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SPEEDTEST:

LINUX VS WINDOWS

IT'S TIME TO SETTLE THE SCORE

GROUP TEST

Compact Tablets

Little doers outclass the big guns

One of these will change your mind about tablets!

REVIEWS

SAMSUNG GALAXY TAB S, LG G WATCH, HP 800ED DESKTOP MINI, MSI GT70, QNAP TURBO NAS TS-45, ASUS PG278Q, OCZ REVODRIVE 350 AND MORE!

HOW TO:

FACEBOOK AD ALERT: THE HIDDEN DANGERS

MAKE BIG MONEY FROM YOUR APP

OUTLOOK PRO TIPS

GOOGLE GLASS

REAL WORLD REVIEW

HACKERS IN THE HOUSE

INTERNET APPLIANCES ARE THE NEW BACKDOOR

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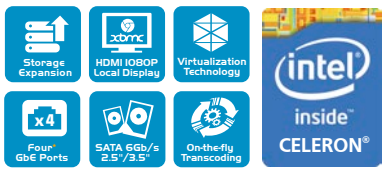

* TS-253 Pro only has dual LAN ports

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www.qnap.com

Take your tablet

When form-factors come of age.

I finally get tablets. All it took was the perfect combination of size, weight and materials.

With tablets, form is also function. To make a rectangular slab which can balance on your lap, or sit up on a coffee table or desk, one would think would be a relatively easy engineering task. But no. They've been too heavy and too slippy in the hand to make that critical final leap into daily life. Well, my daily life.

All that's changed now, and it was the iPad Mini that did it. The right size for casual use, a weight that wasn't, really, and no real compromise on performance. It was perfect, all except for the OS, which I really don't like (personally!). So, I went back to an ultrabook for the same tasks and was happier.

Then I used the Samsung Galaxy Tab S 8.4. Not only was it the slimmest and lightest tablet I've ever held, but is also a snappy performer and has a bright AMOLED screen that's exquisite. As well as an OS I like. Perfection! But as I write, we still haven't had a review unit from Samsung for long enough to enjoy beyond the labs testing. The Tab S didn't even win the labs roundup in this month's main feature, though it's certainly my personal favourite of the compact tablets we did test, although that's ignoring value, with the Galaxy being amongst the most expensive you can buy today.

So now that I've discovered a love for tablets, I'm assuming that this will be an adjunct to my life-set of innumerable yet essential devices. It had better be, because deep down I'm a PC traditionalist and I don't for a second want to believe that the desktop PC is anything but the King of the castle.

Thus, it was with giddy excitement that I shifted it up to 11 and started using the new Microsoft Surface Pro 3 just a few days ago, which is irrelevant to any discussion about compact tablets, because it isn't one, though it's as thin and light as the best covered in this issue, is a treasure to hold and it runs Windows 8.1 (which I still mostly dislike, even on a tablet where it belongs, but that's a whinge for another day).

Enjoy!

Ben Mansill
Editor
bmansill@nextmedia.com.au

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- Our tests are performed by experienced reviewers in our Labs in accordance with strict benchtesting procedures
- Our brand new benchmarks have been tailor-made to reflect real-world computing needs
- We put tech through its paces – seriously. From processing power to battery life, from usability to screen brightness, our tests are exhaustive
- We will always offer an honest and unbiased opinion for every review

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Photokina is nearly upon us! I'm pretty pumped to see what's coming in the camera world.

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CORRECTION

PC&TA #202 stated that the warranty period for the Asus PB287Q was 5 years. This is incorrect, the warranty coverage (for all Asus monitors sold in Australia) is in fact: "3 years Australia-wide Onsite Pick Up Warranty, and 3 Years Perfect Pixel guarantee for all other LCDs." We apologise for any inconvenience this caused.

LETTER OF THE MONTH

How can you have possibly omitted the Amiga from you "Historical PCs" article, August 2014? The Amiga 1000, released in 1985, was the first true multitasking/multimedia PC, with CLI/Shell/GUI integration, produced ever, and years ahead of any computer available at that time. Also it had a two button mouse, resizable windows, superior graphics, high quality audio, swap screens, speech capability, HD add-on etc. PC World, in 2006, voted the Amiga 1000 as the 7th greatest PC of all-time, and in 2007 the 37th best tech product of all time!
Tony

Ben Mansill replies: Tony, I wholeheartedly agree. I, too, earned my computer stripes with an Amiga (the legendary 500, and yes, all I did was play games on it...). But even as editor it's not my call entirely, as the writers who worked on that piece had their own thoughts and that's how the list turned out. That said, the list that we did run, I think, is no less valid. I know (from an enjoyable email exchange with Tony) that his Amiga collection is still mostly still running, and that there's an extremely active wider community of Amigaheads keeping these wonderful pieces of computing history still running. There aren't many computers you can get emotional about, but among them are the Amiga machines, and most of all, whatever our own first computer was!

DIY NAS

I have been thinking about building a do-it-yourself NAS box for quite some time with the miniITX form factor.
I am having a great deal of difficulty finding a miniITX NAS case with hot-swappable drive bays that use standard ATX or even SFX power supplies.
In a future release of the magazine can you do a labs feature on DIY NAS cases on the market that have hot-swappable drive bays that use standard power supplies? It would be a pain to change a dead drive with the current crop of miniITX cases that weren't designed for server/NAS builds.
I am a big fan of the magazine and love the lab reviews. Thank you for your assistance.
Tony

Ben Mansill replies: The NAS scene is really lighting up with more and more products addressing the rapidly growing consumer market. In just this issue we've covered two new and interesting NAS chassis' and one of them just might fit the bill. It's the Synology DS414slim and it stopped us in our tracks at this year's Computex show. It's small, affordable and powerful enough to stream HD media. It's a dedicated NAS product though, so isn't exactly the standard miniITX case you were hoping for, but gear like this, I think, should be on your radar because I don't know of a miniITX case as you describe either! Former editor John Gillooly volunteered for this review and you can read that on page 45. It's for 2.5inch drives, only, though. But there are many 3.5inch NAS products coming out now with similar qualities. And yes, all that does sound like a group test in the near future!

RAZER WINNERS

This month's letter of the month as well as best site comment will receive Razer Adaro stereo headphones valued at $149.95.
www.razerzone.com/au

TOP SITE COMMENTS

Amazon's efforts here have one purpose only, to entrench their monopoly. This is nothing short of a cynical attempt by Amazon to control the publishing scene. They are betting their deep pockets and bullying tactics will allow them to drive all potential competitors out of business (Sony have gone, B&N & everyone else other than Apple is in deep trouble) and because of that (corrupt?) judge's ruling, their only potential competitor, Apple has one arm tied behind their back for 5 years.
The DOJ went after the wrong company.
amcmo takes a deep breath and shares his opinion.

The Crew looks really great for just driving around with friends and having fun. I've been waiting for a truly great racing game since Need for Speed Carbon; this, along with Forza Horizon 2, might just be what I've been looking for all these years..
James Cray shares his driving dreams. James may well have been one of the many who didn't buy Test Drive Unlimited, despite it all shaping up to be the complete open world driver. That's ok, it was a pretty poor game.

They're cramming DDR4 down a DDR3 bus? What about Mobo support and bios updates for timing support?
Duper wonders, like the rest of us, just how useful DDR4 will actually be in the real world. Tune in next month to find out!

Want to read more? Go to **www.pcandtechauthority.com.au** and join in the conversation. Also check out the Atomic forums: **http://forums.atomicmpc.com.au**

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Please limit letters to 200 words, where possible. Letters may be edited for style and to a more suitable length.

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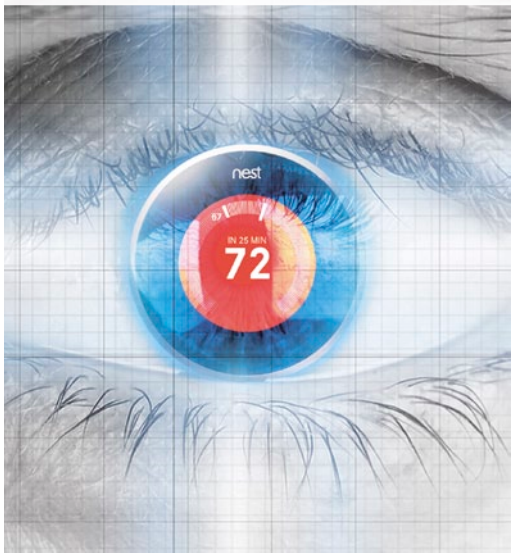

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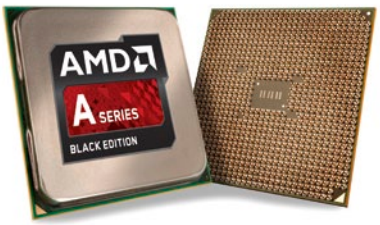

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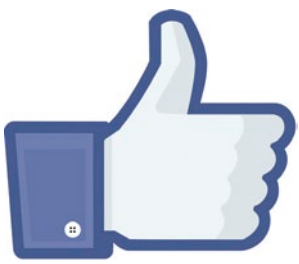

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Tech News

The latest trends and products in the world of technology

SMARTPHONES OUTSELL PCS FOR LENOVO

SMARTPHONE SALES SOAR PAST PCS FOR THE WORLD'S LARGEST COMPUTER MAKER.

Lenovo's transition to a "PC Plus" company continues unabated, with smartphone sales overtaking PC sales for the first time.

While sales of tablets and smartphones combined were higher than PCs in Q1 2013, sales of smartphones alone hit 15.8 million units in its first fiscal quarter of 2014 - 1.3 million more than PCs.

The massive 39% year-on-year upswing in Q1 2014, which ended on 30 June, makes Lenovo the fourth largest smartphone maker in the world, reversing a fairly steep decline seen between the third and fourth quarters of 2013.

This is partly explained by the Chinese company's acquisition of Motorola Mobility, which it bought from Google in January earlier this year.

At the time, Yuanqing Yang, Lenovo's CEO, said that the acquisition of "such an iconic brand [and] innovative product portfolio" would "immediately make Lenovo a strong global competitor in smartphones".

The company also retains its position as the world's largest PC maker, and its PC business also saw an increase, although at 14.5 million units sold it hasn't yet returned to its Q3 2013 high of 15.3 million units.

In EMEA, the company's revenue increased 49% year-on-year, hitting US$2.8 billion. The company also increased its PC market share and operating margin in the region, while smartphone sales hit one million units for the first time.

Not surprisingly, Lenovo's strongest market was its home country of China, where its revenues totalled US$3.8 billion in the quarter, accounting for 39% of its US$10.4 billion worldwide revenue.

"This has been a quarter of milestones for Lenovo - record PC share, a number three ranking in worldwide tablets for the first time, and an even stronger number four global smartphone position we hold," Yang said.

"As the PC industry recovers, the smartphone market continues its shift from premium to mainstream... we see even more opportunity to keep growing rapidly," he concluded.

INTEL INTRODUCES CORE M, ITS FIRST 14NM BROADWELL CHIP

INTEL PROMISES INNOVATIVE NEW FORM FACTORS THAT DON'T REQUIRE FANS THANKS TO CORE M CHIP.

Silent, fanless, thin devices are about to get a performance boost thanks to Intel's new low-power Core M processor - its first chip based on the 14nm Broadwell architecture.

The new design has been created specifically to take advantage of the power efficiency of the 14nm manufacturing process, which will be used to make a range of products, from energy efficient servers to tiny Internet of Things device.

"Intel's 14-nanometer technology uses second-generation Tri-Gate transistors to deliver industry-leading performance, power, density and cost per transistor," said Mark Bohr, Intel senior fellow and director of process architecture and integration.

The Core M processor is already in volume production; the first devices using it are expected to appear on the shelves for Christmas, with wider availability in 2015. Other chips based on the Broadwell architecture are in the upcoming pipeline, Intel added.

NEWS BITES

WD RED

WD has launched the latest hard drives in its Red range. Intended for NAS use, Red-class drives have firmware optimised for 24/7 operation, yet still manage to deliver performance similar to regular consumer hard drives.

SEAGATE NAS DRIVES

Just days after WD's Red announcement came the word from Seagate that it, too, has a new series of NAS hard drives. Also optimised for endurance, the Seagate NAS drives come in capacities of 2TB to 30TB.

SURFACE PRO 3

Microsoft's new Surface Pro 3 is in our hot hands for testing, but alas it only arrived here a couple of days prior to sending to print, so the review will come in the next issue. But just quickly, we need to share the excitement of using the best tablet yet. Its exquisite engineering and carefully considered design at work (and play!). We have no doubt that this device will have a huge impact on the almost commoditised tablet scene.

RAZER NABOO

The wearable revolution is well under way, and it's becoming increasingly difficult to find a company that doesn't have something you can wrap around your wrist, or has one in the works. Razer is trying to make some noise about its upcoming Naboo, which is interesting because it focuses on apps and social more than fitness.

PARALLELS DESKTOP 10

We attended a private demo of the new Parallels Desktop 10 and left very much impressed, but alas, embargo dates preclude us giving you more detail here. Suffice to say, for now at least until we do a full review, that it's a super-slick and mega-quick way to run Windows on a Mac, and with enough new features and refinements to definitely warrant an upgrade from version 9.

YOU'VE GOT 18 MONTHS TO UPGRADE FROM IE8

IF YOU'RE RUNNING AN OLDER VERSION OF INTERNET EXPLORER, MICROSOFT IS GIVING YOU UNTIL JANUARY 2016 TO UPGRADE.

Anyone still running Internet Explorer 8 has 18 months to upgrade - although you really should do it as soon as possible, Microsoft has warned.

Microsoft revealed end of support for the five-year-old version of its browser, saying IE8 will no longer receive updates from 12 January 2016.

IE8 is the most used version of Microsoft's browser, with 22% of the desktop market, according to Net Applications, compared to IE11 at 17%, IE9 at 9% and IE10 at 6%.

It's a growing problem that so many people remain on the older browser, Microsoft said, as more recent releases are more secure.

"Outdated browsers represent a major challenge in keeping the web ecosystem safer and more secure, as modern web browsers have better security protection," said Roger Capriotti, director of Internet Explorer, in a Microsoft blog post.

Confusingly, not all versions of Windows support the most recent version of Internet Explorer, so it's not only those on IE8 who may need to upgrade. The minimum supported browser as of January 2016 depends on the system you're running, meaning you'll also need to upgrade from IE9 or IE10 if you're on a more recent OS.

For example, anyone still on Vista or Server 2008 SP2 will need to upgrade to IE9, while anyone on Windows Server 2012 must upgrade to IE10. Everyone else will need to be on IE11.

For companies that rely on older versions of IE for business-critical apps, Microsoft pointed to its Enterprise Mode for IE11, which offers backward compatibility for many legacy apps. Microsoft said Enterprise Mode would be supported throughout the duration of any OS lifecycle.

Microsoft pointed out that using the most recent browser is safer for users, but also more convenient for developers. "Older browsers may not support modern web standards, so browser fragmentation is a problem for website developers," Capriotti said, despite Microsoft's guidance suggesting at least three versions of IE will be in use two years from now.

IE is one of the last major browsers not to move to a rolling refresh cycle, with Chrome and Firefox both automatically updating users to the latest version.

REVERSIBLE USB CABLE ENTERS PRODUCTION

NO MORE FIDDLING WITH PORTS.

A new type of USB connector that will completely overhaul current specifications is about to enter production.

The USB 3.1 Type-C, which is about the size of a micro-USB but thinner, "opens the door for the invention of an entirely new, super-thin class of devices that consumers haven't seen yet," according to Alex Peleg, VP of Intel's Platform Engineering Group.

He previously claimed the Type-C is "the only connector one will need across all devices".

The USB 3.1 Promoter Group, part of the USB Implementers Forum, has taken a leaf from Apple's book in the development of the Type-C. Like the Lightning connector, it's reversible, meaning users can insert it into their device's port no matter which way up it is.

It also supports USB performance at SuperSpeed 10 GB/sec and USB Power Delivery up to 100W.

The Type-C, which has been in development since late 2013, is a totally new type of cable, meaning it won't directly interface with current connectors. However, the organisation is also defining standards for adapters, meaning people can still use the new technology with their existing devices.

USB 3.0 Promoter Group chairman Brad Saunders claimed excitement about the new standards has been so intense that "representatives from the PC, mobile, automotive and Internet of Things industry have been knocking down our door anticipating [it]".

Yet there's no word yet on quite when the USB 3.1 Type-C will be released, despite the Promoter Group saying it's entering production. Full details and specs will be revealed at upcoming developer conferences that are "currently being planned", the organisation said.

HOT... OR NOT

HOT

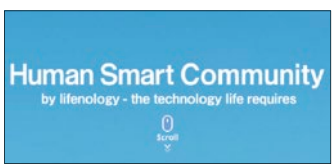
LOVELY PHRASES

Unlike the example in NOT, below, there are some advertising catchphrases that we instantly warm to. Our all-time favourite comes from MSI. Earlier this year the company ran an advert for an All-In-One PC, with a picture of an exploding head made of water, and proclaiming "As the Crystal, Beautiful and Firm." *Yes!*

NOT

CRAPPY BUZZWORDS

In the midst of a bit of an emotional moment brought on as we were told for the umteenth time that week that a new bit if gear is '**disruptive**', our simmering rage exploded, when visiting the Toshiba site, where, splashed across the home page was '**Lifenology**'. No no no no *no!*



Gaming News

All the news that's fit to print from the gaming world

BIOWARE REVEALS NEW PC GAME SHADOWREALMS

BIOWARE GOES BACK TO ITS ROLEPLAYING ROOTS WITH NEW CO-OP RPG.

A new BioWare game is always cause for excitement, and that's just what we got overnight at GamesCom. Even better, it's a new PC game, called Shadow Realms.

There's no date yet for the game's release, but we do know that sign-ups for closed alpha-testing are already open, so there is that. But what are you getting into if you sign up?

Shadow Realms is an online action RPG, with four player co-op versus one lone, rather more powerful, player. Here's the official spiel:

In Shadow Realms, Modern Heroes on Earth are being awakened and recruited, because of magical powers they never knew they had, to fight in a new and dangerous war against the Shadow Legions of Embra. The Shadow Legions, who have been battling on Embra for years against the members of the Radiant Empires, have gained new strength with the coming of a powerful, unknown force that we call the Shadowlords. And, they have just figured out how to leave Embra and invade Earth.

Players can level up and customise both their hero, and their iteration of the Shadowlord. While it does sound like a fantasy version of Evolve, we're guessing that the Shadowlord may well have control over more than a few minions.

The game will also feature episodic content that advances the game's story and plot.

"Shadow Realms is a new BioWare RPG that has the hallmarks of all BioWare games with a rich story," said Jeff Hickman, General Manager and Vice President at BioWare Austin, "a unique world setting and deep combat progression, but built as an interactive experience that evolves the genre and broadens the appeal to online gamers all over the world."

Sounds kinda cool to us.

THE EVIL WITHIN

A NEXTMEDIA EVENT

We love a good scare, and when it comes to scary games nothing gets us more excited than The Evil Within, a brand new title from horror master Shinji Mikami (who created a little phenomenon known as Resident Evil).

Thanks to the crew at Bethesda, 10 lucky VIPs will win the chance to spend several hours on the edge of their seat playing The Evil Within here at nextmedia HQ with the *Hyper, PC PowerPlay and PC & Tech Authority* teams, who will be on hand with pizza and beer, before the game is released. Not only will you be able to experience the game for yourself and walk away with a bag of The Evil Within goodies, but one lucky attendee will also score a major prize bundle, one that is so terrifyingly awesome that we dare not speak its contents.

To enter, and for terms and conditions head over to **www.hyper.com.au/evilwithin (you must be in Sydney and over 18).**

SIERRA RESURRECTED FROM THE DEAD!

ACTIVISION ACTIVATES NEW WEBSITE, TRAILER HINTS THAT BIG THINGS ARE COMING.

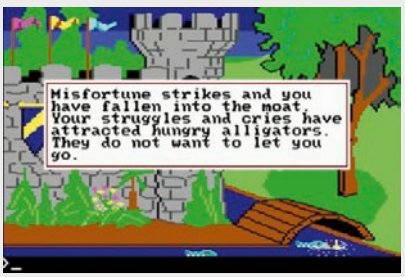
Did not see this one coming... However, shortsightedness aside, it looks like classic game developer Sierra is making some kind of shambling comeback.

Surprise!

Sierra made a raft of classic games - King's Quest, Police Quest, Leisure Suit Larry, and more - before its sad demise, but now, all of a sudden a new website is live, complete with enigmatic teaser video for the beloved brand.

The site has that standard Activision copyright boilerplate, and a link to this month's Gamescom expo page. So, that's when we'll learn more.

We can't imagine Activision would bring back a brand like Sierra without either some original staff, or be looking at bringing some old titles back to life. And what platforms those titles would be for also remains a mystery, though it seems unlikely that Activision would release anything that isn't at least on everything under the sun.



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Chip News

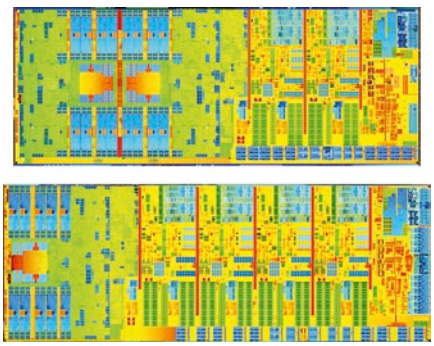
Nvidia create a CPU that correctly interprets incorrect instructions, as Intel's CPUs incorrectly interpret correct instructions, while AMD sneakily unleashes Tonga. **Mark Williams** has the latest in chip news.

CPU

INTEL SHIPPING FAULTY CHIPS

It has been discovered that current Intel chips based on Haswell and the upcoming Haswell-E and Broadwell-Y architectures that sport the new TSX (Transactional Synchronization Extensions) feature have a fault baked into them that can cause critical software failures.

Very reminiscent of AMDs TLB erratum in its Barcelona based products back in 2007, Intel has stated that it will be issuing micro code patches to motherboard manufacturers who will then release BIOS patches for their products to end users. This patch will simply disable the new feature altogether on the affected chips, thus preventing the issue from occurring.



A simple silicon revision should fix this problem in future CPU batches, but the damage is already done with millions of affected chips already out in the wild.

While embarrassing for Intel, TSX doesn't have wide spread adoption yet so most users will likely not come across this problem any time soon.

Let's just hope the BIOS patch doesn't cause 10%+ drops in performance like AMD's TLB patch did!

NVIDIA MAKES A CPU!

Better known by its project code name 'Denver', Nvidia has released details about its upcoming Tegra K1 64-bit SoC.

The CPU they're building on this is going for a left field thinking solution. The core itself is based on the ARMv8 ISA but has undergone significant alterations, so much so that Nvidia's benchmarks are showing that two Denver cores outperform its current quad core Cortex-A15 Tegra based solutions by 50-150%, with claimed IPC throughput on par with Intel's Haswell thanks to a wide seven-way superscalar engine.

All this from a 64-bit in-order design (reminiscent of Intel's early Atom models) which'll be great for power usage. The really intriguing part is how they feed it. They've gone the Transmeta style route of using binary translation to convert incoming ARMv8 instructions into Nvidia's own internal ISA on the fly before executing it. This is done in a software layer lower than the OS which allows them to efficiently reorder code before feeding it into the engine while also allowing them to cache previously decoded instructions into memory for quick retrieval. This, however, could mean the claimed speed results are only achieved under optimal conditions.

GPU

GTX 880 AND 870

Leaks are showing up with details about Nvidia's next performance parts, the GTX 880 and GTX 870 (based on the GM204 chip) that will bring its new Maxwell architecture to the performance segment.

It has been confirmed that the reference boards for these cards have successfully undergone certification and validation testing. Apparently the boards look closer to the GTX 770 in design than the GTX 780 which supports the rumour that these are using a 256-bit memory interface to save on power and costs (the GTX 780 GPU was 384-bit wide).

To make up for this fact the 4GB of GDDR5 allegedly will run at 7GHz and rely on Maxwell's efficiencies to cover any shortcomings.

Leaked GTX 870 specs show it may have 13 SMs, 1664 shader cores, 138 TMUs, 32 ROPs and have a base clock of 1051MHz with a boost of 1178MHz. A couple of 3DMark benches put this around GTX 780 in performance. Both are billed to launch in the middle of September.

FIREPRO W7100 BETRAYS R9 285

AMD recently launched its new workstation grade card the FirePro W7100. While end users don't typically care about such products this one is worth inspecting. It's AMDs first card with the new Tonga GPU inside and gives us a glimpse at what to expect for the upcoming R9 285.

Of note is that it's a full Tonga core but with 4 CUs disabled for 28 total, making this a Tonga Pro part with 1792 stream processors (the same as Tahiti Pro). This leaves room for a possible future Tonga XT part for an R9 285X.

The FirePro W7100's core clocks weren't disclosed but it was revealed that 8GB of 5GHz GDDR5 will sit on its 256-bit wide memory bus and the card had a TDP of 150W. The R9 285 however will likely only have 2GB when it arrives.

The R9 285 release date is imminent and will likely already be out as you read this.

One concerning rumour is that in the longer term, Tonga chips might end up powering current R9 280 series cards, thus making AMD's already confusing product stack confusing for buyers trying to differentiate between Tahiti and Tonga powered parts.

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Most Wanted

Extra things that shine.

▲ BEATS PILL + BIKE MOUNT

This 19cm-long Bluetooth as well as regular 3.5mm jack speakers are certainly expensive, at least in terms of what we expect for a product like this - perhaps a tad too expensive - but mega U.S. rap stars command a premium dollar for their endorsement and possible though unlikely involvement with the actual product development.

What you get for your funkybucks, though, is a very tidy portable audio device, capable of punching out enough clear and defined volume to easily fill a room. The choice of running on an internal battery or AC is nice, as is the included microphone, which can be used with typical Bluetooth function on a device for taking calls.

Beats also sell-separately a clamp that attaches the Pill to bike handlebars (!) .We do like that, though, again, at $79 it's a bit much for an (albeit very well designed) accessory like this.

www.au.beatsbydre.com

▶ BEATS SOLO 2

When the good people at Beats sent us the Pill to check out, there in the groove-package was also a set of Beats Solo 2 headphones. Ha! They must be joking, we thought. Famously the worst headphones possibly in the known universe - or beyond, Beats Solo's have been accidentally purchased by many a trend-follower in the mistaken belief that style = substance.

But! In one of the biggest product shocks of the year, it turns out that the new Beats are really good! As opposed to the originals, the new Beats can handle any type of music - including gentle classical or soft vocals, and they're just as meaty for the bassy stuff. They're possible the equal of the amazing KEF headphones we reviewed earlier this year - and those ones we declared the very best available at that price-point. Like the originals, they're quite uncomfortable, for those who choose to wear them on their head instead of around their neck. For the $259 price, they offer genuine competition to others in this bracket, and are better than most. You'll still be judged harshly by others when they see you wearing them, such has been the legacy of the originals, but hey, it's about the music.

www.au.beatsbydre.com

▶ SAMSUNG NX CAMERA

The cost of a decent interchangeable lens camera has fallen, and for $500 the Samsung NX mini is a tiny tempter. It's very small, very light, packs in the expected non-essential functions like Wi-Fi and, a little curiously, NFC. For megapixel junkies there's 20.5 of them across the sensor, also impressive is 6fps continuous, along with a blazing 1/6000th top shutter speed.

www.samsung.com.au

THE SILENT ASSASSIN

INCREDIBLE POWER AND NO NOISE?

▲ The ASUS ROG Swift PG287Q uses G-SYNC to deliver amazingly smooth performance in games.

Who wants a powerful gaming PC that delivers perfectly fluid game play at the crispy clear resolution of 2560 x 1440, while maintaining frame rates well above 60 frames per second, without a hint of screen tearing? What if we told you that it was possible to build a machine this powerful, yet it remained deathly silent when not in use? Using three of ASUS's new products, we're going to show you how a PC powered by the Republic of Gamers is a beast while gaming, yet as quiet as a mouse when you're surfing the Net or working in Word.

ASUS ROG SWIFT PG287Q

Key to this machine's unique ability to play at incredibly high frame rates without a hint of screen tearing is NVIDIA's new G-sync technology. ASUS is one of the first companies to release a G-sync display in Australia, in the form of the 27 inch, 2560 x 1440 PG287Q. With a blistering fast refresh rate of 144Hz, it's able to run games at any frame rate up to 144Hz without screen tearing, yet doesn't need V-sync enabled to do so. G-sync slaves the display to the GPU, so that the screen is only refreshed when the GPU is ready. This removes the need for V-sync entirely, yet also solves the problem of screen tearing when V-sync is disabled. It also means that the frame rate can drop to around 40 fps yet still look fluid and smooth. It's unlikely that this PC will ever drop to such a low frame rate though, as it's equipped with some very powerful graphics hardware.

ASUS STRIX GTX 780

NVIDIA's GeForce GTX 780 is one of the fastest GPUs on the market, but it only includes 3GB of onboard memory. Combine the display's 2560 x 1440 resolution with high anti-aliasing levels and it's possible to fill this 3GB of memory, leading to lower performance levels. ASUS solves the RAM shortage by doubling the onboard memory of the new STRIX GTX 780, which includes a hefty 6GB of onboard GDDR5 memory. Put two of these graphics cards in your PC and it will easily maintain frame rates of around 90 to 100fps in the latest SLI-supported games, with every graphics option maxed out.

▶ ASUS Strix GTX 780

▼ The ASUS Maximus VII Formula

ASUS MAXIMUS VII FORMULA

Based on Intel's new Z97 chipset, the Maximus VII Formula is the perfect home for your twin STRIX GTX 780 graphics cards. ASUS has equipped this motherboard with gaming-quality audio in the form of the SupremeFX sound solution, which uses exotic components to deliver audio with a stunning 120dB SNR. Games will sound vibrant and alive, with none of the distortion or hissing found on lesser motherboards. The Formula also includes a fan controller that ensures the CPU fan slows down when not in use, while simultaneously disabling all case fans. The end result is a powerhouse of a system that remains whisper quiet during normal desktop duties, with the fans only spinning up when needed. Combine these three core components, along with a powerful CPU and rapid SSD storage and you're going to end up with the finest PC gaming experience possible. It's impossible to understate how impressive G-sync is in action, and ASUS is proud to be one of the first to bring this revolutionary new display technology to Australia.

"ASUS solves the RAM shortage by doubling the onboard memory of the new STRIX GTX 780, which includes a hefty 6GB of onboard GDDR5 memory."

Metadata megastore

Is the concept of privacy a relic of days past?

Australians of all stripes could soon have their metadata held for up to two years after the Federal Cabinet approved a data retention regime for Australia. The detail isn't clear and there's been conflicting information from government about what exactly constitutes metadata.

What is clear is that the government wants to bring into law a rule that would require internet and telco providers to store their customers' metadata so that it's available to authorities. The soon-to-be-introduced laws are being promoted as part of the wider fight against terrorism taping into fears about so-called 'home-grown' terrorists who are radicalised in conflict zones overseas and come home to carry out attacks.

Attorney-General George Brandis reportedly said that information such as phone and email time, destination and origin will be captured. This was contradicted by Prime Minister Tony Abbott who said it would include browsing history, although he quickly recanted from this statement. The government has since stated that a 'uniform standard' of information will be required. Metadata is typically traffic details, rather than content, although with social media, tweets, for example, can clearly reveal the content in the metadata.

Industry representative such as internet providers and groups such as the Communications Alliance are in the dark about the exact details and have reportedly said the government has asked for a wide sweep of customer details.

The move towards a mandatory data retention regime doesn't come as a complete surprise. A Senate inquiry into the Telecommunications Act has been underway this year, chaired by Greens senator Scott Ludlam. It's had public inquiries and received submissions from policing authorities, internet providers, civil liberties groups and technical experts, which can be viewed here: **www.aph.gov.au/Parliamentary_Business/Committees/Senate/Legal_and_Constitutional_Affairs/Comprehensive_revision_of_TIA_Act**

The committee's report is due at the end of August, but the government isn't waiting around for it and could introduce new laws in the next parliamentary sitting period. The government has promised more detail in the legislation, but already there are claims it will add significant costs to telcos and internet providers. The ever expanding amount of data generated everyday makes it a daunting and expensive prospect, which could ultimately be passed on to consumers with higher plan costs.

"...a daunting and expensive prospect, which could be passed on to consumers with higher plan costs."

Critics of the scheme such as internet provider iiNet (**http://blog.iinet.net.au/protecting-your-privacy/**) have said that existing laws are adequate and that it should not be forced to collect, store or match en masse the personal information for all its customers on behalf of their parties such as law enforcement agencies.

At present, law enforcement agencies can access customer information without warrant, although telcos and internet providers don't necessarily store this information.

Civil liberties group Electronic Frontiers Australia (EFA) is opposed and says there's no need for the scheme because it treats everyone as a suspect and places and unfair burden on small service providers (**www.efa.org.au/2014/08/05/no-justification-for-data-retention/**)

Elsewhere similar schemes have been trialled or are under consideration. The UK recently introduced a data retention scheme, which critics say expands the surveillance state (**www.legislation.gov.uk/ukpga/2014/27/pdfs/ukpga_20140027_en.pdf**). The EU has a scheme, although it's been deemed invalid by the EU Court of Justice (**http://ec.europa.eu/dgs/home-affairs/what-we-do/policies/police-cooperation/data-retention/index_en.htm**). The US currently has no data retention regime in effect, at least as public policy, although the recent Snowdon leaks exposing the National Security Agency's activities are well known.

The previous government went down this path for a time. It drafted plans, but ultimately abandoned these after objections from many groups including senior Liberals and today's Communications Minister Malcolm Turnbull.

The government hasn't started the sales process for the controversial scheme well and won't allay people's fears that it's a land grab for more of their private information (**http://theconversation.com/data-retention-means-you-are-on-the-record-like-it-or-not-19906**). There's been some confusion about the exact detail of the scheme and what's in and what's out and conflicting statements.

ROSALYN PAGE has been a journalist for over 10 years specialising in the areas of consumer issues, technology and lifestyle. Rosalyn is the 2008 winner of the Best Consumer Technology Journalist at the IT Journalism awards. Her work is published in a range of newspapers and magazines

What is metadata?

Metadata is information that internet and cellular devices including laptops, smartphones, tablets and games consoles create. It can include:

- The device's IP address
- Location detail
- Dates and times
- Device details such as browser and OS
- Browsing history
- Content such as images and multimedia on web pages
- Content of tweets
- Content of Facebook posts

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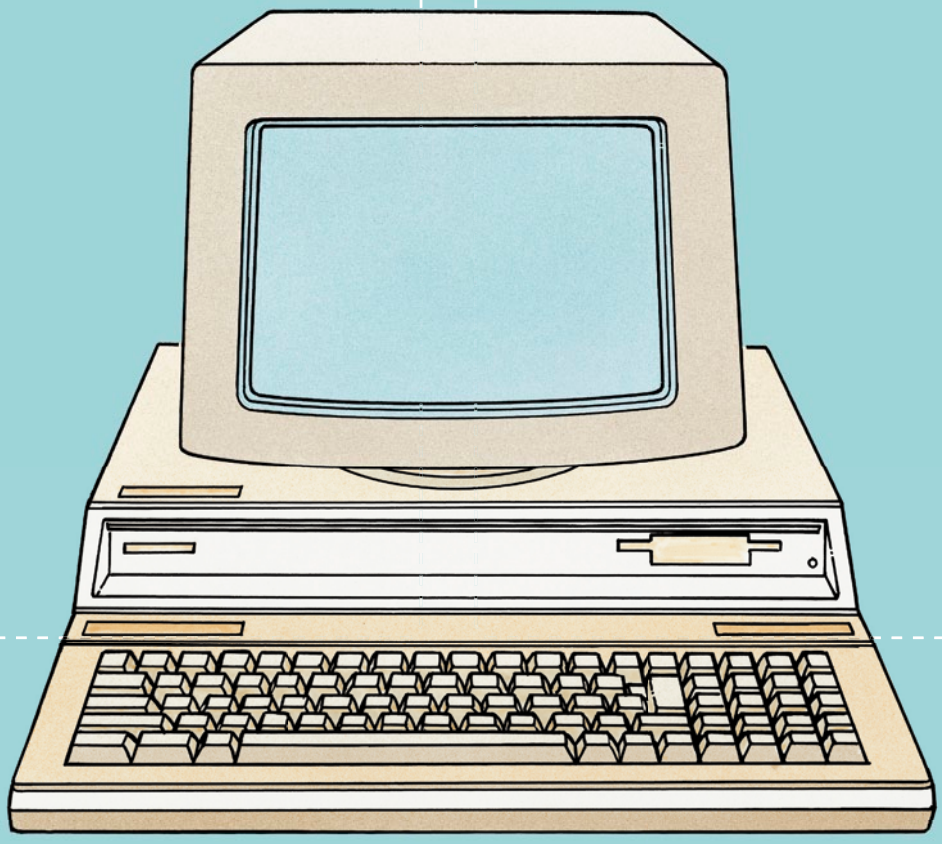


Ten events that changed tech

WHAT IF SERGEY BRIN HADN'T MET LARRY PAGE? WOULD WE LIVE IN A WORLD WITHOUT GOOGLE? WE TALLY UP TEN TECH TURNING POINTS, AND IMAGINE THE TURN OF EVENTS HAD THEY NOT TAKEN PLACE

SETTING THE WEB FREE

Tim Berners-Lee came up with a way to link documents over the internet in 1989, creating the hypertext transfer protocol (HTTP) and writing the first web browser. His initial proposal for the project won approval from his boss Mike Sendall with the words "vague, but exciting", and the first website (**http://info.cern.ch**) went live the following year – and changed the world. Sir Tim's real innovation was setting the web free: he asked for no royalties and filed no patent, and designed the web to be decentralised. At the time, there were other ways to get to information on the internet, notably the text-based Gopher – however, its creators at the University of Minnesota declared in 1993 that they would charge licensing fees to run Gopher servers. That same year, CERN, the huge lab where Berners-Lee worked, put the World Wide Web software into the public domain.

Had that not happened, the web would be a different place. Berners-Lee himself has said that there would be "lots of incompatible webs" created to dodge royalties, leading to a series of walled-garden AOL-style online communities

that didn't connect with each other. In other words, we'd still have the web, but it wouldn't be worldwide.

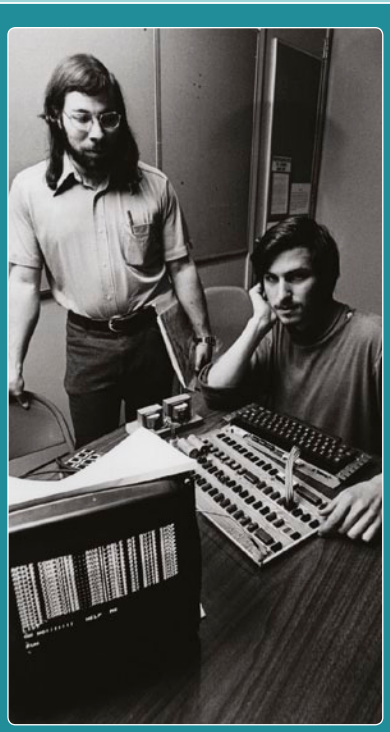
FROM LINUX TO ANDROID

The world of computing owes a debt of gratitude to Linus Torvalds. Even if you don't run Linux on your PC, it's used across the web, in businesses and at the core of Android. Being free allows others to innovate – Linux is the metaphorical shoulder that web developers, IT companies and even Google stand on.

Torvalds started working on Linux – then named Freax – in 1991 at the University of Helsinki. If he hadn't, would Android still exist? Well, probably. The free software movement was sparked by Richard Stallman, who had set a goal ten years previously to create a free Unix-compatible software system. That led to the creation of the GNU kernel, and 386BSD, which led to OpenBSD and FreeBSD. Torvalds has said that if the GNU kernel or the BDS variants had existed when he started work, he wouldn't have bothered making Linux.

The free software movement was bigger than one man, in other words – and that, indeed, is the beauty of it. We may not have had Linux without Torvalds, but we would have had something similar thanks to open-source developers.

A PAIR OF STEVES SPARKS APPLE



Steve Jobs was introduced to Steve Wozniak in 1971 by mutual friend Bill Fernandez, while attending high school in California. Jobs and Wozniak shared an avid interest in technology, and the pair worked together on several electronics projects before founding the Apple Computer Company in 1976 in order to sell the Apple I.

If Wozniak hadn't met Jobs, it's doubtful many of us would know his name today. He was an exceptionally talented electronic engineer, but had no particular ambition to build his hobby into a business. He had a comfortable full-time job as a staff engineer at HP, and had he not been offered the opportunity to co-found Apple, he admits he'd have happily remained there his whole life.

Steve Jobs was an aggressive entrepreneur who pushed Apple to embrace innovation and bring groundbreaking products to reality. This ambitious spirit would surely have expressed itself even without Wozniak. That's clear to see from the fact that after Jobs was ousted from Apple in 1985, he responded by promptly founding NeXT to compete with it. Within Apple, so dominant has Jobs' personality been over the decades, that even if he had founded it with a different partner, the end result today probably wouldn't look much different.

BILL GATES GRABS DOS

Somewhere out there, in a parallel universe, sits an alternative Microsoft: a mildly successful software company with a nerdy boss called Bill. If Gates had taken the same route as Digital Research and spurned the chance to create the underlying operating system for IBM's PCs, our world would be very different. As it was, Microsoft grasped the opportunity with gusto, buying a version of DOS and then adapting it to meet IBM's specifications.

Gates then negotiated a deal whereby IBM would license MS-DOS (rebranded as PC DOS), but Microsoft could continue developing it separately. The result? An outpouring of "IBM-compatible PCs" that allowed an open market to flourish, rather than a series of different, proprietary computers. We still have much to be thankful to Bill Gates for.

CLIVE SINCLAIR CREATES THE ZX81

The ZX81 wasn't the first home computer, but for nerds above a certain age it may as well have been. While chunky contemporaries such as the Acorn Atom and the Commodore VIC-20 sold for $300 and upwards, the ZX81 could be had in kit form for only $100, or pre-built for around $200. What's more, while Acorn and Commodore sold their systems through specialist outlets and mail order, Sinclair cannily negotiated to get the ZX81 into retail outlets.

It would be an exaggeration to say the ZX81 single-handedly kick-started personal computing . With the support of the national broadcaster, Acorn's much-loved BBC Micro found its way into schools nationwide. However, since the BBC hardware was even more expensive than the Atom, few families invested in their own. The revolution that saw British kids hide away in their bedrooms and hack together their own programs – a revolution that, in time, brought us Championship Manager, GoldenEye, Elite, Lemmings, Manic Miner, Populous, Speedball and any number of other classic games – began with the ZX81

NAPSTER KICK-STARTS ONLINE MUSIC

The history of online entertainment can be divided into two distinct eras. Before Napster, listening to music on a computer meant sticking a CD in the drive. Although the MP3 standard had been created in 1995, there were very few programs capable of playing encoded files, and sharing them wasn't exactly convenient in the age of 1.44MB floppy disks and dial-up internet.

Then, in 1999, Napster was released. It was the first truly mainstream peer-to-peer sharing system, allowing users to easily find and download music files from anywhere in the world. Students on fast academic internet connections immediately began to fill their hard disks with enormous MP3 collections – and with the growth of domestic ADSL, file-sharing quickly became a mainstream phenomenon too. Although the digital revolution made a mockery of copyright law, it helped drive the phenomenal success of the iPod and its rivals – which in turn set the scene for the advent of legal download and streaming services.

Today, it seems perfectly natural that music should have moved online and into the digital realm. Music retailers, with their finite stock and limited opportunities to listen before buying, already seem anachronistic. But at the time of Napster's arrival, the industry certainly wasn't eager for change, and resisted digital distribution, even as the popularity of portable players soared. It took until 2003 for Steve Jobs to persuade the "big five" record labels to sign up for the iTunes Store. In reaching that agreement we can be sure he made the point that, through Napster and the copycat networks that succeeded it, digital downloads were already a reality, whether the industry acknowledged it or not.

Without Napster forcing the issue, the music industry might have dragged its heels for far longer, and the migration of music from CD to MP3 could easily have been delayed by years or even decades. The iPod could have been relegated to niche status, if it had existed at all, and services such as iTunes and Spotify almost certainly wouldn't exist in their current forms. Arguably, we can thank Napster not only for opening up digital music, but also for pushing online entertainment as a whole up the cultural agenda – laying the groundwork for services such as Netflix.

If there's a moral to the story, it's a muddy one: Napster itself was flagrantly illegal, which didn't bother its users, and no-one was surprised when it was shut down by a court order in 2001. But it gave the entertainment industry a kick in the trousers, pushing it to make the most of technology. Unless you had shares in HMV or worked at a Virgin Megastore, that's something to celebrate.

GETTING THE (MOUSE) BALL ROLLING

Virtually everyone who uses a computer is used to controlling the cursor on the screen via hand movements, but if Douglas Engelbart had taken a different path, you could be nodding at your screen.

Before deciding on a hand-guided device, other methods of interface navigating tested in the 1960s by Engelbart and his team at the Stanford Research Institute (now SRI International) included a "nose pointer", a knee-operated lever, and a light pen.

Ultimately, Engelbart found that the mouse – so named because the cable coming out the back of the device resembled a tail – was "both faster and more accurate than any other device".

It took two decades for the mouse to catch on, but with Microsoft offering support in MS-DOS and Apple including it with the Macintosh 128K, it eventually became ubiquitous.

Had Engelbart decided the other methods had more merit, would someone else have developed the mouse, or would we have very dextrous knees? There were plenty of others working on trackball technology, which was first invented in 1946 by British scientist Ralph Benjamin. Indeed, the first commercial hand-guided device was released by German company Telefunken. The company considered it too small to patent.

BEZOS NAVIGATES THE PUBLISHING JUNGLE

While making an epic 4,500km drive from New York to Seattle in 1994, 30-year-old Jeff Bezos came up with the idea of an online bookstore. The Princeton graduate had an interest in internet-led business, and he had such faith in his plan that he quit his job as vice president of a Wall Street hedge fund to found Amazon.

Had his bosses at hedge fund DE Shaw managed to convince him to stay – as indeed they tried to – would we still be buying all our books and DVDs on the high street?

It's unlikely. Bezos identified a key gap in the market at the start of the dotcom era but, had he not, a similarly entrepreneurial internet enthusiast would have. Even if an exact parallel of Amazon.com hadn't come along, contemporaries such as Play.com, Rakuten or even eBay could have stepped in.

The world of computing may have been different, however. Amazon is credited with making cloud computing accessible. Google is the only other candidate that would have had both the means and motivation, but whether Sergey Brin and Larry Page would have identified the same business opportunity as Bezos is uncertain.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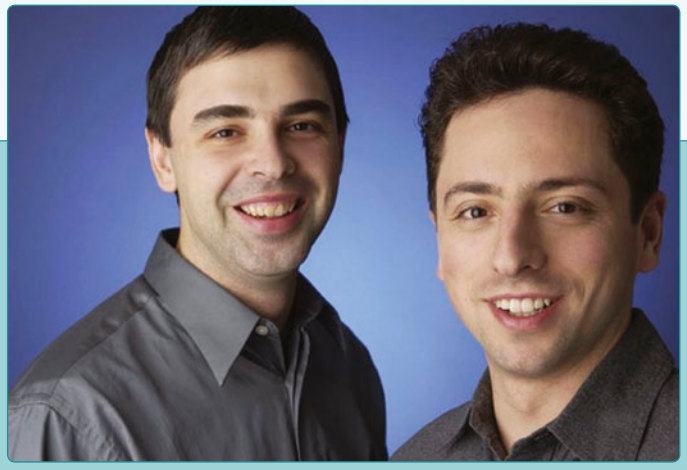
WHEN SERGEY MET LARRY

The random event of PhD student Larry Page being asked to show potential postgraduate Sergey Brin around Stanford University in 1995 changed the way all of us use the internet. If the two hadn't met, or Brin had chosen a different school, our lives would have been different. However, the two clicked, and a year later were already working on a curious project called BackRub, hosted on Stanford's servers, which based articles' ranking on how many links went to them.

When the two met, the concept of searching the internet was in its infancy: we'd been suckled on a diet of bulletin boards, AOL-style walled gardens and website listings pages a la Yahoo. Search-based alternatives such as AltaVista were gaining traction, but didn't quite give people the results they were looking for. The path was open for a newcomer without the baggage of a parent company such as DEC, then owners of AltaVista, or indeed Microsoft.

Google – or Google! as it was then – was the right product at the right time. By 1999, it was starting to get coverage in titles such as PC Magazine, and the time was ripe for it to break out of Stanford's servers – where it was consuming a huge amount of bandwidth – and become an entity in its own right. The two incorporated their own company, backed by US$100,000 of private funding, and since then haven't stopped developing new ideas, disrupting industries and making a whole lot of money in the process.

What might have been? It's impossible to believe Yahoo and AltaVista would have stayed on top, but it's easy to imagine a pair of upstart British graduates having a great idea about page rankings… and they'd probably have paid corporation tax, too.



APPLE'S MAGICAL IPHONE

With no 3G, no GPS and no third-party apps, the first-generation iPhone looks pretty rudimentary to modern eyes, but in 2007 it was a revelation. Hitherto, would-be smartphones had been the preserve of geeks, and they looked it: Nokia's N95 was a squat box adorned with a bewildering nine buttons on the front, plus a four-way rocker control and a very funky slide-out numeric keyboard.

