PC & TECH AUTHORITY

200TH ANNIVERSARY ISSUE

YOUR NEXT SMARTPHONE
18 LABS-TESTED

MAGAZINE OF THE YEAR
Australian IT Journalism Awards for 2013

Virtual Reality
It's almost here

A SEISMIC SHIFT IN TECH IS ABOUT TO HIT
REVEALED: HOW IT WILL CHANGE YOUR LIFE

- HOW IT WORKS
- THE HEALTH RISKS
- KEEPING IT CHEAP
- FACEBOOK ALL-IN FOR US$2 BILLION

REVIEWS
NEW INTEL SERIES 9 MOTHERBOARDS, WD MY PASSPORT PRO, CORSAIR K70, MSI 290X LIGHTENING, AMD 295, ASUS ROG RANGER AND MORE!

HOW TO:
FAKE YOUR INTERNET LOCATION: BROWSE IN SECRECY & ACCESS BLOCKED OS CONTENT

PHOTO DIRECTOR BEGINNER TUTORIAL

THE END OF XP
WHY YOU'RE RIGHT TO BE WORRIED

SUPERCHARGE YOUR BROWSER
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- We will always offer an honest and unbiased opinion for every review

THE TEAM...

Managing Editor
David Hollingworth
E dhollingworth@nextmedia.com.au
T @atomicmpc

200 issues – I can still remember getting my first gig in the industry back in issue 6. Amaze!

Advertising Manager
Jo Ross
E jross@nextmedia.com.au

Still buzzing from *PC & Tech Authority* winning Best Magazine, go team!

Art Director
Tim Frawley
E tfrawley@nextmedia.com.au

I managed to delete 60GB of photos from my honeymoon off my laptop...awesome!

CONTACT US...

Call us
(02) 9901 6100
E-mail us
inbox@pcandtechauthority.com.au

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200 ISSUES OF *PC&TA*!

Let's get right to it. There's important self-congratulatory business to attend to here. The sort that needs a fair whack of trumpeting, so with puckered lips at the ready...

This is our 200th issue! That's a milestone not many mags can boast of and it's a very powerful feeling to be a part of a magazine that's truly achieved greatness. It's a testament to a whole lot of things, not least of all the correctness of our attitude towards serving you, and how that's done. It's a thumbs-up to the PC scene in general, and its ups and downs over the years. It's a mighty pat on the back, too, for the many wonderful people who have worked on *PC & Tech Authority* over the last 15 years. Thank you, one and all.

We're especially chuffed because just a couple of days ago, on a glorious Friday night at the annual Optus IT Journalism Awards, your magazine won the prestigious Best Magazine award. We were up against some high quality competition, but our wise voting peers tapped us as the finest tech magazine you can buy. For the third year running, no less.

There are many reasons why we're not just surviving, but winning, in this age of free internet content. It's our old school approach to high quality long-form journalism, rigorously scientific testing, and a feel for what matters most at any given time, in tech.

As we gear up and power on, thanks go to you, our treasured reader. Whether you have been with us since the beginning, have recently found us, or come and go, it's you who is the heart and soul of *PC & Tech Authority*.

Thank you for trusting us.

Ben Mansill
E bmansill@nextmedia.com.au

Also, don't forget to check out the iPad version, packed with exclusive interactive content complementing the regular magazine. Here's a sample of what you can expect:

- **Video:** Get video tutorials, game trailers and more
- **Image Galleries:** Get a better look at some of the products reviewed
- **360 View:** Get up close with tech from every angle.
- **Get the app:** *PC & Tech Authority* for iPad http://tinyurl.com/iPADPCTA

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INBOX

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Getting in touch

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Inbox, Level 6, Building A, 207 Pacific Highway, St Leonards NSW 2065

WEB
pcandtechauthority.com.au

EMAIL
inbox@pcandtechauthority.com.au
Please limit letters to 200 words, where possible. Letters may be edited for style and to a more suitable length.

LETTER OF THE MONTH

I'll get straight to it. Is *PC & Tech Authority* a PC magazine or not? I certainly noticed when you added the word Tech in your title a few years ago, and I welcomed it. Man doesn't live by PCs alone. What with smartphones and tablets and the rest it was very handy to have you take on the role of keeping up to date across a wider range of things that interest me.
And I do love reading about all that.

But does this all mean that the PC will take a backseat to whatever new trendy gadget is flavour of the month?

Please don't cut back on the PC stuff, you guys do it better than anyone else (always have!).
M. Crossfield

Ben Mansill says: I know that we have shifted with the shifting sands of tech over the few years. But at our heart will always be the PC (and let's not forget that a Mac is also a personal computer). The PC is my passion, and most of our writers specialise solely in writing about the PC.

Now that there are fewer PC magazine on the newsstands, I feel it's more important than ever to provide the high level of PC coverage that's been our trademark over the years. If anything, with me at the helm you'll see even more.

PRICEY

Where do you get your prices from? Sometimes they are right, sometimes they more than a bit off. Sometimes it says "TBA".
R. Pelton

Ben Mansill says: The top priority for us is relevancy. So, whenever possible we use street prices, usually taken from the popular site **staticice.com.au**, which tracks enough online stores to give a reliable average.

Often, though, we will be sent a product for review prior to it going on sale, in that instance we will use the manufacturer-provided RRP (as no street price is obviously available at that point – and we wouldn't ever use an overseas average, as different local pressures influence prices). Failing the above, 'To Be Announced' goes in, that happens when we're sent a product so early the manufacturer or distributor haven't yet determined a local price.

PAY ONCE, OWN FOREVER

If Microsoft are so keen on stopping piracy why are they switching to a subscription model for Office pricing? Office 2010 was pretty good and I can't personally see any reason why I should upgrade. The thing is, I always have. Call me crazy but I've always found that a new version of Office is interesting enough to warrant getting it just to see how far along they have come. Now I just couldn't be bothered.
B. White

TOP SITE COMMENTS

COMMENT OF THE MONTH
I don't understand this curved screens trend. It seems like they are making a curved phone just because they can. Is there any research to actually back up that consumers want curved phones and what they add to the mobile experience?
Spencer Waldon fails to look ahead to the day when room-sized LCD hemispherical VR head-zones change our virtual lives.

Did not know any PS2 games were still playable online, which came as quite the shock!
Nobody813 kicks it old school.

With decisions like these, one could be forgiven for thinking HBO was run by Aussie Politicians! ;-)
Darth Stig appreciates that the content battlefield seems to pit consumers against content providers.

I've been screaming ever since they started producing iPhones to give us longer battery life as the Most important enhancment they could possibly make.
Rudolf doesn't care for fancy features.

Next step, tactile and proprioceptive feedback.
SadisTech forced us to look up "proprioceptive".

Television has to change or it will be destroyed... although I suspect it is too late for Channel 10.
Joel Reid on TV reality.

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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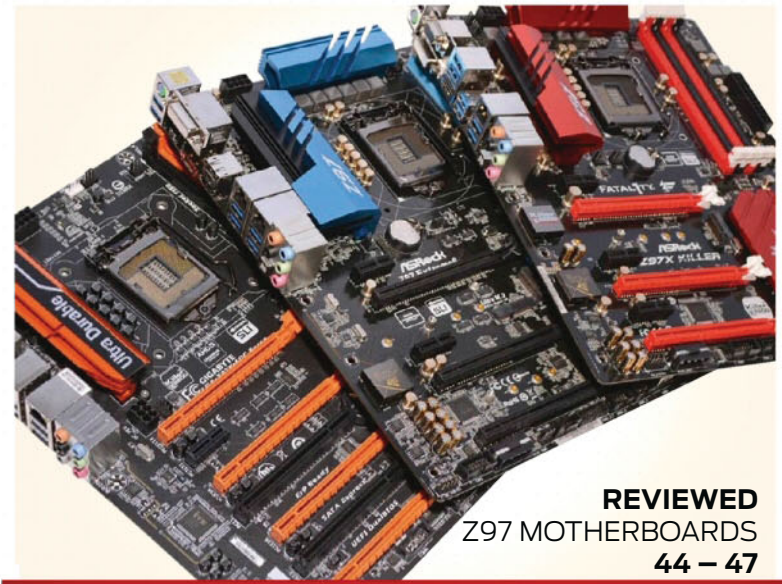

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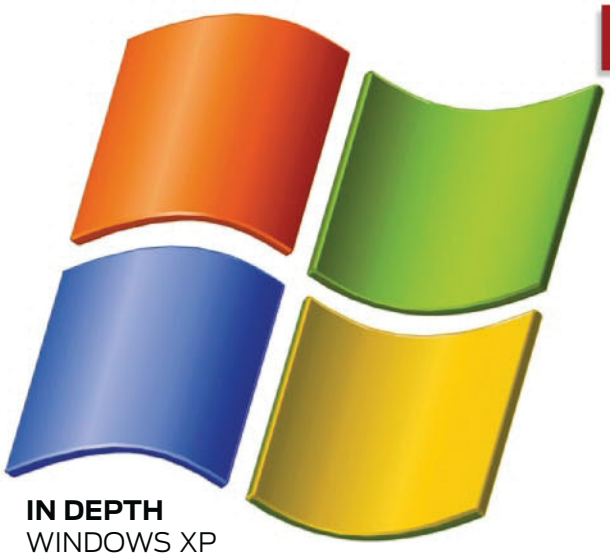

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TECH NEWS

LATEST TRENDS AND PRODUCTS IN THE WORLD OF TECHNOLOGY

TENS OF THOUSANDS OF SERVERS *STILL* VULNERABLE TO HEARTBLEED

HALF OF ALL SERVERS AFFECTED BY THE GLOBAL HEARTBLEED FLAW REMAIN UNPATCHED - AND IT COULD BE MONTHS BEFORE VULNERABLE SYSTEMS ARE FIXED, IF EVER.

Security professionals are being warned to re-check their systems after researchers revealed that up half the servers affected by the global Heartbleed flaw remain unpatched - and it could be months before the 'long tail' of vulnerable systems are fixed, if ever.

In a May 8 blog post, 'white-hat' hacker Rob Graham, CEO of Errata Security, said that one month after the Heartbleed flaw in the OpenSSL library first hit the headlines, he has scanned the internet and found over 300,000 of the 600,000 servers originally affected remain vulnerable.

Likewise Yngve Pettersen, a software developer at Opera Software and security specialist for TLS Prober Labs, blogged on May 7 that while he had found 5.36 percent of all servers were vulnerable to Heartbleed four days after it was announced, the proportion currently at risk remains close to half that number, at 2.33 percent.

His figures differ from Graham's in that Pettersen says many servers could have been patched in the days before his first scan, meaning the proportion still unfixed could be just 10 to 15 percent of those originally at risk, rather than half. He also reassures users that "most publicly used vulnerable sites have been patched".

But the two surveys show that In the best case tens of thousands of servers - and worst case hundreds of thousands - remain unpatched.

Pettersen also warns that efforts to fix the flaw have all but ground to a halt recently. He writes: "While the vulnerability number had been halved, to 2.77 percent, after two weeks, in the most recent scan, two weeks later, the number has only been reduced to 2.33 percent, indicating that patching of vulnerable servers has almost completely stopped."

Pettersen also believes that in their rush to do something about Heartbleed, thousands of systems administrators have upgraded unaffected servers to a newer, but still 'buggy' version of OpenSSL. "This means that thousands of sites have gone from not having a Heartbleed problem, to having a Heartbleed problem!" he said.

Pettersen also warns of a "more problematic issue". All servers that have been patched since April 7 should have replaced their old digital certificate, because it has to be assumed these certificates were comprised by Heartbleed. But Pettersen says up to two-thirds have not renewed their certificates. "This indicates a serious problem for the users of those sites," he says.

