top and bottom of the fin stacks are covered with black plastic covers, to keep air flowing from the fan through the fins. The result is a cooler that takes up a lot of room but also has a lot of wasted space in the center that could otherwise contain cooling fins.

Zalman continues to use the universal backplate design it's been using since at least the CNPS9900Max—the one that requires four nuts (either silver-colored or gold-colored, depending on socket), four sliding plastic retainers, and a special angled 2.5mm hex wrench. You can use a standard 2.5mm head, but the tool Zalman includes can be used from an angle—necessary, given the placement of the

fan. The CNPS11X also ships with a resistor cable to slow the 12cm fan and reduce noise.

On our test bed, with an ambient lab temperature of 22.8 C (73 F), the CNPS11X cooled our overclocked Core i5-750 to 65.75 C at full burn. This is better than our baseline cooler, the $30 Cooler Master Hyper 212+, but 5 C hotter than the Prolimatech Armageddon, our favorite air cooler. Zalman's CNPS9900Max, by contrast, performs slightly better than the Armageddon. (We prefer the Armageddon's installation process, which is why it's still our favorite.) The CNPS11X is also noticeably louder than either the Armageddon or CNPS990Max. Using the included resistor cable drops the noise to tolerable levels but raises CPU temperatures a degree or two.

The CNPS11X is not a bad cooler, but it's not a great cooler, either. The CNPS11X retails for $90. For $4 more, you can get a Prolimatech Armaged-

don with two 14cm fans, which has an easier install, a more robust mounting bracket, and better performance. Or, for $10 less, you can get the Zalman CNPS9900Max, which kicks as much ass as the Armageddon, costs less, and has that radial-fan look that Zalman does so well. Maybe you dig the V-shaped fin stacks and don't mind that this is a louder, more expensive, and less effective cooler than the CNPS-9900Max. But if the design doesn't speak to you, the performance won't hook you either. **–NATHAN EDWARDS**

VERDICT 7

Zalman CNPS11X

➕ **STARMAN** Decent looks; included resistor cable.

➖ **CARMAN** Expensive; loud; outperformed by cheaper coolers.

$90, www.zalmanusa.com

BENCHMARKS

	Zalman CNPS11X	Prolimatech Armageddon (2 fans)	Cooler Master Hyper 212+ (1 fan)
IDLE (C)	35.25	**33.75**	34.75
100% BURN (C)	65.75	**60.75**	68.5

Best scores are bolded. Idle temperatures were measured after an hour of inactivity; load temperatures were measured after an hour running Intel's internal Lynnfield thermal testing utility at 100 percent load. Test system consists of Intel Core i5-750 overclocked to 3.2GHz on an Asus P7P55D Premium board in a Corsair 800D case with stock fans. Temperatures taken with HWMonitor.

Harman AKG GHS 1

A stylish headset from a newcomer to the field

HARMAN'S AUDIO PRODUCTS, which comprise brands like JBL, AKG, and Harman/Kardon are known as much for their high-tech aesthetic as for their audio quality and have never included a gaming headset—until now. We were excited to get the GHS 1 into the Lab to find out whether the design-conscious company's first foray into the gaming peripheral landscape was a success.

Like we said, Harman's products are always visually creative, and the GHS 1 is no exception. It's not as out there as, say, the Harman/Kardon crystalline desk speakers, but it's slick and distinctive all the same. There are three color schemes available, but the model we received sports a matte black finish with silver accents and a grey fabric band with orange stitching. The built-in mic is on a sharp-looking, stubby boom, and it folds up for easy transport. The long, bright-orange cable has inline volume/microphone controls and ends in two rubberized connectors that plug in to your analog ports. Good design is always going to be subjective, but as far as we're concerned, this is among the nicest-looking gaming headsets we've ever seen.

In terms of comfort, the GHS 1 is a mixed bag. The two-layer fabric and plastic headphone is very comfortable, which, combined with the overall light weight of the set, means your head isn't going to get sore even after long sessions with these. We're less enamored with the earcups, which are of the supra-aural variety, sitting directly on top of the ear. The cups are quite padded, but the padding itself isn't squishy enough to keep the phones from becoming slightly uncomfortable during extended usage. Some people like supra-aural headsets better than others, but if you're not a fan, the GHS 1 isn't going to change your mind.