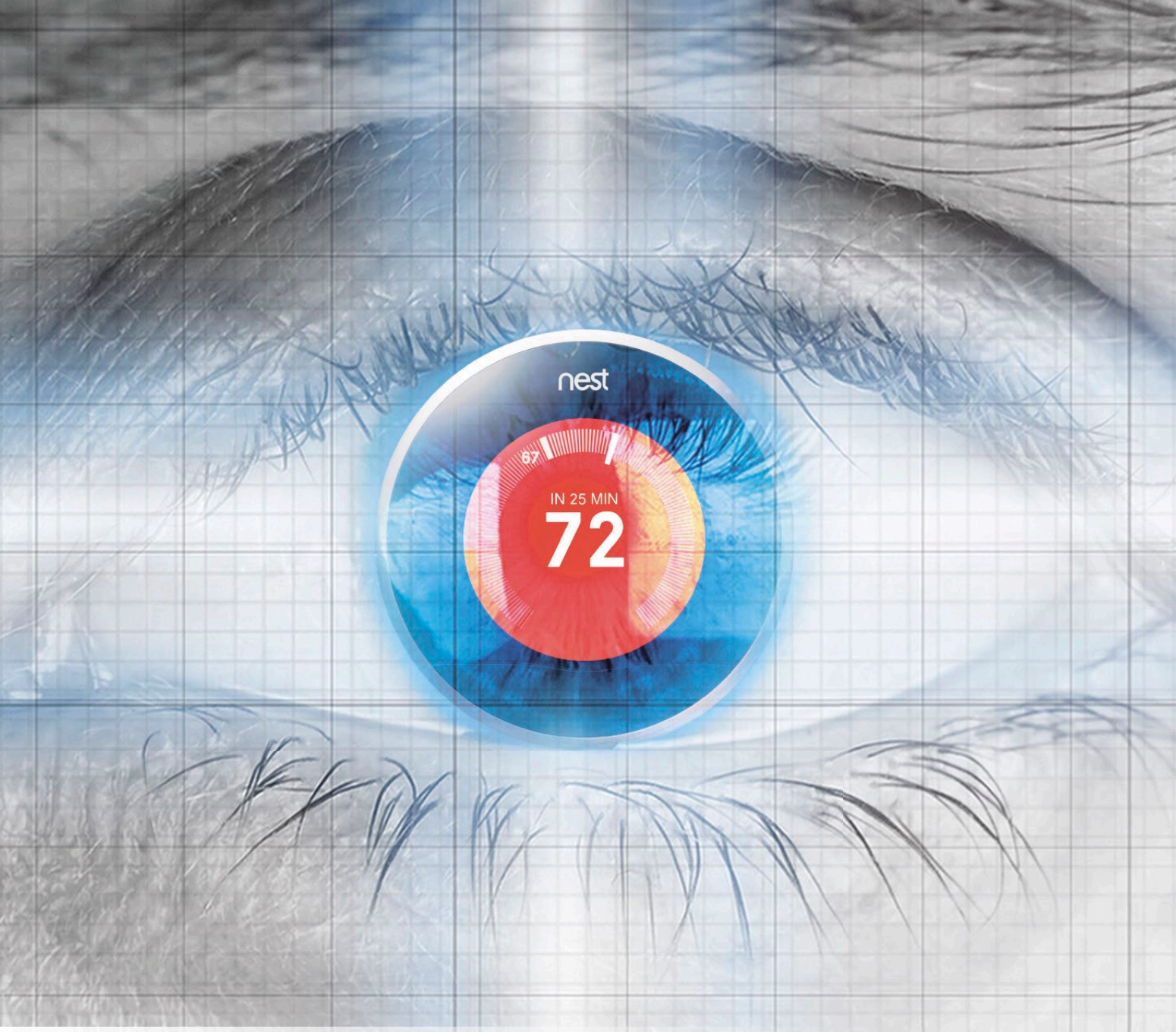
Paring back the physical controls made using the iPhone a simpler, more elegant experience. It also allowed the entire face of the device to be given over to the screen, a vibrant 3.5in panel that made Nokia's 2.6in display look ridiculously cramped. Instantly, the iPhone became not only a status symbol, but also a style icon. A year later, with the launch of the iPhone 3G, another advantage of the large touchscreen became apparent: it gave third-party apps tremendous flexibility to transform and extend the iPhone's capabilities in all sorts of directions.

It's tempting to see the iPhone as a blueprint that rival smartphones quickly copied. When Android came along the following year, Steve Jobs supposedly lambasted it as "a stolen product", swearing to "spend every penny of Apple's US$40 billion in the bank to right this wrong". There's no denying that even today's Android and Windows Phone platforms seem to owe much to Apple's original design.

The truth is less clear-cut, however. While the iPhone was launched in 2007, court documents reveal Apple started working on it as early as 2004. At this point, Android had already been in development for a year, but it wasn't acquired by Google until 2005. Internal Google documents show that by 2006 a prototype Android smartphone, supporting mobile browsing and third-party apps, was in the works.

However, there's one telling difference between this prototype and what finally came to market. Google envisaged its smartphone having a squat design with a physical Qwerty keyboard, similar to the BlackBerry devices of the time, and a compact screen. It also envisaged a release date of mid-2007. In the event, the first Android handset (the HTC Dream, also known as the G1) arrived more than a year later – and although it offered a full keyboard, it was tucked away beneath a full-sized sliding touchscreen. Subsequent models did away with the physical controls altogether.

After the launch of the iPhone, Google must have recognised the appeal of the full-face touchscreen, since it put its launch plans for Android on hold while it went back to the drawing board to reconceive its own OS as a touch-first environment. So, Android could have arrived sooner, but we might still be expected to tap out emails and text messages on tiny keyboards – and to squint to read the replies on half-height displays.



ATTACK OF THE KILLER APPLIANCES

FROM KITCHENS TO CARS, SMART DEVICES ARE MAKING OUR LIVES MORE CONVENIENT – BUT A CONNECTED WORLD COMES WITH HIDDEN DANGER. **NICOLE KOBIE** REVEALS THE SCARIEST HACKS SO FAR, AND ASKS WHAT CAN BE DONE TO PREVENT THE INTERNET OF THINGS BECOMING A BOTNET OF EVERYTHING

The consequences of companies such as eBay being hacked are bad enough: your home address and credit card details are leaked. But what happens when hackers target your thermostat, front-door lock, car or pacemaker? All of these so-called "smart" devices have already been hacked, yet manufacturers of Internet of Things (IoT) devices are failing to focus on security. Are we turning a blind eye to a catastrophe waiting to happen, or are the risks being exaggerated?

Here, we delve into the world of IoT, assess the security implications of connecting everything, and consider the new problem of keeping people secure when their fridge, smartwatch and car are all online.

RESEARCHING THE RISK

Headlines have recently been full of IoT hacks (see IoT hacks, right), and we can be certain that there'll be more to come. One of the most dramatic exploits to date involved security experts Charlie Miller and Chris Valasek taking over a smart car's steering wheel and brakes via a laptop. Others have hacked almost everything, from front-door locks to toilets, and the upcoming Def Con security conference has a host of attack revelations planned, including taking control of traffic systems and smart TVs.

Most of the hacks so far have been at the hands of security researchers, not criminals – although it's safe to assume that if white-hat hackers can manage it then black hats will have the ability, too. Although most cybercriminals are in it for the money – and making your smart lights flash red won't lead to much of a pay-off – Mike Ellis, an open-source developer at SourceForge, says IoT hacks should be taken more seriously.

"It demonstrates how easily systems can be hacked, no matter how early developments are," he says. "To date, there hasn't been anything with huge negative implications for people or business, but once we have mass adoption, future hacks could be more serious."

Let's take a closer look at a few hacks. LIFX is a smart lightbulb system that's recently joined the developer network of Nest, the smart-home firm bought by Google. Security firm Context hacked into the system, and was able to turn lights off and on. Context warned that the hack "was certainly not trivial, but would be within the capabilities of experienced cybercriminals" – and beyond messing with your mood lighting, the hack could give attackers access to your Wi-Fi network. LIFX has since patched the flaw.

Dropcam, which was recently bought by Nest, is an automated, IP-connected camera that not only allows you to keep watch on your house for security reasons, but also enables you to catch your dog lounging on the couch and bark at him to get off it through the integrated loudspeaker. Researchers at Synack bought the home-surveillance kit and reverse-engineered it to find that anyone with physical access could take advantage of an unpatched Heartbleed vulnerability. Malware planted in this way may not only turn the unit into a spy camera, but also offer a backdoor to your network.

One last hack, and this is one you may have heard about: at the end of last year, hundreds of thousands of connected devices including smart TVs and a fridge were hijacked to send spam. The attack was carried out by criminals, not researchers, and security firm Proofpoint classed it as the "first proven Internet of Things-based cyber-attack" involving appliances. It should be mentioned that the way Proofpoint examined the spam botnet showed only that devices at a certain IP address were sending spam, and some have argued that the culprit

"RESEARCHERS HAVE HACKED ALMOST EVERYTHING, FROM FRONT-DOOR LOCKS TO TOILETS"

▼ Genes: industry and government need to take IoT security seriously

was just as likely to be a hacked PC via the home router as a fridge. Still, it's possible – and as soon as there's a financial benefit to hacking your kitchen appliances, assume criminals will manage it.

Questionable botnets aside, such hacks become more worrying when they're more targeted: it's another attack route if someone wants to harass you or hurt your business, and hacktivists such as the now defunct LulzSec would have loved to mess with the lighting of their targets. Plus, hacking household devices can help spies in their surveillance – at one US government building, staff claimed that its smart thermostat was passing data back to a Chinese IP address.

Where targeted attacks become most deadly is in healthcare. White-hat researcher Barnaby Jack, who died last year, was infamous for hacking digital pacemakers and insulin pumps. The threat was clear enough that Dick Cheney's pacemaker connection was disabled while he was in office to avoid a hi-tech assassination. While such devices clearly need to be more secure, they've so far saved more lives than they've cost (which is, as far as anyone knows, none).

"US GOVERNMENT STAFF CLAIMED THAT A SMART THERMOSTAT WAS PASSING DATA BACK TO A CHINESE IP ADDRESS"

SECURITY STORM

While it's early days for IoT, the growing number of connected devices is creating a perfect storm of security risks. Manufacturers and developers are racing to get their products to market first and are focusing on usability – both of which are important to success. However, it means that security is often a second thought, if at all.

"Software development cycles are getting faster and faster; time to market is getting faster and faster," says Trend Micro Chief Technology Officer Raimund Genes.

It's also tougher for the security industry to protect IoT networks and devices than standard IT systems, since there are so many different platforms and disparate data sources.

"We, as the security industry, will not be able to apply Band-Aids," said Genes. "It was nice when we had a monoculture – when we had Windows, to be frank."

And, while Windows has a built-in update system, IoT is difficult to patch. "It's way too complicated and there are far too many different flavours," says Genes, comparing it with Android's various versions, with manufacturers adding their own skins and not always rolling out major updates to older devices.

Appliances, cars and wristwatches are used for longer than a standard tech product – how often do you replace your oven versus your smartphone? Genes points out not only that an appliance will require updates throughout its lifespan, but also that a fridge that's well designed and tough to hack now will become easy pickings as it ages, as Moore's law hands ever increasing processing power to hackers.

For all these reasons, Genes isn't optimistic: he thinks a security flaw in IoT will kill someone before the risks are taken seriously by industry and governments.

"There must be some blood on the street before something happens," he says. "The industry should create its own standards – but if it doesn't set the standards, someone will get hurt."

TIME FOR ACTION

Others are more optimistic. Jon Howes, technology director for analyst firm Beecham Research, says: "All of that leads to not a sense of disaster and doom, but of ways to secure against [it]." So, what can be done?

Tech companies have already started to work together. To make the IoT operate more smoothly and securely, there's a host of "consortiums" popping up, hoping their platform will become the standard: Open Interconnect Consortium (members of which include Intel and Samsung), the AllSeen Alliance (Linux Foundation, Microsoft, Qualcomm), the Industrial

IOT HACKS

LIGHTBULBS

Security firm Context hacked into LIFX smart bulbs, which can change colour and be turned on and off remotely. While an unexpected disco may not sound too serious, the hack also let attackers access Wi-Fi network settings, including passwords. How enlightening.

BABY MONITOR

In the US, there's been a string of incidents where a creepy man hacks into internet-connected baby monitors and screams at the child to wake up. The manufacturer, Foscam, advised users to update their firmware and not leave passwords set to defaults.

SMART THERMOSTAT

GTVHacker members revealed a way to jailbreak the Nest thermostat, letting an attacker monitor activity in the home, although this requires physical access to the device. More alarmingly, the US Chamber of Commerce has said a smart thermostat was found to be communicating with an IP address in China – to what end is unknown. Hot stuff.

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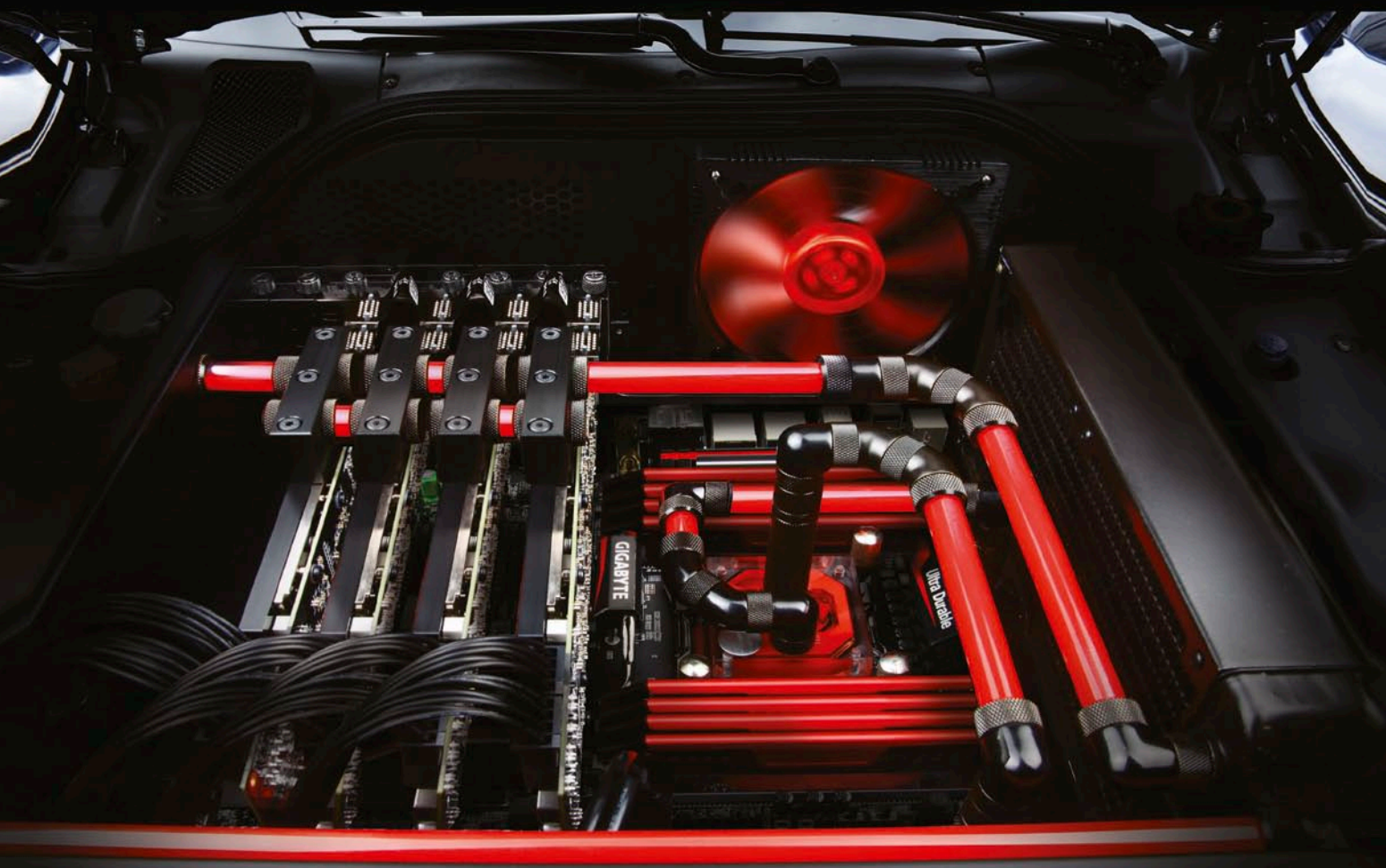

DREAM MACHINE

GIGABYTE X99 Series Motherboards

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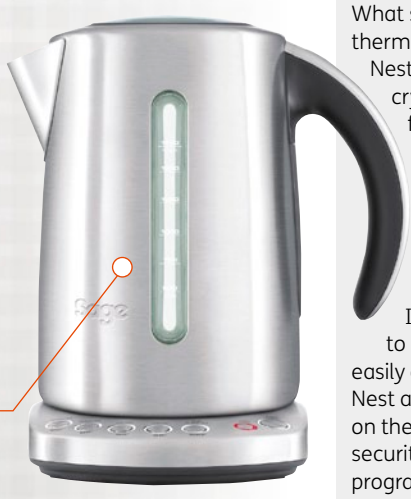
For more information, please visit http://www.gigabyte.com.au/

The above photos are for reference only. Product features and specifications may vary by model.
Motherbaord models may vary based on local distribution.

IOT HACKS

FRIDGE

Reports that a fridge was part of a botnet sending spam may have been a wee bit exaggerated, but it's only a matter of time before appliances from smart ovens to connected driers are hacked – if not by cybercriminals, then by curious researchers.



KETTLE

The idea of a smart kettle that knows when you need tea is appealing, but Russian broadcasters reported that chips found in Chinese-made kettles and other mundane appliances were connecting to unsecured Wi-Fi networks. .

TOILET

Security firm Trustwave has successfully hacked a Satis smart toilet, which is controlled via an Android app, showing that any Satis toilet can be easily taken over. An attacker could repeatedly flush the toilet, open the lid, or activate the bidet or "air-dry" functions, "causing discomfort or distress to the user".

Internet Consortium (Cisco, HP, IBM, Intel) and Thread (ARM, Nest, Samsung) among others, including the systems created by Apple and Google that use their mobile OSes as a platform in order to connect smart-home devices.

At the core of much of that work are the chipmakers - ARM and Intel pop up in several systems – as they're often at the core of standardisation, according to Howes: "They're key to bringing all of this together."

ARM is taking part in UK group HyperCat. Pilgrim Beart, CEO of IoT start-up 1248, says HyperCat is designed around the idea that different services need different levels of protection.

"The real danger is exposing IoT devices to mass attacks," he says. "Some products use the same key for every device or, in some cases, no security at all. These are particularly vulnerable to large-scale attacks. Imagine the effect on the grid if every kettle was turned on simultaneously."

However, he also argues that it's not ideal to lock down devices too much: "The opposite extreme is to keep data so secure that only the originator can see it - but that would

NEST ON SECURITY

Nest is best known for its iconic smart thermostat, but the Google-owned company is now letting third-party developers use its system to connect their devices. We spoke to Lionel Paillet, GM of Nest Europe, to find out how the company protects user data.

What security features do the Nest thermostat and alarm have?

Nest uses public-key cryptography. Its security features include HTTPS, SSL and 128-bit encryption.

Information from the Nest Learning Thermostat is stored on its cloud servers for as long as a customer remains with the company.

If a customer wants us to delete that data, they can easily choose to do so from their Nest account in the Nest app or on the web. How will you address security in the Works With Nest programme? How do you maintain security while still allowing third-party devices to talk to each other and to Nest? Our goal is to make sure developers have everything they need to build great Works With Nest experiences – without violating customer trust. We share only the minimum amount of information necessary for a connection to work, and we don't share any usernames, passwords, email or home addresses.

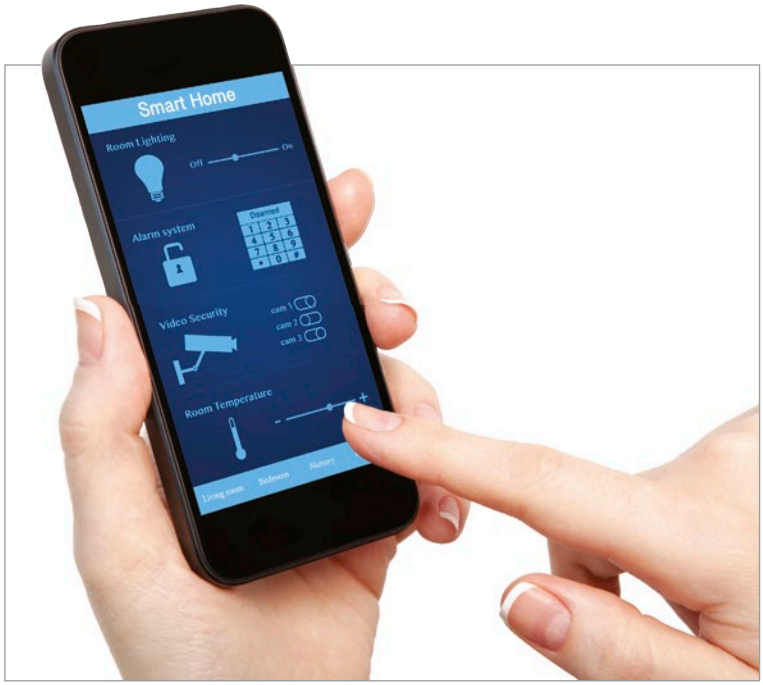
From a technical viewpoint, Nest requires SSL between all of our Works With Nest connections to make sure the communication is always encrypted and secure, and that all user data is protected. For authorisation, we use industry standard OAuth2, and we require

developers to let users know what information and capabilities they're requesting, and why they're requesting it. That way, when a user chooses to authorise an integration, they understand exactly what they're authorising and how it will benefit them.

We also have policies in place for how developers may use Nest data, and they're not permitted to retain more than ten trailing days of data. Users can choose to disconnect an integration at any time. Nest's deal with Google has been criticised for handing people's data over to a huge information-mining company. What do you do to user data to ensure user privacy? And how do you ensure that shared data isn't going to cause problems for users?

Nest customer data is kept separate from Google, intentionally. Nest is being run independently from the rest of Google, with a separate management team, brand and culture. Our privacy policy remains separate and is the same as it was before the acquisition.

Google can use the platform and create an interesting offering in the same way that any developer might. Although it's the owner of Nest, Google is subject to the same terms and conditions as other developers who are part of the program. And just like with any other integration, users can authorise Google integration as well as deauthorise it at any time.



IOT HACKS

SMART TV

While you're watching Netflix, your TV is watching you. Or it could be, according to research unveiled at Def Con that showed how easy it is to break into smart TVs, using the access to watch and listen to you (if your TV supports that), to monitor network traffic, or even brick the TV.

"A SECURITY FLAW IN IOT WILL KILL SOMEONE BEFORE THE RISKS ARE TAKEN SERIOUSLY BY INDUSTRY AND GOVERNMENT"

prevent the provider and third parties from helping the originator to make sense of their data." IoT makers need to find a balance between these two positions, where data is accessible but yet is still relatively secure.

Another way of connecting devices is via Google's Nest, which is expanding its smart thermostat into a wider platform for the smart home. For security, its own devices use HTTPS, SSL and 128-bit encryption by default, but Nest also limits what data it hands to third parties, as well as its owner, Google (see Nest on security, p26). Plus, says Lionel Paillet, GM of Nest Europe, the firm has a "team of white-hat hackers who are dedicated to ensuring our products are secure".

Nest is in a stronger position than many firms. Crowdfunding sites are full of IoT products, many of which are made by small companies that are unlikely to have the means to hire in their own hackers in order to test products.

A LITTLE BIT OF HELP

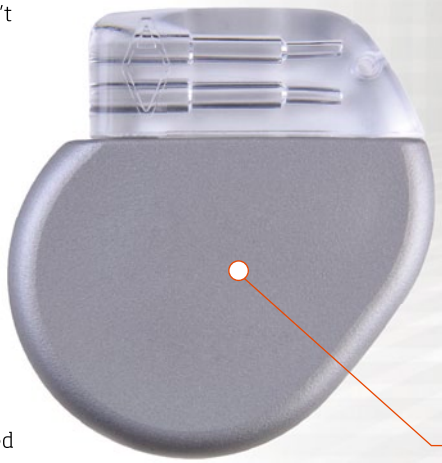
Help is available. BuildItSecure.ly, a project from American firm Duo Security, offers security support to small or crowdfunded IoT products to try to keep them from becoming a problem.

"We feel that many of the smaller IoT vendors won't have the funding to hire professional security researchers to assess security," says Duo's security evangelist Mark Stanislav. "To that end, we believe we can provide the most help to this nascent market space by giving a hand to brilliant minds creating exciting products. We want to see IoT succeed, and our talented

▼ Stanislav: a typical consumer can't tell if a device is safe to use

DOOR LOCKS AND ALARMS

One researcher managed to hack into a front-door lock and reset the entry code at last year's Black Hat conference. Others broke into the Z-Wave home-automation system, which can be used to control heating, garage doors, alarms and electronic door locks.



MEDICAL DEVICES

IoT isn't only about smart homes: humans are also being connected via medical implants. While devices such as digital pacemakers have saved thousands of lives since they first came into use, researcher Barnaby Jack successfully hacked them, as well as digital insulin pumps. That's a heart-stopping flaw.

pool of researchers is here to help make that a reality."

So far, BuildItSecure.ly has signed up "some of the top security researchers in the world" to provide free support. It has two partners – Nest-owned Dropcam and Pinocchio – and plans to announce more at Def Con in August.

Stanislav also hopes IoT makers take the time to learn about security. BuildItSecure.ly has a host of presentations, white papers and advice on its website. He advises developers to head to relevant conferences to be educated, and also be willing to shell out to hire a professional to review devices before sending them to market.

REGULATION

Why should we simply trust companies to be good at security? Trend Micro's Genes argues that regulation is the answer. But before you flip the page in a rage against European bureaucracy, hear him out. Genes points to the automotive industry as an example. "Do you think the car industry would have installed safety belts on its own?" he asks. "Think about recalls. Do you think a car manufacturer would recall cars if nobody had died? So why doesn't the government say you have to recall the thermostats?

"The airline industry is heavily regulated because human lives are at risk. So how is it that aeroplanes don't crash due to a software bug? Because by law. They need to have three different software systems written by three different vendors."

Genes wants to see similar security considerations made for IoT devices. There are, of course, obvious problems with government regulation of technology, not least the fact that politicians don't understand it. "It's scary that governments are so far behind when it comes to IT topics," he says. "They need five years to debate and bring it through, but in five years from now, the work will be different."

However, such problems aren't a justification not to act. "We have standards for how a banana should look," Genes argues. "It's totally stupid: I don't care how the banana looks, but for IT products, where our life relies on it, and where we're connected... what are the rules and regulations?"

And, contrary to popular opinion, there are occasions when politicians can make real progress: American authorities forced Apple, Google and Microsoft to install tools to track and lock smartphones after too many were stolen.

Apple has already rolled out the technology, and it's on the way for Android and Windows Phone as well.

CRASH TESTS FOR SECURITY

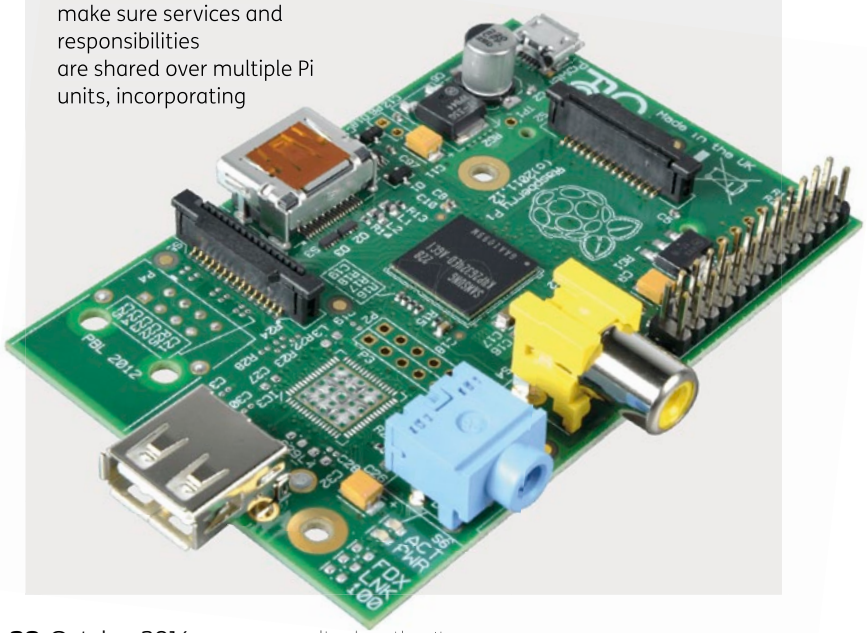
So what form should such regulation take? First, it must be region-wide: country-by-country rules will affect innovation, but Asia Pacific is by far a large enough market to make it worthwhile for tech firms to act. Second, the regulation shouldn't be too prescriptive, instead detailing a framework of how to protect certain classes of information – not unlike how HyperCat imagines it. Third, updates should be a component. If a flaw is found in a product and the manufacturer doesn't fix it,

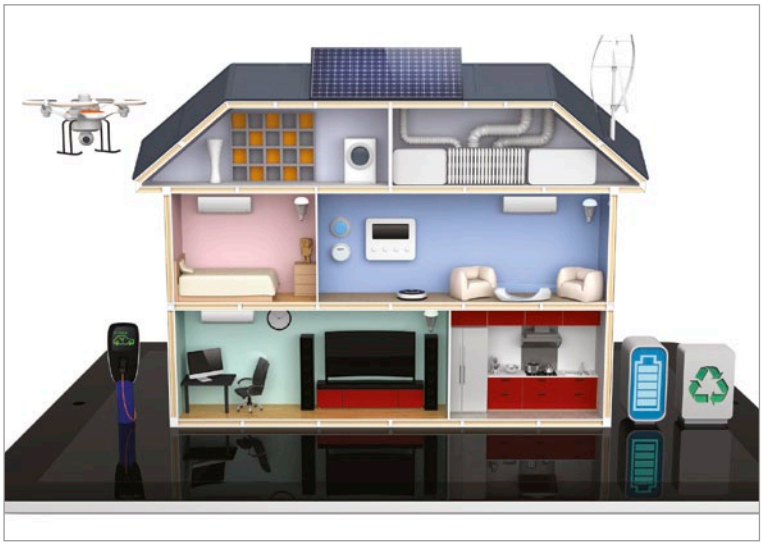
"THE REAL DANGER IS EXPOSING IOT TO MASS ATTACKS. SOME PRODUCTS USE THE SAME"

PROTECTING YOUR RASPBERRY PI HOME

You don't have to wait for Apple, Google or other tech giants to automate your home – you can do it yourself with a Raspberry Pi. Building security into your system from the beginning of your project can help keep it safe. Chris Littlebury, senior penetration tester for Knowledge Consulting Group, shares his advice on keeping your system safe from attack.

- Use lightweight, front-end web application frameworks such as Flask or Sinatra, which are simple but extensible.
- Segment your services by function, so that each technology has its own service and port, ensuring that potential service failures remain segmented instead of having a system-wide effect.
- For complex implementations, make sure services and responsibilities are shared over multiple Pi units, incorporating redundancy, when possible, into the system.
- Make sure your primary Pi server is connected to an uninterruptible power supply system to ensure that power remains available.
- Use non-wireless communication (such as Cat5 cable) when available, with Ethernet over power (not to be confused with Power-over-Ethernet) as a great alternative.
- Consider using out-of-band backup communications from companies such as FreedomPop.
- Implement solutions that offer proactive service/system monitoring and automated "health" checks that provide notifications in the event of outages.





the product should be taken off the market. Manufacturers should state from the outset the length of time they'll support a device, and should provide necessary security updates throughout that period.

There are also actions that can be taken on a smaller scale. HyperCat's Beart says that existing data legislation is "adequate", so long as the rules are actually applied and enforced. He says we should look to the internet, since it has "proven that the best model for developing secure software is open standards, multiple implementations and a free market".

While he feels tough security regulation could lead to "stifled innovation", he admits that "a balance must be struck", suggesting that "where devices are medical or control dangerous machinery, they clearly need to undergo rigorous safety testing".

Genes suggests a security-checking service, similar to the mandatory crash tests for cars. "We should have a certification body for IT products, and their job [would be] to hack," he says.

WHAT CAN YOU DO?

With multiple alarm bells now probably ringing in your ears, the obvious question would be is there anything we can do to assess a product's security? "There's no way a typical consumer can know whether or not a device will be safe to use," Duo's Stanislav warns. He suggests that the best way forward is for consumers to only use IoT devices if they feel comfortable with the knowledge that someone could potentially take control of them, and are prepared to learn enough to be able to act when an intrusion is underway. "Be mindful of what data you're giving up, since you can't ever be certain that it won't fall into a criminal's hands."

He advises consumers to keep an eye on IoT hacks to see how companies react. "You can tell a lot about a company's security maturity by how they respond to a public security issue," he says.

While there's much concern around IoT security, Beecham's Howes says most of the attacks are "experiments" – so there's no need to panic – and as it's early days, there's time to fix weaknesses. "The great thing is, it's the time to get it right."

"THERE ARE PROBLEMS WITH GOVERNMENT REGULATION OF TECHNOLOGY, NOT LEAST THE FACT THAT POLITICIANS DON'T UNDERSTAND IT"

IOT HACKS

SMART CARS

Charlie Miller and Chris Valasek last year hacked a pair of smart cars, taking control of the brakes and accelerator, and even choking the driver with the seatbelt.

GOOGLE GLASS

Security firm Lookout hacked Google Glass using QR codes. When a Glass wearer sees a malicious code, the glass is forced to connect to a "hostile" Wi-Fi access point, letting the researchers spy on the wearable device's web connections and see what's uploaded to the cloud.

IPAD CONTROLS

One security researcher hacked into an iPad-controlled, hotel-room automation system, taking control of the lights, temperature, music, TV and even the window blinds. It's the ultimate remote control for hotel guests, but also for the hackers who remotely take over.

TOYS

Software engineer Jennifer Savage hacked her daughter's app-controlled bunny, turning its cameras and microphone into an adorable spying device.

FLASHBACK

PC AUTHORITY, THE EARLY YEARS

A few weeks ago we received an email from Les, a (very) long-time *PC&TA* reader. Les wondered if we would like his old circa 1998/99 issues of *PC Authority* (long before we added the '& Tech'). Would we? We would! Our collection of paper mags doesn't include the very oldest issues, so when they arrived it was excitement all around as the team ventured deep into the past. We marvelled at page after page of decade and a half-old gear... the (many) beige PCs, the advent of 3D accelerator cards, and a historic wealth of emerging technology which, I'm proud to say, were treated with balanced analysis by the then *PCA* team, without a hint of hyperbole to be found.

Enjoy, with us, a brief look back to where it all began. To an era when PCs were busting through the 500MHz barrier and portable computing was imminent.

It's a fantastic bit of unexpected perspective. To the old days!

OH YES WE DID...

Not only did we cheerfully accept advertising dollars from AOL, but we also 'put the Internet' (AOL's version of it) on the cover disc (it was a CD back then, DVD's were a thing of a future to come).

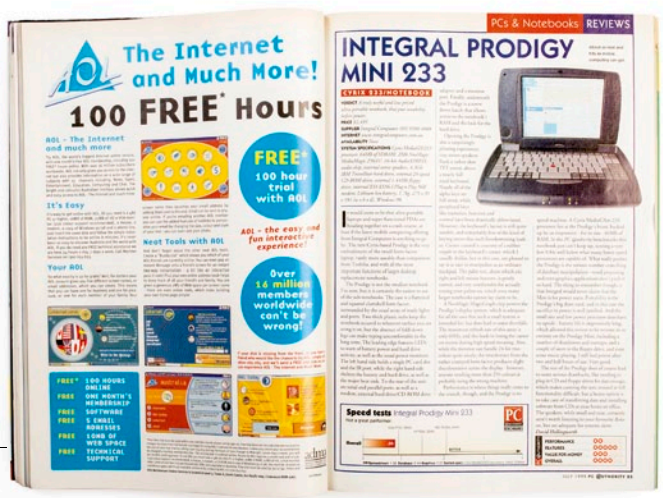
THINGS WE SAID

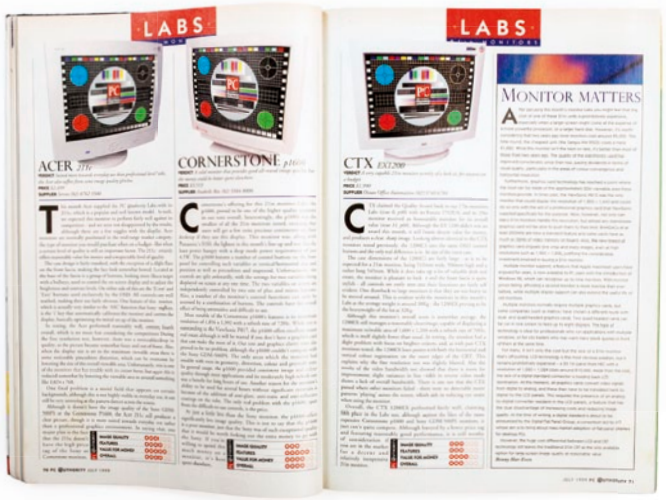
"It would seem to be that the ultra-portable laptops and super-functional PDAs are heading together on a crash course..."

"Linux is fast becoming an alternative to Windows."

"Real-time chat and email can take away the feeling of isolation caused by phyisical distance."

"Above all don't panic!!" (our Y2K recommendation)





BIG IN EVERY WAY

A multi-thousand dollar 21inch CRT was so desirable, yet so far out of reach. So when prices started dropping to just a couple of grand it was time to declare a revolution.

THINGS WE SAID

"LCD remains prohibitively expensive - a 20.1in panel from NEC ... costs around $10,000."
"Before getting up in the morning I reach for a Libretto connected via fibre to my intranet, and check my emails."
"I never leave the house without taking at least one GSM cellphone."
"Who needs a new PC when you can buy a refurbished one?"

MOAR POWAH!!!

With a 300MHz AMD K6 CPU ripping through the binaries in a Super 7 motherboard, surely peak computing power had arrived. We knew better. 1 *GIGAHERTZ* CPUs were being talked about, and the days of PC Rapture weren't far off.

THINGS WE SAID

"Writing 1.83GB of mixed files to the Jaz took 642 seconds."
"The difference between 2D and 3D really comes down to the type of image that you are displaying."
"The performance of the Voodoo2 is staggering."

IS THAT THE FUTURE IN YOUR POCKET, OR...

T'was the age of Windows CE and little machines known as Personal Digital Assistants. We were all quite sure that a portable computer would be wonderful, if only it did anything useful...

THINGS WE SAID

"You can use the dead time on a train or bus journey to keep abreast of discussion groups or the morning's email."
"The promise of the digital television revolution is another area for potential Microsoft domination."
"The future won't be totally Wintel and Microsoft dominated."

THE BEIGEPOCOLYPSE

Image a world where every car on the road was the same colour... just why it took the industry a good decade to add some colour to our PCs can only be explained if you consider that these were the same industrial designers who thought that only corporations bought PCs.

THINGS WE SAID

"What do we want? Free Internet access to our POP email accounts from anywhere in the world without fiddly dial-up settings and crawling Web-like speeds!"
"The future looks bright for palm-sized PCs."
"IE4 is a powerful and technologically advanced browser."

IN THE LABS

YOU WON'T FIND BETTER REVIEWS ANYWHERE IN AUSTRALIA!

Orwellianology

BEN MANSILL ISN'T AS CONCERNED AS SOME ABOUT THE IMMEDIATE FUTURE.

I'm sure you've heard the delectable put-down 'Glasshole'. Used to describe a Google Glass user - or more specifically, one who uses their Glass to record things the all-seeing camera faces - it's caught on and the spotlight is now firmly on the social implications of wearable technology, rather than the gizmo itself.

Fair enough, too. But one can't help wonder if largely instinctual Luddite tendencies are actually at play, here? After all, everyone on the planet, pretty much, carries a phone with a camera, and we learned to calm down about that soon after early alarmism that may or may not have driven geeks from beaches ever since.

As a technology, though, it's fascinating, and the comprehnsive review that begins as you turn the page bears that out. What we can't answer - at least with any scientific certainty - is how Glass will fare under the increasing glare of social judgement, which will no doubt be fuelled by the hysterically under-informed. Or, indeed, if this particularly brave example of wearable computing is jumping the gun just a little? Perhaps we need to spend another year or two adapting to more benign wearable tech on our wrists before we start sticking our face into it.

A safer trend that's in full swing is the refinement of NAS enclosures as proper consumer devices. If you've run a NAS in the past, I'd bet that it was either a SOHO-intended device, or one pitched at the home market, but with little to offer media consumers. At this year's Computex we saw many NAS enclosures that go so much further. They big breakthrough isn't particularly innovative, but it's needed. For one, CPUs that can handle greater demands are being used (along with a matched and usually generous amount of RAM), and the second half of the big thrust being the software layer. It wasn't long ago that all I wanted in a NAS was a quiet box'o'drives that I would access simply via Windows Explorer. Early attempts at 'appifying' the NAS were annoying - with some even insisting on a login to an account required by the manufacturer to let you play with your files. Bugger that.

There's still the danger that this will spin out of control. I know from many conversations with NAS manufacturers that they are embracing the concept of their products being services, not simply storage products. Qnap, for example, have such an incredibly wide range of apps that they verge on operating system functionality.

Still, I have to give a tip of the hat to whoever at Qnap came up with the HappyGet app, which saves to the NAS as a media file any online streaming content. Nice feature, even nicer name.

GOOGLE GLASS
34

SAMSUNG GALAXY TAB S 10.5 **47**

LG G WATCH
48

WHAT OUR A-LIST MEANS

Our A-List award is reserved for the best products in each category we review. With a winner and an alternative pick in each, that's 92 products you know are first class.

WHAT OUR AWARDS MEAN

PC & Tech Authority's comprehensive Real World testing sorts out the best products from the pack. Any product recommended by *PC & Tech Authority* is well above average for features, value for money and performance.

WHAT OUR RATINGS MEAN

★★★★★★	OUTSTANDING
★★★★★	VERY GOOD
★★★★	GOOD
★★★	ORDINARY
★★	POOR
★	VERY POOR

HOW WE TEST

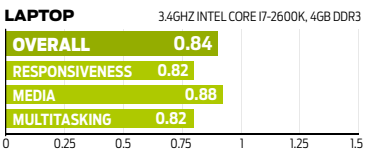
OUR BENCHMARKING TESTS ARE THE BEST IN THE BUSINESS. READ ON TO FIND HOW THEY WORK...

2D TESTS

We test desktop PCs, netbooks and laptops with our own, custom-built, 2011 Real World Benchmarks.

We split the results into three categories: Responsiveness, Media and Multitasking, with the Overall score an average of the three sub-scores.

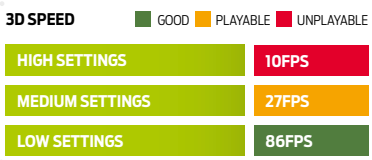
For instance, responsiveness replicates light browser and productivity workloads. The Media test involves running iTunes for audio conversion, Photoshop CS5 to crunch large images and Sony Vegas 10 to edit home video. This then gets run simultaneously alongside Cinebench 11 in order to get a handle on the multitasking ability of the system.



3D TESTS

We use pre-recorded demos in Crysis and DIRT 3 to test gaming performance where relevant. We have three standard test settings, depending on the power of the graphics card: Low, Medium and High.

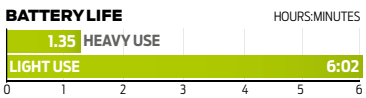
To test gaming performance, we use our own recorded Crysis benchmark. We use the Low, Medium and High quality settings in 1366 x 768, 1600 x 900 and 1920 x 1080 screen modes respectively. Very high-end systems can also be tested using the ultra-intensive Very High settings, with all detail switched on, and varying levels of anti-aliasing enabled.



LAPTOP BATTERY LIFE

We subject laptops to two battery tests. In the light-use test, we optimise the system settings for the greatest power efficiency. We then disconnect the mains and run a script scrolling a selection of web pages until the system shuts down, giving you a realistic idea of the surfing time each laptop offers.

For the heavy-use test, we engage Windows' High Performance power profile, set the display brightness to maximum, and allow the taxing Cinebench 3D renderer to push the processor load to the limit. This gives a worst-case figure, revealing how long you can expect the battery to last under the most demanding conditions.



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GOOGLE GLASS

FORGET SMARTWATCHES – GOOGLE GLASS TAKES WEARABLE TECHNOLOGY TO A WHOLE NEW LEVEL. IS THIS A GLIMPSE OF THE FUTURE?

PRICE $2099
SUPPLIER www.google.com/glass

Imagine a future where smartphones, tablets and physical devices are old news, a world in which the internet isn't at your fingertips, but instead beamed directly onto your retina. Google Glass is a first step towards this science-fiction concept made real; a device that attempts to blur the lines between our online and real-life experiences like nothing before. And now, it's available outside the U.S.

DESIGN

It's impossible to mistake Glass for a traditional set of spectacles. Prised straight from its minimalist packaging, it isn't actually fitted with any lenses at all: a mere strip of titanium stretches from ear to ear, interrupted by bold accents of coloured plastic that wave along Glass' right edge. Up front, the prismatic projector that provides the heads-up display (HUD) – the window to Google's vision of the future – juts out.

It's difficult not to admire the ingenuity of the design. The stuff that makes Glass tick – the tiny projector, the processor, the camera, the battery and the storage – is all crammed into the plastic housings on the right edge. The telltale glint of a camera lens hides in the rounded plastic surround, and the distinctive display module curves around in front of the right eye. It bears all the hallmarks of a *Star Trek* prop made real.

Despite the asymmetric design, Glass doesn't feel uncomfortable to wear. At 43g, it's a little heavier than a standard pair of spectacles, but it's surprisingly easy to forget you're even wearing it – often, it wasn't until colleagues remarked on Glass that we remembered we were wearing it. The domino-sized battery nestles comfortably behind the ear, serving to balance the weight of the hardware up front, and the titanium frame makes it possible to bend the nosepiece so that it sits comfortably on the bridge of the nose. Google also provides a couple of spare rubber nose pads to help you get the fit just right, and offers a variety of pricey clip-on frames and shades to help Glass look more ordinary; thankfully, you get your choice of one of these for free.

KEY SPECS

Android 4.4 · 16GB storage · micro-USB · 802.11bg Wi-Fi · Bluetooth · 5MP camera · 720p video · 43g · MyGlass for Android app requires a device running Android 4.0.3 or higher

BEHIND THE GLASS

In terms of its raw capabilities, Glass is truly multitalented. A tiny projector hidden within beams a 640 x 360-resolution image into the prism; this appears as a semi-transparent display floating in the upper corner of your right eye's vision. Google describes Glass' display as being the equivalent of a 25in, high-definition screen viewed from 8ft away; in use, the display appears big enough to remain legible without significantly obscuring your vision, and is sufficiently clear to display a limited amount of at-a-glance information.

Glass can do more than display the occasional Facebook or Twitter

update, however – much more. Bone-conduction technology sends audio directly through your skull (although a mono earbud comes bundled, too); there's an integrated microphone; the built-in gyroscope, compass and GPS give Glass the ability to track movements in three dimensions; and the camera can capture 5-megapixel images and record 720p video. Glass can even detect when you blink. It sounds sinister, but it's capable of tracking your every move.

▲ Thankfully, Glass is available in more sombre colours

GETTING STARTED

Perhaps surprisingly, Glass isn't intended to serve solely as a companion to an Android smartphone (although it works best as such). You can happily tweak settings and install apps using the MyGlass portal via a browser on a laptop. The MyGlass app is available for iOS, too, but Windows Phone users aren't accommodated.

Whichever platform you use, setup is straightforward. Short videos show you how to wear Glass, adjust the prism display and connect via Bluetooth or Wi-Fi.

Initially, you're greeted with an ultra-minimalist homescreen that floats the time and the keyphrase "ok glass" in front of you. Say that out loud and a list of available voice commands hoves into view. Moving your head up and down scrolls through the list; speaking a command activates it. As you install apps, this list gets longer and extra phrases become available.

Google has also squeezed a functional touchpad into Glass' right-hand edge. One-fingered forward and backward flicks of the touchpad move through menus; downward swipes act as the back button; and tapping selects an option. It sounds fiddly, but it soon becomes second nature.

The homescreen fades away after a few seconds, but you can wake Glass with a tap of the touchpad. It's also possible to toggle On-Head Detection, which activates Glass when you put it on, or Head Wake Up, which detects when you tilt your head backwards. By default, Head Wake Up wakes Glass when you tilt your head back 30 degrees, but we quickly notched this down to around 12 degrees: this makes it easier to activate Glass without emulating a severe facial tic.

APPS

At the time of writing, Google's Glassware roster consists of 72 apps. All the core Google apps you'd expect are there – Search, Maps, Gmail, Google Now, Google Play Music, Hangouts and YouTube all appear in some form – and big hitters such as Facebook and Twitter are accompanied by the likes of Strava, Foursquare and Shazam.

Installing apps couldn't be much simpler: just flick a switch in MyGlass to turn them on. Some provide new voice-command options – for instance, Field Trip adds "explore nearby", Word Lens adds "translate this" and Strava offers "start a bike ride" and "start a run" – for hands-free operation.

> **"Google Glass is a first step towards a science-fiction concept made real"**

To make the most of its limited screen resolution and size, Glass displays information in the form of cards. You can see key information at a glance, but you'll need to use the touchpad to explore further or cycle through each app's options.

Swipe backwards from Glass' homescreen, meanwhile, and Google Now, Calendar and Weather cards give rapid access to key information, as well as Glass' settings menu. Swipe forward and you're presented with an ever-growing feed of recent apps, news items, messages and photos from the past seven days. Individual items can be dismissed with a couple of swipes and taps, but unfortunately there's no easy way to clear items en masse.

One apparent absentee is a browser – which makes sense, as Glass' screen is far too small to make browsing the web a pleasant experience. You can find web pages via Google search, however, and use two-fingered strokes on the touchpad to zoom in and out.

LOOKING THROUGH GLASS

For all its potential, Glass is resolutely a beta product. Google couches it in fluffy terms – describing users of its beta programme as "Glass Explorers" is a canny piece of marketing – but a frustrating inconsistency in day-to-day use confirms the device's immaturity.

At its best, Glass comes close to eliciting the kind of open-mouthed amazement normally reserved for only the most futuristic, cutting-edge technology. Google Maps, for example, perfectly demonstrates Glass' strengths: a map of local streets floated into view, locked in perfect synchronisation with every twist and turn of the head. It's a similar story with apps such as Star Chart, which uses Glass' GPS and head-tracking abilities to pinpoint every star in the sky with a nifty augmented-reality overlay.

At the same time, there are plenty of grating annoyances to undermine the experience. During our testing we encountered a whole gamut of issues, from laggy behaviour and ignoring voice commands through to the occasional complete lock-up – we had to reset the headset on more than one occasion.

One persistent problem is overheating. Even basic tasks can

◀ It's impressive just how much technology is packed inside Glass

quickly cause Glass to lose its cool: record a few minutes of video or use it for any length of time and the housing becomes unnervingly hot to the touch. During our testing, messages warning that Glass was overheating popped up on a regular basis; while the device continued working, it became noticeably sluggish.

Problems with responsiveness aren't limited to high-temperature situations. When we tried adding captions to pictures or dictating messages, Glass' tendency to insert a pregnant pause often made us repeat ourselves or stop mid-flow. Of course, this results in incomplete or duplicated messages, which are dispatched immediately – unless you manage to swipe down on the touchpad in the brief two seconds before Glass sends the message.

Battery life is another letdown. In light use, merely using Glass to check our email and take the odd photo, we rarely got more than five hours of operation before needing to reach for the charging cable. Try recording video and the battery won't last an hour. All-day use simply isn't on the cards.

More basic design issues bothered us, too. The display easily washes out in bright light, and its proximity to the eye meant we sometimes struggled to focus on it. Depending on your eyesight, you may not find Glass a comfortable optical experience.

Then there's hair. To Glass' credit, the touchpad does remain somewhat responsive while hidden by a mop of hair, but taps can be mistaken for swipes, and vice versa. Hair flopping over the camera is another issue, and here the only solution is to manually hold your hair out of the way while filming or taking pictures. Perhaps Google should offer a matching hairband for more hirsute Glass users.

A final annoyance was Glass' occasional bouts of seeming deafness. Even in a quiet office or a home environment, Glass regularly seemed to become unresponsive to our voice commands. For this at least, however, we eventually discovered a solution: the trick is to pronounce "glass" with a short "a", rather than a long "ah". In fact, the same goes for any command with a similar regional variation in pronunciation. Glass' voice recognition isn't 100% reliable in any dialect, but it definitely does better when you adopt a stateside lilt.