Other security experts contacted agree that, despite the uncertainty of the statistics, Heartbleed remains a major problem – and say responsible security professionals should re-check their public-facing servers as the long haul to patch the flaw continues.

Paul Stone, senior consultant at independent security consultancy Context Information Security, told us via email: "It's not surprising that so many servers are still vulnerable. After the initial rush to patch the vulnerability in the days after it was made public, there is now 'long tail' of vulnerable servers that will be gradually patched over many months but will never completely disappear.

"Those responsible for corporate IT security should double-check their public-facing servers to make sure that none are still vulnerable to Heartbleed. It is possible that while web servers have been patched, things like mail servers or appliances that support SSL could have been missed."

Stone added: "For users, most of the 'important' sites they use have probably been patched such as banking and e-commerce, but there may be one or two smaller sites they use that are still affected."

The Heartbleed flaw (CVE-2014-0160) was first revealed in early April and quickly led to targeted hacking attacks. It is a bug in the OpenSSL library, quickly fixed in OpenSSL version 1.0.1g, which allows hackers to steal encryption keys and so access apparently encoded data passing through websites or other affected devices – anything from user passwords or bank details through to highly confidential company documents.

INTEL LIFTS LID ON NEW GENERATION OF CHROMEBOOKS

NEW CHIPS PROMISE BETTER PERFORMANCE.

Intel and Google have unveiled a new generation of Chromebooks based on Haswell Core i3 and Bay Trail Atom processors - bringing the total Chrome OS market to more than 20 devices by the end of this year.

Core i3 models are confirmed by Acer and Dell, with Acer's model set to go on sale in the US this summer at $US349. The new devices promise a significant step up in horsepower from existing models using Celeron-branded processors.

"As HTML5-based apps do things like applying photo effects, or face detection, you'll see the importance of performance," explained Navin Shenoy, Intel vice president and general manager of the mobile computing group. Browser-based gaming and Google Hangouts were also singled out as applications that would benefit from greater processing power.

For those seeking a more lightweight device, 11.6in and 13in Chromebooks based on the Bay Trail SoC were revealed by Asus, Acer, Lenovo and Toshiba, with US launch dates again set for this summer. Interestingly, Lenovo's $US329 N20P will include a touchscreen, a feature rarely seen on such devices - although precedents include Lenovo's own ThinkPad Yoga 11e, Acer's C720P and the Chromebook Pixel.

Shenoy predicted that a Bay Trail Chromebook could deliver 11-hour battery life, as well as thinner and lighter designs than were previously possible - including the first fanless Intel-based Chromebooks. He also promised that the coming generation of Bay Trail-based Chromebooks would for the first time bring 802.11ac to the platform.

Shenoy also demonstrated a new HP ChromeBox, a striking turquoise creation similar in appearance to the Intel NUC, and the first "ChromeBase" – a 21in all-in-one design from LG set to launch in the US later this month at $US349.

He wrapped up with the announcement that Chrome OS devices would be among the first to use "conflict free" processors, eschewing any materials from sources that finance African warlords.

Caesar Sengupta, Google VP of product management, took the opportunity to announce a few new features for Chrome OS.

"Every Chromebook keeps getting better over time," he declared. "This is what differentiates it from every other laptop on the market."

"We're adding Google Now and voice actions into Chromebooks, so in the next weeks and months you'll be able to do stuff with your laptops that's never been done before. And within the next few weeks, Chromebook users will be able to watch their favourite movies and TV shows not only online, but also offline in the Google Play movies app."

"Now, if you're in an aeroplane, or you're deep underground without the network, you can choose to be productive with Google Docs – or, completely unproductive with TV shows."

HOT... OR NOT

HOT

Z97

M.2 SSDs are a bit exciting, for sure. But the real joy is that a new Intel chipset sparks an impetus of innovation, and a bunch of new model motherboards with features the makers may have been holding back for a bigger big bang release in new chipset season. Which, we suspect, was the point of it all.

NOT

GREENLIGHT AND KICKSTARTER GAMES

First, we loved having early access to incomplete games. Then, it felt like a chore to check in after each update to see what had changed, and if it was more game-like, now. Then, later, it seemed like every new game on Steam was a Greenlight early access tech demo. We were turning to jade. So we turned our attention to the Kickstarter scene to see what was coming. Everything is coming. There are more games coming than individual PCs on Earth, it seems. One game per PC. Your very own game, just for you. Just give someone a hundred grand. Or a dollar and never see it again.

HERE'S ANOTHER USE FOR THE OCULUS RIFT

IT'S NOT JUST FACEBOOK THAT'S GOT BIG PLANS FOR OCULUS POWERED VR, BUT THERE ARE SOME INTERESTING MILITARY APPLICATIONS.

Bless those canny Norwegians. Not content with just generally being an awesome liberal democracy, they're also looking at some clever new uses for the Oculus Rift.

Mainly, as a new vision tool for tank crews. The Norwegian army is using the technology to augment tank crews' vision, especially when the tank is buttoned up.

Tanks generally close their hatches during battle, greatly reducing situational awareness. With a Rift unit, and enough external cameras, tank crew can effectively 'see' through the tank. Adding ammunition counts and gun elevation, as the following video points out (**www.tu.no/tutv/forsvar/2014/05/05/norwegian-army-driving-armoured-vehicle-using-oculus-rift**) makes the experience just like a video game.

With Facebook now owning the tank, it will also mean that tank commanders can stay up to date with their friends' news feeds while pumping out APFSDS shells with near gay abandon.

GAMING NEWS

ALL THE NEWS THAT'S FIT TO PRINT FROM THE GAMING WORLD

WII U PROBLEM ISN'T GETTING BETTER, ACCORDING TO NINTENDO FINANCE REPORT

THE CONSOLE MANUFACTURER POSTS A HUGE LOSS WHILE SALES FALL SHORT OF EVEN REDUCED PROJECTIONS.

How's the Wii U doing in the wake of the PlayStation 4 and Xbox One launches? Still pretty poorly, as Nintendo's latest earnings report now clearly demonstrates.

Nintendo posted an annual operating loss of 46.4 billion yen for the fiscal year ending on March 31, 2014, the third consecutive year the company has been in the red. Nintendo previously expected a loss of 35 billion yen as of January, which is a far cry from its original projection of operating income of 100 billion yen.

The continued slump is due largely to the middling performance of its Wii U console, which moved 2.72 million units in the fiscal year for a total of just 6.17 million systems sold since launching in late 2012. By contrast, Sony has sold more than 7 million PlayStation 4 consoles to consumers since its November 2013 release.

Both hardware and software sales just missed their latest projections, although games like New Super Luigi U and the brilliant Super Mario 3D World sold more than a million units apiece. Despite its unique second-screen GamePad controller, the underpowered Wii U hardware has failed to catch on with players and has spurned many major game publishers–notably Electronic Arts.

"Nintendo will seek to enrich the value of the Wii U GamePad, the most important differentiator of Wii U, and as a result expand the sales of the Wii U platform," reads the company's report to investors. It'll be interesting to see how.

Sales for Nintendo's 3DS handheld also missed their target, with 12.24 million units sold against a projection of 13.5 million. But it's not all doom and gloom - 3DS software sales (67.89 million) beat their expectations (66 million) on the back of strong titles like Pokémon X & Y, which together sold 12.26 million copies. Given that these games sell for proper money–the polar opposite of smartphone offerings–these numbers aren't to be sniffed at.

CARD HUNTER LAUNCHES NEW CARD-FILLED EXPANSION

ATTACK OF THE ARTIFACTS ADDS A WHOLE LOT OF AWESOME TO THIS FREE ONLINE FANTASY RPG.

One of our truly guilty little pleasures is Card Hunter (**www.cardhunter.com/**). It's an unashamedly old-school, retro-DnD-inspired online RPG, and I often have it open in a discrete browser tab most of the time. It's fast, fun, and very flavoursome, not only creating an old-school series of loot-rich dungeon-crawls, but also running it all with some some neat card-based mechanics.

And now it's got a new expansion, Attack of the Artifacts.

Attack adds 70 new cards and 200 new items to the game, along with new adventures and shiny new multiplayer gaming league.

And, to celebrate, you can win new loot just by logging in! How cool is that?

PARENTS QUITE HAPPY WITH KIDS WHO GAME

GAMES ARE NOT BAD, HMMKAY? AT LEAST ACCORDING TO A NEW US REPORT.

A new US study has revealed that the majority of American parents see gaming as adding a positive influence to their children's lives, and that most parents game with their children.

The 2014 Essential Facts About the Computer and Video Game Industry report (**http://theesa.com/facts/pdfs/ESA_EF_2014.pdf**), released by the Entertainment Software Association, paints a pretty positive picture of family gaming, which is a fact-backed perspective needed in the U.S. where lobby groups usually set the agenda.

"Parents across America recognize the widespread benefits of video games, including education, mental stimulation, and the bonding opportunities they create for families," said Michael D. Gallagher, president and CEO of ESA, the trade association that represents the U.S. video game industry. "Video games are a favorite pastime enjoyed by men and women of all ages, and millions worldwide who share their game play experiences with friends and family."

You may want to take some of these new gaming facts with a grain of salt. We're pretty sure they're straight up, but it's always worth remembering that it's the ESA's job to promote gaming, so any study details it releases are always going to be carefully picked.

We'd also suggest that though US-centric, the findings are probably fairly indicative of local Australian attitudes as well - though likely with less household guns involved.

Other facts in the report include the number of US citizens playing games (over 180 million), the average gamer age (31, making me feel pretty damn old), and that casual games on mobile devices is continuing to rise in popularity (surprising no one).

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CHIP NEWS

NVIDIA SWUNG FIRST, BUT AMD COUNTERS AND CONNECTS FIRST FOR A POSSIBLE GAMING KNOCKOUT. HAS AMD SLAIN THE TITAN? **MARK WILLIAMS** EXPLAINS WHILE LOOKING AT THE BRIDGE AMD IS BUILDING TO BEAT INTEL AND NVIDIA.

CPU

AMD'S FUTURE UNVEILED

With Intel's ever present x86 market leading dominance and Nvidia slowly cooking up its project Denver ARM processor, AMD sees opportunity on both fronts. At a recent press event AMD finally detailed its 'ambidextrous strategy' and what it's devilishly working on behind closed doors.

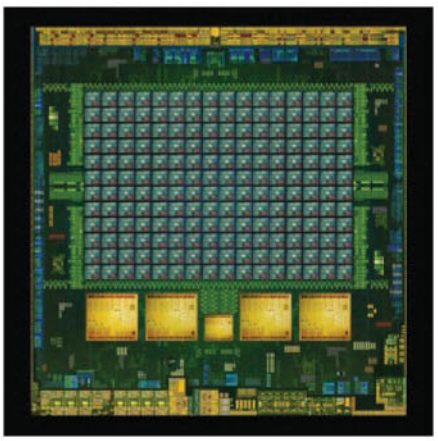
The strategy it's come up is covered by two code names: K12 and SkyBridge.

K12 refers to two new CPU architectures being built. One is a new custom architecture and the other a new x86 architecture that'll supersede Bulldozer. The release time frame for these is set for 2016. All we know at this stage design wise is that it will "extend the range ARM is in" and that they're taking the "best of both" from current Bulldozer and Jaguar designs when creating these K12 designs.

SkyBridge refers to a new SoC framework (the pieces that'll encompass the CPU core). So things like the IGP, L3 cache, I/O ring, memory controller and socket pin-out will remain the same regardless of which CPU ISA is included on the chip. Being pin compatible means only one motherboard is needed to handle both SoC variants.

