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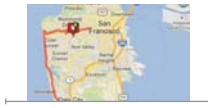

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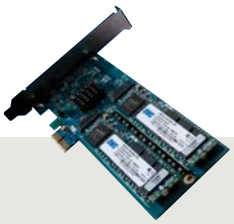

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Gordon
Mah Ung

THE OS WE DESERVE, NOT THE OS WE NEED

I'VE LIVED through Windows Millennium Edition and Windows Vista—two of the most despised Microsoft operating systems in history.

ME was infamous for its instability, crashing, and suckage, while Vista stunk up the joint like a pot of old broccoli water left on the stove overnight. As much as people didn't like ME and Vista, the bile over Windows 8 has reached a pitch unlike any I recall from those earlier lemons.

People don't just dislike Windows 8, they truly seem to despise it, and it's not even out. We did an informal, unscientific poll asking Maximum PC Facebookians if they planned to upgrade to Windows 8. The result was an overwhelming NO!

People are so amped up to bash on Microsoft that even the company's new logo to sync with the new Windows 8 "Metro" look was batted around like a whiffle ball by just about everyone. While it's always fashionable in tech to bash Microsoft, the vitriol was way over the top with some suggesting that the earlier logos had attitude and swagger and suggested something akin to "world domination," while the new one is nothing but a bland, boring fail. Really? A logo? Aren't we reading a little too much into a typeface?

The truth is, Windows 8 is not that bad. It's not Vista 2.0 by a long shot and it's certainly not Windows Millennium Edition. The performance is good, it's stable, and there are some legitimately nice flourishes to the OS such as the nifty file-copy interface. As I said last month, even Metro (I refuse to call it "Windows 8 style") can be a joy to use—if you have a touchscreen and run multi-monitors.

Would I upgrade to it? On one machine, which I plan to run with a touchscreen, yes. On all? Probably not. I simply don't see enough merit at this point to upgrade all of my laptops and PCs to Windows 8, what with Windows 7 being such a solidly good OS. Would I put it on my wife's machine? Perhaps. The ability to restore Windows 8 to day-one performance without doing a complete reinstall could be pretty handy and those fast boot times are attractive, too.

My point in all this is that I would advise you not to jump on the Windows 8-bashing bandwagon. Dislike the operating system for things that truly don't work for you, such as the jarring transition between Metro and desktop—hell, I even miss the transparencies of Windows 7—but don't start bashing just because you want bash it.

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

↘ submit your questions to: comments@maximumpc.com

THE NEWS

Game Developers Up in Arms over Windows 8

Microsoft finds itself under fire from software developers who fear Windows 8's walled-garden approach to content

BY THE TIME you read this, Windows 8 may have already shipped to the general public, and if not, it will soon (October 26, 2012 is the big day). Either way, Microsoft's next-generation operating system represents the biggest change to the Windows platform in more than two decades, so it shouldn't come as a shock to the system that the OS sparked controversy months before its release. At the heart of this controversy is Windows 8's tile-based style and Windows Store integration.

Gabe Newell, co-founder of Valve and a former Microsoft employee of 13 years, struck an apparent chord with game developers when he called Windows 8 "a catastrophe for everyone in the PC space." Newell's fear is based on the perception that Microsoft appears to be taking a so-called "walled garden" approach to Windows 8, whereby it will eventually shift to a closed ecosystem where games and apps would have to be approved and distributed by Microsoft. If and when that happens, Newell predicts a mass exodus from the Windows universe.

"I think that we're going to lose some of the top-tier PC OEMs," Newell stated in an interview with Ed Fries, former VP of publishing at Microsoft Game Studios. "They'll exit the market. I think margins are going to be destroyed for a bunch of people."

End users have been critical of Windows 8's funky new interface, but for some game developers, the real concern is the temptation for Microsoft to close down the platform.

Newell followed up his comments in an episode of Spike TV's *GTTV* show by saying the Windows 8 interface will prove so frustrating, users "will basically rage quit computing after they use it." Whether concerned about the UI or ecosystem, he isn't the only game developer wary of Windows 8. Rob Pardo, executive VP of Game Design at Blizzard, backed Newell's negative assessment in a Twitter post, adding that the potential situation is "not awesome" for his company, either, while Stardock CEO Brad Wardell told website GamesIndustry International that Microsoft is employing a "wrongheaded strategy" with Windows 8. Those aren't exactly glowing endorsements from a segment (PC gaming) that's walked hand-in-hand with computers since the beginning of time.

Not all developers share Newell's concern, even if most are now afraid to weigh in. We reached out to a number of key players in the gaming community—the majority of which were unwilling to go on record—and Scott Miller, founder of Apogee Software (3D Realms), told us he doesn't see the big deal if Microsoft takes an Apple-like approach to Windows 8.

"I can't see Microsoft being so stupid as to prevent Steam-like software on their system," Miller told *Maximum PC*. "Seriously, that would truly be crazy stupid if Microsoft blocked Steam, or tried to charge Valve for having Steam on Windows 8 PCs. And the customer outrage would be overwhelming against Microsoft. So I really see this as a lot of worry over nothing."

That's not to say Newell is fearmongering. Brian Blau, research director of Consumer Technology and Markets for Gartner, agrees that Newell "has a right to be upset, as his business is fundamentally on the PC and anything that will restrict Valve's ability on that platform can't be good for Valve or gamers." At the same time, Blau tells us Newell's argument "is a bit hollow," noting there are plenty of opportunities even in a walled-garden ecosystem. "Apple controls the App Store and does have rules in place... but with more than 175,000 developers and 650,000 apps, it's hard to see how innovation is being stifled on iOS."

Microsoft refused to broach the subject with us, choosing instead to let Windows 8 speak for itself. Let's hope we like what it tells us. **–Paul Lilly**

A Keyboard for Clean Freaks

It has long been known that your keyboard has more germs than a toilet—by a factor of 60. So what do you do about it? If you had Logitech's new K310, you'd just dunk your plank in a sink full of suds and wash away all potential contaminants.

The new K310, the latest in Logitech's washable series, will withstand submersion in up to 11 inches of water. If you have really stubborn, caked-on hot chocolate stains, you can leave it in the water for up to 24 hours without harming the K310's functionality.

The K310 is so ready for cleaning duty that Logitech even attached a small brush so you can whisk away Doritos and Sabor de Soledad crumbs.

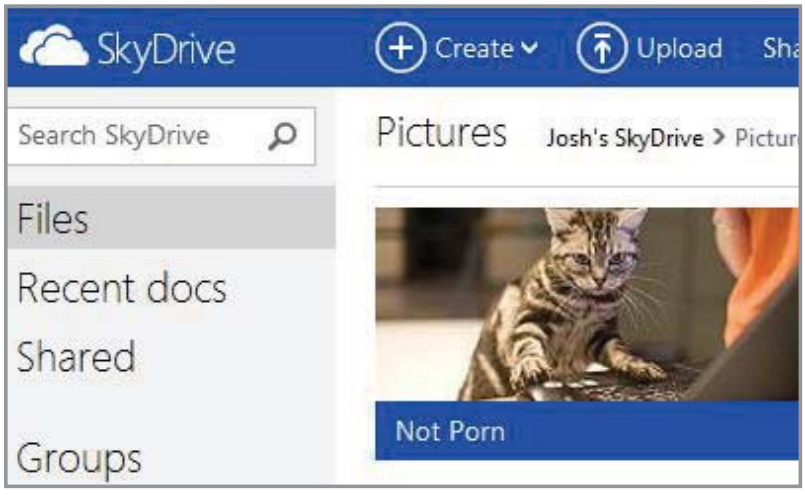
What about the old trick of putting a keyboard in the dishwasher? Interestingly, Logitech doesn't recommend running the K310 through the wash cycle. It's likely the heat that's at issue—the K310 is only rated for water at up to 77 degrees Fahrenheit. **–GU**

Android, iOS Conquer Smartphone Market

If you have a smartphone running an operating system other than Android or IOS, you are in an ever-shrinking minority. According to intelligence firm IDC, Google and Apple now control over 85 percent of the smartphone OS market, with Android taking the greatest share of that pie with over 68 percent, thanks largely to Apple's favorite courtroom punching bag, Samsung. The Korean company is responsible for a staggering 44 percent of all Android phones sold, which is more than its next seven competitors combined. Windows mobile phones account for a paltry 3.5 percent market share as of Q2 2012. **–JN**

Microsoft Bans Nudes from SkyDrive

In an attempt to keep its SkyDrive cloud storage service as lily white as the vaporous puffs it's named after, Microsoft is trying to keep users from uploading nude content by outlawing the practice in its Terms of Service. Not only are nude pictures a no-no, but drawings and partially-nude photos are also frowned upon, making SkyDrive the strictest cloud service in existence. We're no experts, but if you do need to upload porn, try one of its competitors: Box, Dropbox, and SugarSync let you upload anything you want, as long as you're not breaking the law. **–JN**



Tom Halfhill
Fast Forward

AMD'S JAGUAR LEAPS BOBCAT

CAUGHT FLAT-FOOTED in the race for lower-power processors, AMD is running hard to catch up. Although desktop and server processors remain important, the world is clearly moving toward lightweight notebooks, tablets, and smartphones. The Bobcat core was AMD's first step, and the new Jaguar core is a big improvement.

Jaguar enables quad-core chip designs, whereas Bobcat was limited to dual cores. Doubling the number of CPU cores may seem contrary to the goal of reducing power consumption, but AMD faces the same dilemma as all chip vendors—users want more performance in addition to longer battery life. The top smartphone processors already have four cores.

All Jaguar cores will now share a unified L2 cache of 2MB. In contrast, each Bobcat core had its own L2 cache (512KB). When a Jaguar core slumbers to save power, the remaining cores have more cache to share, partly compensating for the lost performance.

New instruction-set extensions catch up with Intel's: SSE 4.1 and 4.2, first-generation Advanced Vector eXtensions (AVX1), AES crypto instructions, and other goodies. Intel will introduce AVX2 next year, so more changes are coming, but AMD isn't far behind. Jaguar also improves virtualization and expands memory addressing from Bobcat's 36 bits (64GB) to 40 bits (1TB), suggesting a play for low-power servers.

To boost performance, the FPU width doubles to 128 bits and the ALU pipeline adds one stage (for 17 total). Fabrication moves to 28nm technology, a leap ahead of Bobcat's 40nm. Consequently, Jaguar is 36 percent smaller than Bobcat, despite its additions. Also, Jaguar is even more synthesizable, giving AMD more freedom to shift production to different fabs and fabrication processes.

Intel's Atom still consumes less power and offers multithreading. Plus, a new Atom core is coming next year. Nevertheless, Jaguar keeps AMD in the race for lower power.

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

Thomas McDonald
Game Theory

THE 230 PERCENT DEAD CAT BOUNCE

DID YOU hear the one about PC gaming being back and stronger than ever? It's true! PC games saw a 230 percent sales jump, whereas console sales are down an average of 25 percent each month over last year's numbers! Woo-hoo, baby, we're back in business!

Game writers across the country have oiled up their creaky old "The death of PC gaming has been greatly exaggerated" phrase and are taking it for the umpteenth spin through the weedy fields of their clichéd prose. Ah, it feels good to be loved again, if only it wasn't a steaming pile of BS.

I really, really try to avoid the dead/alive stories, since they always (*always*) miss the point: PC gaming has *changed*. It will never again command the dominance it did in the 1990s, since its most popular innovations have been effectively co-opted by consoles, even if consoles still don't do it quite right.

There are two reasons PC gaming boomed in the 1990s: Technology made it a better platform and that lead to innovation, and we all were riding high on the Bush-1/Clinton-era economy. In short, consoles were still kids' stuff, and we all had more money. Now consoles play a lot like PCs, and we're all broke. Can you still afford to maintain and upgrade a $2,000 system each year?

As most writers are noting, Diablo III accounts for much of that 230 percent sales jump. In economics, it's called a "dead-cat bounce." Anything that falls from a great height will bounce when it lands, even a dead cat. That bounce doesn't tell us how well PC gaming is recovering: It tells us how far it had fallen. Diablo III numbers couldn't warp the sales chart that much unless the sales chart had flatlined.

But that misses the point entirely. PC gaming has shrunk back to where it can be really interesting again: It's returned to the indies, the occasional mainstream title, the casual games, and even the freemium market. All of this is where we are our strongest. There's a reason titles like Dear Esther and Amnesia aren't on consoles, so we should just stop banging the "PC gaming is dead/alive" drum and just focus on what we do best: making interesting games.

You can follow Thomas McDonald on Twitter: @StateOfPlayBlog.

SSD Prices Set to Climb

You probably remember how hard drive prices skyrocketed earlier this year in response to flooding in Thailand. Well, get ready for another price increase due to flooding—of NAND flash, that is. Apparently sales have been quite weak for USB devices, smartphones, and other flash-based hardware, so flash manufacturers such as Samsung, Hynix, and Toshiba will begin curtailing flash production in order to help drive up prices a bit. Toshiba has already slowed production at some of its plants—could be they're putting issues of *Maximum PC* in all employee break rooms. Samsung and Hynix are expected to follow suit shortly, though we have not received their subscription orders as of press time. **–JN**

Kindle Fire Goes Big, Apple Downsizes

Now that Amazon's 7-inch Kindle Fire and Apple's 10-inch iPad are taking over their respective markets, each company is hungrily eyeing each other's dominance and planning to put an end to it. FCC filings suggest Amazon is prepping a 10-inch Kindle Fire to take on the iPad, and rumor-mill whisperings foretell a 7-inch iPad Mini in the near future. We can't wait to check them out, if they exist, but more importantly we'd love to see a Google Nexus 10, as that would probably be the ultimate PC lover's tablet. Make it so, Google! **–JN**

Windows 8 Watch

Surface Complaints Surface

When Microsoft revealed its all-new Surface tablet earlier this year, the most surprising revelation wasn't just the tablet itself, but the fact that Microsoft is planning on manufacturing the 10-inch unit without partnering with an outside company. Traditionally, Microsoft would turn to its hardware partners, including Acer, Asus, Lenovo, and others to handle the manufacturing duties once it had drawn up the spec, but this time around Microsoft is taking the reins, and in doing so it's going head-to-head with partners who will be making their own tablets to compete with Surface. Awkward!

Not surprisingly, manufactures aren't happy about being shut out of the Surface business, especially after they've driven Microsoft's software business for all these years. Acer president Campbell Kan was so pissed off that he asked aloud, "If Microsoft is going to do hardware business, what should we do? Should we still rely on Microsoft, or should we find other alternatives?" Presidents don't typically say things like that out loud, and in the wake of their printing, Acer chairman J.T. Wang went on the record to reassure the media that Acer had no plans to quit developing Windows-based PCs.

Long-time partner Lenovo plans to release its own Windows 8 tablets, and has expressed frustration with Microsoft's foray into the hardware side of things. CEO Yang Yuanqing told reporters he's confident Lenovo will build better hardware than Microsoft, but in the next breath Yang noted that ideally he'd like to see Microsoft stick to what it does best—software. **–JN**

Quinn Norton
Byte Rights

PARTY LIKE IT'S 1984

LEGISLATIVELY, privacy around the world has been hit pretty hard.

Recently, Australian legislators passed a law allowing law enforcement to compel ISPs to retain user data without a warrant. They're proposing data retention laws that would impact all citizens—similar to proposed laws in the UK, US, and other countries that got interested in the mass surveillance of mass data retention. All of this in the name of catching terrorists, pedophiles, and anyone infringing copyright. But in practical terms, this kind of data gets abused everywhere it gets collected.

One Aussie online activist who goes by Asher Wolf isn't taking out her frustration via online petition. Instead, she's throwing a party. Specifically, a cryptoparty. She's planning on music, beer, and lessons on how to use strong encryption tools to claim back privacy from prying eyes. "Basically I like parties, I like hackers, and I like my privacy," she explained, going on to list party activities like TOR, PGP, GPG, TrueCrypt, OTR, and VPNs—software that allows private communication, untraceable browsing, and encrypted storage. Often these tools are too hard for people to learn on their own, but at a cryptoparty, they have a chance to work on them together, and with local geeks, in person. "Hackers have something to share—and sometimes n00bs like me just need a chance to learn," said Asher Wolf. She took her idea to social media and suggested to others that they might want to celebrate the abrogation of rights by having their own cryptoparties. "The beauty of #CryptoParty is you need nothing more than a room, a bunch of friends, a slab of beer, and your laptops," she tweeted. The response was immediate and overwhelming. From Denver to Berlin to Oakland to Adelaide, people want to cryptoparty.

Laws are national, but it turns out that crypto and a desire for privacy bring the whole world together.

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

Most PC Gamers Are Pirates, Ubisoft Claims

Despite a banner couple of years for PC gaming, Ubisoft claims that 95 percent of PC games are pirated.

Only 5 to 7 percent of gamers bother to buy a game, with the rest pirating it, claimed Ubisoft CEO Yves Guillemot during an interview with website GamesIndustry International. Guillemot said the PC piracy is so rampant the company can make as much off free-to-play models as it does on retail boxed copies of games.

Guillemot didn't say where he got his numbers from and company officials weren't available to provide more details, but the statement seems to run counter to industry figures showing that PC gaming has been on the rise. NPD analyst Anita Frazer recently reported that PC games sales were up 230 percent, thanks to Diablo III's release, while console sales were down 28 percent. DFC Intelligence also believes PC gaming will lead in global sales with 39 percent of market share through 2017. **–GU**

Google Puts Flash in a Sandbox

We know that updating your web browser is right up there on the list of priorities next to brushing your cat's teeth, but the Chrome team recently released an update that is the culmination of over two years of effort to make Adobe Flash faster and more secure. In the new version of Chrome, which is version 21, for those keeping count, Google has finally ditched the Netscape-era NPAPI plugin for Flash in favor of its very own PPAPI, which allows Flash to run inside a sandbox environment in order to increase security and prevent malicious attacks. According to Google, the sandbox that Flash runs inside is as secure as Chrome's native sandbox, and since all that legacy code has now been removed, the Flash plugin runs faster and crashes less. **–JN**

ECS Uncloaks Stealth Mobo Concept

Motherboard manufacturer ECS has unveiled a dark and pointy mainboard concept based on the ultra-trick Lockheed F-117 Stealth Fighter. Named the X79R-AX Stealth, the concept mobo looks like a standard X79 Intel motherboard cloaked in angular shrouds that cover the majority of the PCB. ECS says the shrouds cover a network of heat pipes and heatsinks that collect heat, which is then transferred away from the board via exhaust vents and fans. The design has also left room for additional small fans underneath the shrouds, should more hot air need to be exhausted. Though it's just a concept, we'll be the first ones to review it should it ever break cover! **–JN**

THE LIST

SIX WAYS TO BENCHMARK YOUR BODY

6 NIKE+

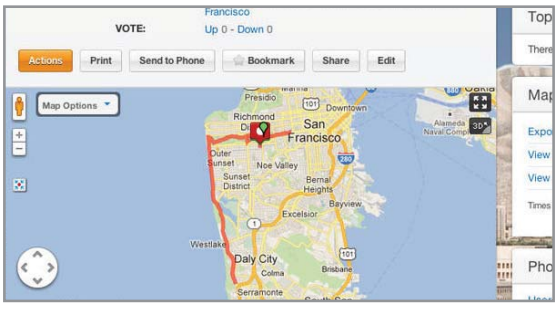
Nike+ can track your speed, heart rate, and location data, but it won't tell you when you've worked off that Big Mac. nikeplus.nike.com/plus

5 STRAVA

Strava lets you view segments of your rides so you can easily see if you've become the king or queen of the mountain. www.strava.com

4 MAPMYRIDE/MAPMYRUN

MMR/MMR lets you plot your routes ahead of time so you can see how challenging it is ahead of time. www.mapmyrun.com

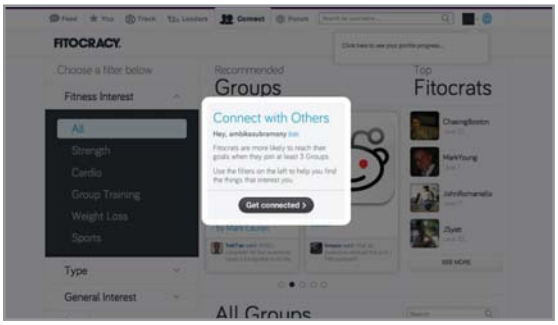


3 DAILY MILE

DailyMile is like Twitter for your workouts, so you can write "everyone said I was the best!" after your workout. www.dailymile.com

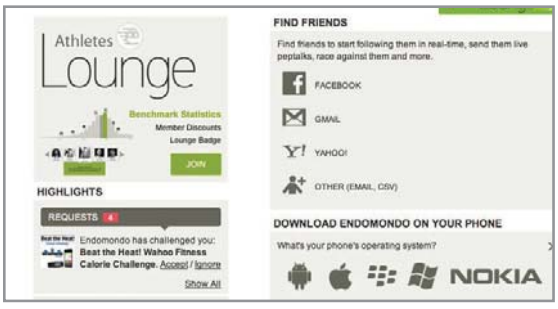
2 FITOCRACY

Fitocracy lets you join challenges, accumulate points, and "level up" through workouts. Let's hope the level boss isn't too badass. www.fitocracy.com



1 ENDOMONDO

Endomondo's main strength is support for failed and failing smartphone OSes—so Windows Mobile, Symbian, and BlackBerry users, rejoice! www.endomondo.com



HEAD TO

BY JOSH NOREM

Google Nexus 7 vs. Apple iPad

We all know the Apple iPad sits atop the 10-inch tablet market like an MMA fighter straddling the octagon fence after a first-round TKO. That fight is over, for now, but the battle for 7-inch supremacy is still going strong and our new favorite contender is the Google Nexus 7, made by Asus. Since we now have two favorite tablets, and room for only one in our man purse, we must settle this the old-fashioned way—with a tab blood-letting.

Round 1: Size and Form Factor

When it comes to web surfing and light e-booking, we think a smartphone is too small, an iPad can be a smidge too big, and the 7-inch Nexus is *just right*. We can easily see all our favorite websites and e-books, and can even game on it despite its smaller size. Best of all, we can hold it in one hand, which is mostly impossible with the iPad. Admittedly the iPad's size is pretty sweet for web surfing and games, but the Nexus 7 fits in a coat pocket or a back pocket, whereas the iPad simply doesn't. We also like the dimpled, rubberized backing of the Nexus 7 compared to the smooth metal of the iPad. It lets us toss the Nexus 7 around without worrying about scratching its delicate backside.

Winner: Nexus 7

Round 2: Display

We all know the Retina display used on the iPad 3 is the category's standard bearer at a righteous 264 pixels per inch, for a resolution of 2048x1536. It looks amazing and is like taking your eyeballs to a day spa every time you use it. The Nexus 7, however, is nipping at its heels with a sweet 1280x800 display that rocks 216 pixels per inch; not quite as high-res as the iPad, but it looks better than any other 7-inch tablet we've perused. It suffers from semi-low contrast, which is especially noticeable on the home screen, but it is still surprisingly sharp and crisp. Though we'll happily give this category to the iPad, the Nexus 7 still looks very, very good, especially considering its $250 price tag.

Winner: iPad

Round 3: Performance

Though it might seem unfair to compare a $500 iPad to a $250 Nexus 7, the truth is that both tablets seem pretty damned fast to our eyes and our fingers, and when you look at the specs it's clear why. The iPad comes equipped with a 1GHz dual-core A5 processor while the Nexus sports a 1.3GHz quad-core processor, and both have 1GB of RAM as well, so neither tablet is a slouch in the get-up-and-go department. Overall the Nexus 7 feels faster to our fingers—there's no hesitancy whatsoever when launching apps, switching between windows, or navigating within the Jelly Bean OS. The iPad never really seemed sluggish—until we used the Nexus 7, that is. The difference isn't night and day, but it's noticeable enough to tip the cards in Google's favor.

Winner: Nexus 7

Round 4: User Interface

If anyone knows how to create an intuitive interface, it's Apple. Even its nemesis, Samsung, has described the iPhone/iPad interface as "heaven," and though we wouldn't go *that* far, it is very difficult to get confused in the iPad environment. The Nexus 7, on the other hand, runs the Android Jelly Bean 4.1 OS, and though it's not quite as easy to pick up and figure out as the iPad, we prefer the flexibility of the Android OS over the locked-down nature of OS X for iPad. Unlike the iPad, you can change almost everything in the Android UI and the security features are also beyond what Apple offers. Yes, Android is more complex, but the trade-off is a PC-like environment where we can tweak and change almost anything we want, which is how we like it.

Winner: Nexus 7

HEAD

Apple's iPad rules the tablet market with a black-turtleneck-clad fist. Can a 7-inch tablet that costs half as much challenge the iPad's supremacy?

Google's Nexus 7 costs just $250 for the 16GB version and is our new favorite 7-inch tablet.

Round 5: Content Ecosystem

This category pits Apple's all-dominating iTunes universe against the relatively nascent Google Play—a service Google has cobbled together from all its various media offerings. Don't get us wrong—Google Play is perfectly functional and offers a wide variety of magazines, music, movies, books, and apps, but it's nowhere near as bountiful as iTunes, due to Apple's multiyear head start on everyone. And though there are several hundred thousand Android apps available today, not all of them are compatible with the Nexus 7 and Jelly Bean, so it's safe to say there is more content available for the iPad at this time. Sadly, you need iTunes to get that content, and we're not fans. We prefer the Nexus 7's "drag file into folder" approach to media management, but we can't deny iTunes' dominance.

Winner: iPad

And the Winner Is...

We went into this shootout thinking there was no way a $250 tablet could compete against a competitor twice its size, and we were wrong. The iPad delivers a very smooth tablet experience with its intuitive interface, gorgeous screen, and plethora of apps and content right at your fingertips. It's genuinely awesome, but here's the rub: The **Nexus 7** delivers an arguably more enjoyable experience for half the price of the iPad. More importantly, the Nexus 7 doesn't hobble the ways in which you can interact with the tablet itself, as opposed to Apple's locked-down approach. It's obvious that the iPad offers more of everything—storage, wireless cellular, accessories, and content, but compared to the dainty Nexus 7 it's a bit *too* much for our tastes, especially since it costs twice as much.

DOCTOR

THIS MONTH THE DOCTOR TACKLES...

> GPU vs. APU
> VM and Real PC Sharing
> Noisy Connectors

Where's My Upgrade Path?

My PC is running two Radeon HD 5850s in CrossFireX with an AMD Phenom II X4 955 Black Edition CPU (overclocked to 3.4GHz) and 16GB of RAM. All of this is running on an Asus Crosshair III motherboard. I would like to upgrade, but being a budget gamer, I can really only afford to upgrade my CPU/mobo/RAM or GPU. Can you suggest what would be the best-bang-for-the-buck upgrade for my system?

—Kevin Conrow

THE DOCTOR RESPONDS: You're clearly good on RAM, and we'd stick with the 955 and mobo until you're ready for a full platform upgrade. And, actually, your HD 5850s, if overclocked, still give a GTX 670 a run for its money at 1080p, at least in older games, though the limited VRAM could hold them back.

If you don't already have an SSD, that should be your first upgrade. Even though your motherboard doesn't support 6Gb/s SATA, you should get a 6Gb/s SATA SSD so you can move it over to your next build when you upgrade. Right now we think a 240-256GB SSD (depending on controller) is the way to go, and you should be able to find one for under $220.

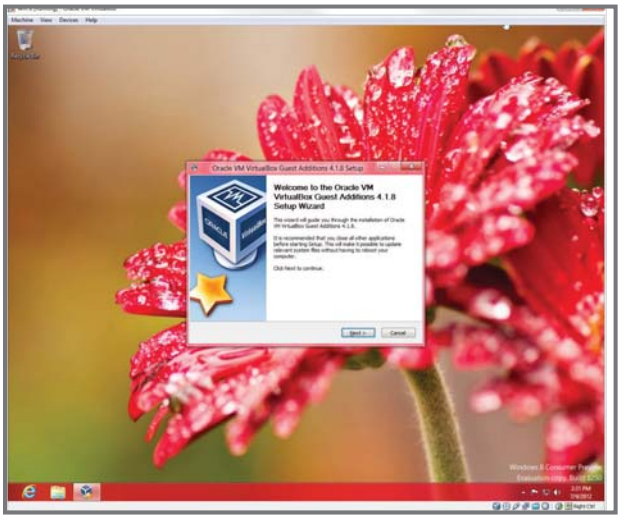
If you already have an SSD, we'd recommend a platform upgrade, probably to Ivy Bridge. The performance increase you'd get by going to the fastest current AMD chip can't touch even an Intel Core i5-3570K. You can get that CPU and a decent Z77 mobo with CrossFireX support for about $400 total.

Sharing Between Real and Virtual Machines

I set up Windows 8 in a virtual machine so I can run it while Windows 7 runs on my other monitor. Is there any way for the Windows 8 virtual machine to access files utilized by my Windows 7 installation? It would save me from having to download files and would allow access to documents, photos, etc.