"In a world of me-too gadgets and identikit smartphones, Glass is daring and different"

While most of these complaints represent shortcomings of the device itself, the apps aren't blameless either. Google Now, the navigation features, and the feed of soundbites from email and social networks all make great use of Glass' ability to present key information quickly and unobtrusively, without requiring you to reach for your smartphone or look down at a smartwatch. However, other apps we tried seemed ill-suited to Glass' low-resolution display and limited input options. Developers are a long way from developing what Glass needs most: a set of killer apps that play to the platform's strengths.

VERDICT

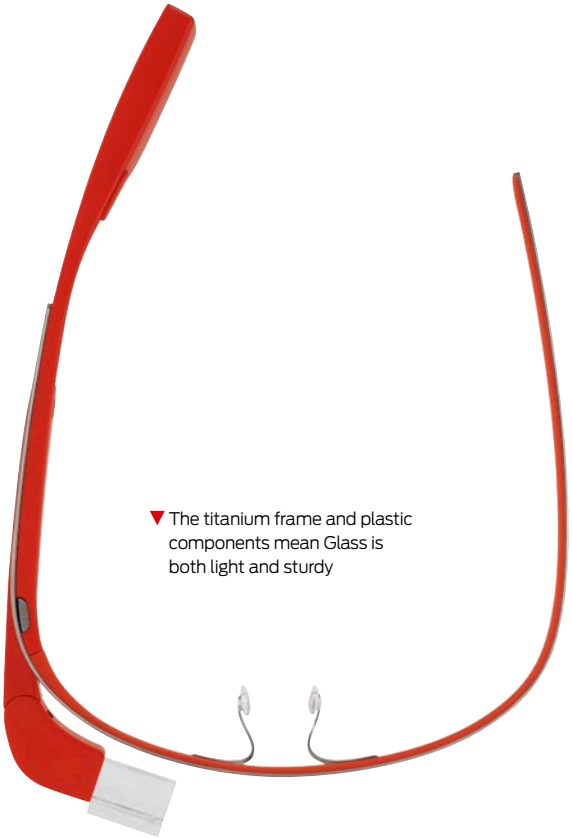
Despite its many faults, Google Glass is a breath of fresh air. Born into a world of me-too gadgets and identikit smartphones, it's daring and different – at its best, inspiringly so. Google has struck out in a bold, new direction, and it's easy to understand why the concept has caught people's imagination.

At the same time, it's impossible to overlook the numerous problems with the device in its current form – or the $2,000 cost. It's a stinging admission price for those who aspire to be a Glass Explorer, especially since what that huge sum buys you is a beta product, a mess of untapped potential and immature hardware, more hi-tech toy than functional tool.

It's too early to say whether Google Glass will usher in a new type of computing or flop horribly. As with smartphones, and the nascent smartwatch trend, it's the apps as much as the hardware that will make the difference.

Still, as fully signed-up Explorers, we're genuinely excited to anticipate what the coming months and years have in store. In a few years, we may look back and wonder what could have been – or, equally possible – Google Glass headsets may be staring back at you everywhere you look. Place your bets now.

Sasha Muller



▼ The titanium frame and plastic components mean Glass is both light and sturdy

◀ Glass can be used with or without lenses in the frames.

PERFORMANCE	★★★★★★
FEATURES&DESIGN	★★★★★★
VALUE FOR MONEY	★★★★★★
OVERALL	★★★★★☆

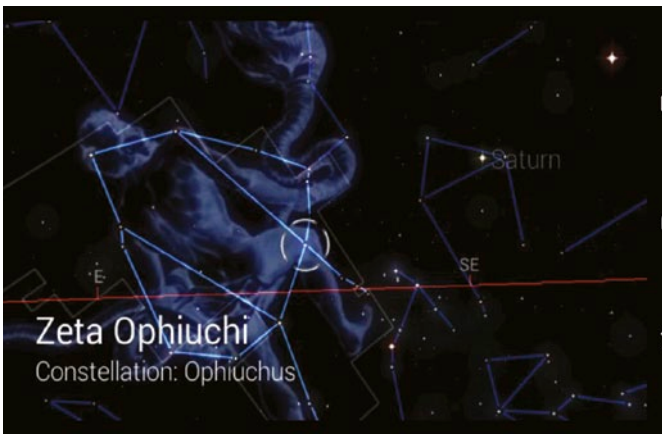
GOOGLE GLASS APPS

A TASTE OF THE APPS AVAILABLE. ALAS, NO KILLER APPS JUST YET...

STAR CHART

This is the app that caused a whole roomful of people to gasp as we handed around Google Glass for them to try – and it's easy to see why. Look up into the sky and Star Chart overlays the constellations, planets and stars, to help you understand what you're gazing at. It hunts for the most interesting stellar body as you look, zooms in, flags up its name, and even adds an audio description. Gasp-inducing stuff, indeed. This isn't to suggest it's perfect: in the polluted Sydnet sky, we found it tricky to map what we were looking at through the glasses with the onscreen display. Even in broad daylight, however, there's something wondrous about seeing the stars spanning outwards in every direction.

RATING ★★★★★★

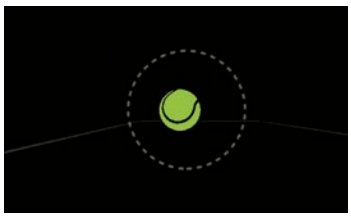


STRAVA

Strava is well known for good reason: if you upload GPS data from your workouts, you can compete against the world, whether dashing around the park or cycling the Alpe d'Huez. The two apps available for Glass, Strava Cycling and Strava Running, provide a stripped-down interface, with a large readout for elapsed time flanked by two smaller entries for distance travelled and current speed (or pace for runners). Sadly, there's no option to display heart rate, cadence or power data from ANT+ sensors connected to your smartphone. We love the idea of getting at-a-glance statistics without taking your eyes off the road, but, with sluggish display updates, there's plenty of room for improvement.

RATING ★★★☆☆☆

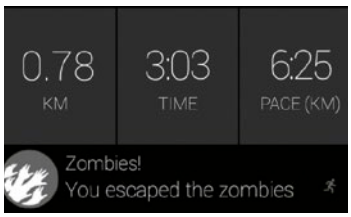
MINI GAMES



Google preloads five games onto Glass, and while they're not in Angry Birds' league, they offer an enjoyable way to get to grips with using the controls. Our favourite – purely because it's so difficult – is the clay-pigeon shooting game, in which you get two shots to hit the clay (tap the touchpad or say "fire"). The clever bit is that you need to move your head to follow the target. It's much, much tougher than it sounds. We also like the cute balance game, where you have to keep various shapes on top of your head using subtle movements, while a memory game should prove a pleasant distraction for younger Glass users. Tennis, meanwhile, is best described as virtual-reality version of the classic Pong.

RATING ★★★☆☆☆

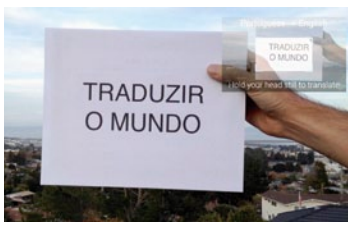
ZOMBIES, RUN!



This app gives you a choice of three audio stories, all designed to make you run for your life. The first is called Jolly Alpha Five Niner, where you end up surrounded by zombies: as you run, you collect achievements and generally try to avoid being caught by the undead. It's simple, but a lot of fun. While you're avoiding zombies and picking up axes, a simple onscreen display tracks how far you've gone, the time elapsed and your pace. Zombies, Run! is a great example of how Glass can do things the standard smartphone app can't. It's easy to check your speed and progress without having to fumble in your pockets, for instance, and the visual legend shows just how close you are to being zombified.

RATING ★★★★★☆

WORD LENS



We loved Word Lens when we first saw it on a phone: there's something magical about seeing foreign signs and restaurant menus translated merely by pointing your smartphone camera at them. In theory, then, Word Lens for Glass should be a killer app. The reality is rather less impressive. Pinpointing the text you want to translate is horribly fiddly: the position of Glass' camera means it's necessary to tilt your head quite unnaturally to frame text correctly, while smaller text left us awkwardly clutching menus right against our forehead (despite an auto-zoom feature). The nail in the coffin is the camera's poor low-light performance, which means it struggles in anything less than perfect lighting conditions. With a lot of polishing, though, this smells like a winner.

RATING ★★☆☆☆☆

MSI GT70 WORKSTATION

AN UNDOUBTEDLY POWERFUL MACHINE, BUT ALSO ODDLY RETRO.

PRICE $3999
SUPPLIER http://au.msi.com

We're quite familiar with MSI's gaming laptops, but this is the first pro-level workstation we've seen from the company. But it's looking remarkably familiar, and more than a little like it's of rather mixed parentage. This is because despite an obvious professional pedigree – the 4700MQ CPU, 16GB of RAM, and K3100M graphics chip – it's all packed into one of MSI's gaming chassis.

There's no denying that the SteelSeries keyboard feels good, and we're sure some pro users who also game might appreciate the dedicated, gaming-focused Killer NIC, but there's a certain level of cognitive dissonance in the GT70's design. For instance, the Dynaudio speakers, with a cunningly placed and very effective sub-woofer, are good, but not really necessary for a workstation, as is the full-color LED backlit keyboard. This is a serious amount of bling for a working machine. If you're a multi-media producer, we can see the style and added extras being very appealing, so for content creation and editing the GT70 is an excellent choice. And if you are a gamer as a well as a content professional, and want a single machine for work and play, well, it becomes almost a no-brainer.

KEY SPECS
Intel Core i7 4700MQ processor, 16GB DDR3 memory, 17.3in Full HD 1920 x 1080 LED display, 2x 128GB solid state drive + 1TB hard drive, BluRay writer, NVIDIA K3100M 4GB GDDR5 graphics card, 3x USB 3.0 ports, 1x USB 2.0 port, 1x HDMI, Killer DoubleShot LAN, Audio Boost, 2x2W/1 speakers, Windows 7 Professional

The 2880x1620 IPS display is great for graphics professionals (and for watching movies via the included Blu-ray drive), and the power on offer from the hardware will certainly handle heavy editing or even compositing tasks. The full keyboard is great, and there's an impressive array of connectivity options, especially if you like using a multi-monitor setup when your laptop is bound to a desk. It's a weighty beast, of course, but you don't get this many features without making some sacrifices.

But we can't get away from the fact that it really doesn't look like a professional machine. MSI's gaming chassis always tend to look like they're built from a five year old style notebook - which is okay if you like over-aggressive industrial design. However, it may be a little too fancy for your tastes.

David Hollingworth

PERFORMANCE	★★★★★
FEATURES&DESIGN	★★★★½
VALUE FOR MONEY	★★★★½
OVERALL	★★★★½

AOC G2460PG

THE 144HZ GAMING REVOLUTION IS HERE, AND IT SHOULD EXCITE EVERYONE.

PRICE $349
SUPPLIER www.aoc.com

We've looked at a very similar monitor from Asus this issue, and on paper these two monitors perform admirably similarly. And it's a lot cheaper, though running at a smaller resolution than the Asus (2560 x 1440).

Feature comparisons aside, though, you're getting a lot of monitor for your buck. At 24 inches of image at 1080p resolution, with two USB3 ports, USB2, and a fast-charge port, Nvidia's new G-SYNC technology, and a 144Hz refresh rate, $350 is a remarkably fair asking price, making AOC's monitor around $100 cheaper than its competitor. It's also not quite so bright, and there is a slight flatness in colour reproduction, but it is negligible, especially if gaming is your prime reason for picking up the G2460PG.

Motion blur reduction is also on offer, but this only works at certain refresh rates, the highest being 120Hz - which seems beside the point when the monitor is capable of more than that.

During normal performance, it's a moot point anyway, as both in gaming and normal usage, the G2460PG is as solid as a rock. A few tweaks to the OSD (we recommend running the gamma2 setting for best results), and the AOC looks great - though we frown at the built in cursor functionality that can place a hardware level cross-hair on the screen in any game. Playing games like Battlefield 4 at HD resolution and 144Hz refresh delivers an astoundingly smooth experience. The combination of fast refresh and G-SYNC (which Nvidia drivers will turn on by default) transforms the gaming experience - if you run an Nvidia card, it really does become a must-buy. Even day to day tasks become that much easier, with smooth cursor movement and excellent video playback - 1080p video that might show some tearing at 60Hz can be watched without issue.

Ultimately, the reasonable price makes this an excellent mid-range gaming purchase, and one of the best choices on the market for a multi-monitor gaming setup.

David Hollingworth

KEY SPECS
24in · 1920 x 1080 · 144Hz · 16:9 · G-SYNC

IMAGE QUALITY	★★★★★★
FEATURES&DESIGN	★★★★★☆
VALUE FOR MONEY	★★★★★☆
OVERALL	★★★★☆

ASUS ROG SWIFT PG278Q

WHAT DO WE THINK OF G-SYNC?

PRICE $999
SUPPLIER www.asus.com.au

G-SYNC is Nvidia's new proprietary technology, built into select new gaming screens. It forces the display to be a slave to the graphics card, only updating the screen when the graphics card has a new frame ready for it. It's the opposite to the way monitors and GPUs work today, where the GPU is slaved to the monitor, causing issues like screen tearing if V-synch is disabled, or frame rates capped at your screen's refresh rate if V-sync is engaged. G-SYNC removes the need for V-sync entirely, while also allowing you to play games at 40fps and above without noticeable slowdown.

This also means that it's possible to have a perfectly smooth playing experience without necessarily needing a top-end GPU. Now it's possible to run a game at a consistent 40fps, and it'll look just as smooth.

This screen also features a fast 144Hz refresh rate, and once again G-SYNC makes the most of this. In the past, owners of 144Hz displays generally needed multiple GPUs to deliver 144fps as a minimum, ensuring they could run with V-sync engaged to remove any screen tearing issues. However, it's now possible to disable V-sync and use G-SYNC instead. The frame rate can hover anywhere between 40 and 144fps, without the image tearing or latency increasing dramatically, issues that occurred prior to G-sync.

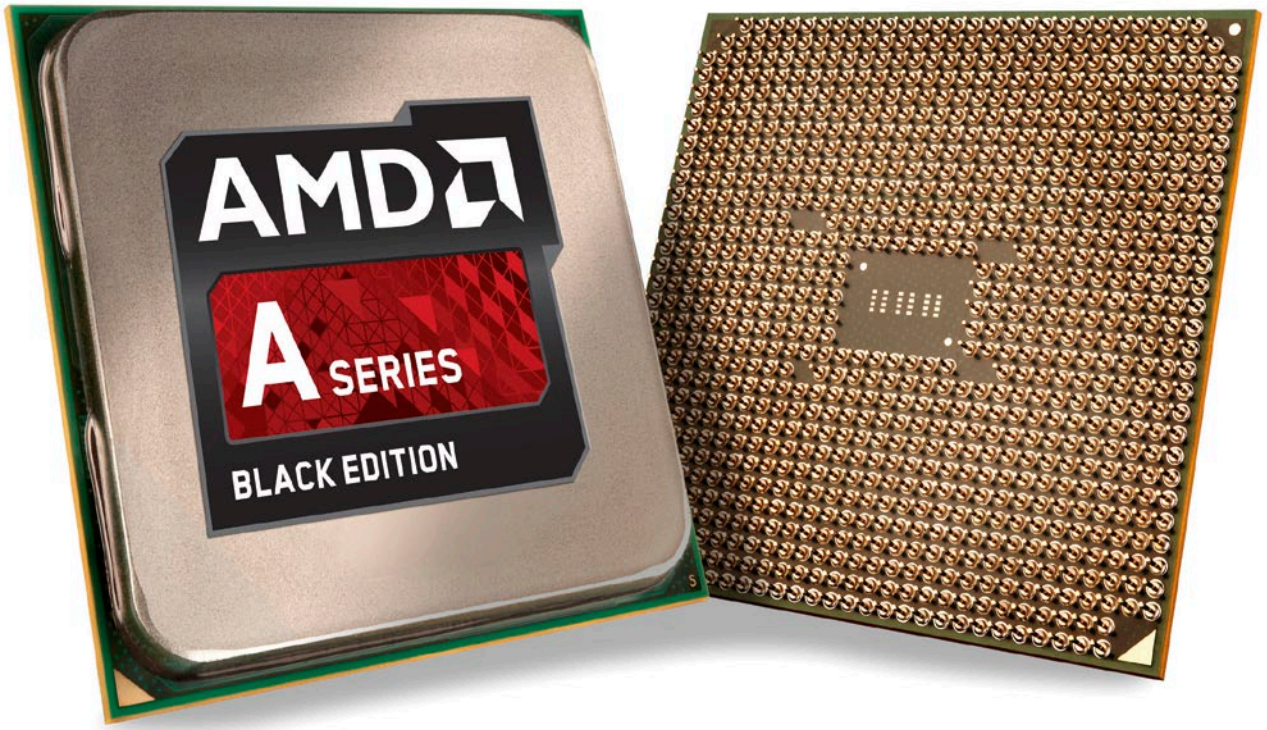
Before calibration, colours look washed out, with poor contrast levels. However, a quick tinker with the image quality settings brought the image to life, though we did notice persistent issues with the screen uniformity, with three of the monitor's four corners measuring 20% dimmer than the centre of the screen.

G-SYNC only works with Nvidia-based GPUs and monitors, as each monitor requires the inclusion of a special G-SYNC board. If you own an AMD card, you're not going to be able to use this monitor's defining feature. It's a shame that such an impressive new technology is limited to a singular manufacturer, as it has the potential to revolutionise the display industry if it became an open format. Here's hoping Nvidia decide to license G-SYNC, but until then Nvidia owners have a proprietary technology hard to resist.

Bennett Ring

KEY SPECS
27in · 2560 x 1440 · 144Hz refresh rate · NVIDIA 3D Vision 2 ready · G-SYNC

IMAGE QUALITY	★★★★★☆
FEATURES&DESIGN	★★★★★☆
VALUE FOR MONEY	★★★★★☆
OVERALL	★★★★☆



AMD A10 7800 APU

WHICH TDP WOULD YOU PREFER?

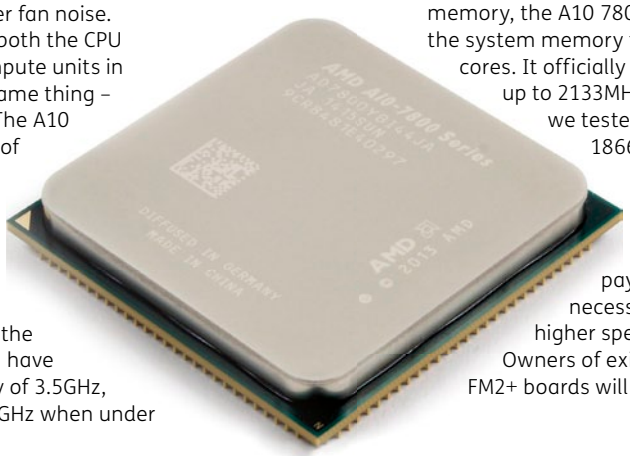
PRICE $189
SUPPLIER www.amd.com

With the latest chip in the Kaveri family, which originally launched at the start of the year, AMD has taken its sweet time to deliver the A10 7800 APU to consumers. AMD latest desktop processor once again focuses on combining both CPU and GPU cores into a single chip and, like prior Kaveri releases, has a very unique feature in the form of a variable TDP.

A processor's TDP refers to the Thermal Design Power; put simply, how many Watts of energy the processor emits while running under load. Laptops and small form factor systems prefer cooler processors, and thus tend to use chips with a lower TDP. The Kaveri line of processors were the first consumer processors to introduce a configurable TDP. In the case of the A10 7800, out of the box it's set to the maximum TDP of 65W, which is relatively tame compared to other AMD desktop processors, such as the FX 8320, which has a steamy TDP of 125W. However, users who require even lower operating temperatures can flick a single BIOS option to drop the 7800's TDP down to just 45W. The frequency of the APU is then adjusted, but the clever use of Turbo on single threaded applications means performance drops by a mere 7% in most scenarios. Well, that's what AMD claims. Most buyers of this CPU will probably never use this feature, as the 7800 APU is being sold as a desktop processor, where the TDP isn't usually of concern. Having said that, it could prove to be a godsend for those building small form factor PCs, where the lower TDP will result in lower fan noise.

AMD refers to both the CPU threads and compute units in its APUs as the same thing – compute cores. The A10 7800 has a total of twelve compute cores, comprised of four CPU and eight Compute (ie GPU) units. At default settings, the 7800's CPU cores have a base frequency of 3.5GHz, increasing to 3.9GHz when under load. Meanwhile the eight Compute cores spin by at 720MHz apiece, and are based on AMD's R7 GPU design. Each of these Compute cores is comprised of 64 GPU cores, giving the 7800 a total of 512 GPU cores. This should give the chip some of the fastest integrated graphics performance on the market, second only to the slightly faster A10 7850K.

KEY SPECS
Socket FM2+; DDR3-2166MHz; 12 Compute Units; 4MB L2 cache



Due to the inclusion of these GPU cores, the A10 7800 is quite reliant upon the system's memory speed when it comes to game performance; as opposed to a discrete GPU which has its own pool of speedy onboard memory, the A10 7800 relies upon the system memory to feed its GPU cores. It officially supports DDR3 up to 2133MHz speeds, but we tested with DDR3-1866MHz, as the value-oriented owners this APU targets are less likely to pay the premium necessary for the higher speed modules. Owners of existing Socket FM2+ boards will be relieved

to see that the A10 7800 uses this socket design.

As with its earlier Kaveri processors, AMD is going to great lengths to emphasise the Heterogeneous System Architecture

"...thoroughly outclassed by Intel's similarly priced rivals"

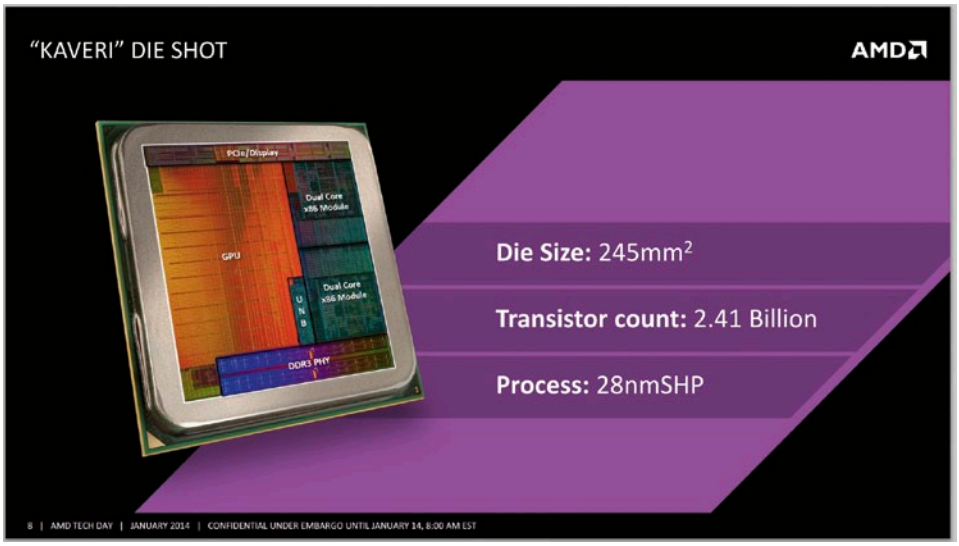
(HSA) employed within the 7800. Basically speaking, certain pieces of software will benefit from the speed of AMD's integrated GPU, which is superior to Intel's integrated GPU. However, the A10 7800's CPU cores are still built on the inferior Steamroller architecture, which has been shown to be far less effective per clock cycle than Intel's 4th Gen CPU cores.

AMD is counting on software partners to start tapping into the power of the R7 GPU via HSA cores to make up the difference, but it's still being used in a minority of current applications.

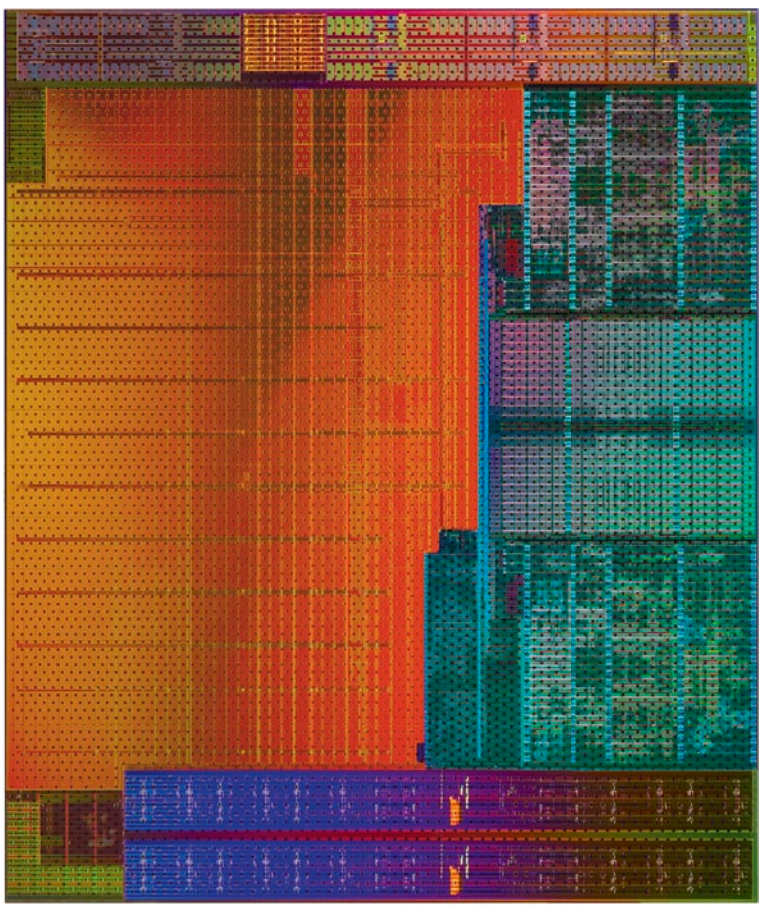
As our benchmarks show, when it comes to raw CPU performance, the A10 7800 is thoroughly outclassed by Intel's similarly priced rivals. We tested the A10 7800 in an ASUS A88X-PRO motherboard, with 16GB of DDR3-1866MHz Patriot Viper memory and a Radeon R9 270X GPU. Our benchmark result focuses on raw CPU performance, which is why the A10 7800 turned in relatively mediocre results. As expected, Intel still has the lead when it comes to pure CPU results, but AMD has a better story to tell when it comes to integrated graphics. After removing the R9 270X GPU, we set our games to medium detail levels and ran them at 1280 x 720 resolution off the CPU's integrated GPU. *Thief* proved to be too much for A10 7800, despite its support for AMD's Mantle technology. However, *Grid Autosport* turned in very playable results, something Intel's integrated GPUs still can't do. Increasing the resolution to 1920 x 1080 should be possible on older games, making this a compelling option for those looking for a budget gaming box.

But therein lies the problem. Most gamers will happily spend a few dollars extra to buy a cheaper Intel CPU such as the Pentium G3420 with an affordable GPU like the GeForce 750Ti; the end cost will only be $40 or so higher than a system based on the A10 7800 without a discrete GPU, but the game performance will be dramatically increased. The A10 7800 makes plenty of sense in PCs that lack the room for a discrete GPU, but for the average desktop user the average CPU performance makes it hard to justify.

Bennett Ring

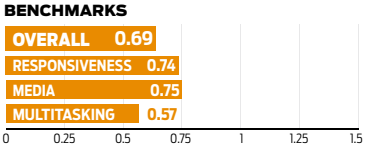


▲ The A10 represents the top-performing Kaveri, for the moment.



◀ Two dual-core CPU cores take up the upper and lower green areas, while the majority of the APU (the orange area) is the GPU.

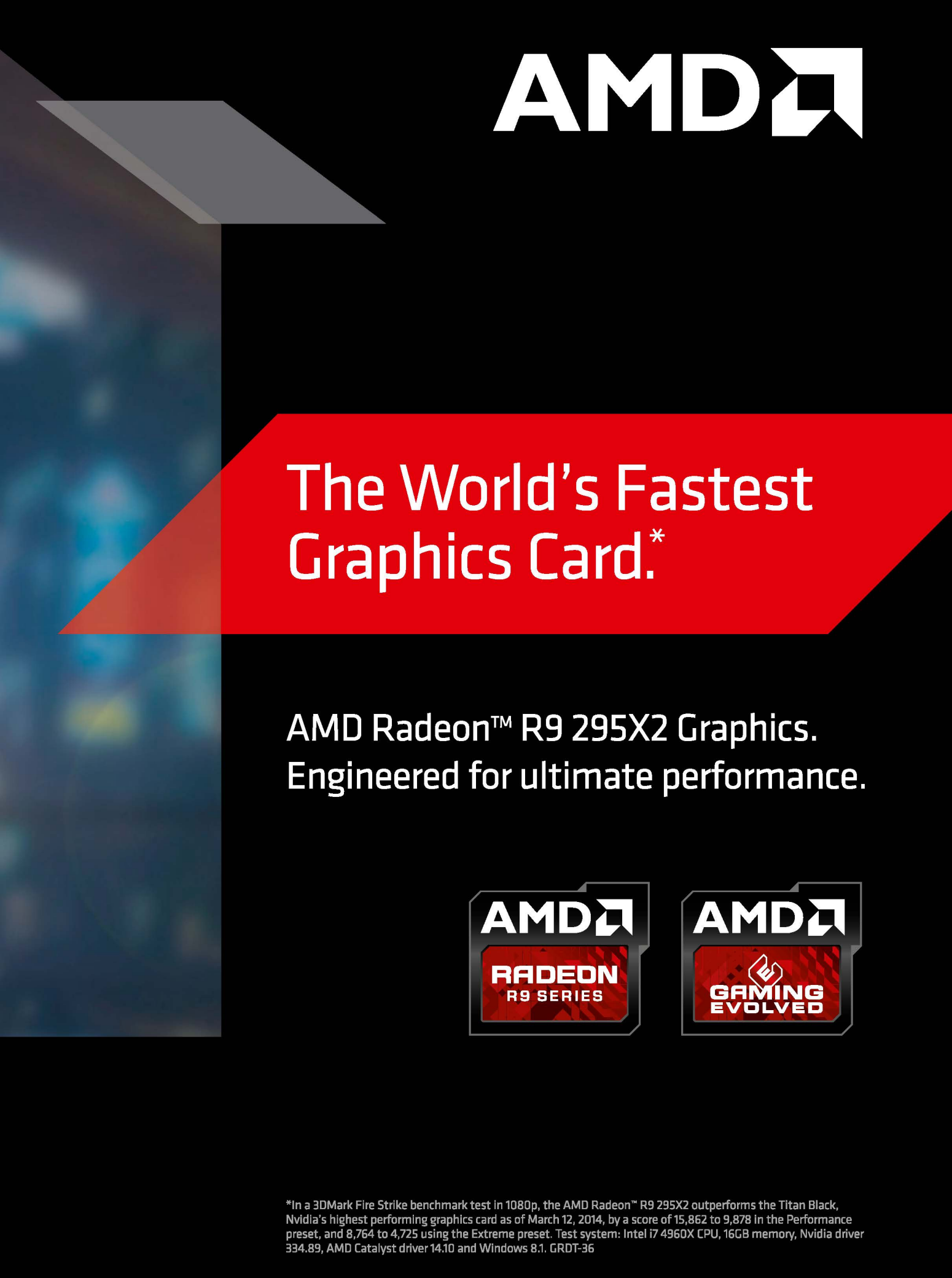
BENCHMARKS



PERFORMANCE ★★★★☆☆
FEATURES&DESIGN ★★★★☆☆
VALUE FOR MONEY ★★★★☆☆

OVERALL ★★★★☆☆

See why Radeon™ is gaming at **amd.com/R9**



*In a 3DMark Fire Strike benchmark test in 1080p, the AMD Radeon™ R9 295X2 outperforms the Titan Black, Nvidia's highest performing graphics card as of March 12, 2014, by a score of 15,862 to 9,878 in the Performance preset, and 8,764 to 4,725 using the Extreme preset. Test system: Intel i7 4960X CPU, 16GB memory, Nvidia driver 334.89, AMD Catalyst driver 14.10 and Windows 8.1. GRDT-36

OCZ REVODRIVE 350

WILL PCI EXPRESS UNLOCK THIS DRIVE'S POTENTIAL?

PRICE $1000
SUPPLIER www.ocz.com

The recent introduction of M.2 and SATA Express has given hard drive buyers more options than ever, but both ultimately rely upon the PCI Express lanes they're connected to, which may be operating at a less than optimum speed depending on the motherboard's lane multiplier configuration, or the number of other cards occupying them. OCZ's new RevoDrive 350 ignores both of these new connection types, instead jacking directly into the motherboard's PCIe lanes. Your motherboard will require a spare PCIe Gen 2.0 x8 connection to accommodate the RevoDrive, something users of dual-GPU systems will need to keep in mind, as it's unlikely they'll have enough spare PCIe lanes to feed this speed demon's appetite for data. This drive requires a PCIe Gen 2.0 x8 lane to reach its full potential; anything slower and the drive won't function at its advertised speed. On our 480GB sample, hidden beneath the plate are the multiple 19nm Toshiba NAND flash modules, as well as a whopping four SandForce SF-2282VB1 SSD controllers. This means that the drive is actually four separate SSDs, which are then tied together via a separate RAID0 chip created by OCZ. However, unlike other SSDs that have been joined via RAID, the RevoDrive 350 still supports the crucial TRIM feature that keeps SSDs running optimally over time. This chip also enables SCSI command support, a crucial feature for Enterprise users.

The result of this scarily powerful concoction of hardware is one of the fastest drives we've ever tested. OCZ promises a sequential read performance of 1800MB/sec, around three times the speed of today's best SATA SSDs. In our AS SSD benchmark, it came close to the advertised speed, scoring 1512MB/sec in sequential reads, and 847MB/sec in sequential writes. Moving to the 4K-64K Threaded test saw the results reach an impressive 415MB/sec read, 549MB/sec writes, both several times faster than the best SATA 3 SSDs. Boot times weren't quite as impressive, as the hardware takes around ten seconds to initialise, so it only shaved a few seconds off our Windows 8 boot time. Obviously this kind of killer performance comes at a price. We tested the 480GB version of the drive, which will set you back a rather hefty $1000, making it one of the most expensive forms of storage available. Still, that's the price to be paid for best-in-class-performance.

Bennett Ring

PC &TECH AUTHORITY RECOMMENDED

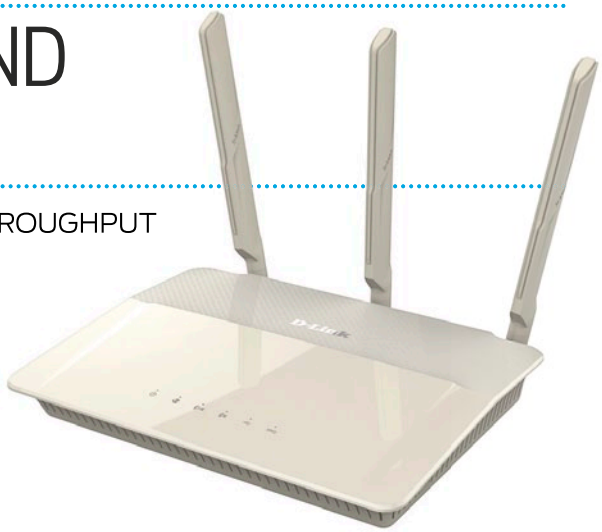
KEY SPECS

3 year warranty • rated for 50GB/day host file writes for three years • AES-128 • SMART and TRIM supported

PERFORMANCE	★★★★★
FEATURES&DESIGN	★★★★★
VALUE FOR MONEY	★★★★☆
OVERALL	★★★★☆

D-LINK AC1900 DUAL BAND GIGABIT CLOUD ROUTER

EXCEPTIONAL RANGE AND QUALITY WITH EXCELLENT THROUGHPUT



PRICE $299
SUPPLIER www.dlink.com.au

D-Link's AC1900 joins the ranks of increasingly widespread AC capable devices.

Ports are standard with 4 Gigabit wired Ethernet, a Gigabit WAN port and a USB 2.0 all on the back and a USB 3.0 port on the side. This is very handy for mounting an external hard drive and makes for easy media sharing. 3 detachable knife-shaped antennas are also mounted on the back which can make getting to the ports a bit fiddlier, however give an excellent range out of the box with the ability to extend. Multiple walls and a floor and an extreme range of around 30 metres showed a drop in speed (reducing by around 30%), although not nearly as much as expected and there were no drop-outs during our testing.

The setup is exceptionally easy with the admin panel nicely designed, although a bit of a change from the previous D-Link interface which may take some getting used to for those accustomed to the old style. The visual "network mapping" layout is excellent and makes common tasks very quick and easy after the initial learning curve. The standard round of features are all there such as IPv6, Web-filtering , port forwarding, guest networking (one for each band, so you can set up two guest networks), QoS, and firewalling.

Dual band means you have 2 WI-FI networks to share the load across and the router will put older, slower devices onto the 2.4GHz band and faster devices onto the 5 GHz band. Streaming over multiple devices at once, some on the "slow" connection and some on the high speed showed excellent data throughput for all devices and no drop-outs or slow down even when older, slower wireless devices were added.

While the price is a little high, the D-Link AC1900 manages data demand in a busy, connected household where a quick and easy setup straight out of the box is an added bonus.

Nicole Tillotson

PERFORMANCE	★★★★★☆
FEATURES&DESIGN	★★★★☆☆
VALUE FOR MONEY	★★★☆☆☆
OVERALL	★★★★☆

SYNOLOGY DS411 SLIM

A BABY NAS FOR UNIQUE NEEDS

PRICE $349
SUPPLIER www.synology.com

When we first set eyes on Synology's DS411 Slim at Computex this year we were instantly impressed. Designed to use 2.5in hard drives it is a tiny unit, one that makes every other NAS we have encountered look overly bulky. But then those silly notions of practicality kicked in and the downsides took over our thinking - in all our years of testing NAS units, physical size has never been the issue, and the ultimate problem in our minds is that the tradeoff for such a small footprint is greatly limited storage space.

2.5in drives will currently be limiting you to 4TB of total storage, and that involves filling it with the largest capacity drives out there at the moment. You'll also be paying for the privilege - at the time of writing a 2.5in 1TB Western Digital Red NAS drive was around the same price as a 2TB 3.5in one. According to Synology, the advantages of using 2.5in drives are reduced cooling and power consumption. Of course, power consumption savings go out the window when you factor in the higher price of drives, and the cooling factor is a moderate issue at best.

There is nothing inherently wrong with the DS411 Slim, it uses Synology's excellent DSM operating system, which enables it to perform all sorts of home server functions, from file serving through to backup and running third party plugins like Apache and other common server packages. It also sports dual LAN ports and two USB 3 ports. It isn't the best solution if you need heavy transcoding of video (you'll need one with a beefier CPU for that), but it can hold its own against anything else in the price range.

But ultimately its usefulness comes down to a very tiny niche - one in which you are space limited but still want the benefits of a fully fledged NAS over a standard network hard drive (which will deliver 4TB of storage in a similar sized package). Reduced cooling (and hence noise) is nice, but it only really comes into play when the NAS is in a confined space. This is one of those products that will be the perfect solution for some, but largely inappropriate for the masses.

John Gillooly

KEY SPECS
2.5in SATA II x4 • USB 3 x 2 • Intel Atom 1.6GHz • 256MB DDR3

PERFORMANCE	★★★★★☆
FEATURES&DESIGN	★★★★★☆
VALUE FOR MONEY	★★★☆☆☆
OVERALL	★★★★☆☆

COREL AFTERSHOT PRO 2

A DISAPPOINTING UPDATE THAT FAILS TO KEEP PACE WITH ADOBE LIGHTROOM

PRICE $75
SUPPLIER www.corel.com

Bibble was once a powerful raw-processing and photo-management application, and a worthy rival to Adobe Photoshop Lightroom. After being bought by Corel in 2012 and rebranded as AfterShot Pro, it looked set to get the wider recognition it deserved.

Version one impressed us with some superb tools for tracking down photos in the library, and while raw processing lagged slightly behind Lightroom, in most other respects it was an equal; in some areas, it even surpassed it.

It was a strong start for Corel's new acquisition. At the time we concluded that if the developer could round out the features without compromising the existing functions, it could have a Lightroom killer on its hands.

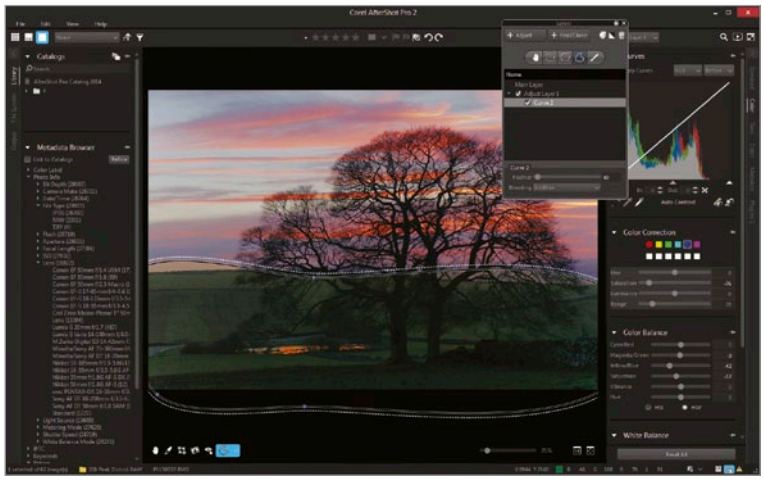
On paper, AfterShot Pro 2 appears to stick to the lean, streamlined design brief. There's a move to 64-bit code, which Corel claims makes raw processing 30% faster. We didn't have the two versions side by side to verify this, but we were able to compare it with Adobe Photoshop Lightroom 5. Exports of 60 raw files to JPEG – complete with colour correction, noise reduction, sharpening and lens distortion correction – took two-and-a-half minutes in AfterShot Pro 2, compared to four minutes in Lightroom 5. We also appreciated how easy it was to drag photos from the library directly onto a Batch Output template to initiate export.

▲ The new HDR module has been ported directly from PaintShop Pro

Other aspects of performance weren't so impressive, though. Importing our library of 56,000 photos took around five hours, and crashed each time it encountered a "corrupt or unreadable file". We also experienced a few crashes and numerous periods of inactivity – lasting around ten to 20 seconds – during normal use.

There's an HDR module that's new to AfterShot Pro, although it's exactly the same one that has been available in Corel PaintShop Pro since 2011. It's accessed by selecting multiple images and choosing an option from the right-click menu. Corel AfterShot HDR then launches as a separate application.

The first job is to merge the images, and handy tools assist with automatic alignment and defining parts of images that should be included or rejected – useful for avoiding ghosting on moving subjects. Then it's on to the tone controls: these include controls for contrast, highlights, midtones and shadows but, strangely however, not overall exposure.



◀ The ability to process limited areas of the frame using the full set of raw-processing functions remains the software's greatest strength

This module can also create an HDR-like image from a single raw file. It starts by generating three virtual bracketed shots at varying exposure levels before continuing the process as normal. However, the underlying raw-processing algorithm used here is inferior to AfterShot's own, and it's incapable of extracting the same amount of highlight information – a fundamental failing when it comes to HDR photography.

AfterShot Pro 2's own raw-processing engine still falls short of the standard set by Adobe Camera Raw (which powers Lightroom, Photoshop and Photoshop Elements).

As before, we found that recovered highlights were susceptible to banding. There's a new Local Contrast control, which boosts the contrast relative to nearby pixels – great for accentuating details – but Lightroom's similar Clarity control produces better results, with fewer artefacts around high-contrast lines.

Noise reduction now benefits from a new algorithm that's offered in addition to the existing one. However, its ability to tackle noisy images still falls considerably short of Lightroom's.

Lightroom also takes a clear lead for comprehensive support of cameras' raw files. We tried to import raw images from 20 recently launched cameras: Lightroom 5.5 accepted all 20, but AfterShot Pro 2 managed only nine. Lightroom additionally has a much larger database of lens profiles for automatic correction of lens defects. AfterShot Pro 2 can only correct for lens distortion automatically, and for fewer lenses, leaving the user to tackle vignette and chromatic-aberration correction manually for each photo.

Lightroom is an extremely tough opponent against which to go head to head. We had high hopes for AfterShot Pro 2, but this update doesn't rise to the challenge.

Ben Pitt

EASE OF USE	★★★★★
FEATURES&DESIGN	★★★★★
VALUE FOR MONEY	★★★★★
OVERALL	★★★★½

SAMSUNG GALAXY TAB S 10.5

STUPENDOUS HARDWARE, BUT IT NARROWLY LAGS BEHIND THE SONY XPERIA Z2 TABLET AS OUR ANDROID TABLET OF CHOICE

PRICE $599 (Wi-Fi 16GB); $699 (Wi-Fi 32GB); $749 (Wi-Fi + 4G 16GB)
SUPPLIER www.samsung.com.au

Samsung's Galaxy Tab S 10.5 draws the eye right away with a stunning 10.5in, 2,560 x 1,600-resolution Super AMOLED screen. Apart from its sibling, the Galaxy Tab S 8.4, it's the only tablet on the market to feature such a panel, and its sheer vibrance stops you dead in your tracks. Graphics and images jump out of the screen in a way that IPS displays don't.

However, we had to tinker with the settings to get it looking its best. Watching movies and TV shows in the default "adaptive" mode produced uncomfortably lurid skin tones. Switching to the "basic" setting yielded much better colour accuracy without sacrificing punch and presence.

Although the Tab S's screen is easy to fall in love with, it isn't as bright as the best IPS displays. According to our colorimeter, the Tab S 10.5 goes up to 276cd/m2; IPS screens can hit 400cd/m2 or more. This won't normally be a problem for indoor use, but in bright sunlight the Tab S will be less readable than, for example, the iPad Air. What's more, AMOLED displays are susceptible to screen burn – depending on how you use it, the Tab S may not look so good a few years from now.

Regardless of the display, the Tab S is a beautiful device. It measures only 6.6mm thick and, at 465g, you'll barely notice it in your bag; holding it up to watch a movie or read isn't tiring at all. It isn't quite as light as the Xperia Z2 Tablet, and lacks that device's water-resistant sealing, but we found its rounded design more comfortable to hold for long periods. Our only minor moan is that the bronze-framed bezels – which, admittedly, look great – are so narrow that it's tricky to pick up the tablet without accidentally activating the touchscreen.

On the plus side, the Tab S offers plenty of connectivity. There's a microSD slot that will take cards up to 128GB in size; the micro-USB socket supports MHL, for HDMI video output; wireless stretches to dual-band 802.11ac; and an infrared transceiver means you can put the tablet to use as a giant universal remote control.

Disappointingly, you don't get a stylus with this tablet, but a fingerprint scanner is built into the home button. This works in the same way as the scanner on the Samsung Galaxy S5 smartphone, although its positioning, along the long edge of the tablet, isn't as convenient.

Inside the Tab S beats a Samsung Exynos 5 Octa SoC with eight cores (four running at 1.9GHz, four at 1.3GHz), alongside 3GB of RAM, a base storage allocation of 16GB and Mali-T628 MP6 graphics. This is the same specification as the larger Samsung Galaxy NotePRO 12.2; not surprisingly, it delivered similar benchmark results. The Tab S completed the SunSpider test in 478ms and recorded single- and multi-core scores of 741 and 1,769 in Geekbench 3.

Inevitably, the Tab S's high resolution holds back gaming performance. In the GFXBench gaming test, it averaged only 14fps; the iPad Air scored 21fps and the 1080p Xperia Z2 Tablet managed 28fps.

In everyday use, however, everything is perfectly responsive. In our testing, we almost never saw the tablet slow significantly, and the fussy Magazine UX newsfeed was as smooth as butter. Battery life was impressive, too, with the power-efficient AMOLED screen paying dividends. In flight mode, with the display set to 120cd/m2, the Tab S 10.5 played 13hrs 26mins of video before hitting 5% capacity; the screen then dimmed automatically and the movie continued for a further 31 minutes. That's a strong showing, beaten only by the Xperia Z2 Tablet's 14hrs 38mins and the 16hrs 3mins of Amazon's Kindle Fire HDX 8.9in.

The Tab S's 8-megapixel rear camera, which is accompanied by a single LED flash, captures clean, clear stills and decent 1080p video as well. There's also a front-facing 2.1-megapixel camera, but this isn't as good. We weren't impressed with the sideways-facing speakers, either, which aren't particularly loud or full-bodied.

As usual, Samsung has skinned Android 4.4 with its TouchWiz front-end and preinstalled a long list of proprietary apps. Whether you approve of this is a matter of taste, but some of the bundled software is undeniably useful. Smart Stay, for example, keeps the screen on while you're looking at it; Multi Window lets you line up two apps side by side; and the new SideSync feature allows you to drag files back and forth between the tablet and a Samsung Galaxy smartphone.

All in all, the Galaxy Tab S 10.5 is an excellent tablet. The screen is fabulous, performance and battery life are more than respectable, and the design is the very definition of svelte. Unfortunately for Samsung, the Sony Xperia Z2 Tablet offers even better performance and battery life – not to mention water-resistance. As a result, the Tab S narrowly misses out on a wholehearted recommendation.

Jonathan Bray

KEY SPECS

1.9GHz Samsung Exynos 5 Octa SoC · ARM Mali-T628 MP6 graphics · 3GB RAM · 16/32GB storage · 10.5in 2,560 x 1,600 Super AMOLED display · 8MP/2.1MP rear/front cameras · 802.11ac Wi-Fi · Bluetooth 4 · microSDXC slot · 7,900mAh Li-ion battery · Android 4.4 · 2yr RTB warranty · 247 x 6.6 x 177mm (WDH) · 465g

BATTERY: LOOPING VIDEO 13HRS 57MINS

PERFORMANCE	★★★★★★
FEATURES&DESIGN	★★★★★☆
VALUE FOR MONEY	★★★★☆☆
OVERALL	★★★★★☆

LG G WATCH

ANDROID WEAR MAKES AN IMPRESSIVE DEBUT, BUT THE FIRST HARDWARE – THE LG G WATCH – IS A DRAB DISAPPOINTMENT

PRICE $250
SUPPLIER www.lg.com.au

The G Watch isn't the first smartwatch we've seen, but it's the first publicly available device to run Android Wear, Google's dedicated smartwatch OS. What makes Wear so important is that it's an open platform: unlike Samsung's Tizen-based Gear 2, Gear 2 Neo and Gear Fit watches, which work only with Samsung smartphones, Android Wear watches will work with any smartphone that has Android 4.3 or above installed.

THE HARDWARE

For such a significant product, it's a shame the watch isn't more attractive. It's a blocky, plain slab of plastic, regardless of whether you choose the black or white colour scheme. No buttons or ports punctuate the edges, and only a series of contacts on the base for charging and a small hole along the bottom edge for the microphone distract from the 1.65in touchscreen on the front.

The IPS screen has a resolution of 280 x 280, so it isn't as colourful or sharp as Samsung's Gear devices (including the upcoming Android Wear-based Gear Live), which offer 320 x 320 AMOLED displays. Still, it's sharp enough not to look pixellated, and it's readable in bright sunshine.

Its core hardware is perfectly powerful, too: a dual-core 1.2GHz Qualcomm Snapdragon 400 is all the watch needs to keep things running smoothly, and there's 4GB of storage.