The AKG GHS 1's short microphone looks great, but isn't quite as sensitive as a full-length boom.

So is the GHS 1 all style and no substance? Not at all. The sound produced by the set isn't going to blow your mind, but it easily matches the best offered by its competition in the sub-$100 market, with rich, clear mids and highs. The bass isn't quite as strong as we'd like it to be, but on the whole the set delivers a balanced, detailed sound that's equally good for gaming, music, and movies.

The first time we saw the microphone on the GHS 1, two thoughts occurred to us in quick succession. First was, "Hey, that's a hell of a lot cooler-looking than a normal boom mic!" The second was, "But does that even work?" Well, it works, but it's not magic. It's further away from your mouth, and accordingly, picks up a little less sound. It wasn't a major deal, but there were a few instances where we found ourselves having to speak up to be heard.

So on the whole, Harman's first attempt at gaming audio is a success.

The set's design is absolutely top-notch, and if you want better sound quality, you'd better be prepared to spend more than the GHS 1's $80 price tag. The only thing working against this set is the small, supra-aural earcups, which don't provide much noise cancellation and can get uncomfortable. If you've used a supra-aural headset before and liked it, this one's a great deal for the money. –**ALEX CASTLE**

VERDICT

8

Harman AKG GHS 1

➕ **GLOSSY** Excellent design; folds up when not in use; strong sound quality.

➖ **LOSSY** Irksome ear cups; microphone can be insensitive; bass is a little weak.

$80, harmanaudio.com

Razer Onza Tournament Edition

Razer's gamepad is finally out— was it worth the wait?

WE'RE NO FAN OF THE CONSOLE-IFICATION of PC gaming, either, but you've got to admit, Microsoft has had the gamepad market locked since it introduced the USB Xbox 360 controller more than five years ago. In that respect, it's not really surprising that the first real challenger to Microsoft's super-solid wired controller is, itself, an Xbox 360 controller: the Razer Onza.

The Onza was first revealed more than a year ago at CES 2010, so consumers have had a lot of time to ask questions like, "Is Razer really going to try and become a console peripheral company? Can a third-party controller ever really beat the first-party offering?" Well, we don't have an inside line on Razer's business dealings, but we do have the Onza in our hands, and we can tell you that the answer to the second question is an emphatic yes.

The Razer Onza isn't a wide departure from the standard 360 controller in looks—it's the same shape, more or less, with a nearly identical layout of face buttons and analog sticks and feels as good in the hands as the original. A slightly rubbery, nonslip coating makes it easy to hold on to, and it looks nice in matte black. It feels just the tiniest bit lighter and less solid than Microsoft's controller, but that still leaves it in "very sturdy" territory. Like the Xbox 360 controller, no additional drivers are needed in Windows Vista or 7.

Where the Onza controller beats the regular Xbox controller is in features. Notably, the Onza uses Razer's Hyper-esponse actuators for the light-up face buttons, giving them a much clickier and more responsive feel. Additionally, Razer's controller packs two bumper buttons above each trigger—the bonus button can be bound to any of the other standard buttons—and the physical resistance of the two analog sticks can be adjusted individually.

The one questionable change to the Xbox 360 controller formula is the switch from a rocker-style D-pad to one with four oversize buttons with lots of travel. It's not a disaster, by any means, but we can't say we like it better than the rocker, and it might trip up people who use the D-pad for complex inputs, such as fighting game commands.

At just $10 more than an Xbox 360 controller (or the exact same price for the non-Tournament Edition, which lacks the adjustable sticks and light-up buttons), and with a strictly superior feature set, we'd recommend this one to anybody. Hands down, this is the gamepad to beat. **–ALEX CASTLE**

VERDICT

9

KICK ASS!

Razer Onza Tournament Edition

➕ **GRAVIS GAMEPAD** Feels great; cool extra features; competitive pricing.

➖ **JAGUAR CONTROLLER** Slightly less rock-solid than the original; new D-Pad isn't for everyone.