—David Winokur

THE DOCTOR RESPONDS: You didn't say what VM software you're using, but you will need to install additional software to get access to your desktop. Assuming that you're using VirtualBox, as recommended in our June 2012 feature on Windows 8, go to the Devices menu in the VM while Windows 8 is running and select Install Guest Additions. Once that has installed and you have rebooted the virtual machine, go back to Devices and select Shared Folders. From there, choose where you want the shared folder to appear on your Win7 host OS—say, the desktop—and create the folder. If you want it to persist, select the options for auto-mount and Make Permanent. Any file you copy into the folder on your host OS should appear in the folder on your guest OS by clicking the Windows Explorer icon on the desktop.



VirtualBox's Guest Additions function lets you share folders between the host OS and virtual machine.

Noisy Onboard Audio

I recently built a new system with an Asus P8Z68-V/GEN3 motherboard. Rather than buying a discrete audio card, I decided to just use the onboard audio on the motherboard. On occasion, I notice that the volume fluctuates for no discernible reason. It's not a big difference, but it's definitely noticeable. On rarer occasions, when I'm not using the speakers (but they're still on), I'll hear random static or feedback. I can stop it by going into the Control Panel and running a test on the speakers, but I still don't know what's causing it, and it's nagging at me. These two problems don't happen

↘ submit your questions to: doctor@maximumpc.com

often, and I haven't been able to isolate the conditions when it does happen. It has occurred when I've been surfing the Internet, reading my email, or even just typing up a document in MS Word. I'm using pretty old speakers—Logitech Z560 4.1—but I'm pretty sure they're not the problem. I swapped out speakers with an older pair of 2.1s, and the problem eventually re-occurred. I have downloaded the latest audio drivers from Asus's website and rechecked all the connections. Everything seems in order, except for these two issues. At this point, I'm ready to wave the white flag and just purchase a soundcard. Can you help?

—Joseph Calacat

THE DOCTOR RESPONDS: If you haven't plugged your speakers directly into the motherboard, please do so. Front-panel audio connectors in the vast majority of cases are notorious for being poorly insulated against noise. If you are connected directly to the board, the noise you're hearing is usually the result of poorly laid-out trace routes for the sound subsystem. Most modern motherboards do a better job of running the trace routes than older boards, but could still get audible interference—especially when you have the volume on the speakers turned up, but the volume output from the onboard audio turned down. Try raising the PC output volume and lowering the speaker volume. Also, if you have the speaker cables wrapped around another cable, try separating them to make sure they're not picking up interference from outside the machine. You should also consider that you may have a grounding issue on your motherboard, such as it being improperly grounded. Same for the system or a component, such as the PSU, which could be throwing off interference that your speakers are picking up.

If that doesn't eliminate the issue, consider switching to a discrete internal soundcard or USB audio dongle. Finally, you should also consider technical support. It's quite possible your board is defective, causing the random feedback and static.

CPU or APU?

The motherboard on my PC has died. I have a few options: I can get a new motherboard and AMD FX-4100 Zambezi CPU and reuse my Nvidia GeForce 7800 GTX, or I can get a new motherboard with an AMD A8-3850 Llano APU, which has Radeon HD 6550D integrated graphics. Both courses will receive new RAM, an SSD, and Windows 7 Pro. All else being equal, will the second option yield better gaming/graphics performance than the first? Since my current card is so old, my guess is that the AMD APU might yield better performance. What do you think?

—Mike Peters

THE DOCTOR RESPONDS: Mike, the Radeon HD 6550D in an A8-3850 APU will indeed offer better graphics performance than a GeForce 7800 GTX, but the FX-4100 is a marginally better CPU and likely offers a better upgrade path with its AM3+ socket. If you really have zero budget for a GPU now or in the future and your priority is gaming, go for the A8-3850. That said, we'd opt for a more powerful CPU (like the FX-4100 or even an overclocked Phenom II) if you think you can squeeze out another $150 or so for a decent last-gen GPU like a 6870 to go with it. We always recommend discrete GPUs where possible, especially in desktops where there's room.

WINDOWS 8:

MICROSOFT STRAPS A TABLET OPERATING SYSTEM TO WINDOWS 7 AND TICKS ITS NUMBER UP A NOTCH. SHOULD ENTHUSIASTS MAKE THE BIG UPGRADE?

BY DAVID MURPHY

Microsoft's Windows 8 is not a want, it's a necessity. Not for you, the consumer. For Microsoft.

We'd like to think that somewhere, somehow, a group of user interface experts like to meet up for lunch in one of Microsoft's (likely) sprawling Redmond cafeterias. They talk about their days, their families, and how horrified they are at Microsoft's decision—and need—to unify a single user experience across its entire product line.

That's the real reason why Windows 8 looks and feels like a tablet operating system slapped overtop Windows 7 (with a few tweaks here and there). It is. Users are given no way around it—Microsoft has made sure of that fact. And, in many ways, there's no way around it for Microsoft, either. The company has decided that users cannot have dissimilar Windows experiences across desktops, tablets, smartphones, or any other kooky gadgets on the horizon, but refuses (or can't) cut the cord of the traditional desktop experience just yet.

Windows 8 is the natural, necessary hybrid—the last time you're likely to see the "core" Windows experience of the last decade mashed together with the multicolored, touch-sensitive, "Metro" boxes of the future. A word on that: While Microsoft has elected to not call the tablet-ized portion of Windows 8's user interface Metro—it's now just called "Windows 8," we think—we'll keep using the old nomenclature just to make this review easier to process.

However, we're willing to bet you'll have many other colorful names for your experience with the new OS.

THE NEW ORDER

THE INSTALLATION

We never thought we'd type the words, "Microsoft has made it easy to install Windows," but there you have it. Your first introduction into Microsoft's latest iteration of Windows comes from the previously laborious process of blanking your hard drive and playing the company's equivalent of 20 questions to install an OS.

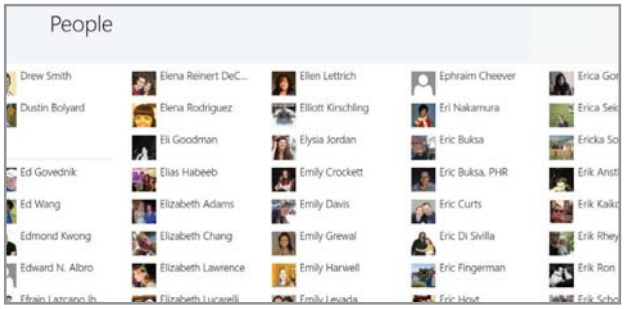
Assuming you have a product key—now a requirement to install Windows 8, instead of an after-the-fact input—the installation process looks identical to Windows 7's at first. Once you've set the installer to copy files to your hard drive, Windows 8 is off to the races. A simple, black installation screen gives you pithy updates about what's happening between your installation media and your hard drive. After that, only five prompts require your attention, including one for picking your PC name and your favorite color and three that relate to verifying the settings for the Windows Live ID you'll want to link to your installation.

When Windows 8 says, "Your PC will be ready in just a moment," it's not kidding. This is the speediest, most annoyance-free OS installation we've ever experienced.

AND THEN...

Up pops Metro, the tiled-box screen that's easily Windows 8's most controversial feature. To discuss the strengths, weaknesses, and intricacies of Metro alone could eat up an entire multipage review. So we'll lead with the biggie: At its core, Metro feels... undone. To put it another way, Microsoft's treatment of its tiles, Metro's interactions with the "normal" half of Windows 8, and the lack of customization present in this Hyde to Windows 7's Jekyll does a disservice to those who want anything beyond an operating system set in "easy mode."

Welcome to Metro! Right-click tiles to select them, and then drag them around your Metro desktop to create new columns—it's a "dumping grounds," of sorts, for groups of programs.



Metro's People app is a virtual gathering place for just about every contact you'll likely ever have—pulled in from your Google, Twitter, Facebook, LinkedIn, and Microsoft accounts, for now.

You, faithful *Maximum PC* readers and computing enthusiasts that you are, will hate Metro.

Let's start with the apps. At the time of this review, Microsoft and third-party developers worldwide have yet to jump on the app bandwagon. We can't speak to what's on the horizon for Metro, but we can certainly discuss the apps that come bundled with the operating system by default.

The single-app, full-screen Metro environment takes some getting used to. Truly, your capacity to enjoy Microsoft's tablet treatment depends on the app: The People app is as pointless as it is cluttered. We don't understand why one would need to have all of one's contacts—yes, your random Twitter friends too, if you so desire—in a setting that's hard to navigate (horizontal scroll only!), difficult to configure (one giant "news feed" for everyone, really?), and difficult to edit (merging contacts and setting "favorites" takes too long).

SkyDrive? We dare anyone to say that this Metro app is easier to navigate than a simple, Dropbox-like folder in File Explorer (Windows Explorer, no more). Video? Sure, if you like a player that's more in touch with Microsoft's online store than an app that can legitimately play all the files you toss its way. Messaging? Works great with Microsoft Messenger and Facebook—and that's about it. Trillian is hardly shaking in its boots, here.

EARLY BIRDS GET PREFERRED PRICING

Microsoft has simplified the editions and prices of Windows 8—at least compared to how the company initially segmented its first batches of Windows 7. However, folks considering an upgrade won't want to delay for too long, as Microsoft is also offering early birds a significant discount on Windows 8.

Windows 8, in total, will arrive in four versions: Windows RT, the ARM version of the OS that comes preinstalled on supported devices; Windows 8; Windows 8 Pro; and Windows 8 Enterprise.

If you're already running Windows XP, Vista, or 7, you can upgrade to Windows 8 Pro for $39 until January 31, 2013. That's just for a digital download; retail copies will cost $69 until the deadline, when the Pro price will then bump to $199. There's no word, as of this article's writing, how much Windows 8 (standard version) might cost.

Still, compare that to the pricing scheme for the three major versions of Windows 7 currently on the market: $119 for Home Premium, $199 for Professional, and $219 for Ultimate. To Microsoft's credit, the company did offer similar discount pricing for Windows users shortly after Windows 7's 2009 launch—a final cost of $50, $100, and $219, respectively.

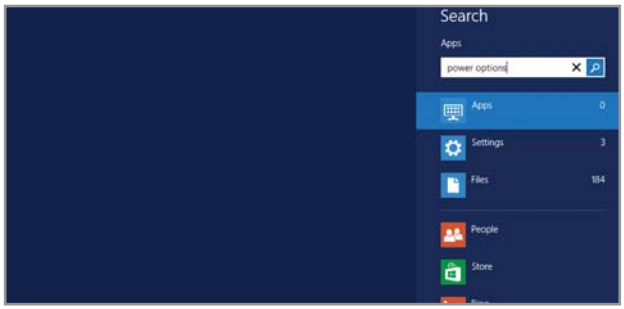
Playing on price is Microsoft's answer to the inexpensive upgrades Apple enthusiasts have enjoyed for years now. It also might just be Windows 8's ticket to increased adoption rates in the face of Metro's heavier criticisms.

Other apps, like Weather and Maps, deliver a compelling experience within Metro. Games—and the downloadable Xbox Smartglass app—finally tie together one's PC and one's Xbox 360 in a better, but not ideal, fashion. News, though still annoyingly stuck to a horizontal plane, looks as wonderful as its companion app Sports.

Mail, however, is downright laughable—especially when free alternatives like Mozilla's now-dead Thunderbird, the web-based Gmail, or Microsoft's own Outlook application blow its lackluster capabilities out of the water.

It's frustrating that Windows 8's built-in Internet Explorer 10, an app that gets the full Metro treatment to delightful results, requires you to set the browser as your default just to play with its Metro version. Apps like Google's Chrome browser—admittedly still in the development channel as of this article's writing—don't cross-pollinate between Windows Metro and Windows Desktop. Each browser is its own unique instance in this case, which couldn't be any more frustrating for laypeople *and* enthusiasts.

The strength of Windows' apps—both third-party and Microsoft-driven—are going to be the make-or-break elements for Metro. At launch, and especially on a single-screen setup, they are more novelty than necessity.



Metro's search tool, accessible just by typing in anything when you're staring at the main tiles screen, is one of its most compelling features. The now-lamer Windows Indexing of Windows 7 just got put to shame.

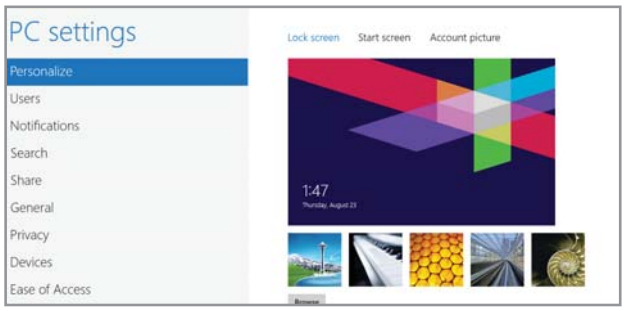
METRO ORGANIZATION

It's possible to think of Metro as simply a start menu—which it basically is, given that Microsoft has killed the traditional Start Menu in Windows 8's desktop mode. Just ignore all the live tiles and downloadable apps and use the blocky UI as a souped-up entry to your desktop. Sort of.

Organizing tiles is as easy as dragging them around to new columns based on whatever internal organization scheme you're going for. That said, it's still annoying that you can't adjust their shape at all, nor edit their size beyond one of two set limits Microsoft has put into place. Microsoft *does* give you the option to assign a name to columns of tiles, but you might miss this feature unless you go hunting (hint: use the lower-right-hand "minus" sign to expand your Metro UI to the full, zoomed-out view, and then right-click a column).

In Metro, a tile is often an app, or a shortcut to an app, that you've pinned to the "Start," though it could also be a folder, library link, or network resource, to name just a few. For whatever reason, you can't create tiles for important "common" files within the Metro interface, like a critical PDF or favorite song you want easy access to.

Windows 8's biggest Metro killjoy occurs when you go to install a new app—like, say, the Combined Community Codec Pack. For Windows 8's Metro interface is, for all intents, its start menu. And when an app like CCC comes with eight or more shortcuts that would otherwise be simple links in said menu, they transform into a whole heckuva lot of tiles within Metro. We can count on one hand the number of times we've needed to delete extraneous or unwanted links on a conventional Windows start menu. Within Metro, you'll be doing this a lot, if you're actually trying to keep your horizontal interface (ugh) clutter-free.



While Metro comes with a number of options to prettify your PC, know that its settings are a wee bit more buried than your average Control Panel—and they aren't even accessible *via* the Control Panel.

To Microsoft's credit, it's wonderful that you can now just type that which you wish to find on your system—from apps, to Windows elements, to files. Metro takes the old and familiar Windows Indexing and kicks it up about five notches. Type in—well, anything—and you'll be able to search for apps that fit your query, Windows settings or prompts, or files. You can even get a little more specific and search *within* apps, like Microsoft's Store, if you already have an idea of what you're looking for and where it might be.

Can you ignore Windows 8's Metro environment and instead pretend that it's just one big, boxy Start Menu? Yes—mostly thanks to Metro's search. However, Microsoft will still do its best to force Metro down your throat by booting to this user interface by default instead of allowing you to jump straight to your desktop. Will you still mostly miss your old Windows 7 Start Menu? We do.

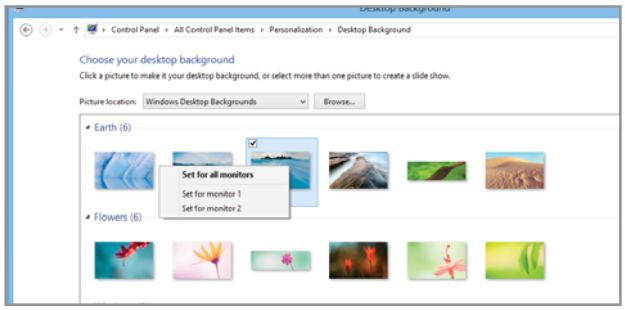
THE MULTI-MONITOR DIFFERENCE

In a single-monitor environment, Metro just doesn't make a lot of sense. As much as Microsoft tries to fit the square peg in the round hole, Metro is, at its core, an interface made for tablets, not a monitor. For a pair of monitors, however, Metro becomes a pretty ideal combination of a standard Windows 7 desktop and a big-ol' screen that you can glance at to view useful information in a blown-up, exaggerated fashion.

In other words, Windows 8 reads a lot better in a multi-monitor setup.

We had the pleasure of being able to try out Windows 8 in such an environment. Better still, our secondary monitor was a handy-dandy ViewSonic touchscreen monitor (for the full Windows 8 Metro experience).

Setting up two monitors is just as easy to do in a Windows 8 environment as it is in Windows 7. For those rocking a touchscreen, however, you'll have to do a bit of jumping around to ensure that your device is perfectly calibrated for your setup. And we don't mean matching your finger-presses to where they register on the panel itself. We had to jump into Windows 8's Tablet PC Settings—of all Control Panel options—to ensure that our finger-presses were correctly mapping to screen number two instead of the primary display. That could not be any more unintuitive on Microsoft's part.



Metro's new multi-monitor support means you'll no longer need to turn to third-party apps to manage the funner parts of a dual-screen setup, like setting different wallpapers (or slide shows of wallpapers) on each screen.

It's great that we no longer have to resort to third-party apps to stretch a single wallpaper image across two desktops—thanks, new Windows 8 personalization settings. Even better, Windows 8 now allows you to set custom backgrounds or slide-show wallpapers for each monitor, and you can even flick off the taskbar—or hide it, if no active apps are open on the display—as you see fit.

Keyboard commands allow you to flick windows back and forth between your monitors—nothing new there for Windows 7 multi-monitor enthusiasts. However, what's lacking is a way to force Metro to pop up on a specific monitor via key press or, even better, set a single monitor as the "default" recipient of any Windows key action on your keyboard.

It gets uglier. Metro doesn't just pop up on whatever monitor your mouse cursor happens to be hovering over—that would be too easy. Metro appears on your primary monitor by default. To launch it on a second monitor instead, you first have to hover your mouse in the lower-left-hand corner of the target display and click. After that, Metro will "bind" to your Windows key for that monitor until you repeat the process on a different display.

That's not so bad, right? It gets *uglier.* The basic Metro interface is not a unique entity; it's attached to your normal operating system in such a way that clicking anywhere outside of the interface—like, say, on your primary display—closes Metro entirely. Huh?

You have to launch a Metro app in order for it to "stick" to your second display. After that, all's well—dragging Metro apps back and forth between monitors is as easy as dragging conventional desktop windows to and fro. Metro's snap feature, or the ability to stash a Metro app to a left or right sidebar while you simultaneously operate another app, stays in place when you switch between screens.

We're not sold on Windows 8's touchscreen controls, first and foremost because Microsoft does the barest minimum to explain what they are—and Windows 8 isn't all that intuitive. Second, because you really have to dig into the bezel in order to activate Metro's various "hot corners," which include the options panel you pull up from the bottom of the screen for Metro apps, the right-hand Charms Bar, and the left-hand app-selector sidebar. It would have been a grand gesture if Microsoft gave users the option to adjust the size or sensitivity of the hotspots on their screen. But, hey, at least Windows 8 now supports multitouch gestures on touchpads. Eh?

Another not-so-insignificant annoyance related to a two-monitor setup is that there's no way to get Windows 8 to ignore any touches during inopportune moments. Since Windows 8 treats a tap as if it was a mouse cursor, playing a game full-screen on monitor one while trying to tap your way to an email or a news item

MINIMIZE METRO'S ANNOYANCES

As mentioned, Windows 8's Metro isn't the simplest of interfaces to navigate—especially if you're stuck on a good-ol' keyboard and mouse. However, there are still a few tricks you can use to streamline and customize your way through (or around) Microsoft's "tablet" portion of the OS.

For starters, make sure you fire up Windows' Default Programs app—found by typing "default" into the Metro UI—and use it to set Windows Photo Viewer and Windows Media Player as the default apps for all file types they can open. This allows you to bypass the annoyance of jumping into Metro Photos or Video whenever you click on a related file in File Explorer.

If you want to avoid Windows 8's app management entirely, don't pin your most-used apps as Metro tiles; pin them to your taskbar. The bottom of your desktop screen might get a little cluttered, but at least you won't have to hunt down your apps within Metro.

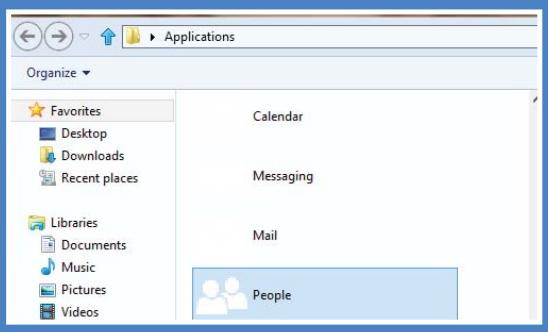
One of our favorite tricks allows you to bypass having to jump into Metro from the desktop to run Metro apps. Make a shortcut on your desktop and type this in for the item location: **%windir%\explorer.exe shell:::{4234d49b-0245-4df3-b780-3893943456e1}**

Your shortcut will pull up Windows 8's Applications window, which will let you launch Metro apps directly from the desktop.

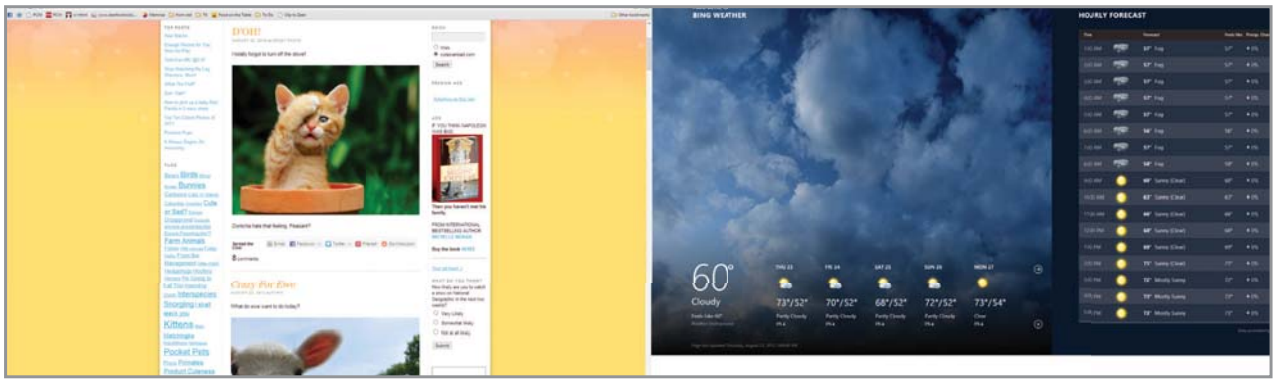
For a more intense Metro transformation, check out the third-party app Classic Shell (classicshell.sourceforge.net).

Not only can you bring the long-lost Start Menu back into Windows 8, but you'll also be able to boot directly to Windows 8's desktop instead of its Metro UI. Additionally, you can also completely disable a number of portions of the Windows 8 Metro UI: Hotspots, the Charms Bar, etc.

Windows 8 also includes a number of useful tweaks within its Group Policy Editor, including the ability to bypass Windows 8's lock screen for faster logging-on. It won't spare you from Metro, but it'll at least help you get to your safe and friendly desktop even faster.



Windows 8's Applications window is the sure-fire way to launch Metro apps without first having to jump into Metro.



This image represents the ideal Metro experience: an easy-to-understand (and ideally, touch-sensitive) Metro app on one screen, combined with the standard Windows 7-ish desktop as the primary input. In other words, Metro is better as a spice than as the main ingredient of Windows 8's dish.

on monitor two's Metro display minimizes your game and sends you back to the desktop on monitor uno.

Specific problem? Yes. But it's the kind of Metro annoyance that screams for a solution.

WINDOWS OTHER

While we think it's important to dig deep into the perils and pleasures of Microsoft's biggest change in the Windows 8 environment, that's not to say the company left the "Windows 7" portions of the operating system out to dry.

First, and most noticeable, is Windows 8's absurdly faster startup and shutdown times compared to any other iteration of the operating system. That's thanks to a lesser hibernation routine that (finally) stores the operating system's kernel session—Windows 8's system state and memory contents—to a file on your hard drive. Windows 8 employs multicore processing to read and decompress the contents of this "hiberfile" during boot, which leads to a much speedier system launch versus Windows 7, which requires a full system initialization each time you hit the power button.

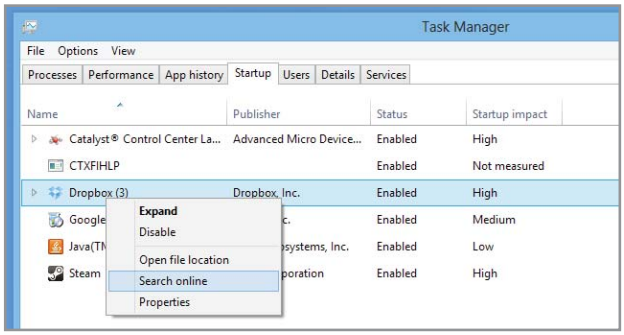
While you might notice slightly slower file transfers within Windows 8 versus Windows 7, were you to compare the two directly, it's because Windows 8 now builds malware scanning directly into the process (helped by the integration of Windows Defender, formerly Security Essentials, into the operating system). We don't mind that a bit, especially when it's accompanied by Windows 8's amazing new File Transfer feature. Not only can you now pause and cancel transfers whenever you want, but Windows 8 also gives you a throughput graph that populates your speeds in real time. It almost makes us want to forget about TeraCopy.

Windows 8's Task Manager receives a similar face-lift, including a wonderful "historical" option that shows you just how many resources various apps have consumed over the past week—Metro-only apps, however, which dovetails nicely with the interface's "never really closes your apps" treatment. And, heavens be praised, Windows finally integrates a "what the heck is this?" option for its Startup tab, which gives you a quick way to search for more information about various apps that run once Windows 8 boots.

The Office-like "ribbon" that now adorns the top of Window 8's File Explorer takes a little getting used to, but it's a great way to organize all of the most useful settings you need to access within a single window. Its available options even change dynamically depending on what you're clicking, from applications, to pictures, to movies, etc. It's still a shame that even File Explorer can't escape Microsoft's need to horizontal-ize Windows 8—you can view more files in a directory when file details are displayed at the bottom of the window, not on the right-hand side.

And, of course, it's hard to overlook Microsoft's head-nod to the cloud in all sorts of various permutations. There's the SkyDrive app, a mini-Dropbox of sorts for 7GB of your most important or interesting files that's wonderfully interwoven with other apps like Office 2013. There's Window 8's native synchronization with your Microsoft Live account (should you set up Windows 8 with one), which allows you to keep your Windows preferences, Metro app data, bookmarks, passwords—the list goes on—in sync no matter which computer you're using Windows 8 on.

Though you'll never need to use them, astute *Maximum PC* reader that you are, Windows 8 even tosses in some great features for

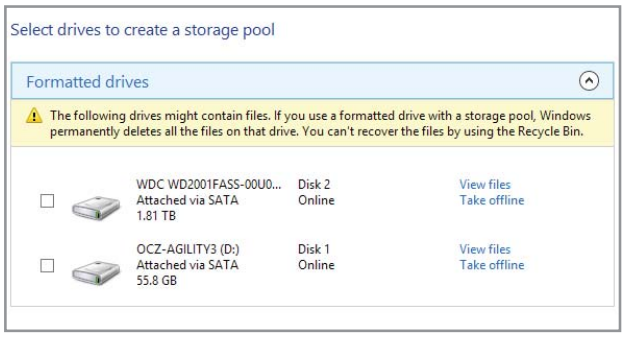


No longer will you have to manually type in strange application names to figure out just what the heck is loading when your system boots. With Windows 8, discovery is but a mouse-click away.

restoring your system in the face of disaster (good luck finding the buried System Restore app, even if you use the Metro search tool). A "Refresh your PC" option copies your data, reinstalls Windows, and transfers your data back—the "lesser" restoration technique that just might do the trick in the face of slowness or serious error. Window 8's more hardcore tool, the "Remove everything" option, does just that: nukes your drive, reinstalls Windows 8, and begins the initial configuration process anew.

OUR FINAL THOUGHTS

Considering that a copy of Windows 7 Home Premium costs north of $80, we think it's completely fitting that a standard Windows 8 upgrade costs $40: Metro's worth can be counted on one hand for a typical desktop user, but the improvements found across the



Windows 8's more advanced Storage Spaces tool allows you to add new storage sources at any time—hard drives, flash drives, or other external storage devices—to create giant storage "pools" with redundancy policies you decide on.

"Windows 7" version of the OS are certainly worth paying for. Even with Metro's annoyances—and we haven't even covered the full list in this extended review of the OS—Windows 8 is a good-to-have, but not supremely necessary upgrade. Those who made the jump straight from Windows XP to Windows 7 know the feeling we're describing here.