Disappointingly, the battery lasts only a day and a half with the watch face on permanently (the default setting). There's an option to have the display time out, which extends battery by a day or so, but you then have to tap the face to wake up the screen. The G Watch is also supposed to wake up with a flick of the wrist, but it requires such a pronounced gesture to achieve this that you have to be careful notto punch the person next to you by accident – it routinely took us several attempts to make this work.

The watch is IP67-rated, so there's no need to worry about getting caught in a rain shower; it will shrug off the most biblical of soakings.

HOW IT WORKS

Getting the G Watch up and running is simplicity itself. Install the Android Wear app on your smartphone and run through the pairing routine on the G Watch and the two will be linked via Bluetooth. From this point on, the watch will buzz whenever notifications arrive on your phone. These appear as Google Now-style cards and include emails, text messages, calendar events, stock quotes, weather updates and sports scores. In fact, any app that can send a notification can send one to the G Watch, and those you don't want to appear can be muted via the Android Wear app. You can scroll through open notifications by swiping up and down, dismiss them by swiping a finger across the watch face to the right, open them with a tap, and access further options by swiping left.

The rest of the UI is fairly basic. Pulling down from the top mutes the vibration and shows you the date and the battery capacity. This is annoying, since you don't always want to mute the watch when you want to see how much battery power you have left. A long press lets you switch watch faces, and a single tap of the homescreen – or speaking the phrase "Okay, Google" – activates voice mode.

This is where the G Watch really comes into its own, allowing you to send short text messages and emails, set reminders, alarms and timers, start the stopwatch, launch apps on your phone and carry out a web search simply by talking into your wrist. We found the voice recognition effective and accurate but, since it relies on an internet connection, there's always a little lag between issuing the instruction and the action being carried out.

One of the most exciting applications for the G Watch is as an extension to Google Maps for getting directions. You can set your destination quickly via the key phrase "navigate to", and Google's voice recognition picks up most destinations and addresses seamlessly. Disappointingly, though, the watch doesn't display a moving map. Instead, next-turn icons pop up onscreen whenever you need to take a turn; we found this didn't work well at all.

KEY SPECS

Dual-core 1.2GHz Qualcomm Snapdragon 400 · 512MB RAM · 4GB storage · 1.65in 280 x 280 IPS touchscreen · Bluetooth 4 · 400mAh battery · Android Wear 1 · 37.9 x 9.9 x 46.5mm (WDH) · 54g

APPS

Part of the appeal of a smartwatch is the ability to extend its capabilities by installing apps. A small selection come preinstalled on the G Watch, including the Fit app, which allows you to see how many steps you've taken that day and view your activity over the past week. Mostly, though, it's left to you to decide which apps to run.

There isn't a massive selection to play with, but we found more than we'd expected to. However, the way these apps are accessed on Android Wear needs serious work. The default behaviour is to tap the screen once, scroll down a list of voice-instruction suggestions and then tap Start to bring up the list of apps. We'd suggest you make the first app you install the Mini Launcher, which places shortcuts to your apps in a translucent drawer, accessible with a swipe right from the top-left corner of the watch's homescreen – it makes using Android Wear a far more pleasant, natural experience.

VERDICT

Other than this annoying niggle, it's a promising start for Google's fledgling wearables OS. It's heartening to see that there's a decent selection of apps already, some of which provide a tempting glimpse of what's to come. We can see the platform taking off as Wear devices grow in popularity. We're considerably less impressed with LG's hardware: the design is bland, the battery life is disappointing, and it lacks features. However, with several far more promising Android Wear devices on their way in the near-term, we'd suggest you hold fire.

Jonathan Bray

PERFORMANCE	★★★☆☆☆
FEATURES&DESIGN	★★☆☆☆☆
VALUE FOR MONEY	★★★☆☆☆
OVERALL	★★★☆☆☆

fractal design

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Mwave	1300 727 446	mwave.com.au
PCCG	03 9551 0889	pccasgear.com.au
Umart	07 3369 3928	umart.com.au
IJK	02 9745 0877	ijk.com.au

NSW

MSY	02 9648 4116
PC DIY	02 9648 1001
Online Comps	02 9211 0898
IJK	02 9745 0877

QLD

Computer Alliance	07 3421 3200
Online Comps	07 3387 1531
MSY	07 3217 9070
Umart	07 3369 3928

SA

MSY	08 8212 1656
PC DIY	08 8410 0446

VIC

CPL	03 8542 8688
MSY	03 9560 2288
Nexus	03 9663 9988
PC DIY	03 9077 9811
Scorptec	1300 726 770
Centrecom	03 8311 7600

WA

Austin	08 9201 2788
MSY	08 9344 1002
PLE	08 9309 4771

APPS ROUND-UP

JENNETH ORANTIA WITH THE WISE WORD ON THE ESSENTIAL APPS, TOOLS AND UTILITIES WE THINK YOU NEED.

FLOATIFY

PRICE FREE **DEVELOPER** JAWOMO
PLATFORM ANDROID

Remember when Android used to own push notifications? All of the other mobile platforms have since more or less copied Android and added their own embellishments on top, leaving the friendly green robot in the odd position of being old-fashioned with its notification delivery.

But never fear, tireless Android fans. The free Floatify utility will give you that smug sense of superiority back, providing a next level of sophistication for your Facebook, email and dozens of other notifications.

Rather than have each notification simply materialise as an icon on the top bar, Floatify makes them also appear as a floating pop-up on the bottom of the screen.

The free version of the app lets you pick one action to perform when you tap on the notification, and this defaults to opening the relevant app.

If you upgrade to the Pro version for $2.40, you get more options for dealing with your notifications, such as expanding it to show the full message (handy for instant messages and email), clearing the notification, or postponing the notification for five minutes so you can deal with it later.

Floatify also provides plenty of customisation features, although most of the advanced ones like background opacity and animations are only available in the Pro version. You can create custom notification sounds for each app (a feature that isn't always available through the native app), change the 'style preset' of the notification, and change individual settings like window style and background colours.

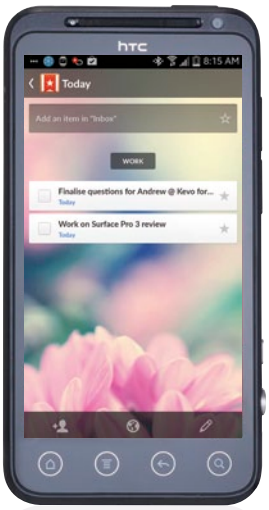
Floatify doesn't replace the stock Android style of notifications, so you'll still see the notification icons in the top bar and be able to access new notifications from the drop-down shade. What Floatify does is add the pop-up window to give you more information on what the notification is.

You can also set it up to display new notifications when you do a short swipe down from the left or right side of the top bar, and if you have more than one new notification, it stacks them on top of each other.

EASE OF USE	★★★★★☆
FEATURES	★★★★★☆
VALUE FOR MONEY	★★★★★☆
OVERALL	★★★★★☆

WUNDERLIST 3

PRICE FREE **DEVELOPER** WUNDERKINDER
PLATFORM ANDROID, IOS, OS X AND CHROME



There really isn't all that much to the standard task management app. You put in all the things that you need to remember to do, like buy milk, pay your phone bill, call your mum, and you add a deadline that it needs to be completed by. For the especially forgetful, there's usually an option to add a reminder so you can receive a notification around the time is due.

If you want a little more than just the bare basics, however, the latest version of Wunderlist 3 will give them to you. One of its strongest features is its cross platform availability. You can access it from the web, Windows, Mac, Chrome, iOS and Android, and there's a beta version available for Windows Phone. With version 3, the developers have added real-time syncing, so any tasks you add on one device are automatically flung to the cloud and then synced to your other devices. Lovely.

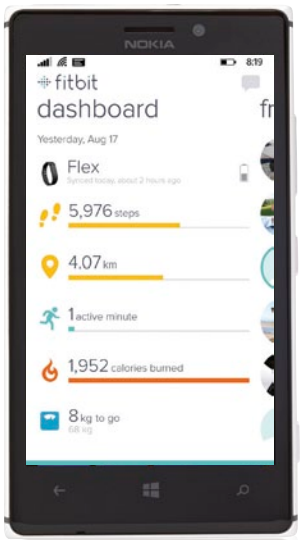
Another new feature is the ability to add comments to tasks – handy if you're collaborating on tasks with family members or colleagues. Previously, this was only available if you had a Pro subscription, which costs US$4.99 a month or US$49.99 a year. You can also now create public lists to share with your social networks, and anyone can view these lists (as well as comment on any of the list items) without having to create an account with Wunderlist.

All of these new features are icing on the cake for what was already one of the most advanced task management platforms on the market. Wunderlist stands out for being powerful without over-loading users with options, which is a drawback that most other project management-style apps have. Wunderlist has all of the features you'd expect in an advanced project management app, such as the ability to organise tasks into different lists/projects, create sub-tasks, add file attachments, comments, and the ability to send and receive tasks in the Wunderlist inbox.

EASE OF USE	★★★★★★
FEATURES	★★★★★☆
VALUE FOR MONEY	★★★★★★
OVERALL	★★★★★☆

FITBIT

PRICE FREE
DEVELOPER FITBIT
PLATFORM WINDOWS PHONE

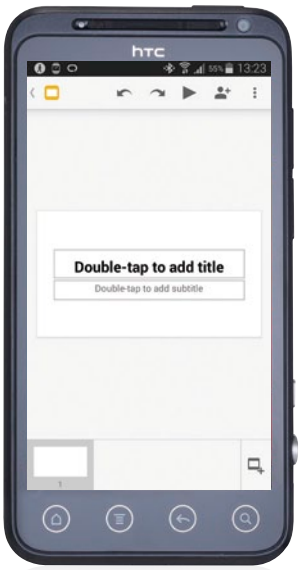


The first thing you should know about Windows Phones and activity trackers/fitness bands is that they generally don't mix. While most of wearables support iPhones and Android phones out of the box, Windows Phone support is glaringly absent. FitBit is the first to buck this trend – a development that's rather fitting, given it was the first fitness band on the market. The new FitBit app for Windows Phone 8 offers full syncing capability (provided the device in question is running Windows Phone 8.1 and has Bluetooth 4.0), and offers all of the features found in its iOS and Android counterparts, such as real-time and historical data, graphs, progress tracking and social integration.

OVERALL ★★★★☆

COMMANDR FOR GOOGLE NOW

PRICE: FREE
DEVELOPER RSEN
PLATFORM ANDROID

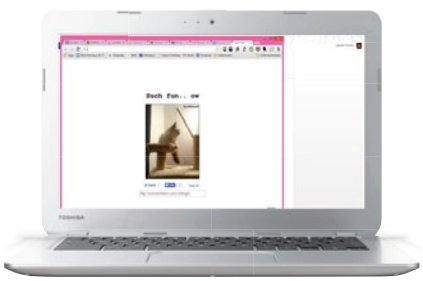


Commandr for Google Now is a simple utility that adds additional voice commands to Google Now without the need to root your smartphone. The app uses a service built into Android that 'listens' to text entered into Google Now and performs the requested functions, including reading unread Gmail messages, turning the flashlight on and off, and controlling music playback. If you set it up with the Tasker app, you can also create new custom commands. The only downside is that you have to say them exactly right. it will turn the flashlight on if you say "turn on flashlight" but not "turn flashlight on".

OVERALL ★★★★☆☆

ANIMATEDTABS

PRICE FREE **DEVELOPER** ANIMATEDTABS
PLATFORM CHROME



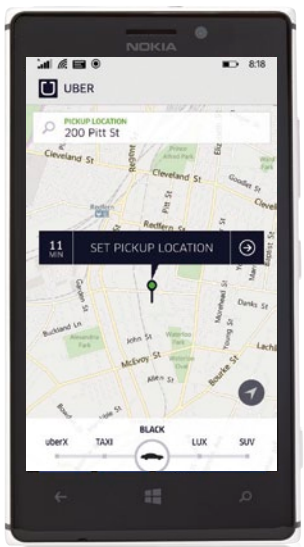
Ever wanted to be that awesome/annoying clown that emails to a couple of hundred of their closest friends those funny animated GIFs, which aren't really appreciated around the office?

Neither have I, but if it's you, then you probably should take a look at this.AnimatedTabs is a simple Chrome extension that presents you with a new animated GIF whenever you open a new tab in Chrome. No more trolling the web for cool animated GIFs, whether it's people falling over and hurting themselves hilariously, the latest popular web meme, or awesome cat videos. It displays the animated video, provides easy links for sharing the GIF to your Twitter and Facebook networks, and gives you the URL to copy and paste the GIF into your emails to spread the funny around.

OVERALL ★★★★★

UBER

PRICE FREE
DEVELOPER
UBER TECHNOLOGIES
PLATFORM WINDOWS PHONE



Another popular app that's made the move to Windows Phone is Uber. Windows Phone users can now book private cars to get out and about using the slick native app rather than having to log into the mobile site.

As with the other apps, you can book private cars, luxury cars, SUVs, and taxis to come pick you up (although unfortunately you can't order a car in advance), and you can track their progress as the come towards you on a map.

You can also take advantage of the new uberX ride-sharing service, which has ordinary drivers that have passed the Uber check to come and pick you up for a lower fee.

OVERALL ★★★★★

LABS BRIEFS

ANTEC GX 500 CASE

PRICE $69
WEBSITE www.antec.com

It's very hard to get excited by the budget end of the PC case market. With a few exceptions, these cases are free of exciting features by design. Antec, however, which has stumbled in the past with budget designs, has really nailed it with the GX 500.

For less than $70, this case boasts three fans, two simple fan-controllers, a unique and very handy screw-in system for optical drives, and room for large video cards. There are rubber mounts for the PSU, and a clever little drive caddy. With two USB3 mounts, you've got everything you might need in a case.

Some corners have been cut, though. The expansions brackets are stencilled cut-outs, which is less than ideal, and the all plastic front and top panels are a little basic, but this is small beer. You'll get slicker designs for more money, but rarely more features.

David Hollingworth

OVERALL ★★★★★

CORSAIR AIR 240

PRICE $129
WEBSITE www.corsair.com

This unique-looking case represents Corsair's push to occupy the premium end of the market, and it's a success in that respect. The low and wide design accommodates both Mini- and Micro-ATX motherboards, which lie flat half way up, with the PSU and drives in the lower half, or, it can be turned on its side if you prefer (and the Corsair logo on the front can be rotated). We were sent both the black and the white versions, and the finish on the white one, in particular, is immaculate – we visited Corsair in Taiwan this year, and the engineers spoke of serious R&D efforts to produce a white paint that won't fade easily – especially if exposed to sunlight.

We assembled a complete PC and soon discovered that some PSUs and some CPU coolers don't quite fit, so be sure to check your measurements. There are also no front-access bays for 3.5in or 2.5in devices at all – a nod to users who have no intention of using an optical drive ever again. Balanced against these limitations is a surprisingly roomy interior, very good value, build quality and good looks.

Ben Mansill

OVERALL ★★★★½

HP 800ED DESKTOP MINI J3U61EP

PRICE $1423
WEBSITE www.hp.com.au

While intended for enterprise deployments, the HP Mini is available for consumer purchase, and, if a very small, well built and well supported PC is what you're after then this should be considered. About the size of an external DVD, the i5-4570T (2.90GHz) CPU, 4GB RAM and 500GB hard drive innards signal its mid-range functional intent. The limiting factor is obviously the memory, but with the removal of a single screw the case is open and memory or 2.5" drive expansions can be made. A Torx driver is needed to access the CPU. One of the two SODIMM slots is used, so unless you want to turf the existing 4GB module and start afresh the obvious path is to jump to 8GB.

VESA-compatible screw holes in the rear allow mounting on the back of a monitor. Only DisplayPort is available as a digital output, and there's a D-Sub connector, too.

We can't help but love the Mini. While relatively expensive, it feels super-solid, and clearly benefits from HP's vast experience in engineering and design.

Ben Mansill

OVERALL ★★★★☆

CORSAIR FLASH VOYAGER GTX

PRICE $169 (128GB); $299 (256GB)
WEBSITE www.corsair.com

This bad boy is the Porsche 911 Turbo of the USB drive world. If you don't think USB transfer speed really matters, then you really won't get the appeal of this, but if you like the sound of up to 400MB/s transfer speeds (though in our real world testing it was closer to 300MB/s – still mighty), then you're already making plans for this device in your life.

This is, in actuality, an SSD with USB connectivity (of course, compatible with USB 2 – but why you'd attach this speed demon to a USB 2 port is beyond us). It uses a proper SSD controller (we weren't told which one, though) to manage the device. As a result of this design the drive runs S.M.A.R.T and TRIM for optimised speed and endurance.

Right now, I know, there are people who have been screaming out for such a device for years, and here it is. Available in appropriately massive 128 and 256GB capacities, it's not cheap, but nor should you expect it to be.

Ben Mansill

OVERALL ★★★★★

DLINK WI-FI AUDIO EXTENDER

PRICE $79.95
WEBSITE www.dlink.com

Wireless music streaming has been desirable and achievable, thus far, via integrated system such as those from Sonos. But if you already have a decent speaker set and your home or office Wi-Fi range can't quite handle clear music, then this handy little $80 device could solve your problems.

It looks like a standard AC power plug, and indeed it must, of course, be plugged in to take power (though it's not any kind of home powerline network device), but on the device are also a standard 3.5mm audio plug, as well as a WPS button to make the initial connection to your Wi-Fi network.

Then, download the app and away you go. Your network music library is accessed via the app, and you should be able to install multiple units for simultaneous music through the home or office.

It's only 802.11n, but that keeps the price down (as opposed to 802.11ac), and really, n is more than sufficient for music via Wi-Fi.

Ben Mansill

OVERALL ★★★★☆☆

FRACTAL CORE 3300

PRICE $TBC
WEBSITE www.fractal-design.com

Fractal Design is a trusted name in high-end, quiet cases for the serious enthusiast that doesn't necessarily want a loudly designed gaming case. Fractal's kind of left that market segment with the Core 3300, instead aiming at a the very crowded budget market.

Sadly, it seems a bit of a mis-step.

It's not that there's anything really wrong with the case - for its price (based on US pricing), you get some good features, two fans, and sturdy, stylish design. There's a lot of room for expansion, and a unique bar arrangement for storage drives means that there's not only good airflow, but also room for large graphics cards.

The problem is that at this end of the market Fractal's competing with gems of budget case design from BitFenix, and even lower-end Corsair cases, which offer similar features for less, on top of looking a little more inspired.

It's simply a case of good being not quite good enough.

David Hollingworth

OVERALL ★★★☆☆☆

RAPOO V900 MOUSE

PRICE $69
WEBSITE www.rapoo.cn

Technically, there's nothing wrong with Rapoo's entry into the serious gaming peripheral market. The V900 looks and feels sleek, and has some great features. It features 8200dpi tracking, a built-in processor and memory for macro recording, and wonderfully slick and smooth feet. It has great lift-off, and cool looking, breathing LED lights.

However, as comfortable as the rubber side-grips are, it seems to be built for smaller hands than ours. The symmetrical grooves on either side make for a comfortable thumb grip, but our pinky and ring fingers can't find a comfortable purchase - it either pushes our grip uncomfortably forward, or pushes it too far back on mouse for accurate clicking.

It does boast a good price, so if you can get your hands on one to make your own opinion, it's worth checking out, we say. It's about 5mm too short for us, however.

David Hollingworth

OVERALL ★★★★☆☆

QNAP TURBO NAS TS-451

PRICE $829
WEBSITE www.qnap.com

PC & TECH AUTHORITY RECOMMENDED

The capabilities of the TS-451 likely go well beyond your requirements. This fully-featured and then-some NAS is able to effortlessly handle multiple network connections, and you can always grow into its extra features (like all NAS products these days, it's heavy on the apps). Or, just take advantage of the most powerful CPU we've ever seen in a SOHO NAS (a dual core 2.4GHz Celeron). As a media server, its star feature is transcoding multiple video sources simultaneously (either in real-time, or you can designate a 'transcode' folder, and anything dropped into it is converted immediately). The beefy (for a NAS) CPU also has appeal for rapidly processing encrypted data. You can also run a Virtual Machine, running Windows, Linux or UNIX, although you'll need to upgrade the installed RAM from 1GB (default) to at least 2GB (max 8GB).

Four 3.5 or 2.5" drives can be installed. Connectivity includes two Gigabit Ethernet ports, two USB 2 and two USB 3 and, pleasingly, HDMI.

Ben Mansill

OVERALL ★★★★★

Photography: main intro, Danny Bird; mini-intro and cutouts, Henry Carter

Compact tablets

SMALLER TABLETS MAKE GREAT PORTABLE WEB BROWSERS, GAMES MACHINES AND EBOOK READERS, BUT WITH SO MANY AVAILABLE, WHICH ONE SHOULD YOU BUY? WE'VE TESTED THE BEST EIGHT TO HELP YOU MAKE THE RIGHT CHOICE

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Buyer's guide

WHAT SEPARATES A GOOD COMPACT TABLET FROM A BAD ONE? OUR GUIDE EXPLAINS HOW YOU CAN SPOT THE DIFFERENCE

If you're in the market for a compact tablet, the range on offer can seem daunting. Not only are there a huge number of devices to choose from, but also every one seems to offer something slightly different, with features, screen technologies, operating systems and prices all varying dramatically between tablets.

The key difference – and one from which all other differences stem – is the price, which runs the full gamut from laptop-rivalling bank-balance smashers, to bargain-basement impulse buys. At the top end you can expect to pay more than $700; there's a middle band of tablets costing around $300-$400; and a selection of cheaper devices that come in at just over $200.

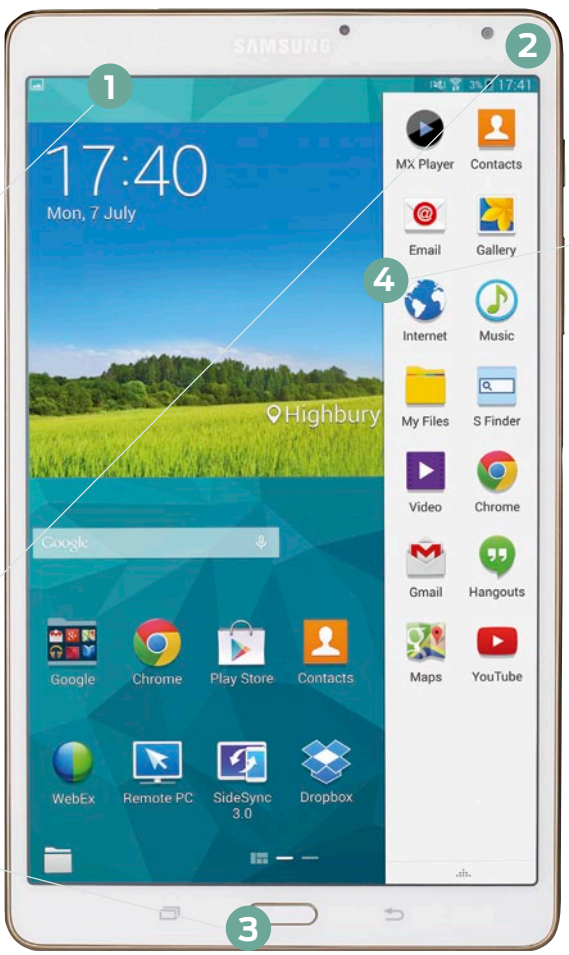
You may wonder why there's such a big price difference between these tablets, since at first glance there isn't a huge difference in size and appearance. Plus, they all do essentially the same thing, right? Well, that's not entirely true.

BUILD, DESIGN AND SCREEN QUALITY

For starters, build and design does vary quite significantly as you go up the price scale. The lower-priced models will usually have chunkier, creakier designs, with cheap plastic chassis that exhibit a lot of flex if handled roughly. Shell out a bit more and chassis begin to look sleeker, and employ more expensive materials for a sturdier build quality. Pricier tablets tend to weigh less as well.

It's a similar story for displays. A good screen is absolutely essential for a tablet, compact or not. You'll have difficulty finding a compact tablet display that isn't at least IPS, so viewing angles will always be good; the differences concern quality and resolution. With a compact tablet, you want the screen to be as bright as you can get it and contrast to be as high as possible. Although you won't always need to turn it up to full brightness, the brighter the screen at its maximum setting, the more likely you are to be able to read it outdoors in bright sunshine. Aim for around 400cd/m2 and above as a baseline. For contrast, anything from 700:1 and up is pretty respectable.

Resolutions vary hugely, too. At the top end of the market, you'll find



1 Tablet screens vary depending on how much money you're spending. Cheaper tablets tend to have lower-resolution, IPS displays. Pricier units up the resolution, and some more expensive tablets even have super-colourful OLED displays.

2 Unlike smartphones, compact tablets don't always have front and rear cameras, and the specifications and quality tend to lag behind as well. Generally, among this month's crop, we've found that the more megapixels, the better the quality.

3 Look out for unusual features: this Samsung tablet has a fingerprint reader built into the home button for unlocking the tablet.

4 Android tablets often have a customised user interface, which is why they look different from one another. The only tablet to run completely pure Android this month is the Nexus 7.

5 A useful feature worth looking out for is an infrared transceiver. This allows a tablet to be employed as a super-luxurious universal remote control. Very handy for when the TV remote has gone missing and you need to change channels.

6 Not every tablet has one, but a microSD slot is extremely useful. It allows you to expand the storage in your tablet much more cheaply than buying a higher-capacity device in the first place.

pin-sharp 1,600 x 2,560 screens. At the bottom end you're limited to 800 x 1,280. Don't assume that higher is always better, however, since there's a limit to the level of detail the human eye can resolve.

This is where Apple's handy Retina definition comes in. Simply put, a "Retina" display is one where, when held at a "typical viewing distance", the individual pixels aren't visible to the human eye.

For example, if you view your tablet screen from a distance of 50cm, an 8in 800 x 1,280 screen will be sufficient. If you'd like your tablet screen to look crisp from 30cm, you'll need a 1,080 x 1,920 screen. In other words, although the specifications look impressive on paper, the high-DPI displays of tablets such as the Apple iPad mini with Retina display and Samsung Galaxy Tab S are overkill at this screen size.

CORE HARDWARE AND BATTERY LIFE

You can never have too much power, however. The faster your processor, the more responsive your ta blet will feel in general use. The faster its graphics chip, the smoother it will play demanding games. A more powerful tablet is also likely to remain usable in a few years, when the increasing demands of apps and OS updates may render a slower one frustratingly sluggish.

So which chips should you look for? Most modern tablets employ processors designed by British company ARM, but there's a profusion of different models. Currently, the fastest models are the Qualcomm Snapdragon 800/801, Samsung's Exynos Octa 5 and Apple's A7. You'll see these mostly in premium tablets, but they're also found in many devices costing as little as $299.

The slowest and most sluggish performers tend to come from lesser-known manufacturers such as Rockchip and MediaTek. You'll find these in tablets at around the £100 mark. The performance of such chips is improving all the time, and in real-world use they'll cope with most tasks. However, you'll experience more slowdown when downloads, installations and updates are happening in the background, or when many apps are running simultaneously.

Then there's Intel, which is slowly beginning to muscle in on ARM's territory. The latest versions of the firm's Atom chips, as found in the Asus Memo Pad 7, deliver performance that's comparable to the fastest current ARM processors, both in gaming and non-gaming scenarios – and from the hardware we've seen so far, the cost isn't prohibitive.

The problem with Intel-powered Android tablets is that not all apps and games on Google Play are compatible with them. It isn't a huge problem, but in a recent ARM study, around 9% of apps tested failed to run. It's something you need to consider when weighing up which tablet to buy.

> "The high-DPI displays of tablets such as the iPad mini are overkill at this size"

It's also worth bearing in mind that a tablet's core hardware will have an impact on battery life. Once again, the latest ARM-based processors come up trumps here: we've found that tablets powered by the Qualcomm Snapdragon 800/801 processors tend to deliver the longest battery life in our tests.

That isn't the only factor at play when it comes to stamina, though. With more pixels to power, an ultra-high-resolution screen may sap the battery quicker. And the capacity of the battery is also important in determining how long a tablet will last between charges: the higher the mAh rating of the battery, the better.

OTHER FEATURES

What you can actually do with your tablet is mostly determined by the operating system it runs. We've covered this topic in depth overleaf, but there are a few other features in the hardware that are worth taking note of.

Not every tablet has one, but a microSD slot is useful. It allows you to transfer large files quickly to your tablet, and keep them stored locally without impinging on your main storage. With an Android tablet, it's also possible to install some apps directly to the SD card, thus freeing up the higher-performance internal flash for storage- and performance-hungry games.

An HDMI video output is worth having, too – it's by far the easiest way to display the screen of your Android tablet on a TV or monitor. However, dedicated outputs are rare on compact tablets. These days it's more common for devices to deliver video output via either MHL or SlimPort, both of which allow the tablet to output a video signal via the USB output. You'll need to buy a cheap converter (around £5) to get this to work, though.

Finally, it's worth keeping an eye on the camera specifications. Not every compact tablet has a rear camera and the low-megapixel units tend to be awful. Even on the more expensive models, which can shoot decent snapshots, don't expect smartphone levels of quality.

HOW WE TEST

PERFORMANCE

We test compact tablets in a similar way to smartphones, primarily because the two types of devices share so many features in common. As with phones, there's a variety of platforms, which means we must use benchmark tools that run on all the devices we test.

We use Geekbench to provide a measure of processor performance. GFXBench allows us to measure how the tablets cope with ultra-demanding games. We run this at the native resolution of each tablet, so we'd expect tablets with lower-resolution screens to do proportionally better than those with higher resolutions. Finally, we run SunSpider and Peacekeeper to show how the tablets perform when browsing the internet and running web applications.

We combine the results of these tests with our own subjective experiences of how responsive the tablets feel to give an overall score out of six for Performance.

DISPLAY, BATTERY LIFE AND FEATURES

To test the quality of our tablets' displays, we measure them with an i1Display 2 colorimeter. This gives us figures in cd/m2 for brightness (candela per square metre) and the contrast ratio.

To gauge battery life, we play a 720p video on loop with Wi-Fi switched off and the screen set to 120cd/m2 brightness which represents an average setting, timing how long each tablet takes to eventually run out of power.

We also tot up other features, taking into account connectivity, video outputs, storage expansion and whether or not the tablet has a rear-facing camera.

VALUE FOR MONEY

Finally, the Value for Money score. Here we take into account the price of the most basic (the cheapest) model available, and combine this with the other ratings to give a score out of six.

Tablet OSes compared

APPLE, GOOGLE OR MICROSOFT – WHICH IS RIGHT FOR YOU? **JONATHAN BRAY** EXPLAINS THE PROS AND CONS OF EACH OF THE THREE MAJOR PLATFORMS

It's an unavoidable truth that most of us tend to focus on the hardware when we're out to buy a new tablet. A high-resolution display, attractive design and fast core hardware tend to dominate our thoughts long before the software on the device.

To a large extent, this is due to the fact that most of us are simple beasts: we see a device in the shop, we play with it, talk to a salesperson, and we fall in love (hopefully with the tablet, not the shop-floor assistant).

However, we'd advise a more perspicacious approach. Before you buy, consider the software, too; although closer than ever before, there are fundamental differences between the three major operating systems available on tablets today – differences of which you should take note and balance their respective features against your expected usage.

DESIGN, LOOK AND FEEL

Android, iOS and Windows 8 all have their own visual style. iOS favours a minimalist look and a simple layout, with shortcuts to launch apps displayed in a grid, on an ever-expanding array of homescreens. There's a customisable "tray" of shortcuts at the bottom of the screen, and apps can be organised into folders.

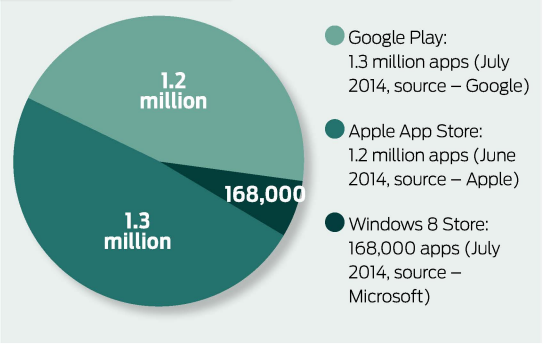
That used to be all there was to the iOS front-end, but it has progressed in recent times to include a notifications menu, accessible via a pull down from the top of the screen, and the Control Centre, which gives quick access to commonly used functions such as screen brightness, rotation lock and flight mode, with a pull up from the bottom of the screen.

Beyond a few small cosmetic differences, the basic Android front-end looks similar, hosting shortcuts to apps on a series of sideways-scrolling homescreens, with a pull-down notifications menu at the top. The Android UI is different in a couple of fundamental ways, however: it allows you to drop widgets (interactive, data-rich panels) as well as shortcuts onto homescreens, and to hide less frequently used apps away in the app drawer.

Google also gives hardware developers free rein to customise. Thus your tablet can run plain Android, exactly the way Google intended it; it can look entirely different, similar to Amazon's Fire OS (see opposite); or it can be somewhere in between, as on Asus' recent Android tablets.

> "we see a device... we play with it, talk to a salesperson, and we fall in love"

APP NUMBERS



The software that runs on a Windows tablet (unless it's the cut-down Windows RT) is identical to that on any Windows PC or laptop. In some respects, this works well on a compact tablet: links to apps and web pages are displayed in a continuous grid of sideways-scrolling tiles, which can be moved around, grouped and resized. It looks very different from Android and iOS, but it's just as fluid and largely as easy to use, once you've learned the "edge-swipe" gestures. You also get the added bonus of being able to run desktop applications such as Adobe Photoshop and Microsoft Office.

Indeed, add a keyboard, mouse and external monitor, and your Windows tablet turns into a desktop computer; neither Android nor iOS can compete with that level of versatility.

Compared to those platforms, however, Windows does fall down in some areas. Our biggest gripe is that

there's no single place where notifications are grouped together; instead, you're reliant on Live Tiles on the homescreen for this information. Alas, not all apps have Live Tiles.

Our other issue with Windows on a tablet is that the settings are scattered all over the place: some are accessed via a touch-friendly menu; others must be changed via the desktop settings dialog box, which is a nightmare to operate via the touchscreen.

a Windows 8 tablet, the number and quality of apps designed for touchscreens on the Windows Store can't match that of Google or Apple. A larger number doesn't guarantee all apps will be good, but at this sort of scale, it increases the likelihood they will be.

FLEXIBILITY

Android has long been held up as the most flexible mobile OS, and with good reason. Historically, both users and developers have been given much more freedom by Google than Apple. It's easy, for instance, to move files around an Android tablet, since the Android file system is exposed to all apps; this isn't the case with iOS, where apps and related storage live in their own silos. The next version of iOS is set to improve this situation, but app developers will need time to implement the changes.

> "Android has long been held up as the most flexible mobile OS, and with good reason."

APPS, APPS, APPS

It used to be said that you went with iOS if you wanted the greater choice of quality apps, and Android for more variety and flexibility. It's an argument that's becoming increasingly irrelevant.

In some respects, Apple's App Store maintains a lead. Music, photo, video and other creative apps are in plentiful supply, and they tend to be of a superior quality. Plus, when it comes to apps with tablet-friendly layouts, Apple also has the advantage: the App Store gives you the ability to filter by iPad or iPhone, where Android's Google Play does not offer such a feature.

For the core apps, however – such as Facebook, Twitter, Instagram and Spotify – Android is now level with iOS; since most major developers now produce for iOS and Android at the same time, it should remain this way. Alas, the same can't be said for the Windows Store. Although you can run any Windows application on

There are all manner of ways you can tweak and fiddle with the user experience on an Android tablet: you can replace the keyboard, install a launcher to get the homescreen looking just the way you like it, or replace the OS entirely with a customised ROM. With an Android tablet, you don't even have to use the preinstalled Google Play app store if you can't find what you're looking for within it. You can "sideload" apps, or run an alternative store if you wish.

Windows is the odd one out. On one hand, its mobile front-end is pretty rigid. You can't change the keyboard, or customise the tile-based homescreen beyond moving and resizing tiles, adding a photo to the background or changing the colour theme. On the other hand, a tablet running Windows is more flexible than one running either Android or iOS. With Windows 8 onboard, you can run any desktop app, connect to most peripherals, and hook up more easily to PC-based corporate networks and shared network storage.

AMAZON FIRE OS

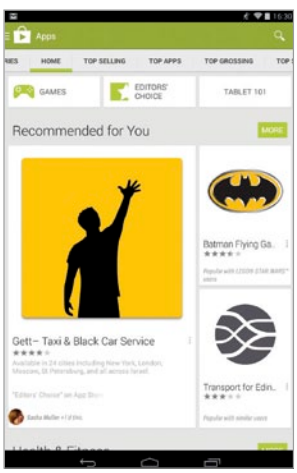
There's another operating system that we haven't included in this comparison: Amazon's Fire OS, which you'll find running on all the firm's Kindle Fire tablets.

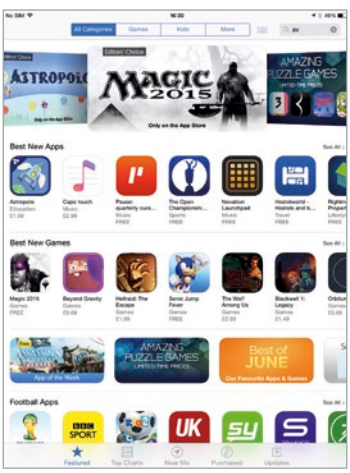
At its core, Fire OS is Android, and there are some similarities with the standard-issue OS. You can run Android apps and games on a Kindle Fire tablet; you can sideload apps if you wish; and you can drag and drop files to the device over USB.

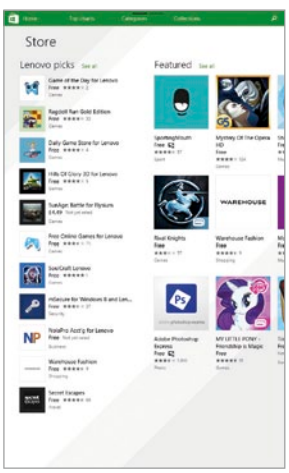
However, in other respects, Fire OS is a completely different animal. Instead of putting apps front and centre, Amazon's OS places content – books, movies, music and so on – at the forefront, and makes shopping online for that content via Amazon's services as easy as can be.

The downside is that Amazon tablets don't give you access to the Google Play store as most other Android tablets do. Instead, you're forced to buy your books, movies, music and even apps from the online retail giant. Amazon's tablets miss out on the core Google Apps, too (Maps, Gmail, Google+, and Calendar, for example), although it does replace some with its own versions.

Alas, the Amazon Appstore is a pale imitation of Google Play, with a far poorer selection of apps and games on offer.







▼ Apple's App Store (centre) is still the best, with Android's Google Play (left) just behind

VERDICT

Each of the major mobile OSes has something to recommend it. In the case of iOS, we love its outward simplicity: it's the easiest mobile OS to get to grips with, and the selection of tablet software in the App Store is second to none. Android is more flexible – a mobile OS for the power user – with a selection of apps that's almost as good as Apple's; while Windows is ideal for anyone who just can't let go of their desktop apps and peripherals, or for those who need full integration with their home or office network.

For us, iOS just edges ahead as our preferred OS. It's the platform with the best tablet-specific software, and with the advent of iOS 8, it's set to shed some of its reputation for being restrictive. Android, however, comes a very close second making the choice one of personal preference.

		RECOMMENDED	BEST VALUE
	Amazon Kindle Fire HDX 7in	Apple iPad mini with Retina display	Asus Memo Pad 7 ME176CX
OVERALL	★★★★½	★★★★½	★★★½☆
Performance	★★★★½	★★★★★	★★★½☆
Features & Design	★★★½☆	★★★★½	★★★½☆
Value for Money	★★★★½	★★★½☆	★★★★★
KEY DETAILS			
Price	$329	16GB, $479; 32GB, $598; 64GB, $699; 128GB, $799. 4G LTE versions $150 extra	$229
Manufacturer	www.amazon.co.au	www.apple.com.au	www.asus.com.au
Warranty	1yr	1yr	1yr
Dimensions (WDH)	185 x 9.4 x 128mm	200 x 7.5 x 135mm	114 x 10.3 x 189mm
Weight	303g	331g	295g
HARDWARE			
Processor	Quad-core 2.2GHz Qualcomm Snapdragon 800	Dual-core 1.3GHz Apple A7	Quad-core 1.3GHz Intel Atom Z3745
GPU	Qualcomm Adreno 330	Apple A7	Intel HD Graphics
RAM	2GB	1GB	1GB
Storage	16/32/64GB	16/32/64/120GB	16GB
Battery capacity	4,400mAh	6,471mAh	3,950mAh
Accelerometer	✓	✓	✓
Light sensor	✓	✓	✓
GPS/satnav	✓	✓	✓
3G	Optional	Optional	✗
DISPLAY			
Type	IPS	IPS	IPS
Size	7in	7.9in	7in
Resolution	1,200 x 1,920	1,536 x 2,048	800 x 1,280
Pixel density	323ppi	326ppi	216ppi
Video outputs	✗	✗	✗
MHL/SlimPort	✗	✗	✓ (SlimPort)
Maximum brightness	448cd/m^2	396cd/m^2	303cd/m^2
Contrast ratio	1,179:1	792:1	721:1
Colour temperature	5,923K	6,480K	6,694K
CAMERA			
Rear camera resolution	N/A	5MP	2MP
Focus type	N/A	Autofocus	Autofocus
Built-in flash type	N/A	N/A	N/A
Front camera resolution	1.3MP	1.2MP	0.3MP
Max video recording resolution	1,280 x 720	1,280 x 720	1,280 x 720
PORTS & CONNECTIONS			
Best Wi-Fi standard	802.11n	802.11n	802.11n
Bluetooth standard	4	4	4
Dual-band	✓	✓	✗
Memory card reader	✗	✗	microSD
Ports	3.5mm audio jack; micro-USB	3.5mm audio jack; Lightning	3.5mm audio jack; micro-USB
SOFTWARE & ACCESSORIES			
Operating system	Kindle Fire OS	iOS 7.1	Android 4.4
App and media stores	Amazon Appstore	Apple App Store	Google Play
BENCHMARK SCORES			
Battery life @ 120cd/m^2	12hrs 6mins	12hrs 1min	9hrs 25mins
SunSpider	730ms	418ms	638ms
Geekbench 3 single-core	Would not run	1,390	772
Geekbench 3 multi-core	Would not run	2,508	2,427
GFXBench T-Rex HD (onscreen)	22fps	21fps	27fps
GFXBench battery test	Would not run	5hrs 17mins	4hrs 29mins
Peacekeeper	856	1,763	Would not run

	Lenovo Miix 2 8in	LABS WINNER Nexus 7	Samsung Galaxy Tab S 8.4
	★★★☆☆	★★★★★☆	★★★★★☆
	★★★☆☆	★★★★★☆	★★★★★☆
	★★★☆☆	★★★★★☆	★★★★★★
	★★★☆☆	★★★★★★	★★★☆☆
	$348	16GB, $299; 32GB, $339; 32GB LTE $439	$479 (16GB Wi-Fi); $629 (16GB Wi-Fi + 4G; $579 (32GB Wi-Fi)
	www.lenovo.com/au	www.google.com.au	www.samsung.com.au
	1yr	1yr	1yr
	132 x 8.5 x 215mm	114 x 8.5 x 200mm	126 x 6.6 x 213mm
	394g	290g	294g
	Quad-core 1.33GHz Intel Atom Z3740	Quad-core 1.5GHz Snapdragon S4 Pro	Octa-core 1.9GHz Samsung Exynos 5 Octa (4 x Cortex A7 + 4 x Cortex A15)
	Intel HD Graphics	Qualcomm Adreno 320	ARM Mali-T628 MP6
	2GB	2GB	3GB
	32GB	16/32GB	16/32GB
	4,730mAh	3,950mAh	4,900mAh
	✓	✓	✓
	✓	✓	✓
	✓	✓	✓
	Optional	✗	✗
	IPS	IPS	AMOLED
	8in	7in	8.4in
	800 x 1,280	1,200 x 1,920	2,560 x 1,600
	189ppi	323ppi	359ppi
	✗	✗	✗
	✗	✓ (SlimPort)	✓ (MHL)
	357cd/m^2	459cd/m^2	276cd/m^2
	410:1	977:1	ffi
	6,914K	7,021K	7,949K
	5MP	5MP	8MP
	Autofocus	Autofocus	Autofocus
	N/A	N/A	Single LED
	2MP	1.2MP	2MP
	1,280 x 720	1,280 x 720	1,920 x 1,080
	802.11n	802.11n	802.11ac
	4	4	4
	✓	✓	✓
	microSD	✗	microSD
	3.5mm audio jack; micro-USB	3.5mm audio jack	3.5mm audio jack; micro-USB
	Windows 8.1 32-bit	Android 4.3	Android 4.4
	Windows 8 Store	Google Play	Google Play
	9hrs 37mins	13hrs 3mins	12hrs 22mins
	423ms	1,000ms	477ms
	825	580	927
	2,481	1,811	2,768
	21fps	15fps	14fps
	Would not run	Would not run	2hrs 18mins
	1,135	514	888

NEXUS 7

STILL THE KING OF THE COMPACT TABLETS, THE NEXUS 7 WEDS SUPERB OVERALL QUALITY WITH A REASONABLE PRICE

PRICE $299 (16GB), $339 (32GB), $439 (32GB with LTE)
SUPPLIER www.google.com.au

It's been almost a year since we proclaimed Google's Nexus 7 as the king of the compact tablets. Since then, high-performance compacts such as the Apple iPad mini with Retina display, the Amazon Kindle Fire HDX 7in and Samsung Galaxy Tab S 8.4 have emerged to challenge its dominance.

In the face of such stiff competition, we were left to wonder whether it could weather the storm, or wilt into irrelevance. It turns out it isn't as clear-cut as it was when it first appeared, but the Nexus 7 is still the best buy in the compact sector.

DESIGN AND DISPLAY

At 290g, it's the lightest tablet in this Labs, and it's a mere 8.5mm thick. Although many of the tablets in our Labs can now match the Nexus 7's slimness – the iPad mini and Galaxy Tab S 8.4 shave off even more, with profiles measuring 7.5mm and 6.6mm respectively – no compact tablet here can match its beautifully understated design.

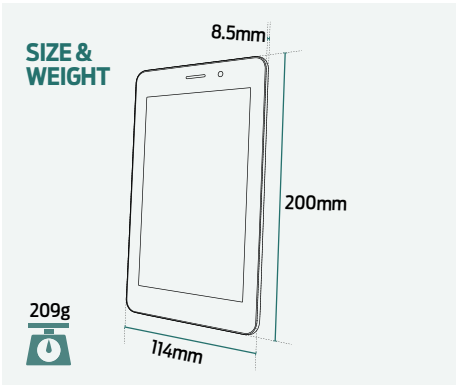
Clad in rubberised, soft-touch plastic, the back panel is completely black, and at 114mm wide it's comfortable to grip one-handed. Build quality is rock-solid, particularly for such a delicate-looking device, and that rubbery rear gives it a hardy, shock-absorbent feel.

Flip over the tablet and you'll be struck immediately by the Nexus 7's brilliantly illuminated 1,200 x 1,920 IPS screen, which is the brightest display in this group. We measured the LED backlight's maximum luminance at a huge 459cd/m²; outside, on a blazing-hot sunny day, the screen remained totally legible.

We were also struck by the clarity and sharpness of the high-resolution screen. The 323ppi pixel density, in conjunction with the bright screen and perfectly competent contrast ratio of 997:1, means that video, text and photographs look stunning.

CORE SPECIFICATIONS AND PERFORMANCE

The Nexus 7's core hardware is still competitive, but it's starting to show its age. In our benchmarks, the 1.5GHz quad-core Qualcomm Snapdragon S4 Pro still managed to outperform the lower-quality and middle-of-the-pack tablets in our roundup, but it fell short of the heavy hitters. It completed the SunSpider JavaScript test in



1,000ms, a time that's beaten by all but the Vodafone Smart Tab 4 and the Tesco Hudl. It's a similar story in the Geekbench 3 tests, where the Nexus 7 finds itself languishing in the bottom half of the table.

Gaming capability is better, but it still isn't brilliant. A GFXBench T-Rex HD result of 15fps beats the Vodafone and Tesco tablets' scores once more, but it's a fair way behind the iPad mini's 21fps and the Kindle Fire HDX 7in's 22fps.

Benchmarks don't tell the full story, however. We noticed no significant slowdown or lag in general use, and the lower-power hardware helps the Nexus 7 last longer away from the mains than any other tablet. Indeed, its time of 13hrs 3mins in our battery test outstripped the nearest competitor – the Galaxy Tab S 8.4 – by almost an hour.

SOFTWARE

That's all before you consider the most important factor in the tablet's enduring success: its status as an official Google product.

This has two key benefits. First, it runs a clean version of Android, unmolested by the kind of proprietary add-ons and apps with which many other manufacturers bloat their tablets. Second, the Nexus 7 receives every Android update as soon as it's released – usually months before other manufacturers bother to update their products. Along with the Nexus 5 smartphone, the Nexus 7 will be among the first clutch of devices to receive the Android L update when it arrives this autumn; and if you can't wait, you can install an early beta.

"Nexus 7's core hardware is still competitive, but it's starting to show its age"

CONNECTIVITY AND CAMERAS

The tablet's ports and connectivity options are a mixed bag. There's the standard 3.5mm audio jack and micro-USB charging point, which can output video via a SlimPort cable, but no microSD slot or infrared transmitter.

There's Bluetooth 4, and for an extra $100 (over the standard 32GB model) you can purchase the Nexus 7 with LTE. There's no 4G option, however, and Wi-Fi is dual-band 802.11n rather than 802.11ac. The 5-megapixel rear and 1.2-megapixel front cameras produce slightly noisy – yet still sharp – snapshots, and video capture is restricted to 720p.

VERDICT

The Nexus 7's lead over the market isn't what it once was: rival budget tablets can now beat it on performance, and tablets at the premium end of the market are significantly better equipped.

Despite its age, however, the Nexus 7 still provides the best balance between price, design, performance, features, screen quality and battery life. And with no word yet on when a successor might arrive, there's scope for this excellent tablet to remain relevant for some time to come.