$50, www.razerzone.com

The Onza's low-profile face buttons are much more responsive than the standard Xbox 360 controller.

Portal 2
Gordon Freeman who?

LET'S GET ONE THING straight right away: Portal 2 is not Portal 1. Don't get us wrong: Portal 2 is still completely brilliant—just in entirely different ways. If Portal 1 was an incredibly witty one-liner, then Portal 2 is a whole night of stand-up. That is to say, it's still smart, subversive, and riotously funny, but it does manage to drag in a couple areas—if only briefly.

Portal 2 sees previous heroine Chell awaken many, many years after her fateful game of "Ha ha, got your brain" with hilariously nefarious AI GLaDOS. The first character you encounter this time around, however, is a far friendlier face (or fast-chattering robo-eye, as it were). His name's Wheatley, and he's equal parts cowardly, incompetent, and voiced by Stephen Merchant. Primarily for that last reason, you will instantly fall in love with him. He's an amazing counter to GLaDOS's morose musings and exemplifies Portal 2's more expansive tone and breadth of material.

The other new character—who we're not going to mention by name for fear of spoilers—doesn't fare quite so well. Put simply, his run-of-the-mill jokes and personality don't quite reach the sterling standard set by GLaDOS and Wheatley—an issue not helped by the fact that his levels are a bit too expan-
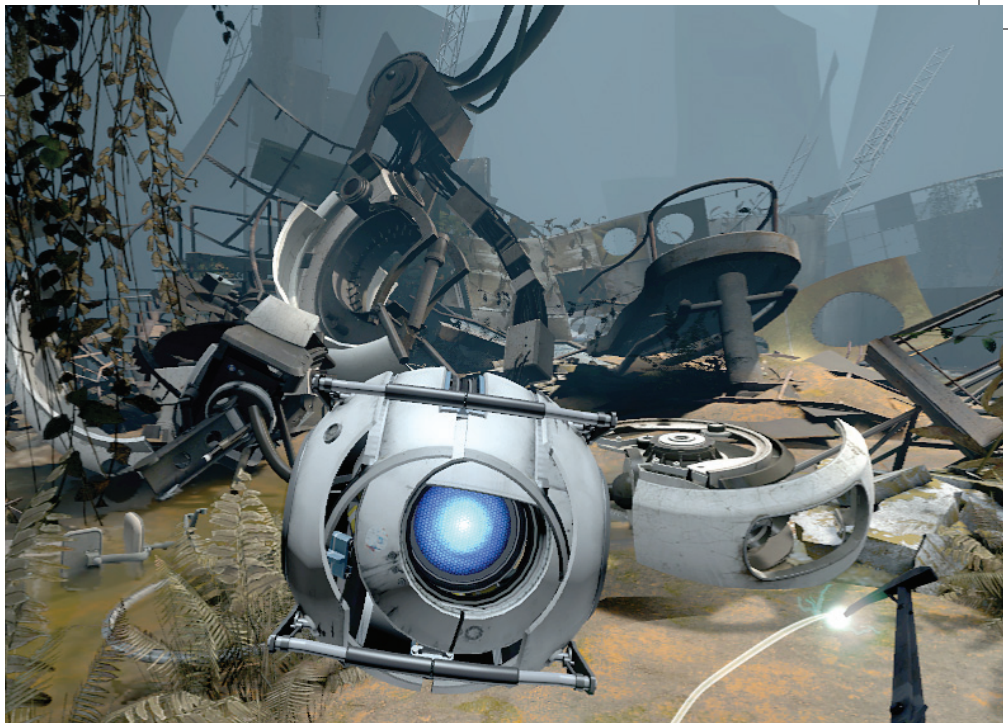
We're calling it now: best new videogame character of the year.

sive for their own good, which causes Portal 2's pacing to take a disappointing dip during its middle chapters. Fortunately, things pick up again before too terribly long, and the resulting wave of momentum crashes into an absolutely fantastic ending.