The features we've touched upon, and some of the operating system's more hardcore elements that we haven't—like Windows 8's Storage Spaces or File History feature—just about balance out the general issues you'll deal with when confronting Microsoft's "newbie mode" head on. It would be wrong to fear Windows 8 because of the sweeping changes (and poor follow-through) Microsoft has introduced into an otherwise fine desktop operating system. Upgrade your OS. Bask in your faster boot times. Synchronize your settings and files with Microsoft's fluffy clouds. Heck, burn and *mount* ISO files—that's a new one for Windows!

Fear Windows 9 instead. Once Microsoft cuts the cord on the classic desktop, kiss your productivity goodbye. Say hello to Microsoft marketplaces accompanying everything on the OS—much as they do now with a handful of Metro apps.

Us? We plan to prepare for the desktop apocalypse by stockpiling copies of Windows ME. $100 per. Cash only.

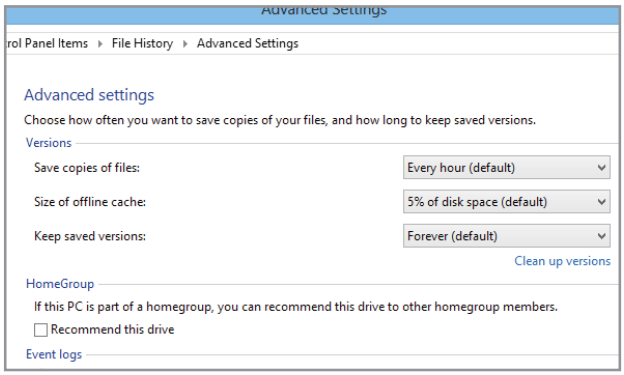
VERDICT 7

Windows 8

START MENU Vastly improved boot times; excellent cloud integration on all fronts; comprehensive desktop and system search; improved multi-monitor support; super-speedy installation.

METRO Metro is too simple; jarring effect of constant desktop/metro switching; lacks UI customizability where it's needed; Metro organization more difficult than standard Start Menu.

$40 (upgrade), www.microsoft.com



Windows 8's File History setting, buried deep within the Control Panel, is yet another "backup" technique that saves shadow copies of your data to other hard drives, external devices, or network-based storage.

WINDOWS 8: UNDER THE HOOD

While the new Metro UI will be what catches your attention in Microsoft's latest OS, there's actually far more under the hood that offers tangible performance benefits.

USB 3.0 Native Drivers

Windows 8 brings native USB 3.0 drivers to the mix, so no longer will you have to hunt for USB 3.0 drivers after your clean install. Even better, USB 3.0 performance is greatly increased with the native Microsoft drivers, too.

Windows Acceleration

Windows 8's implementation of Direct2D—the API for hardware-accelerating text, bitmaps, and other UI elements—offers a huge leap in performance over Windows 7 by relying on DirectX 11.1 to accelerate 2D graphics. Other improvements include 60 percent faster decompression of JPEGs and PNGs and techniques to make graphically intense chores drink less power.

DirectX11.1/WDM1.2

DX11.1 offers fairly innocuous changes from DX11, with the most noticeable being support for enhanced 2D graphics acceleration. DX11.1 also officially adds stereoscopic support, improved memory management, and better management of tile-based rendering for low-power applications.

Improved Scheduler

We already know that AMD says Windows 8 will give its Bulldozer cores an uptick in performance, thanks to an improved scheduler that can deal with AMD's core design, but it's apparently also a bit faster on Intel parts. See our performance analysis on page 32 for more info.

App Suspension

This applies more to the Metro side of the fence, but instead of Metro apps staying open and sucking up RAM, Windows 8 will suspend the applications to disk when not in use and also let the OS reclaim RAM easily. Even desktop apps, though, can be individually suspended or have components suspended when physical memory is running low.

WINDOWS 8 VS. WINDOWS 7: FIGHT!

Windows 8 haters have already labeled the new OS as the second coming of Windows Vista, but those who can contain their bile know that Win 8 is likely to be far from the performance-sucking, driver-breaking Windows Vista in its pre-SP1 days.

To find out how Windows 8 compares to the lithe Windows 7, we took an Asus P8Z77-V Premium board; inserted a Core i7-3770K, a GeForce GTX 690, 8GB of DDR3/1866, and an OCZ Vertex 4 SSD; loaded up Windows 7 Professional SP1; and ran our benchmarks. We then took an identical Vertex 4 SSD, loaded up Windows 8 Professional, and reran our benchmarks. We used the same beta 304.79 GeForce drivers for both and the latest beta drivers available from Asus for our testing.

The verdict? We expected the scores to be nearly identical, and for the most part they were. As Windows 8 is built on the foundation of Windows 7, we didn't expect a quantum shift here, but we did see some performance differences. The most glaring difference was in PCMark 7, where Windows 8 produced significantly faster scores in the creativity and computation tests.

Why such a huge difference? We suspect it's the result of changes to Windows Media Foundation in Win 8. Windows Media Foundation is Microsoft's replacement for DirectShow, which was implemented in Windows Vista. 3DMark 11 also showed a difference, but in Windows 7's favor, by a smaller percentage, in the physics and combined score. The difference there is likely due to some efficiency with the Bullet Physics engine that FutureMark uses in the test. More importantly, the graphics score is the same between operating systems, which tells us there should be no difference when gaming in Windows 7 or Windows 8—at least on Nvidia hardware.

Windows 8 includes native USB 3.0 support, and we saw it smoking the stock Windows 7 USB 3.0 performance by a hefty margin. Our Asus board, however, includes a Turbo mode, which puts it within striking range of Windows 8. USB 3.0 performance on Windows 8, for the most part, is pretty awesome, though.

The rest of our tests were mostly a wash except in two interesting instances: Cinebench 11.5 and X264 HD 5.0.1. Both are multithreaded like mad, and both show about a 5 percent advantage in Windows 8. This could quite possibly be a sign of the improved scheduler in Windows 8.

To sum up, Windows 8 performance is generally the same as Windows 7, with a performance edge in anything that uses the Windows Media Foundation and likely anything that is heavily multithreaded. USB 3.0 is also markedly improved. We do note the issue with Bullet Physics in 3DMark 11, but we don't think it's a very serious issue. So all you haters better find something else to hate on. **–Gordon Mah Ung**

SPECIFICATIONS

	Windows 8 Pro	Win7 SP1 64-bit
PCMark 7 Overall	**6,056**	5,712
PCMark 7 Lightweight	**6,146**	5,726
PCMark 7 Productivity	5,406	**5,619**
PCMark 7 Creativity	**9,925**	5,602
PCMark 7 Entertainment	**5,913**	5,891
PCMark 7 Computation	**12,605**	5,775
3DMark 11 Overall	P14,042	**P14,408**
3DMark 11 Graphics Score	17,333	17,305
3DMark 11 Physics Score	9,543	**10,095**
3DMark 11 Combined Score	8,182	**8,924**
Cinebench 11.5 CPU	**7.94**	7.75
Cinebench 11.5 OpenGL	59.11	59.21
X264 HD 5.0.1 Pass 1 (fps)	**77.9**	73.5
X264 HD 5.0.1 Pass 2 (fps)	15.3	15.3
Stitch 2.0 (sec)	866	858
ProShow Producer 5.0 (sec)	**1,461**	1,486
Unigine 3.0 (fps)	54.4	54.1
Valve Particle Test (fps)	210	208
Resident Evil 5 (fps)	**299.9**	294.2
SiSoft Sandra Bandwidth(GB/s)	24.66	24.46
Crystal Disk Mark SATA 6Gb/s R/W (MB/s)	522.5/232.7	507.4/266.6
Crystal Disk Mark R/W (MB/s)	419/184	257/183

We used an Asus P8Z77-V Premium board outfitted with a stock-clocked Core i7-3770K, 16GB Corsair DDR3/1833 RAM, GeForce GTX 690, and OCZ Vertex 4 SSD to test Windows 7 Professional SP1 64-bit and Windows 8 Professional 64-bit. For our SATA performance testing, we used an OWC Mercury Extreme Pro 6G on the Intel Z77 PCH. For our USB 3.0 testing, we used a Patriot Wildfire SSD in an Asus UASP-enabled USB 3.0 enclosure on the Intel Z77 PCH controller.

WINDOWS RT: WHAT IS IT?

Even though Microsoft is planning to put the full version of Windows 8 onto its upcoming Surface tablet, the company realized it would also need a stripped-down version to run on ARM tablets and cell phones, so it has created Windows RT to handle those duties. Windows RT, which stands for Windows Runtime (we know, the name is horrible) is designed to run one thing and one thing only—apps from the Microsoft store. That's all it will do, just like how an iPad or Android tablet only lets you add or remove applications. There will be no desktop, no file explorer, or any other trappings of a traditional Windows environment. Think of it this way: Imagine if Microsoft yanked Metro's tile-based interface out of Windows 8 and created an operating system out of it; that's Windows RT in a nutshell.

Now before you go getting your jimmies rustled, consider this: Using apps is all a tablet is designed to do. You'll have an app for your email, web browsing, e-books, and so forth, so you should be able to accomplish most of what you can do on today's tablets on a Windows RT device. You'll even be able to be mildly productive, as Microsoft is bundling a *free* version of its ubiquitous office suite, tentatively named Office RT. And though you'll surely be able to download some sort of media player, Windows Media Player will not be bundled with Windows RT. Hopefully, VLC will come to the rescue.

What can't you do in Windows RT? You won't be able to install whatever Windows software you have lying around, so put that USB key away for now. If it's not in the Windows 8 store, you can't install it. Good news, though—*Maximum PC* will have an app, so you can read all about the latest hardware anywhere you take your tablet (we won't ask where that is). **–Josh Norem**

LET'S GO SHOPPING: INSIDE THE WIN 8 STORE

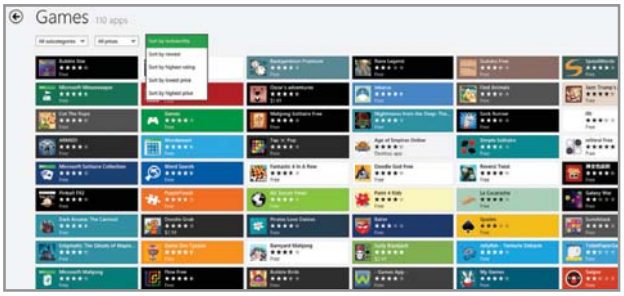
Microsoft's official Store app isn't the only digital point-of-sale within Windows 8. A number of Metro apps essentially serve as marketplaces with scant features, instead of full-fledged apps that focus more on function than shopping (Video, anyone?).

Still, Microsoft's "app store" for Metro is its aptly named Store app. It's here where you'll find all sorts of new ways to spice up your Metro experience and, like the conventional app store on your smartphone or tablet, it's the one-stop location for upgrading any Metro apps you've previously installed within Windows 8.

Funnily enough, Store is perhaps the one place within all of Windows 8 Metro where you don't feel like you're being bombarded with promotions, sales, or offers of new (paid-for) content to download. In other words, it feels a lot more like a traditional app store (albeit on one's desktop PC) than the Xbox Live Marketplace—which, we note, is also accessible via its own Windows 8 app.

Microsoft splits Store into two sections: the Store itself and the traditional "My Apps" section where you can go to see what exactly you have installed on your system. But the fun doesn't stop there. You can also segment your list by apps you've previously downloaded but haven't yet installed on your desktop (in a much easier-to-view fashion than with, say, Google Play), and you can also view any apps you've installed on other Windows 8 systems under your Microsoft Live account name.

You can't mark apps for installation or uninstallation on these

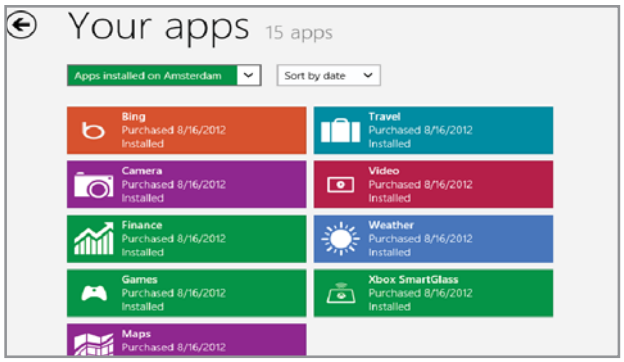


Without Windows 8's filtering features, separating awesome Metro apps from the crud would be near-impossible. We'd still love a way to rank the popularity of all Windows 8 apps at once, however.

remote systems, but you can view these lists and, should you desire, install apps onto your desktop that you first slapped onto your laptop (for example).

As of this article's writing, Store is split into 20 different categories of apps (which you navigate using Metro's dreaded horizontal scroll), including Games, Sports, Security, and the ever-popular Government category (one app!). An overall Spotlight section gives Microsoft the ability to highlight apps it thinks users might find interesting, although users are also free to hit a Metro button to quickly search within any of the aforementioned categories for the newest or most popular apps to grace Store.

Unfortunately, you're currently limited to browsing by categories only—there's no way to just dump an "All Apps" listing and filter by Microsoft's provided options: prices, popularity, rating, and release date.



If you've used a smartphone at some point in recent years, this should look familiar: Yes, Windows 8 also has a section for helping you keep track of apps you've downloaded or installed on your various systems.

This might just be a function of this review being written prior to the official Windows 8 release date of October 26, but the store is currently populated with far more free apps than paid: 92 to 18 in the Games category alone, which seems as if it would be the one area above all where purchasable apps would find the most traction.

We'd love to be able to review the quantity and quality of Store in total, but it's just too soon. One glance at the Social tab exemplifies this, given that official apps from the big names in online networking are all noticeably absent: Twitter, Facebook, LinkedIn, etc.

One interesting feature that's difficult to find unless you jump through all the right configuration hoops is Windows 8's built-in parental controls, dubbed Family Safety. Enable the feature for a Standard user account, and you'll be able to restrict what said user can download via ESRB ratings. Windows 8 will also generate an activity log of all Windows Store downloads, in case you want to see what a particular user has been surreptitiously trying to install on your system.

Given the fairly lackluster capabilities of the Metro apps that ship with Windows 8 by default, Metro's Store is going to be one of the make-or-break battlegrounds for this half of the operating system, if not Windows 8 in total. Microsoft needs strong, creative third-party developers to truly make Metro the environment it was meant to be.

On the plus side, at least Store itself does a fairly good job of helping users find the best Metro apps to grab.

By Jonathan Roberts

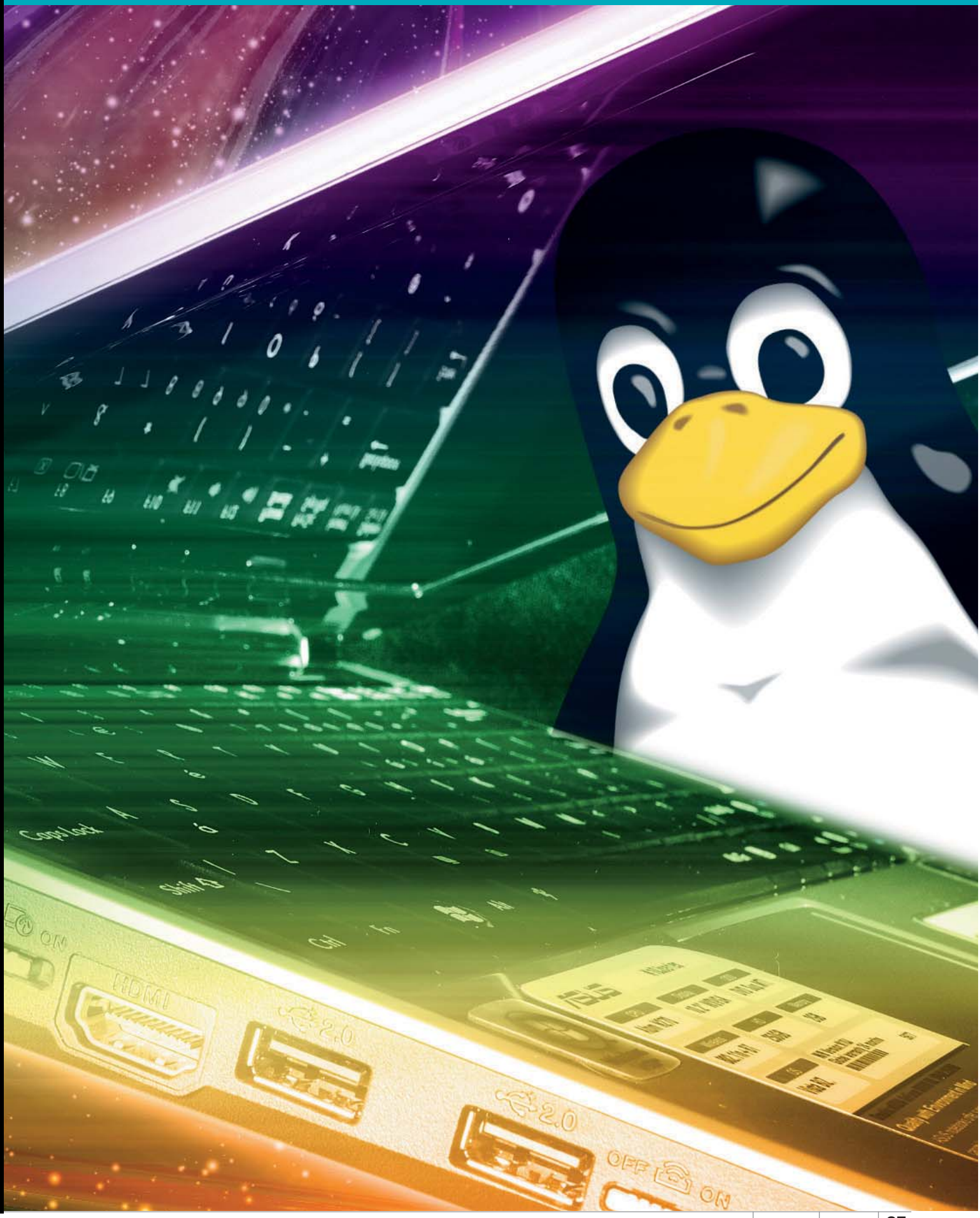
DISCOVER LINUX

THERE'S NEVER BEEN A BETTER TIME TO TRY THE ALTERNATIVE OS

WINDOWS 8 might offer some nifty new features and performance to PC users, but it also comes saddled with the touch-centric UI commonly known as Metro, which Microsoft has made impossible to circumvent. The upshot is that Windows 8 will require us to relearn how we do things on the desktop. Perhaps—just perhaps—that time could be better spent finally learning to use Linux.

Besides offering a number of distinct and useful attributes over Windows and Apple's OS, Linux is far more conducive to tweaking and customization. You could even say that Linux is the operating-system analog of hardware tinkering. Why would a power user settle for anything less?

If you're feeling the least bit intrigued, you need to check out this guide. We'll begin by looking at what Linux is and why you'd want to use it. Then we'll show you how to get your feet wet in a risk-free way, before explaining how to install Linux and go about your day-to-day business with it.


HDMI
2.0
2.0
OFF
ON

WHAT IS LINUX?

Linux is an operating system in the same way that Windows, Mac OS X, iOS, and Android are all operating systems. Each provides a platform on which everything else on your computer runs.

This platform is made up of lots of different parts. Some parts are responsible for making the hardware work, others for displaying the user interface, and still other parts for ensuring that applications can work with the hardware and with each other.

Just like Windows et al., Linux performs all of these functions. You may be asking, "If Linux does all the same things that Windows or Mac OS X does, why bother switching?" The answer is that Linux has its own way of doing things, and for some people, this way is better.

Linux is a powerful and attractive desktop operating system with unique features you won't find on any other platform, including these spectacular spinning virtual desktops.

SECURE, FLEXIBLE, POWERFUL

There are several technical aspects to Linux that make it distinct from other operating systems. The OS has a radically reduced risk of catching viruses—so much so that only very specialized users need to run antivirus software.

It's modular, and so infinitely flexible. For example, while Windows limits you to a single user interface (what the system looks like), on Linux you can choose from a dozen different options. It runs well on very old and slow hardware, as well as on modern laptops and supercomputers (by some counts, 90 percent of the world's supercomputers are currently running a variant of Linux).

It's designed with security in mind, with features such as strong encryption included as standard.

One caveat you'll want to keep in mind with regard to Linux's technical differences is that it has a completely different approach to making hardware work. This means that Linux's developers have to add support for hardware all by themselves. They do a remarkably good job of this, and you'll find that almost every piece of hardware imaginable works "out of the box." There are exceptions to this, though, particularly when hardware manufacturers keep the way their devices work a secret. On these occasions, the developers have to figure out just how a device works for themselves, and then write the software to make it work—it's kind of like listening to a piece of music to figure out the score.

This most often applies to graphics cards and wireless cards, although even these are almost universally supported these days. Later in the article, we'll show you how to check if your hardware works, and how to get help if it doesn't.

DISTRIBUTIONS: WHAT YOU NEED TO KNOW

As Linux is modular (the user interface, hardware interaction, etc., are all separate from each other), and there are so many ways to combine the different elements, you'll never use just "Linux." What you'll be using is a distribution of Linux. Each distribution brings together different combinations of the available components, and each configures them with a different audience in mind.

For the purposes of this article, we'll be focusing on a general-purpose distribution called Ubuntu. It's widely regarded as the easiest distribution to get started with, and it has a large number of users who are willing to help when you get stuck.

After reading this article and getting comfortable with Ubuntu, don't feel confined to this distro. Many users think that trying lots of different distributions is fun and a good learning experience, so they encourage new users to experiment as much as possible.

FREEDOM

Another way Linux differs from other OSes could broadly be called "ideological." Linux is what's known as free, or open-source, software. This doesn't necessarily mean it's free of charge (although it often is), but that anybody can study how it works, share it with their friends, modify it, and use it for any purpose they wish.

This sounds a bit out there, but it's actually a very important aspect of Linux. For starters, it means that it's not developed by a single company or nation, but instead by a massive community that's spread around the world.

This means you don't need to worry about a company going bust and taking your photos, documents, and other data with it; neither do you need to worry that your computing activity is surreptitiously being recorded, or otherwise influenced, to advance some unknown group's interests. With free software, your computer works for you.

Of course, some people don't use Linux for any of the aforementioned reasons—they just like the way it works. What's more, as you'll soon see, you can try Linux in a virtually risk-free way, without modifying the current contents of your computer. So, really, what's stopping you from giving it a try?

FIRST THINGS FIRST

Before you take Linux for a test drive, you must first back up your data. This isn't because using Linux is dangerous—in fact, as we've said, it's virtually risk-free—it's just that accidents do happen,

and you should back up your data regularly anyway. If you don't yet have a backup solution, Jungle Disk (www.jungledisk.com) is a great option. It works with Windows, Mac OS X, and Linux, and it has a basic monthly cost of just $2. More importantly, though, it uses Amazon's cloud storage to back up your files. This means your files are kept in a different location from your computer, ensuring they'll remain safe even in the event of a fire or any other physical disaster.

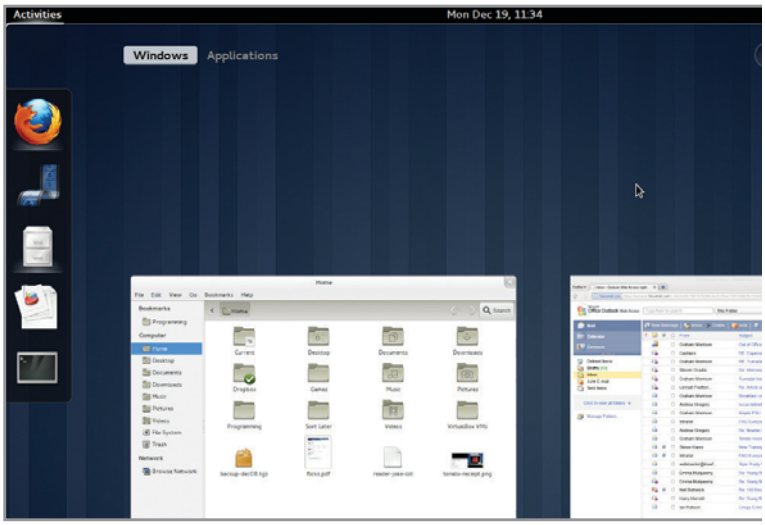
Of course, if you're in a hurry or you have limited bandwidth, you could burn your data to a DVD or put it on a portable hard drive—just remember to keep it in a different location.

TRYING LINUX

With your data safe, we're ready to get started and load Linux for the first time. We recommend a version of Linux known as Ubuntu (See "Distributions," left). This version of Linux, like many, is really clever, because you can use it as a live CD. Just download the operating system as an ISO file, then burn to disc—you can find full instructions at www.ubuntu.com.

"Live CD" means you can run the entire operating system from the disc without it making any changes to your computer. If you decide you like Linux, you can then install it using the same disc; if you don't, you can just reboot your computer, take out the disc, and everything will be just as you left it. It's the perfect way to try Linux without risk. The only thing you need to bear in mind about live discs is that they're going to run slower than if the operating system were installed on your hard drive. So, while it's a useful way to get a feel for what a system is like, don't think that Linux is always so slow!

To use the live disc, you'll need to put the disc in your computer and then reboot. When the first screen appears, usually with your computer manufacturer's logo on it, you'll need to press a key to tell your computer to start from the disc, rather than your hard drive. This key is different on every computer, but it's usually F2, F12, or Del. The only way to be sure is to try the different buttons, one of which will display a boot menu. From this menu, you'll want to select the entry that corresponds to your DVD drive.



The Activities overview lets you manage running applications and launch new ones.

Follow through the various screens; eventually your computer should load Linux and leave you at the desktop—the main interface. Great! This is so cool! Now what? Well, the first thing to do is get familiar with the interface.

Remember, Linux isn't Windows, and it isn't Mac OS X. As with the technical and ideological differences, Linux's interfaces are different from others'. This means it will take some getting used to, but if you persevere, you'll be surprised at how quickly the new interface becomes second nature.

It helps that some of the most basic functions, such as the mouse, work just the same in Linux as in other operating systems. So, you use the left mouse button to select things, some of which require a double-click, and the right mouse button often pulls up a menu with further actions you can perform. That said, let's take a look around the desktop.

As you hopefully noticed while exploring the Activities overview, Linux comes with a great set of applications installed by default. This means you can get started working with your new operating system as soon as you've turned it on.

MULTIMEDIA SUPPORT: DOING IT YOURSELF

If you're like us, one of the main reasons you use a computer is to enjoy multimedia content. That's everything from videos of Benton the dog chasing deer through a park on YouTube, to sitting back and relaxing with a pair of headphones on while listening to Handel's *Messiah*.

As a result, you've probably built a collection of multimedia files and stored them in your existing operating system. Now you want to be able to enjoy them on your new Linux machine, too.

This is perfectly possible, but there's one small caveat you need to be aware of. Most people keep their music in MP3 format and their videos in MP4, and most like watching YouTube, which for now uses Flash to play its content. Because these are patented technologies and need to be licensed for distribution (even though they're free for personal use), most Linux distributions don't include them by default because they can't afford to. That doesn't mean you can't enjoy media in these and other patented formats, it just means that you need to add support for them yourself. In Ubuntu, this is a simple matter of installing a single package, called "restricted-extras." You'll want to wait until after you've installed Ubuntu on your hard disk, rather than doing this while running from the live CD.

A few of the applications will be familiar to users of other platforms, since they're available for all operating systems; some of the applications are Linux-specific, however, and aren't so well known (although they're generally just as good, if not better!).

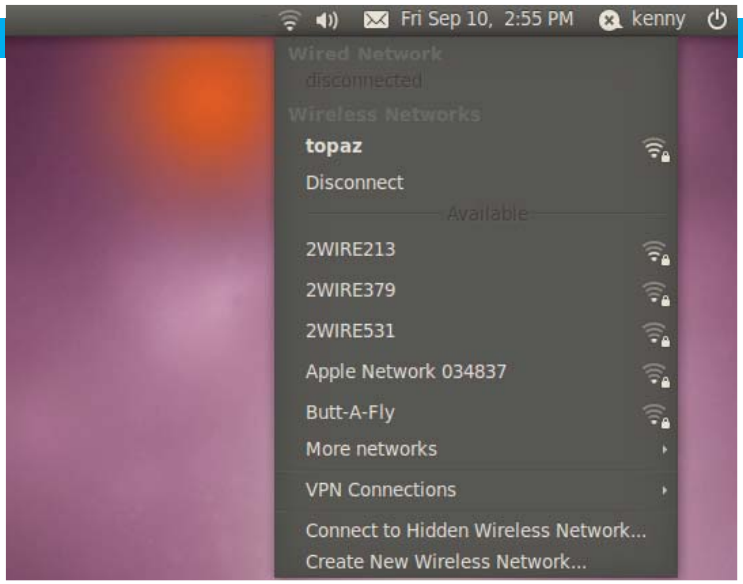
GETTING TO KNOW YOU

To speed you on your way to familiarity, we've compiled the below table, which compares Ubuntu's default applications with their counterparts on other operating systems. Most of the default applications are fairly self-explanatory, requiring little more than a bit of time playing with them to discover their essential functions. For those times when you're not quite sure how to do what you want, however, check out the online tutorials we've linked to.