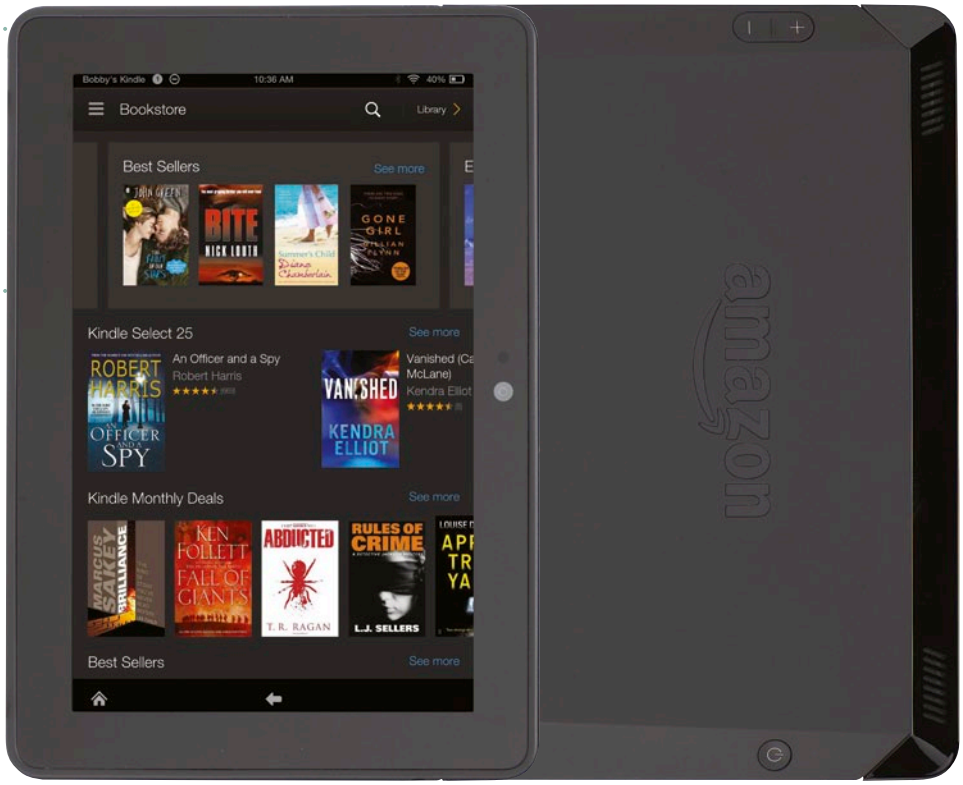
BATTERY: LOOPING VIDEO 12HRS 1MIN

PERFORMANCE	★★★★★☆
FEATURES&DESIGN	★★★★★☆
VALUE FOR MONEY	★★★★★★
OVERALL	★★★★★☆

AMAZON KINDLE FIRE HDX 7IN

A FANTASTIC COMPACT TABLET, WITH A GLORIOUS SCREEN AND TOP PERFORMANCE THAT'S HAMPERED SOMEWHAT BY ITS PROPRIETARY OS

PRICE $329
SUPPLIER www.amazon.com.au



The Kindle Fire HDX 7in is Amazon's current compact flagship, and we were impressed with its design and all-round performance when we first reviewed it at the end of last year. Competition has steadily increased since then, but our opinion remains the same.

In terms of its physical design, the HDX is a triumph. Its angular profile still catches the eye more than most, with wide, angled bevels on the rear that lend the tablet a dramatically different look. The HDX 7in weighs only 303g, making it the second-lightest tablet in this Labs, behind the Nexus 7. It also feels built to last.

Turn the Kindle Fire HDX around and you'll immediately be struck by its bright, pixel-packed 1,200 x 1,920 IPS display. Everything looks pin-sharp on this 323ppi screen, but this is by no means the screen's only strength. The panel's LED backlight is bright, reaching a maximum of 448cd/m2, only narrowly behind the Nexus 7's 459cd/m2. We took the Kindle Fire HDX 7in out for a quick jaunt on a sunny day and were pleased at how well the backlight cancelled glare from the sun. The 1,179:1 contrast ratio is the second best in the Labs.

Thanks to the Kindle Fire HDX 7in's proprietary Amazon OS, we weren't able to run our full suite of benchmarks. In the tests we were able to run, however, the HDX's quad-core 2.2GHz Qualcomm Snapdragon 800 SoC and 2GB of RAM delivered good results.

In the SunSpider benchmark, the Amazon tablet achieved a time of 730ms, which is in the middle of the pack. In the GFXBench T-Rex HD gaming test, it drew level with the iPad mini and Lenovo Miix 2 with a score of 22fps. We were also able to install Asphalt 8: Airborne and found it ran smoothly on the highest available quality settings.

The Kindle Fire HDX's battery life was even more impressive: its 4,400mAh battery kept it going for 12hrs 6mins of 720p video playback. This is the third-best battery life in the Labs, although it lags behind the Nexus 7's time by almost an hour.

It's not all good news. There's no rear-facing camera, just a 1.3-megapixel front-facing one, and as much as we like the design, there isn't much in the way of connectivity, with only a 3.5mm audio jack and micro-USB charging port. There's no microSD or video output.

This lack of versatility is also reflected in the proprietary Amazon OS. While its simple, content-focused design makes it easy to get to grips with, it has major downsides. You don't have access to Google Play, nor any of Google's core apps, such as Google+ and Maps; in fact, the Amazon OS permits the use of only Amazon's own services, which offer plenty of content, but not as wide a range of apps or as much flexibility as plain Android.

There's no denying that Amazon's Kindle Fire HDX 7in is a fantastic compact tablet. It looks great and handles well, the price is reasonable, and its screen is one of the best around. However, its insistence on backing its own services leaves it in the dust of the more versatile Nexus 7.

BATTERY: LOOPING VIDEO 12HRS 6MINS

PERFORMANCE	★★★★★☆
FEATURES&DESIGN	★★★★★☆
VALUE FOR MONEY	★★★★☆☆
OVERALL	★★★★★☆

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Antec's EDGE series is the pinnacle of power supplies. EDGE is fully modular with a revolutionary 18+10-pin MBU socket for the needs of tomorrow. By using a PSU that is 80 PLUS® GOLD & ErP Lot 26: 2014 certified, operating up to 92% efficient, you can reduce your electricity bill by up to 20% when compared to many other power supplies. EDGE's innovative 16-pin sockets create a new level of flexibility by doubling the modular connectivity, supporting two different 8-pins connectors and even future connectors of 10, 12, 14 or 16-pins. All cables are darkened and also flat (except MBU cable) to become Flat Stealth Wires and are thus nearly invisible in your chassis. 2 High Current Rails and a ~99% +12V output ratio maximize EDGE's capabilities to power the latest CPU's & GPU's. CircuitShield™ makes EDGE safe and reliable in any environment with its 7 industrial-grade protections. Backed by a 5 year warranty and lifetime global 24/7 support, EDGE embodies everything a power supply can accomplish today.

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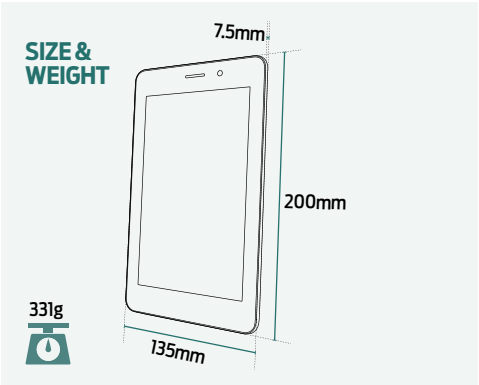

APPLE IPAD MINI
WITH RETINA DISPLAY

A BRILLIANT COMPACT TABLET WITH A REASSURINGLY EXPENSIVE PRICE TAG – THE IPAD MINI WITH RETINA DISPLAY DELIVERS ON ALL FRONTS

PRICE $479 (16GB) to $949 (128GB LTE)
SUPPLIER www.apple.com.au

In a market dominated by Android compact tablets, the second-generation Apple iPad mini comes as a breath of fresh air. It's essentially a small version of the larger-screened iPad Air, and it's just as beautiful to behold. At 7.5mm, it's amazingly slim, and the flat metal back, which comes finished in either silver or gunmetal grey, looks gorgeous.

This iPad mini doesn't rely only on its good looks for success. Build quality is rock-solid, despite the slim profile, and in typical Apple fashion the specifications are spectacular. For starters, the 7.9in screen is superb: it boasts a "Retina"-class resolution of 1,536 x 2,048, which delivers a pixel density of 326ppi. Although maximum brightness and contrast aren't as good as some, colour accuracy is a real strength. And while many Apple products have a tendency to crush dark greys into black, the iPad mini possesses no such failing: there's a clear distinction between even the darkest of greys and black.

This iPad doesn't look quite so glamorous under the hood, but the partnership of a dual-core 1.3GHz Apple A7 SoC and 1GB of RAM still delivers stellar benchmark results. It completed the SunSpider JavaScript test in 418ms, the fastest time this month. In the Geekbench 3 tests it achieved great results, with the fastest score this month in the single-core component. And its huge 6,471mAh battery helped it match the best in terms of stamina, with a time of 12hrs 1min in our looping video-playback test. The GFXBench T-Rex HD test results weren't as impressive, at 21fps, but remember this tablet has more pixels to draw per frame than most, so it's still a decent result.

Elsewhere, Apple's tablet continues to impress. The 5-megapixel rear camera produces crisp, sharp snaps that look almost as good as those captured by the Samsung Galaxy Tab S 8.4's 8-megapixel snapper, and videos shot in 1080p look good, too. There's dual-band 802.11n Wi-Fi (but no 802.11ac) and Bluetooth 4. 4G LTE versions of all models are available for around $150 extra. With this being an Apple product, it isn't surprising to find a comparative dearth of ports and sockets: the iPad mini possesses only the single Lightning charging point and 3.5mm audio jack, with no potential for storage expansion at all. With this in mind, we'd recommend buying the 32GB model; once you start loading it up with a few games, digital magazines and movies, you'll find yourself rapidly running out of space if you opt for the 16GB model. Both Wi-Fi and 4G LTE models also come in 64 and 128GB capacities. If that's a negative point, it's worth bearing in mind that the breadth and quality of tablet-specific apps in the Apple App Store remains superior to that available on Google Play, as does the selection of accessories. Once you've purchased an iPad mini, there's a huge variety of stuff out there to go with it.

The iPad mini with Retina display is a superlative piece of hardware, then, and it has the best software and accessory ecosystem. The high price places it behind the Nexus 7 overall, but if you're looking for top quality and money is no object, then this is the tablet we'd recommend.

PC &TECH AUTHORITY RECOMMENDED

BATTERY: LOOPING VIDEO 12HRS 1MIN

PERFORMANCE	★★★★★★
FEATURES&DESIGN	★★★★★☆
VALUE FOR MONEY	★★★★☆☆
OVERALL	★★★★★☆

NBN Ready Routers

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Fast . Reliable . Secure

Ideal for home to small to medium size business networking solutions.

VDSL2 / ADSL2+ Professional Business Firewall Routers

Vigor2760 Series - VDSL2 / ADSL2+ Firewall Router with 2 x VPN tunnels

TAIWAN EXCELLENCE 2012

NBN READY

UFB READY

- Built-in VDSL2 / ADSL2+ modem
- Selectable Gigabit WAN / LAN (for NBN Connection Box or other xDSL / Cable modems)
- 4 x Gigabit LAN ports with 30,000 NAT sessions, IPv6, SIP Firewall, Web Content Filter and QoS
- 2 x VPN tunnels with hardware accelerator
- 2 x USB ports for 3G / 4G Backup, FTP server and network printers
- IEEE 802.11n Wireless LAN for Vigor2760n and Vigor2760Vn
- SIP VoIP (2 x FXS and 1 x Line port) for Vigor2760Vn
- Support TR-069 for VigorACS SI Central Management

Vigor2860 Series - Quad-WAN Firewall Router with 32 x VPN tunnels

TAIWAN EXCELLENCE 2013

NBN READY

UFB READY

- Quad-WAN Firewall Router with 1 x built-in VDSL2 / ADSL2+ modem, 1 x Gigabit WAN port & 2 x USB ports for 3G / 4G Mobile with Load Balance and Fail-Over
- 6 x Gigabit LAN ports with 50,000 NAT sessions, IPv6, SIP Firewall, Web Content Filter and QoS
- 32x VPN tunnels with VPN load balance and redundancy, Central VPN Management & 16 x SSL VPNs
- 2 x USB ports for 3G / 4G modems, FTP server, network printers & temperature sensor
- IEEE 802.11n Wireless LAN with Central AP Management for Vigor2860n / n-Plus / Vn-Plus
- Concurrent Dual-Band Wi-Fi for Vigor2860n-Plus and Vigor2860Vn-Plus
- SIP VoIP (2 x FXS and 1 x Line port) for Vigor2860Vn-Plus
- Support Smart Monitor Traffic Analyzer (up to 30-nodes)
- Support TR-069 for VigorACS SI Central Management

Broadband Professional Business Firewall Routers

Vigor3900

Multi-WAN Enterprise Firewall Router with 500 VPN tunnels

NBN READY

TAIWAN EXCELLENCE 2012

- 5 x Gigabit WAN ports (4 x Ethernet & 1 x SFP) & 2 x USB ports for 3G / 4G Mobile with Load Balance and Fail-Over
- 3 x Gigabit LAN ports (2 x Ethernet & 1 x SFP) with 120,000 NAT sessions, IPv6, SIP Firewall, Web Content Filter and QoS
- High-Availability (with CARP) ensuring 24/7 system uptime
- 500 x VPN tunnels with VPN load balance and redundancy, Central VPN Management & 20 x SSL VPNs
- 2 x USB ports for 3G / 4G modems & temperature sensor
- Support Smart Monitor Traffic Analyzer (up to 500-nodes)
- Support TR-069 for VigorACS SI Central Management

Vigor2960

Quad-WAN Professional Firewall Router with 200 VPN tunnels

TAIWAN EXCELLENCE 2013

NBN READY

- 2 x Gigabit WAN ports & 2 x USB ports for 3G / 4G Mobile with Load Balance and Fail-Over
- 4 x Gigabit LAN ports with 80,000 NAT sessions, IPv6, SIP Firewall, Web Content Filter and QoS
- 200 x VPN tunnels with VPN load balance and redundancy, Central VPN Management & 20 x SSL VPNs
- 2 x USB ports for 3G / 4G modems & temperature sensor
- Support Smart Monitor Traffic Analyzer (up to 200-nodes)
- Support TR-069 for VigorACS SI Central Management

Vigor2925 Series

Quad-WAN Firewall Router with IPv6 & 50 VPN tunnels

TAIWAN EXCELLENCE 2013

NBN READY

- 2 x Gigabit WAN ports & 2 x USB ports for 3G / 4G Mobile with Load Balance and Fail-Over
- 5 x Gigabit LAN ports with 50,000 NAT sessions, IPv6, SIP Firewall, Web Content Filter and QoS
- 50 x VPN tunnels with VPN load balance and redundancy, Central VPN Management & 25 x SSL VPNs
- 2 x USB ports for 3G / 4G modems, FTP server, network printers & temperature sensor
- IEEE 802.11n Wireless LAN with Central AP Management for Vigor2925n / n-Plus / Vn-Plus
- Concurrent Dual-Band Wi-Fi for Vigor2925n-Plus and Vigor2925Vn-Plus
- SIP VoIP (2 x FXS and 1 x Line port) for Vigor2925Vn-Plus
- Support Smart Monitor Traffic Analyzer (up to 50-nodes)
- Support TR-069 for VigorACS SI Central Management

i-LAN TECHNOLOGY

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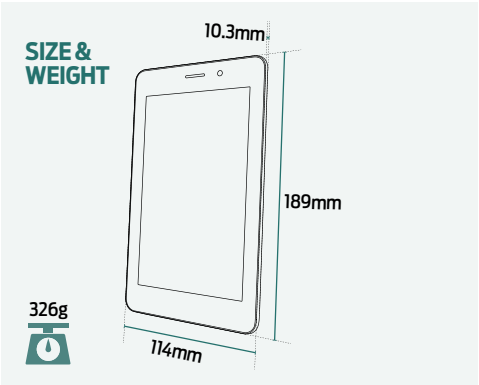


ASUS MEMO PAD 7 ME176CX

A FANTASTIC BUDGET COMPACT TABLET, THE ASUS MEMO PAD 7 GIVES YOU GREAT BANG FOR YOUR BUCK

PRICE $229
SUPPLIER www.asus.com.au

At a mere $229, comparisons between the Asus Memo Pad 7 and the similarly priced Nexus 7 (16GB) are inevitable. However, Asus' history of building top-quality Android tablets stands it in good stead.

Asus' budget baby strikes all the right notes. It's light at 295g, it's also slim at 10.3mm, and it's better-looking, too, with the plastic back panel boasting a coloured metallic finish, broken only by a small, silver Asus logo. Our review unit came in a bright, lipstick red, but there are plenty more sober colours to choose from (black, white, blue and yellow).

The Memo Pad 7 is comfortable to hold, the back panel curving up softly towards the edges, and a quick glance around the tablet's edges reveals there's memory expansion on offer in the shape of a microSD slot, in addition to the usual 3.5mm audio jack and micro-USB charging point. In terms of core hardware, this 7in Asus is generously equipped. Running the show is a quad-core 1.3GHz Intel Atom Z3745, supported by 1GB of RAM, with graphical grunt handled by the CPU's integrated Intel HD Graphics.

This line-up offers very competitive performance, netting a time of 638ms time in SunSpider and Geekbench 3 single- and multi-core scores of 772 and 2,427 respectively.

It's a dominant performance, which continues in the battery test, where the Memo Pad 7 lasted 9hrs 25mins to the Hudl's rather disappointing time of 6hrs 37mins.

"a fine choice for the discerning tablet purchaser on a budget. It's one hell of a compact tablet bargain."

The Memo Pad 7 also makes for a powerful handheld gaming device. In the onscreen GFXBench T-Rex HD test, we measured an average frame rate of 27fps – the highest score in this Labs. Consequently, demanding games such as Asphalt 8: Airborne run superbly, even with the quality settings ramped all the way up. It's worth noting, however, that not all games and apps are compatible with the Intel hardware.

Hardware performance is all well and good, but if a tablet's screen isn't up to scratch then all the expensive hardware in the world won't save it from mediocrity. And it's in screen quality that the Memo Pad 7 lags behind. The display isn't bad by any means, but with a maximum brightness of 303cd/m^2 and contrast ratio of 721:1, its 800 x 1,280 IPS panel is its weakest suit, although again, at this price a top-shelf screen isn't really reasonably expected.

The Memo Pad 7's 2-megapixel rear camera is no great shakes, either, producing smeary, over-compressed snaps, and with no autofocus, shots are often extremely blurry as well. The 0.3-megapixel front camera is terrible, and video is both noisy and shaky thanks to a lack of image stabilisation.

The Asus Memo Pad 7 isn't the greatest tablet in the world, nor would we expect it to be at an RRP of just $229. Notably, the screen is dimmer than most.

However, this tablet's excellent performance, gaming capability and solid build quality establish it as a fine choice for the discerning tablet purchaser on a budget.

It's one hell of a compact tablet bargain, and it stacks up competitively against the Nexus 7.

PC &TECH AUTHORITY RECOMMENDED

BATTERY: LOOPING VIDEO 9HRS 26MINS

PERFORMANCE	★★★★☆☆
FEATURES&DESIGN	★★★★☆☆
VALUE FOR MONEY	★★★★★★
OVERALL	★★★★☆☆

LENOVO MIIX 2 8IN

A COMPETENT WINDOWS TABLET LET DOWN BY A DISAPPOINTING SCREEN, THE LACK OF A VIDEO OUTPUT AND MIDDLING BUILD QUALITY

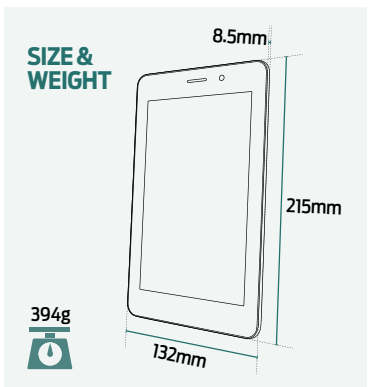
PRICE $348
SUPPLIER www.lenovo.com.au

The compact cousin of the Lenovo Miix 2 10in, the Miix 2 8in, holds the distinction of being the only Windows tablet in our roundup this month. Like its larger stablemate, the 8in Miix 2 is generously equipped, both in terms of core hardware and ports, and at first glance it's a handsome piece of kit.

Tall at 215mm, but surprisingly thin at only 8.5mm, the Miix 2's lean, 9mm bezels make the 8in screen seem longer and broader than you'd expect. Turn the tablet over and it still looks good: the slightly dimpled, gunmetal-grey plastic back panel is broken only by the Lenovo logo and a thick band of smooth, silver along the bottom. However, while it may look attractive, it isn't the best-made tablet we've come across, exhibiting a worrying amount of flex and bendiness when twisted.

The Miix 2 has a reasonably generous array of connections, with a microSD slot, a 3.5mm audio jack and a micro-USB port that doubles as the tablet's charging point. We were a little disappointed with the lack of a dedicated video output, though, and the Miix 2's micro-USB port isn't MHL-compatible. Since one of the strengths of Windows tablets is their ability to be put to use as an occasional work machine, that's a disappointment.

We were more impressed with the Miix 2's performance. With a quad-core Intel Atom Z3740 CPU running at 1.33GHz, supported by 2GB of RAM, the tablet stormed through the benchmarks, finishing the SunSpider JavaScript test in only 423ms and achieving single- and multi-core Geekbench 3 scores of 825 and 2,481. In these tests, it sits second and third overall, respectively. The Miix 2's 4,730mAh battery helped it to a time of 9hrs 37mins in our looping video test. It isn't the longest-lasting tablet around, but it should get you through at least a day on a full charge.



Graphical power is pretty good, too. Intel's integrated HD Graphics delivered a smooth performance in our tests, finishing the onscreen GFXBench T-Rex HD test with an average frame rate of 21fps, and even graphically demanding games such as Asphalt 8: Airborne ran well, with no visibly dropped frames.

There's no chance of those games being spoiled by a murky screen, either. The 8in 800 x 1,280 IPS panel's LED backlight reached a respectable 357cd/m^2 at maximum brightness, so outdoor use isn't out of the question. However, this is pretty much the only thing this display has going for it.

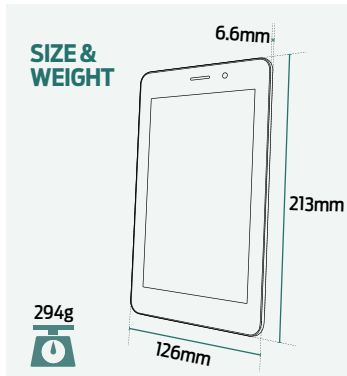
The contrast ratio of only 410:1 leads to limp, washed-out colours, grey-looking blacks and anaemic skin tones. We'd consider this obstructive to our enjoyment of any tablet, and other sub-$400 Windows tablets we've seen have fared much better. In addition, the low resolution means text appears pixellated at normal viewing distances.

Finally, the Miix 2's 5-megapixel rear camera is fine for taking casual snapshots outside, but in low light it produces noisy, smeary photos; the 2-megapixel front camera suffers from the same problems. It should be noted, however, that this is typical of almost all tablet cameras.

With some adjustments, the Lenovo Miix 2 8in may have been a contender: it's well equipped, attractive and fast. However, the washed-out display, insubstantial build and the lack of a video output sour its appeal. In a market where competition is fierce, and prices cutthroat, this tablet hasn't got it where it counts.

BATTERY: LOOPING VIDEO 9HRS 37MINS

PERFORMANCE	★★★★☆☆
FEATURES&DESIGN	★★★★☆☆
VALUE FOR MONEY	★★★★☆☆
OVERALL	★★★★☆☆



SAMSUNG GALAXY TAB S 8.4

AN ATTRACTIVE AND ZIPPY HIGH-PERFORMANCE COMPACT TABLET THAT, NONETHELESS, STRUGGLES TO JUSTIFY THE STEEP PRICE

PRICE $479 (16GB Wi-Fi); $629 (16GB Wi-Fi + 4G; $579 (32GB Wi-Fi)
SUPPLIER www.samsung.com.au

OLED screens are usually the preserve of smartphones and pricey TVs, but Samsung has bucked the trend with the Galaxy Tab S 8.4 – this tablet uses one of Samsung's pixel-packed Super AMOLED panels with an eye-prickling resolution of 1,600 x 2,560.

There's no doubt that it looks fabulous. One of the benefits of OLED displays is that they have no backlight and so deliver a perfect, or effectively infinite, contrast ratio. The result is a vivacious, highly dynamic screen that's great at displaying everything from the deepest blacks to the brightest whites. Out of the box, we found colours oversaturated, but this is easy to change; there are a number of alternatives to the lurid default Adaptive mode in the tablet's display menu settings, and we found the Basic setting delivered the most accurate colours.

The screen isn't perfect, however. Since it's OLED, maximum brightness isn't that high. We measured it at 276cd/m^2, the lowest in this group, and it isn't as easy to read in bright light as the iPad mini. This type of display tends to suffer burn and discolouration over time – more so than IPS LCD – and it likely won't look as good in a few years. Plus, the high resolution is mostly pointless; on a screen of this size, 1,200 x 1,920 is all you need.

Still, the tablet itself is handsome, measuring a mere 6.6mm thick and weighing only 294g; that's almost as light as the Nexus 7, despite the larger screen. The finish is all plastic, with a dimpled white rear and metallic bronze edging, in a similar style to Samsung's Galaxy S5 smartphone, and there are a couple of circular clips, flush to the rear, where the official cover attaches. It's pleasant enough to hold, but not a patch on the sleek, metal iPad mini.

It betters the iPad mini in other areas, though. The 8-megapixel rear camera produces more detailed shots, and is equipped with a flash, where the iPad mini has none. There's a microSD slot for memory expansion too, and 802.11ac wireless where the iPad mini is stuck with 802.11n.

In general, performance is excellent. Processing power comes from a Exynos Octa 5 SoC, which has four cores clocked at 1.9GHz for the heavy lifting, and four at 1.3GHz for lighter loads. It scored 477ms in the SunSpider test, where it was beaten only by the iPad mini and the Lenovo Miix 2. It surged past both tablets in the multi-core Geekbench test with a score of 2,768. Battery life was impressive, too: it lasted 12hrs 22mins in our looping video test.

The only disappointment was gaming, where the high-resolution screen dragged down performance. In the GFXBench test, it gained only 14fps – firmly in the bottom half of the table.

That's a disappointing result for a premium compact tablet, and we were equally unimpressed by the heavy-handed custom Android UI. The tile-based "Magazine UX" newsfeed, accessed with a swipe to the right, is an unnecessarily fussy addition to the device. There's no doubt the Galaxy Tab S 8.4 is an excellent tablet, but it's expensive, and there are too many niggles to nudge it into the upper echelons. For our money, the iPad mini and Nexus 7 remain the compact tablets to beat.

BATTERY: LOOPING VIDEO 12HRS 22MINS

PERFORMANCE	★★★★★☆
FEATURES&DESIGN	★★★★★★
VALUE FOR MONEY	★★★★☆☆
OVERALL	★★★★½☆

VIEW FROM THE LABS

And so the dust has settled on another *PC & Tech Authority* Labs. However, this time our winner isn't some gleaming neophyte, fresh from CES, sporting the newest Retina screen or the fastest processor, but the Nexus 7, a tablet to which we awarded our A-List crown a year ago.

It isn't as if there hasn't been some stiff competition in the intervening months. In fact, many of the tablets in this month's Labs are considerably more impressive on paper than the Nexus 7. The Apple iPad mini with Retina display, Samsung Galaxy Tab S 8.4 and Amazon Kindle Fire HDX 7in all have slick, cutting-edge hardware that manages to outdo our Labs winner in the suite of benchmarks we used to test their performance. Nor is the Nexus 7's 323ppi display quite as impressive as it once was – one of the newest tablets on the block, the Galaxy Tab S 8.4, pushes out in front with a pixel density of 359ppi.

You should never purchase any product on specifications and benchmarks alone, however, but consider them as part of the whole package. Take those displays, for instance. While the latest high-contrast, pixel-dense panels look to have the Nexus 7's mere Full HD display well and truly trounced, the reality is you don't actually need a sharper screen than that of the Nexus.

At the typical distances a user holds a 7in tablet – around 50cm from the eye – the Nexus 7's pixels are indistinguishable from one another. Packing in more pixels is mere one-upmanship; worse, it's a practice that can have a negative impact. Since the tablet has more pixels to redraw per frame, it limits performance in games, and high-DPI screens can also be more power-hungry, which affects battery life.

To cap it all, the Nexus 7 gets it right when it comes to maximum brightness: it's the brightest display of any we encountered this month, beating even the iPad mini in this regard. We'd rather have a brighter screen that's more readable outdoors than pixels piled upon more pointless pixels.

The same goes for core performance. The Nexus 7 is far from the fastest tablet on the market. In the past year, other models have taken advantage of significant advances in mobile processor technology and are now way out in front. However, the Nexus 7 doesn't yet feel underpowered. It may have only two cores running at 1.5GHz,

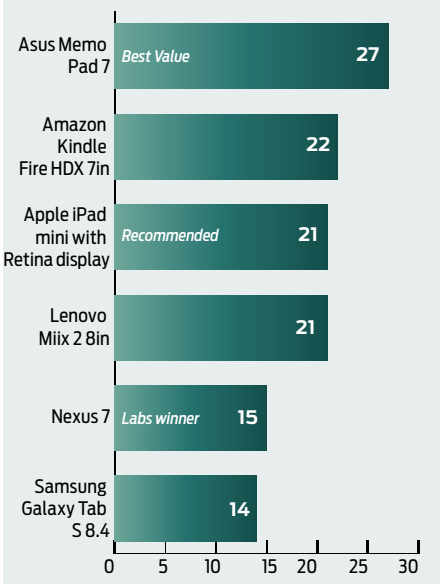
> **"The simple truth is that Google's tablet gets it right in all the areas that matter"**

but responsiveness remains perfectly acceptable. Critically, in everyday use, we couldn't tell the difference between the Nexus 7 and its more expensive competitors.

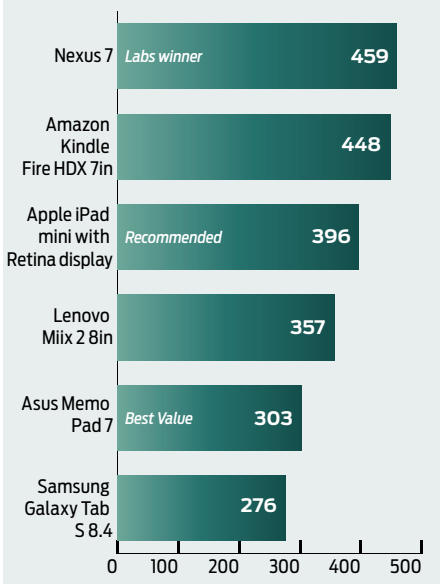
As with the screen, that lower power processor has positive side effects: battery life is superb, with the Nexus lasting longer in our video-playback test than any other device in the group.

The simple truth is that Google's tablet gets it right in all the areas that matter. The screen is sharp enough, and beats the competition on brightness. Its performance is as fast as it needs to be, without compromising responsiveness or battery life. In fact, the only other tablet that matches its all-round balance is the iPad mini with Retina display, but that will never come down in price enough to compete with the Nexus 7's everyman appeal.

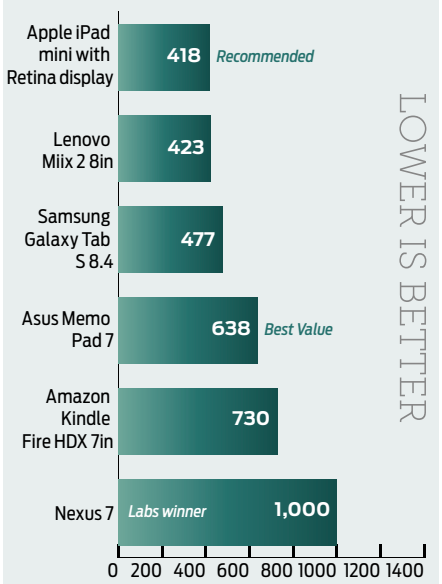
GAMING (GFXBENCH) *T-Rex HD onscreen (fps)*



BRIGHTNESS *Candela per square metre (cd/m²)*



SUNSPIDER *Milliseconds (ms)*



SUNLESS SEA PREVIEW

A CHARMING LOVECRAFTIAN GAME LIES BURIED UNDER A WALL OF DIFFICULTY A MILE HIGH.

DEVELOPER Failbetter Games
PUBLISHER Failbetter Games
WEBSITE www.failbettergames.com/sunless

The small touches in Sunless Sea are so lovely, so abundant and so pleasing that the game – and its relatively uncomplicated yet super-addictive game mechanic – has risen rapidly in the Steam charts, and also into my heart. I love committing to a game in which it's clear that the devs are a properly clever and creative lot. But, and there's a big but – the game is out now under Steam Early Access, and I think that was a mistake because the current play balance makes it excruciating difficult to enjoy.

In Sunless Sea, a calamity has long ago flooded all of London, drowning most of it underwater. The old buildings are still partially visible through the translucent water, over which you will chug-chug around in your vessel, in no particular hurry.

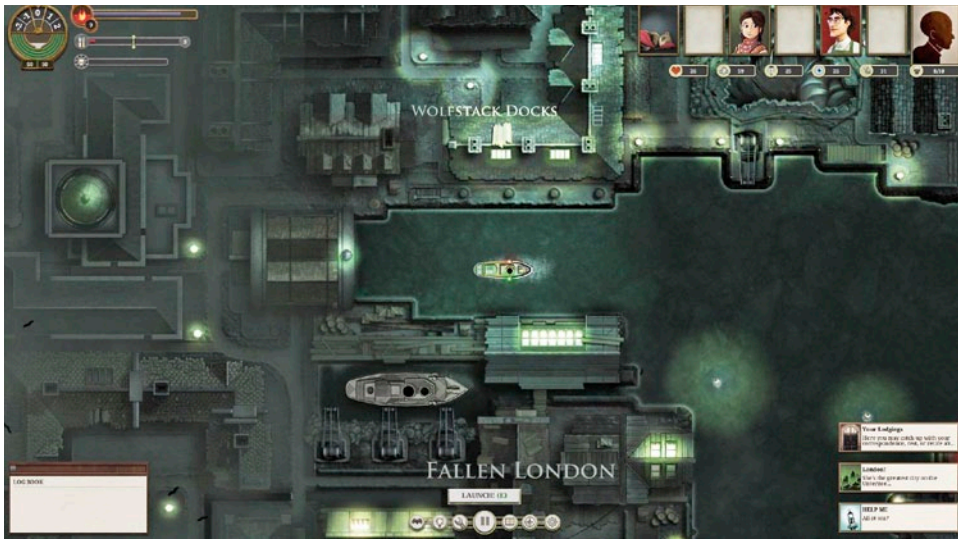
Sunless Sea is about exploration, trade and combat, which are the means by which you attain more money to upgrade your ship, or buy a better one. The top-down view is delightfully arcade, with cursor keys used to steer your vessel adding to that nice retro feeling. Each port has something – usually several things – on offer. It may be a mission, a segment of a multi-part larger mission, perhaps a trade opportunity, or intelligence that can be sold later back in London (home base) to the Admiralty.

The never ending honey pot cycle is the mechanic that keeps you chugging on, and it's an absolute pleasure to be hooked on. Departing a port usually means carrying at least three or four new objectives with you, so strategising over your most economical route becomes an absorbing exercise. However, any hope of zinging and zanging between ports with a cargo hold full of potential profit, getting ridiculously rich and powerful, is a pipe dream, because Sunless Sea is really, really difficult.

It may be a balancing issue in this Early Access code, but even after a couple of patches life on the dark seas is a matter of just barely surviving, so presumably this is just the way it's going to be.

The greatest – by far – impediment to churning through it all is that every second (literally) that you spend more than a couple of boat-lengths

PLATFORMS
PC only



away from shore increases the crew's 'Terror' rating. As the red in the terror bar grows so does your crew's state of panic and their ability to do anything useful, most critically being their combat effectiveness. One single exploratory mission – just a quick jaunt to the nearest island and back again – will have your terror peaking, and then it can take hours of play (literally) to get it back down again. Little things ease it back, like visiting the local pub or spending a night in a hotel, but each of those costs money and you'll only bring terror back by a pixel or so in the grand scheme of the long terror bar. Stopping by London reduces your terror to half of the possible maximum, but the remaining half still requires a great deal of work to get it down further.

So, the itch to identify and exploit plumb trade routes is routed because you just don't want to take any costly risks. Over time, as you reveal more and more of the map the semi-solution becomes apparent – being that you quickly dart to the nearest land point, then repeat, hop scotching your way to your planned destination and avoiding any open water. All good, but not. Because, it takes a long time to do enough exploration runs in the early game to reveal even the most basic outline of distant lands, and through that time you'll be hard pressed to make a profit, as your meagre cash pot is only able to barely cover fuel, food and crew hire costs.

Story-based missions offer greater profit prospects, but are usually (and this is right from the start of a new game), of the kind that need you to find a far away land (impossible until mid-late game), or ambiguously worded, and with no concise 'journal' list of your impending objectives.

Grinding from the very start is the only way to go, with a couple of hours of short, safe trade runs needed to save up enough food and fuel to make a five minute run from home. It's agonisingly frustrating. But I hold out hope because a great game is just a bit of balancing away.

Ben Mansill

CATCH-UP: DAYZ

WITH LOTS OF UPDATES AND CHANGES UNDER ITS BELT, WHAT'S OUR FAVOURITE RUSSIAN DEPRESSION SIMULATOR LOOKING LIKE THESE DAYS?

DEVELOPER Bohemia Interactive
PUBLISHER Bohemia Interactive
WEBSITE www.dayzmod.com

Steam's Early Access program is changing the way we perceive games. Once, games were either in development, in beta or alpha phases of testing, or just released (though possibly chock-full of bugs). Early Access blurs those lines, however, so that gamers are still purchasing a product, but what they're getting isn't finished yet.

On the upside, you're getting exactly what you're promised – early access to something that gamers no doubt want to play. But on the downside, as some detractors point out, is spending money on something that isn't finished really clever? It's almost a philosophical question, and it's certainly something that can only be judged on a case-by-case basis.

Bohemia Interactive's DayZ is probably the most popular of all of Steam's Early Access titles. It topped the distribution service's sales charts at launch, and still sits proud as one of the best selling games on the platform. It's a game we've been playing since it launched, and tracking the progress of development not by trailers and dev diaries, but by actually being inside the process, is fascinating, and even kind of exciting.

STATE OF PLAY

DayZ is certainly a richer game than when we first bought, and richer even than when we last wrote about it. Some issues still persist, though: zombie path-finding can be a little haphazard, and the undead are still prone to clipping through walls and floors, making for scary surprises and hilarious escapes, depending.

But they have improved in other ways. For one, the zombie count is slowly increasing; the game's not up to the levels of the mod just yet, but it's a lot more dangerous moving through built up areas now. There are more animations being seen, too, so that while some will run shambolically at you, others pounce about on all fours.

The game engine also now supports rag-doll physics, so the canned death animations have been replaced by far more naturalistic reactions. A dead body might slide down stairs, or collapse mid-run into an awkward heap. It's not a big mechanic, but does add another layer of immersion.

All that said, zombies are still not the game's main threat. In the original mod, they were the main reason we'd die, often under un-ending swarms of them drawn by inopportune gunfire.

In dayZ standalone, however, they're a nuisance, while the real danger remains other players.

Thankfully, a lot of DayZ servers are now promoting non shoot-on-sight policies, and actual roleplaying. Once away from spawn areas it is actually pretty easy to avoid other players, again because player count is lower than eventually intended. The game map is quite large, and 40 players can spread themselves very thinly. Still, in this iteration of DayZ, most of my deaths have been at the hands of player bandits, marauders, or just plain distrustful types.

When DayZ launched, it was crazy-easy to get geared up. Everyone had Colt M4 assault rifles and scads of ammunition, but now, tracking down military grade hardware is a lot harder. There are now more weapons in the game, from small submachine guns, to rifles, and even bows and crossbows now. This means weapons are more spread out, and pushes players to constantly explore to look for new gear. Ammunition seems in a little shorter supply, too, which also keeps things very tense.

There's a lot more non-combat gear now, too. There are more bags and backpacks, and more clothing choices with greater or lesser carrying power, from satin tracksuit pants for the zombie killing pimp-about-town, to a huge range of camouflage and military clothing. Dean Hall and his team have also started to add more crafting possibilities, and the beginnings of full wildlife to hunt and gather from. You can fish in streams, skin cows, or strip down certain items.

MILES TO GO

My current way to play is binge on the game for a few days with each patch, and then move on to something else. It's still fun, and as I've said, fascinating to watch, but low populations of players and zombies alike can make the game feel a little staid at times.

We still think it's worth being a part of at this stage, though.

David Hollingworth

WASTELAND 2 PREVIEW

FINALLY, AFTER MANY PATIENT YEARS, THE END OF THE WORLD IS READY TO BE ENJOYED.

DEVELOPER inXile Entertainment
PUBLISHER inXile Entertainment
WEBSITE inxile-entertainment.com

Once upon a time RPGs were isometric affairs, where you and a party of companions would venture out into a world, lockpick every chest you could find and fight enemies in delicately balanced, turn based setpieces. Then Mass Effect came along and it all became about fancy cutscenes and full voice acting done by Nolan North.

Thankfully, due to the crowd funding phenomena, the isometric RPG is having a renaissance. Even more excitingly we have games like Wasteland 2, Pillars of Eternity and Numenara: Torment on the way, with some of the finest minds in the history of RPGs driving the development.

Wasteland 2 is leading the charge and is expected to land sometime in September, an event we are eagerly awaiting after losing 20 plus hours to the beta version. For it is shaping up to be everything we expected it to be, a deep, involved, enjoyable and highly adult RPG that is set to suck up a chunk of our waking hours.

Set in a post nuclear holocaust world, Wasteland 2 takes place across Arizona and Los Angeles, with you controlling a group of Rangers, a militia that has helped to keep law and order since the event. As your journey begins you and a bunch of new recruits have to head out and fix some radio towers.

It should be pointed out that our 20 odd hours of gameplay only covered the very beginning of the game, where you and your team have to choose between two destinations, both of which are under threat. The game forces you to pick one, which means that the other goes unsaved, and you then find yourself then having to deal with the consequences of this.

This is the sort of scenario that one would never see in a big budget RPG nowadays, especially one with heavy use of expensive techniques like voice acting and cut scenes. The story, and dialog, in Wasteland 2 plays out in text form, which means you'll need to read, but it also means that even small decisions can have significant impact on everything from quest outcomes to the interaction between various characters.

In our play through we decided to save the Agricultural Centre when faced with this first choice, which in turn meant that the surviving members of the town of Highpool (the one we ignored), hated us when we eventually turned up, blaming us for not coming to save them when they came under attack. This choice also effected a bunch of side missions dealing with cleaning up our actions at the Ag centre, as well as who joined our party along the way.

Sitting on top of this very traditional storytelling structure is an excellent turn based combat system. Unlike some other RPGs, in Wasteland 2 you end up with a fairly large party (mine had six NPCs), which makes combat quite nuanced, with characters a mix between long and shortrange gunners and some melee characters.

This is augmented by crafting skills in the game that allow you to break down weapons to find upgrades, which can then be used to augment others. Combat is then influenced by weapon strength, mods and the individual team abilities. Weapons can jam, wounds need treating and members of your team can panic and go rogue. For a game where combat isn't the primary focus, it is an immensely satisfying part of the game and something that demonstrates the attention to detail given to the game's development.

Wasteland 2 is shaping up as both a fantastic nostalgia kick for those with fond memories of the golden days of isometric RPGs and a wonderful experience in its own right. Given that we spent a whole day just previewing a small chunk of it, there is a lot of content to be devoured and a huge amount of replayability to boot. The golden days are here again!

John Gillooly

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THE A-LIST

ONLY THE BEST OF THE BEST MAKE IT TO *PC & TECH AUTHORITY*'S A-LIST

For only the second time this year the A-List survives a month intact. We have seen many updates over the last few issues, but as it stands today, the gear shown here carries over from the previous issue.

Over the last couple of days before we went to press, however, we were impressed with at least a couple of new products that will surely take a spot here when they are reviewed in the magazine, but for now, the good gear here keeps the *PC&TA* gold.

PCS DESKTOPS

HIGH-END PC&TA EDITOR'S CHOICE

★★★★★★

PRICE $3800

An extreme PC able to deliver perfect gaming performance, but also be equipped to handle the most demanding desktop apps.

SPECIFICATIONS i7 4770K CPU; AMD 295 graphics; Corsair Dominator Platinum DDR3 16GB; ASUS Maximus VI Extreme motherboard; ASUS ROG Front Panel; Coolermaster Cosmos SE case; Coolermaster V1000 PSU; Sandisk Extreme 2 240GB SSD; 2 x SanDisk Ultra Plus 256GB SSD; SanDisk Extreme Pro SSD 480GB

MEDIA PC&TA EDITOR'S CHOICE

★★★★★★

PRICE $1159

This versatile media box is also perfectly capable of doing double-duty as a lightweight TV game box. Built to a budget with performance in mind.

SPECIFICATIONS: Bitfenix Prodigy; Kaveri A10-7850K APU; – Gigabyte GA-F2A88XN-WIFI; Corsair Dominator 8GB; Thermaltake Water 3.0 Pro; Seagate 4TB SSHD; Corsair RM 650 PSU; Logitech Wireless Touch K400

ALL-IN-ONE APPLE IMAC 27IN

★★★★½

PRICE $1949 **SUPPLIER** www.apple.com/au

If you can afford it, the 27in iMac is the finest piece of all-in-one engineering on the market. A truly powerful beast with performance to match its looks.

SPECIFICATIONS 2.7GHz Core i5-2500s; 4GB DDR3 RAM; 1TB Western Digital Caviar Black HDD; DVD writer; AMD Radeon HD 6770M graphics; 27in 2560 x 1440 LCD.

HANDHELDS

SMARTPHONE HTC ONE M8

★★★★★★

PRICE From $820 **SUPPLIER** www.htc.com.au

A beautiful, highly competent smartphone that's packed with clever features. Right now it's the best Android smartphone you can buy.

SPECIFICATIONS Quad-core 2.3GHz Qualcomm Snapdragon 801 CPU · Adreno 330 GPU · 2GB RAM · 16GB storage · 5in 1,080 x 1,920 display

TABLET APPLE IPAD AIR

★★★★½

PRICE $539 **SUPPLIER** store.apple.com/au

The new iPad is pretty much the king of the hill when it comes to tablets, smaller and more powerful than ever before.

SPECIFICATIONS 9.7in 1536x2560 widescreen Multi-Touch display; 1GHz A5X processor, 16, 32 or 64 GB available; 3G and/or Wi-Fi connectivity; max 652g weight.

EBOOK READER KINDLE

★★★★★★

PRICE $109 **SUPPLIER** www.amazon.com

The new model is quicker, slimmer, lighter and cheaper than before. If all you want to do is read books, its simple design and performance are perfect.

SPECIFICATIONS 6in e-Ink screen, 170g weight, 114 × 8.7 × 166 mm, 2GB memory, 10-day battery life . WEB ID 279534

PCS LAPTOPS

VALUE ASUS TF103C

★★★★★★

PRICE $429 **SUPPLIER** www.asus.com.au

While ostensibly a tablet with a removable keyboard, it also fits tidily into the value portable category thanks to it's immense usability and remarkably low price.

SPECIFICATIONS Quad-core 1.86GHz Intel Atom Z3745 · 1GB RAM · 8GB/16GB eMMC storage · 10.1in 1,280 x 800 IPS display · dual-band 802.11n Wi-Fi

PERFORMANCE AORUS X7

★★★★★½

PRICE $2999 **SUPPLIER** aorus.com

Super-sleek, light, outrageously powerful and with a spec-list that outclasses many high end desktop systems.

SPECIFICATIONS Q4-3.4GHz i7-4700HQ · 4GB/8GB DDR3L 1600, 4 slots (Max 32GB) · 17.3" Full HD 1920x1080 · NVIDIA® GTX 765M SLI GDDR5 4GB · mSATA 128GB/256GB, 2slot 2.5"HDD 500GB/750GB/1TB 5400rpm

PROFESSIONAL APPLE MAC BOOK RETINA

★★★★½

PRICE $3199 **SUPPLIER** www.apple.com/au

The machine that does everything right, and looks the part, too. We've chosen the top-end 2.3GHz i7 model with 16GB of RAM and a 512GB SSD plus GT 750M graphics.

SPECIFICATIONS 2.3GHz Intel Core i7; 16GB RAM; 512GB SSD; 15in 2880 x 1800 LCD; 1 x USB 3; 2 x USB 3; 2 x Thunderbolt 2; dual-band 802.11abgn Wi-Fi; Bluetooth 4; 3G

ULTRA PORTABLE LENOVO CARBON X1

★★★★★½

PRICE $2499 **SUPPLIER** www.lenovo.com/au

Lenovo inherited – and built upon – IBM's legendary ThinkPad build quality, and added a much-needed dose of style to this highly capable machine.

SPECIFICATIONS 2.1GHz Intel Core i7-4600U; 14in touchscreen (2560 x 1440); 8GB RAM; 256GB SSD; 802.11ac/abgn; Bluetooth 4

PERIPHERALS

WIRELESS ROUTER NETGEAR NIGHTHAWK X6 AC3200

★★★★★½

SUPPLIER www.netgear.com.au

Designed to keep pace with high-bandwidth content consumption, it is the router King.

SPECIFICATIONS 1GHz dual core processor with 3 offload processors, 6 High performance antennas, one 2.4GHz band and two 5GHz Wi-Fi bands

DESKTOP STORAGE SEAGATE 2TB BACKUP PLUS DESKTOP

★★★★★★

SUPPLIER www.seagate.com

This 2TB external drive still offers good value despite the rise of higher-capacity drives. The USB 3.0 adaptor makes for excellent transfer speeds.

SPECIFICATIONS 2TB external hard disk with NTFS; USB 3.0, with other docks available as optional; 44 x 124 x 158mm 894g.

NAS SYNOLOGY DISKSTATION DS214PLAY

★★★★★★

SUPPLIER www.synology.com

The fastest NAS in our grouptest (*PC&TA 197*), with excellent media streaming capabilities.

SPECIFICATIONS 2.1GHz Intel Atom; 2GB RAM; 2 x USB 3 + 1 x USB 2; iOS and Androidmobile apps; RAID 0, 1, 5, 10; JBOD .

ALL-IN-ONE PRINTER CANON PIXMA MG5460

★★★★★½

SUPPLIER www.canon.com.au

The winner of our most recent printer grouptest, this combines excellent print quality with decent costs and is just as good at printing photos as it is documents.

SPECIFICATIONS 9600 x 2400dpi print; 2400 x 4800ppi scan; USB; 802.11n WLAN; 125-sheet tray; 455 x 369 x 148mm

LASER PRINTER DELL B1160W

★★★★★★

SUPPLIER www.dell.com.au

The best all-rounder in our printer grouptest, with excellent text printing and decent costs.

SPECIFICATIONS 1800 x 600dpi resolution; USB 2; Wi-Fi; 150-sheet input trays; 331 x 215 x 178

SOFTWARE

SECURITY KASPERSKY INTERNET SECURITY 2014

★★★★★★

SUPPLIER www.kaspersky.com/au

The winner of this year's security software grouptest, a big improvement over recent years, and a good solution for beginners and more advanced users. Kaspersky AV software runs well on even low-end machines, and operates relatively seamlessly and with a small memory and OS footprint.

BACK UP ACRONIS TRUE IMAGE 2013

★★★★★½

SUPPLIER www.acronis.com.au

A clear and well-organised front end makes this easier to use than ever. Not much has changed from previous years, but it remains our go-to backup solution

OFFICE SUITE MICROSOFT OFFICE 365 HOME PREMIUM

★★★★★½

SUPPLIER www.microsoft.com.au

The easiest to use Office to date.

WEB DEV ADOBE DREAMWEAVER CS5

★★★★★½

SUPPLIER www.adobe.com.au

This edition makes PHP and CMS its core focus, which gives it the new lease of life it so desperately needed.