SkyBridge will show up in 2015, well before K12. SkyBridge's initial release will come equipped with Puma+ cores for x86 (à la Mullins/Beema) and a Cortex-A57 for the ARM variant, all made on a 20nm process.

These dual architectures together with a common SoC fabric clarifies AMDs ambidextrous approach going forward and gives them a future regardless of where server, desktops or mobile devices go in terms of supported ISA's.



▲ The Project Denver processor from Nvidia will deliver ARM-compatibility.

AMD'S MULLINS & BEEMA

The replacement for current Temash and Kabini chips, Mullins (ultra-books) and Beema (tablets) respectively have launched. Both are the same architecturally, just binned differently. The included CPU cores are referred to as "Puma+", which are basically the same as the previous Jaguar cores the only difference being that AMD have tweaked power efficiency by reducing leakage and have done some work to raise clock speeds such that AMD can claim power savings of up to 20%, while clock speeds have been boosted by a massive 55% up to 2.4GHz. Initial reports show these easily beating Intel's current Bay Trail offerings.

GPU

R9 295X2 BEATS TITAN Z TO MARKET

Following Nvidia's reveal of its Titan Z dual GPU beast that I covered last issue, AMD officially unveiled its counterpunch, the R9 295X2. Bringing back the "X2" moniker to its dual GPU line this behemoth is just as uncompromising in its aim to be top dog, with everything doubled over the R9 290X.

Check out our full review of this card over on page 42.

Funnily enough, despite being announced later, the 295X2 is available now. The Titan Z has yet to go on sale (at the time of writing) due to an unforeseen delay. There is no word on the cause at this stage.

VESA AND MIPI RATIFY DSC

The growing trend of high density and resolution displays is causing something of a problem in how we transfer all the information required from our GPUs to our displays. With 4K resolutions, the likes of HDMI 2.0 (18Gbps) and Display Port 1.2 (17Gbps) interfaces are hitting their limits despite being computing's highest bandwidth interfaces.

The problem is that these interfaces transfer data going to your screen in an uncompressed fashion which is bandwidth intensive, and there's only so far you can push a copper wire.

With DSC (Display Stream Compression), VESA and MIPI (associations that cover standards in the PC and mobile industries respectively) have ratified a transmission compression method to solve this problem from the other end. Rather than try to push for higher speeds and bandwidths, instead send less data in the first place using compression.

This lossless standard keeps display output looking basically the same and low latency while consuming up to 66% less bandwidth overall.

For VESA this gives them a solution going forward for 8K+ resolutions to satiate future TV and monitor demands.

For MIPI the big benefit for mobile devices is that with less bandwidth required to drive high PPI touchscreens it'll draw less power giving longer battery life.

Being cheap to implement both monetarily and compute power wise, expect to see the uptake on this to be swift. Keep a look out for devices supporting VESA's Display Port 1.3 or in mobile devices MIPI's DSI (Display Serial Interface) 1.2.

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	MSY	http://www.msy.com.au/	(02) 9648 4116
	Mwave	http://www.mwave.com.au/	1300 727 446
	Tech Buy	http://www.techbuy.com.au/	(02) 9648 1818
	Umart	http://www.umart.com.au/	(02) 9099 2688
	Wireless1	http://www.wireless1.com.au/	(02) 9687 8828
VIC	Budget PC	https://budgetpc.com.au/	(03) 9541 9000
	Centrecom	http://www.centrecom.com.au/	(03) 8311 7651
	CPL	http://www.cplonline.com.au/	(03) 8542 8688
	Landmark Computers	http://www.lmc.com.au/	(03) 9600 2244
	MSY	http://www.msy.com.au/	(03) 9560 2288
	PC Case Gear	http://www.pccasegear.com/	(03) 9560 2122
	Prototech Computers	http://prototech.com.au/	(03) 5444 1980
	Scorptec	http://www.scorptec.com.au/	(03) 8561 3206
	Standard Computers	http://www.standard.com.au/	(03) 9315 1234
	Tecs	http://www.tecs.com.au/	(03) 9602 3499
	Umart	http://www.umart.com.au/	(03) 9590 8688
QLD	Computer Alliance	http://www.computeralliance.com.au/	(07) 3421 3200
	Computer Function	http://www.computerfunction.com.au/	(07) 3720 4777
	GameDude Computers	http://www.gamedude.com.au	(07) 3387 1500
	MSY	http://www.msy.com.au/	(07) 3217 9070
	Umart	http://www.umart.com.au/	(07) 3369 3928
WA	Affordable Laptops	http://www.affordablelaptops.com.au/	(08) 6461 6836
	MSY	http://www.msy.com.au/	(08) 9344 1002
	PLE	http://www.ple.com.au/	(08) 9309 4771
SA	Getright Computers	http://www.getright.com.au	(08) 8231 0622
	MSY	http://www.msy.com.au/	(08) 8212 1656
NZL	Computer Lounge	Computer Lounge	(09) 368 4818
	Just Laptops	Just Laptops	0800 587 852
	Playtech	Playtech	(09) 415 1020

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MOST WANTED

THE GOOD STUFF THAT'S JUST AROUND THE CORNER

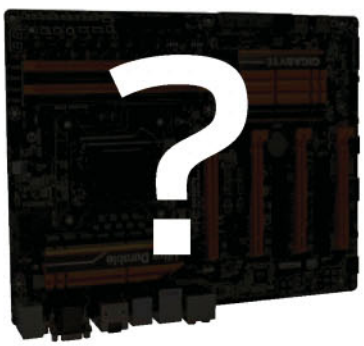
STAR CITIZEN

The Dogfighting Alpha Test is now officially overdue, so we're officially adding it to the Most Wanted list, because we do most want this. So much. Star Citizen is the hugely epic space-everything (fighting, trading, exploring...) game from Wing Commander hero dev Chris Roberts. It's by far the most successful crowd-funded project (of any type) ever, sitting at almost US$44 million at the time of writing. Due for full release at the end of this year (which we now fear will slip), the first chance to play it will be a straightforward dogfighting module to test things out. But it's late. Twice late, as it was originally due at Christmas last year.

We know Mr Roberts and co aren't slacking off, thanks to the rather incredible transparency he's created with every step of the project. We just want to fly our lovely ships that we've spent more money on than we care to admit.

www.robertsspaceindustries.com

Z99



Now that we're seeing the first Z97-based motherboards coming out, we are, of course, looking further ahead. Later this year the high-performance member of Intel's Series 9 chipset will make its appearance across many genuinely exciting new motherboards.

The Z99 chipset is designed for Intel's Haswell-E CPUs, which will sport 6- and 8-core variants. Heralding its high-end potential, Z99 boards will be able to run five PCI-Express 3.0 x 16 slots, and with it, the potential to configure these as 8x/8x/8x/8x/8x. Suddenly tri and quad GPU setups have become a whole lot more interesting!

For storage excess, Z99 will bring support for 10 SATA 6 controllers, and like Z97 will support the new M.2 SSD standard. Much like the dawn of the SSD era, this sort of array will let us run one very fast SSD (M.2) as the boot and main app drive, with many more regular drives running as very fast general storage - only this time most if not all of the storage drives could be SSDs, as we put our older SSDs to work in less glamorous tasks. It's a thrilling prospect, as we're looking down the barrel of a substantial jump in PC performance when you factor in all the things Z99 brings as a whole.

COMPUTEX

During the first week of June each year, right about when you're possibly reading this, the annual Computex show is underway. That's what we're looking forward to most, we always do. It's the epicentre of all that's new in PC and PC-related tech. In the tropical heat of Taiwan, for four solid days, hundreds of exhibitors big and small proudly show off gear and components that are evolutionary and often revolutionary. Some take hold, some take off, and some sink, never to be seen again.

Your team from *PC & TA* will be there in force. We will be posting daily on www.pcauthority.com.au with photos and news as we go, sharing our discoveries. *PC & Tech Authority* is highly regarded in Taiwan, and all of the major companies have secured private sessions with us to show off the most exciting new products and technologies for the rest of the year, and beyond.

Of course we'll also be privy to new innovations which may still be in development, and perhaps not slated for release until later in the year. While we're usually bound by non-disclosure agreements that set a date off in the future when these can be revealed to you, it's invaluable for us to make the most of that early access to properly understand what the new technology will bring, and its place in the bigger picture. All of these you will see when the time is right, in these pages. Computex takes place from June 3rd to June 6th in Taipei.

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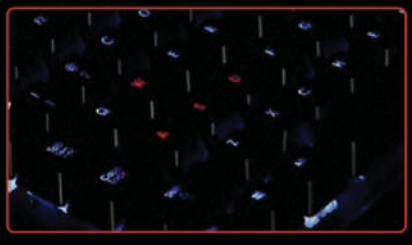

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CHERRY

How fair is your phone?

IS THE COMMODITIZATION OF THE MOBILE PHONE GOOD FOR THE PLANET?

Sometimes I look at my phone and wonder who else has handled it. I don't mean fingerprints from the small people in my life. I'm thinking of all the people who have had a hand in creating the phone from the assemblers right back to the people mining the metals that are used in it.

It's an uneasy thought, I'll admit that, to wonder about how much they were paid and what was traded to get the precious ores out of the ground and to the refineries. I don't know why it's the phone in particular that makes me feel guilty.

I could be uneasy about my carbon footprint for all the flights I've taken or the environmental impact of all the things I use on a daily basis. I could worry about the plastics in the packaging, or seafood I consume or synthetics in clothes or the fuel in my car.

Stories about the factories employing thousands of people assembling mobile phones have been in the press in the last few years. There have been reports about poor working conditions and employee suicides at big manufacture plants used by the likes of Apple. It's brought some attention to the invisible hands that hold our smartphones before they're shipped to us eager consumers.

It's not just assemblers who have a hand in our phones. These high-tech gadgets are built with precious metals such as gold, silver, tantalum and zinc that make up the circuit boards and other components. Sourcing the precious metals is another contentious issue when it comes to mobile phone manufacturing. They're mined in situations of violence and conflict where warlords and militias control the mines that can reap big profits from precious metals. Tantalum, in particular, is mined in the Democratic Republic of Congo (DRC) and is in high demand as the hunger for devices has grown worldwide.

Why does this matter now? The way these materials are sourced could be starting to change – for the better. A US law came into effect last month that compels companies listed on the US stock exchange to disclose if they are using conflict minerals, which is defined as tantalum, tin, gold or tungsten mined in the DRC or surrounding countries.

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

Companies must report if they're using conflict materials and audit their supply chain to ensure they're coming from conflict-free mines. The mine and refinery must be disclosed and all this information must be made available on their website, although this particular requirement has been challenged in court.

It's not just the US that is taking action on the issue of conflict minerals. The EU is taking great interest in the US law and wants regulations that require companies mining tantalum, tin, gold or tungsten to audit and report. It's looking at mining, but has a wider focus on how these conflict materials are traded and where the profits flow.

The legislative focus on sourcing these precious metals means that companies must look into their supply chains and report on conflict minerals and how they are mined with the goal of improving the way phones are manufactured for the people literally at the coal face.

Change is afoot on the transparency of conflict materials. There's a project called Fairphone that manufactures a phone that uses conflict-free materials that can be upgraded to last longer and is safe to recycle. The fairphone.com website explains the project. At this stage, it's not available in Australia but it is about to enter its second production run so hopefully sometimes in the future there might eventually be enough demand for a local version.

"Conflict-free materials that can be upgraded to last longer and are safe to recycle"

The Raise Hope for Congo group has a conflict mineral ranking for electronics companies on its website. Companies themselves are also starting to own up. Apple along with HP, SanDisk and Philips are publishing the names of their supply chain smelters.