The most important thing to do at this point is play around with everything. It's almost impossible to break anything, and if you do, you can just reboot your computer and remove the disc! Don't forget to launch the System Settings dialog from the user menu, too, as you'll find all kinds of options in there, including changing the wallpaper, the keyboard layout, and much more. While you're trying things out without fear of breaking them, now is a great time to test your hardware, too. If you've managed to boot Ubuntu successfully and explore the desktop, you can rest assured that all the most important bits work well already—including your graphics card.

TEST CARDS

Having said all of the above, one bit of hardware Linux occasionally has trouble with is wireless cards, so it's worth using this playing-around time to make sure that this works too. The easiest thing to do is to just make sure your computer can see some nearby wireless networks: To do this, click the small computer icon on the right of the screen and, if all is well, you should see a "Wireless" entry followed by all the nearby networks.



Wireless cards can sometimes be tricky in Linux. But if you see entries under Wireless Networks, you know you're good to go.

If you can't see this and you think you should, don't worry too much. With Linux, there's almost always a way to make things work, it sometimes just takes persistence and a helping hand to get there.

See "Getting Help with Linux" on the next page to find out how to go about solving your problem.

APPLICATION ALTERNATIVES

Ubuntu App	What It Does	Windows Equivalent	Online Tutorials
Firefox	Web browser	Firefox, Internet Explorer, Google Chrome	http://support.mozilla.com/en-US/kb/getting-started-firefox
LibreOffice	Complete office suite, including word processor, spreadsheet, and presentation programs	Microsoft Office, LibreOffice, OpenOffice.org	www.libreoffice.org/get-help/documentation
Banshee	Plays music, videos, and DVDs. Provides access to Amazon's MP3 store, as well as the Internet Archive. Also makes managing your iDevice and Android phone's media a cinch	iTunes, DoubleTwist, Windows Media Player	http://library.gnome.org/users/banshee/1.8/
Thunderbird	Reads, sends, and encrypts emails	Thunderbird, Microsoft Outlook	N/A
Shotwell	Organizes and displays photos	Picasa	http://yorba.org/shotwell/
Ubuntu One	Automatically stores files inside a special folder in the cloud	Ubuntu One, Dropbox	help
PiTiVi	Edits videos and exports them to different formats	Windows Movie Maker	https://one.ubuntu.com/help/tutorial/
Movie Player	Plays videos, with support for playlists; no support for media libraries, etc.	Windows Media Player, VLC	www.pitivi.org/manual/
Empathy	Instant messenger; works with many networks, including AOL, MSN, and Facebook	Trillian, Pidgin	N/A
Brasero	Burns discs, with support for audio as well as data discs	Nero Burning Room	N/A

INSTALLING LINUX

Things are looking pretty good at this point. You've successfully started your computer with Linux instead of your normal OS; you've explored the interface and tried a few of the default applications; you've even checked that it works with your most important hardware.

If, by this point, you're wanting to explore this new world further, then it's time to install the OS on your PC and learn more about the system. This will give you the chance to begin finding out how you can tweak the system, how fast it runs in the real world, and to use it with your own files in your day-to-day work.

This is the part where that backup you made is more important, as we're going to make changes to your computer's hard drive. It's easy, but in the event of any mistakes, you'll want to know that your data is safe. If you didn't make a backup earlier, do it now. To start the installation process, get to the desktop of the live CD as before, and then double-click the Install icon on the desktop.

From this point on, most of the installation screens will ask you straightforward questions about your language, time zone, keyboard layout, and the like. However, there are one or two screens that will require a bit of further explanation.

The third screen will give you some options covering how Ubuntu should be installed—whether to install it alongside your existing OS, replace the existing system entirely, or let you do your own thing.

What this screen is really asking is how to partition your hard drive. By shrinking the partition your existing operating system is on and creating a new one, Ubuntu's installer can let you keep the existing system while still making Ubuntu available to you. This is what the Install

Ubuntu's installer partitions your drive automatically, so you can use Ubuntu and Windows.

Alongside option will do, and this is the safest option to choose while you're just getting started. If you select this, every time your computer starts, a menu will appear asking whether you want to start Ubuntu or your previous system—aka dual booting. This way, if you still need your old operating system, whether for games or to occasionally use something familiar, you can just reboot and select its menu entry.

SECURITY

The other screen you'll want to pay extra attention to is toward the end, where you're asked for a username, computer name, and password. While it doesn't really matter what you choose to call your computer or user, you should think carefully about choosing a good passphrase, as this will greatly increase your security.

As we've often said, the best thing to do is string together a few random words, such as "MPClovesunicorns," to create something memorable and difficult to crack. Try to use some upper- and some lowercase letters, and maybe add a few punctuation marks, too.

This screen also gives you the option to encrypt your home directory (more on the home directory shortly), which provides extra protection if you ever leave your laptop on a train—or in any other position where some nefarious foe might get physical access to your computer.

GETTING HELP WITH LINUX: GENIUSES WITHOUT THE BAR

When you have a question about Linux, or something goes wrong and you need help, where do you turn? In most situations, there's no helpline to call, neither is there a Genius Bar to visit. Instead, Linux users take advantage of the friendly and supportive community of fellow users and developers who, on the whole, give their time for free. The question is, where do you find this community? Well, depending on your urgency and personal preferences, there are two main sources of help.

FORUMS

If it's not urgent and you can wait a few hours, or days, we recommend Ubuntu's official forums (http://ubuntuforums.org), where you can post a message in the appropriate subtopic. Other users will be able to see your message and respond accordingly. You'll get an email whenever anyone replies to a thread you've contributed to, so you'll know an answer's waiting.

IRC

If the problem's more immediate, or complex, you may want more interactive help. For this, most Linux users rely on Internet Relay Chat (IRC), which is a system for accessing live chat rooms. The easiest way to enter these chat rooms is to go to http://webchat.freenode.net. You can then enter a nickname and room to join, and you'll be able to chat through your web browser. Ubuntu has its own support and discussion room (or channel) called #ubuntu, so if you enter that in the channel box, you'll be able to chat with people who know lots about Ubuntu and are willing to help.

GOOD KARMA

One thing to bear in mind when using these resources is that it's important to be a good citizen yourself. By following these simple rules, your experience in the forums and chat rooms will be far more positive: Always be polite. Do some research before you ask a question. Often, you'll find your answer by searching for your problem in the forum or on Google. If your question has already been answered lots of times, people won't want to repeat themselves.

Give as many relevant details as possible when describing the problem.

Be open and honest about your knowledge of Linux, and you'll get help that's more appropriate for your level of expertise. As time goes by and you become more knowledgeable, you may want to take the time to give something back to the community by helping new users yourself.

MOVING TO LINUX?

After installing Ubuntu, rebooting your computer, and selecting your brand-new operating system from the boot menu, the first thing you'll want to do is make all your existing data accessible.

This is a straightforward task. Launch the Activities overview, and from there select the filing-cabinet icon at the bottom of the dash. This will launch Nautilus, the default Ubuntu file manager. On the left of this window is a panel, and above all the bookmarked locations, such as Home, Pictures, and Downloads, there should be an entry for an "xxx GB File system."

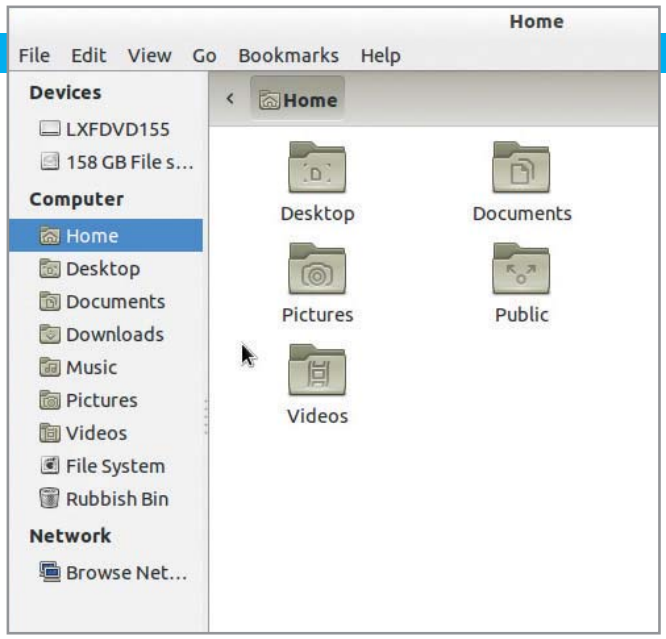
This is the partition your previous operating system lives on, and which contains all your old files and folders. Accessing them is just a matter of double-clicking the entry, and everything will appear in the main part of the window. Most user documents and settings on Windows 7 and Vista are stored in the Users\[username] directory, on XP in Documents and Settings\[username], and on Mac OS X they're in the /Users/ [username] directory.

If you can't find this directory, check to see if there's more than one partition listed in the side panel. Some manufacturers ship their computers with a separate data partition by default, so you may need to look in these other partitions for your files.

COPYING AND LINKING

Once you've got access to the files, you may want to copy them across to the appropriate directory on your Ubuntu partition. This works the same as in all other operating systems: Use the mouse to drag a box around all the files you want to copy, go to the Edit menu at the top of the window, and select Copy (or press Ctrl + C). Then, go to the location on your Ubuntu partition where you want to store the files (probably in your Home folder, but maybe in the Documents, Music, or Pictures subdirectories) and select Paste from the Edit menu.

Of course, this will work best if you're not constantly switching between operating systems. If you are, then you may find that you end up with files that are out of sync with one another. The best way to avoid this situation is to work on the files straight from the Windows partition; if you do this, however, keep in mind that you'll have to open the file manager and click the partition each time you want to use it. There is a way to automate this, but it's beyond the scope of this feature. (Take a look at "Getting Help with Linux" on the previous page if you want to learn more about the process).



On Linux, all your files are kept in the Home folder. This means there's only ever one place for you to go looking for your files, and only you can see them.

IMPORTING DATA

The final thing you'll want to do to make your new operating system feel like home is to import some of your files to the appropriate applications. For instance, now that your music files are accessible, you can import them into Banshee's database, which will then automatically download cover artwork and keep everything organized for you.

To import your music into Banshee, launch the Activities overview and begin typing Banshee. After a few characters, the Banshee icon should appear and be highlighted, at which point pressing Return will launch the program. Then, go to Media > Import Media, and select Choose Folders... in the window that appears. This will launch a file browser, from which you can browse to your Windows partition, or the location on your Ubuntu partition where your music files are stored. Select the folder that your music is stored in, and then click Import at the bottom of the file browser. Banshee will then take care of everything else for you. (Note that importing your photos to Shotwell involves a similar process).

It's also worth knowing that Banshee comes with support for several online media stores turned on by default, so you can download new music from Amazon, get podcasts from Miro, or pick out classic videos and audio from the Internet Archive. All of these are available at the bottom of Banshee's side panel.

THE HOME FOLDER: WHERE THE HEART IS

The Linux filesystem is notoriously cryptic, with folder names such as etc, var, usr, bin, and tmp. Fortunately, there's no reason why you ever need to deal with any of these, at least in day-to-day use. This is because, along with these cryptic folders, there's one called Home, which stores a subfolder for each user on the system.

The idea of these folders is that they store all the files and settings that belong to an individual user. So, when you're working on a document, you save it in your Home folder; when you transfer pictures from your camera, they'll go in your Home folder; and when you extract audio from a CD, that also goes in your Home folder.

Note that each user's Home folder is private to that user—with the exception of the root user, no one else can read its contents (see "Users and Privileges" on the next page).

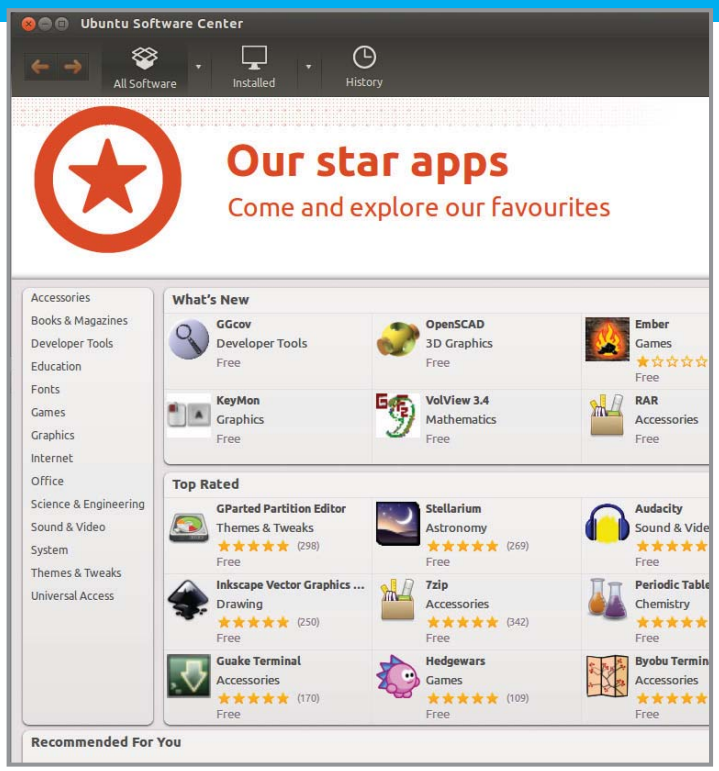
If you decide that you want to learn more about Linux, then you'll no doubt begin to tinker with the other files and folders, but as a normal user, there's no need. So don't worry about the et ceteras.

PACKAGE MANAGERS

The penultimate step on our journey is to show you how to install new programs and keep old ones up to date. This is an area where Linux has been ahead of the game for years. Rather than expecting you to go to third-party websites and download executable files (.exe in Windows, .dmg in Mac OS X), Linux distributions provide package repositories, which store all the software you can install on that distribution.

This is much more secure, since the packages in the repositories are all digitally signed to guarantee their origin. This means you can be sure who's providing the package, and that it hasn't been altered by someone with malicious intent (whereas on Windows and Mac OS X, there's little to guarantee the authenticity of the programs you install).

It also has the major advantage that all the software on your computer can be kept up to date automatically. So every time there's a security fix, you'll immediately be notified about it and given the opportunity to install it. It's really a very good system.



The Software Center lets you install new applications. It comes complete with a review and ranking system, so you can be sure you've picked the best application for the job.

INSTALLING AND UPDATING

On Ubuntu, the repositories are accessed through the Software Center. If you launch it from the Overview mode, you'll find yourself at the Software Center's homescreen. It's very much like the iTunes app store—here, you can see featured applications, browse by category, or search for applications.

Once you see one that interests you, click its entry and you'll be taken to a more detailed description of the program. This page includes user reviews, version details, and an install button.

Installed applications are marked by a green circle with a tick, and instead of having an Install button, these have a Remove button.

Updating applications uses an alternative program. From the Overview mode, you'll want to launch the Update Manager. You can click Check to look for new updates, and then Install Update to install them. It's rare that you'll need to restart your computer for updates to take effect, but you'll be notified if necessary.

THE COMMAND LINE

We're now at the end of our introduction to Linux. Before departing, however, we want to mention the command line. The command line is another interface for your computer. Rather than relying on using a mouse to click graphical elements, it interprets words and letters that you type into it. It's because of the command line that Linux has a reputation for being difficult, since, despite its power, it's not very intuitive. As you've seen in this article, however, you can use Linux to do lots of different things without ever having to touch the command line. That said, as you start to begin tweaking settings, writing code, or just becoming more of a power user, the command line is sometimes the best tool for the job. It can also be a lot of fun to learn.

USERS AND PRIVILEGES: DO YOU HAVE PERMISSIONS?

Linux is designed with multiple users in mind. At the heart of this is the idea that every file on the system is owned by a particular user. This has lots of benefits. For starters, it means that an entire family can share a single computer, but all keep their files private. It also means that the system is more secure than it would otherwise be. If one user accidentally downloads a virus or enters a mistaken command, it can affect only that user's files—everyone else's, and the system as a whole, remain safe. When a user has the ability to read or modify a particular file, we say they have "permission" to do this. Every file can have its permissions set individually, and you can specify whether a single user, a particular group of users, or every user on the system can read or edit it.

There's one user on the system, however, who has permission to read and modify every file. This user is known as root, or the super-user, and should be used with caution. When you installed Ubuntu, you created a single user account for yourself. This account is not the root, but it still has permission to do certain tasks that usually require you to be the root, such as installing and updating applications. Exactly how this works isn't important now, but it *is* important that you know something about the root user and the idea of permissions. At the very least, it will explain why you can't read the contents of other users' home directories—by default, they own their files, and they're the only ones (besides the root) with permission to edit them.

PICK A DISTRO, ANY DISTRO

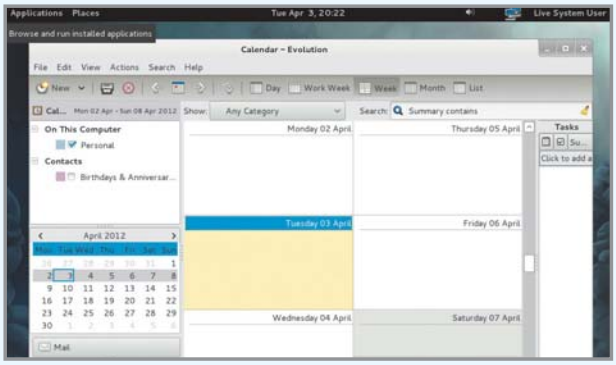
An astounding array of Linux variants means you can choose a distribution that meets your specific needs –Graham Morrison

There are literally hundreds of Linux distributions out there, and the list is growing weekly. The free software world is, after all, primarily one of choice, and that means developers can—and often do—scratch their own itches. Here are a few of the more notable distros and what they're most suited for.

PRODUCTIVITY: FEDORA 17

There's usually one distro you rely on more than any other. This is the distribution that's going to be used day-in, day-out, and often for essential-yet-mundane tasks such as email and writing documents. It makes sense for this distribution to be as streamlined, stable, and secure as possible, while still providing software support for the latest features.

Fedora sports serious open-source credentials, and each update skims off the cream of the latest updates and bundles them into a single, very well-tested distribution. The new release will also offer the best default user experience of the new Gnome desktop.



Fedora is an ideal distribution if you're looking at daily office tasks. You can try it easily, too.

HACKING: ARCH

Arch Linux has just celebrated its 10th anniversary, but only in the last couple of years has this DIY distribution started to gain serious traction. Compared to most other distributions, it has a tough learning curve that starts at installation. There's no graphical interface, and you're expected to add and configure everything manually. It's an old-school experience that brings a great feeling of satisfaction, as well as unrivaled knowledge of your system's configuration and Linux in general.

Arch uses a rolling release cycle, rather than one or two major updates a year. This means that when you install Arch, you always have the latest versions. Every package is cutting-edge, so your installation will surf as close to application and desktop releases as possible, without expecting you to compile the packages by hand. And while Arch can be tough, it's nowhere near as complex as a distro like Gentoo. Even a beginner could follow the excellent wiki instructions and come away with a working installation, and the community is one of the best and most helpful around.

The brilliant thing about Arch, and the reason we'd pick it for hacking and tinkering, is its Arch User Repository of packages. It's not officially supported, but it's massive and easy to contribute to. The AUR also makes it very easy to install packages from their source code, install their dependencies, and keep them up to date. This makes it perfect for experimentation.

SECURITY: TAILS 0.10.2

The big advantage of using Tails is that it boots into a Tor-enabled desktop. Tor is an anonymity network, and it works as a kind of random multistepped VPN, where your Internet connection passes through a variety of machines before appearing somewhere random, theoretically making it very difficult for anyone to retrace the route back to your IP address. As soon as you open the browser, you should be browsing anonymously.

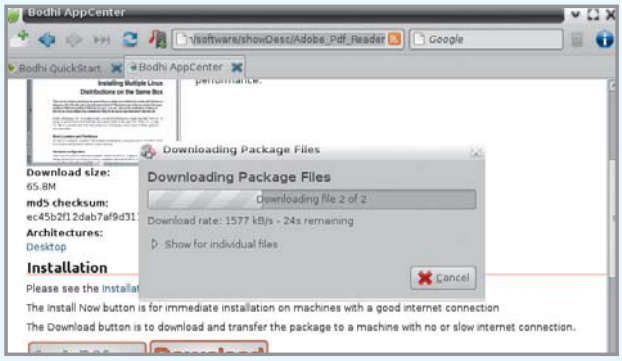
Tails includes many other tools to help with security and privacy. LUKS, for example, can encrypt your storage. Your email, instant messaging, and standard browsing can all be protected using a variety of other plugins, safeguarding you from potential changes in the local configuration, and because Tails is a live CD, as soon as you reboot or shut down your machine, all traces of your session are removed. Tails even takes care to blank your memory at shutdown, so there shouldn't be a single electron of data remaining.

SPEED DEMON: BODHI

From the boot menu, you get to choose from a selection of desktop configurations, from bare-bones to a design for netbooks, as well as an overall theme. Less than a second later, everything is configured. This speed and minimalism comes from a desktop called Enlightenment. Bodhi is one of a new breed of distros that opt for efficiency and minimalism over the perceived bloat of KDE and Gnome.

As a result, Bodhi has modest system requirements without sacrificing features. The Midori web browser, for instance, is very quick, and because it's built on WebKit, it can render the vast majority of sites to the same standard as Chrome and Safari. General applications are also quick to boot due to the distribution's low memory footprint.

You can't tell by looking at it, but Bodhi is built on Ubuntu, so you have access to the same broad selection of packages. There's also a good selection of packages that can be installed with a single click from the web browser. Just point it at http://appcenter.bodhilinux.com and click Install.



Bodhi is a streamlined, superfast distribution designed for efficiency.

By Henry Winchester

OPTIMIZERS PUT TO THE TEST

DO PC-TUNING UTILITIES REALLY MAKE A DIFFERENCE IN YOUR PC'S PERFORMANCE?

Buying a system optimizer is the computing equivalent of buying a sound bar for your TV. Just as a TV should come with decent speakers, an installation of Windows should run well right from the word *go*. OK, that's a really bad analogy, but the point remains: PC-optimization-utility providers think that Windows simply isn't good enough.

In theory, these utilities scan your whole PC, locating missing registry entries, deleting temporary and unwanted files, and generally giving the whole thing a spruce-up. In practice, they can negatively affect Windows' performance by running in the background and loading at startup. It's a very fine line indeed between optimization and diminution.

Of course, PC-tuning software becomes somewhat irrelevant if you've just bought an SSD, which accelerates Windows far beyond what's achievable by merely tidying the registry or buying more RAM. But in some cases an SSD isn't practical or affordable, and this is where optimization software comes in handy.

With this in mind, we've tested six of the most popular PC-optimization suites. It was a nightmare of constantly copying a standard Windows installation back-and-forth, and running a series of tests to see what difference each piece of software made. In the end, we got a pretty clear picture of what you can reasonably expect from a PC optimizer and which ones are the best.

ASHAMPOO WINOPTIMIZER 9

POOR DESIGN OFFSETS BENEFITS

It may be a little confusing and look a bit janky, but it's quite handy once you get past its exterior.

IT CAN BE HARD to take a piece of software seriously when it asks whether you want to activate your Internet connection "Automatically" or "Manuel." That's just one of many mistranslations or misspellings in Ashampoo WinOptimizer 9, and it's indicative of the overall sloppiness of the design.

The software's cramped interface includes a handy summary of your system's hardware and settings, along with maintenance categories, plus CPU and RAM speedometers. Optional settings such as Live-Tuner and Hibernation File can be switched on and off from here, but there's no explanation as to what these toggles actually do.

FEATURES

Windows registry cleaner, hard drive health monitoring, system cleaner, PC acceleration, Windows customization, data rescue

Fire up the Tuning Assistant and you're presented with a bewildering number of questions, as if you're filling out a job application. People who know their way around Windows will find this survey easy to answer, but novice users are likely to find questions like, "Do you use the hibernation status of Windows?" confounding.

WinOptimizer applies fixes based on your answers, and it was here we found one of the program's saving graces: an option to adjust USB polling. Windows checks for new USB connections every millisecond, but this can be reduced to every five milliseconds to save power.

In the end, WinOptimizer 9 did make a difference. It came in third for Windows boot times, and although Half-Life 2 didn't start that quickly, LibreOffice's times were among the best. It's a piece of software that will benefit office and Internet users more than gamers, and a decent Peacekeeper score backs this up.

VERDICT 6

Ashampoo WinOptimizer 9

$40, www.ashampoo.com

AVANQUEST FIX-IT UTILITIES 12

'FIX IT' IS AN OVERSTATEMENT

Much like a kit car, Fix-It initially looks the business, but taking it for a test run reveals numerous flaws.

FIX-IT UTILITIES has the best-looking initial interface of the software in this roundup. Boot it up and you're presented with three battery-style columns representing the optimization, security, and maintenance status of your PC and an Analyze Now button. The application then finds every problem and, with a single click, fixes it.

Unfortunately, scratching beneath Fix-It's glossy surface reveals there's not much to it. It includes standard features, such as a registry optimizer and a startup-program killer, but nothing more. It feels as if developer Avanquest invested a lot of thought in the interface but forgot to include anything but the most rudimentary of optimization settings.

FEATURES

PC fixing, system-slowdown identification, Windows speedup, one-click maintenance, virus and spyware protection, file shredder

To make matters worse, it all becomes hugely confusing and poorly laid out once you get into the options. "Active programs" reveals 46 running services, like Windows NT Session Manager and DcomLaunch, but doesn't indicate what these are, other than "Necessary." Novice PC users may be bewildered.

Fix-It performed poorly across all our tests. Our Windows boot time was slowed by nearly a minute over the best-performing piece of software, and Fix-It was the lowest-scoring in our Half-Life 2 and LibreOffice tests. Every result showed a substantial decrease over Windows 7's native performance.

There is one small piece of wheat among the chaff, in the form of a file shredder, which permanently deletes files to "U.S. Department of Defense Standards." But, then, free software such as File Shredder (www.fileshredder.org) makes this universally available, anyway.

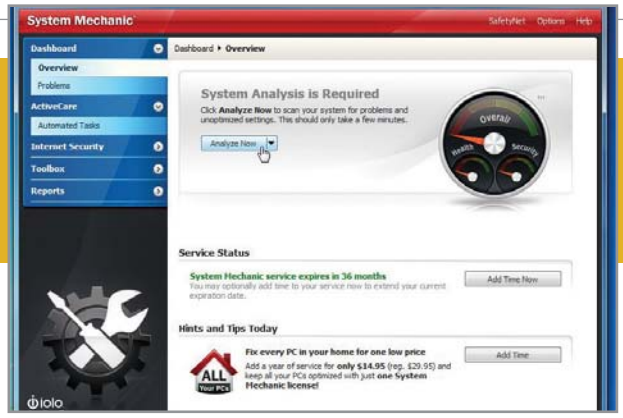
VERDICT 3

Avanquest Fix-It Utilities 12

$40, www.avanquest.com

IOLO SYSTEM MECHANIC 10.7

ITS OPTIMIZATION LEGACY LIVES ON



Those 14 years of experience have paid off: This is easily one of the best optimization suites we've tested.

ESTABLISHED IN 1998 with the grand vision of optimizing every PC on the planet, Iolo is the granddaddy of system-improvement software. The company estimates that its products account for 85 percent of optimization program sales in the U.S., and it pretty much created the genre. With facts like those, you'd hope System Mechanic would be good.

We weren't disappointed. The tool delivered astounding results in almost all our tests, with a snappy Half-Life 2 and LibreOffice opening, a best-ever Peacekeeper browser benchmark, and a low Windows shutdown time. Windows 7's startup time increased just slightly. The program also detected a staggering 260 registry problems in our system—almost four times as many as some of the others.

FEATURES

PC tune-up, undelete files, secure online backup, CRUDD remover, memory mechanic, Registry Revitalizer tool, secure data removal

Iolo has clearly invested a lot of time and money in ensuring a fluid, aesthetically pleasing experience from its software. Boot it up and a set of meters estimates your PC's health, with a nice big Analyze Now button to begin the optimization process. From here you're presented with a summary of issues on your PC, with the option to repair them one at a time or all at once.

It also provides a suite of tools for ongoing optimization to ensure that future problems are nipped in the bud. Each automation, like startup configuration and detection of low-memory problems, can be toggled on and off, and clear descriptions mean new users won't feel out of their depth. Further tools provide more tweaks, like acceleration and registry revitalization, and none of these feel tacked-on.

Sprucing up our operating system to levels far above its original installation, System Mechanic proved itself to be the best all-in-one product in our test.

VERDICT 9

Iolo System Mechanic 10.7

$50, www.iolo.com

PIRIFORM CCLEANER

CAN FREE SOFTWARE COMPETE?

A stripped-back but brilliant piece of software that does exactly what it should. And it's free.