AUDIO CUBASE 7.5

★★★★★½

SUPPLIER www.steinberg.net

The addition of better filters solidifies this program's continued place on the A-List.

VIDEO SONY VEGAS MOVIE STUDIO HD PLATINUM 11

★★★★★½

SUPPLIER www.sony.com.au

May not have the bells and whistles of other consumer editing packages, but its tools are efficient.

PHOTO ADOBE PHOTOSHOP LIGHTROOM 5

★★★★★½

SUPPLIER www.adobe.com.au

An excellent tool for photo management and light editing, as used by the pros and now available at a very reasonable price.

KITLOG

We were so very close to replacing the Game Box monitor with one of the new G-Sync screens we reviewed this month (the Asus ROG Swift PG278Q and the AOC G2460PG, page 40), but after a little pondering, and some arguing, decided to keep the LG 27incher in there.

At almost $1000, the Asus is certainly occupying the premium end of the price-scale, but equally, it's one of the only genuine purpose-built gaming monitors in existence, thanks to hardware support for G-Sync. However, it has company in the form of the also-new AOC G2460PG, another G-Sync device, and also reviewed in this issue, at at close to half the price.

Why stick with a plain old non-G-Sync screen? Because not everyone runs an Nvidia GPU, which is required. At around $400 (cheaper if you hunt around), the LG is big, bright and cheap. For now, that earns it the recommended spot.

THE GAME BOX

CPU

INTEL CORE I5 4670K
PRICE $275
Gamers can do without Hyperthreading and save $100 or more, compared to an i7. The K version is unlocked for easier overclocking.

MOTHERBOARD

ASUS ROG RANGER
PRICE $259
Fully featured, extremely well engineered. Alternatively, the MSI Gaming 7 or Gigabyte Z97X-UD5H are equally as good at the same price.

MEMORY

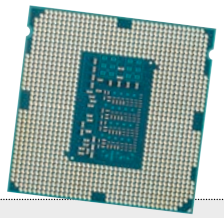
KINGSTON HYPERX BEAST 16GB
PRICE $240
Our roundup award winner, it's well-priced, fast and overclocks very well.

VIDEOCARD

GIGABYTE GTX 760 OC 4GB
PRICE $360
An excellent price/performance balance, and with 4GB of memory to handle high resolutions or games with large textures.

THE PERFECT PC

CPU



INTEL CORE I7 4970K
PRICE $400
Intel's top-of-the-line quad-core i7 delivers huge performance and can overclock easily to around 4.7GHz with the K version.

MOTHERBOARD

ASUS Z97 DELUXE
PRICE $485
Plenty of cutting-edge technology crammed into this package. It's for those who want it all in a LGA1150 system .

MEMORY

CORSAIR DOMINATOR PLATINUM CMD32GX3M4A2133C9 32GB
PRICE $619
These memory chips are hand selected and tested, and 32GB of fast RAM will keep things smooth and fast in intensive tasks.

VIDEOCARD

MSI GTX 780TI
PRICE $800
This single-GPU powerhouse is cool and quiet yet has the power to push though anything effortlessly. Mature drivers and good cooling help.

SUBTOTAL: **$2852** RIG ONLY: **$2123**

COOLER

COOLERMASTER NEPTON 140XL
PRICE $140
Easy to install AIO CPU cooling, relative quiet and performance to rival twin-radiator units.

SYSTEMDRIVES

SAMSUNG 840 EVO 250GB
PRICE $190
Super-fast, cheap and space for the OS and your games.

WD BLACK 2
PRICE $340
An extra 128GB of SSD storage plus another 1TB of HDD space, all in a tiny 2.5in size.

DISPLAY

LG IPS277L
PRICE $400
27 inches of IPS glory. The resolution isn't perfect, but the price is. The thin bezel makes this a very attractive screen.

AUDIO

TT ESPORTS CRONOS
PRICE $80
Fantastic set of headphones that delivers great 2.1 audio for gaming and music without swamping you with bass.

SOUND BLASTER X-FI XTREME
PRICE $80
The best positional game audio and pretty good music quality, too.

CASE

BITFENIX RONIN
PRICE $99
Bitfenix continues to deliver great budget cases that look terrific and are easy to build in.

KEYBOARD

CORSAIR K70
PRICE $160
The glorious perfection of mechanical keys with well thought-out gamer design.

MOUSE

TT SPORTS VOLOS
PRICE $89
The easy first choice at *PC&TA* HQ where we play hard and test every mouse. Also superb value.

POWER SUPPLY

CORSAIR CS650M
PRICE $140
It's quiet, reliable, and at 650W is more than we need for this build, but has the headroom for additional graphics.

SUBTOTAL: **$5511** RIG ONLY: **$4408**

COOLER

CORSAIR H105 WATER COOLER
PRICE $160
Best-of-breed cooling plus nice and quiet equals a happy CPU.

SYSTEMDRIVES

SAMSUNG 840 EVO 1TB SSD
PRICE $680
Samsung has conquered the market with its 840 EVO, so fill up with 1TB of incredible speed and storage.

WD BLACK 2
PRICE $340
Supplement the EVO with this hybrid drive and 128GB of SSD + 1TB of HDD space.

DISPLAY

ASUS PB287Q
PRICE $799
A fully-featured 4K monitor with near-perfect colour accuracy for under $800.

AUDIO

ASUS XONAR ESSENCE ST/X
PRICE $175
The go-to card for perfect music quality, though the motherboard's onboard sound is fine if this isn't so important to you.

CASE

COOLER MASTER COSMOS II
PRICE $400
The only case you'll ever need. Premium luxurious bliss.

KEYBOARD

CORSAIR VENGEANCE K95
PRICE $179
The perfect keyboard. Lovely Cherry Red mechanical switches, a slick and attractive aluminium body and customisable backlighting make this The One.

MOUSE

RAZER OUROBORUS
PRICE $125
An excellent performer and highly configurable mouse that suits both left- and right-handers.

POWER SUPPLY

CORSAIR AX1200
PRICE $349
Reasonable value for this mighty power unit, delivering stable power and able to handle quad-graphics.

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Valued at $4,999, the **Bose Lifestyle® 535 system** delivers vivid surround sound from five Premium Jewel Cube® dynamic speakers and great bass from the Acoustimass module, while the stylish control console is a hub for all your AV sources. The SoundTouch™ wireless adaptor adds streaming music from Internet radio, Pandora and your own iTunes music collection.

The **SA-4 amplifier package** ($799) and **FreeSpace® 51 environmental speakers** ($749) will extend the SoundTouch™ streaming experience to your outdoor area, with control of both systems being simplicity itself using the included SoundTouch™ controller, your preferred iOS or Android smart device, or a PC or Mac computer.

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3 AUDIO SOLUTIONS :
Enhance your musical experience with LUXA2's immersive Bluetooth wireless stereo speakers, taking and sharing your favorite tunes, wherever and whenever.

4 GAMING HEADSETS :
Tt eSPORTS gaming headsets reveal subtle audio cues and spatial positioning details while delivering clear voice communication to teammates, to offer the competitive edge needed to win.

5 GAMING KEYBOARDS :
Tt eSPORTS gaming keyboards are built tough, with quality switches, ergonomics, and design. The keyboards offer the best typing and gaming experience possible.

6 GAMING MICE :
Tt eSPORTS gaming mice come in a variety of shapes, features, sensors, and styles to make sure we've got the right tool for you to win in every game.

7 GAMING MOUSE PADS :
Tt eSPORTS' comprehensive mouse pad selection encompasses different sizes, materials, and surface styles to offer you the right control & glide.

8 DOCKING :
Thermaltake offers a comprehensive and easy way to access files from all types of external and internal storage devices to provide the ultimate experience in data solutions.

9 CHASSIS :
Experience the next generation of chassis design! Thermaltake has a series of enthusiast-focused chassis for any type of system or configuration.

10 COOLING :
Thermaltake coolers consistently exceed user expectations by providing the most innovative coolers to protect our customers' CPUs and systems; it is time for you to enjoy optimized cooling performance.

11 CASE FANS :
Case fans by Thermaltake precisely balance efficiency with quiet cooling performance. Just add your selected styles into the PC case.

12 POWER SUPPLIES :
We bring state-of-the-art technology to our users. Thermaltake PSUs have a reputation for efficiency and reliability while providing the most revolutionary technology; our PSUs are eco-friendly and a logical energy-saving solution.

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HOW TO

Each month our experts get under the hood to provide you with detailed How To guides on hardware, software and everything in-between.

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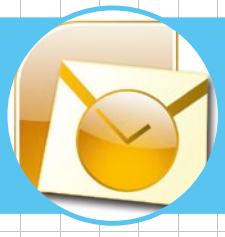
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HOW TO
Power advertising with Power Editor

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HOW TO: In my day...

DAVID HOLLINGWORTH MAY NEVER HAVE WORN AN ONION ON HIS BELT, BUT HE DID DO A LOT OF PC TESTING BACK IN THE DAYS OF *PC & TECH AUTHORITY'S* INFANCY.

A very lovely reader recently sent in a large pile of old issues of *PC Authority* (from well before we added the '& Tech' into the title!), and we've been having quite a bit of fun going through them. Personally, I've enjoyed going back to articles I wrote about fifteen years ago and feeling validated that even back then I wasn't too bad at my job.

You've no idea what a relief that is.

But something we've all been very amused by is the difference over the intervening years in PC building and design, and consequently how we reviewed machines back then.

▲ Once upon a time, this was the vehicle we used to travel to the worlds only our imaginations could otherwise contrive

IT'S A BEIGE, BEIGE WORLD

The most obvious difference is the colour of everything – a flat, boring, beige. If you're lucky, there might be a sky blue accent somewhere, but by and large, everything is coloured like it belongs in some kind of institutional setting, which of course, by and large, they were. Oddly, it's kind of accurate - PC gaming was a thing, of course, but for a lot of PC users, computers were very much for working, and that meant being boring. But it really is shocking to see keyboards, cases, monitors... everything in that terrible, colour.

ENTER THE DARK AGE THE MOD AGE

At that time we were all thinking and wishing that our PCs should look as cool as we wanted them to be. Modding kicked off, because, well many gamers were thinking exactly the same thing. At first we painted our cases a cool black, and along the way leaned a great deal about the best paint to apply to a metal surface. Then we started cutting holes around the place ostensibly for better ventilation, but in large part, too, because the whole *Mad Max* look was desirable (though rarely achieved).

It was that trend – and for gamers taking ownership of their PCs in general and wanting to feel like they were a unique clique, that *PC Authority's* sister title, *Atomic,* was launched. The *PCA* and *Atomic* teams sat side by side, and little did we know at the time that it was all the beginning of a great circle. Staff Writer on Atomic John Gillooly went on to serve a stint recently as editor of *PC & Tech Authority,* Bennett Ring, our other *Atomic* staff writer still contributes to *PC & Tech Authority,* and Atomic's founding editor, and the man with an unmatched passion for PCs, Ben Mansill, is now the editor of this very magazine. Incredible.

> **"With the rise of overclocking, came the world of case mods to show off custom built and tweaked hardware"**

On top of that, there's also the memories of what such a machine would look like after just a few weeks of use. In a word, they'd look 'festy' – every edge would pick up a dark smear of colour, from sweat, body oils, and just plain dirt. Looking at the machine I'm currently working on, with predominantly dark metals and plastics, it feels a world cleaner. Intellectually I know it's not – keyboards are terrible cesspits of germs – but it's the feel that counts.

There were similar design horrors inside machines back then, too. Motherboard PCBs were universally green, and sockets for RAM and other slot in hardware made up of an arbitrary range of colours that seemed to be designed only with clashing in mind. They underestimated the commonly good taste of gamers. Many manufacturers still do...

It is a little unfair, though, because it was in this period that PC performance was really pushing ahead. I can remember when we got our first 1GHz processor into the labs, and how mindblowingly powerful it was – the gear was fast and getting faster, but it just didn't look the part.

THE MOD AGE

This was the world before gaming cases, side-windows, and serious cooling. In fact, a lot of that was a response to the rather staid world of PC hardware at the time. As PC enthusiasts became ever more performance conscious, it was

inevitable that they would also want to show it off. With the rise of overclocking, came the world of case mods to show off custom built and tweaked hardware, and so window mods were created.

While hardware became as much of a showpiece as a performance part, it also started to look better – coloured PCB was a revelation. At the same time, case manufacturers were realising that if consumers were willing to spend time and money to mangle their chassis, perhaps building windows into cases was a good move.

And it was, of course. But, ironically, it made case modding a little old hat. Ironic, really.

10X AWESOME SPEED

Another thing that boggles the mind is the focus we had back then on optical drives. These days, no one ever asks about the speed of a DVD drive, or assumes that a DVD can't burn a disc pretty easily. Back then, though, speed was everything, and since everything came on disc still (every machine still had floppy drives back then, as well as a plethora of similarly now outmoded disc storage systems), how fast you could install Photoshop, or a game, was pretty important. Hell, we did product roundups of nothing but optical drives. Like the floppy drive before it, opticals are fast becoming a liminal PC component. We know, for instance, that a lot of our readers still value their DVD drive – we know because they love our cover disc. But we also know that a lot of readers – especially younger ones – have ditched their optical drives in favour of digital distribution methods. Personally, I use my DVD drive two or three times a year; mostly, I download games via Steam, and other software directly from the source.

"Our labs needed to have custom built shelving installed to handle the weight of dozens of machines"

▲ Masterchief dropped by one happy day for a singalong of Kumbaya.

◀ The boys chillin in the old PC Authority labs, circa 2000AD. L to R: Ashok Zaman, Bennett Ring, John Gillooly, Ben Mansill, Tim Dean and David Hollingworth.

A lot of software simply isn't even resident on my PC any more. Google Docs has replaced Microsoft Office, and I'm quite happy with the functionality. But I also live in the inner city, have access to ADSL2, and a very generous download quota – sadly, Australia does not have great net access everywhere, so I think we'll be packaging DVDs with our magazine for some time yet.

I am glad we no longer have to review those drives however.

A WEIGHTY PROBLEM

Another issue we don't miss is the sheer mass of systems from back then. Not only were PC cases and their parts generally heavier, but they came with huge CRT monitors as well. Our labs needed to have custom built shelving installed to handle the weight of dozens of machines, and to maximise space, we used two ranks of shelves one over the other – and guess where it was easiest to place the monitors?

Yep – the top shelf.

Because we often worked standing up, going from one machine to the next, installing benchmarks, tweaking settings, and then moving on, having the monitor at head height was handy – but hell on the old back. Thankfully, we were young men way back then.

Which is why it's a good thing those CRT days are gone – flat panel displays are not only so much easier from a day to day standpoint, but also for testers. In fact, most things today are far lighter than their counterparts from the days of yore.

We're just not as young as we used to be. ■


LABS
3D GRAPHICS CARDS

3D GRAPHICS CARDS

3D CLAIMS TO OFFER SOMETHING FOR EVERYONE. WE RAN 13 OF THE TOP 3D CARDS THROUGH THEIR PACES TO SEE WHAT 3D MEANS FOR YOU.

LABS INDEX

HOW TO:
Opt out of social ads

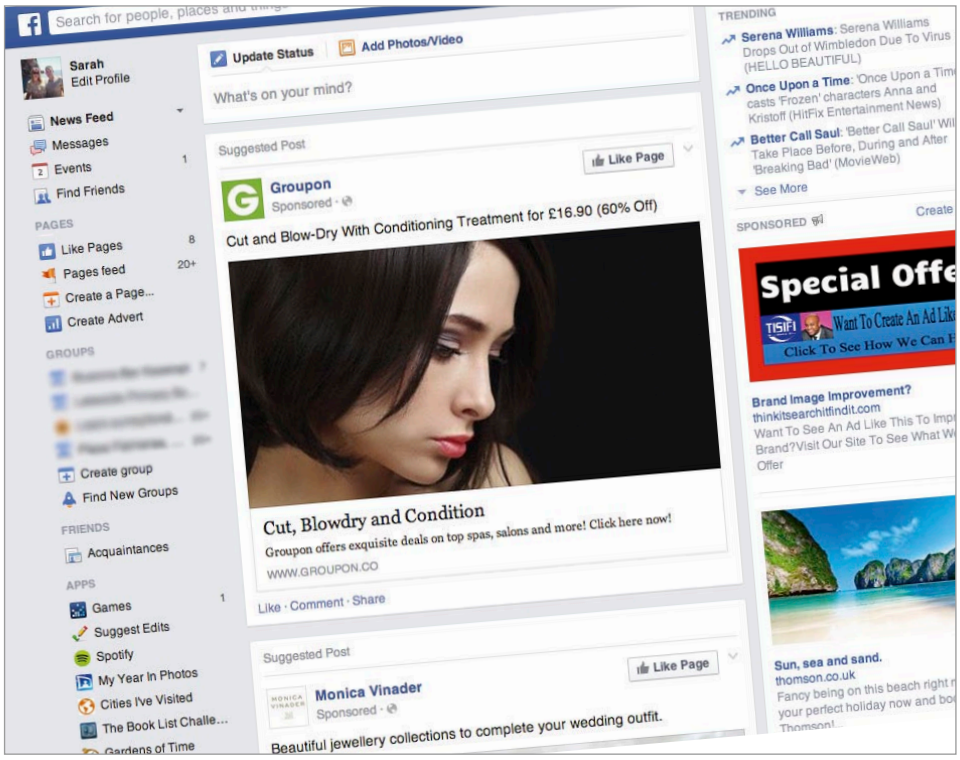
DAVEY WINDER DEMONSTRATES HOW BEST TO MINIMISE THE IMPACT OF FACEBOOK ADVERTISING, AND ADDRESSES PASSWORD CONCERNS

This month, I'm devoting my column to answering some of the many emails I receive from readers. Although I do my best to respond to people who get in touch, there are only so many hours in the day, so I can't reply to everyone.

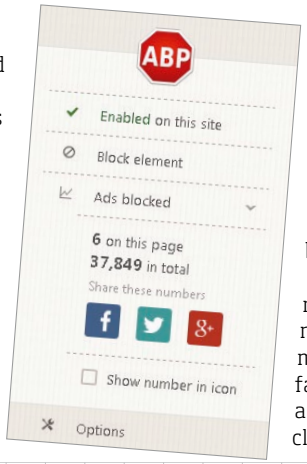
It makes sense to focus on the queries I think other readers may also find helpful, so I'll start with the subject of obtrusive advertising on social networks. Ron got in touch to ask how he could reduce the number of adverts that litter his Facebook newsfeed, most of which are of no interest to him, and all of which interfere with his user experience. Facebook advertising has always been a hot potato, since the website wouldn't be able to continue operating without a way of generating revenue. (And yes, I'm fully aware that Kevin Partner gives a rather different view on Facebook in his column this month – see p95.)

Actually, Facebook has long since passed the point of critical mass beyond which normal small-business rules apply. Even so, advertising remains a critical driver of the internet economy, and we consumers of free content and free services need to acknowledge this. I help to run a million-member-plus IT support site called DaniWeb. This service is free to the end user, but isn't free to operate – the server fees alone would cripple most small concerns. As such, we carry banner adverts, and although I'm not responsible for the commercial side of the operation, I understand the pressure to make these stand out. The compromise DaniWeb has arrived at is this: as soon as a new member has hung around the site for a few days and submitted a few posts, an option to disable these adverts is made available to them. If they so desire, ads are thereafter consigned to history. So, how do we make any money?

For one, users can make a donation if we've helped them – which works well. We also recently introduced a system of wealth-sharing, whereby members pay a dollar (it's a US-based service) to promote a question they've posted. This money is then shared between all the people who help answer the query. Sure, it's a micro-economy model, but all these little bits of cash add up over time. When a user hits a minimum payout level, they can cash in profit. I mention this partly as blatant self-promotion, but mainly to show there are ways to address the revenue problem other than obtrusive advertising. Sites need to wake up to this, or their advertising revenue is likely to dry up altogether, thanks to what I call the obstruction/blockage cycle.



▼ Adblock Plus remains the weapon of choice in the war against obtrusive ads



This cycle has to be broken. Take a look at the Acceptable Ads Manifesto site (**https://acceptableads.org**), which campaigns to make the internet a better place by ridding it of what it calls "obnoxious" advertising. The manifesto urges sites to use adverts that aren't annoying, disruptive or distorting of page content; that are transparent (adverts shouldn't pretend to be anything but adverts); and that are appropriate to the site on which they're placed. This seems reasonable to me, and I expect most users will agree – but this is where Facebook falls short, and it's why Ron got in touch.

Luckily for Ron, there's a simple answer to his problem – opting out. Don't get too excited: Facebook doesn't actually allow you to opt out of ads, but it can't stop users controlling what they see once it's been served to their browser. Content filtering at the client

side is the answer. My preferred utility to achieve this is Adblock Plus (https://adblockplus.org). It works well at removing banner ads from my social network screen, and I like the configuration option that allows me to support sites which adopt a less intrusive approach to advertising revenue generation.

Funnily enough, both the Android and iOS Facebook apps seem less determined to serve up advertising than the main site, for which I'm grateful. I'm also pleased that Facebook has no plans, as far as I'm aware, to extend its strategy of using web-browsing history to serve up targeted ads – which it's planning to roll out in the US – locally. Now, you may say that targeted advertising is a good thing: I'm quick enough to complain about ads being of no interest to me, so surely tailoring them to my interests is a good thing? Well, no. The problem with targeted advertising is that it almost always fails to hit its target, or does so too late.

Amazon's recommendation system is a prime example (if you'll excuse the pun) of this failure. Recently, I browsed the site for a hosepipe and bought one I liked – only to receive an email a few days later enquiring whether I may be interested in buying, you've guessed it, a hosepipe. Mind you, this isn't as bad as when I next logged in to the Amazon website, where I was met with recommendations based on my purchase history that consisted solely of portable camping toilets.

The problem with Facebook's scheme is that it goes beyond the usual data-collection boundaries and leaps far ahead of the social network itself. In June, Facebook posted an announcement under the title "Making Ads Better and Giving People More Control Over the Ads They See", which explained how it currently targets adverts on interests learned from the things you do on Facebook, such as the pages you Like. However, it went on to say: "Starting soon in the US, we will also include information from some of the websites and apps you use." So, if you've been looking for a new TV and searching for online reviews and the like, Facebook will use that information to show you ads for TVs. "And because we think you're interested in electronics, we may show you ads for other electronics in the future, like speakers or a game console to go with your new TV," the statement continued.

Of course, this type of data collection isn't unique to Facebook. The trouble is, most people are unaware it happens, and merrily click those "we use cookies" statements to get them out of the way, without reading or understanding the potential implications. To be honest, even if they were aware of the ramifications, they wouldn't know what to do about it.

What else can you do to minimise the impact of Facebook's advertising? Well, you can visit the Adverts tab in Settings, where you'll find the following sections:

- ***Third Party Sites*** Although Facebook doesn't give third-party applications or advert networks the right to use your name or picture in adverts, it may do so in the future. Choose how this information can be used here.

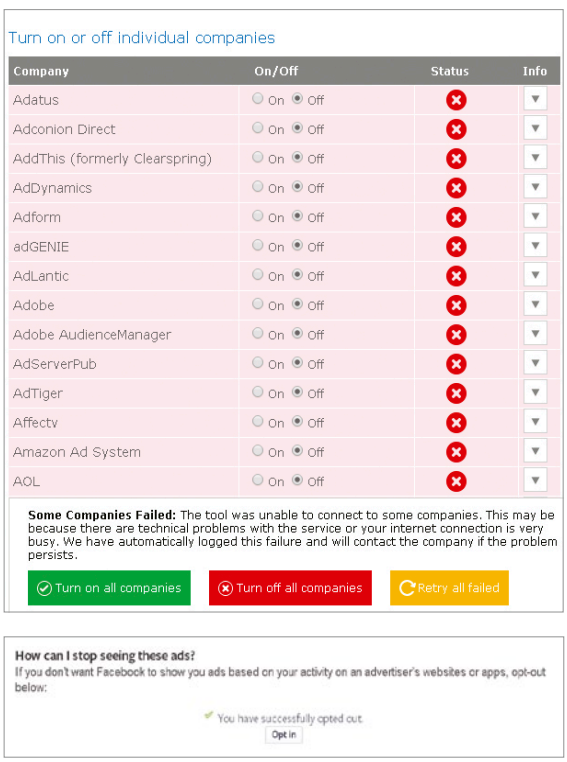
- ***Adverts and Friends*** Apparently, "everyone wants to know what their friends like", so this feature, called social advertising, pairs adverts and friends. Essentially, social adverts show a marketing message alongside an action you take; your friends will see this, and vice versa. My suggestion is to pair your social actions with adverts for "no-one".

- ***Website and Mobile App Custom Audience*** This option has an opt-out link you should click, which takes you to a page with another opt-out button. Hit this and a cookie will be stored for the browser you're using, which will prevent ads being served on activity in third-party apps or on Facebook advertisers' websites.

"The problem with targeted advertising is that it almost always fails to hit its target"

If you clear your cookies, you'll automatically opt in again, as you will if you access Facebook from a different browser.

▼ It's easy to opt out of behavioural ad tracking if you know how



CHROME'S INSECURE SECURITY-EXTENSION UPDATE

Earlier this year, Google updated its Chrome browser, which isn't unusual in the browser world. Such updates often improve security by patching a vulnerability, but this particular security update actually made browsing less secure for tens of thousands of users. Google's intention was good, but its implementation was badly handled.

I was alerted to this problem when reader Maria got in touch to ask: "Why has Kaspersky Internet Security stopped working properly?" She was particularly concerned by the sudden absence of its Safe Money function, which opens any online banking or financial transaction session in a new browser window, with strengthened security features such as checking security certificates, scanning for vulnerabilities before performing a transaction, and using a secure or virtual (on-screen) keyboard to prevent keylogging.

In fact, it wasn't only the Safe Money feature that had stopped working; the dangerous-website blocker, the URL advisor and the virtual keyboard had also vanished. The common factor was that all of these were implemented in Chrome as extensions, and none at all had been installed via the official Chrome Web Store.

It turned out that Google has implemented a policy of allowing only extensions from the official store to be installed, in order to render malicious extensions ineffective. This prevents a whole bunch of Kaspersky extensions

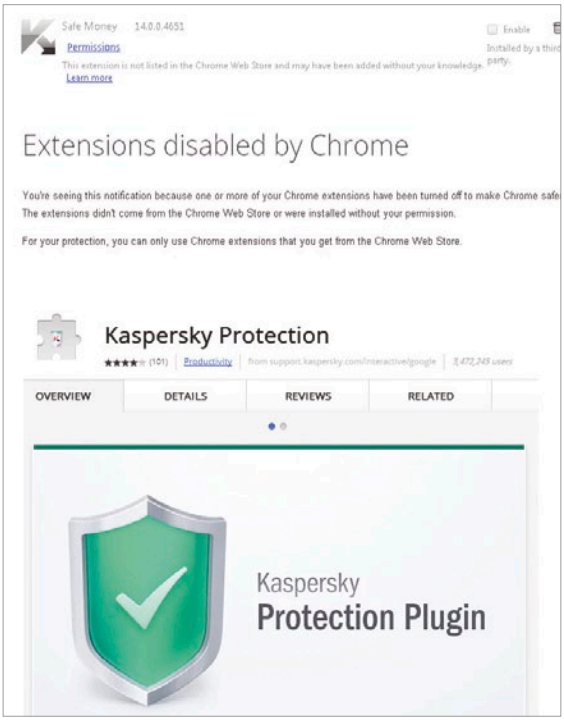
from working with any iteration of Chrome from version 33 onwards. It was fortunate that Maria got in touch, as I was able to determine that she hadn't updated her Kaspersky installation with the most recent patches – if she'd done so, the problem would have been resolved, since the Kaspersky Protection Chrome plugin is part of that release and works with the latest Chrome releases. To remedy the issue, install the patch and restart Windows. Chrome will then ask about the new plugin; hit the Enable Extension button and restart the PC again to get these features working.

In the event, this process didn't work for Maria; her extensions still showed as disabled. It's possible to install the Kaspersky Protection plugin directly from the Chrome Web Store, so try doing that if you have similar problems – it worked for Maria. Although there's a happy ending here, I can't help but sigh at a security update that left some users less secure. Whether it was the fault of Google or Kaspersky is open to debate, but better co-ordination between browser and extension developers is needed.

DOES LASTPASS MAKE YOU THE PRODUCT?

Chris got in touch to ask about LastPass, a password-management tool that I often recommend. Unlike 1Password, which I also champion regularly, LastPass is free to use. As such, Chris was wondering whether the saying, "If you're paying, you're the customer; if you're not, you're the product" applies here. "As LastPass is free, I wonder in what sense I will be a 'product' if I use the service," he observed.

If you use LastPass, don't worry about its complimentary nature implying any risk. It uses its free service to promote a premium version; if it were a poor solution, this would obviously affect the company's commercial strategy. There's nothing wrong with the free version, apart from the fact that it will show you adverts; in that sense, you're the product, a pair of consumer eyeballs. In truth, however, I recommend upgrading from the free version, this brings the advantage of mobile access for Android and iOS, among other platforms, plus multifactor token support and access to a priority tech-support service.



▲ A recent Chrome update may have prevented Kaspersky from working properly

HOW STRONG IS MY P@SSW0RD?

The last of this tranche of readers' letters also concerns passwords, and it comes from a confused chap by the name of Stewart. "I've been following your advice and making sure that I no longer share passwords between different sites," he writes, "but I've been totally flummoxed by the variations between sites regarding how strong the passwords I'm using actually are." Like many people, Stewart was using a system (which I won't reveal in detail here) to generate similar passwords that were easy to remember but pseudo-random in structure.

> "Banish any thought of password-strength meters from your memory"

Of course, Stewart is now aware that I don't approve of this pseudo-random strategy, which creates passwords that aren't random at all and are therefore much easier to compromise. The point is, however, that he found that passwords created using the same technique were reported as being everything from "weak" to "very strong", depending on the site.

As I told Stewart, 99% of password meters are just eye candy – and misleading, if not dangerous, eye candy at that.

My advice to everyone remains to use a decent password-management system, one that creates truly random password strings or phrases and allows them to be both securely stored and easily retrieved. Use one of these alongside two-factor authentication wherever possible, and banish any thought of password-strength meters from your memory – although that said, the password meters featured in such password managers seem to be more accurate, and give a ballpark idea of strength. ■

BEACH BREECH

Recent research commissioned by Cisco highlights the way that employees enjoying holiday time can put employers at risk. The research found that 77% of UK workers take work devices on holiday, and 72% of those keep up with what's going on in the office for up to two hours a day. Unfortunately, 60% admitted to failing to check whether the wireless network they were using was secure, despite 69% confirming that their employer had informed them about the dangers of remote device working.

HOW TO:

How to sell your app

A GREAT IDEA IS JUST THE START. **MARK NEWTON** EXPLAINS WHY TESTING, MARKETING AND CHOICE OF PLATFORM ARE ALL OF VITAL IMPORTANCE IF YOUR APP IS TO SUCCEED

Work on my mobile app has progressed well: final testing is complete, tweaks to the graphics are done and everyone involved seems happy with it. Now's the time to submit it to the app stores. Since it will be a paid-for app, the first step is to set up the bank account into which purchases will be paid, which is a fairly painless task on Google Play and Apple iTunes. (I won't cover the Windows Store here, since this app doesn't run on Windows Phone.)

For iOS apps, you need to visit iTunes Connect (**https://itunesconnect.apple.com**) and go to "Contracts, Tax, and Banking", where you'll probably find one contract is already set up if you've tested some Ad Hoc builds. This contract is for free applications only, but you can leave it there if that's all you need. Since I'm charging for my app, I need to tell Apple which back account I want the earnings transferred into. There are several stages to this process, including filling out US tax requirements, but it isn't too onerous.

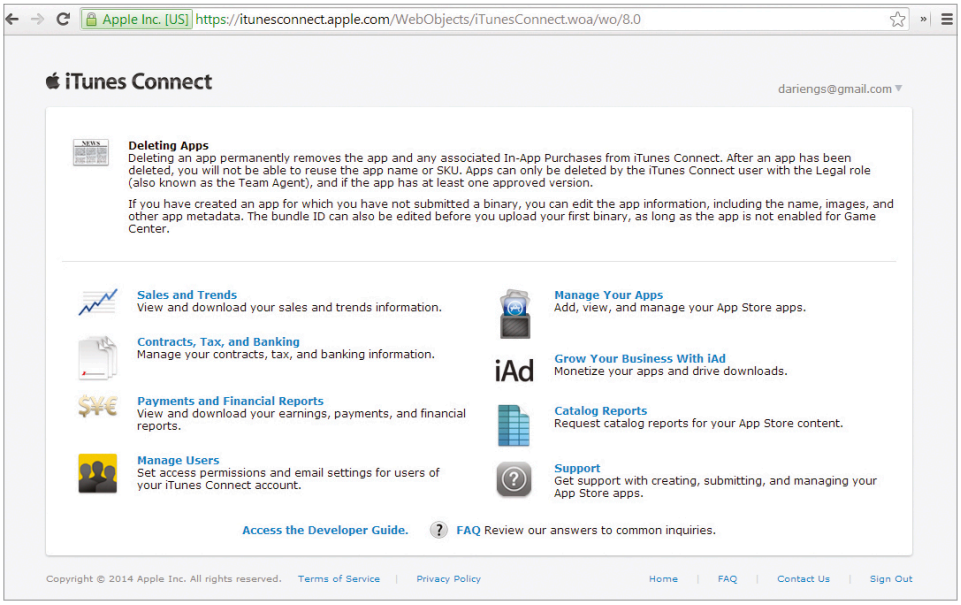
You'll also need to set up a third contract if you want to receive revenue from adverts placed inside your app. Apple's system seems to know about all the banks and relevant accounts, whereas the simpler-to-complete Google Play doesn't activate the accounts until it has sent a small deposit to the account you specify and you've confirmed receipt by entering the amount on the web page. This is a perfectly sensible way to confirm the account exists, and makes sure any future payments go to the correct place, but it means a delay of several days before your Google Play account is available to take payments, so bear this in mind when planning your app's launch. Google Play uses Google Wallet (big surprise) to accept transactions, so you'll need to set this up if you haven't done so already.

> "Keep a close eye on crashes, since the simplest of bugs can ruin your app's ratings"

You're now ready to receive the torrents of money that will (hopefully) be coming your way. You can also consider moving your app from beta to full published status. This is a good time to check that all the description text, keywords and screenshots are correct, up to date and professional-looking. You'll have to rebuild your iOS app as an iOS Production rather than the Ad Hoc build used for testing, while for Android it's simply a matter of promoting your beta app to production. Your iOS app will need to be approved before it can go live, so there'll be a delay before you can start promoting it – and do please make sure you warn your marketing department to this effect.

Once the app is published and users start downloading it, you can use both stores to monitor the downloads, comments, ratings and crashes of your app. It's extremely important you keep a close eye on the latter, since the simplest of bugs can ruin your ratings and drop the ranking of your app. With so many apps vying for top ranking, promotion is vital – without it, you'd need either a lot of luck or an app with extraordinary appeal. To increase your chances of being seen in the crowded stores, you can follow the tricks and tips of fellow contributor Kevin Partner in his Online Business column.

▼ Connecting your bank account to iTunes is the first step towards creating a bestseller



BLACKBERRY JAM

While writing this series of columns about developing mobile apps in HTML5, I've had several readers enquire whether it's possible to write apps for BlackBerry in the same way. Intel's XDK development tool doesn't offer a build option for BlackBerry, and although a web app build works fine on these devices, you can't submit them to the BlackBerry World store. Selling outside the store would give you minimal chance of being seen, and charging would be far more tricky. As such, I was pleased to see that the BlackBerry developer site now offers an HTML5 development tool called WebWorks. It employs the Apache Cordova framework, and it enables you to submit your app to the store.

I simply took the source files for my own app – everything under the "www" folder, which comprises the HTML, CSS, image and JavaScript files – and copied them into the folder created by WebWorks upon creating a new project. The experience was far from painless, however: I had considerable trouble figuring out the various certificates needed to sign the app. Even after creating these, things weren't working.

The problem was caused by my relatively small 250GB SSD C drive. Due to its size, I always install and create work files on my 2TB D drive. However, by default, WebWorks looks on the C drive for the certificates, even if you tell it otherwise. In the end, I gave up and created the locations and files it was looking for on C, after which the build progressed a little further before complaining that it needed a debug token or release token. To generate one of these, you need to "execute the run command", but you're given no clues about where this might live or what it involves – it seems you can't do it within the WebWorks user interface.

After a trawl through all the online documentation, I discovered this requires the running of some command-line scripts, and that these debug tokens time out after 30 days, even if you only want to test on the free BlackBerry simulator. Talk about making things difficult. I understand the need for signing for security, but please, BlackBerry, make the process obvious and easy – no wonder developers are choosing to write for more switched-on platforms.

On the positive side, BlackBerry's free simulator is rather good: a proper virtual machine, rather than merely a browser-based version of the device. I've written here before about the limitations of browser-based mobile emulators when it comes to advanced device properties; a virtual machine does a better job with involved device issues that arise during testing. I'll be having a further play with this emulator, but for now I have a few deadlines to meet...

WHICH PLATFORMS?

The question of which mobile platforms to develop for isn't as simple to answer as you might expect. HTML5 technology might enable you to develop for almost all platforms simultaneously, but you'll soon start to discover various differences between the physical devices as you write and test. iOS is perhaps the easiest to deal with, since there are only a handful of models against which to test. The real trouble lies with Android.

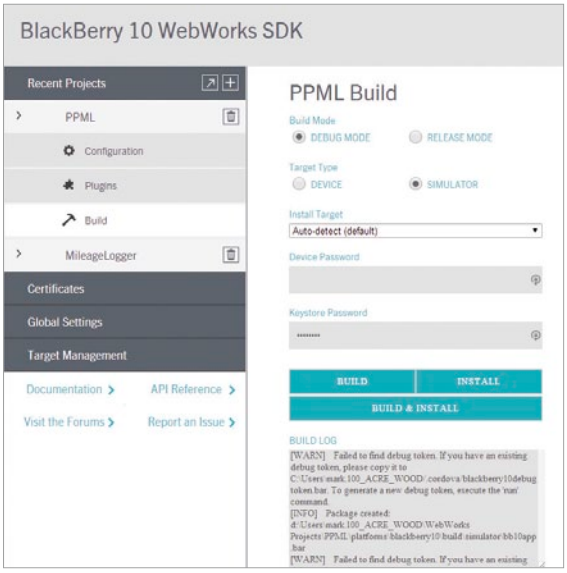
The latest build of my app should run on more than 4,000 Android devices, but it's clearly impossible to test on all of them. So, you have to either adopt the "publish and be damned" approach, or try to check as many as possible by using a huge beta test group. This can cause major support headaches. If your app is free, people will be less critical, but as the price increases, so do customers' expectations. And if they're using your app to run essential parts of their business, expect plenty of "feedback" when something doesn't work.

It's just such a problem – making sure the code is bug-free – that's delaying the release of the Android version of one intriguing app aimed at tradespeople. After considerable research, Benjamin Dyer and Chris Barling – both formerly of e-commerce software firm Actinic – felt they'd discovered a hole in the market, specifically a way for labourers to record their work without having to rely on memory, bits of paper or carbon-copy books.

Laptops were ruled out because of their short battery life and lack of robustness, but tablets and phones seemed ideal given their size, long battery life and built-in connectivity. Coupling a mobile device to a cloud service to keep data secure in case of damage (a relatively common occurrence in the industry) seemed the most viable solution. The result was Powered Now (**http://poweredrnow.com**), an HTML5 app for iOS devices that enables tradespeople to handle quotes, invoices, tasks and payments via their mobiles. Not only does the app help organise workflows, it also removes the need for a bookkeeper to dig through a shoebox full of receipts every month.

I was impressed by the design and ease of use of the product, which is aimed at a mainly non-IT crowd who want to save time and costs without slowing their workflow. I've seen plenty of apps become too complex through a mistaken belief that "more is better", but a plumber just wants to get one job done and move on to the next without having to navigate a complex sequence to record the job details.

One of my clients is an electrical company, and the software they need to use has now become so complicated that they dread upgrades because of the steep learning curve they impose. When developing an app, try not to lose sight of your projected end user, and don't be tempted to add features just because you can or because they're "cool". It's a measure of the rapid development of web technology over the past couple of years that a fully featured, robust app such as this one can be built using HTML.



▲ WebWorks is a nice start, but it needs more work

CORDOVA

I finally found a plugin for Apache Cordova that provides a WebSQL database on the Windows Phone platform. Adding this to my app's code should make it possible to build and distribute the same code on all platforms. 'm currently using the Intel XDK for development, which doesn't support third-party plugins, although I'm assured that the next major release will provide this important capability.

Microsoft has also announced that the Apache Cordova framework will be integrated into a preview release of Visual Studio, an update that goes by the catchy name of "Multi-Device Hybrid Apps for Visual Studio CTP 1" and will give you a way of using Visual Studio to build mobile apps simply for most devices.

EIGHT-BALL BLUES

I've been itching to get the latest app-development tools from Microsoft onto my work machine, but I needed to be running Windows 8.1, rather than Windows 7. I hadn't upgraded before, because operating system changes can – and often do – break development environments. Nonetheless, I decided that the time had come.

I hit a big problem right away: there's no way to upgrade in place from Windows 7 to Windows 8. Microsoft will sell you an upgrade disc, Action Pack or MSDN subscription image that enables you to perform an upgrade, but the only choice this offers you is leaving your files on the disk or erasing them – you can kiss goodbye to all your installed programs and settings. Choose this kind of "upgrade"

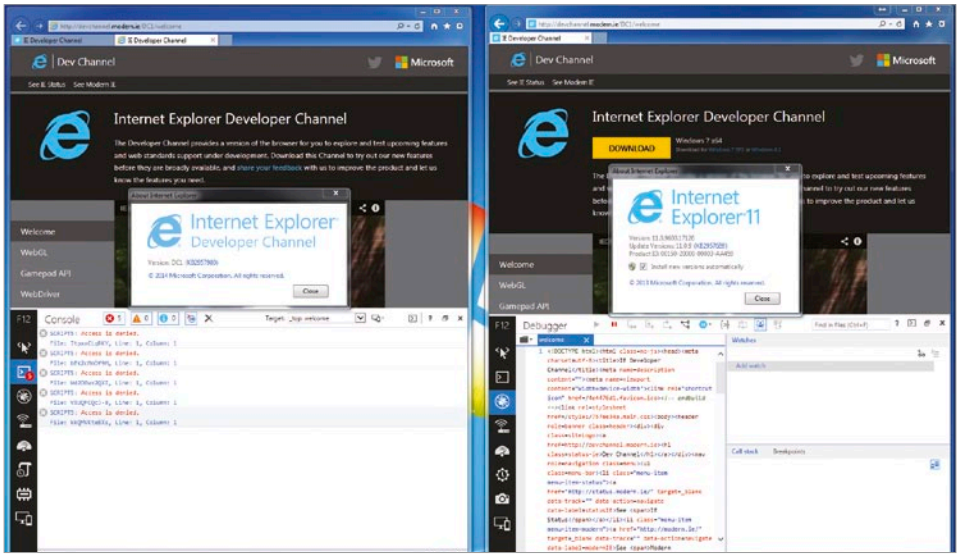
and a reinstall of all your programs is required.

I'm waiting for a reply from Microsoft as to why it can't offer a better upgrade experience, but based on previous dealings I doubt I'll get an answer. I'll have to leave this change of OS for a less busy time, or maybe install Windows 8 on a new machine – perhaps the powerful new Chillblast Photo OC Mobile. Anna, my business partner, has just bought one, and she keeps making rather perturbing purring noises.

I'm not given to boasting, but my desktop machine has the equivalent of 12 processors and 16GB of RAM, and I'm pleased with its performance. Anna's laptop, however, offers eight processors and 16GB of RAM. It's a fantastic machine for photo and video editing, but I still need my three monitors for work. What's that? The Photo OC Mobile can drive two extra monitors? Hmm, I'm not jealous – honestly. Time to talk to our accounts lady to see what state the PC Upgrade piggy bank is in.

DEVELOPER VERSION OF IE

The reason the app I'm developing isn't being distributed for Windows Phone is that the OS doesn't have a SQLite database built in; this is critical for the offline storage my app employs. When developing in the fast-moving world of web technologies, it can be difficult to know which approach to take. Do you write a specific version of your app for each platform – with all the issues of support that can bring – or use one codebase with conditional code depending on the platform in question? The latter makes support tricky, too, but overall it's a more manageable solution. Alternatively, do you wait for the platform to add the function your app requires? After all, it could be just around the corner. What's really required is a crystal ball.



▲ You can run the developer version of Internet Explorer alongside the shipping version

Unfortunately, working versions of such fortune-telling devices are few and far between, and while Mozilla Firefox and Google Chrome are fairly transparent about forthcoming changes, with developer builds available, Microsoft has always been more secretive about what's coming in the next version of Internet Explorer (IE). Now, however, Microsoft has come up with a way of involving the developer community in the development of IE and keeping them informed. After all, it's much better for Microsoft to spend time developing enhancements developers need, rather than features Redmond thinks they might need. To this end, it has released a developer's version of IE with the forthcoming technologies included in it, so that developers can test their code against the next version.

> **"When developing an app, try not to lose sight of your projected end user"**

The developer version of the browser will be updated as new features are developed, but before they're added to the "public" build. Thankfully, you can install and run this version alongside the regular version of IE11 on your PC, and if you visit **http://devchannel.modern.ie** you can even participate in the conversation about what should be in the next version of IE.

If you're running Windows 7, you may need to download PowerShell 3 and, of course, .NET 4 to install the developer version. At the moment, it looks very similar to the regular version, with most of the visible changes confined to the developer tools accessed via F12. One interesting enhancement is the addition of WebDriver, a method by which developers can automate the browser for testing, and for returning useful performance and debugging information for users.

It's early days, and most development tools don't yet support this, but they will.

The graphics capabilities of IE have also been enhanced, with further improvements to the WebGL renderer, better performance, and the addition of features such as instancing, where one object can be created and then cloned thousands of times. This is great if you want to render a forest, but there are other uses for this technology.

While these changes mainly concern games developers, they also make it possible to consider the option of running visualisation web apps on mobile devices.

The more power and apability the browser has, the more it will be possible to program in it. However, it's important that the mobile versions of the browsers are just as capable as their desktop cousins, or we'll be again faced with a pile of developing issues. The more standards-compliant these devices are, the better for all of us.

Part of the same initiative is **http://status.modern.ie**, which shows the current status of the technologies that IE supports and from what version – again, this can be useful to check what you can use in your HTML5 app for Windows 8.1 and Windows Phone 8.1, since these use exactly the same version of IE as their desktop. ■

▼ Will this Chillblast laptop – lustworthy and well priced – be my next purchase?

HOW TO:

How to make Outlook work better for you

SIMON JONES LOOKS AT A FEW TOOLS AND TRICKS TO HELP YOU GET THE MOST FROM MICROSOFT'S PERSONAL INFORMATION MANAGER

Many of you spend much of your working day using Outlook. You probably start it up when you switch on your computer in the morning, leave it chugging away in the background all day and check it in the evening before shutting down. But is Outlook working the way you want it to, or does it make you jump through needless hoops?

With a little jiggling, you should be able to make Outlook work more smoothly. For example, the panes and tools around the main window can all be customised, perhaps to give you more help or a little more space to read your emails.

The folder tree at the left of the window is a good place to start. A white arrow in this tree signifies a folder that has more folders within it; click the arrow to expand the folder and view them. You can re-order these folders within their parent by dragging them up and down the list, and you can drag them from one parent to another.

Then there's the small area at the top of this pane, labelled Favorites. This usually has only a couple of folders in it, but you can add as many as you want; drag any folder from the folder tree into Favorites to create a shortcut to that folder. Minimise the Favorites list by clicking the arrow to the left of the word Favorites, or turn it off by clicking View | Layout | Folder Pane | Favorites. You can also minimise the Folders pane by clicking the arrow at the top right of the pane: your top eight or so Favorites will now be listed vertically down the side, and you can access the full folder tree again by clicking All Folders at the bottom of the list.

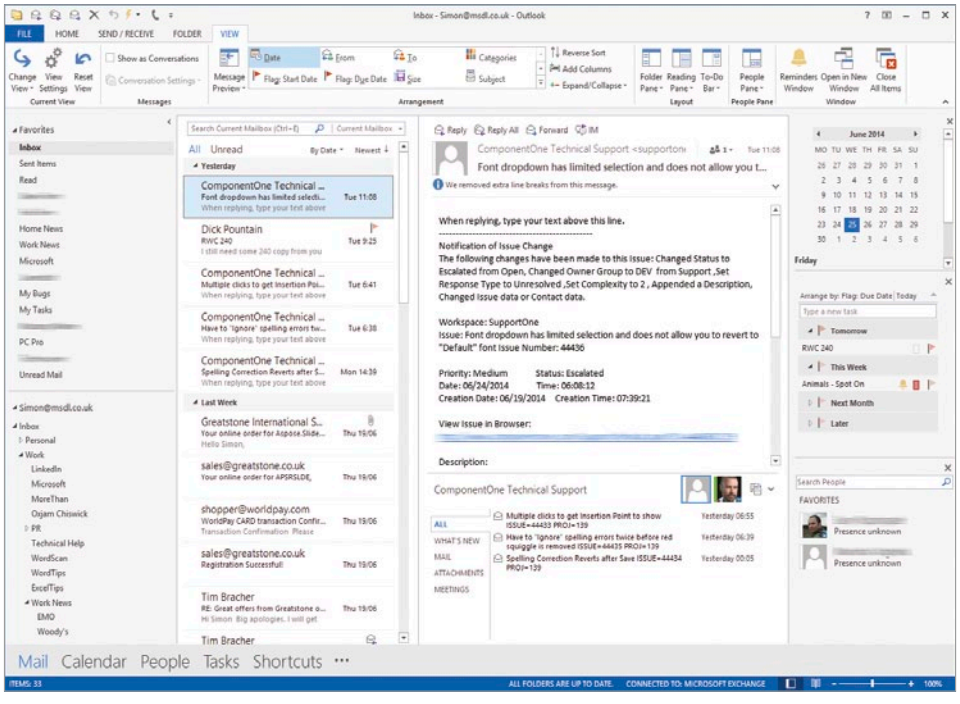
If you don't want to minimise the folder tree, you can make it narrower or wider by dragging its border left or right, making it just wide enough to read the names of the folders and freeing more room in which to read your emails. Similarly, you can adjust the list of emails within each folder.

READING ROOM

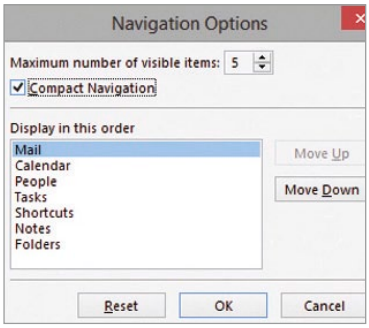
The reading pane, where you see the header and body of your emails, takes up the bulk of the space in Outlook's main window. The header area shows the sender of the email, its subject, the date and so on. You can make it smaller by clicking the Up arrow at its far right, which compresses the header, makes the sender's picture smaller and displays several items on the same row to save vertical space. This won't make much difference on a large monitor, but it can be a significant improvement on a tablet screen.