The real stars of the show, however, are the puzzles. Once again, Valve's masterful ability to reprogram your brain with all manner of subtly game-changing objects and techniques is on full display. With the game's substantial increase in length and drip-feed of tools like Aerial Faith Plates, Hard Light Bridges, and redirectable lasers, puzzles are certainly more complicated this time around. Even so, you probably won't notice, as Valve's brilliant design could convince even the world's worst puzzle-solver that he/she is a complete genius.

Co-op, meanwhile, adds yet another layer of complexity (two portal guns!) and manages to be ridiculously satisfying as a result. There are some real head-scratchers in the mix, but having two heads to scratch instead of one speeds up the process more than enough to make up for it. The end result? Brain-twisting bliss. There's really nothing quite like hitting a wall, thinking out loud for 10 minutes, and then—just when all hope seems lost—having simultaneous "eureka" moments. It's cooperative in the truest sense, and you may very well come away feeling closer to another human being as a result.

Consequently, Portal 2 is far more than "Portal, but longer." Its newfound scale affords it greater variety in locales, puzzles, and characters, leading to an entirely new tone and feel. By and large, Portal 2's hugely successful in making the jump up to the big leagues, but inevitably, a few jokes are duds and a few crummy puzzles made the cut. But hey, no comedian ever has a perfect night. The best ones just give you so many highs that you forget the lows even happened. **–NATHAN GRAYSON**
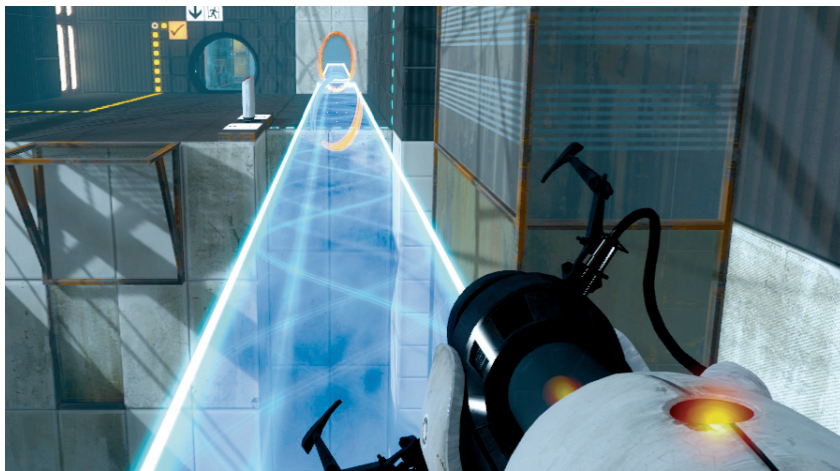
A bridge—or, as someone with a portal gun would call it, "peasant travel."

VERDICT
9
KICK ASS!

Portal 2

⊞ **ANIMAL KING** Hilarious, incredibly well-written story; brain-bending puzzles; excellent co-op.

⊟ **SENTIENT CLOUD** Middle section drags a bit; some not-so-memorable jokes.

$45, www.thinkwithportals.com, ESRB: E10+

DCS A-10C and Thrustmaster HOTAS Warthog

Finally, something for flight-sim junkies to get excited about!

IT'S BEEN A LONG, LONG TIME since flight-sim fans were treated to something new and exciting that celebrates their passion. Hell, most virtual flight jockeys are still piloting relics such as Falcon 4.0 (first released in 1998), Lock On, and FSX 10. So, for us to simultaneously get our hands on a seriously crafted "study" simulation (it's not a game) and perfectly matching high-end control hardware at the same time is a Very Big Deal. We take Eagle Dynamics' DCS A-10C and Thrustmaster's HOTAS (hands-on throttle and stick) Warthog for a survey flight, followed by some serious mud-moving action. **–STEVE KLETT**

DCS A-10C

For most gamers, a 669-page manual would be a serious turn-off and relegate the game that accompanied such a treatise to the bargain bin. In this case, however, a manual of biblical proportions is, well, heavenly—particularly when the manual is so well-written. DCS A-10C's Flight Manual PDF includes background history on the A-10 "Warthog" airframe, and exceedingly detailed information on just about every dial, switch, component, and weapon system therein.