FIFTY-FOUR SECONDS. That's how long Amir Khan stood in the ring at the WBO intercontinental lightweight championship before being knocked out by Breidis Prescott in 2008. It's also the amount of time it took our Windows 7 PC to boot after installing CCleaner. For Khan, it was a bad result. For us, it's very, very good.

Unlike all the other products here, CCleaner is free. Rather than promising a complete system optimization, it just cleans out all your browsers' temporary files, tidies up the registry, and empties Windows' temporary storage areas. It doesn't hang around on your system, and it doesn't load when Windows starts, which may explain that amazing boot time.

FEATURES

Registry cleaner, cleaners for all major browsers, Windows cleaner, ignores persistent logins

You might expect freeware to be poorly presented and full of adverts, but CCleaner is marvelously refreshing in its simplicity. It simply says, "Here's what we've found, you can click this button to get rid of it." You can choose what's kept and what's not, but you can also set it to clean everything apart from those all-important logins for webmail services.

In the rest of our tests, CCleaner didn't make a huge difference to native Windows performance. It scored second-lowest in our Peacekeeper benchmark, and Half-Life 2 took slightly longer to load, but this could have been a result of CCleaner turfing out gaming-client Steam's temporary files—something no other product did.

These are slight inconveniences compared to that 54-second Windows boot time. CCleaner may not appeal to those who are looking for the all-singing, all-dancing optimization software, but for us it's simply brilliant.

VERDICT 9 KICK ASS!

Piriform CCleaner

Free, www.piriform.com

SYMANTEC NORTON UTILITIES

BIG NAME, LITTLE VALUE

It's easy to use, but lacks features compared to much of the competition.

NORTON'S REPUTATION for antivirus software makes it a name people trust. PC users rely on it to keep all sorts of viruses and trojans at bay, so it makes sense that they should let Norton tinker with the way their machines run, right?

Resplendent in Norton's trademark honey-yellow hues, Utilities includes the de facto optimizers—and nothing more. You'll find a registry cleaner, service management, defragmentation tools, and a startup tool. A complete optimization involves clicking through a series of soulless web-page-like menus and applying the fixes Norton recommends. One nice touch is that Norton can apply fixes instantly without a system reboot, thanks to a Refresh Windows setting.

FEATURES

Fixes Windows issues, file rescue, hardware-problem scanner, registry optimizer, hard drive defragmenter, web eraser

The level of control here is all or nothing. Norton provides a pair of service managers with just two options—Recommended or Minimal. Choose either and you're presented with a huge list of running services to customize, but little in the way of description or explanation. Checkboxes turn them on or off, but most users will simply go with what Norton reckons is best. It seems like an overcomplicated approach.

Utilities failed to provide a substantial performance boost, increasing our boot time and giving mediocre results in Half-Life 2 and LibreOffice timed benchmarks. It found 114 registry problems, less than most others.

Norton Utilities may have been around for ages, but this new release feels more like an attempt to squeeze the last breath from a dying brand rather than a return to former glories. There are simply much better options out there these days.

VERDICT 4

Symantec Norton Utilities

$50, www.symantec.com

SYSTWEAK ADVANCED SYSTEM OPTIMIZER 3

TWO-IN-ONE OPTIMIZER AND ANTIVIRUS

Its handy features and decent overall performance are marred by a clumsy interface and intrusive operation.

ADVANCED SYSTEM OPTIMIZER scans your PC for security vulnerabilities and registry issues, then presents them in a dramatic red box inviting you to "Register now." The utility found 1,206 issues on our machine—surprising, given that no other software reported so many.

Once we registered, Advanced System Optimizer ran a full scan of our machine and fixed the problems. It also dumped folder upon folder of HTML report files on our desktop, closed Chrome, and restarted our PC.

FEATURES

Smart PC card, driver updater, PC fixer, undeleter, game optimizer, system protection, disk optimizer, secure encryptor, registry cleaner

With such intrusive and poorly designed programming, you'd hope ASO would offer serious improvements in performance, but the main result was only slightly better than average: The Windows boot time increased by nine seconds. On the other hand, the Half-Life 2 game load (as measured with a stopwatch) was faster than all others.

There are added benefits, too. ASO comes with System Protector, which is essentially a stripped-down antivirus program. This isn't an antivirus group test, so we won't detail its intricacies, and we wouldn't trust it alone to defend our PCs. It makes Advanced System Optimizer feel a little more substantial, though.

Its other benefit is a gaming mode, and ASO is the only optimization tool to offer this. Any game you specify is run in a virtual desktop, so you can switch between it and your real desktop quickly. It smooths out sound levels so your eardrums don't burst from virtual gunfire, and allows key remapping. It's a handy feature, but not quite enough to save Advanced System Optimizer from its disappointments: heavy-handedness and intrusive operation.

VERDICT 6

Systweak Advanced System Optimizer 3

$40, www.systweak.com

OPTIMIZATION UTILITIES COMPARED

	Native Windows Performance	Ashampoo WinOptimizer 9	Avanquest Fix-It Utilities 12	Iolo System Mechanic 10.7	Piriform CCleaner	Symantec Norton Utilities	Systweak Advanced System Optimizer 3
Windows Boot Time—login to Steam starting (min:sec)	1:09	1:17	1:54	1:15	0:54	1:21	1:18
Game Load: Half-Life 2 w/App Timer (min)	0.966	0.813	0.936	0.639	0.855	0.752	0.765
Game Load: Half-Life 2 to main menu w/ stopwatch (sec)	36	40	43	34	42	39	33
LibreOffice—Writer start (min)	1.937	1.648	2.228	1.638	1.656	1.671	1.665
Peacekeeper Browser Test (higher is better)	2,083	2,103	2,007	2,132	2,095	2,102	2,120
Windows Shutdown (sec)	18	18	20	15	17	16	17
Registry Problems Found	N/A	170	153	260	71	114	74

THE FINAL ASSESSMENT

Our group test told us what we already suspected: Despite makers' proclamations, most optimization software doesn't actually do a great deal for your PC. Of the six products we tested here, only one was able to boost our Windows start times significantly. Meanwhile, none of the products gave us consistently good results across the board—they either boosted Half-Life 2's start times, but let us down in the LibreOffice loading times, or vice-versa.

That's not to say system optimizers are completely useless. The majority did offer a selection of decent-quality tools on top of the conventional registry tidiers and disk defragmenters, such as Ashampoo's ability to alter USB polling and ASO's gaming mode. As performance optimizers, however, only two of the programs really qualify as worthwhile.

> NONE OF THE PRODUCTS GAVE US CONSISTENTLY GOOD RESULTS ACROSS THE BOARD

IOLO SYSTEM MECHANIC

Iolo's System Mechanic promises a lot and, despite our initial reservations, it delivered on the majority of its features. It might cost a little more than other tune-up software, but there's bags of value here. Extra features include the wittily titled CRUDD scanner, which removes redundant programs, and whole-family licensing, so it can be installed on numerous PCs. It performed admirably, too, delivering decent results in everything apart from system startup time.

PIRIFORM CCLEANER

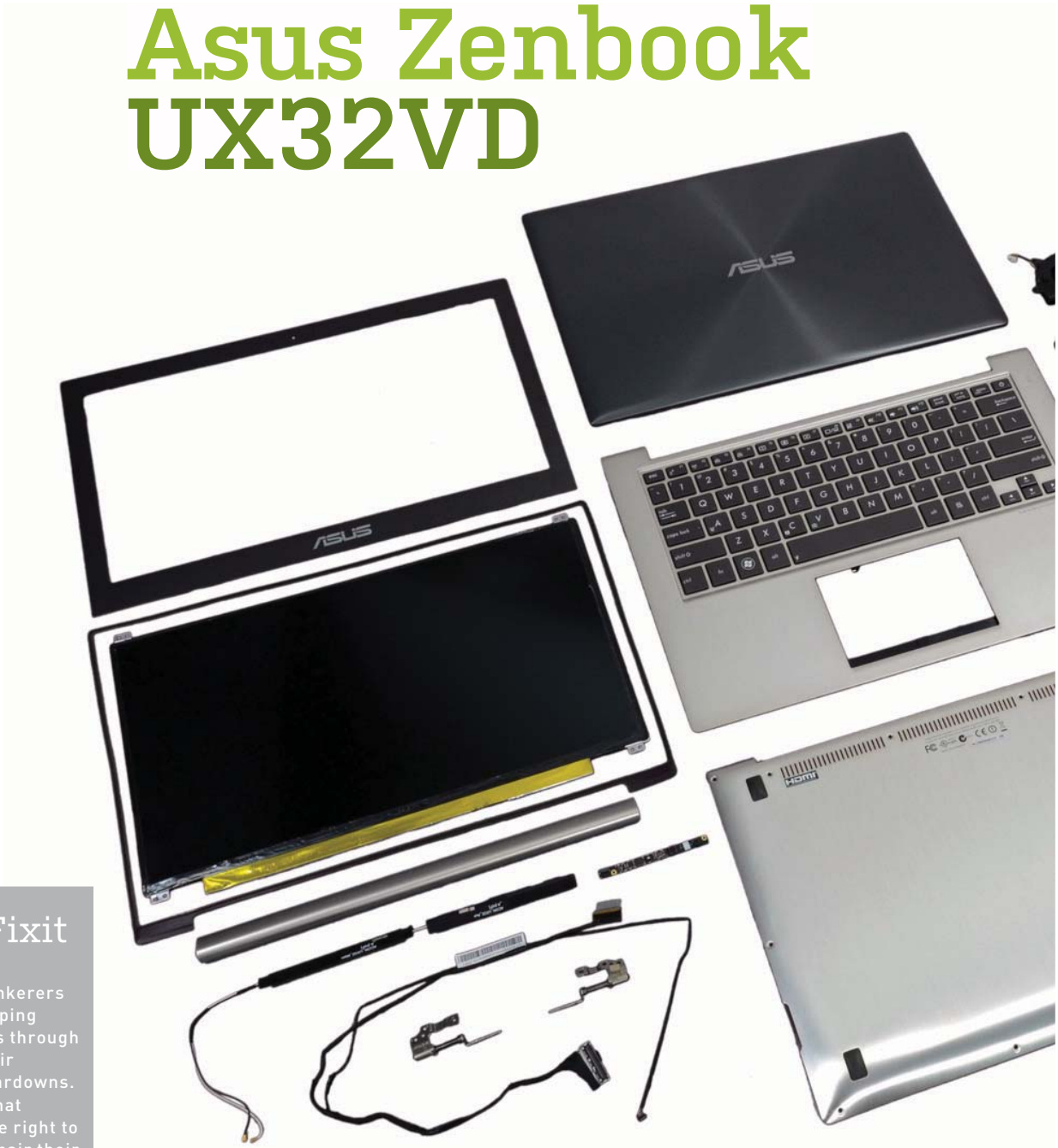
But our favorite of the utilities is Piriform's CCleaner. We love its nuts-and-bolts approach, and it's by far the best option when it comes to optimizing your PC. It didn't drag our system down at all, and its run-once method feels a lot better than being constantly nagged and reminded that the software is there. It feels solid and reliable, too, and because it's free to use, you don't have to invest anything to find out if it works. Do your PC a favor and try it out.

iFixit presents:

AUTOPSY

THIS MONTH WE DISSECT...

Asus Zenbook UX32VD



About iFixit

iFixit is a global community of tinkerers dedicated to helping people fix things through free online repair manuals and teardowns. iFixit believes that everyone has the right to maintain and repair their products. To learn more, visit www.ifixit.com.

MAJOR TECH SPECS:

The Zenbook UX32VD is Asus's flagship Ultrabook featuring discrete graphics. In our teardown, we found that the Zenbook lived up to its name, giving us very little frustration during deconstruction. Here are some of the Zenbook's most calming features:

- 1.9GHz Intel Core i7 processor
- Nvidia GeForce GT 620M dedicated GPU
- 1920x1080 IPS LCD
- 4GB (2GB upgradable) RAM
- 500GB HDD stock with 24GB SSD cache

KEY FINDINGS:

- The UX32VD Zenbook earns a reparability score of 8 out of 10. All the components are easy to access, with no proprietary screws standing in the way.

- The stylish aluminum lower case is held in place with 12 T5 Torx screws.

- The battery is not glued in place, but rather held down by eight good-old Phillips #0 screws and can be replaced in a matter of minutes. (Incidentally, the 7.4-volt, 6,520mAh battery in the UX32VD weighs 280.5 grams, accounting for approximately 20 percent of the Zenbook's weight.)

- You can upgrade both the RAM and the hard drive in this machine.

- Motherboard removal and replacement is fairly easy with the inclusion of labeled connectors on the board. Off come some standard connectors and screws, and the motherboard is free.

- Because fans are responsible for circulating the air through the computer, they're often the component that collects the most dust. The UX32VD's easy-to-access fans make the device easy to maintain.

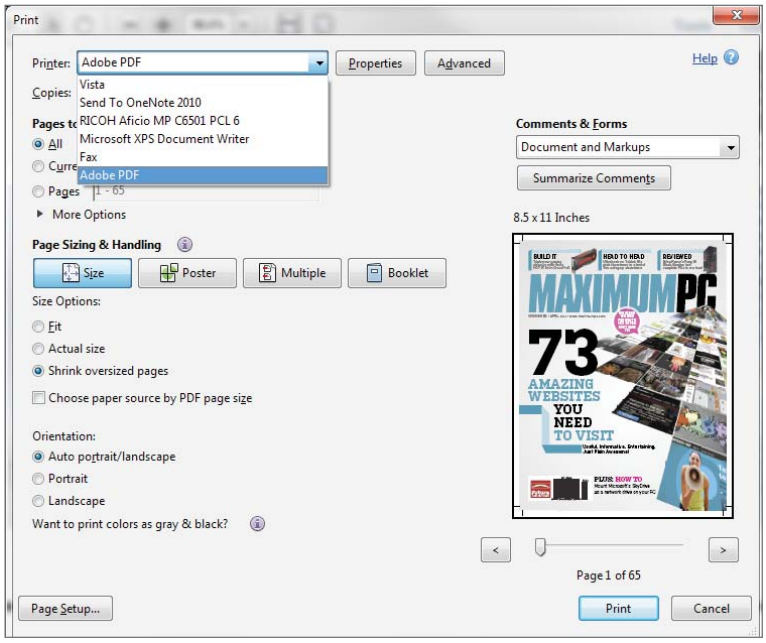
- Not only is there no obnoxiously glossy front glass on the Zenbook's display, but the bezel comes off pretty painlessly after applying some heat and using our guitar picks to separate it from the display. But right as we were about to go gaga over the display's accessibility, we had to catch ourselves: The LCD and camera cables are routed underneath a rubber gasket that was installed with a formidable adhesive. Needless to say, the gasket required lots of heat and patience to peel up.

- Indeed, an excess of adhesive holding some components in place was the Zenbook's biggest failing.

HOW TO

STEP-BY-STEP GUIDES TO IMPROVING YOUR PC

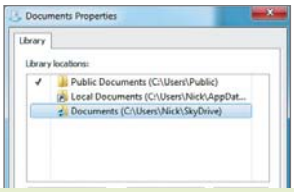
WINDOWS TIP OF THE MONTH



'RE-FRY' A PDF FOR A SMALLER FILE SIZE

If you need a quick way to shrink a PDF down to a more manageable file size, here's something you can do with nothing more than the free Acrobat reader. Just open the file, start the Print dialogue, and under Printer, choose Adobe PDF to create a new file. You'll get a smaller file that should still be totally legible.

MAKE - USE - CREATE



ALEX CASTLE
CONTRIBUTING EDITOR

SETTING UP YOUR MOBILE HQ

I RECENTLY moved to Hawaii, and after a brief, frustrating stint working from home, I've moved my operation to a coworking facility here in Honolulu. Coworking, if you're unfamiliar, is a relatively new phenomenon where spaces are set up for freelancers and entrepreneurs to work on a daily basis—like working from a coffee shop, but with a membership fee, free coffee, and better Wi-Fi.

Since I don't get a permanent desk where I work, I've had to learn to be very mobile. Over the last few weeks I've come to appreciate cloud services—like Dropbox, Evernote, and Google Docs—even more. Between the three of them, I've got a complete mobile workspace, with everything I need available wherever I am, and on whatever device I want. Even if you work from a normal desktop workstation, I recommend integrating these tools into your routine now, to give you more flexibility when you need it in the future.

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

Create Stunning Animations from Video Clips

YOU'LL NEED THIS

CLIPLETS
Cliplets is a free cinemagraph-making program from Microsoft Research, available at bit.ly/yluu7v.

A VIDEO CLIP
Cinemagraphs are best made from videos taken with a stationary camera.

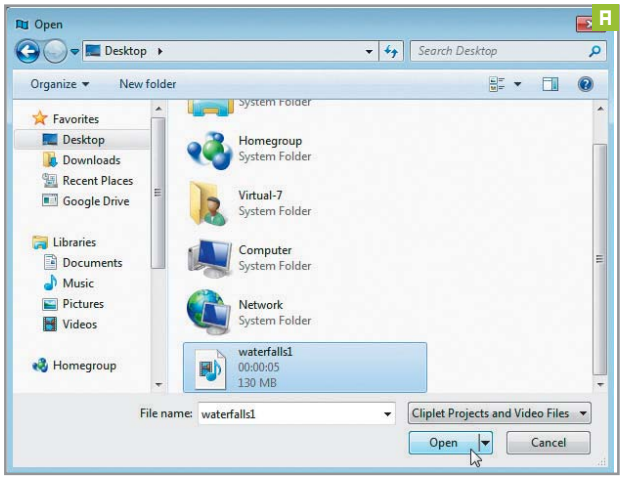
WHEN YOU'RE ON vacation, taking a day trip, visiting friends, or just out and about, you'll probably be carrying either your camera or a phone that can be used to shoot video and photos. When the time comes to show off your pictures and videos, you might gather the family around a computer, upload files to a social network, or create a gallery on your own website. These are all great ways to share your favorite images, but what if you're looking for something a little different?

Microsoft Research Cliplets is a stunning free program that can be used to create "cinemagraphs." These are essentially still images with sections that are animated. It's a lot of fun transforming your videos into something a little different, and the results never fail to impress. Give it a try for yourself, and you're sure to be amazed. –MARK WILSON

1 DOWNLOAD AND INSTALL To download Cliplets, visit the Microsoft Research page at research.microsoft.com/cliplets. On the right of the page click the "Download for 32-bit Windows" or "Download for 64-bit Windows" button that's displayed—only one will be visible—and then click the Download link to save the file to your hard drive.

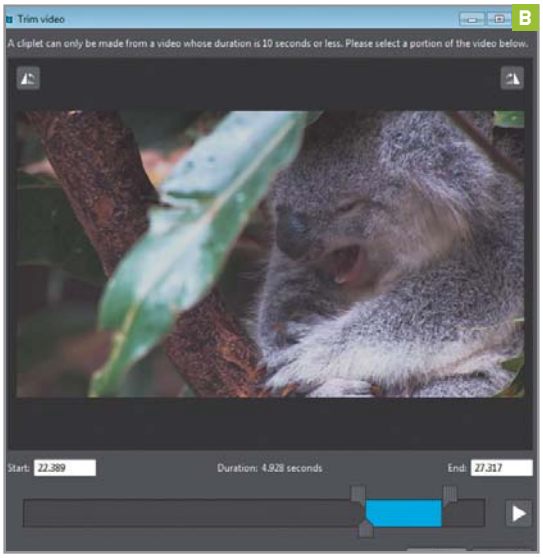
» Run the installer. If you don't already have the Visual C++ 2010 Runtime Libraries installed, you'll be prompted to download them—just click Yes and you'll be taken to the download page. You can then continue with the main installation, which takes just a few moments. There's no need to change any of the default settings.

2 CONFIGURE YOUR VIDEO CLIP After launching the program, click the Open button in the upper right of the window and then select a video file you would like to work with **(image A)**—most of the popular formats are supported, including MP4 and AVI. Having selected a video file, click the Open button to load the file into the program. Alternatively, you can drag and drop a video file onto the program window.



» Cliplets has been designed to work with video clips that are 10 seconds or less in length. If you've opened a longer video, you'll need to select a portion of it to use. Beneath the video preview, drag the first of the upper sliders to the start of the section you'd like to use and the second to the end **(image B)**. You can drag the blue bar back and forth to choose a different area.

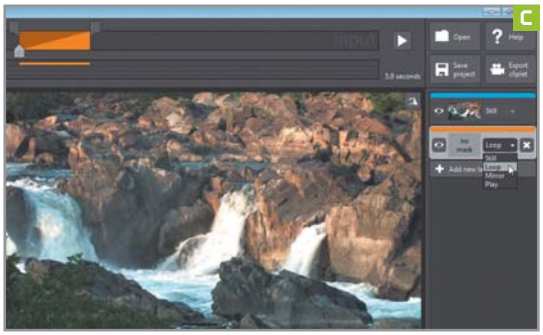
» Click OK to import your video selection into the program. It's possible you might have shot video footage that's on its side. If this is the case, just click either the "Rotate counterclockwise" button in the upper left of the view preview, or the "Rotate clockwise" button in the upper right of the video preview window. You're now ready to start working on your first Cliplet.



3 CREATE YOUR CLIPLET The next thing you need to do is define the areas of your video that should be static and those that should remain dynamic. To do this, move the playback slider at the top of the screen to a suitable point in the video clip and click the "Add new layer" button to the right of the program window. Make sure Loop is selected from the drop-down menu that's displayed **(image C)**.

» The mouse cursor will now change into a pencil, which you can use to draw around the area of your video that you would like to retain movement. Keep the left mouse button pressed while you draw around the relevant area and release the button when you're done **(image D)**. If you make a mistake, just click the X next to Loop at the right of the screen and repeat the last two steps.

» In the Playback bar at the top of the screen, drag the colored bar left and right to position it with the preferred static background. You can also move the start and end points of the slider to determine the loop of the video **(image E)** and check the Smooth box beneath the video window to ensure that the video loop appears completely seamless.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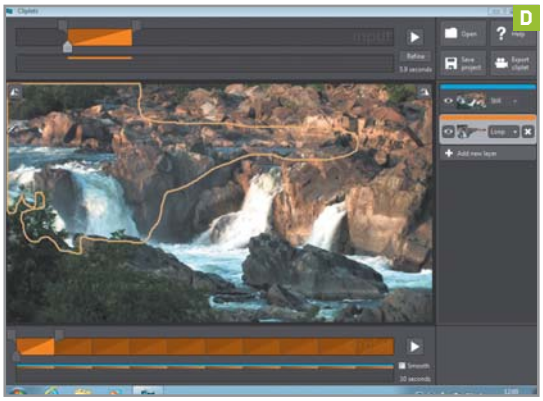
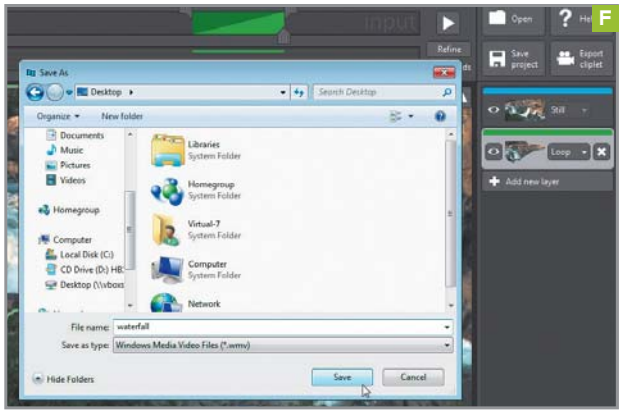

D


E

4 PREVIEW AND SHARE YOUR CLIPLET Click the Play button located beneath the video window and your footage will be rendered for you. If you're happy with the results, you're ready to save your completed project. If not, you can continue editing and previewing your video until you produce the results you're looking for. It's worth spending a little time on this to get the best possible Cliplet.

» You'll find that Cliplets makes it very easy to create something truly eye-catching, and you'll no doubt want to share your creations with others. Click the Export Cliplet button in the upper right of the screen, enter a suitable name, and use the "Save as type" drop-down menu to choose a video format to save the file in **(image F)**, or choose to save it as an animated GIF. It's now ready to post online or email.


F

Clean Up Your Hard Drive with DrivePurge

YOU'LL NEED THIS

DRIVEPURGE

A free, portable hard drive cleaning utility from bit.ly/nmBRSL.

ALTHOUGH HARD DRIVES are now bigger and cheaper than ever, you may be surprised by just how much unnecessary garbage is cluttering yours. While the chances of running out of space are lower than they have been in the past, an untidy hard drive is still less efficient than a neat one, and can slow down the overall performance of your computer.

DrivePurge is a fantastic, free maintenance tool that will not only tidy up all the unwanted files that accumulate over time, but can also help protect your privacy by cleaning up the data stored in your PC's log files and registry. You'll be amazed at how much useless data is filling up your hard drive! Try the tool out for yourself to see how much space you can save. **–MARK WILSON**

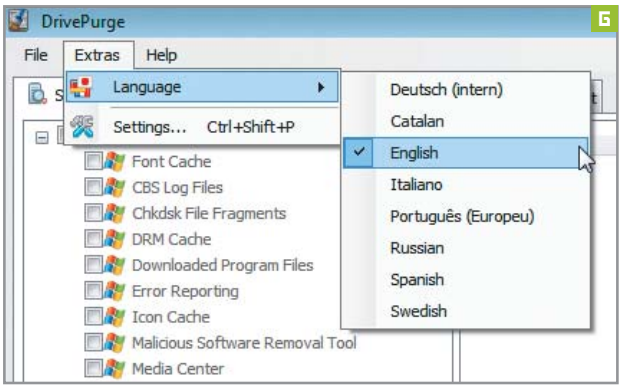
1 DOWNLOAD AND INSTALL For the download, navigate to www.gaijin.at/en/dldrivepurge.php. Beneath the Download heading, click Download. DrivePurge is provided as a compressed RAR file—on the off chance that you don't already have a program capable of extracting .rar files, we recommend 7-Zip, available for free at www.7-zip.org/.

» Extract the DrivePurge RAR. The program doesn't require an install, so you'll be able to run the executable directly from the folder you extracted to. Right-click it and select Run as Administrator to get started with the program.

2 CONFIGURE DRIVEPURGE Click Yes in the User Account Control dialog and DrivePurge will load. It will start in German mode at first, so select the Extras menu and then click Sprache / Language followed by English **(image G)**.

» Click OK and then close and restart the program in the same way to activate the new setting.

» Before deleting any files, click the Extras menu and select Settings. Now move to the System Cleanup tab and check the box labeled "Move files to the Recycle Bin (if possible)" before doing the same on both the Drive Cleanup and User Tracks Cleanup tabs. Click OK when this is done.

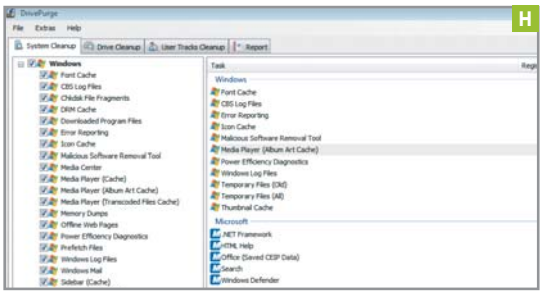


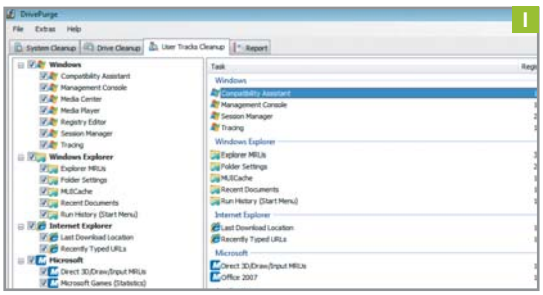
3 CLEAN UP YOUR SYSTEM On the System Cleanup tab, check the boxes to the left of the Windows, Microsoft, and Applications labels to select all of the options, and then click the Analyze button at the bottom of the screen. When the results of the drive search are shown **(image H)**, click the Cleanup button to the bottom right, followed by OK to delete them.

» If you change your mind about deleting a particular item in the list, you can right-click its name and select the Remove Job option. Once this is done, you're ready to move to the Drive Cleanup tab.

» To the left of the screen you'll see a list of all the hard drives inside your computer. Check each of them, make sure that All is selected from the drop-down menu to the right, and check all of the boxes below. Click Analyze, and once the scan has been performed click Cleanup followed by OK. Now move to the User Tracks Cleanup tab to protect your privacy.

» In addition to saving space, DrivePurge can also be used to protect your privacy by cleaning up traces of your past activities. In the same ways as before, you can check all or just some of the boxes on the left **(image I)** before clicking Analyze and then Cleanup, this time to remove logs stored by programs. Work through these tabs on a regular basis to free up space and clean logs.