What this means for consumers is that they can expect to find out if their device uses conflict-free materials. These four – tantalum, tin, gold or tungsten – are a first step, but there are others such as platinum, cobalt, and copper that need to be added to the list. As consumers know to ask the questions, companies can respond to show that they're willing to reveal the supply chain details and do the right thing.

HAD AN ISSUE AS A CONSUMER? INVESTIGATOR CAN HELP.

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SUPERCHARGE YOUR BROWSER

EXTENSIONS CAN CUSTOMISE AND TRANSFORM THE BEHAVIOUR OF YOUR BROWSER. HERE ARE OUR PICK OF THE BEST 46 TOOLS, PLUS A GUIDE TO MAKING YOUR OWN

You don't have to be a developer to edit the web. With the right extensions, you can create the online experience you want in only a few clicks. Want to ban profanity from YouTube comments? Done. Hate how Facebook and Gmail have been redesigned? You can change that. Want to see kittens instead of offensive content? That's possible too.

Extensions – known in Firefox as add-ons – are small, usually free tools that perform simple tasks. They can add features to your browser, complement desktop applications, or enhance the workings of specific web services. Since anyone can write an extension, they can even modify the behaviour of websites in ways that their creators might not approve of.

That's a strength, but it's also a risk. As with any downloadable code, an extension could contain malware that steals data or otherwise interferes with the operation of your PC. Both Google and Mozilla operate official stores (see Getting and managing extensions, p20), from which anything found to be malicious will be quickly ejected, but dodgy extensions can still cause trouble before they're detected,

so check reviews and use common sense before installation. Note, too, that updates to extensions can change how they function, so what runs okay today may not tomorrow.

Don't panic, however. Malicious extensions are in the minority. On these pages, we've selected reputable add-ons that can make the web behave exactly as you want. Except where noted, all of the extensions mentioned are available for both Chrome and Firefox. And if you're having trouble finding an extension to suit, you could make one yourself (see p21).

CUT IT OUT

Annoyed by ads? Offended by swear words? Irritated by the Daily Mail? You can automatically delete all of these from your browser with extensions. One of the web's most popular extensions is AdBlock, which stops ads in their tracks. Not only will this boost load times, but it will help you to avoid malicious adverts. It also lets you temporarily allow ads, or whitelist an entire site and has advanced blocking tools, too. To access them, click on Filter Lists in the management tool to add different languages, remove social media buttons or ban other annoyances. Even if you don't run AdBlock all the time, it's worth installing in the event that a site fails to load because it's weighed down with ads, for example.

If simply turning off ads isn't enough, you can specifically target Flash with extensions such as FlashBlock, or prevent JavaScript from running automatically with ScriptBlock (Chrome only).

There's more to block online than irritating ads. Kitten Block shows pictures of tea and kittens whenever you inadvertently click on a link to The Daily Mail, while Simple Profanity Filter (Chrome only) replaces offensive words with carefully placed asterisks – although it doesn't block obscene images, and in our tests we found it didn't catch every bit of profanity. F-Stop actually replaces the obscene phrase with a less offensive one.

If it's social networking spam that you want to rid, FB Purity and Social Fixer can edit out irritating game updates or sponsored posts, while AntiSocial wipes social platforms from web pages. The extension Rather lets you replace what you don't want on social sites – like TV show final results, – with what you do want, such as pictures of cats.

If there's something you'd rather not have on a website, there's an extension to remove it.

KEEP SECURE

Some extensions improve the security of your browser. The free LastPass password manager is a PC Pro favourite; a popular alternative is 1Password.

HTTPS Everywhere, created by privacy campaigner the Electronic Frontier Foundation, encrypts your connection to websites wherever possible. Web of Trust (WOT) issues security warnings as you browse, while Click&Clean tidies up the traces you leave behind in your browser, such as cookies, cached items, typed URLs and browsing history.

Ghostery blocks advertisers and others from tracking you online; install it, and it will tot up how many servers are following you – it's an eye-opener – and will let you block trackers or whitelist specific sites. Disconnect does the same, splitting tracking requests into advertising, analytics and social groups, so you can easily whitelist pages and block others. Disconnect also charts how much time and bandwidth you save by blocking social sharing tools, advertising networks and other items that can chew up your quota in the background.

> "There are plenty of add-ons to help you share web content, with all major social networks supported with extensions"

SYNCING AND SHARING

In some cases it's desirable to block social tools embedded in pages, but there are also plenty of add-ons to help you share web content with your friends. All the major social networks are supported with extensions – both official and third-party – and with these you can, for example, tweet or Like a post directly from your browser, without clicking over to the official site, or add features and remove irritations.

Some extensions focus on one service – Silver Bird (Chrome only) is a full Twitter client embedded in your browser, for example – while others, such as Buffer (also Chrome only), let you share to multiple services.

If reading from your laptop doesn't appeal, you can save down an article to read from a different device using extensions such as Pocket, Instapaper and Readability. Pushbullet connects your desktop to your phone, so you can easily push links, messages, files and directions between the two, as well as to your friends' handsets or computers. If you use Evernote, by installing its extension you'll be able to save notes with a single click, while anyone carrying out online research should download Zotero, which not only saves articles but also makes them searchable later.

HACK YOUR GMAIL

There are a host of extensions for customising the behaviour of Google's webmail service. Checker Plus (Chrome only) makes Gmail act more like an app, popping up notifications when you receive a new message, and letting you read and delete emails without switching away from your active browser tab. Google Mail Checker works similarly, with a live icon that informs you about how many unread messages you have in Chrome or Firefox.

Gmail Offline (Chrome only, although there are Firefox alternatives) enables you to access your inbox without internet access, while Boomerang for Gmail lets you write emails and schedule to send them when you eventually get online. It also lets you manage your inbox by postponing messages so you don't see any work emails until you're in the office, for example.

Gmelius lets you tweak the UI by picking and choosing which elements to include. It also lets you switch back to the old compose email window, and search emails from the omnibox. Minimalist for Everything is a dashboard that lets you choose how Gmail will work by toggling interface items on or off, such as the colour of links or starred items. Preferences can be synced across multiple PCs, and Minimalist works with other pages too; click the icon on any page to view the options.

CREATE A BETTER BROWSER

If there's something about Chrome or Firefox that you find annoying – such as a missing feature or a task you have to perform repeatedly – it's safe to assume that there's an extension to save the day.

Managing tab overload is something of a challenge, and neither Chrome nor Firefox has done much to address the issue. OneTab for Chrome saves all of your open tabs into a list, freeing up their occupied memory until you restore them. TooManyTabs works similarly, but shows your tab collection graphically, letting you preview them more easily.

Lazarus: Form Recovery saves the text you enter into web forms, in case your browser crashes mid-entry, while Print Friendly reformats web pages so they print more cleanly. Awesome Screenshot lets you record a snapshot of an entire page, no matter how long it scrolls on for. AutoPager lets you scroll rather than click across sites that split their content across multiple pages – handy for skimming through Google search results – while Stylish offers themes for major sites including Facebook, YouTube and Google. MightyText provides the ability to send a text message from your browser, and RescueTime tracks how you spend your time online, outputting your productivity in a series of charts.

▲ Kitten Block presents pictures of kittens and tea when you click through The Daily Mail website

If your ISP has started filtering adult sites, you don't need to log in and change the settings every time you're looking for child-unfriendly content. The wonderfully named "Go away Cameron" (Chrome only) lets you slip past the filters with the click of a button. It does slow down download speeds, however, so you'll only want to use it when necessary; you can set how long the re-routing lasts for before it's automatically cancelled. It works in Chrome's Incognito mode too, which is handy for certain types of content. Ahem. Alternative rerouting services include Media Hint and Hola.

◀ Ghostery shows you who's tracking your web browsing – and lets you block this activity

GREASEMONKEY

Of all the powerful extensions, Greasemonkey is king – it lets users manage scripts to control how they see and use the web.

It works only in Firefox, but some scripts are supported natively in Chrome. Scripts are widely available online – http://userscripts.org is a good resource, although Googling what you want to fix with the terms "Greasemonkey script" will often uncover what you need. Be warned, though, some scripts are dodgy – one promised us the ability to steal Facebook passwords – and some simply don't work very well. If you're not happy with what you find, you can also make your own.

> "If your ISP filters adult sites, you don't need to change settings every time you're looking for child-unfriendly content"

Getting started with Greasemonkey is easy. Install the extension, find a script you'd like to use (it will look like name.user.js), and click the link to load it. Reboot the browser, click the monkey icon to open up Greasemonkey and manage your scripts... and you're done.

GETTING AND MANAGING EXTENSIONS

To get Chrome extensions, go to the Chrome Web Store (www.chrome.google.com/webstore); for Firefox, visit www.addons.mozilla.org. You can find many more extensions online, but they won't have been vetted by Google or Mozilla.

Extension icons appear next to the omnibox in Chrome and Firefox. You don't need to click one by one to manage them: in Chrome, typing chrome://extensions into the omnibox will present a settings page from which you can disable tools, delete them or allow them in Incognito mode, and set permissions. In Firefox, click the top-left Firefox button, then select Add-ons to view options for your extensions. You can search for and install extensions directly from here, using the search field at the top.

Of course, there also exist extensions to help you work with your extensions: Extensity provides a dropdown menu to quickly access them in Chrome, while Slim Add-ons Manager cleans up Firefox's own system to make it easier to use.

You can also use extensions in Safari, Opera and Internet Explorer – in the latter, click settings and Manage Add-ons. The options are limited, but software such as LastPass and Evernote will be supported in all the major browsers.

◀ Find extensions on the Chrome Web Store

HOW TO WRITE YOUR OWN CHROME EXTENSION

Writing a Chrome extension isn't as complicated as you might at first imagine. In fact, if you've dabbled in JavaScript and HTML before, you'll have most of the knowledge and tools at your disposal. All you need to know is how to put it together, so Chrome can interpret it and make use of it.

Even if you're new to coding, you'll be able to follow this simple tutorial, and by the end of it you'll have created an extension that lets you quickly look up facts using the open-source encyclopaedia, Wikipedia.

All you need is a text editor – we've used our current favourite, Sublime Text – a Google Chrome browser, and a paint application such as Paint.NET to design the icon for your extension.

THE BASICS

There are two different types of Chrome extension: a "page action" and a "browser action". Icons for page actions appear within the omnibox address bar of Chrome and affect only the page that's loaded into the currently displayed tab. An example of a page action is a button that allows you to subscribe to a page's RSS feed.

Browser actions, on the other hand, work independently of the loaded page, and their icons appear outside the omnibox. Our Wikipedia extension is a browser action, an extension that we want to be available no matter which web page or tab we have open.

The first step in creating your Chrome extension is a straightforward one: create a folder where all the files can live. This can be anywhere on your PC or laptop, but it makes sense to put it somewhere you can get to easily, such as the desktop or My Documents folder.

Next, you need to create the text files that will contain the code. We're creating the simplest Chrome extension possible, so all we need is a manifest file, a HTML file and a PNG file.

Create two new text files and rename them as follows:

manifest.json
displaypane.html

What do these files do? The manifest file is an instruction sheet. It tells Chrome what type of extension it is, its name, the version of the manifest file format you're using, plus other important information, such as where the icon for the button lives and the various files the extension needs to run. The HTML file contains the code that tells the extension what to do or display when it's clicked.

The PNG file is a 19 x 19-pixel image that will appear on the extension's button in the toolbar. It's best to keep your icon simple. We've used a single letter "W" and created the icon in Paint.NET. If you're unsure of how to do this, we show you how in the walkthrough on p23.

Once you've designed your image, you can save it into the folder, naming the file icon.png, and then get on with populating the text files with the code you need. You can also create a 38 x 38-pixel image if you don't want the icon to look fuzzy on high-resolution displays.