Oh, and this is just one of *three* manuals, the other two being a 226-page tome walking you through the game's GUI and features and a "quick start" 21-page pamphlet that attempts to get you up in the air and into the thick of things in short order. You could spend at least a week read-

ing and just familiarizing yourself with the A-10's cockpit, in which every switch, button, and dial you see is interactive and works, supposedly, just like the real deal. Sweet.

DCS A-10C is made by the folks that brought us DCS Black Shark, which is probably the most hardcore sim we've ever attempted to fly (emphasis on *attempted*—we had trouble just getting that "game's" Russian Ka-50 attack helicopter into a proper hover). For those folks that persisted, however, Black Shark rewarded them with a deeply rich and über-realistic experience. A-10C is much the same, but the modeled airframe is a bit, dare we say it, simpler, and the developer has made some efforts to help less-experienced pilots get up in the air.

Put in the practice time and the sim will reward you, handsomely. There's no feeling quite like evading enemy ground fire and dropping a 500-pound Mark 82 smack-dab on target—or successfully hosing down an armored column with the A-10's murderous 30mm Gatling gun and making it back to base to fly and fight another day.

This is a good thing—after all, it takes years of training to fly the real A-10, and it will likely take a year or more for all but the most gifted of simmers to master the virtual counterpart DCS has so lovingly, and painstakingly, created here. DCS A-10C has some serious long-term "legs." It's just too bad Eagle Dynamics didn't do more to dumb it down a bit so that more casual

players could enjoy it. This is hardcore/moderate pilots–only territory.

And that's a shame because A-10C is a sumptuous feast for the eyes. Just about any gamer would appreciate the amount of detail that's been put into modeling not only the A-10C, but all the other vehicles and aircraft you'll encounter throughout the sim. You can literally count the rivets on the machines, if you wish, and just about everything that should animate, does.

This is just one of the many reasons why DCS A-10C is a virtual pilot's dream come true—particularly if you pair it with Thrustmaster's HOTAS Warthog, reviewed below.

THRUSTMASTER HOTAS WARTHOG

To many, the A-10 airframe is something only its conceiving engineering team can love—and this is why it's affectionately known as the "Warthog." Given that most of the Warthog's duties are at relatively low levels where situational awareness is tantamount to survival and proper delivery of ordinance, its cockpit was designed with simplicity in mind—and the hands-on throttle and stick (HOTAS) controls inside enable the pilot to fly and fight without ever taking his or her eyes off the target to hunt for dials, buttons, and switches.

Thrustmaster's HOTAS Warthog replicates the actual A-10's stick and throttle controls down to the last dial, button, and switch—at least that's what the company says. We'll take its word for it because

Every button, dial, and switch you see here works. You can use the mouse or the slew control on the HOTAS to interact with them, or the mapped keys on your keyboard—but what fun is that?

everything about this HOTAS looks, feels, and behaves in an authentic manner and helps push DCS A-10C to the edge of the envelope, where game, simulation, and reality blur together.

The HOTAS consists of separate throttle and flight stick modules that connect to your PC via USB: Just plug them in, along with your rudder pedals of choice, and you are good to go—the controls are preconfigured to work with the DCS A-10C out of the box (and a control map for the HOTAS is included in the A-10C manual). So, there's no need to load profiles and tweak settings—a process that can take weeks to get "just right." The dual throttles have a magnetic sensor system to precisely register movement in the sim, and since the magnets are frictionless, there's zero mechanical wear to worry about.

Both the stick and throttle are constructed from metal and feel heavy and realistic. Each button, dial, and switch is calibrated to work as closely to the real thing as possible, meaning you need to employ the same amount of pressure to activate them as you would in the real cockpit. The stick uses the same magnet sensor system as the throttle, and we found it to be the most precise flight stick we've ever had the pleasure to fly with. Very little pressure is needed to make the stick do what you want it to, which is not something we can say about previous Thrustmaster efforts. Everything is, of course, programmable, and doing so is not as painful as it has been in years past. So you can make your own custom profiles for any other flight sim you have with relative ease.