BUILD IT

NATHAN EDWARDS **SENIOR EDITOR**

Roll Your Own Home Server

We haven't checked in with FreeNAS, the FreeBSD-based DIY NAS OS, in quite some time. The OS has been completely overhauled, plugin support has been added, and it now works with even more hardware

LENGTH OF TIME: **3 HOURS** | LEVEL OF DIFFICULTY: **ADVANCED**

THE MISSION Since the last time we built a FreeNAS box, for the January 2010 issue, the OS has been through some changes. It switched developers, nearly switched platforms, removed media streaming, added it back in via plugins, added better ZFS management, and more. FreeNAS promises near-endless customization and hardware support, enabling nearly anyone to build a highly moddable NAS from off-the-shelf parts. I've been promising an updated FreeNAS build for quite a while, and now's the time to deliver. I assembled a cream-of-the-crop batch of hardware, got the latest version of FreeNAS, and got cracking.

CHOOSING THE HARDWARE

THE BEAUTY OF FreeNAS is that it'll work with just about any old hardware you have lying around—you don't need to build a special box for it. This "build" is more about exploring the new version of FreeNAS than it is about the hardware itself. I took the opportunity to build a pretty powerful system, but you don't have to take my hardware choices as your minimum recommended specs or anything like that. I just wanted to see what would happen if I gave it beefy hardware to play with.

I chose a Fractal Array R2 chassis, which has six drive bays and an integrated PSU. I had a Mini-ITX FM1 board and an AMD A8 APU lying around and decided to use those, because a more capable CPU in your NAS means better transcoding and streaming. You could just as easily use any Mini-ITX board with a PCIe slot, maybe one with an integrated Atom or Brazos chip, if you want to save some money.

Four Western Digital Caviar Red NAS drives at 3TB each give me a theoretical 12TB of capacity if I were just going to make a RAID 0, which I'm not. Because I'll be using a filesystem called ZFS, which does all its volume management in software, I want a good host-bus adapter that doesn't insist on imposing its own hardware RAID over it—just something to pass the commands from the OS to the drives. I picked LSI's SAS-9207-8i, which can control up to eight 6Gb/s drives and runs on a x8 PCIe 3.0 bus. Because I want to use the case's SATA power connectors, I also bought a HighPoint Mini-SAS-to-SATA breakout cable rather than use the included connectors, which run on Molex power.

Because ZFS loves RAM and wants as much as you can throw at it (the specs recommend at least 1GB per TB of storage), I used two 8GB DDR3 DIMMs from G.Skill.

FreeNAS won't mount any storage on the boot drive, and only takes up about 2GB total (with another 2GB swap), so there's no point wasting a hard drive on it. It's perfectly happy booting from a flash drive. I just used an 8GB drive left over from a CES press kit.

INGREDIENTS

	PART	URL	PRICE
Case/PSU	Fractal Array R2 w/300W SFX PSU	www.fractal-design.com	$200
Mobo	Asus F1A75-I Deluxe	www.asus.com	$175
CPU	AMD A8-3850 2.9GHz APU	www.amd.com	$100
Cooler	Stock AMD	www.amd.com	$0
RAM	G.Skill RipjawsX	www.gskill.com	$105
Boot Drive	8GB Flash Drive	various	$8
Hard Drives	3TB WD Red NAS drive (x4)	www.wdc.com	$880
Drive Controller	LSI SAS 9207-8i	www.lsi.com	$305
SAS-to-SATA cable	HighPoint Int-MS-1M4S	www.highpoint-tech.com	$10
OS	FreeNAS 8.2 Release	www.freenas.org	$0
Total			$1,783

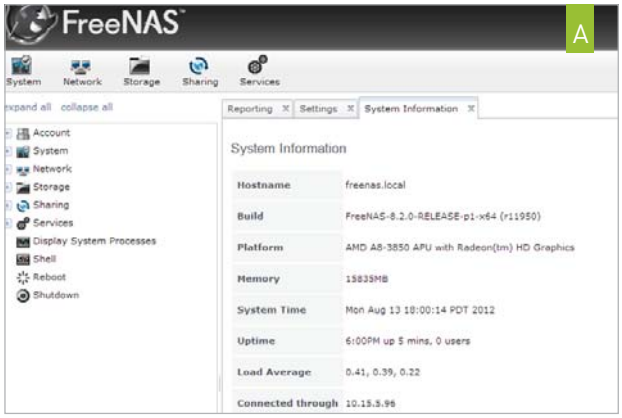
SET IT UP

Since this is a very straightforward build but a complicated software install, I'll skip the step-by-step build entirely, and start with the software configuration. It's a bit of a doozy. Thankfully, I have the excellent instructions on Freenas.org and the FreeNas Quick Start Guide (http://doc.freenas.org/index.php/Quick_Start_Guide) to help. Here's how to set up FreeNAS; create volumes; set up users, groups, and sharing; and install a few streaming plugins.

1 INSTALL THE OS

TO CREATE the bootable OS image (from a Windows machine), you'll need the aforementioned USB drive, the programs 7-Zip (www.7-zip.org) and Win32 Disk Imager (bit.ly/N3QiJT), and the img.xz file for your install. We're using FreeNAS 8.2.0 Release 1. Download the FreeNAS-8.2.0-RELEASE-p1-x64.img.xz file from SourceForge (bit.ly/N3Qvg7). Extract the img.xz file using 7-Zip to turn it into an .img file, then burn that file onto your USB key with Win32 Disk Imager. This might take a few minutes. Once it's ready, plug the USB key into one of the FreeNAS box's rear USB ports and turn on the machine. You'll need a keyboard and a monitor for this, but only for a few minutes. Make sure the FreeNAS box is connected to your network via Ethernet. Make sure the system is set to boot from USB. The system will spend a few minutes doing a self-test and then dump you at a screen called Console Setup. At this point, under a list of 11 options, you should see the phrase "You may try the following URLs to access the web user interface," followed by an IP address. Go to another computer on your network and enter that address into the web browser; you should be able to get right into the web console, which will make this whole process a lot easier **(image A)**.

You'll notice a blinking Alert light on the upper right. Click it and you'll see that you need to change the admin password. Hit the Account button to the left of the Alert button, then select Change Password. Changing the admin username from "admin" can help with security too. You should also set up an email address for the root account, so FreeNAS can email you with admin alerts. Go to Account, then Users, then View Users, and click Change Email on the root account. You should also set up console logging by going to System > Settings > Advanced and selecting Show Console messages in footer.

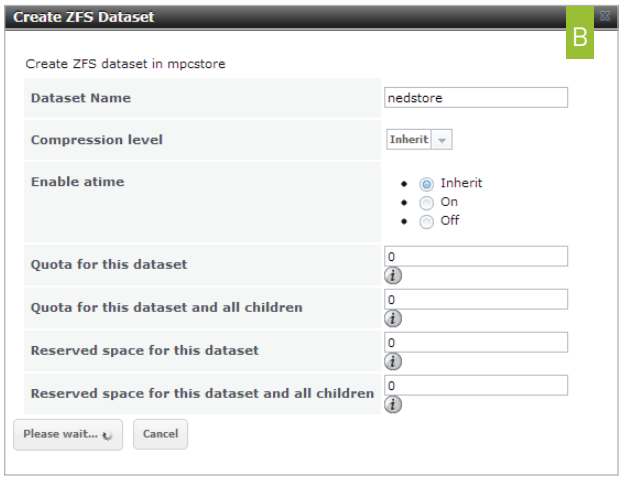


2 SET UP STORAGE

NOW FOR THE fun part: volume management. Thousands of words can be and have been written about the relative merits of the various traditional RAID levels, as well as ZFS-specific types like RAIDZ1 and RAIDZ2. Any choice will be a trade-off between performance, capacity, and robustness. I'm going with RAID-Z2, which will allow me to tolerate up to two disk failures without data loss.

Go to Storage > Volumes > Volume Manager. Create a volume name (I used "mpcstore"), then hold Ctrl and select the drives to use—I used all four drives. For filesystem type, select ZFS, then RAIDZ2. Select Add Volume. My four 3TB drives created a volume of 6TB; I'm sacrificing space for redundancy.

Inside the volume, I'll create individual ZFS datasets so I can set granular permissions on each of them. Because I'm the first user, I'll create a dataset within mpcstore for myself. In the left navigation pane I'll go to Storage > Volumes > /mnt/mpcstore and select Create ZFS Dataset. I'll call it "nedstore" and give it an unlimited quota **(image B)**.



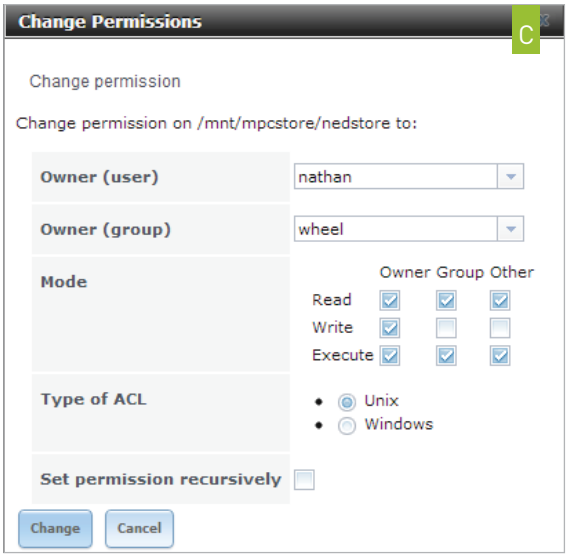
3 ADD USERS AND GROUPS

FREENAS can be configured to inherit users from an Active Directory or LDAP, but I'm assuming that this device will be used in an unmanaged home network, so we'll assign users with the same names as the Windows login names they use, per FreeNAS's instructions.

I've created a user named Nathan (for myself), and selected "Create a new primary group for the user," which will let me fine-tune permissions. I set my home directory to the dataset I created earlier, i.e., /mnt/mpcstore/nedstore.

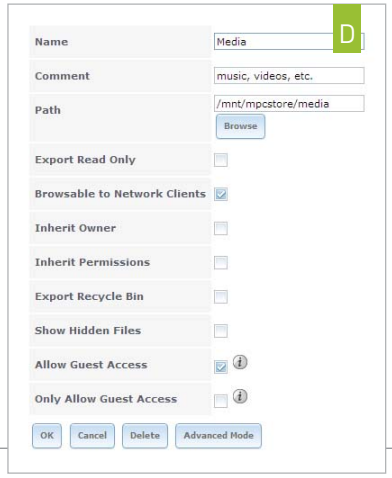
4 CONFIGURE PERMISSIONS

GO BACK into Volumes and find the dataset you created earlier—in my case, that's nedstore. Click Change Permissions and select the user you just created. Here you can control which users and groups have read/write access to the dataset **(image C)**. Repeat the dataset, user, and permission steps for any users you create.



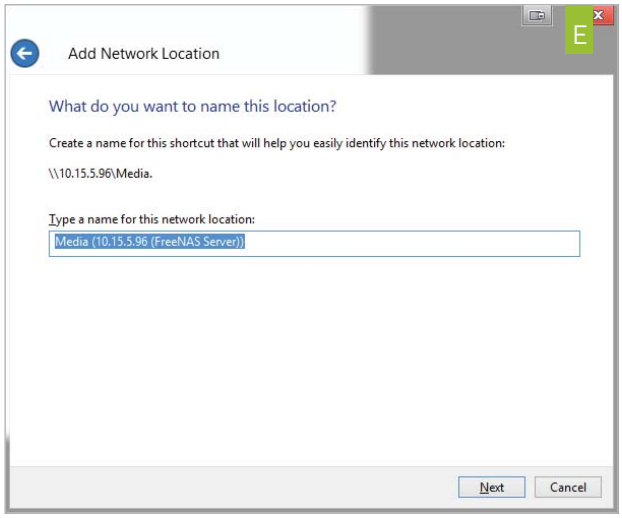
5 SET UP A MEDIA SHARE

I'M GOING TO SET up a media dataset so I can share my music and movies with the rest of the Windows computers in my network. Follow the procedure above for setting up a new dataset (I called it Media), then browse in the navigation pane to Sharing > Windows (CIFS) > Add Windows (CIFS) Share. Create a new share and point it to the dataset you've just created **(image D)**. You can either restrict it to specific users or groups, or enable an anonymous Guest Mode. If you have Apple computers on your network, you should also turn on AFP; if you have Linux, enable NFS. You can also enable SSH, rsync (for replication), iSCSI, and more, all from the Services panel.



6 MAP THE DRIVE

NOW YOU can map the Windows share you've just created. Go to My Computer, right-click, and select Add Network Location. Plug in the IP (the same one in your web console) and share name, as shown in the image **(image E)**. Give it a fancy name. Note that you'll have to configure permissions so that users have write access if you want to be able to add files and folders via Explorer.

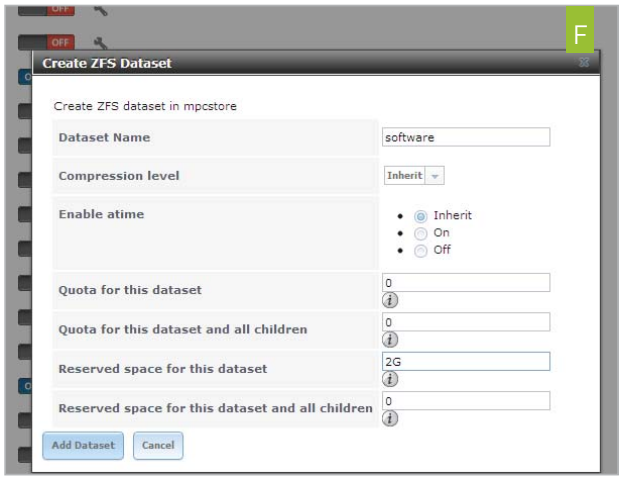


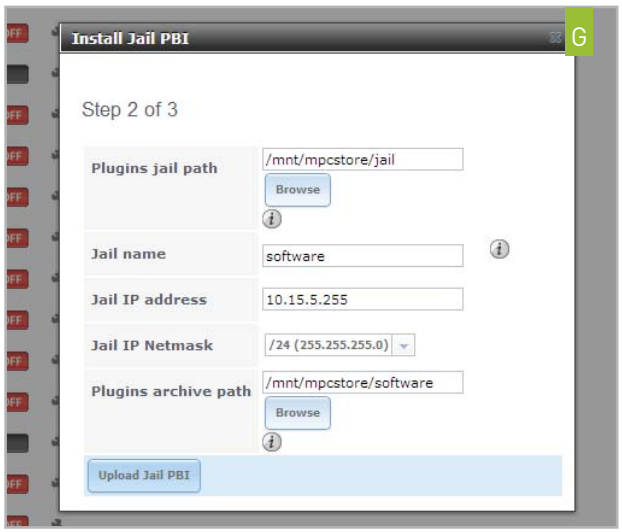
7 SET UP THE PLUGINS JAIL

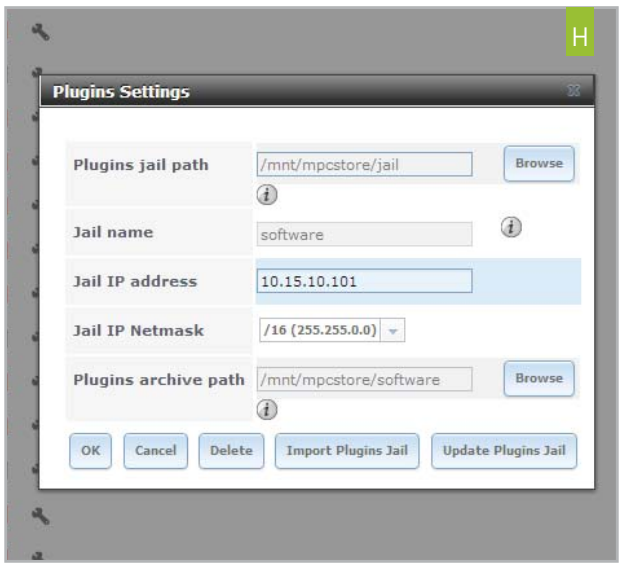
EARLIER VERSIONS of FreeNAS contained robust streaming options, such as iTunes, uPnP, and BitTorrent clients. FreeNAS version 8.2 restored that functionality via the use of plugins. The word "plugin," however, dramatically overstates the ease of using these. To install and set up these plugins, first go to your storage volume and create two ZFS datasets, one of at least 2GB called Jail and another called Software **(image F)**. The plugin system basically creates a virtualized FreeBSD system inside your FreeNAS system, and by this point if you're tearing your hair out, you're not alone.

Next, go back to SourceForge and find the plugins_Jail.pbi file for the release you're running. In our case, that's at http://sourceforge.net/projects/freenas/files/FreeNAS-8.2.0/RELEASE/x64/plugins/. Download the PBI file to your computer. Now click the little wrench icon next to Plugins in the Services menu. That'll put you through a three-part setup screen. The first one will give you a temporary place to store the PBI you're about to upload. I just used the root of my mpcstore. The second lets you set up the paths to your jail and software datasets. Point the plugins jail path to the jail dataset and the archive path to the software dataset **(image G)**. The third step is to upload the plugins jail PBI file from your desktop.

You'll also need to create a separate pingable IP address for the software jail, distinct from your FreeNAS IP address **(image H)**.



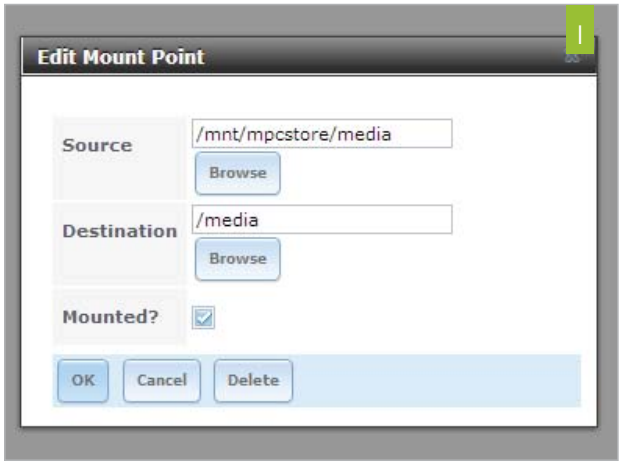


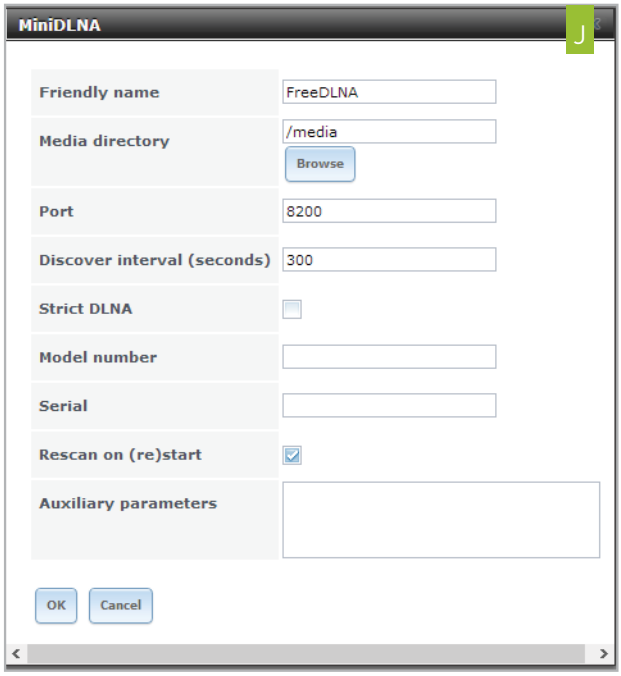


8 INSTALL PLUGINS

NOW YOU SHOULD be able to slide the Plugins slider to On and click the Plugins menu at the top. Go back to SourceForge and download the PBI files for the plugins you want to install. Right now the ones available are Transmission (a BitTorrent client), MiniDLNA (a, yes, DLNA client), and Firefly, a no-longer-maintained iTunes-library service. Once you've downloaded them, hit the Install Plugin button and browse to the PBI file and upload it. You'll see it appear in the Plugins list, with service status set to Off. Create a mount point *within* the jail pointing to a folder *outside* the jail **(image I)**. I directed it to the same dataset I'm using for my Windows share, so I can drag-and-drop media that can then be broadcast over MiniDLNA and Firefly. Easy, right?

Now go to the left-side navigation tree and go to Services > Plugins, and select the plugin you just installed. I'll use MiniDLNA as an example. Give it a friendly name and a media directory. Note that your media directory should use a relative path within your software jail, so it's best to just type it in manually. I used /media again **(image J)**. Save your changes and turn the plugin on. Make sure the IP address you picked for your software jail is working and you should see the DLNA server show up in your list of UPnP devices (I used VLC to check).





PADDLING IN THE SHALLOW END

SO NOW YOU know how to set up users, groups, datasets, and sharing, and you've got your plugins ready to go. We've only scratched the surface of what FreeNAS has to offer. Fortunately, there's a robust community that loves documentation and has its own forum with discussions and FAQs for every part of the FreeNAS experience, from hardware to software to plugins to fine-tuning, and more (bit.ly/OosjiB).

One note: Be sure to back up your NAS data to an external drive. Even with two-disk loss tolerance, you never know when disaster will strike. You can use FreeNAS's built-in rsync to make sure you have all your data synched to an external drive.

As for the specific hardware I used, it's probably overkill for most home users. It did enable large-file read and write speeds of over 90MB/s, which is quite nice.

FreeNAS's greatest strength is also its greatest weakness: It's incredibly complex and granular, with myriad configuration options, plugins, services, and so forth. The average home user may be better off buying an off-the-shelf NAS from Qnap or Synology, which are easier to configure and often include mobile access apps. But if you have the patience and the inclination, there's nothing like building your own.

REVIEWS

TESTED. REVIEWED. VERDICTIZED.

INSIDE

STEALTH MACHINES ESPIONAGE PAGE 76

Stealth Machines Espionage

A machine that will still have support in 2022?

YOU MAY NOT have heard about PC builder Stealth Machines, but apparently that's the way the company likes it. In fact, the company's web page proclaims that it's the "underground computer company of the hardcore gamer." We'd guess that's the "stealth" part of the name.

So color us surprised when the Stealth Machines Espionage arrived and it wasn't matte black and sporting that new ECS Stealth motherboard (see Quickstart).

The Espionage isn't extreme, but it's nicely outfitted. Built around an EVGA Z77 FTW board, it packs a 3.4GHz Core i7-3770K overclocked to 4.68GHz. All four DIMM slots are packed with Mushkin DDR3/2133. For a gamer, the most important component is the graphics card. In this case, it's the graphics card*s*—plural. Stealth Machines held out until the last minute to score a pair of EVGA GeForce GTX 660 Ti cards.

Would it make more sense to run a single GeForce GTX 680 instead? We think there's no easy answer to that question. Our general philosophy is to run the single fastest GPU you can afford, since it will give you performance in every game from day one rather than having to wait for SLI or CrossFireX profiles. We think the 660 Ti might be an exception to that rule. Basically, the 660 Ti duo will smoke a single GTX 680 card in most games and came surprisingly close to the performance of our zero-point rig's GTX 690. Part of that is the result of the Stealth's overclocked Ivy Bridge CPU, but it's a shocker to see this PC just 16 percent slower than our zero-point in Batman: Arkham City and 11 percent slower in 3DMark 11.

Lest you cheapskates scoff at the GeForce GTX 690, we'd be remiss if we didn't point out that our zero-point hammers out 55.5fps in the tessellation-heavy Heaven 3.0 benchmark while the Stealth is way back at 38.3fps. That's almost a 30 percent difference—so there is a point to the heavy metal sometimes.

Elsewhere, the Espionage aces the zero-point in Stitch.FX 2.0 and ProShow Producer 5.0. Neither benchmark exploits the six cores in our zero-point, but the ZP gets payback in Premiere Pro CS6 and x264 5.0, which can eat all the cores you throw at 'em.

In the end, the Espionage is a pretty nice gaming rig and has plenty of power for content creation, too. But we can't publish this review without some criticism. First, we'd probably opt for a pair of 8GB DIMMs rather than four 4GB sticks, to allow for future upgrades. We also had a small snag in the overclock, as one core failed during a Prime95 test. Stealth had us add voltage to the core and all was well. Our final criticism, though, is the price. The machine, while fast for its class, is also awfully expensive for its class. As a comparison, our Ultra rig (see Blueprint) is just $140 more expensive with a hexa-core CPU, GTX 690, 3TB drive, Cosmos II case, and an LGA2011 board.

Stealth argues that much of its value comes from the warranty it's willing to put on the line: 10 years. That's indeed one of the longer warranties available on a modern PC, but we're not sure we're really going to care about any PC we buy in 2012 in 2022. Still, we can't argue with the performance; it just doesn't offer the price-to-performance ratio we expected.

–GORDON MAH UNG

VERDICT **8**

Stealth Machines Espionage

+ F-22 Lethal combo of Ivy Bridge and SLI 660 Ti cards.

– F-105 Expensive; not as quiet as you'd expect from a company named Stealth.

$3,225, www.stealthmachines.com

SPECIFICATIONS

Processor	Intel Core i7-3770K@4.6GHz
Mobo	EVGA Z77 FTW
RAM	16GB DDR3/2133
Videocard	EVGA GeForce GTX 670 in SLI
Soundcard	Onboard
Storage	240GB Mushkin Chronos SSD, 2TB WD Caviar Black
Optical	Lite-On DVD+RW
Case/PSU	NZXT Switch 810 Corsair HX1050

BENCHMARKS

	ZERO-POINT	
Premiere Pro CS6 (sec)	2,000	2,520 (-21%)
Stitch.Efx 2.0 (sec)	831	730
ProShow Producer 5.0 (sec)	1,446	1,268
x264 HD 5.0 (fps)	21.1	17.9 (-15%)
Batman: Arkham City (fps)	76.0	64.0 (-16%)
3DMark 11	5,847	5,187 (-11%)

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

Our current desktop test bed consists of a hexa-core 3.2GHz Core i7-3930K 3.8GHz, 8GB of Corsair DDR3/1600, on an Asus Sabertooth X79 motherboard. We are running a GeForce GTX 690, an OCZ Vertex 3 SSD, and 64-bit Windows 7 Professional.

We're not fans of the LED strips on the power cables, but you might like the colorful addition.

MSI's GTX 660 Ti sports dual "Frozrs" to keep things cool.

Ménage à GeForce GTX 660 Ti

It's like the 8800GT all over again

When Nvidia launched its new Kepler architecture earlier this year with the GeForce GTX 680, the question on everyone's minds was what features Nvidia would sacrifice in future cards to hit lower price points. With the arrival of the $300 GeForce GTX 660 Ti, we have our answer, and thankfully it's "not much," as this card is very close to the blazing-fast GTX 670 (itself a slightly stripped-down version of the GK104 GPU from the GTX 680) both in terms of specs and performance. It has the same number of CUDA cores (1,344), texture units (112), and SMX units (7) as the GTX 670. The only real differences between the GTX 660 Ti and its beefier cousin the GTX 670 are the ROPs (the 660 Ti has 24 to the 670's 32), the L2 cache (384KB versus 512KB), and the memory interface (192-bit versus 256-bit).

We've collected cards from Gigabyte, EVGA, and MSI that offer a range of clock speeds, cooling shrouds, and prices to see how this new card fares in the heat of battle. **–JOSH NOREM**

MSI GTX 660 TI POWER EDITION

MSI's GTX 660 Ti is an overclocked version of the 660 Ti, hence the name Power Edition. The company has pushed the core clock speed up 105MHz from the reference design and given the Boost clock quite a bit of latitude as well. Memory speed is 1,502MHz, just like the reference design and all the cards in this roundup. Keeping the whole thing frosty is an elaborate cooler with a funny name—Twin Frozr—that's composed of two heat pipes embedded into a flat, wide array of aluminum fans. Two decent-size fans squat down on top of the heatsink and do an amazing job of keeping temperatures in check—we never saw the card go above 61 C under full load, but it was easily the loudest cooler in this group under those conditions. The fan spun down nicely once the stress was relieved, however, like a college student exhaling after a tough final exam.

In testing, the MSI card dominated the proceedings, taking victories in seven out of 10 categories, and losing by whisper-thin margins to the Gigabyte card in the other categories. When we put the card under full load, the GPU clock automatically increased from the stock 1,020MHz to 1,215MHz, which is a decent overclock given that the card does it automatically.