> "By the end of this tutorial, you'll have created an extension that lets you quickly look up facts using Wikipedia"

THE CODE

The manifest file is constructed using JavaScript Object Notation (JSON), which is a subset of the JavaScript programming language. As you can see from ours below, manifest files can be pretty basic. They contain a block of code, contained within curly brackets, which includes a number of settings, or "fields".

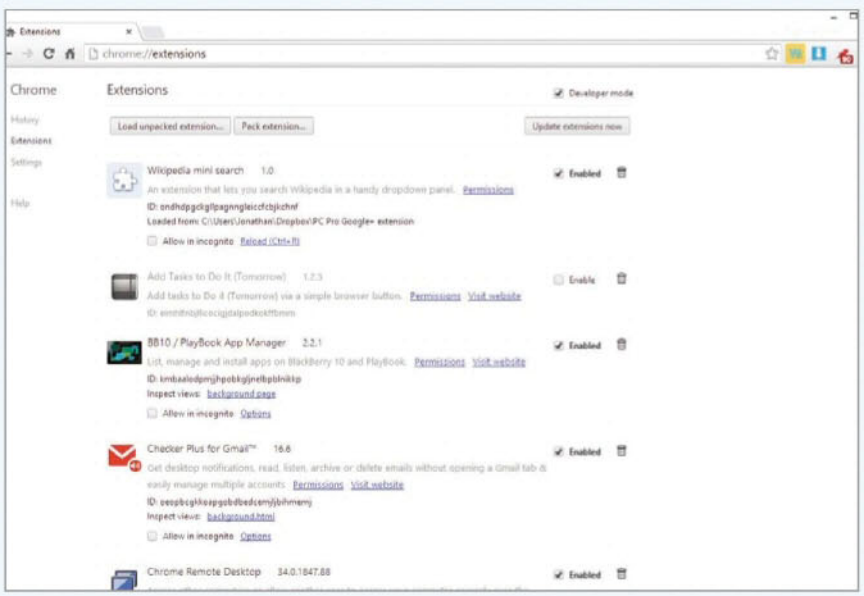
```
{
"manifest_version": 2,
"name": "Wikipedia mini search",
"description": "An extension that
lets you search Wikipedia in a handy
dropdown panel.",
"version": "1.0",
"browser_action": {
"default_icon": "icon.png",
"default_popup": "displaypane.html"
}
}
```

The only required fields are the manifest version and the name that you can see at the top of our block of code.

In our manifest we've added a few extras. There's a description field, a version-number field, and we've also told Chrome that the extension type is a browser action.

Within the browser action field, there are a number of additional options. We're telling Chrome to use icon.png for the extension's button image, and displaypane.html for the main layout, design and behavioural code. Copy all of this text into your manifest.json file, making sure not to omit the starting and finishing brackets.

The main body of an extension is contained with HTML and JavaScript files. Here, we need only a single HTML file – displaypane.html – to populate with



▲ To go to the Extensions settings page, type chrome://extensions into the omnibox address bar

the most basic of HTML page structures: a <head> and <title> tag, a <style> tag with CSS code within it stipulating how the HTML should look, and a single line of HTML code.

```
<!doctype html>
<html>
<head>
<title>Wikipedia mini search</
title>
<style>
body {
height: 580px;
border: 0;
}
iframe {
height: 100%;
border: 0;
}
</style>
</head>
<body>
<iframe src="http://m.wikipedia.
com/"></iframe>
</body>
</html>
```

All we're doing here is loading the contents of Wikipedia's mobile website directly into an <iframe> tag, but you don't have to keep it this simple. You can do much more: use JavaScript to create dynamic content drawn from remotely hosted XML pages, for example.

Note that the maximum height of a Chrome browser action extension is 600 pixels; we've set our height slightly shorter at 580, however, to avoid two scrollbars – one for the browser action and one for the iframe – from appearing.

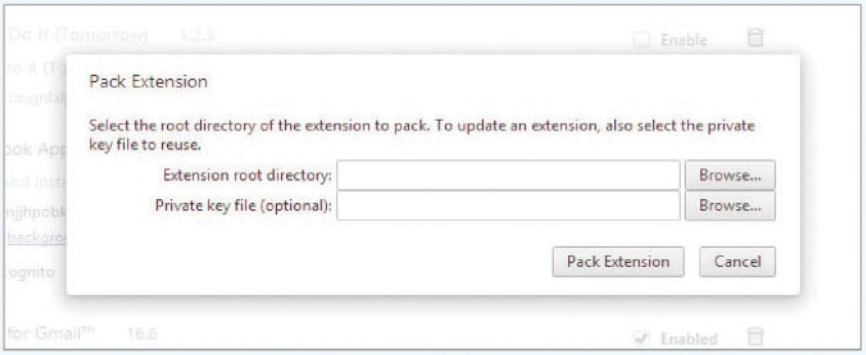
Now that you've understood the code, you're ready to install and run the extension. Just copy the code above into the displaypane.html document in your folder and save it.

LOAD THE EXTENSION INTO CHROME

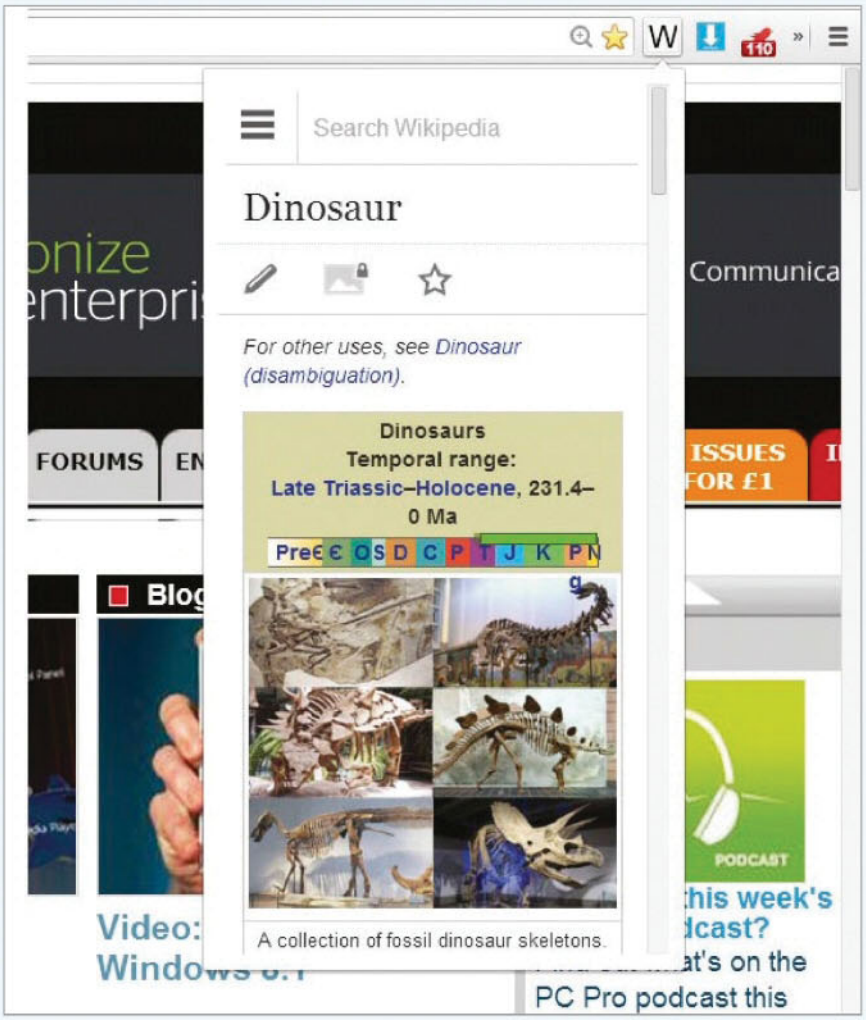
Normally, Chrome extensions are packaged up into a single CRX file, but while we're still fiddling with the code – and we encourage you to experiment – we want to keep everything separate and editable.

To install your "unpacked" extension, you'll need to switch Chrome into Developer mode. Go to the Extension settings page, by typing chrome://extensions into the omnibox address bar, then look in the top-right-hand corner of the web page that appears next, and tick the Developer Mode checkbox.

To load your extension, click the "Load unpacked extension..." button, navigate to the folder where your extension files

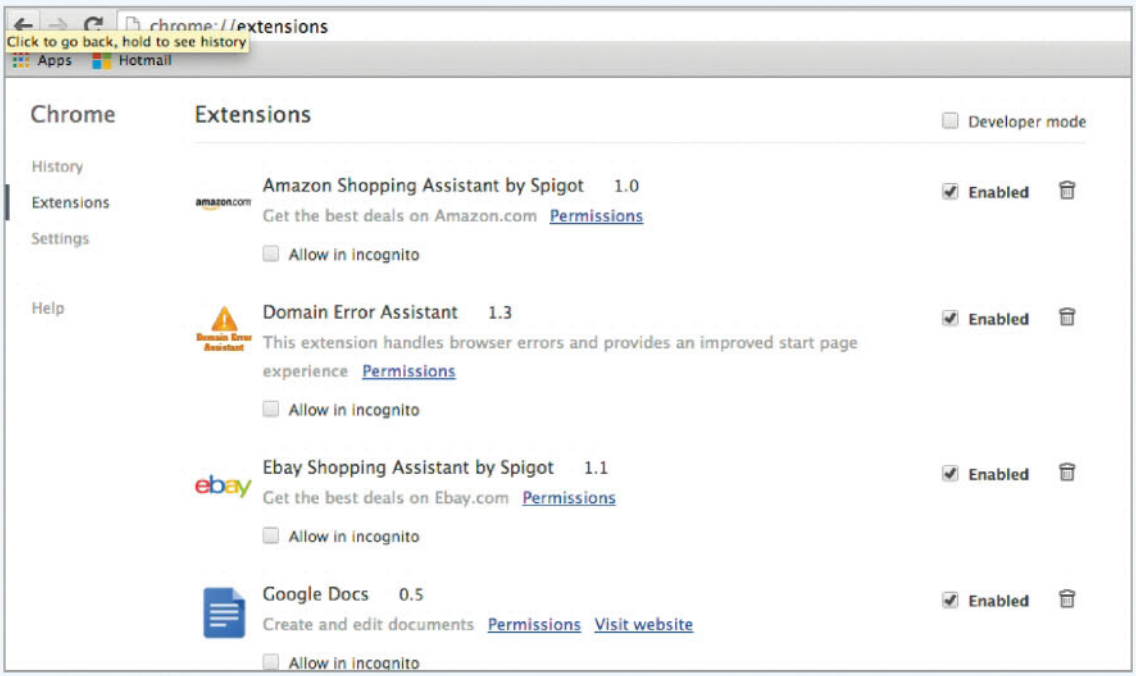


▲ To install your "unpacked" extension, you'll need to switch Chrome into Developer mode



▲ Hit the W extension icon and you can search Wikipedia from your current web page

> "You don't have to keep it simple. You can use JavaScript to create content drawn from remotely hosted XML pages"



▶ To go to the Extensions settings page, type chrome://extensions into the omnibox address bar

are and click OK. The extension, adorned with the icon you designed earlier, will now appear in the toolbar next to the omnibox address bar.

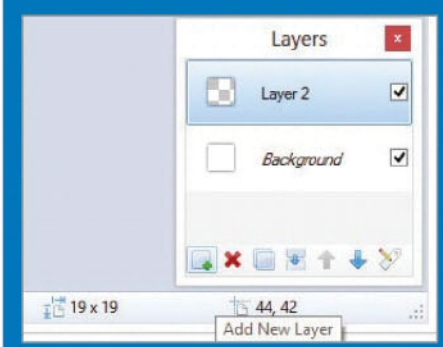
Click the icon and you'll be able to search and browse Wikipedia's mobile website, without having to leave the page you're currently reading.