The HOTAS may be pricey, but this hefty controller is an exact replica of the controls used to drive an A-10C.

The only real thing to perhaps grouse about here is the $500 price tag, but honestly, the HOTAS Warthog feels like it's worth every penny. There's nothing that's been skimped on here, and it truly is a work of engineering beauty that any serious flight simmer will appreciate for years.

VERDICT 9 K!CK ASS!

Thrustmaster HOTAS Warthog

➕ **NATO** Gorgeous, functional, precise, and authentic.

➖ **WARSAW PACT** Expensive—and eats up desktop real estate.

$500, www.digitalcombatsimulations.com

VERDICT 8

DCS A-10C

➕ **MAVERICK** Everything about this sim screams realism.

➖ **GOOSE** Not for the casual crowd.

$60, www.digitalcombatsimulations.com

The A-10C can dish out and take considerable punishment. But due to the nature of its job, when things go wrong, they often go very wrong.

The 3D model of the A-10C comprises more than 100,000 polygons and is highly detailed, with complete animation of control surfaces, multiple-texture maps, and normal and specular maps.

LAB NOTES

AMBER BOUMAN **ONLINE FEATURES EDITOR**

Big Screens,
Big Trouble

Testing is easy compared to all the hassles of setting up a bunch of big screens

THIS MONTH'S MAXIMUM PC CHALLENGE proved to be quite a time-consuming endeavor. For once, getting product in was the easy part. It was in the setup and software where things got difficult. While the physical build of each setup took a little bit of time—with the MD230X6 taking the longest, as it had to be bolted together—everything also had to get hauled upstairs to our photography studio, then back down to the Lab/conference room/wherever we could find space, then plugged into our test bed and configured. Between downloading drivers; finding DisplayPort, HDMI, or DVI cables/adapters; fighting with power supplies; adjusting software; and configuring aspect ratios, field of view, bezel correction, etc. , each build took at least a few hours to get up and running—all for a few sweet hours of intense gameplay. In the end, it was well worth the effort, but a great deal more time intensive than we had anticipated.

Gordon Mah Ung
Senior Editor

Can't see all your RAM in your new LGA1366 board? Normally, reseating the RAM modules fixes the problem, but on a recent board I ran into something more insidious: a bent pin leading to the memory controller. The board would only report the correct amount of RAM one out of four POSTs. So mind the pins, people.

Nathan Edwards
Senior Associate Editor

Intel's 320 series SSD is a great 3Gb/s SATA SSD, but being the fastest SATA II SSD in 2011 is like being the [ERROR: SPORTS-RELATED ANALOGY NOT FOUND]. In any case, it's good news for the vast majority of humans that lack decent native 6Gb/s SATA. Like, for example, anyone on an X58 chipset.

Alex Castle
Online Managing Editor

Man, what a month! I went to look at the release list to figure out which game would be next month's review, and I found no fewer than six releases that would normally be contenders for the spot. I'm most excited for Brink, but with so many options it's going to be a hard month for my bank account.

Alan Fackler
Online Associate Editor

Mere minutes before this writing, I was in the Lab with Editorial Director Jon Phillips taking a first look at the Asus Eee Transformer, a small laptop that doubles as a tablet—simply pull the screen off the keyboard dock and you've got a Froyo-enabled, 11-inch tablet. This is an exciting step in the right direction, and could very well be a tiny window into the future of our day-to-day tech.

George Jones
Editor in Chief

This month, we added a benchmark to the all-in-one PC test suite in order to gauge gaming and GPU performance. We chose Call of Duty 4: Modern Warfare—it's an older game, and it's something we use to test notebook performance. Right now, there's no comparison. The notebooks we test crush these AIO systems.

LETTERS

WE TACKLE TOUGH READER QUESTIONS ON...

> ## DDR 1333 vs. 1600
> ## High-Speed Greed
> ## The Dual PC

What's the Sweet Spot for RAM?

What's the difference between DDR3/1333 and DDR3/1600 in terms of performance? In what way is the latter superior? Will DDR3/1600 at CL8 beat DDR2/800 CL5? And DDR3/1333 CL7? Also, what about overclocked DDR3—say, DDR3/2000?