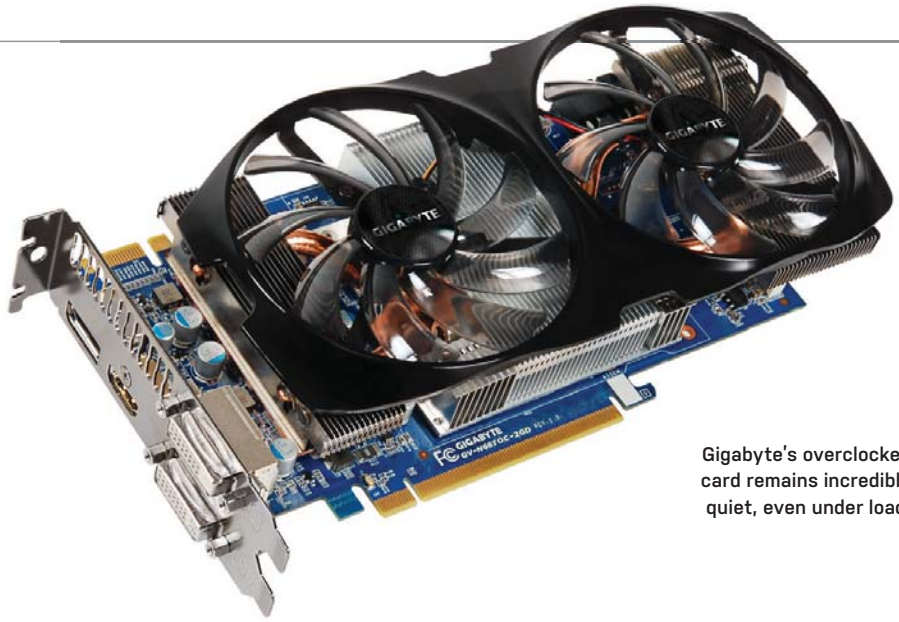
The bundle includes a scant pair of Molex-to-6-pin power connectors and a software CD that includes the easy-to-use Afterburner overclocking program. It lets you tweak the card's voltage, clock speeds, fan speeds, and even capture activity logs; beyond those basic tasks, it becomes less intuitive, especially for newbies.

We like the MSI card a lot and it's clearly the fastest in this group. But we don't like the fact that it's also the loudest, and its accessories "bundle" is severely lacking.

VERDICT **8**

MSI GTX 660 Ti Power Edition

$310, us.msi.com



Gigabyte's overclocked card remains incredibly quiet, even under load.

GIGABYTE GTX 660 TI OC VERSION

Gigabyte's card is also an overclocked card, having a GPU clock speed of 1,033MHz, which is 53MHz higher than stock. It also features a 52MHz overclock on its Boost clock, giving it a ceiling of 1,111MHz when overclocked. The card includes a massive cooling apparatus that features twin 10cm fans blowing down onto aluminum fins fed by two fat copper heat pipes connected to a heat exchanger. The cooling setup is so big it overhangs the edges of the card a bit, but we don't mind—it was the quietest card in our testing by a clear margin and remained silent even under full load; an impressive feat for a card that is overclocked this much.

Though the Gigabyte card was not as fast as the MSI board, it was nipping at the latter's heels in every test and even beat it in two of the tests by the slimmest of margins. In reality, we can easily call it a wash between the two cards and declare both the fastest in this roundup. One area in which the Gigabyte was the clear winner was in clock speeds, as it used GPU Boost to pump itself up to a surprising core clock speed of 1,241MHz, up from its 1,033MHz stock clock speed.

Like the MSI board, the bundle that comes with the card is minimal, including just two Molex-to-6-pin power-cable adapters and a CD with its OC Guru II software and drivers. The OC Guru software gets the job done but is not easy to use, and lacks any onscreen instructions.

The Gigabyte card is the most expensive card in this roundup—by $10—and is easily worth it. We are happy to pronounce it Kick Ass by virtue of its speed and quiet operation.

VERDICT 9 KICK ASS!

Gigabyte GTX 660 Ti OC Version

$320, www.gigabyte.us

BENCHMARKS

	MSI GTX 660 Ti PE	Gigabyte GTX 660 Ti OC	EVGA GTX 660 Ti SC	EVGA GTX 560 Ti 448	XFX Radeon HD 7870 GHz	Sapphire Radeon HD 7950 OC
Price	$310	$320	$310	$250	$280 (street)	$370
3DMark 11 Perf	**9,118**	9,095	8,438	6,295	7,001	7,683
3DMark Vantage Perf	31,575	31,468	30,363	25,523	27,953	**31,752**
Unigine Heaven 2.5 (fps)	39.8	**40.2**	38.4	31.8	33.2	39.4
Shogun 2 (fps)	**71.1**	68.7	64.3	43.1	62.2	70.6
Far Cry 2 / Long (fps)	**133.3**	131.1	131.1	112.4	112.7	121.6
Dirt 3 (fps)	95.1	**96.8**	90.6	68.8	82.4	79
STALKER: CoP DX11 (fps)	49.9	49.8	47.3	38.4	42.6	**53.2**
Just Cause 2	**68**	67	64.7	55.8	59.6	65.5
Batman: Arkham City (fps)	80	81	78	64	45	**85**
Metro 2033 (fps)	22.3	22.3	22.0	22.6	24.2	**30.7**

Best scores are bolded. Our test bed is a 3.33GHz Core i7 3960X Extreme Edition in an Asus P9X79 motherboard with 16GB of DDR3/1600 and an AX1200 Corsair PSU. The OS is 64-bit Windows Ultimate. All games are run at 1920x1200 with 4x AA and all settings maxed out, except for the 3DMark tests, and Shogun 2, which is run at 1080p High settings.

EVGA's 660 Ti is a perfectly cromulent card, if a little understated.

EVGA GTX 660 TI SUPER CLOCKED

Though the EVGA GTX 660 Ti looks like a reference card, don't let its standard-looking cooling shroud fool you. This is certainly an overclocked card, though its overclock is the most modest in this grouping at just 65MHz above reference speeds. Its Boost clock frequency is also lower than the other cards at just 1,059MHz. The board features a very short 7-inch circuit board, compared to over 9 inches on the other cards, but its extra-long cooling shroud makes the card just as big and long as the others.

The EVGA did not win in any of our benchmark tests, but it was close in all of them and usually off the pace by just a handful of frames. We're not too surprised about this, given the card's lower clock speeds—at up to 1,123MHz when under 100 percent load, the EVGA has a 100MHz deficit compared to its competition. The card did stay cool and relatively quiet, though, running at a steady 65 C even when pushed for hours under full load. We would describe the noise level as worse than the Gigabyte's but not as bad as the MSI board; noticeable but not annoying.

Surprisingly, though this board looks like it's the most boring in the group, it includes the best bundle of accessories, including a VGA-DVI adapter, two power-supply cable adapters, and a sheet of EVGA stickers that are kind of cool.

As it stands, the EVGA is a tough sell, since it doesn't excel in any one area compared to the other cards here. We hear the company will release a more powerful FTW version in the future, and we can't wait to check out that card when it arrives. This card is a solid offering, but there are better options available.

VERDICT **8**

EVGA GTX 660 Ti Super Clocked

$310, www.evga.com

SPECIFICATIONS

	GeForce GTX 660 Ti	GeForce GTX 670	GeForce GTX 680
Number of Cores	1,344	1,344	1,536
Texture Units	112	112	128
SMX Units	7	7	8
ROPs	24	32	32
Base Clock Frequency	915MHz	915MHz	1,006MHz
Boost Clock Frequency	980MHz	980MHz	1,058MHz
Memory Clock Frequency	1,502MHz	1,502MHz	1,502MHz
L2 Cache Size	384KB	512KB	512KB
Frame Buffer Size	2,048MB	2,048MB	2,048MB
Memory Interface	192-bit	256-bit	256-bit
Memory Data Rate	6Gb/s	6Gb/s	6Gb/s
Connectors	2x dual-link DVI, 1x HDMI, 1x DisplayPort	2x Mini DisplayPort, 1x dual-link DVI, 1x HDMI 1.4a (Fast)	2x dual-link DVI, 2x HDMI 1.4a (Fast), 2x DisplayPort 1.2
Power Connectors	2x 6-pin	1x 6-pin, 1x 8-pin	2x 6-pin
Thermal Design Power (TDP)	150W	170W	195W

Silverstone Heligon HE01

Asymetrical cooling

SPECIFICATIONS

Dimensions H x D x W (inches, with fan)	6.2 x 4.6 x 5.5
Weight	2lbs, 8.5oz
Heat Pipes	6
Stock Fans	1x 14cm PWM
Add'l Fan Support	2 (clips included)

THE MOVIE *Die Hard* was so awesome it spawned a wave of imitators that all had just one distinguishing difference—Die Hard on a plane, Die Hard on a boat, Die Hard in a nursing home, etc. And so it is in the world of air coolers: We have dozens of skyscraper aluminum coolers with just one standout feature, and on the Silverstone Heligon HE01 the standout feature is its super-thick 14cm fan. It's so big that Silverstone had to shave off a sliver of the cooler's right appendage to make room for it, giving the cooler an asymmetrical look that resembles a tennis player's arms.

The XXL fan sports a 4-pin plug for PWM functionality, as well as an easily accessible switch labeled "Q-P" for Quiet and Performance modes, but it should be Q-L for Quiet and Loud. The fan blows air through aluminum fins attached to six copper heat pipes that snake into a copper base, with the whole shebang plated in snazzy-looking nickel. The heat pipes are not the direct-contact variety like the ones in our favorite cooler, the Cooler Master Hyper 212. It's a massive cooler at almost 6 inches to a side, and though it does require RAM without tall heat-spreaders, it's not any larger than the best coolers in its class, including the Phanteks PH-TC14PE (reviewed June 2012) and the Noctua NH-D14 (reviewed April 2012), both of which will also interfere with tall RAM.

Installation was easy on our LGA2011 test bed and required tightening just two screws with a Phillips-head screwdriver after we hand-tightened the mounting brackets. Installing the Heligon's giant fan was *hella* hard, though, since the retention clips don't permanently attach to the fan and kept falling out of their holes.

In testing, the Heligon in quiet mode was just 2 C warmer than its natural competitor, the Phanteks PH-TC14PE, and neck-and-neck with the Cooler Master, and in performance mode its benchmark results are top-of-the-charts if you can handle the noise (we couldn't). For fun we added a second fan to the mix, although we found it to have a negligible benefit. We also ran it in PWM mode but considered the fan to be too loud under stress.

All in all, the Heligon is a solid package but nothing too groundbreaking, especially for its semi-high price. If the performance mode was quieter, it'd be a must-buy. –**JOSH NOREM**

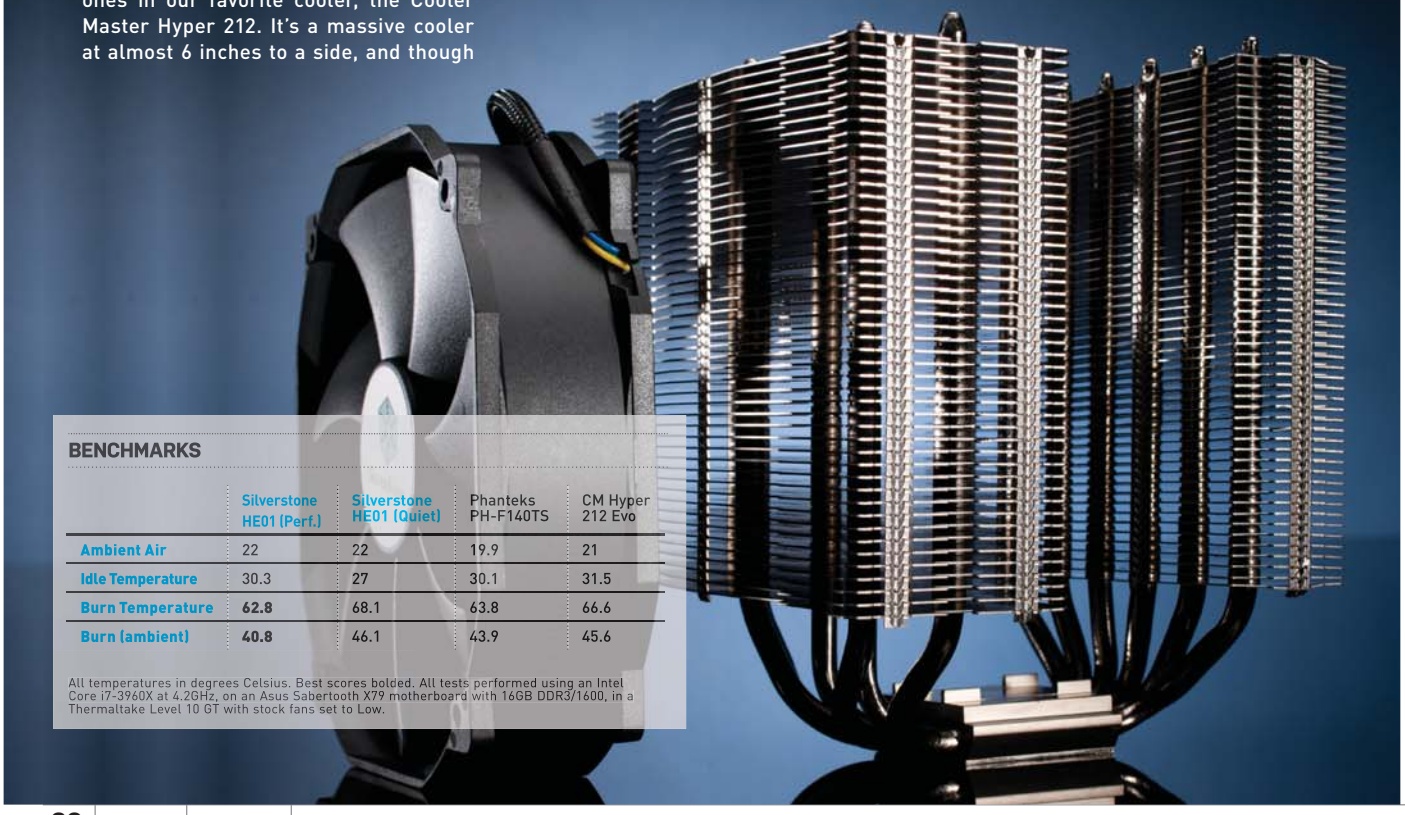
VERDICT 8

Silverstone Heligon HE01

+ PURRING Excellent performance; quiet (in quiet mode); semi-easy install.

– HISSING Finicky retention arms; loud in performance mode; requires low-profile RAM .

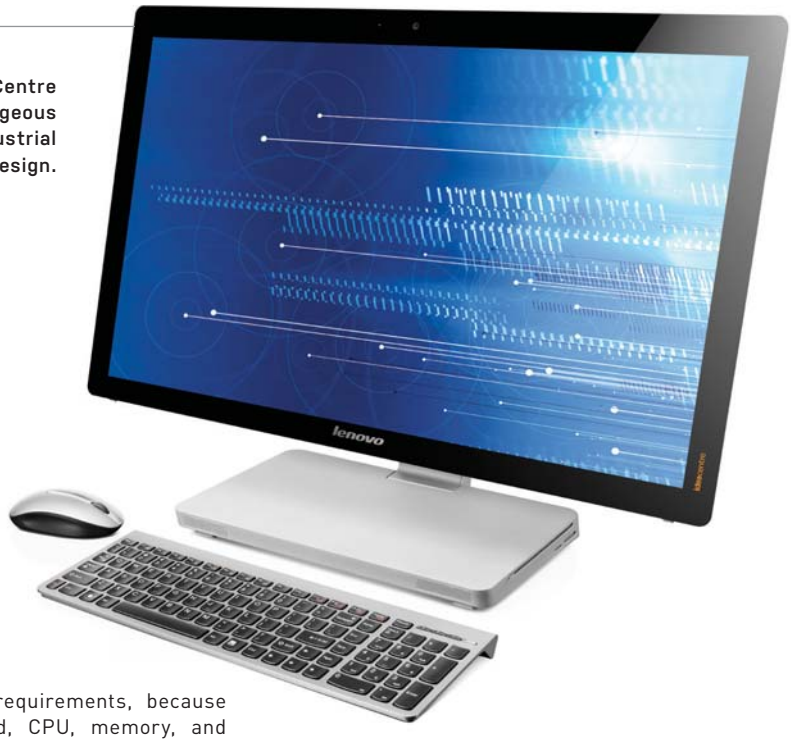
$79, www.silverstonetek.com



BENCHMARKS

	Silverstone HE01 (Perf.)	Silverstone HE01 (Quiet)	Phanteks PH-F140TS	CM Hyper 212 Evo
Ambient Air	22	22	19.9	21
Idle Temperature	30.3	27	30.1	31.5
Burn Temperature	**62.8**	68.1	63.8	66.6
Burn (ambient)	**40.8**	46.1	43.9	45.6

All temperatures in degrees Celsius. Best scores bolded. All tests performed using an Intel Core i7-3960X at 4.2GHz, on an Asus Sabertooth X79 motherboard with 16GB DDR3/1600, in a Thermaltake Level 10 GT with stock fans set to Low.



Lenovo's IdeaCentre A720 is one gorgeous piece of industrial design.

LENOVO IDEACENTRE A720

Exciting design; meh performance

LENOVO HAS introduced the most exciting all-in-one computer design since HP reinvigorated the market with its TouchSmart series in 2008. The IdeaCentre A720 is a pizza-box design, much like the original TouchSmart; but modern ingredients enabled Lenovo to produce a thin-crust form factor that HP could never have dreamed of.

The drawback to the easel design that nearly every other all-in-one manufacturer uses today is that it provides very little freedom of movement for the display. That's not a problem when you're sitting in front of the computer, but touchscreens practically beg to be used from both sitting and standing positions. Stand in front of a computer that's at desktop height, and you'll want to tilt the display very far back. The hidden hinges on the A720's 27-inch touchscreen allow the display to fold back 90 degrees: absolutely flat.

This form factor enables Lenovo to house the motherboard and other major components inside the chassis, as opposed to the display. This reduces the A720's cooling requirements, because the motherboard, CPU, memory, and other heat-sensitive parts aren't next to a hot panel. The Lenovo was considerably more quiet than other 27-inch all-in-ones we've tested, and its 10-touch-point display should make it a better fit for Windows 8 than the nontouch displays on those machines (we're referring to the Asus ET2701 INKI-B046C, Dell XPS One 27, and HP Omni 1015t we reviewed in October 2012).

The A720 has an HDMI input—a feature we now consider de rigueur for an all-in-one—and you can control the volume of whatever device is connected to that port using touch-sensitive controls on the display bezel (but not with the keyboard or the provided IR remote). You can use that HDMI input and the volume controls even if the PC side of the system is completely powered off. The machine also has an HDMI output, so you can drive a second display.

Unfortunately, the A720's tiny front-firing speakers sound positively horrid; they're exceedingly bright and the amp that drives them can't boost a connected HDMI device's audio signal enough to fill the smallest room (volume is less of an issue with other audio sources, but they don't sound any better).

The A720's VA (Vertical Alignment) display looks gorgeous with video, websites, and games, but it doesn't hold a candle to the 2560x1440-pixel PLS panel on the Dell XPS One 27. Then again, the Dell costs $300 more than the Lenovo. So let's compare Lenovo's A720 to Asus's ET2701 INKI-B046C: That machine costs $200 less and is equipped with a faster CPU and GPU. The Asus packs a 3.1GHz Intel Core i7-3770S desktop CPU and an Nvidia GeForce GT 640M, while the Lenovo is outfitted with a 2.3GHz Intel Core i7-3610QM mobile CPU and an Nvidia GeForce GT 630M. The Asus, on the other hand, can't match the A720's awesomely articulated touchscreen. Which machine is the better value? The answer depends on how bad you want a 27-inch touchscreen. –MICHAEL BROWN

SPECIFICATIONS

	Lenovo IdeaCentre A720
Price	$1,700
CPU	2.3GHz Intel Core i7-3610QM
GPU	Nvidia GeForce GT 630M
RAM	8GB DDR3/1600
HDD	1TB (5,400rpm)
Optical	Blu-ray player/DVD burner
Display	27-inch, LED-backlit VA LCD 1920x1080 (touchscreen)

BENCHMARKS

	Lenovo IdeaCentre A720	Asus ET2701 INKI-B046C
3DMark 11	P1,313	**P1,937**
Metro 2033 (fps)	20.8	**29**
Adobe Premiere (sec)	461	**404**
MainConcept (sec)	1,026	**919**
ProShow Producer (sec)	562	**486**

Best scores are bolded.

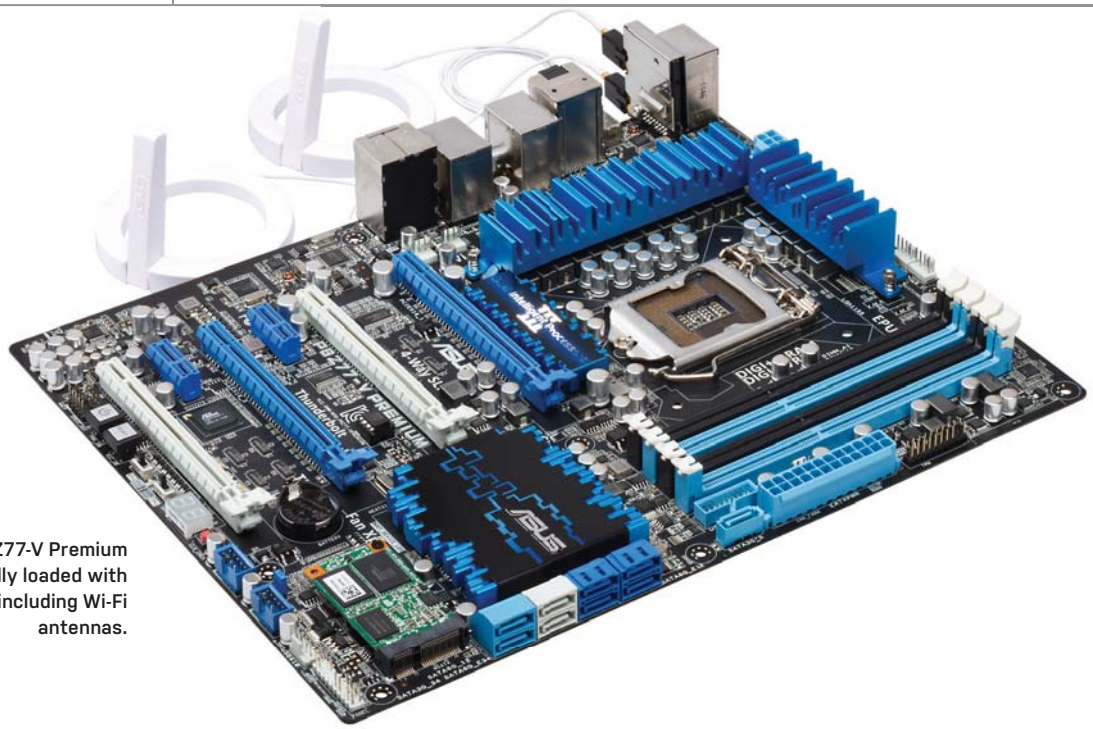
VERDICT 8

Lenovo IdeaCentre A720

IDEA 27-inch, 10-finger touchscreen; brilliantly designed display mount.

IKEA Terrible speakers; only three available USB ports; mediocre benchmark performance.

$1,700, www.lenovo.com



The Asus P8Z77-V Premium comes fully loaded with features, including Wi-Fi antennas.

Thunderbolt Arrives!

Getting the new tech requires a new motherboard

With our skepticism of Thunderbolt officially blown away (see last month's Head to Head) we're now ready to embrace the new I/O interface. But unless you're one of the lucky few to have an older Asus board with support for the company's Thunderbolt add-in card, you'll need to buy a new motherboard to enjoy Tbolt goodness. Luckily, Thunderbolt boards have arrived. To gauge the choices, we gathered up both the priciest and cheapest Tbolt boards we could find and set at them. **–GORDON MAH UNG**

ASUS P8Z77-V PREMIUM

LGA2011 boards have always occupied the luxury side of town, whereas LGA1155 has been pretty blue collar. Not anymore. Asus's new P8Z77-V Premium pretty much shatters the idea that LGA1155 boards are low rent.

How swanky is it? This Z77 board is brimming with every bell, whistle, and horn available. Obviously, Thunderbolt is here, in the form of a single Thunderbolt port using Intel's "Cactus Ridge" DSL3310 second-gen Tbolt controller. Asus also equips the board with a PLX8747 PCIe 3.0 switch chip, so the board is able to run up to four GPUs. Boards without a bridge chip are normally constrained to two GPUs, and some boards switch off components too.

Want more? There's also the excellent Asus fan controls, a Wi-Fi and Bluetooth module, a secondary Marvell SATA 6Gb/s with four ports, and a 32GB Lite-On SSD in the mSATA slot, in addition to the two Gigabit ports running Intel silicon. There's so much hardware jammed onto this board, it takes an afternoon just to go through the UEFI settings.

Performance of the board is quite good, especially with the "free" mSATA SSD used for caching (which we did for our testing).

So how much does all this hardware cost? A lot. At $450, the P8Z77-V Premium is the most expensive Z77 board we've reviewed. And unfortunately, not all the features make sense to us. The mSATA, for example, isn't useful for anything beyond caching due to its size. But will someone who runs a 4x GPU setup and Thunderbolt really be running a hard disk as his or her primary boot device?

For the most part, you have to have particular needs to want the P8Z77-V Premium. Obviously, just wanting the most tricked-out Z77 board on the market is one need. The other is more practical: You need to run more than three GPUs and you must have Thunderbolt. Frankly, without those specific needs, we think it would be more fiscally prudent to buy a non-Premium version of the P8Z77-V and add the optional Thunderbolt card.

Don't get us wrong, the P8Z77-V Premium is fully loaded, stable, and the fastest-booting Z77 board we've tested yet (it'll go from cold to OS in 17 seconds in Windows 8) but most folks will likely find it just too much motherboard for too much money.

VERDICT **8**

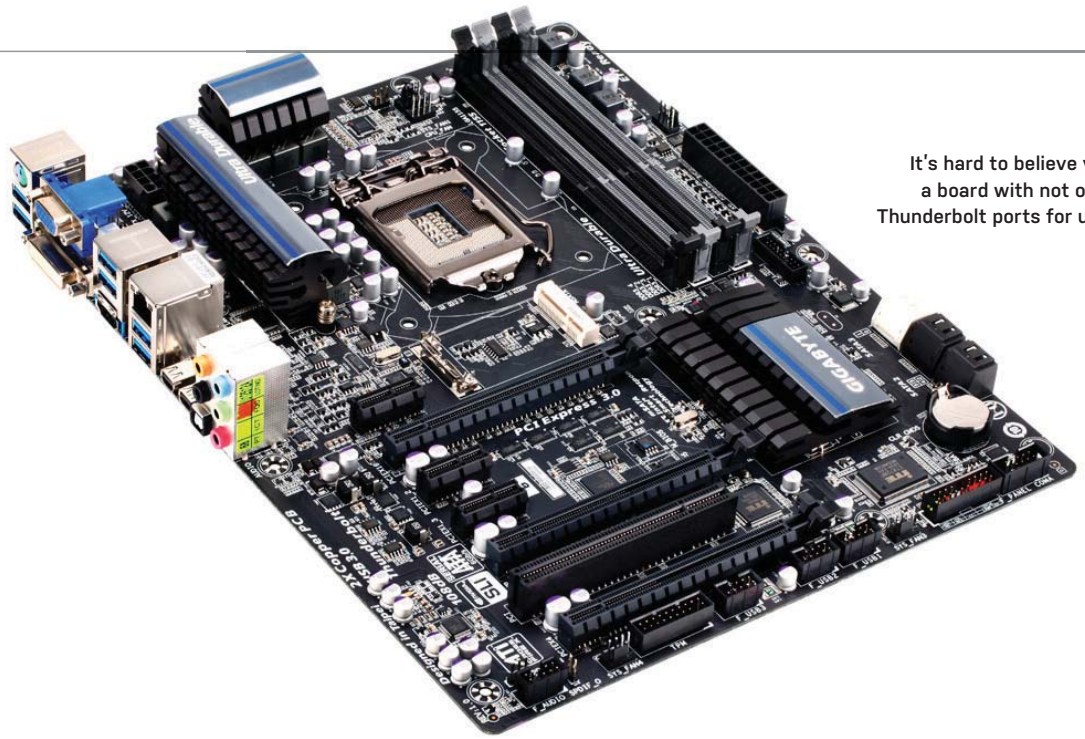
Asus P8Z77-V Premium

$450, www.asus.com

GIGABYTE Z77X-UP4 TH

It's commonly understood that if you can run Thunderbolt, you probably also snack on Beluga caviar, wear a Patek Philippe watch, and vacation in a country only rich people know about: Grenyarnia.

Not so, actually. Thunderbolt apparently doesn't require you to smash the piggy. This is no more apparent than with Gigabyte's Z77X-UP4 TH. What the TH stands for we don't know for sure, but we're guessing it has some relation to



It's hard to believe you can get a board with not one, but two Thunderbolt ports for under $200.

Thunderbolt, which the Z77X-UP4 TH has in spades.

The Z77X-UP4 TH pretty much has all the modern must-have components, including both native Intel and discrete VIA USB 3.0 ports. There's also SLI/CrossFireX, an mSATA slot, and not one, but two Thunderbolt ports.

The fact that Gigabyte can jam all this into a board that streets for $190 is astounding. Lest you think the board is the equal of the P8Z77-V Premium, it isn't. The lack of extra SATA controllers, surface-mount power switches, extra SATA ports, and a POST LED affirms this board's pedestrian pedigree, but for the price difference, you could buy a CPU.