On the right-hand side of the main window is the To-Do pane, which can show your Calendar, Tasks and people you've added to your favourites. The order of these sections is controlled by the order in which you turn them on (via View | Layout | To-Do Bar). You can adjust the size of any section by dragging its borders up and down. You might like seeing constant reminders of what's coming up in your calendar, but all that information is available simply by hovering over the words or icons of the Navigation bar at the bottom right of the screen, so having this information constantly displayed may not be preferable. Click the small X at the top right of any section to turn it off, or click View | Layout | To-Do Bar | Off to dismiss the whole thing.

The navigation bar at the bottom left of the screen shows the different modules of Outlook, either in words or as icons. By default, it shows Mail, Calendar, People, Tasks and a [...] button, which gives you access to more modules, namely Notes, Folders, Shortcuts and the Navigation Options dialog. You can change the order of these modules, choose how many should be visible and select Compact Navigation, which changes large words to small icons and tucks them away at the bottom of the folder pane, providing more room for reading. I use Shortcuts extensively,



▼ Outlook is able to display a lot of useful information, although it can feel quite cluttered



▲ You can set the order and number of items shown in the navigation bar. Compact Navigation changes the words into icons

so I move that up to fifth place, set the number of visible items to five and switch on Compact Navigation.

PEOPLE WHO NEED PEOPLE

Another piece of clutter (sorry, "helpful user interface") you may or may not wish to see is the People Pane, which is Outlook's way of connecting to social networks such as Facebook and LinkedIn. This appears at the bottom of the Reading Pane and lets you browse the emails and meetings you've had with the sender and recipients of a particular message, as well as any attachments you've exchanged – plus the stream of consciousness that pours from their social networks (you might be interested to know that your correspondent just had a really great BLT, but I'm not). While social network integration provides pictures of your contacts, you don't need to have the People Pane turned on to see these: they already appear in the header area of incoming email.

Using the People Pane is one way to see all the emails you've exchanged with someone, but you can also do this by right-clicking any message and selecting Find Related | Messages From Sender. If you need to find attachments from that person, find their messages, then click Search | Refine | Has Attachments. This isn't the exact results list you'd get from the People Pane – Search is often more accurate – but it's easy to do and doesn't waste screen space. I keep the People Pane turned off (via View | People Pane | People Pane | Off), and I don't understand why the button has its own group on the ribbon. Perhaps it's because it started off as an add-in and was never properly integrated into the main application.

Speaking of the ribbon, having access to all the features, all the time, is good if you have enough screen real estate. However, on smaller screens, you'll want to devote more space to content rather than tools. As such, you should consider minimising the ribbon. At its far right end, you'll find a small up-arrow; clicking this shrinks the ribbon to show only its tabs. Click on any tab to roll down the ribbon temporarily so you can use its tools; once you've clicked the button you want, the ribbon will roll away again. To get it back permanently, you can click the Pin icon at the bottom right of the floating ribbon. The keystroke Ctrl+F1 toggles between these two states.

If you don't want to delve into the ribbon to find commands you use regularly, right-click a button and choose "Add to Quick Access Toolbar" (QAT). This copies the button to the QAT – the row of little buttons at the top left of an application's window – and makes it available all the time. You can re-order or remove tools you no longer need by right-clicking in the QAT and choosing "Customize Quick Access Toolbar" or "Remove from Quick Access Toolbar". There's also a small Down arrow on the end of the QAT to quickly add common tools. The editors for different item types (mail, appointment, person and task) have their own ribbon commands and QATs that you can customise, too.

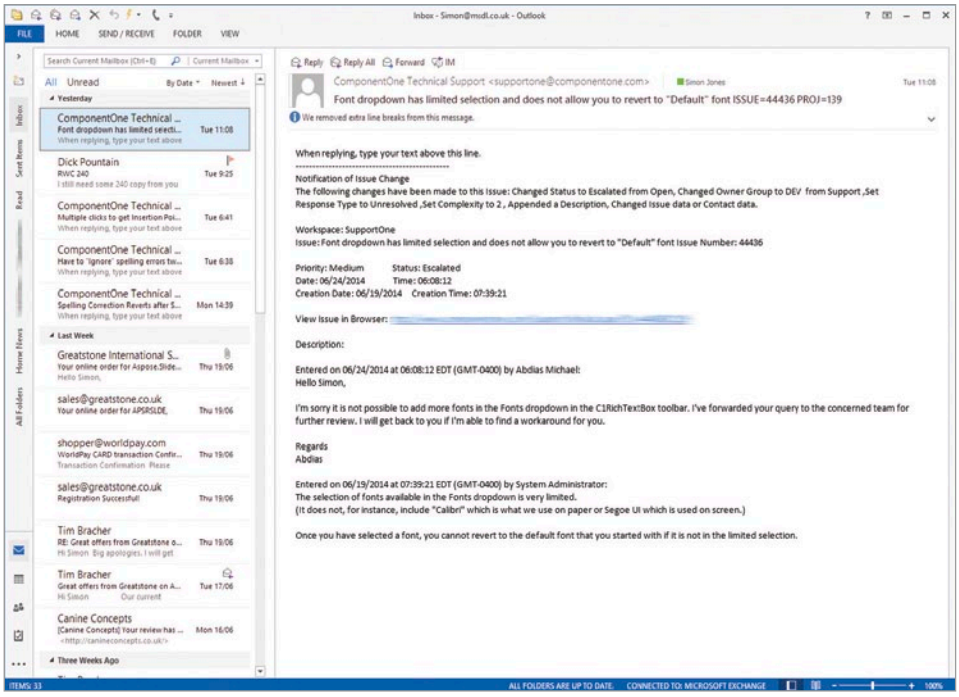
In Outlook 2013, there's a third mode that hides both the ribbon and the status bar. To enter it, click the Ribbon Display Options button in the far top right of the application and choose Auto Hide Ribbon. The application's title bar, the ribbon and the status bar will disappear and the application will take up the whole screen (you can't auto-hide the ribbon and make the application's window resizable). The ribbon is now hidden behind the top bar of the window, which will turn blue whenever you move the mouse over it. The only other buttons up there are the application's Close button and the main Ribbon Display Options button.

> "On smaller screens, you'll want to devote more space to content rather than tools"

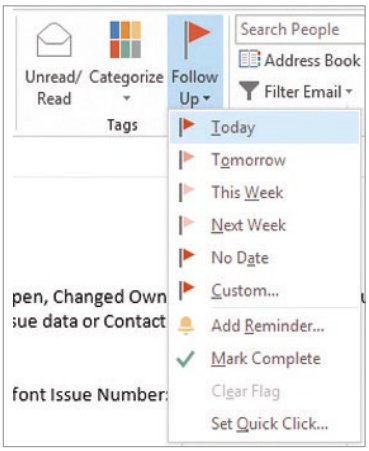
With the ribbon minimised or hidden completely, you'll want to make more use of right-click menus. Right-click works everywhere in Outlook and offers different useful tools depending on the context. Right-clicking while creating or replying to an email, for instance, pops up a mini toolbar with font and style options, as well as a menu for cut, copy and paste.

CONVERSATION

All the tips and tricks I've mentioned so far concern the layout of Outlook. There are several other tools you can use to manage the data that's shown in Outlook, perhaps to stem the tide of email that washes over you every day. Conversation View, for one,



▼ Outlook also offers a less cluttered view, ideal for smaller screen sizes



▲ Flag messages for follow-up so you know what has to be done

arranges emails into groups based on their subject (and other metadata) so that related emails can be seen in one place, rather than scattered about in time. It works across folders, too, bringing together related emails in your Inbox, Sent Items and other folders without your having to file them together.

You can turn on Conversation View by clicking View | Messages | Show As Conversations; then choose whether you want to show conversations in the current folder or all folders. I'd recommend starting with only the current folder to see whether you like the result. Conversation View works best with Exchange Server 2013, but it makes a good stab at older Exchange Servers as well as IMAP and POP3 services.

The latest email in any conversation is shown in the list of emails, with a white arrow to its left indicating that there are more emails in the conversation. Clicking the arrow will expand the conversation, but if the arrow remains white, there are yet more emails hidden from view, probably because their content is quoted in other visible messages. Click the arrow again to fully expand the conversation.

When people's replies include the original message, the subsequent messages grow longer and longer (until someone like me decides to tidy it up by trimming their reply). These back-and-forth sequences contain the entire history of the conversation in one message, so there's often little point keeping the old messages since the latest reply contains the text of its predecessors. The Clean Up tool removes messages that are repeated in other messages: click Home | Delete | Clean Up to clean a single conversation, the current folder or the current folder and its subfolders. Of course, messages deleted by the Clean Up tool are moved to your Deleted Items folder, so you can get them back, but I'd still test it on a single conversation to see whether you like the effect before committing to cleaning a whole folder.

I don't use the Clean Up tool myself, since I prefer to read messages in time order rather than having to work backwards from the bottom of a message to see the context. I'd prefer a tool that stripped out the "in reply to" parts of each message, but there's no consistent way to determine where that starts if the original message is merely quoted in the body text of the reply. Each email client handles this slightly differently – even Outlook offers three ways to include the original email in a reply.

When you're trying to get work done, you may want to limit distractions, say by switching off your mobile and turning on the answerphone. You might even disconnect the doorbell, or put a "do not disturb" notice on your office door. In this spirit, you could close Outlook to stop it collecting emails. But what if you want to read your emails while not being disturbed by new ones?

One quick way to do this is choosing to work offline. Click Send/ Receive | Preferences | Work Offline and you'll be disconnected from your email server as if you had no network connection; Outlook won't collect or send emails until you click Work Offline again to turn it off. You can tell when you're offline because the status bar will show Working Offline instead of Online or "Connected to: Microsoft Exchange". You can still access all the emails Outlook had collected for you previously, and create new email and replies, although these won't be delivered until you connect to the server again.

If that's too drastic, try turning off new mail notifications: mail to and from you will still be delivered and collected, but you won't be interrupted to be told about it. Click File | Options | Mail and untick the boxes under Message Arrival, particularly "Play a sound" and "Display a desktop alert".

ACTIONS, NOT WORDS

Do you ever receive emails that trigger the need for a meeting, whether in person, on the phone or online? Outlook enables you to schedule such meetings and link them to the triggering email in a couple of ways. Click Home | Respond | Meeting to trigger the "Reply with Meeting Request" tool. This creates a meeting request from the original email, addressed to all its recipients. You can then use the Scheduling Assistant and Room Finder tools to add any other people or resources involved and set the location and time before you send the meeting request.

"When you're trying to get work done, you may want to limit distractions"

If you want to meet with people other than the sender of the email, or if you want to book time to deal with the email, drag it to the calendar in the navigation bar; dropping it onto the word Calendar (or onto the Calendar icon) will create an appointment. You can then adjust the time and add further attendees.

If you want to make sure an email receives a reply or is otherwise actioned, flag it for follow-up. Whenever you hover over a message in the list, it will show a grey flag icon; if you move over this flag, it will turn red. Click once and the red flag sticks, and if you right-click you'll see options concerning completion of the follow-up. Click any flag again and it will change to a green tick to indicate the follow-up is complete. These actions can also be achieved through the ribbon by clicking Home | Tags | Follow Up.

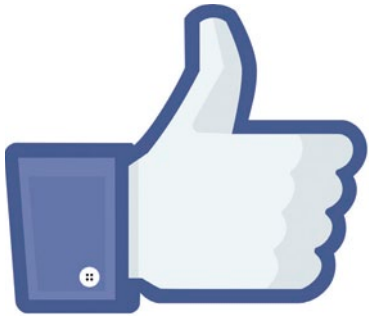
Outlook may be a huge, complicated application, but by using these tips you can tame it and make it work for you. Many accept the default configuration, thinking that tweaking is one of those illogical challenges Microsoft products often throw at you, but it's well worth the time. Next month, I'll be looking at some other tools and tricks, such as Quick Steps and Search, which make finding messages and doing things much easier. ■

TO-DO BAR

Emails in your mailbox that have been flagged appear in the To-Do bar along with your other tasks, but you can also find them easily in any folder by clicking in the search box at the top of the message list and then, on the ribbon, clicking Search | Refine | Flagged. If you need something more formal, drag an email to Tasks in the navigation bar to create a task containing that message. This enables you to set start and due dates, record progress and so on.

HOW TO:

Power advertising with Power Editor

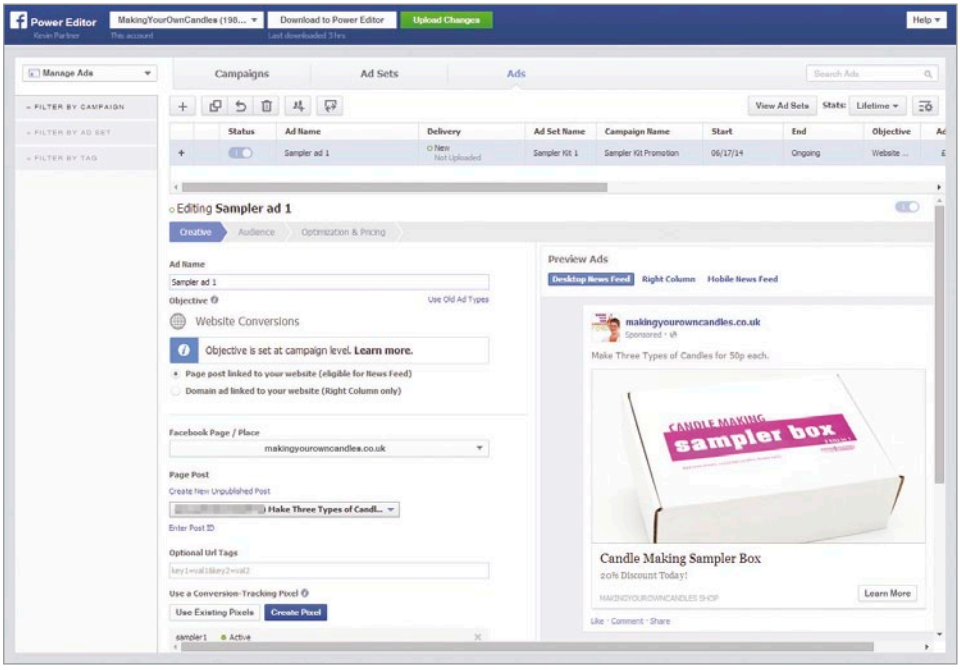


KEVIN PARTNER EXPLAINS HOW YOU CAN TARGET YOUR MARKETING EFFORTS MORE PRECISELY WITH THE USE OF FACEBOOK'S ADVERTISING TOOL

It's no surprise that Facebook has gone to great lengths to make its advertising system easy for busy online-business owners to use. In fact, it could hardly be simpler: type a status update, click the Promote button, set a budget and it's done. Facebook will then present your post to more than the 10% or so of followers who would normally see it. Sadly, this simplicity comes at a price: it's next to impossible to make your adverts pay.

The key to controlling your Facebook campaign is to employ the site's Power Editor. This is "tailored specifically for large advertisers" and offers "precise control of [your] campaigns". Despite Facebook's recommendation that advertisers with fewer than several hundred ads should use the built-in Ads Create Tool, the Power Editor can be used by anyone who wants to take control of their campaign. To use Power Editor, you'll need to set up an advertising account with Facebook; this can be created easily at **www.facebook.com/ads/manage**. This will enable you to access the Power Editor at www.facebook.com/ads/manage/powereditor. Unlike the Google AdWords interface, ads aren't created and edited directly in Power Editor; instead, you "upload" them into the Facebook ads system when you're ready to set them live. Although this could be seen as a more involved and more time-consuming method by which to create ads, the advantages greatly outweigh the effort required to learn your way around the system. In fact, if you're not prepared to use Power Editor, I don't think you should bother with Facebook ads at all.

> "Power Editor will transform the effectiveness of your Facebook advertising"



▼ Facebook's Power Editor opens up its advertising engine to small businesses

CONVERSION TRACKING

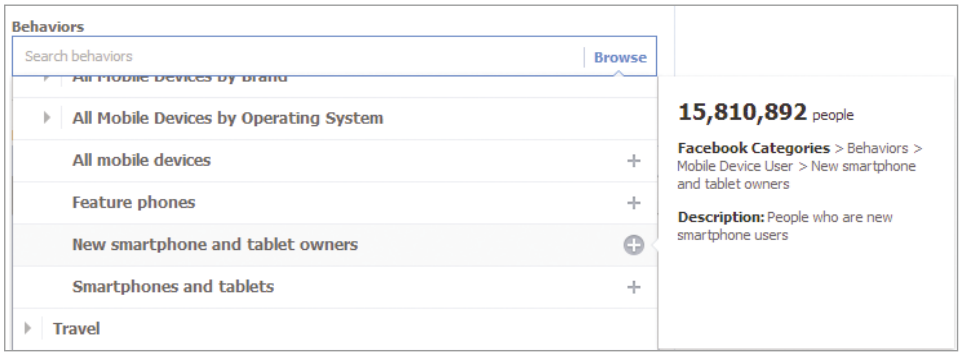
Even if tracking were the only benefit of Power Editor, which isn't the case, it would still be enough to transform the effectiveness of your Facebook advertising. To set it up, copy a snippet of JavaScript to the page on your website to which customers are directed after a firm sale, usually the "thank you" page. This allows Facebook to link that click on your ad to any subsequent action. Without conversion tracking, it's difficult to deduce if your advertising is proving effective, but Power Editor makes your adverts accountable, rather than them being simply a marketing expense. The conversion rate is likely to be the most important metric in most campaigns, so its inclusion in the reporting makes it far simpler to run comparative tests and, therefore, optimise your ads.

CUSTOM AUDIENCES

With Power Editor, you can target Facebook members according to their relationship with you outside the social network. For example, if you employ MailChimp to collect email addresses, you can use Power Editor to connect this email list to your Facebook adverts, then set up ads targeted at those members of your list who also use Facebook. If your list has been set up properly, these users will be aware of your business and either existing or potential customers, so you can write keenly targeted ads.

For example, since they've already visited your site to sign up for your list, you can tailor the ad text to reflect this, which will make it feel far more personal. However, it's important to keep in mind that you, as the advertiser, won't know the names of the email-list members who have Facebook accounts, merely that your ad will be shown to all of them.

You can also create a custom audience based on visitors to your site, which is achieved by embedding into



▲ Power Editor allows you to target specific groups, such as recent buyers of mobile devices

your site a "Facebook pixel" that sets a cookie – this is essentially a piece of JavaScript code. From this, Facebook can tell whether or not a user has visited your site, so you can write ads specifically for them. I admit such ads can be annoying, but they can be powerful if done with discretion. After all, if a customer visits my site but goes away without buying anything, a gentle reminder of our presence a few days later may jog their memory and bring about a sale.

POSITIONING AND DEVICE TARGETING

Users of the desktop Facebook client can view ads within or down the right-hand side of their main newsfeed. Power Editor lets you choose in which location you want your ad to appear. In most cases, you'll want to test both positions to see which results in better conversion rates. You can also specify whether your ad should be shown only to desktop users, mobile users or to both. You can even choose on which specific brands of mobile device a particular ad should be seen. Although you might imagine that targeting the widest audience possible is the best option, having information on which device a user is viewing Facebook – when combined with an understanding of how much the typical user of that device is worth to you – can focus your marketing efforts far more tightly and make it more effective.

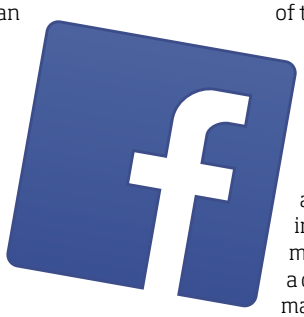
For example, in most markets, we're approaching the tipping point where mobile visitors become the majority. However, what if your site analytics show that desktop users tend to spend more and have a higher conversion rate? First, this suggests you need greater insight into your site's design and sales funnel: how does your shop look on a smartphone screen and how easy is it for customers using a smartphone to pay? But it also implies that it would make sense for your ads to appear only if the potential customer is viewing Facebook on a PC, or at least imply that you'd be better off devoting more time and money to such users. Furthermore, such device targeting will enable you to run split tests – in which the same ad is shown across multiple platforms – to see which works best.

You can even target tablet users, rather than those using phones; iOS devices over Android ones; and iPads instead of iPhones. It takes little effort to duplicate an ad within Power Editor so that one set of "creatives" can be tested across multiple devices and

> "You can quickly see which campaigns make the greatest difference to your bottom line"

in front of different audiences. And, thanks to conversion tracking, you can quickly see which combinations make the greatest difference to your bottom line.

If this catalogue of benefits hasn't yet convinced you, Power Editor also offers batch editing, which can greatly shorten the time it takes to make a single change across multiple ads. It's also first in line for any new features Facebook introduces to its ad system: these tend to be tested and perfected by Power Editor users before being implemented in the standard system.



SETTING UP A CAMPAIGN

If you want to use a custom audience – for example, by connecting with MailChimp, uploading an email list or adding a Facebook tracking cookie to your website – set up a campaign first. It's a simple matter of following the prompts. Power Editor will ask whether you want the "fixed-price" or "auction" buying type: the former allows you to specify an overall budget, on the basis of which Facebook will inform you of how many impressions you're likely to get; the latter lets you specify a daily budget and guide price. The latter is the option I usually choose.

You can now tell Facebook what action you want users to take – in other words, your main campaign metric. For an online shop, this would normally be conversions, whereas other web businesses may want users to visit a certain URL or "Like", comment or share a page post.

The next step is to create at least one ad set (the equivalent of an ad group in AdWords), each of which has its own daily budget and start date. Take care here, since Facebook doesn't ask for an end date by default, but it's essential to set one. To see the necessary field, deselect "Run my ad continuously".

You can now create new ads for this ad set, each of which will have three aspects, called Creative, Audience, and Optimisation & Pricing. Facebook ads are simply normal status updates, photos and videos that are promoted, so the first step is to identify an existing update or create one within the Power Editor interface. You can associate your ad with any Facebook Page you administer; once you've selected it, the latest post for that page will appear. In most cases, however, you'll want to create a new post that will be used only for the purposes of advertising.

Another advantage of the Power Editor is that it gives you far more choice about what this ad contains and what options it presents to the user. For example, you can embed a button containing one of a range of text labels, such as Learn More or Download. You also get far more control over the headline and descriptive text, so you can craft a compelling ad. This is also the point at which you can specify where your ad will appear and on which devices, so if you intend to target both desktop and mobile users, I recommend having a different campaign for each – it makes it much easier to see quickly which is performing without having to drill down to the individual ads.

It's with the audience options that Facebook's ad system establishes its advantage over AdWords – the range is amazing. If you've chosen to import a custom audience, you can simply select it at this point, or you can choose the sorts of people to whom you'd like your ad exposed. You may expect this selection to be based on gender, age and the range of interests

users have indicated in their profiles, but Facebook ads goes way beyond this level of detail. For example, not only does Facebook know whether a user owns a smartphone or tablet, but it's also aware of how long they've owned it – presumably based on when they installed the Facebook app. This means you can target those who have recently purchased a tablet if, for example, you're selling insurance or tablet covers. You can even – heaven help us all – advertise to holidaymakers a week after they've returned home.

The final step is to set up the pricing scheme you wish to use, which should almost always be cost per click (CPC), since this will force you to work out how much a click is worth to you. Cost per thousand impressions (known as CPM, for cost per mille) is a licence for Facebook to print money, whereas optimised CPM allows you to set marketing goals and have Facebook set the cost per action to fit these goals. Once you've done this, click the Upload button; once Facebook's ad team has reviewed your campaign, it will go live.

FIRST IMPRESSIONS

It's early days yet for the campaigns I'm currently running, but the first results appear encouraging and interesting. So far, the most effective has been the advertising aimed at desktop users: not only am I making sales as a direct result (on the evidence of the conversion tracking system), but the cost per conversion is comparable to that of AdWords. In fact, it's been around 25% cheaper.

I've found the advertising based on my MailChimp custom audience to be effective, too, although the number of impressions and the conversion rate is much lower. So far, the least effective has been the mobile campaign: although there have been plenty of impressions and a reasonable clickthrough rate, the conversion performance has been poor. This could be down to site design and payment processing, so I haven't given up on advertising to mobile users. For now, though, I'm turning off this campaign.

So far so good – I'll certainly continue using Power Editor to run my Facebook campaigns. I like the fact that I can drive clicks directly from the social network to my online shop and, crucially, record any conversions to sales. I can then make a direct comparison between my marketing efforts via Facebook and my advertising on Google.

AGENCIES

Whether you need to hire an agency to handle your social media marketing depends on how important this form of promotion is to your business. In the case of my online retailing, for example, we have a popular Facebook page but we market mainly through AdWords and our email list. My ongoing experiment with Power Editor has demonstrated that pay-per-click ads have their place on Facebook, although the traffic and sales they generate are insignificant compared to those of AdWords. Therefore, I can't justify the cost of using an agency. On the other hand, if my business depended on Facebook or Twitter, using the expertise and manpower of an agency makes more sense.

BUILDING A COMMUNITY

While you'll need a business Page to get started with Facebook advertising, you won't need a big following if your aim is simply to send clicks to your website. You'll get the best out of the platform, however, if you build a community to whom you can advertise directly, alongside the wider Facebook userbase. With this larger following for your Page, you'll also receive the social media benefits of being able to provide support and generate interest in your products.

> "You have to earn the right to promote your products by first providing valuable content"

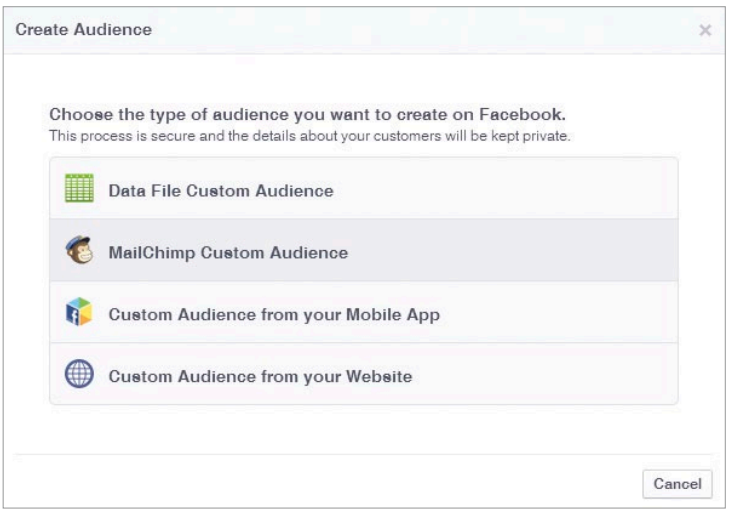
It's been a while since I've started a Page from scratch, so I asked Ben Harper of social media agency Datify to provide some advice. The best approach, he says, is to mix the creation of content with advertising from the start. Conventional wisdom has been to create lots of interesting posts before starting to advertise, but it can take weeks to populate a Page in this way, and you'd end up with a negligible audience. It's far better to run ads from the beginning, since many people will "Like" a page if they like its title.

That said, at this stage advertising should be aimed purely at increasing the fanbase of your Page. If you're intending to send clicks to a third party or to sell directly from Facebook, Harper recommends you hold off this type of promotion for at least six weeks or so; otherwise, you risk alienating your nascent community and stunting its growth. Indeed, he says this is the most common mistake made by newcomers to Facebook marketing – you have to earn the right to promote your products by first providing interesting content.

FINAL THOUGHTS

I'm impressed with Power Editor, since it turns a system that was of marginal value to most online businesses into a genuine alternative to AdWords. There's no danger that it will replace Google's cash cow for me anytime soon, but it's a useful supplement and a far better option than Bing. By using Power Editor, I can target Facebook users with unmatched precision, and I can run experiments with fine levels of control until I discover the magic formula that provides a good level of conversions for minimum cost.

It's a shame that Facebook doesn't trumpet this tool more widely and, indeed, appears to go out of its way to put off small businesses from using it. Were I a cynic, I'd suggest this is because it makes more money from the cruder system built into Pages, which would be reason enough to choose Power Editor. Give it a try, it might surprise you. ■



▶ Using Power Editor, it's possible to match Facebook users with your email list or visitors to your website

DVD contents

Apps, essentials, full software, drivers & more!

ON THE DVD:

FEATURES
+ ASHAMPOO PHOTO COMMANDER 11
+ FILEWING SHREDDER 2014
+ MOVAVI SCREEN CAPTURE
+ SAMPLITUDE PRO X SILVER
+ XARA PHOTO & GRAPHIC DESIGNER 7

DRIVERS
+ ATI CATALYST
+ NVIDIA FORCEWARE

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+ DAMAGED OR FAULTY DVDS
+ USING THIS DVD
+ INSTALLING SOFTWARE

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+ BURNING AN ISO IMAGE
+ PC&TA EDITORIALS

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+ SERIAL CODES
+ BLANK REGISTRATION WEBSITE
+ CAN'T FIND A FILE?
+ INSTALLATION ERROR

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+ CCLEANER
+ CUTEPDF
+ DEFRAGGLER
+ DEEPBURNER
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+ MALWAREBYTES' A/M
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+ VLC MEDIA PLAYER
+ WINRAR
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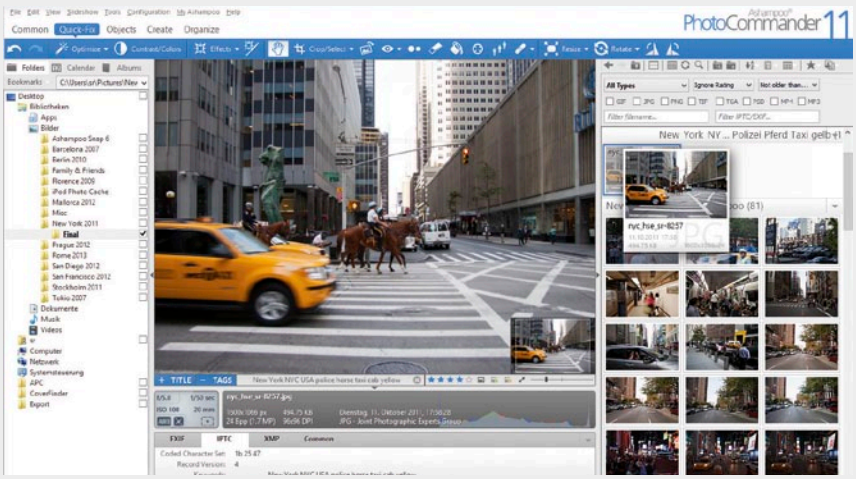
+ AOL INSTANT MESSENGER
+ VUZE
+ DROPBOX
+ GOOGLE CHROME
+ FILEZILLA
+ M/S SECURITY ESSENTIALS
+ MOZILLA FIREFOX
+ MOZILLA THUNDERBIRD
+ SKYPE
+ STEAM
+ ZONEALARM

LINUX
+ UBUNTU



ASHAMPOO PHOTO COMMANDER 11

Whether it's simple brightness, contrast and color manipulations or complex tasks such as image restoration, Ashampoo Photo Commander 11 provides everything you need in one intuitive package.

- Manage, organize and browse your photo collection
- Work with intuitive wizards to achieve best results
- Save time and auto-adjust your images for maximum visual clarity
- Restore picture quality and remove noise, scratches and other unwanted objects
- Become creative with a myriad of brilliant image effects
- Convert between numerous image formats
- Turn your images into greeting cards, calendars or photo collages
- Upload your work to social networks or share your images through email
- Enhanced wizards: Recursively add files from directories, auto-store files in default image folder where appropriate
- MiniMap: Drag within the mini overview to scroll inside images
- Zooming: Smoother zooming with redesigned zoom bar
- Easy-Printing: Support for imperial measurements
- Color-Picker: Icon-drag support to select any visible color
- Fullscreen view: Auto hide/show image tags
- Compare mode: Auto-enable dual-view on image modifications
- Image effects: Instant visual feedback through live previews

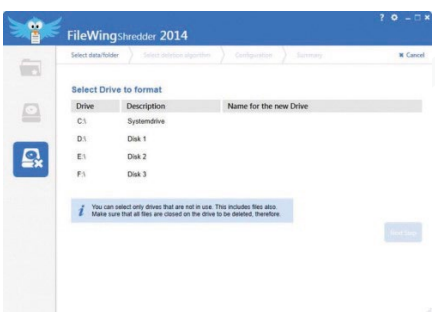
FileWing Shredder 2014

Safely and irreversibly removes files

FileWing Shredder uses different algorithms to safely remove your data. You've got the choice between seven different methods of data removal. These algorithms overwrite your data between one and 35 times, which increases the safety of irreversible removal of your data. The used algorithms are scientifically tested.

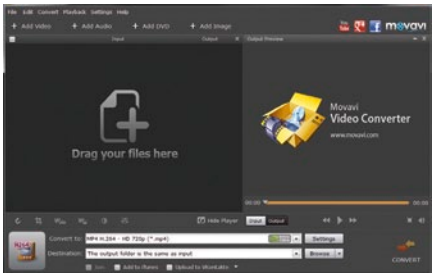
Guaranteed data removal

The algorithms to delete files in FileWing Shredder were developed by security experts. They are scientifically proven and optimized.



Safely and irreversibly removes files

Choose between seven different methods to safely delete your files.



Movavi Screen Capture

Capture screen video of any kind: desktop, the Web, and more

While most screen recording software specializes either in creating slick screencasts or in recording games, Movavi's all-purpose recoding program with support for Windows 8 does both – plus it captures streaming videos. And each mode is perfectly adapted to the recording and editing needs of that specialty.

Edit recorded video: split, merge, and enhance

Whether you're enhancing, applying special effects, or overlaying titles and soundtrack, with Movavi Screen Capture Studio you can turn your recorded video into a first-class user guide with the help of Movavi's huge range of video editing tools. Edit videos on a multi-track timeline, enhance the quality using different filters and apply special effects for an even better impression.

Record live streaming videos

The Internet knows everything and we can tap into that knowledge through webinars, interactive guides, and videos. Watch events live or at your convenience – use our software to record whatever you want and set it up for later viewing. The optimization for Intel Core processors with Intel HD Graphics support enables you to reduce CPU usage and get smoother screencasts of online video as a result.

Create screencasts, record webcam and online chats

No matter what you plan to do capturing the screen – create a video tutorial or record a PowerPoint presentation – high quality and flexible recording options are a must. With a frame rate of up to 60, smooth, professional video output is within your reach. Use Movavi capturing toolkit as a webcam video recorder or video call recorder – its possibilities in capturing screen activity are almost endless. Above that, take screenshots with a single click – whether full screen, window, or the full screen area.

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No freezes or slowdowns! We know only too well that a deca-second counts, which is why our capture screen app uses every ounce of your PC's processing power to capture your gameplay with no system hangs or delays. You get a perfect recording of Skyrim or WOW, complete with master shots and epic battles.

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Samplitude Pro X Silver

Samplitude Pro X is the perfect DAW for uncompromised audio productions - from

arranging and recording, to editing and mixing, all the way to professional mastering and CD/DVD authoring.

Work with a fully customizable interface and experience a DAW tailored to your needs. The precision audio engine with 64-bit support, outstanding mastering quality plugins, 5.1 Surround mixing and its ability to be seamless integrated into your studio make Samplitude Pro X the most powerful audio workstations.

- For Windows XP, Windows Vista & Windows 7
- VST supported
- Up to 44.1kHz samplerate
- 8 tracks (MIDI / Audio)
- Unlimited objects per track
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- Input / Output: 4/4
- Intuitive interface
- Hybrid Audio Engine
- Renewed docking concept
- Object oriented workflow
- 32-Bit Floating Point engine
- Mixer
- Object editor
- Export: Wave, OGG, MP3 (requires WMP 10 or higher)

PC & TECH AUTHORITY

DVD CONTENTS

No 203 / OCTOBER 2014

WINDOWS: CCLEANER + CUTEPDF + DEFRAGGLER + DEEPBURNER + FOXIT READER + APPLE ITUNES + MALWAREBYTES' A/M + SANDBOXIE + SPYBOT S&D + VLC MEDIA PLAYER + WI + 7ZIP **INTERNET:** AOL INSTANT MESSENGER + VUZE + DROPBOX + GOOGLE CHROME + FILEZILLA + M/S SECURITY ESSENTIALS + MOZILLA FIREFOX + MOZILLA THUNDERBIRD + SKYPE + STEAM + ZONEALARM **TROUBLESHOOTING** SERIAL CODES + BLANK REGISTRATION WEBSITE + CAN'T FIND A FILE? + INSTALLATION ERROR **HELP** DISCLAIMER + DAMAGED OR FAULTY DVDS + USING THIS DVD + INSTALLING SOFTWARE **EDITORIAL:** BURNING AN ISO IMAGE + PC&TA EDITORIALS **LINUX:** UBUNTU **FEATURES:** ASHAMPOO PHOTO COMMANDER 11 + FILEWING SHREDDER 2014 + MOVAVI SCREEN CAPTURE + SAMPLITUDE PRO X SILVER + XARA PHOTO & GRAPHIC DESIGNER 7 **DRIVERS:** ATI CATALYST + NVIDIA FORCEWARE

INSTRUCTIONS: Open Windows Explorer, navigate to your DVD drive and double-click Index.html in the root directory. **DISC PROBLEMS:** To replace faulty DVDs, please send the discs to: *PC&Tech Authority* DVD Replacements, Level 5, Building A, 207 Pacific Highway, St Leonards NSW 2065

Make sure to include your name and postal address on the back of the package so that we know where to send the replacements. For all other DVD related issues email **cd@pcauthority.com.au**. As the delivery platform only, *PC&TA* and Haymarket Media cannot and will not provide support for any of the software or data contained on these discs. Although all discs are virus scanned, Haymarket Media cannot accept any responsibility for any loss, damage or disruption to your data or computer system that may occur while using the discs, the programs or the data on them. There are no explicit or implied warranties for any of the software products on the discs. Use of these discs is strictly at your own risk.

Input Output

DAN RUTTER BRINGS THE ANSWERS TO YOUR QUESTIONS LIKE NO-ONE ELSE CAN

"SOUND OFF!" "ONE!" "ONE!" "I'M ONE TOO!"

I work in a 10-person office with what you might kindly call a "chaotic" Windows network setup, but it works well enough most of the time with no more than the usual shared printer that one computer can't see, shared files that some other computer won't access, etc. We've got laptops and drive boxes and stuff coming and going all the time so there's no one configuration for us to fix, and no pressing need for it. Except when everything goes wrong.

Sometimes, in some particular configuration, everybody starts being unable to see everybody else, even if we unplug/disconnect-from-wireless every computer and start adding them back again one by one. So far the debugging process has revealed that if we give computers fixed IP addresses, they are immune to whatever this is. So we could just do that with a poster on the wall that says who has what address so new stuff doesn't clash, but it feels as if I'm right next to the solution but can't see it. Any incredible ideas?

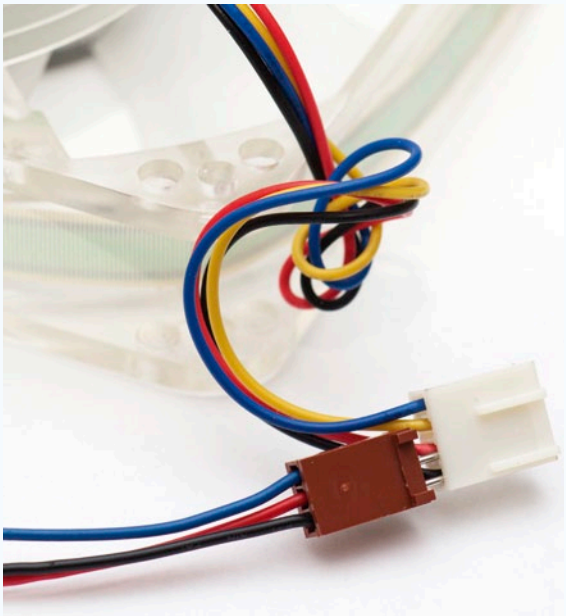
C F King

You've got DHCP server problems.

The Dynamic Host Configuration Protocol lets any computer, and various other things like "network appliances" of various kinds, work as a server that hands out IP addresses to anybody who asks. If you set something to "obtain an IP address automatically", it'll use DHCP.

The ubiquity of a DHCP server as a feature of every network box, though, makes it easy for a frequently-changed network like yours to end up with more than one DHCP server on it. One server is meant to be there, probably as part of a router that that connects its clients to each other and the Internet; the other server is probably in out-of-the-box default configuration and actually will in theory connect its clients to each other, but not to anything else.

There's a simple little utility called DHCP Explorer, available as a command-line version for various OSes or as a possibly-made-by-someone-else graphical version for Windows, bit.ly/dhcpexplorer. Run it, click the button, and it sends a DHCP request and tells you what responds. If only one server does, then whatever your problem is, it's not multiple DHCP servers. If you see more than one DHCP server, then the DHCP-server option needs to be unticked in the setup for whatever access point, drive box or actual computer is the evil culprit.



NEEDS MORE GAFF AND JB WELD

As my girlfriend will tell you I am one of the smartest idiots in the world, so I would like to know if my latest invention [pic above] is genius, or not.

That is a fan double adapter made of two bits of paper clip wire. You push the wire through the bottom of the connector until it comes out the top, and then you can carefully plug the bottom connector onto the motherboard and another fan onto the top.

How bad is this idea? I know paper clips are steel and that's not the usual choice for electrical wiring... what else have I missed?

Liam C.

Moderately.

Steel indeed is not a very good conductor, but a little bit of it passing a low current won't be a problem.

But, first, the fans you double-adapt this way must not between them exceed the power-delivery ability of the motherbaord header.

Second, if the connector comes apart - and there's nothing much holding it on - the paper-clip wires could short out and pop a motherboard fuse.

Third, make sure you only connect the power and ground wires, as in this case, not the third speed-sensor wire or the fourth speed-control wire. (In the picture, the top fan connector has the third wire, the bottom has third and fourth.) Actually, the speed-control wires of a couple of fans could probably be spliced together and the mobo could control them together, but splicing speed-sensor wires would confuse the mobo deeply.

Fourth, there are more reliable ways to run extra fans, like with a Molex-PSU-plug-to-fan-socket plug adapter, or with a proper wired Y-adaptor with the same electrical structure as your paper-clip adapter.

So I'd categorise this not as "it's stupid, but it works", but more as "slightly too stupid to work properly".

THERE ARE WORSE FLUIDS

Time for another "weird gunk in the computer" letter!

I've got a nice old clicky IBM keyboard, which was suddenly made less nice by a pile of cat vomit on it. Mindful of your past mention of it being OK to clean electronic equipment with tapwater, I just ran the hot tap over the affected regions of the keyboard, then dug out what was between the keys popping

I/O OF THE MONTH

KEEP PRESSURE ON IT! DON'T YOU DIE ON ME!

My living-room computer is an old 17-inch Dell, almost 10 years old, that I'm frankly surprised still works. Except yesterday it didn't work, and today it does again. Yeah...

Yesterday, about the bottom third of the screen turned into vertical lined garbage. OK, fair enough, ancient laptop finally dies but maybe I can get a new screen on eBay or something, but as I was closing the lid I caught a glimpse of it coming OK again. So I opened it and poked and prodded and discovered that if I squeezed the left side of the bezel back against the case, the screen worked again. So I got a little spring clamp and put it on the screen, and bingo, perfect again. Oh, super.

So that's great and all, but my question is, why does putting a clamp on the SIDE fix it? I don't know much about laptops, but I do know that the data cable goes into the BOTTOM of the screen. What's a loose connector or something doing half way up the left side?

Josh Carboni

▲ A screen like this is not always as bad as it looks.

O LCD monitors are one of those commonplace technological things that obviously can't actually work, like jumbo jets and, come to think of it, CRT monitors too. (Just wiggling electrons around in a hair-bun of wires at the back of a giant vacuum tube steers THREE beams of other electrons through onto pinhead patches of phosphor? Suuuuure.)

Every square pixel of an LCD is made of three rectangular subpixels, but the screen itself is a sandwich of multiple layers from a reflector at the very back, through polariser and colour-filter and switching and the actual liquid-crystal layers in the middle, to the (hopefully) scratch-resistant frontmost layer. Even the simple liquid-crystal display in a calculator or watch has at least six layers; an ordinary computer monitor can have nine or more.

Every subpixel has its own transistor, and those transistors have to all be wired up, and both the transistors and the wires need to be pretty much see-through or the light from the back of the sandwich won't make it to the front. So you end up with a layer of transparent indium-gallium-zinc-oxide transistors, which is pressed up against super-thin transparent metallic wiring on a layer of glass. If those layers aren't pressed together any more the transistors won't have power and the screen will go white (LCD subpixels are black when the transistor is fully *on*, blocking all of the light from the backlight). If the layers are *slightly* separated, you get random garbage.

So the side of your old LCD has, presumably, separated just a bit, and clamping it together, even through the plastic casing from the outside, is enough to push the layers back into contact. The connection to the laptop mainboard is, as you say, at the bottom through the hinge, but there are plenty more connections within the LCD itself.

off keycaps where necessary and putting them back on when done, then I shook the remaining obvious water out of it and left it in the sun for an hour and plugged it back in... and it doesn't work.

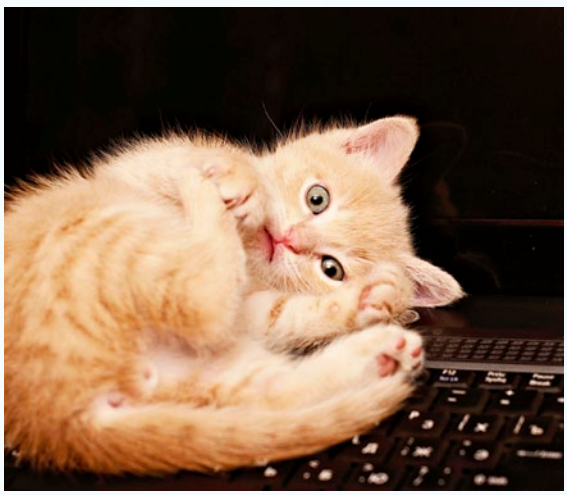
The num lock / caps lock / scroll lock lights come on in unpredictable ways, and no keys seem to work.

Have I hosed my keyboard by hosing my keyboard?

Reb Rogers

O Probably not. You just need to dry it out completely.

If you leave the keycaps on, it's difficult to get water into the workings of an IBM keyboard, or any other kind where the plastic caps cover "wells" that go down into the switchgear. Running water vigorously over the whole keyboard will get some water in there, though, and IBM keyboards, like everyday cheap rubber-dome keyboards, have a sandwich of circuit-matrices in there that does the switching.



▲ Awww, look at the filthy little bastard.

(The click from an IBM clicky "buckling spring" keyboard is the sound of the spring buckling, not an actual mechanical keyswitch. The more common clicky keyboards that're now widely available all use discrete keyswitches, and may or may not be easier to drown than this.)

While the circuit sandwich is damp, it won't work. This goes for all keyboards that have such a sandwich in there, whether it's the capacitive type in an IBM keyboard or the simple switching matrix of an ordinary cheap rubber-dome 'board.

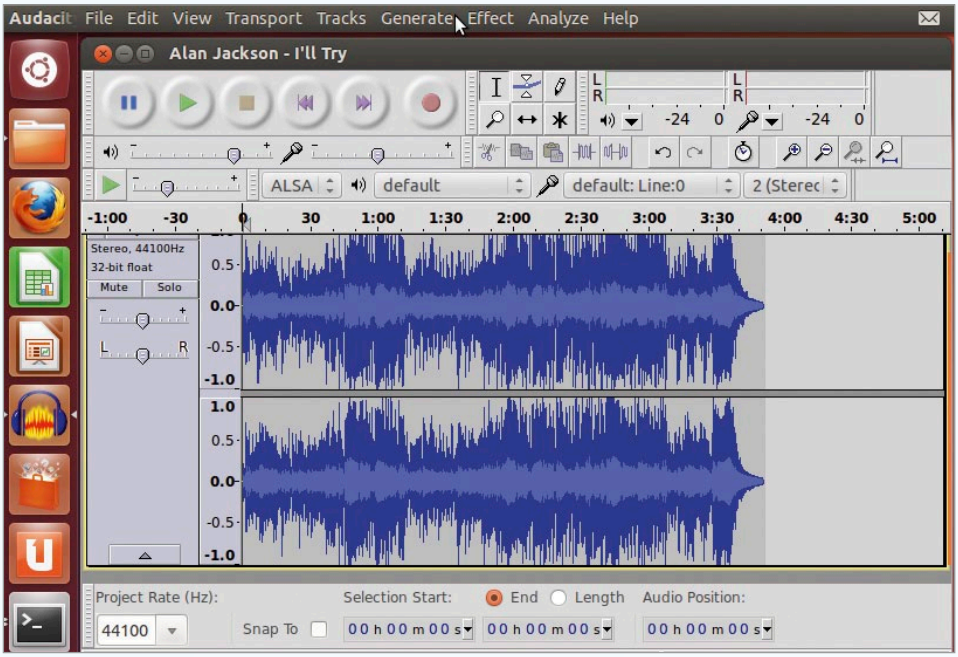
(The rubber domes in cheap keyboards are both spring and switch for each key. The inside of the dome is conductive, and bridges contacts on the circuit sandwich when pressed down onto it.)

In some cases you may need to actually take the keyboard completely apart to clean it, or at least to dry it. But often you'll be fine if you just thoroughly dry the thing with air-flow from outside.

So take your damp keyboard, put it in front of an ordinary household fan, and leave it there for a LONG time. Like, a few days. If you put it out in the sun and the breeze it may be thoroughly dried in an afternoon, but it doesn't hurt to leave it longer. Well, unless it rains and returns you to good old square one.

Ubuntu vs Windows: which is faster?

LOOKING TO MAKE THE MOST OF OLDER HARDWARE? **DARIEN GRAHAM-SMITH** PITS MICROSOFT'S BEST AGAINST THE POPULAR FREE ALTERNATIVE



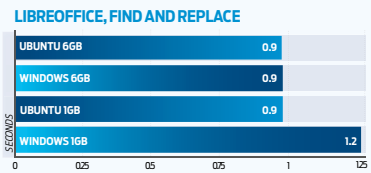
It's generally perceived that Linux is a better-performing operating system than Windows, especially on low-power hardware; those with long memories may recall that, back in 2007, low-powered netbooks ran Linux for precisely this reason.

Since then, however, Microsoft has worked hard to make Windows 7 and 8 responsive even on less-powerful hardware. So if you're keen to eke the best performance from your hardware, you might be wondering which operating system is the fastest. We've put the latest versions of Windows and Ubuntu head to head to establish whether the old wisdom – that Microsoft's flagship operating system struggles to keep pace with Linux – still applies.

To establish a level playing field, we carried out our testing using Windows 8.1 Pro and Ubuntu 14.04 LTS in a dual-boot configuration on a low-cost laptop from a few years back, namely an Acer Aspire 5750G. Both OSes were installed to a 100GB partition – plus a 6GB swap partition for Ubuntu – to minimise performance issues arising from limited disk space. To keep things as fair as possible, our tests focused on applications that are available on both platforms, and in both systems we ran each test twice – once with 6GB of system RAM and once with 1GB to see how performance was affected by memory conditions.