–Robert Bayly

SENIOR EDITOR GORDON MAH UNG RESPONDS: Synthetic benchmarks that stress the memory bandwidth of the RAM will show fairly significant differences between DDR3/1333 and DDR3/1600 or DDR3/2000. However, most applications will not exhibit significant increases due to increased memory bandwidth or low latency. This is likely the result of the way

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CUT, COPY, **PASTE**

In the review of the HP Dm1z in our June issue, we mentioned that the notebook didn't easily accommodate hardware upgrades. We were wrong. If you remove the battery, the underside of the notebook easily lifts off, exposing both RAM and hard drive bays.

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applications are designed and also the massive caches that modern CPUs include. The sweet spot, frankly, seems to be DDR3/1333.

What about Incoming VoIP?

All VoIP phones are good for outgoing calls. What no one addresses are incoming calls. My cable provider has been trying to sell me phone service for a year. I live in a suburb of a large metroplex. In order to have local service, I have to subscribe to AT&T's "extended metro service." This makes both incoming and outgoing calls free. After several conversations with my cable provider, they acknowledged incoming calls under their service would in fact be long distance. I have emailed Ooma's tech support asking this same question, but so far have gotten no response. Can you tell me if any providers of VoIP can in fact give you free incoming service? If I choose a local area code using Ooma, would incoming calls be local?

–David Rain

SENIOR EDITOR GORDON MAH UNG RESPONDS: VoIP phones are no different than cellular phones. Local and long distance coverage are tied to the area code and prefix. If

you lived in Los Angeles, but your cell phone still has your New York area code, anyone dialing that number from Los Angles would pay long distance. If you changed your cell phone or VoIP to a Los Angeles area code, there would be no long distance charges for people dialing it from the same area. So, this very much depends on what number you select for your VoIP account at setup. And, yes, long distance and toll calling billing models are antiquated.

Dual-PC Build It?

I've had this idea for years. Imagine taking two PCs and sliding them side by side and removing the middle side panels. You'd have a double-wide PC case holding two separate units on which you could run two different operating systems. On the front, you control which one is turned on (one or both), and the front audio, USB, and FireWire jacks could be shared. The case opens in the middle on a hinge to access the inside, and both back panels could come off. Can the "Build It" crew handle something like this?

–Cassandra Murray

SENIOR ASSOCIATE EDITOR NATHAN EDWARDS RESPONDS: Cassandra, we know of at least one company that does

just that. Mountain Mods, the company who made the chassis for our 2010 Dream Machine, offers several case configurations that can hold two full PCs with standard ATX motherboards. The Ascension Duality and U2-UFO Duality are the cases to look for.

High-Speed Greed

I found myself in a very similar situation to what George Jones described in his editorial in *MaximumPC*'s June issue (Ed Word, "High-Speed Greed"). When I wanted to upgrade to the Motorola Atrix, I made two separate phone calls to make sure I could keep my unlimited data plan before I made the switch. The first rep I spoke with wasn't 100 percent sure, but thought I could keep it. So I waited a couple days and called AT&T a second time. This time, the rep I talked to was familiar with the issue and told me, without a doubt, I could keep it. So I purchased the Atrix as soon as it became available. What did AT&T do with my data contract? They canceled it completely, and started charging me by the MB! I called AT&T and they admitted to messing up. But the system wouldn't let them put my unlimited data plan back. I asked to speak to a

↘ submit your questions to: comments@maximumpc.com

supervisor, but was told one wasn't available. So, I went down to my neighborhood AT&T store and explained my situation. The AT&T rep in the store called AT&T and got my unlimited data plan restored. The current situation with wireless carriers is in a sad sate with regard to the consumers. Oh, and by the way, the Atrix is by far the best phone I've ever had.

–**Tom Prossima**

High-Speed Greed II

I enjoyed and related to your editorial on AT&T. If you have not come across a recent U.S. Supreme Court decision on a class action filed against AT&T Mobility regarding arbitration in connection with agreements for the sale and servicing of cell phones, you might be interested in AT&T Mobility v. Concepcion, et al., Supreme Court No. 09-893, decided on April 27, 2011. A copy is available at bit.ly/m7HDt7.