FURTHER READING

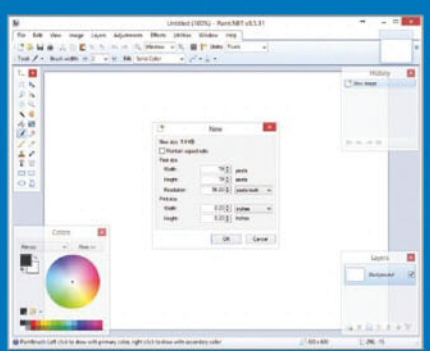
At this point, we encourage you to play around with the code to see how it all works. If you want to learn in a more structured way, however, there's plenty of material online to get stuck into. The best place to go to learn about Chrome extensions is Google's own developer website. You'll find tutorials and code samples aplenty, along with the complete documentation. Go to developer.chrome.com/extensions/getstarted for a more in-depth primer, and https://developer.chrome.com/extensions/api_index for the full technical details of Chrome's JavaScript APIs.

> "On Google's own developer website, you'll find tutorials and code samples aplenty, along with documentation"

CREATE AN ICON IN PAINT.NET



1 First, download and install Paint.NET, and then you'll need to create a blank 19 x 19-pixel image. Click File|New, then type 19 into each of the width and height boxes. Click OK.



2 Create a new layer by typing F7 on your keyboard, and clicking the new layer icon in the bottom-left corner of the Layers dialog box. Select your new layer, and select the Text tool from the main toolbar – this should be docked to the left-hand side of the Paint.NET window.

3 Finally, set the font size to 16, click in the image and type the letter W; you may need to move your layer to get the letter to sit nicely in the centre. When you're happy, save the image as a PNG file in your extension folder and you're ready to proceed with the rest of the tutorial.

PERSISTENT INNOVATION FOR THE FUTURE OF PERSONAL COMPUTING

INTRODUCING ASUS 9-SERIES MOTHERBOARDS

ASUS believes that wherever there is a customer demand, it needs be fulfilled. This is the force behind the continuous ASUS innovation, to do our share to bring up the momentum of this ever growing computer industry. Extensive research and development power has been invested into the development of the 9-series motherboard product lines, aimed to deliver the products that will amaze its users, with feature set inspired by its users, and developed for its users. Let's take a sneak peek at what ASUS has to offer this time.

ALL-IN-ONE SYSTEM OPTIMIZER

Everyone loves to get the most out of their spending, whether that is in performance, energy efficiency, quieter operation noise, better sound quality, or smoother network transmission. However, it is unfortunately not always achievable by everyone due to the lack of technical knowhow. The ASUS research and development team, after years of research in desktop system optimization, have developed a series of system optimizers aimed to assist its users to achieve such goal with ease. Featuring:

▲ASUS 9 series motherboards support the latest 4th and upcoming 5th Generation Intel® Core™ processors.

◀Automatic tweaking is a click away, or, dive in and enjoy manually creating a perfect setup.

EZ TUNING WIZARD, the simple BIOS based system tuner that speaks the same language as the users. Users can easily configure RAID and system performance settings within seconds after answering a few easy questions, turning the painful tuning process into an absolute pleasure.

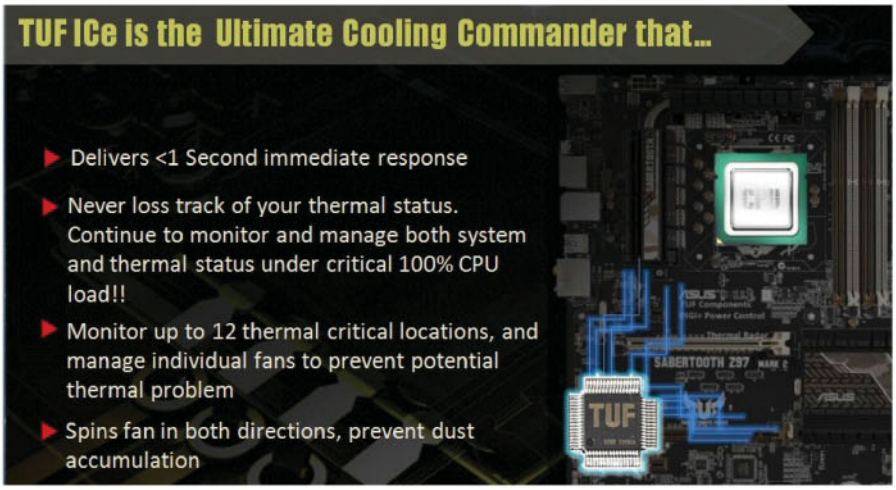
5 WAY OPTIMIZATION, the Windows based all round system tuner has evolved from its predecessor, the award winning 4-Way Optimization. Extending its coverage, and take into the consideration of users' usage scenario, the new Turbo App engine enables users to decide the desired performance, audio settings as well as network prioritization for each different application running on the system, putting every last bit of system power to the best and the most precise use.

▲Answer a few simple and sensible questions and the system is configured to your needs.

MINIMIZE FAN NOISE LIKE NEVER BEFORE

Apart from the complete feature sets of the already powerful Fan Xpert 2, the newly upgraded Fan Xpert 3 delivers the complete freedom of fan control by allowing different reference temperature for different fan headers. While all fan headers feature the ability to manage each fan headers with both 4pin PWM and 3pin DC control, the introduction of the brand new Extreme Quiet Mode, that further reduces the lowest PWM fan speed right down to minimal DC controlled RPM when the system idles down, making your system not only cool and quiet, but cool and silent whenever possible.

While ROG receives its dedicated processor, the iROG, and the ASUS branded motherboards receives its TPU since the LGA775 days, it is time for the TUF series to receive its dedicated processor. The TUF ICe is a newly designed embedded processor that monitors and manages system status utilizing zero system resource, meaning no raise of CPU load or DPC latency, which is always desired. This exclusive design enables the system to keep track of the system status every second, while enabling the management over all fans even when the CPU works under the critical 100% load. As well as that, the newly upgraded Thermal Radar 2 also includes the calibration and management over the fans on the discrete graphics card, bringing the system acoustics management to a different level. Better yet, it also enables the assistant fan to do reverse spin for a set period configured by users, minimizing the chances dust accumulation.



SCAN THE QR CODE FOR FURTHER INFORMATION ON ASUS 9 SERIES MOTHERBOARDS

SUPPORTS intel inside CORE intel inside CHIPSET Z97

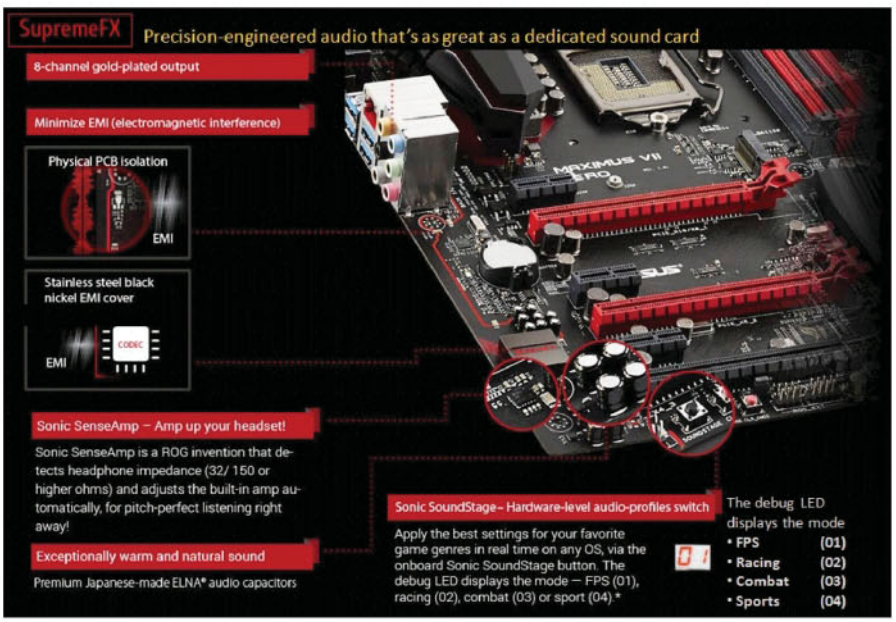
GAME BETTER, GAME FASTER, WITH STYLE

DISCRETE EQUIVALENT AUDIO SOLUTION

If there is one expansion card that a desktop PC enthusiast will invest after owning a discrete graphics card powered system, it will have to be the audio card. The ROG SupremeFX has always been appreciated as much as the discrete gaming audio solution by the gaming community, now it is time for the entire ASUS range to receive quality audio. The Crystal Sound 2 features the core design of the SurpemeFX, consists of clean and precise outputs that is then amplified to deliver the most tempting effect which no man can resist. Understanding amplified output also causes loud pop noise during system on/off when working with speakers or headsets without relay, all ASUS 9-series motherboards also feature unique de-Pop Circuit to prevent such concerns. The SupremeFX 2014 on the other hand is equipped with an intelligent Sonic Sense Amp headphone impedance calibration engine that calibrates the level of amplification for optimal result, and the hardware based equalizer, the Sound Stage to enhance audio experience, anytime, anywhere. Finally, the DAC users are also not disadvantaged, thanks to the inclusion of the TrueVolt USB for both the front and the rear USB 2.0 ports, making no compromise for all audio needs.

FAST AND STABLE NETWORKING PERFORMANCE

While the ASUS and TUF series receive ROG GameFirst II network equivalent upgrade with the inclusion of TurboLAN, the research and development of premium gaming network continues. Featuring the fastest, and the most reliable network solution provided by Intel®, protected by the fully protected and most reliable Anti-Surge LANGuard that has 1.8X higher static electricity tolerance and 1.5X higher surge tolerance than standard RJ45 LAN connector, and managed by the newly evolved GameFirst III gaming network manager, securing every last bit of gaming advantage for the gaming enthusiasts.



ENJOYING LIFE AND GAMING WITH STYLE

The ROG series is long known to feature a vast number of onboard buttons and switches for unique functions. However, these functions may not be easily accessible after closing the chassis. KeyBot, the latest ROG innovation since the Maximus VII series utilizes a brand new iROG processor, bringing the convenience of access these buttons and switches directly from the keyboard. Better yet, it also turns any keyboard into a professional gaming keyboard with its powerful Marco keys function, bringing more advantage for its gamers. On the other hand, the Z97-DELUXE also features exclusive convenient gears such as NFC Express 2 and Media Streamer that makes the interaction between PC and mobile devices more enjoyable. With a single tap on the NFC Express 2, the video streaming on the PC can be passed on, and played on your smart device, then to a different PC, or back to the original. Digital entertainment is finally on-the-go with its users, wherever you are. Want to avoid tripping off the smart device while charging? No problems, with the bundled Wireless Charger, delivering cable-free charging freedom for the wireless charging devices.

THE QUALITY YOU CAN CERTAINLY TRUST

Last but not the least, is the quality and maintenance that you can trust. ASUS motherboards features the most durable 5X Protection to safeguard against environmental hazards, qualified with over 1000+ devices for the total of over 7000+ validation hours to ensure the highest reliability, compatibility and safety throughout. The TUF series even features the consumer industry exclusive server grade validation and 5 year warranty, together with the exclusive ASUS innovations, making ASUS your top choice for motherboards for the past, the present, and beyond.