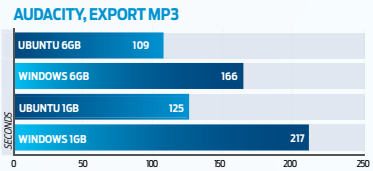
APPLICATION PERFORMANCE

We began our tests with real-world productivity applications. Word-processing and spreadsheet tasks make light demands on a system, and even a major hardware upgrade can make a barely perceptible difference to the user experience. We therefore started with an unrepresentatively demanding task – finding and replacing more than 3,000 instances of a given string across a 20-page document in LibreOffice Writer.



Clearly Linux copes better with less RAM than Windows – but the difference between 0.9 seconds and 1.2 seconds is hardly significant.

For our next test we turned to a more demanding application: the free Audacity audio editor. We loaded in a 44-minute podcast episode in WAV format, applied dynamic compression and exported the result as an MP3 file with a constant bit rate of 128Kbits/sec. The compression test completed at precisely the same speed on both platforms, but the free operating system pulled way ahead when it came to encoding and saving the file in MP3 format:

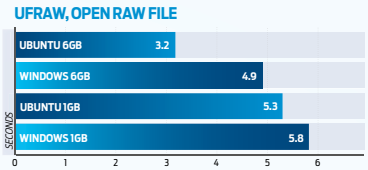


It may be significant that the version of Audacity provided by the Ubuntu Software Centre comes with the ability to export MP3 files built in, while the Windows edition requires an external encoding library. We used the recommended LAME v3.99.3 software, so on both platforms the software was tested in its standard configuration. The results speak for themselves: Audacity's performance in Ubuntu suffers only slightly from lack of available memory, while Windows is significantly slower even with plentiful RAM, and falls further behind when memory is tighter.

To conclude these tests, we moved on to a digital photo-editing workflow. Ubuntu lacks industry-standard software such as Adobe Photoshop Lightroom, but cross-platform tools exist for processing high-quality images, notably the UFRaw importer for handling raw photo files and the well-known GIMP for editing images.

We started by loading a 24-megapixel image in 14-bit Nikon raw format into UFRaw. Converting the raw sensor data into an onscreen preview involves a

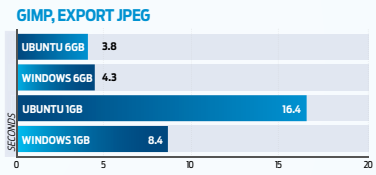
considerable amount of processing. Here's how long it took:



As with Audacity's MP3 export function, Windows trails even with plenty of RAM, although the margin shrinks when memory is straitened to 1GB.

We then transferred the image to GIMP and tried a few transformations on it, first applying a Gaussian blur, then shrinking the image to 1,200 × 800 pixels. Neither of these operations was affected by the amount of RAM available, and although Windows nudged ahead by a fraction of a second, this wasn't enough to make a perceptible difference.

Finally, having restored the image to its native 6,000 × 4,000 resolution, we exported it as a JPEG at 90% quality and saw the only upset of this portion of our testing:

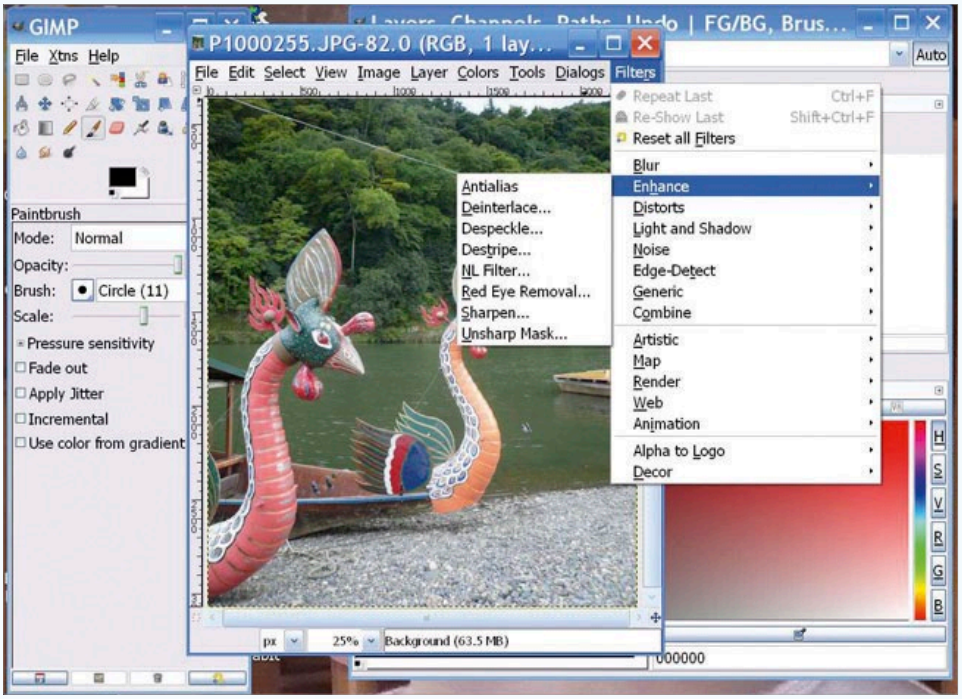


Ubuntu slightly outpaced Windows with 6GB of RAM, but on a low-memory system the free OS took almost twice as long as its Windows counterpart to produce the file.

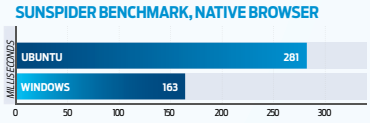
Taken together, the results of our tests suggest that Linux performs slightly better than Windows in productivity applications, especially with low memory. The effect isn't always pronounced, however, nor is it universal, as our photo-editing test illustrates. Still, as we've mentioned, we wouldn't recommend Linux as a platform for editing photos in the first place, especially not on hardware with such limited resources.

BROWSER PERFORMANCE

Although Linux may lack the application support of Windows, these days you can do a lot via web-based services that don't care what OS you're using. If you're setting up a PC for basic email and web-based tasks, then Linux is an appealing choice: it's cheaper than Windows, and more flexible and better supported than Chrome OS.

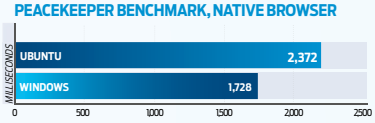


To compare browser performance, we started by running the SunSpider JavaScript benchmark in the browser supplied with each operating system – that is, Internet Explorer (IE) 11 on Windows 8 and Mozilla Firefox on Ubuntu (the current version at the time of testing being Firefox 30). Predictably, the amount of RAM installed made no difference. But we were surprised by the scale of the performance gap between the two operating systems:

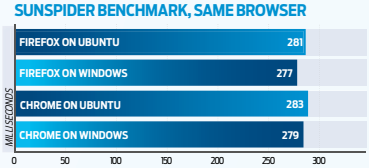


IE wins by a massive margin. It's important to remember, though, that IE uses a completely different JavaScript engine to Firefox, so this isn't an apples-to-apples comparison. Indeed, it's been suggested that IE's exceptional performance in this test may be due to it skipping over parts of its code, having detected that they produce no useful output. This is a perfectly legitimate way to optimise performance, but it can lead to unrepresentative benchmark results. Switching to a different benchmark – one that tests HTML5 gaming and video performance as well as pure JavaScript – turns the tables dramatically:

▲ Keen photographer? Then Windows 8.1 has the overall edge



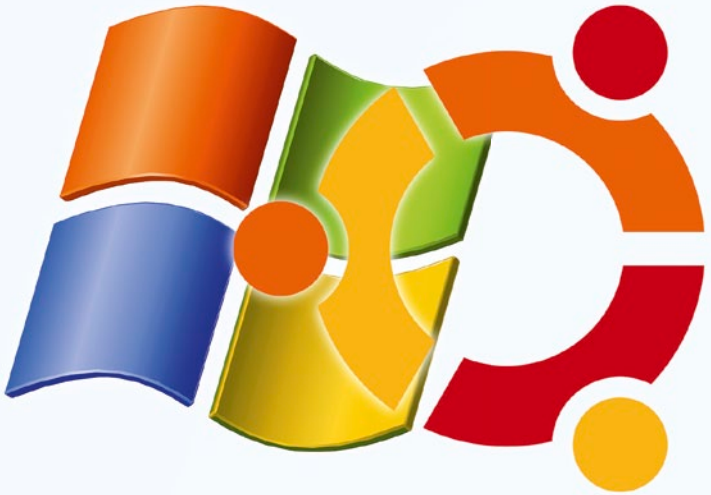
It's hard to derive a definitive conclusion from these scores, but our suspicion is that in real-world use, IE on Windows 8 would trail slightly behind Firefox on Ubuntu. Of course, you're not obliged to stick with either system's native browser: Firefox is available for both operating systems, and Google Chrome can also be installed easily on both.



Once we take IE out of the mix, no meaningful difference in browser performance is visible between Ubuntu and Windows – not only when running the same software, but also across competing browsers.

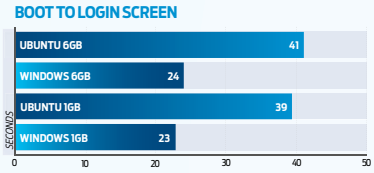
PERCEIVED PERFORMANCE

We've established that Ubuntu can complete certain tasks slightly faster than Windows, especially when memory is at a premium. However, the perception of performance tends to rest on responsiveness as much as real-



world performance.

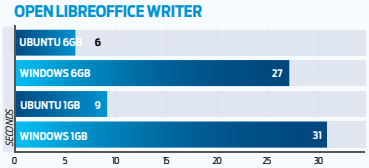
To see how Ubuntu and Windows compare by this very subjective measure, we started by timing how long each operating system took to boot up from a cold start and through to the login screen:



It's striking that the login screen took around 70% longer to open in Ubuntu than in Windows – but this isn't the whole story. On Windows, startup processes continued to load for some time after we'd logged in, making the computer choppy and unresponsive. On Ubuntu, although the desktop was slower to appear, when it did open the OS seemed much smoother. As an experiment, we configured both systems to automatically log in and load Firefox on startup, and then timed the wait between our hitting the power button and seeing the browser appear on screen:

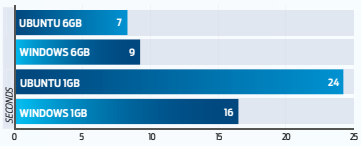
Evidently both platforms take a similar time to fully start up: the difference is simply a question of how long each OS waits before showing the desktop. When it came to waking up from sleep mode, Ubuntu was slightly faster, coming back to life in around three seconds compared with five seconds for Windows.

We next tested how long it took to open a sample application when the computer was otherwise sitting idle. Here, it's fair to say our results were varied: Firefox opened from cold in six seconds on both systems. Things were quite different when we double-clicked on an ODT file to open LibreOffice Writer:



Opening the application a second time – after its resources had already been cached – took around two seconds on both systems, regardless of RAM availability. But the perceptual damage had been done: we had waited around for almost half a minute for Windows to open a word processor, while Ubuntu had done so in a third of the time.

For our final test, we timed how long it took to shut down both of our test computers:



With 6GB of RAM, Ubuntu achieves a seven-second shutdown time that beats Windows by a couple of seconds. As soon as things get tighter, Windows pulls ahead.

THE BALANCE OF PERFORMANCE

The results are in: when the same applications are tested across Ubuntu and Windows, the free OS delivers some performance benefits, but neither has an advantage in browser-based tasks.

Ubuntu may feel faster than Windows: it grinds the hard disk less at startup, it wakes up more quickly from sleep, and in the case of LibreOffice, it allows you to start work more quickly and smoothly. But overall, Windows 8.1 gives Ubuntu a decent run for its money.

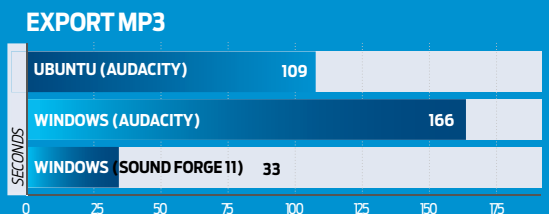
Of course, there are still good reasons to choose one or the other, including hardware support, ease of use, and pricing philosophy.

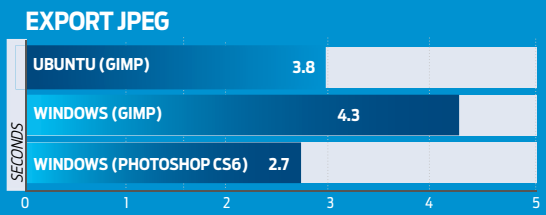
For some, the availability of commercial software may swing the decision in favour of Windows. Performance, especially in office environments, that however, is nowadays a minor consideration.

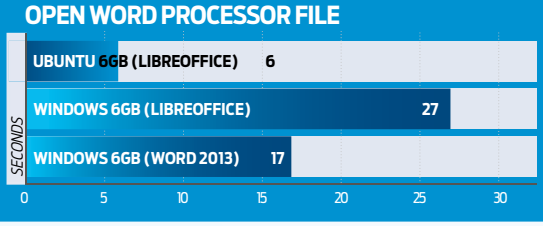
COMMERCIAL WINDOWS APPLICATIONS

Open-source, cross-platform applications make a useful baseline for testing, but in the real world Windows users in particular may eschew such tools in favour of commercial alternatives such as Sony Sound Forge, Adobe Photoshop and Microsoft Office. The graphs opposite show how long it took to carry out our sample tasks using these applications, compared with their open-source equivalents, on a 6GB system.

Commercial applications won't always be faster than open-source code. However, commercial developers have a financial incentive to streamline and optimise their code to attract customers and upgraders, while open-source projects typically have other priorities. So it should come as no surprise to see paid-for applications on Windows outpace their open-source equivalents on Ubuntu.







Bring Your Own Problems

PAUL OCKENDEN REVISITS THE PROS AND CONS OF BYOD, AND NOTICES THAT BLUETOOTH LE IS FINALLY STARTING TO TAKE OFF

I last covered Bring Your Own Device (BYOD) in depth in August 2012, so thought it may be interesting to look at what has changed in the intervening couple of years. Back in 2012, it would have been phones that came to mind when BYOD was mentioned, in particular smartphones. Nowadays, the term has broadened to include tablets, laptops and such like. As I said then, it's hardly new – many readers of this column have been bringing their own device for decades.

Bringing your own tools to work isn't unique to IT and office-based jobs, either: carpenters, mechanics, plasterers and other tradespeople often use their own kit, too. The main beneficiary is the employer, of course, who receives a substantial saving in overheads, both for the initial purchase of the tools and for their replacement when items go walkies (a problem that's endemic in building sites, for example).

A WORKER'S PREFERRED EQUIPMENT SET

Tradespeople also benefit, since rather than having to use equipment that's forced on them, they can choose the tools that suit them best. Although this involves personal expense, you'll often find that workers prefer to buy their own, better-specified tools. A prime example here is soldiers who buy their own boots because they don't care for Army-issue footwear.

Now that these issues are beginning to affect the IT industry, they're discussed as if new, rather than a practice that's been adopted for generations. Is BYOD merely a new term for an old phenomenon, or is there more to it?

Despite "bring" being part of the acronym, we tend to think of BYOD as being less about physically carrying your own kit into the workplace and more about the problems it can cause. BYOD is concerned with the awareness of these challenges, and a realisation of the opportunities that arise when workers bring in their own tools, as well as the procedures needed to manage the risks involved across several fronts..

> BYOD confers a degree of freedom that's lacking with company-supplied hardware

AN EMPLOYEE'S PERSPECTIVE

Some employers will contribute towards all or part of the cost of the employee's kit, whether that be a laptop, a tablet or a phone.

One key benefit to employees is a consistent, familiar working environment. BYOD usually confers a degree of freedom that's lacking with company-supplied hardware – you can set up your phone, tablet or laptop exactly as you'd like it, rather than how the IT department likes it. Of course, this can reap productivity benefits for the employer, too.

Another obvious advantage of BYOD, particularly with regards to phones, is that it solves the "two-pocket problem". Many folk have been carrying around two phones for some time: one supplied by their company and a personal one. We've all smirked to ourselves when someone on the train has answered the wrong phone, haven't we? (Or is that just me?)

It isn't all good news for the employee, however, since there are downsides to BYOD. Perhaps the biggest is psychological; some people feel offended that they're being asked to supply kit that's traditionally been the responsibility of the business and see it as a form of penny-pinching.

In many cases the employer will also require staff to load specific software onto their personal device. But what happens if the phone in question is already full of music, videos and apps? What if it's a laptop with only a small amount of free space on its hard drive? Would you be happy to delete personal content from your own machine to suit your employer's demands?

Most importantly, what if said software restricts what you can and can't do? After all, it's your machine: you paid for it and therefore own it, yet your boss is telling you what you can and can't do with it. This is a steep psychological barrier that some people struggle to overcome, and things become worse still when people realise that their employer could remote-lock or remote-wipe their device.

EDUCATION

The key here is to turn such problems into advantages. Employers should sit down with their staff and explain how remote-locking and wiping can be beneficial for both parties.

They should also address that, if an employee's phone, tablet or laptop is lost or stolen, the company's systems will help track it down. Similarly, the company's security software will prevent a thief gaining access to details such as internet banking credentials, family photos and so on.

THE COMPANY COST

What are the benefits and pitfalls of BYOD from a company's perspective? The first point is that you shouldn't assume there will be a cost saving. While an employee bringing their own laptop to work means you have one fewer device to purchase, management and support costs will almost certainly increase. You'll no longer have a company-spec laptop, installed with a standard hard-disk image that's been used to set up every machine throughout the business, with the common problems with which you're familiar. Likewise you'll no longer have a fleet of company-standard smartphones running the same version of an operating system. Your support costs will increase significantly, possibly to the extent that they outweigh any hardware savings.

What's more, this is before factoring in the cost of device-management software – which in some cases can be eye-watering – and that of ensuring any business tools and apps you use are suitable to run across a broader range of devices.

This is a problem I come across regularly while wearing my CST Group hat. We deliver a web-based tool to a company where BYOD has been adopted, and find we have to fiddle and test over and above what is normal to ensure cross-browser support. I know HTML5 and CSS3 are supposed to render enterprises browser-agnostic, but anyone working at the bleeding edge of web development is well aware that there are still many annoying differences to be found between browsers, even between versions of the very same browser.

BETTER GEAR

On the other hand, one useful benefit is that consumer devices are often of a higher specification and more up to date than company-supplied kit. This is especially true of phones – a typical company smartphone will be on a three-year replacement cycle, whereas many consumers now upgrade to the latest model phone annually.

One area in which I've seen BYOD flourish is short-term project work. In my own industry – building websites and web-based tools – there's been a growing tendency for agencies to hire designers and developers equipped with their own computer and software for a few weeks at a time. These are proper "employed" jobs, not contract roles, often because this enables the company to pay a day rate that's lower than a contractor's fee. I've witnessed this pattern everywhere, from few-man-band agencies up to the biggest outfits.

If properly managed, this approach can work well. However, having spoken to people who have applied for such jobs, I know that, in many cases, management is virtually non-existent. Someone rolls up with a MacBook Pro or Windows laptop loaded with Adobe Creative Suite 6 Master Collection, and at most the company will check the antivirus software is up to date – very rarely will they check the software and whether it's actually properly licensed.

PAUL OCKENDEN
Owner of one of the oldest web agencies, Paul works on award-winning sites for many blue- chip clients.

SECURITY

This lack of scrutiny may be due, in part, to the fact these are often rushed jobs, where people are being brought in to help meet an impossible deadline. The company just wants to get them working – and fast.

I'm not saying all companies are this slipshod, merely that many within the creative industry seem to be, as well as many "job-hoppers" who take advantage of this lack of scrutiny. And, if someone turns up at your premises with a laptop loaded with hooky software, you can be certain they'll leave with more, having hoovered up copies of anything you've bought.

CHECKS AND BALANCES

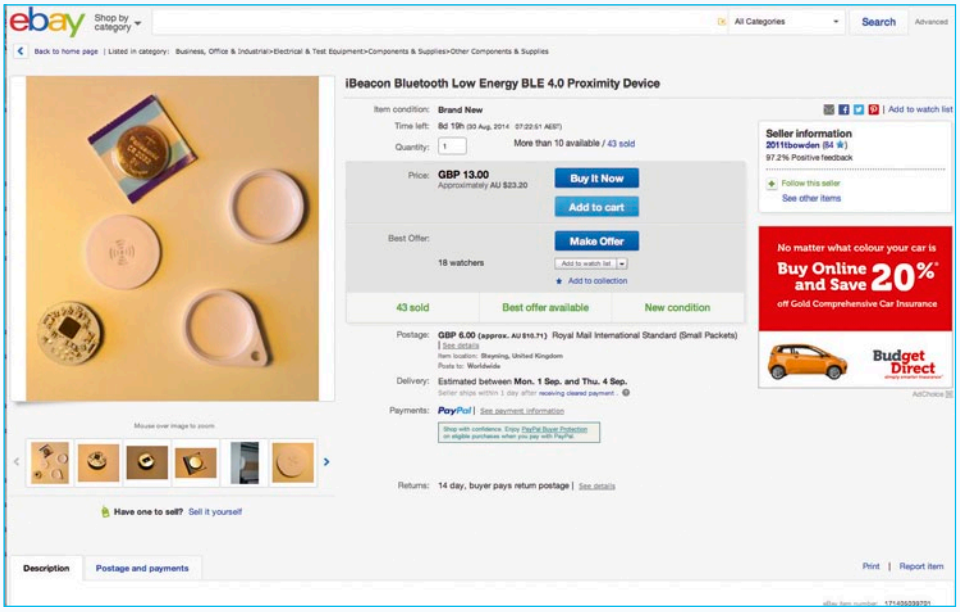
Licence compliance is an issue that many companies believe can be solved by management and monitoring software. Yes, you can load software that checks all the programs on an employee's laptop are legitimate, but these tools don't usually scrutinise whether the fonts that a designer is using in Photoshop or Illustrator are properly licensed, for example. The audit software probably won't spot whether your developers are making use of "borrowed" components in the applications they're developing in Visual Studio, either. In a conventional IT setup, all these things can be effectively managed, but BYOD makes this management far more difficult. These issues can come back and bite you on the bum in a big way – usually at a time when the offending designer or developer has long since flown from the company nest.

SOFTWARE LIMITATIONS

Don't get me wrong: software designed to help in BYOD scenarios has its place. Indeed, it can be a real boon and save a company plenty of time. However, there's also a danger that it may encourage an attitude of complacency. It's crucial to understand the limits of what such software can do and then properly explore what happens around its edges.

Some people advocate desktop

Respected Australian site IT News runs an annually updated survey covering BYOD and it's worth a read, at http://tinyurl.com/noj5pqg



▲ Grab an iBeacon for only $23 on eBay and have a play with them yourself

virtualisation as the answer to such problems, but I'm not convinced this is always appropriate. For starters, working on a remote desktop can be too sluggish for certain tasks, although this can be mitigated to an extent by using fat clients and/or "virtual GPU" graphics cards.

In addition, it removes a key element of the comfortable, familiar environment that's the whole point of using your own device. Yes, the screen and keyboard will be the same, but the underlying desktop and perhaps the operating system will be unfamiliar. Finally, a key advantage of BYOD is the fact that it enables people to take their work home with them, but typical British home broadband speeds mean that working via a remote desktop from home isn't really a viable option for many people.

HANDS-ON, HANDS OFF

The more I've seen of BYOD schemes, the more I've come to realise that the solution isn't more draconian rules and overly zealous device-management software. Nor is it strictly enforced policies that limit what a device can do, or anything that makes the employee feel like they're getting a raw deal. Successful BYOD needs to be financially sensitive. If the employee buys the kit, maybe you can help them obtain a discount, and perhaps help fund the purchase via a small salary sacrifice over a certain period.

Successful BYOD benefits from close communication, too, including easy-to-understand documents that explain what's allowed, what isn't and where both parties' responsibilities lie. Most of all, it requires a "partnership" approach in which both parties fully understand both the benefits and the risks, and are comfortable with the arrangement.

THE LOW ENERGY BLUES

For the past three or four years, I've been telling anyone who'll listen that Bluetooth Low Energy (LE) is on the verge of going mainstream. Now, it looks like my prediction may be about to come true.

Bluetooth LE was introduced with Bluetooth 4. It has been designed for the most frugal battery consumption possible – you'll get around a year's worth of juice from a typical 10p-sized CR2032 button-cell battery – while maintaining a connection range similar to conventional Bluetooth devices. It's a technology sometimes described as Bluetooth Smart, but this is merely a trademarked marketing term for BLE.

In fact, calling it Bluetooth at all is a bit of a red herring. Although it employs the same 2.4GHz frequency band as "classic" Bluetooth – and so is able to share components such as antennas – Bluetooth LE is a different beast entirely. It uses a separate set of RF channels; it has its own speedy wake-up and connection protocols; it provides a lower throughput than classic Bluetooth; and devices can connect to an almost infinite number of nodes. It also introduces the concept of "advertising", by which a slave node announces that it has data available for any device that happens to scan it. Although this was originally termed "advertising" in a technical sense, it offers huge potential for the more traditional sort of advertising.

I last wrote about Bluetooth LE in the context of StickNFind location trackers, but shortly afterwards Apple announced support for its Bluetooth LE-based proximity system iBeacon; since then, we've seen an explosion of Bluetooth LE devices. The StickNFind stickers are actually iBeacon-compatible, and various vendors have created iBeacon development kits, which usually consist of a few Bluetooth LE stickers and some software on which to program them.

For those who prefer a more home-brewed approach, there's a far cheaper option. I picked up an iBeacon-compatible BLE sticker on eBay for $23, and there are several free apps on Google Play and the Apple App Store that you can use to configure the device. I've found Jaalee's eBeacon app to be effective – watch the video at **www.youtube.com/watch?v=kO_KzwOZk1U** to see it in action. These apps, and the $23 Bluetooth LE sticker, provide similar functionality to the StickNFind devices for a fraction of the price.

BLUETOOTH EVERYWHERE

Incidentally, when scanning for Bluetooth LE devices I was intrigued to find that my Apple TV showed up in the list of detected devices. It seems that Apple has deployed this as a super-quick method of configuring the device. While it's on its initial setup screen, you can tap an iPhone or iPad on it and, using Bluetooth LE, it will transfer the settings for items such as your Wi-Fi access point and password without you having to use the awkward onscreen keyboard. I imagine most people assume this is being achieved via NFC, but it's actually Bluetooth LE. Hopefully, we'll start to see all kinds of novel uses for BLE over the next year or so – I'm convinced its time has come. ■

APPLE UPGRADE

It's a shame the Apple TV remote uses infrared, since Bluetooth LE would be a superb way to employ RF control – no more having to point the device at the box. Perhaps in the next version...

Get it taped

JON HONEYBALL DISCOVERS THAT TAPE IS STILL THE MEDIUM OF CHOICE FOR MASS STORAGE NEEDS – AND FINDS HE'S FALLING A LITTLE OUT OF LOVE WITH DROPBOX

▲ The LTO-6 format is now the Big Daddy in the world of tape drives

I decided that we needed a tape backup. This was no small step, since I'd managed to convince myself for a decade that digital tape was the root of all evil. Ten years ago, I had an HP DAT drive, and the kindest thing I could say about it was that DAT stood for "dies after two years", which it did. Then, its replacement had huge problems reading the tapes I'd so carefully created. This wasn't an issue only with HP's drives – DAT itself was at fault – and I know that I wasn't merely unlucky, since a number of my clients had similar problems. So the whole affair left a sour taste in the mouth.

Since then, I've been relying on multiple hard disk backups for my important data. This can be messy, since there's always a temptation to create \wednesdaybackup\mystuff and then next week create \tuesday, which contains \wednesdaybackup\mystuff. Eventually, you feel like Alice peering down the rabbit hole as you acquire endless copies of copies of data splattered across disks in various subdirectories. Sorting this out can take days.

It's worse still when you decide to replace an old PC and take a copy of all its drives, "in case there's something important". This means you end up with \oldmacbookprobackup, which also contains its own mess of \tuesdaybackups and so forth, except that now you've copied the mess onto your shiny new computer (or stuffed it onto a RAID array connected to a server). The only saving grace of such a huge data mess is that drive indexing now enables you to find things quickly, but this isn't really a good enough solution. Sure, it will list all 37 copies of \thatmissingfile.doc, but are they all good?

Today, the amount of data on my network is rather large. One of my main data stores is almost 10TB in size, and there's a 10TB Time Machine archive of it as well. Then there are various other images created using SuperDuper, which is an excellent tool for finely controlling backups. Adding a further 24TB to the network, in the shape of an Asustor AS-608T NAS, was a good way to relieve some bottlenecks, but it left me with a dilemma: should I purchase another to run a backup of the first? And, if I do, how do I locate it off-site in case of fire?

> I found myself crawling across a hellish landscape of firmware updates and patches

JON HONEYBALL
Computer journalist and consultant specialising in both client/server and office automation applications.

Well, cloud-based storage is a big help here. I have a 1TB Dropbox account, through which the most important items can be synced to a computer in my house, ten miles away from the office. But things become murky when you add in the legal issue of being able to prove the state of a particular file on a specified date. I could use Dropbox's infinite undelete facility to roll back the file to a certain date, but would this satisfy a judge? I'm not totally convinced.

Hence my decision to look again at tape. In the world of tape drives, there's now one Big Daddy: the LTO-6 format. This offers 2.5TB of storage natively and up to 6TB compressed, depending on your files. Now, 2.5TB is certainly a start, but arguably it isn't enough. You may remember I tried out a Tandberg LTO-5 drive last year, connected to my desktop Mac via a fibre-channel-to-Thunderbolt interface box.

This worked reasonably well, but clearly I needed more storage space. LTO-6 was a start, but a box that can handle eight LTO-6 tapes in an autochanger is a better size. This ultimately led me back to HP and its 1/8 G2 LTO-6 autochanger.

This dinky thing is only 1U high, but it's deep, which is necessary to accommodate the eight tapes, the autochange mechanism and the tape drive itself. Connection to the outside world is via SAS, so I needed an SAS-to-Thunderbolt interface. I went for the ATTO ThunderLink SH 1068 box, which offers two SAS ports, thus allowing for SAS expansion.

For software, I reverted to Tolis BRU PE, updated to the latest version. This is handy, since it understands Final Cut Pro X installations and can grab all the files for your video-editing projects in one go in a hands-off operation. Getting this rig up and running was almost painless – right up to the point where it didn't work.

Well, it worked some of the time, except for when it hung, or when the software couldn't find the drive, or when Martians invaded and covered everything with custard. Suddenly, I found myself crawling across a hellish landscape of firmware updates and patches.

The ATTO had a firmware patch, but I needed to install Java to get it working. The HP drive? Well, there I ran into a real problem. You see, I typed the serial number of my device into HP's website and discovered that, instead of the 12-month support warranty I'd expected, I had approximately nine months left – and this for a device that had been purchased from a main HP reseller only days beforehand. I know it was a main HP reseller because HP ran a significant cashback offer on these drives in

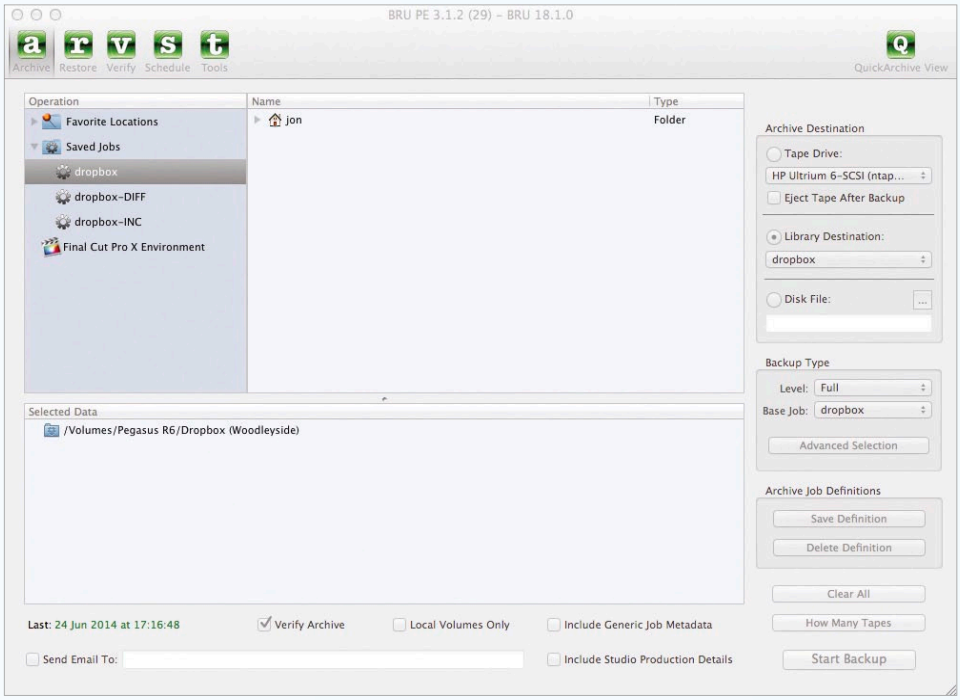
June, and I was given $3,000 off the purchase price.

You can imagine how amused I was to discover this reduced warranty. So amused, in fact, that I engaged the help of the *PC & Tech Authority* team to find someone at HP to whom I could express my amusement. A week – and many apologetic emails – later, HP still can't explain what's happened or why my warranty has been foreshortened. I'll get to the bottom of this, hopefully before I, or the drive, explode. You may recall all that nonsense a few months ago about HP not offering firmware support if your device was out of warranty. Well, I've got my eye on you, HP; our relationship started off rather badly this time around.

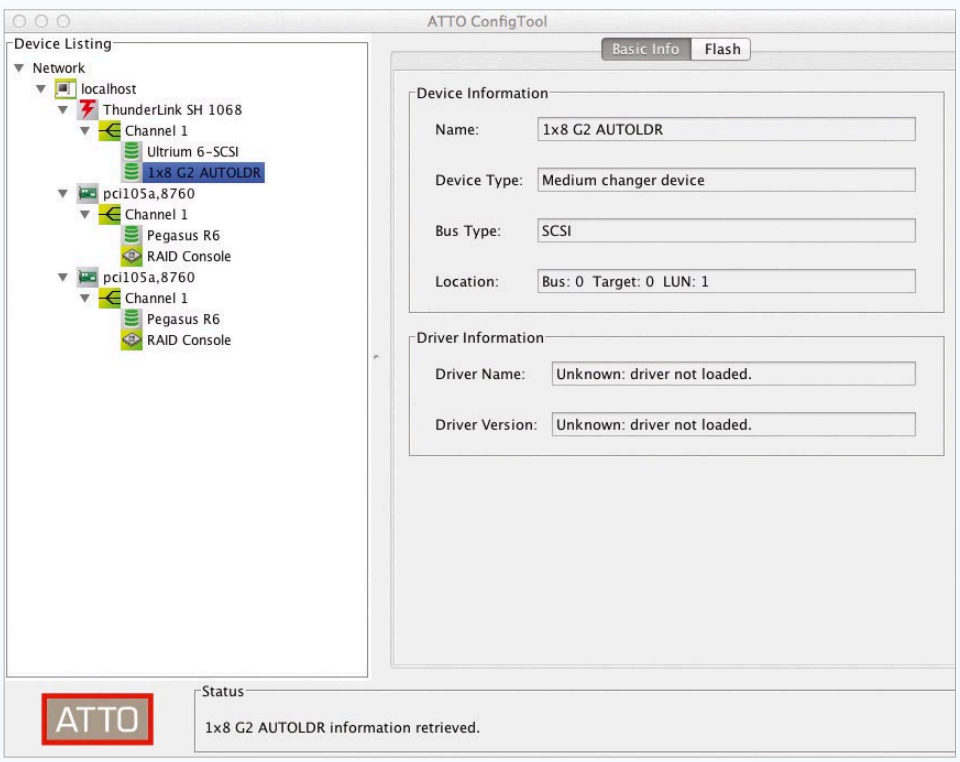
Indeed, the relationship has worsened already. I tried to discover whether I had the correct firmware for the drive and autoloader, which you'd think would be easy: download a pair of firmware files; go to the web-based interface on the device; load the firmware files; and let it update itself. But that would be far too simple.

You see, on HP's website, you have to select the OS you're running, at which point it tells you what's available to you. If you're on OS X, you don't receive any firmware options. Windows 8? Sorry, you're out of luck too. However, choose Windows Server 2008 R2 and you'll get a whole variety of things, including "HP Library and Tape Tools Firmware Bundle (American, International)". Why the distinction between 8.1 and Server 2008? Who really knows...

So, I have a dilemma. I could update the drive and autoloader using the Windows-based firmware updater running in a VMware Fusion VM session; however, I have no desire for any more grey hairs. I delight in using Fusion on an almost daily basis to run various versions of Windows, but to update the firmware in a multithousand-pound tape library? All right, I could connect the library to another machine, but I don't have one with SAS, nor do I have a Windows computer with a Thunderbolt port (not many do), so I'm left with the same dilemma.



▲ Tolis BRU PE is a powerful tool, but its user interface is in need of an overhaul



▼ The ATTO ThunderLink SH 1068 box offers two SAS ports, allowing for plenty of SAS expansion in the future

Of course, it isn't really clear what version of the firmware is actually in the bundle itself: it's simply dated 4 April 2014. The web interface on the device lists a pair of version numbers, but with no dates. You'd think that someone at HP could have joined up this information, but evidently not.

Finding out what was going wrong with the backups brought flashbacks of a nightmare, too. BRU PE is powerful, established and well regarded, but I wish someone would show it some 21st-century user-interface design love: it looks like a dog-eared piece of code written in the 1990s in Visual Basic 3. It makes me sad to say this, since it performs an important role, and I'm far from convinced that my problems had anything to do with the software. I started out by using the Thunderbolt ports on the new Mac Pro, and I think I'd point the finger there first.

Having changed computers, changed the firmware in the ATTO box, changed Thunderbolt cables, reconfigured the Thunderbolt buses,

spat rum and waved a dead chicken over the HP drive, I now have a solution that seems rock-solid. Was it worth the grief? Yes. Being able to set up a number of tapes as a single archive volume is great: throw large amounts of data into the archive and let it sort it out; do a full backup then incrementals; then pull the tapes out and load new ones. As for the legal archiving requirement, I can use WORM (write once, read many times) tapes. In this new arrangement, a set of WORM tapes is taken at the beginning of every month, then taken off-site to be stored in a proper archive.

All of this has given me the kick up the backside necessary to start untangling the pile of spaghetti that is my networked disk-based storage. Getting rid of old duplicates that are no longer needed is certainly therapeutic, and a glance at the price of LTO-6 tape cartridges provides me with a serious incentive to simplify and dedupe.

WHAT'S IN A NAME?

My Tool of the Month award goes to the utterly wonderful Better Rename 9, which you can find in the Apple App Store. This lets you rename a bunch of files in one go, but that's not all: it's incredibly clever in the way it builds new filenames for you. For example, it can dig into a set of EXIF data on photos and pull out the shooting date and time information from the images, then use this to create sequence numbers or add date and time information to filenames. I was simply looking for a way to rename a bunch of JPEG files more meaningfully, but the things Better Rename 9 lets you to do when you dig into its features is breathtaking.

At $24.99 for a one-person licence on an unlimited number of installations, it's worth every cent. There are also family and small-business licences that support up to five people, and even large-business licences, too, so there's no excuse for having the wrong licence. For filename munging, it's the best thing since sliced bread.

And what's this? Yes, there's a version for Windows users, too, called Better File Rename for Windows. These tools have been invaluable in the process of sorting out the debris from my data explosion. Do I really want to see yet another file called _dsc_0237.nef ever again? No – and neither do you.

THAT SYNCING FEELING

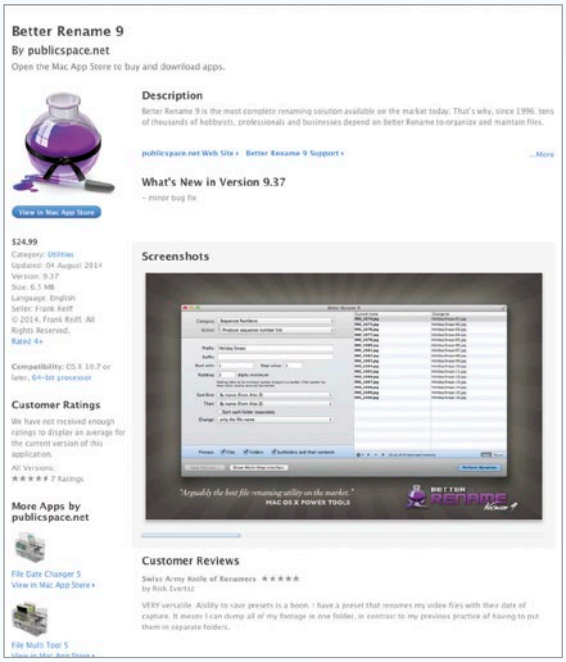
My faith in Dropbox has been shaken. Until a few weeks ago, it had been stunningly reliable, but then things started to become a bit wobbly. I wasn't too enamoured with the renaming of my Dropbox folder from "Dropbox" to "Dropbox (Woodleyside)". Nor was I pleased at the removal of the function that allowed you to rewire up your installation to an existing folder; if you try to do that now, it will whinge that there's already a Dropbox folder there – cue tearing of hair and shouting of rude words. Apparently, there's a file hidden in the root of the Dropbox folder that you can delete to get around this, but it didn't work for me.

Do I really need the facility to have two separate versions of Dropbox on my machine, one for myself and one for my work account? Not really. I'm not convinced its solution is the correct way of going about things, either. Annoyingly, there's still no native facility for encrypting data at the client end, using my own key pair to ensure that what's transmitted over the interwebs to its data centre and stored online is encrypted to my satisfaction. In these post-Snowden days, a small dose of paranoia is no bad thing.

More seriously, the competition is catching up. Microsoft has said that Office 365 subscribers will receive 1TB of storage as part of their subscription, although if you visit **www.office365.com** and look up the relevant accounts it still says 25GB. No matter: I'm sure it will arrive soon, just like last year's Office 365 dashboard upgrade that took more than six months to roll out. It may be July, rumours suggest, but no-one at Microsoft was prepared to confirm even the year.

The increase to 1TB would be most useful, and may even be enough to tempt me to move from Dropbox. After all, I currently pay hundreds of dollars a year for the five-user Dropbox for Business solution, and I could get that for free via my existing Office 365 Enterprise E3 licences. (Actually, I think I'd get 1TB per user on my E3 licences, which makes the Dropbox product look quite expensive.)

There are a couple of wrinkles, of course. There's still no OneDrive Business for Mac client, but I've ranted and raved about that one long and hard already. Then there



▲ The Better Rename 9 app, by developer publicspace.net allows batch renaming of even the most puzzling filenames.

> "In these post-Snowden days, a small dose of paranoia is no bad thing

are rather nasty file-size and quantity limitations. The Microsoft document (**http://support.microsoft.com/kb/2933738**) says that you can sync "up to 20,000 items in your OneDrive for Business library [including] folders and files". I currently have 49,111 items in my Dropbox store, so that's a problem. What's more, in a SharePoint library, you can only sync files up to 2GB.

I'll confess that this 2GB limit made me chortle. I took to Twitter to suggest that it might be down to Microsoft's use of the FAT32 format for the SharePoint server file system. It was only a joke, but one senior Microsofty took it the wrong way and sent me a blistering message that would make a drunk sailor blush. Calm down, my dear, and look it up in the dictionary – it's under "humour", and don't forget the "u".

So, will Microsoft OneDrive's new 1TB offering be enough to make me jump ship? Maybe. But not this year, that's for sure. ■

AND FINALLY...

My 2011 iMac has a DVD drive on its side with a lovely, thin-machined slot. Just below this is an SD slot. Do I need to tell you what I just did? Of course not – you would never be quite so stupid. It took me ages to get the SD card out of the DVD slot with a pair of tiny tweezers, and now there's a blob of sticky tape on the front bezel to remind me which is the SD slot. I suspect old age is creeping up on me.

Technology Futures

FIONA TEAKLE UNDERSTANDS THE WIDER BENEFITS OF TECHNOLOGY.

The future of the world is pretty unknown. When I say that I mean in terms of technology, how the world will look in the future is unknown, while there are people who are predicting various things based on trends. In my mind there is one area that will benefit greatly from the change and improvements in the technology in the future; and that is to be found in the developing world.

Already you can see the impact that technology is having in the developing world. If you have recently been to Africa as an example, nearly everyone you pass will have a mobile phone. The change in technology is allowing some of the poorest people access to modern medicine and doctors that may be 100's of kilometres away without having to leave their village.

The future of technology is not just being driven by people working in ICT, but by people who are passionate about improving the world. Recently Eyenaemia represented Australia at the Imagine Cup Globally and won! The team is comprised of two medical students who are enthusiastic about changing the world. The app allows for users to take a selfie and, by analysing the conjunctiva and also calculates the risk of anaemia.

This change is facilitating a rise in entrepreneurship, which is being demonstrated all over the world. Entrepreneurship is allowing everyday people that are most familiar with the issues look for the best way to solve them and use technology that is at their fingertips.

One of the ways in which the world is working together to solve these problems is through the use of Hackathons. An event aimed at creating a solution to a problem by bringing together people from all sections of the community. One of these aimed at helping solve humanity issues is Random Hacks of Kindness (RHoK). RHoK is a rapidly growing global initiative encompassing a community of over 30 countries making the world a better place by developing practical, open source technology solutions to respond to some of the most complex challenges facing humanity. This is done by defining problems, organizing hackathons, and ensuring projects are effectively deployed.

> "Technology is bringing together people from around the world to help improve the world we all live in"

FIONA TEAKLE is Director of the ACS Young IT Board. You can contact her at fionateakle@acsmail.net.au

While we are looking at ways to improve the world through technology and ensure everyone has a positive future there are also negative aspects that we need to consider. If technology is being distributed around the countries, ensuring an even distribution across urban and rural locations will be a challenge. If not addressed it may lead to a change in socioeconomic classes being formed which may widen the gap for various places. There will also be a change in the demand for skilled workers with a greater level of education which the countries may not be able to provide overall.

One thing the developed world must ensure is that we take the time to understand the issues and impacts of pashing the technology onto the developing world. The environments they live in is different and being mindful of that is essential. The development of technology in a global context will be trial and error, what works in the developed world may not work, while everyone recognises the need to assist those countries less fortunate than ours we need to be respectful and allow the technology to fit into their culture.

Technology is bringing together people from around the world to help improve the world we all live in and to try and close the gap between the poorest and richest countries in the world. The future of technology will help to provide assistance to those in need. However we also have a responsibility to ensure we balance the use of technology and the negative aspects of it to ensure there is a positive change. A quote from Mr. Benoit Blarel, the head of the Bucharest World Bank Office sums it up perfectly, "There should be no difference among regions, urban or rural, among men and women, young and senior, when it comes to access to the IT society. The information brings equal opportunities to everybody and this – together with the use of modern technologies, are the key to changing our lives for the better."

As a sub theme of this year's Youth Festival of ICT, Change Futures will be explored in a number of ways encouraging delegates to start to think about how they may view the future of ICT and the role they can play in it. We have a number of great speakers lined up, including Adam Spencer, Ross Dawson, Naomi Henn and Jodie Fox.

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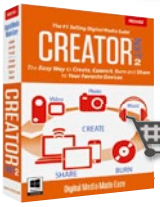

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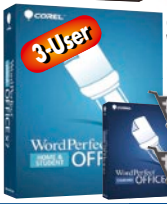

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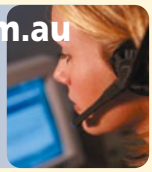

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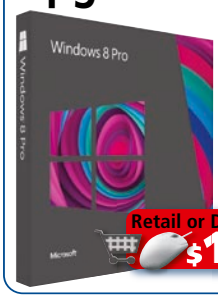

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A grumpy Jon Honeyball yearns for a simpler life... until the postie knocks

"This Epilog column has long been part of *PC & Tech Authority*, when back in the beginning it had one clear target in its 1998 sights: the woeful state of the PC.

"In the PC marketplace, whether it be SoHo or corporate desktop, this is just yet more 'me too' so-called engineering wrapped up in 'all tinsel and no Christmas tree' bullsh*t," my younger self railed. "A lowest common denominator 'it'll do' illness, and a cost-cutting frenzy par excellence, pervades most everything that most vendors do. No wonder PCs are so expensive to maintain, when the ingredients are this bad."

Some 16 years later, and not much has changed. A race to the bottom in hardware prices has now been followed by a similar race in OS licensing and the major apps. Back in 1990, Word was $900 per seat. Today it's part of a $12-per-month rolling home subscription that includes all of Office, cloud storage, and licences for up to five people or machines at home too.

My next column ranted about the appalling state of website design. "Look at an average web page. And ask yourself this question – are you looking at a programmatic window, a window in which a program is running, or are you looking at some graphical vomit spewed out across the screen?" (You'll have to excuse my younger incarnation and his somewhat volatile language.)

"My acid test is wicked, but works every time," I offered. "Take an arty web page, print it out on a colour inkjet printer where it looks magnificent, and then give it to web users and ask them to highlight, with a marker pen, where all the push-buttons are. Ask them how they would navigate around it. Ask them what things should be clicked on, and what items are just graphical baubles. And guess what? They can't."

Has anything really changed? Are websites now actually easier to get around, or are we just blinded by yet more Flash and HTML5 baubles and other trivia?

Back in 1998, typical laptops had Mobile Pentium II processors buzzing away at 233MHz, 32MB of RAM and a 4GB hard disk. They ran Windows 98, and actually did a pretty reasonable job. Today, everything runs at warp speed, but 4GB of storage isn't workable in a phone, let alone a laptop.

Although there's been an incredible change in the capability of the hardware since then, and the scope and breadth of the underlying operating systems and applications, I'm not wholly sure we've made that big a leap forwards. For sure, we can now stream video at high resolution and watch TV offline. But back then we had modems, and ADSL was something of a future dream; a huge part of this new video capability comes from the IP connectivity speed, not the PC itself.

As we move forward into a new era of the "Internet of Things", whatever that inane phrase is meant to convey, it's clear that we'll own gear ranging from smart micro-gadgets that you wear on your collar, through to 80in ultra-high-resolution screens that will look somewhat like a TV today, but be so much more. Data will flow like a rushing flood between devices, and we won't really be aware any more of where our stuff is kept – it will just be "out there, somewhere". There will be so much of it, we probably won't care about any particular piece, because it will just be ephemeral. The government will trawl it, prosecute us for it, and the whole Nineteen Eighty-Four vision will have become a reality.

"Do we need the Amazons and Facebooks and e-shops and other fripperies of modern 'connected' life?"

Maybe there's much to be said for unplugging, disconnecting, and opting for a simpler life. For saying, no, we don't actually need to stream UHD TV, and that a large collection of DVD and Blu-ray discs will give us enough high-quality video material to last a lifetime. Given the billions of CDs already in the world, do we really need online streaming? Do we need the Amazons and Facebooks and Twitters and e-shops and loyalty cards and all the other fripperies of modern "connected" life? Do I need a smartwatch when a mechanical device does just as good a job? Is it time to just stop, enjoy what we have, and try to lead more fulfilling lives as a result?

Now what's this that's just arrived in a sealed box, delivered by a bike courier? A prototype smart device? Some new shiny stuff? Excuse me while I drool. I have something lovely to play with. I may be some time..."

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