–**Charles Lennahan**

EDITOR IN CHIEF GEORGE JONES RESPONDS: I think I hit a nerve with last month's

editorial. I got more responses about AT&T than I have to any previous editorial, and almost all of them were negative. Interestingly, it's clear that AT&T, like a lot of companies, has a customer service problem. Based on the email, it appears that at the time of the Atrix launch, many representatives were not even aware of the logistics and ramifications involved in switching to a 4G plan. One thing is clear: AT&T has a few lags that need to be addressed. Another example of this is the fact that four weeks after Blackberry Playbook's release, AT&T still hadn't enabled the Blackberry Bridge functionality that allows RIM's tablet to connect with AT&T Blackberry smartphones. This can only last for so long before customers start leaving in droves.

Why No AVG?

I'm currently forward deployed in Afghanistan and every time the exchange gets a new issue of *Maximum PC*, I look like a kid in a candy

store snatching it off the shelf and glaring at all the other people like they want to take it from me. When I got back to my tent and opened up the May issue to the antivirus roundup, I was heartbroken that AVG didn't even get an honorable mention. I'm not trying to say that the other virus-protection software suites you mentioned are bad, but I know that most technically inclined people I talk to swear by AVG. Not to mention, the free version is just straight hardcore for being free.

–**CPL Kirk Bater, USMC, Helmand Province, Afghanistan**

DEPUTY EDITOR KATHERINE STEVENSON RESPONDS: We're sorry your favorite app wasn't represented. We had to make hard choices in selecting the AV products to include in our roundup. But as we noted in the intro to the article, we plan to individually review all the major players that we missed, AVG included, throughout the year in future issues of the magazine. ⏻

[NOW ONLINE]
GORDON MEETS THE iPAD

A tense situation developed in the Lab this week when Gordon, filming a preview of the new features in Photoshop CS 5.5, had to lay hands on his arch nemesis—the iPad. The result? A look of the very purest disgust, immortalized on film. It was so good we had to share it, and open up the floor for an impromptu caption contest. Check out the photo, and all of the entries at bit.ly/lOjQC7.

HARDWARE

CAPACITY HARD DRIVE

Hitachi DeskStar 7K3000 3TB

The age of the 3TB hard drive is finally here. With 7,200rpm 3TB hard drives popping up all over the place, both capacity and performance can be yours. Hitachi's 3TB 7K3000 packs 64MB of cache and rocks read and write speeds close to 120MB/s, all for around $250. You'll need UEFI, GPT partitions, and a 64-bit OS to boot from it, but even if you don't have those things, it makes for a speedy and capacious storage drive. www.hitachigst.com

THE REST OF THE BEST

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

Midrange Processor
Intel 3.4GHz Core i7-2600K
www.intel.com

Budget Processor
Intel 3.3GHz Core i5-2500K
www.intel.com

LGA1155 Motherboard
Asus P8P67 Deluxe
www.asus.com

LGA1366 Motherboard
Asus Rampage III Extreme
www.asus.com

AM3 Motherboard
MSI 890FXA-GD70
www.msi.com

Price-No-Object GPU
Asus GeForce GTX 590
www.asus.com

Performance GPU
Asus ENGTX570
www.asus.com

Midrange GPU
MSI NGTX560 Ti Twin Frozr OC
www.msi.com

Budget GPU
XFX Radeon HD 6850
www.xfxforce.com

Performance Hard Drive
OCZ Vertex 3 100GB
www.oczc.com

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

High-End Cooler
Prolimatech Armageddon
www.prolimatech.com

Blu-ray Drive
Plextor B940SA
www.plextor.com

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

Mid-Tower Case
NZXT Phantom
www.nzxt.com

Speakers
Corsair SP2500
www.corsair.com

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

GAMES WE ARE PLAYING

Portal 2
www.thinkwithportals.com

Dead Space 2
www.deadspace.ea.com

Shogun 2: Total War
www.totalwar.com

Super Meat Boy
www.supermeatboy.com