REALI
CHEC

VIRTUAL REALITY WAS HYPED IN THE 1990S, BUT FAILED TO LIVE UP TO EXPECTATIONS. NOW FACEBOOK HAS PAID $2BN FOR OCULUS, VR IS VERY MUCH A REALITY, AS **NIALL MAGENNIS** EXPLAINS

Announcing his company's purchase of Oculus VR, Facebook CEO Mark Zuckerberg triumphantly proclaimed that augmented reality "will become a part of daily life for billions of people". Facebook is betting big on a technology that has promised so much for so long, but has thus far failed to deliver.

Virtual reality could now be on the verge of becoming seriously big business. Sony has announced its own virtual reality headset, Project Morpheus. The technology has been trying to go mainstream for over 30 years, with limited success.

Its continued failure has baffled the geeks and technology companies who have long predicted VR is the future of gaming. But Facebook's move is about much more than just gaming. The company has said it wants to use virtual reality technology for communication, teaching and healthcare. But will Facebook – and VR – fall flat on its virtual face?

ARCADE FIRE

If you were into gaming in the 1990s and lived near Parramatta, you probably made the trek into Intencity to experience virtual reality for yourself on games such as Dactyl Nightmare and Exorex. Hyped up by movies such as The Lawnmower Man, virtual reality felt like it was just around the corner, and with the VR arcade systems installed at Intencity it literally was for many excited people.

Or at least it was until you actually played these games. Sadly, the reality of the VR kit at Intencity was a 3D world that makes today's Minecraft graphics look cutting-edge.

Much of the buzz that fuelled the interest in VR was created by two people: Jaron Lanier and Thomas G Zimmerman, Atari employees with a grand vision for how the new immersive world of virtual reality was going to change our lives. They ended up leaving Atari to form the unfortunately named VPL Research in 1985.

At VPL Research the pair created a headset, data sensory glove and surround-sound audio system, along with a 3D rendering engine and virtual-reality programming language. It was pioneering work, but their vision didn't come to fruition. Hampered by expensive and low-powered hardware, VPL Research

TY CK

WHAT NEXT FOR VIRTUAL REALITY?

went bankrupt in 1990.

Around the same time, a PhD graduate named Jonathan D Waldern set up a company called Virtuality to make VR hardware and games for arcades. These were the systems that made their way into the Trocadero in the 1990s. However, they were expensive, at around $65,000, and they didn't prove very profitable for arcade owners.

Virtuality eventually started working with other partners on headsets for home consoles, including Sega and Atari. However, Sega pulled the plug early, and while the Atari deal reached the stage where prototype headsets were created, eventually it was canned too when Atari threw in the towel on its ill-fated Jaguar console.

The next attempt by a console manufacturer to move into the world of VR also ended up being a damp squib. When Nintendo announced VirtualBoy in 1995 expectations were high, especially as it was designed by Gunpei Yokoi, creator of Nintendo's Game & Watch and GameBoy handhelds.

But the unit's monochrome displays and lack of real 3D put buyers off and within a year it had been withdrawn from sale in both Japan and the US. By the late 1990s consumers were tired and sceptical of VR's promises.

THE DREAM IS OVER?

Despite all the hype, VR failed badly in the 90s. People who tried out the headsets at the time bemoaned them for being heavy and bulky. Worse still, the graphics technology was simply not ready, with worlds that lacked detail and couldn't update the display smoothly enough. Since then it has been a very prolonged game of catch-up.

Andy Millns is co-founder of Inition, a company that produces – among other things – virtual-reality experiences for use in promotional campaigns. Working with Nissan, Inition created a simulated Wingsuit experience that let people fly through the air at breakneck speeds. Millns traces his love of VR back to the arcades of the 1990s.

"In the early 90s I was obsessed as a teenager with the whole idea of VR," he said. "It obviously had a lot of hype, but the technology's really taken 20 years to catch up, be affordable and provide the type of experience that people expect when they put on a headset."

After that first wave of consumer products bit the dust, the technology didn't die. Instead it was put to other uses in labs and theme parks. The main reason for this retreat was one of cost.

"The type of head-mounted displays that you needed in order to provide a high-resolution, wide field of view were very expensive," said Millns. "We actually represent a lot of these manufacturers, and people have been paying tens of thousands of pounds to buy a hand-built headset that's quite heavy and cumbersome."

START OF THE NEW WAVE

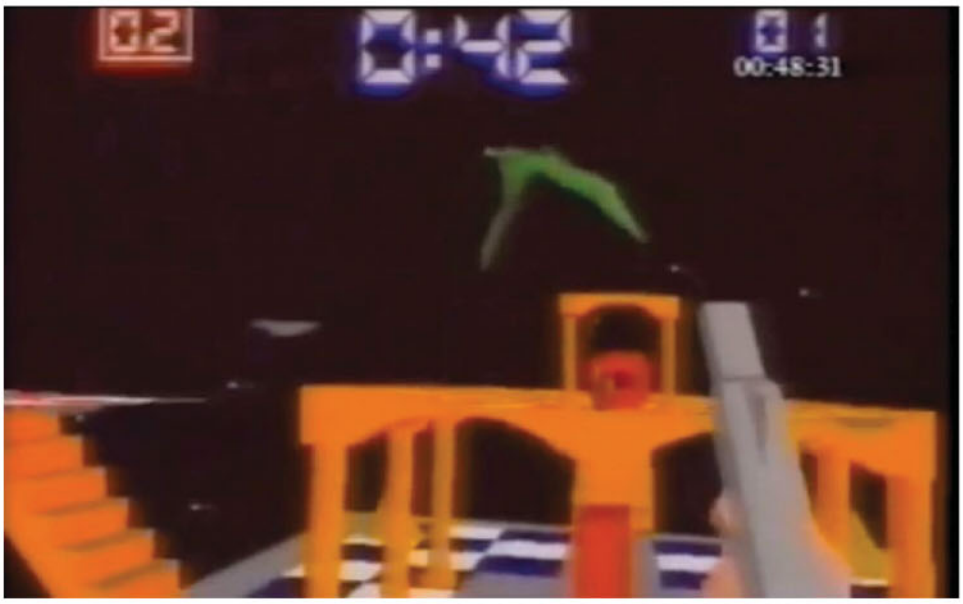
What virtual reality really needed was a low-cost but high-quality headset, which is where the story of Oculus Rift begins. Oculus VR founder Palmer Luckey was a designer of head-mounted displays (HMDs) at the University of Southern California's Institute for Creative Technologies. He was also a collector of VR HMDs, but he found that even the high-end, military-grade headsets didn't produce a very good VR experience.

He started working on the idea of

using readily available components to create a smaller, lighter and cheaper HMD that would appeal to today's gamers. Ironically, his ideas were a perfect example of the design philosophy of Gunpei Yokoi, the creator of Nintendo's ill-fated VirtualBoy.

Before VirtualBoy, Yokoi had created two hugely successful products for Nintendo, the Game & Watch and the GameBoy, through a design process he dubbed 'Lateral Thinking with Seasoned Technology'. This is the idea of taking existing technology that is cheap and well understood and using lateral thinking to find new applications for it.

In the 1980s Yokoi had noticed that there was a glut of LCD displays and semiconductors in the market due to the fierce battle between Sharp and Casio to build cheap calculators. He took this existing calculator technology and used it to create the Game & Watch series of handheld consoles. Nintendo went on to sell over 43 million of them. While trying to rethink how to create a VR headset, Luckey had a similar epiphany. He saw that many of the parts he needed were already present in cheap smartphones.



▲ Games such as Dactyl Nightmare (top) and films such as The Lawnmower Man promised much in the 1990s, but VR failed to live up to the hype

ALL THE KEY ELEMENTS FOR A VR HEADSET WERE ALREADY PRESENT IN RELATIVELY CHEAP SMARTPHONES

"I started from the ground up and said, 'how can I redesign a virtual-reality headset to provide a great experience?' I ended up using a lot of modern mobile phone components, and that led to the design of the Rift today," Luckey said.

These components included a high-resolution screen, gyroscope, accelerometer and magnetometer – all key elements to a VR headset, and all elements that were already present in relatively cheap smartphones.

Previous headsets had used specialised micro displays and complicated multi-element lenses to try to correct image distortion optically. This not only pushed up their cost, but also added to their bulk and weight.

"What the Rift does to get around all of that is it just uses a single set of lenses that give you a very wide field of view by ignoring all geometric distortion," explained Luckey. "It then pre-corrects all of that distortion on the graphics card of the computer, so you get the perfect image you'd get with complex optics, but with none of the cost or weight."

The results impressed many who had experienced previous headsets designed for industrial purposes, including Inition co-founder Millns.

"It's enabled a much simpler design than was possible with the micro-displays that the other headsets used," he said. "And at the same time it offers a huge field of view. It's kind of what people expect when they

▶ Inition creates virtual-reality experiences for promotional campaigns, such as this Wingsuit for Nissan

Oculus Rift benefits from simpler optics, as optical distortions are removed in software

put a headset on: they expect to be totally immersed."

KICKSTARTING SUCCESS

Luckey ended up sending one of his prototypes to John Carmack, co-founder of Id Software, who had been toying around with building an HMD. He was so taken with Luckey's design that he demoed it onstage at the E3 trade show in 2012. As a result, the Oculus Rift Kickstarter campaign ended up with $2.5 million in funding rather than the $250,000 that the company was initially looking for.

Carmack is now the chief technology officer at Oculus VR, helping to develop the prototype into a retail product that's likely to be released this year, a role he looks to be continuing under Facebook's ownership. Given his track record in the games industry, with titles such as Doom and Quake to his name, he's a key figure in the company.

Oculus started shipping developer editions of its HMD to Kickstarter backers in March 2012. Even though it was an early version of the product, it was still very well received.

However, it does have its problems. The screen resolution is relatively low and each eye sees only half of the display. The physical structure of the display is a problem, too, as you can make out the gaps between the pixels. Rift's use of regular LCD screens is also problematic, as they suffer from motion blur. This is a problem that affects all LCD displays, including those used in today's TVs, but it's much more noticeable on an HMD. Headset tracking also has its limitations; Rift can't currently tell if you lean forwards over something, such as the edge of a cliff, and there can be lag between movements being made and recognised.

Luckey says that Oculus has been steadily working through these issues and many have been addressed in the new 'Crystal Cove' prototype shown at the CES trade show at the start of 2014.

"It is higher resolution," said Luckey. "It has full position tracking, so it doesn't just track where you're looking, but how you move through space, so you can move your body and it's able to track that accurately. And it also has a display called a low persistence display that eliminates motion blur."

Luckey explained that getting rid of blur is a big deal when it comes to virtual-reality HMD displays.

"We need to cut it way, way down to eliminate motion blur, because in VR you're much more sensitive to it than on a TV," he said. "So we only keep the frame open for one or two milliseconds and then black the frame for the rest of the time, rather than leaving it on for the full 16 milliseconds."

The company has also worked on improving the tracking, and the

SIMULATOR SICKNESS

If it's to be really successful, the new wave of VR kit, including the Oculus Rift, will need to overcome, or at the very least minimise, problems with simulator sickness.

Simulator sickness can be thought of as the opposite of motion sickness. Your eyes tell your brain that you're moving, but at the same time your brain is receiving contradictory signals from you inner ear that you're not actually going anywhere at all. The conflict between the two can lead to pretty bad feelings of nausea.

Just as with motion sickness, some people are more prone to simulator sickness than others, but many of those who've tried the developer version of Oculus Rift have felt queasy. Simulator sickness can be alleviated by getting rid of onscreen motion blur as well as latency related to the headset's motion trackers. Improving the range of data collected by the trackers can help, too.

Julian Williams from WizDish says that one of the big problems with the developer version of the Rift was that it could only track three degrees of freedom (DOF) – roll, pitch and yaw – whereas the next version will have much better motion sensing.