In performance, the board gave us interesting results. It's the first one we've tested that has faster USB 3.0 performance than the Asus boards, but in overall graphics and system performance, the Gibabyte was slightly slower than the Premium board. To be fair, we did enable SSD caching on the Asus P8Z77-V Premium, but that's because the board comes with it. Like other Gigabyte boards, the Z77X-UP4 TH turned out slower-than-expected performance in some graphics tests. It's not a huge disparity, but it shows up in the numbers. Because we've seen it in three Gigabyte boards now, it's likely some driver-related issue.

Another thing we should note is that our review board smelled like an iPhone crawled into the ass of a laptop and died there. The heavy electronic stink was so overwhelming, we were ready to bury our face in a skunk to get rid of the odor. The smell diminished over time, but P.U.!

Despite the smell, it's hard to argue with the bargain you're getting here. The board lets you run multicard setups, packs two Thunderbolt ports (which were tested to within a few percentage points of the Asus P8Z77-V Premium), and even seems to have improved the USB 3.0 performance markedly. Yes, it could use a couple more SATA ports and a good airing out, but for the money, we ain't arguing.

VERDICT **9**

Gigabyte Z77X-UP4 TH

$190, www.gigabyte.us

BENCHMARKS

	Asus P8Z77-V Premium	Gigabyte GA-Z77X-UP4 TH	Asus P8Z77-V
Price	$450	$190	$190
3DMark 11 Overall	P6,253	P5,914	**P6,308**
PCMark 7 Overall	**5,395**	3,709	3,739
PCMark 7 Lightweight	**5,194**	2,665	2,755
PCMark 7 Productivity	**5,442**	2,506	2,610
Valve Particle (fps)	**210**	203	208
SiSoft Sandra 2012 (GB/s)	21.2	21	21.3
SATA 6Gb/s read (MB/s)	**517.2**	494.4	509.9
SATA 6Gb/s write (MB/s)	**255.3**	225.9	247.1
USB 3.0 Read (MB/s)	429.4	**486.8**	429.9
USB 3.0 Write (MB/s)	183.9	**223.6**	181.3
SLI Compliance	Yes (4-way)	Yes	Yes
32GB Compliance	Yes	Yes	Yes
Auto Overclock (GHz)	4.3	4.43	4.2

Best scores are bolded. We used a Core i7-3770K, 8GB of DDR3/1866 set at DDR3/1600, a WD Raptor 150, 64-bit Windows 7 Professional, and a GeForce GTX 580 in all of our motherboards. SATA 6Gb/s speeds were measured with CrystalDiskMark 3.01 and an OWC Mercury Extreme SSD. USB 3.0 speeds were measured with CrystalDiskMark and a Patriot Wildfire SSD in a USB 3.0 enclosure using an Asmedia controller. 32GB compliance was measured with four 8GB DDR3 modules. The P8Z77-V Premium board was tested in SSD-caching mode.

OWC Mercury Accelsior 480GB

A RAID o' blades

PCIE SSDS, which combine a RAID chip with several SSD controllers and plenty of NAND flash onto one convenient and speedy package, are not a new idea. We've reviewed several, most recently the OCZ RevoDrive3 X2 in December 2011. They can be handy for people who want the speed of modern SSDs but don't have free 6Gb/s SATA ports (this means you, X58). OWC's Mercury Accelsior comes in sizes up to 960GB; we tested the 480GB version.

The Accelsior is a low-profile PCB, so it can be used in small form factor machines or 1U servers. Unlike the RevoDrive, the Accelsior doesn't require special drivers. The x4 PCIe 2.0 board contains a Marvell RAID controller, as well as two long, skinny SSDs in RAID 0, each with an SF-2281 controller and, on this model, eight 256Gb Micron synchronous NAND modules for a total of 240GB of usable space per blade.

We compared the Accelsior to a 480GB RevoDrive3 x2 as well as a RAID 0 of two 240GB SF-2281-based Vertex 3s. We saw sustained read speeds above 700MB/s and writes above 550MB/s in both CrystalDiskMark and AS SSD. This is quite a lot faster than any 6Gb/s SATA drive (which top out around 500MB/s), but the reads couldn't match the more than 1GB/s reads from the Vertex RAID in AS SSD. Both the RevoDrive and the Vertexes had higher 4KB random IOPS at all queue depths, though the Accelsior's maximum response time was the lowest of the three.

OWC states that you'll be able to buy higher-capacity blades in the future, so you can upgrade the storage and keep the card. Since each blade contains the NAND and the controllers, future blades could even use different controllers. But given that you can't reuse the blades anywhere else, will anyone want to just throw away perfectly good SSDs?

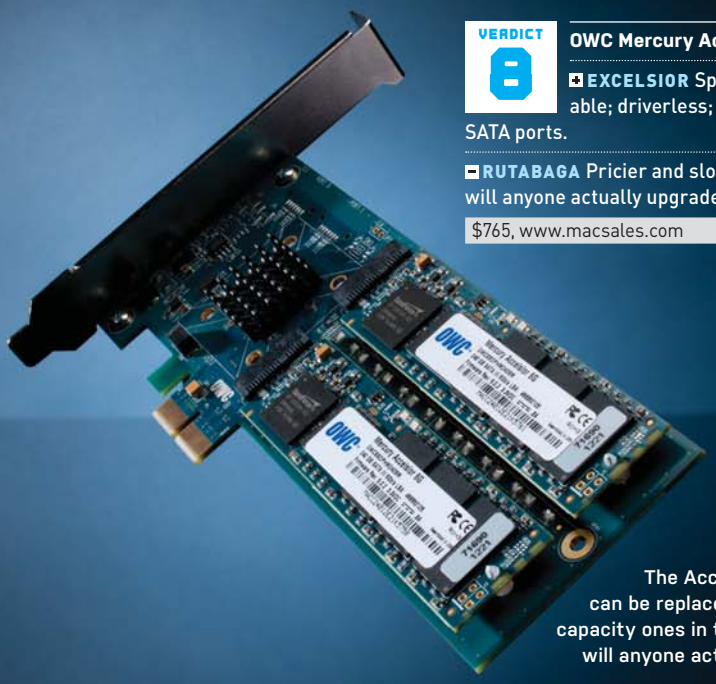
At $765, the Accelsior is a pricy way to get 480GB of RAIDed SandForce drives. If you have a RAID card or two free 6Gb/s SATA ports, you can get two top-notch 240GB drives for about $500, and have faster performance. But if the driverless convenience and upgrade potential intrigues you, the Accelsior is a great choice.

–NATHAN EDWARDS

BENCHMARKS

	OWC Mercury Accelsior	OCZ RevoDrive3 x2	2x OCZ Vertex 3 (RAID 0)
Capacity	480GB	480GB	480GB
CrystalDiskMark			
Sustained Read (MB/s)	716	653.9	**922.4**
Sustained Write (MB/s)	**572.1**	401.5	546.8
AS SSD			
Seq. Read (MB/s)	756.1	796.32	**1,013.7**
Seq. Write (MB/s)	**553.7**	412.6	429.4
4KB Read (IOPS)	4,990	6,679	**7,240**
4KB Write (IOPS)	16,705	19,678	**26,409**
ATTO			
64KB File Read (MB/s)	542.6	**937.0**	525.1
64KB File Write (MB/s)	611.1	**979.2**	904.7
Iometer			
4KB Random Write (IOPS)	57,325.8	73,934.4	**108,434.4**
Max Access Time (ms)	**30**	61	144
PCMark Vantage x64 HDD			
PCMark 11 x64 SST			

Best scores are bolded. Our test bed is a 3.5GHz Core i7-3770K processor on an Asus P8Z77 Premium running Windows 7 Professional 64-bit SP1. SATA controllers tested on Intel 6Gb/s ports with IRST 10.5.



The Accelsior's blades can be replaced with higher-capacity ones in the future, but will anyone actually do that?

VERDICT **8**

OWC Mercury Accelsior 480GB

+ EXCELSIOR Speedy, upgradeable; driverless; doesn't take up SATA ports.

– RUTABAGA Pricier and slower than DIY; will anyone actually upgrade?

$765, www.macsales.com

Adobe Photoshop Lightroom 4.0

The premier asset manager

ADOBE'S LIGHTROOM has never been an easy application to explain to the uninitiated, but we'll give it a shot. Lightroom 4 is, at its core, two things: a DAM (digital asset manager) and a raw-file developer. Sure, it also comes with new or updated modules for mapping and creating books, slide shows, and the like, but the key features are its Library and Develop modules.

Unlike a pure photo editor such as Photoshop CS6, Lightroom will change your photo workflow significantly. Gone are the days of "open file A, adjust file A, save file A, close file A, open file B..." ad nauseam. In fact, it doesn't even make much sense to think of files as being "open" or "closed" when working in Lightroom. This new workflow makes it possible to handle huge volumes of images quickly and easily and in a truly nondestructive manner.

Lifelong nerds may not be comfortable letting Lightroom 4 do all their image management, but once you learn to trust it and let go, Lightroom 4 makes it possible to get a ton more work done. In the end, as you use Lightroom 4, you'll learn to like the way it organizes things.

Furthermore, Lightroom 4 makes it possible to create multiple versions, and still only save a single master file to the drive. If you love testing different treatments of the same image, then comparing them to find the best, Lightroom 4 will save you a lot of disk space over time.

Major changes in this version of Lightroom include an upgraded process version, a new map module for geotagging, a book module for basic books, and enhanced video support in the Library and on export.

Perhaps the most important feature to a photographer is the new-and-improved Process Version 2012. Lightroom 4 comes with major upgrades to its raw-processing engine and compared to Lightroom 3, we experienced more latitude when making exposure corrections, even better highlight recovery, better noise reduction, and a much improved clarity slider. Adobe has tweaked the layout and naming of the individual controls to be more consistent and easier to understand than the previous versions, too. For those who don't like change, the older controls and process versions are available as well. And in the way-overdue department we finally have graduated filters, as well as white balance on brushes.

One yardstick we've long used to measure Lightroom is whether or not we have to launch Photoshop CS6 for deep edits. We've always felt that if we have to launch another app to finish a job, Lightroom has failed us. Lightroom 4 has gotten better, but it's definitely not a full-tilt photo editor. For instance, we often need to open Photoshop to liquefy, build layers, swap heads to correct a blink, and make advanced spot corrections. Don't get us wrong, though: If the bulk of your editing involves whitepoint, exposure, contrast, tone curve, cropping, split toning, or lens-correction adjustments, you can probably do 95 percent of your work without ever leaving Lightroom. But any serious photographer will still need to have a full-service image editor on standby.

Another area where we've wanted improvement from Lightroom is in the efficiency of the codebase. We've found that it's just very difficult to coax more performance out of the program. Adding cores, increasing clock speeds, and adding RAM hasn't seemed to move the needle very much in Lightroom, and nothing changes with LR4. Even more perplexing, we've personally seen Lightroom bog down on Core i7 boxes with 16GB of RAM and an SSD but fly on a 3-year-old Hewlett Packard laptop.

So should you buy Lightroom 4? We think it's indispensable for any serious hobbyist and pro-photographer who is overwhelmed by the number of photos that he or she takes. For those thinking of an upgrade from Lightroom 3, the new process-version engine and the new low price make it a no-brainer. However, we're dinging Lightroom 4 and Adobe for the simply whacky performance issues we've experienced with the app.

–GAVIN FARRINGTON

Lightroom 4.0 allows you to bulk-edit images quickly so you don't have to sit in one photo for hours.

VERDICT 8

Adobe Photoshop Lightroom 4

F/64 Improved visual-quality performance process; white balance on brushes, finally!

F7U Can feel sluggish and difficult to coax performance out of.

$150 ($80 upgrade), www.adobe.com

The Walking Dead

Zombies are about the living, not the dead

WE'VE ALL SEEN this pattern before, haven't we? First the successful comic/graphic novel. Then the compromised, but still runaway movie based on said comic/graphic novel. Finally, you get a buggy, third-rate game that has been rushed out to meet some arbitrary marketing deadline.

Fortunately for fans of all things zombie, we can't say that about Telltale Game's take on The Walking Dead. Instead of trying to follow in the footsteps of Robert Kirkman's comic series of the same name or AMC's TV series, Telltale unwinds a completely different story in The Walking Dead universe.

Told in the classic adventure style, The Walking Dead imbues the same sense of dread and doom that Kirkman's comic does. The game starts off with you as Lee Everett being carted off to prison when the world goes sideways. We can't give away too many details, but there is some crossover with The Walking Dead comic, although it's mostly kept to a minimum.

What's brilliant about The Walking Dead game is that you are forced through the same split-second moral decisions that make The Walking Dead such a unique comic. For example, do you save the resourceful nerd or the TV reporter with her Glock 17 and never-ending purse full of magazines? Sorry, nerd, firepower trumps compiling a Linux kernel ATM. Such choices shape the story arc down the road, but at every turn you're forced to make decisions that put you in uncomfortable territory. Do you lie about your past and let the lie build, or just spill the beans? Who can you trust? Whom do you build alliances with? Whom do you give food to?

Let's just take a little off the top, shall we?

Excellent voice acting and a creepy set can make portions of the game terrifying.

The creepy atmosphere of the game is helped by a beautiful blend of 2D and 3D artwork by Daniel Kanemoto and a dark score by Jared Emerson-Johnson. The Walking Dead game is being released in five "episodes." The first two, A New Day and Starved for Help, are out now, with the third episode imminent. Each chapter takes about two hours to play through, and as adventure games go, it can become a bit tedious if you can't find the one unobvious room you're supposed to go to, but we found that after finishing each episode we couldn't wait for the next one.

The gameplay certainly isn't suited for action junkies, but it's a perfect way to relax after getting constantly sniped in that hell-on-earth, apocalyptic zombie-simulator mod known as DayZ. With DayZ, we already know how absolutely horrible human beings are. Not *can be*, but *are*. With The Walking Dead game, we still have hope that we can hold onto our humanity. **–GORDON MAH UNG**

VERDICT 9

The Walking Dead

+ SLOW ZOMBIES Superb storytelling and voice acting; creepy atmosphere.

– FAST ZOMBIES Console-style button mashing is pointless.

$25, www.telltalegames.com, ESRB: M

LAB NOTES

NATHAN EDWARDS **SENIOR EDITOR**

Gone to Texas

So long, nice weather and gainful employment!

IT'S WEIRD to do this so soon after former online editor Alex Castle's departure for Hawai'i, but this is my last issue as a full-time editor at *Maximum PC*. Like Alex, I'll continue to write for *Maximum PC* part time, but unlike Alex I'll be doing so from the great state of Texas, where my family is moving. I'll also take the time to work on my fiction, which I've been neglecting. I'm excited for the change of scenery but sad to leave; *Maximum PC* has been my home since just after college. My first review was in the November 2007 issue, 65 issues ago. That's also my hand on the cover.

Don't worry, though. I'm leaving *MPC* in capable hands: Josh Norem should be familiar to many of you, as he's been at *Maximum PC* twice before, most recently from 2003-2006. Gordon, Katherine, and Richard are still here, joined by our new online editor Jimmy Thang. Viva la *Maximum PC*!

Josh Norem
Senior Editor

As a returning former editor for *Maximum PC*, I've spent the past month reacquainting myself with Gordon's latent rage and getting up to speed on all the latest hardware and office policies. It turns out Hawaiian shirt Friday is still in effect, but our test Lab is a bit smaller than its previous incarnation. No worries—Gordon and I have forged a fraternal bond over the years, so we're comfortable with close-quarters benchmarking.

Katherine Stevenson
Editor-in-Chief

After all my flag-waving for Windows Phone, I made the semi-impulsive decision to move to Team Android. The deciding factor was the Samsung Galaxy S III. The fact is, nothing in the current Windows Phone lineup was enough of a step up from my old Samsung Focus, so I made the switch. I miss the super-intuitive Windows Phone navigation, but getting to know Android has been fun.

Gordon Mah Ung
Deputy Editor

I spent a week getting the ARMA II mod DayZ working and another half-hour running scared witless from zombies in the dark. The final 20 minutes were spent repeatedly being sniped on Spawn by survivors who were just practicing their bandit skills, because I didn't have jack on my carcass to loot. I'm pretty much hooked.

Richard Koscher
Art Director

Metro, now possibly known as Windows 8 Style, has kept me busy lately here at *Maximum PC*. Besides designing the magazine, I also designed the look and feel of the new Maximum PC Windows 8 app that will hopefully be available near the OS's official launch time (October 26). Let us know if you like it. I think it's pretty cool (the design, anyway).

LETTERS

WE TACKLE TOUGH READER QUESTIONS ON...

> Level 10 Lockdown, Not
> Dream Parts Questioned
> Sloppy Wiring No More

SMNC Is FTW

I'm quite disappointed that your "F2P Is FTW" section of the "Cheapskate's Guide" (October 2012) only featured mainstream titles that have massive player populations. The best F2P I've ever played is Super Monday Night Combat by Uber Entertainment, an independent developer.

It does the F2P model quite well, even more so than TF2, a game it's often accused of cloning. However, it's a completely original MOBA/TPS mashup set in a dystopian future. Sadly, the playerbase is slowly declining, and Uber doesn't seem to be successful at boosting participation. It might be cool if it's featured in the next edition of *Maximum PC*. The game can be found as a F2P on Steam.

—Legionareus

EDITOR-IN-CHIEF KATHERINE STEVENSON RESPONDS: Any time we do a "recommended" list, we inevitably leave off someone's favorite. But thanks for the tip; we're always happy to spread the word about a free, kick-ass indie game. You heard it here, people!

Level 10 Security

There may be a mistake in the Thermaltake Level 10 GTS review (September 2012). It says "While we love the concept behind the case's four side-loading hotswap bays, pray that you never lose the security key that locks them into place, or you'll never be able to remove them." I can't be sure, because I only own the Level 10 GT, but on the GT you can take off the front panel and press the buttons there to remove the bays even if it's locked. I'm not sure if this would work on the GTS but I thought I would let you know about it.

—Dalton Mundhenk

SENIOR EDITOR NATHAN EDWARDS RESPONDS: You're totally right, Dalton. Removing the front panel on the Level 10 GTS bypasses the drive-bay locking mechanism entirely, which completely negates the usefulness of the lock in the first place. We're not sure whether we're relieved or disappointed.

Not Onboard with Onboard

How can you build a Dream Machine (September 2012) without a soundcard? You go balls-out, over-the-top with everything else, including speakers, and you're going to use onboard sound. Shame on you. You should have used onboard video also. What's the matter, your ears broken? Sorry, I'm throwing the BS flag on this one.

—Paul

DEPUTY EDITOR GORDON MAH UNG RESPONDS: As someone who has covered and advocated for soundcards since the Soundcard Wars of the '90s (just after the Clone Wars), I have to admit that I have simply given up. Not only do the vast majority of people—even enthusiasts—skip soundcards, Microsoft effectively put a stake in advanced PC gaming audio when it removed the hardware abstraction layer for DirectSound and DirectSound3D in Windows Vista. I still believe in soundcards and run them in my gaming machines at home, but the sad truth is, no one cares.

Take this Letter and Burn It (to Disc)

I have long enjoyed the annual release of the Dream Machine issue, and was excited to see what you cooked up with the bevy of technologies available today. Naturally, the machine is a performance monster, but unless I've misread, my paltry hexa-core machine can do several things your Dream Machine can't, such as playing a Blu-ray disc, installing software from a CD or DVD-ROM, and backing up data to a writable optical disc. I appreciate that optical media isn't the king it once was, and the cloud is changing the way we access and back up our data. You can call me old-fashioned if you want, but I think your hardware list should have included a Plextor Blu-ray burner. I know mine does.

—Tom Rand

DEPUTY EDITOR GORDON MAH UNG RESPONDS: Is the optical drive going the way of the floppy drive? Frankly, for a lot of us, it's getting there awfully fast. Much faster than I ever expected, personally. That's why we decided to make a bold statement about the optical drive with Dream Machine 2012 (just as we did with the soundcard, too). While 12 years ago companies would invest time and energy in making better and faster optical drives, today it's commodity hardware that people take for granted. I

↘ submit your questions to: comments@maximumpc.com

wish the optical drive industry would take more aggressive steps to get enthusiasts excited, such as with faster read speeds, faster mounting times of discs, or other interesting features, but that just doesn't happen anymore.

Dream Machine SSDs

Why not the Samsung 830s in the 2012 Dream Machine? I've bought these for clients left and right based on the "Best of the Best" label. They're even used in the Ultra configuration at the back of the mag (Blueprint). Then you go and drop in OCZ Vertex 4s in the DM 2012. Did I miss a review?

—Millennium69

SENIOR EDITOR NATHAN EDWARDS RESPONDS: We did indeed review the Vertex 4, back in August. It has the highest write speeds I've ever seen in a 6Gb/s SATA drive, and its sequential and random writes both best the 830. The 830 is a better value, but the Vertex 4s are great too, and they're newer, which is nice to have in the Dream Machine. The 830s are in plenty of our other recommended builds—they're now in our Baseline and Deluxe builds as well, thanks to price drops.

Stop the Sloppy Wiring!

Your Build It in the September 2012 issue has forced me to call you guys out on something I see month after month: crappy wiring! Quote: "Not gonna lie: The new build looks great. It's certainly one of the prettiest machines I've built to date." I threw up a little in the back of my mouth after reading this.

Nathan, come on, man. You get all this awesome hardware, nice cases, etc., and not only get to put it together, but write about it? You have a great job, and you do it a disservice by not taking the time to properly hide wires. What would happen if I gave a customer a custom computer that was assembled and wired Nathan-style? I wouldn't be in business long.

Could you please properly wire and thoughtfully design a layout before assembly and integration? Stop and take some pride in these rigs.

—John Dejesus

SENIOR EDITOR NATHAN EDWARDS RESPONDS: You're right. The wiring was not up to snuff. I resign my position at *Maximum PC*, effective immediately.

In all seriousness, the wiring on that build, especially the fans, could use some work. You're absolutely right that the small touches reflect pride in craftsmanship, and that sloppy wiring makes everything else look bad. My only excuse is that I ran out of time before our photography day and didn't have time to finish the routing. But that's not good enough, is it? I'll make sure future Build Its show proper attention to the details of wiring. I'm still quitting, though.

MS Dumps Metro Name, Alternatives Offered

Right as we went to press it was announced that Microsoft would no longer use the word "Metro" to describe the tile-based UI found in the Windows 8 OS, and would most likely be referring to it instead as—drum roll please—Windows 8! Gee, how clever. This means its Metro Apps will now be called Windows 8 Apps, and we now have to ride the Windows 8 to work. Naturally we felt a bit disappointed, so we asked online for some alternative tags for the much-maligned UI; here are some choice excerpts from our blog and Facebook page:

Xessive: "Window Pane"
Livebriand: "Windows POS UI"
Someuid: "Windows Carnival"
Whiznot: "Lemon UI"
Silencer: "Windows F-You or DUMB, which stands for Daringly Under-handed Marketing Bullsh*t"
Admobadmo: "Windows Kindergarten; full of basic shapes and simple colors"
Zoandar: "Personal Operating System, we all know what acronym this is..."
Sty: "Windows Tile UI" (an actual serious reply)

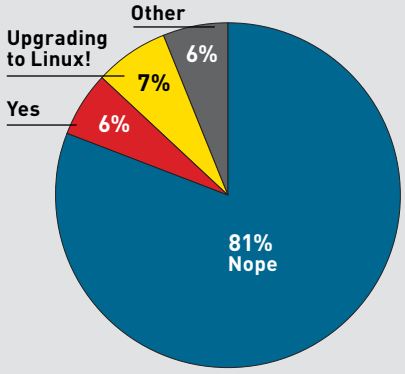
[NOW ONLINE]

NO BS PODCAST #189

Tune in for scintillating conversation among the *Maximum PC* staff regarding the latest hardware news, the stuff we're working on in the Lab, and Nathan Edwards's big send-off (that comment about the sloppy wiring was the final straw), plus a few choice invectives from King Crabapple himself, Gordon Mah Ung.

Facebook Poll

Will You Upgrade to Windows 8?



THE BUILDS

BASELINE

INGREDIENTS

PART		URL
Case	Fractal Design Define R4	www.fractal-design.com
PSU	Corsair HX650	www.corsair.com
Mobo	Gigabyte Z77X-UP4 TH	www.gigabyte.us
CPU	Intel Core i5-3570K	www.intel.com
Cooler	Cooler Master Hyper 212 Evo	www.coolermaster.com
GPU	Gigabyte GTX 660 Ti Power Edition	www.gigabyte.us
RAM	8GB Patriot Gamer DDR3/1600	www.patriotmemory.com
Optical Drive	Samsung SH-222BB	www.samsung.com
Solid-State Drive	128GB Samsung 830 Series	www.samsung.com
Hard Drive	3TB Seagate Barracuda	www.seagate.com
OS	Windows 7 Home Premium 64-bit	www.microsoft.com

Approximate Price: $1,350

AN UNLOCKED Ivy Bridge quad-core and a kick-ass midrange GPU power this lean, no-compromises gaming PC. Thanks to falling HDD and SSD prices, we're able to get both speed and capacity.

On the video side, we were torn this month between the Radeon HD 7850, which has dropped to around $220, the 7870 GHz Edition, which is around $290, and the new GeForce GTX 660 Ti, which outperforms the 7870 GHz Edition in most tests and is $310. We settled on the 660 Ti, but it's a close one: The 7870 GHz Edition and the 7950 would also be good picks.

PERFORMANCE

INGREDIENTS

PART		URL
Case	NZXT Phantom 410	www.nzxt.com
PSU	Corsair HX750	www.corsair.com
Mobo	Asus Sabertooth X79	www.asus.com
CPU	Intel i7-3820 @4.7GHz (overclocked)	www.intel.com
Cooler	NZXT Havik 120	wwww.nzxt.com
GPU	Asus GTX 670 DirectCU II TOP	www.asus.com
RAM	16GB Corsair Vengeance DDR3/1600	www.corsair.com
Optical Drive	LG WH12LS39 BD-R burner	www.lg.com
Solid-State Drive	128GB Samsung 830 Series	www.samsung.com
Hard Drive	Seagate Barracuda 3TB	www.seagate.com
OS	Windows 7 Professional 64-bit	www.microsoft.com

Approximate Price: $1,870

FOR THE DELUXE machine, it's a hard choice between the Ivy Bridge Core i7-3770K and the Sandy Bridge-E Core i7-3820. Both are quad-core CPUs with HyperThreading, but Sandy Bridge-E gives you more of an upgrade path: Ivy Bridge-E will come out next year, and there are always six-core Sandy Bridge-E processors. Depending on your needs, either would be a good choice.

Either way, you get plenty of overclocking headroom, a kick-ass GPU, 16GB of DDR3, a Blu-ray burner, SSD, 3TB hard drive, and a sleek case with plenty of expansion opportunities, all for under $1,900.

BUDGET

SO LET IT be written, so let it be done! We promised you a sub-$1,000 budget machine to alternate with our $3,000-plus Ultra configuration, and here it is! Our Budget box is the machine we need, not the machine we deserve. It has an inexpensive, overclockable Phenom II X4 chip and a modern motherboard that supports USB 3.0 and 6Gb/s SATA—albeit with only one x16 PCIe slot.

For just over $600, we don't get a fancy SSD, classy chassis, or a Blu-ray drive, but at least we have a 1TB 7,200rpm boot drive, 4GB of RAM, and a modern DirectX 11 GPU, the Radeon HD 7770. If you have a little more scratch, you can easily swap the Phenom II CPU for a faster Bulldozer or "Vishera" chip when that comes out, get a faster GPU, expand your RAM, get an aftermarket cooler for overclocking, or a fancier case and beefier PSU—whatever your heart desires. But this Budget box is enough to get you started with enthusiast computing without dipping into your college fund.

For our complete Best of the Best list of recommended components, visit www.maximumpc.com/best-of-the-best.

INGREDIENTS

PART		URL
Case	Rosewill R218 w/ 450W PSU	www.rosewill.com
Mobo	Gigabyte GA-970A-UD3 ATX	www.gigabyte.us
CPU	AMD Phenom II X4 965 BE	www.amd.com
Cooler	Stock AMD	www.amd.com
GPU	Asus Radeon HD 7770 1GB	www.asus.com
RAM	4GB (1x 4GB) Corsair Vengeance DDR3/1333	www.corsair.com
Optical Drive	Lite-On iHAS224-06 DVD/CD writer	www.lite-on.com
Hard Drive	1TB Seagate Barracuda	www.seagate.com
OS	Windows 7 Home Premium 64-bit	www.microsoft.com

Approximate Price: $610

SUGGESTED PAIRINGS

Kick-ass peripherals for your new rig

MIDRANGE MONITOR
Asus PA238Q
$300, ww.asus.com

KEYBOARD
Razer BlackWidow Ultimate
$130, www.razerzone.com

MOUSE
Cyborg R.A.T. 9
$100, www.cyborggaming.com

GAMING HEADSET
Corsair Vengeance 1500
$100, www.corsair.com

SPEAKERS
Corsair SP2500
$205, www.corsair.com

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