▲ Some people can start feeling a bit queasy when wearing a headset

"What the next version of the Rift, and what others are doing, is adding six DOF," he said. "What was happening is that if you bent forward nothing would change, the video would be identical. That sends an alarm panic to your brain because it just cannot cope with that notion and it is why they're adding a new camera [sensor]."

▲LEFT:Stem uses a very weak magnetic field to track hand and body movements accurately RIGHT: WizDish is a low-friction treadmill that allows you to physically walk through a virtual world

latest version is now able to tell not just where you're looking, but how you're moving in space, thanks to an external camera sensor.

"We're using data on the headset from the internal gyroscope, accelerometer and magnetometer and we're fusing that data with the information from our tracking camera that we've developed," he said. "It was developed to be high precision and low latency and it's specially designed for virtual reality."

"The biggest things we're trying to push down right now are latency, cost and weight. We're going to make this thing a lot lighter and the latency is continuing to improve. We have a lot of very low latency demos internally and we're working on integrating that technology with game engines."

THE PRICE IS RIGHT

Luckey also understands that getting the unit out there at a low price is going to be hugely important if it's going to take off outside the world of virtual reality aficionados and early Kickstarter backers.

"Price is definitely key," he said. "If the price is too expensive, it may as well not exist for the majority of people. We're looking to hit the same ballpark as the development kit we're shipping right now, which is US$300."

When it was first announced Oculus had the field to itself, but Sony's Project Morpheus has since muscled in on proceedings. This virtual reality headset works with Sony's PS4 games console, although a price and release date are yet to be announced.

Valve also showed off a prototype of its own HMD at CES this year. Although the company has said that it has no plans to actually launch a headset, it hasn't ruled out getting into virtual reality games in the future. According to Michael Abrash, who works on wearable tech at Valve, the company has shared some of its findings from working on its own headset prototype with Oculus.

There's also CastAR, which has just finished a successful Kickstarter campaign raising over a million dollars. Created by two ex-Valve employees, it differs from the other VR headsets in that it's more of an augmented reality project. Instead of being immersed in a virtual world, the CastAR system makes it look as if virtual objects and characters are being added to the real world around you. Think of R2-D2 and Chewbacca playing the holographic 3D chess-style game in Star Wars: Episode IV and you're not far off the idea that CastAR is trying to make a reality.

SENSORY OVERLOAD

Beyond the big-hitters, there is a whole roster of companies looking to produce weird and wonderful add-ons to be used with the new generation of headsets.

One of these is a UK company called WizDish. It's building an omni-directional treadmill to be used as a VR controller to allow you to physically walk around a game world. It doesn't actually use a traditional treadmill belt, but instead relies on a low friction surface that you move around on while wearing special low-friction shoes.

"Both of your feet swing through the air in the same sort of trajectory as you would normally, except the difference is that both your feet are in contact with the ground," explains

SIMULATING F1

Throughout the 1990s and early 2000s, Formula One teams were spending outrageous amounts of money testing engines, tyres and aerodynamics. In 2010 those in charge of the sport decided to drastically cut down the number of days that F1 teams could go testing. This was largely to try to bring down escalating costs, which many teams just couldn't compete with.

As a result, F1 teams started investing in simulators. These use screens or projectors rather than head-mounted displays, produce realistic graphics and are tied to hydraulic systems to simulate car movements and the bumps of a race track. For example, Ferrari's simulator, which was made by Moog Industry Group, has the driver seated in front of a curved projection screen providing a viewing angle of more than 180˚. There's a 3,500 Watt Dolby Surround 7.1 sound system and the simulator is controlled by 10 computers that produce 5GB of test data a day.

Young drivers often use the F1 simulators to familiarise themselves with tracks they haven't driven yet. However, the simulators can also be used by teams to try out new car setups and new aerodynamic components, as well as testing other factors such as tyre wear or the effects of different car setups.

Not everyone has been a fan of these F1 simulators. Before his recent accident, Michael Schumacher suffered so badly from simulator sickness that he found it difficult to use the Mercedes F1 simulator. And despite having its own high-end simulator, Ferrari chairman Luca Cordero di Montezemolo has said F1 teams should return to real testing. However, with pressure on the sport to be more competitive and more environmentally friendly, we can't see that happening any time soon.

◀A ban on testing forced F1 teams to use simulation

Julian Williams, founder of WizDish.

"When you get into VR I think you have to physically emulate more or less what you're doing virtually," he says. "VR headsets are great for racing games and flying games and things like that because you tend to sit down and look forward most of the time," he said.

"When you're in a first-person game you're stood up, and if you then turn 360° your inner ear is not registering movement and that's one of the key causes of simulator sickness. On the WizDish you can physically turn 360°, so it's not only a lot more immersive and intense, it's also fixing one of the key problems with simulation."

WizDish has a US competitor called Virtuix that is developing a similar product called Omni. Omni has also been through a successful Kickstarter campaign, raising US$1.1 million, and units should be shipping now. They're expensive, costing around US$400-500, and the user needs to stand in a circular frame and wear a safety harness while playing. Like the WizDish it uses a low friction surface the user stands on in special low friction shoes.

Colton Jacobs, product manager for Virtuix, said that learning to walk and run on the low friction surface does take a while to master, but users quickly get used to it.

"It is a slippery surface, so it does take some getting used to," Jacobs said. "But if someone's able to spend an hour on the Omni – either playing a game or running through a simulation – it just becomes second nature and it feels very natural."

There are other companies looking to do more than allow you to move around a VR world by walking or running. Some are looking at ways to make it easier to interact with objects in your virtual surroundings.

Perhaps the company attracting the most attention in this area is Sixense, with its Stem System. Sixense designed the Hydra motion controller, which was marketed by Razr. It used a weak magnetic field to track movements and allows you to manipulate onscreen objects by waving a controller around in the air. The Stem is a modular version of the Hydra, where you start with two hand controllers, and can add more controllers and sensors until you get to a total of five.

The idea behind Stem is that you'll be able to interact with virtual spaces and objects once you've got your Oculus Rift strapped on.

HOW VR WORKS

To create a good virtual-reality experience you need a headset with a top-quality screen and sensors to track your motion as you move your head around. Naturally, you also need a computer or console to create a virtual world to wander around or interact with. That all may sound straightforward, but it's actually quite difficult to get all the different parts working together in an effective way.

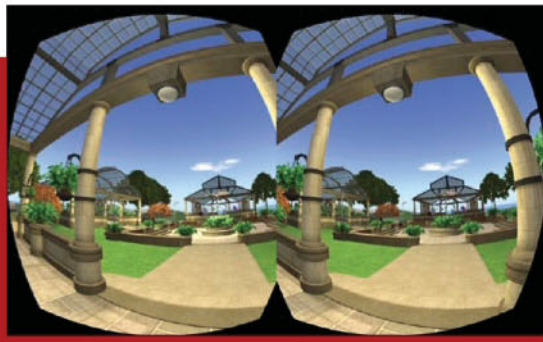
For example, the first prototype of the Oculus Rift used a 1,280x800 pixel, 7in screen, which was basically a mobile phone component. This cut the cost of the headset as previously models had used two micro displays, which are very expensive. However, the resolution is halved to 640x800 for each eye, which is fairly low by modern standards.

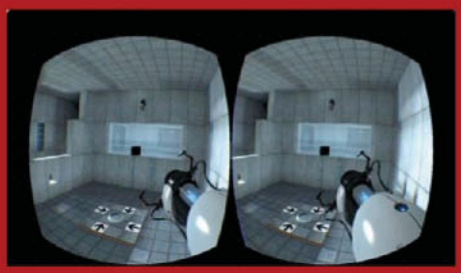
In the latest version the company has used a Full HD display to reduce this effect. But many people we spoke to said that due to the way the optics in the headset enlarge some pixels, a 4K screen may ultimately be needed to produce a truly absorbing experience. What's more, the prototype used an LCD screen, but the unpleasant motion blur means Oculus is looking to switch to a faster-refreshing OLED screen in future.

Also, the tracking on the first version was only able to track three degrees over movement, which was the cause of some of the nausea that people felt using the headset. The latest model uses an external camera to track six degrees of movement, so you can lean over the side of a bridge, for example, and the headset will track the view accurately.

The other issue is one of lag. If there's more than a few milliseconds' delay between moving your head and the display updating to show the new virtual view, then it can be extremely disconcerting for the user. Eliminating lag is one of the trickiest tasks when creating a virtual reality headset and taxes even the most gifted of programmers.

As Oculus's Palmer Luckey said: "It's not just a matter of getting access to the components; there's a lot of stuff that goes on under the hood in software. That's hard even for world-class programmers like John Carmack to do."





▲ The alpha version of Elite: Dangerous supports Oculus Rift, so you really do feel like you're in the cockpit

For example, you might use the controllers to climb a virtual ladder or pick up and throw a bone for a dog to fetch.

"The moment you are fully immersed in a 3D world, you don't want to be reminded that you need to press keys," said Amir Rubin, CEO of Sixense. "You want to have full tracking of your arms and you want to be able to reach in and interact with the world. It's what will make the experience as good as is promised – fully immersive and allowing you to properly escape into the world – whereas today you're really just standing there in the third person."

THE FUTURE OF GAMING

While some of this talk may sound like the type of hype that made the rounds in the early 1990s, a lot of people are genuinely excited about Oculus Rift. None less so than Facebook and Sony, who are both putting serious money into developing VR kit. Obviously there's still a long way to go before we can judge whether this round of VR products will be a success, as none of the ones we've covered here are even finished products yet.

Those who have used the early version of Rift are convinced it really does deliver a new, more immersive experience in a way that current games don't. We certainly saw a lot of potential in it, but persuading the public that they want virtual experiences is going to be a big task. If Oculus can get the technology right, then this could represent the next big revolution in gaming. And Facebook will be hoping the technology doesn't stop there. It's been a long wait, but finally the reality of a virtual world is almost upon us. ■

IN THE LABS

YOU WON'T FIND BETTER REVIEWS ANYWHERE IN AUSTRALIA!

New Intel Series 9 boards

BEN MANSILL IS LESS EXCITED ABOUT INTEL'S SERIES 9 CHIPSET THAN HE THINKS HE SHOULD BE.

Ordinarily the release of a new Intel motherboard chipset is exciting news. It usually heralds a significant step forward in motherboard performance and features, and kick starts an interesting couple of years as motherboard manufacturers work to deliver the best implementations.

But it's all a bit lacklustre for the Intel Series 9 release. There is very little to get excited about and the whole process feels very much marketing driven.

Of all the new Series 9 features, only the M.2 SSD support really interests us. While SSD's in general have been on the receiving end of some good improvements, most of them we'd rate as features that should have been rolled out in the Series 8 chipset.

TRIM support for RAID 0 configurations is one such, and for those who use it, Intel's Rapid Start Technology (IRST) - which caches the RAM's contents to an SSD partition when the PC is in sleep mode - now supports setting aside a dedicated 16GB SSD for this. Because IRST needs the SSD partition to match the size of the system's installed RAM, it makes good sense to install a dedicated IRST drive now that the new chipsets allows that. A quick price check shows that around $50-60 is the going rate for a 16GB SSD.

These are nice features, but hardly transformative. M.2, though, now that's sexy. You can argue that for most uses SATA 3 - or even SATA 2 - is just fine, as SSDs are so quick that it ultimately doesn't matter. But think back to gen 1 SSDs which delivered around 200-250MB/s on a good day. SATA 3 SSDs roughly doubled that, and M.2 will again. Yes, we need more speed.

PCIe (SATA Express) SSDs have been available for some time but these are considered enterprise server drives, and are priced accordingly. M.2 promises similar speeds (up to 1,000 MB/s), although in real world use we expect around 850 - 900MB/s.

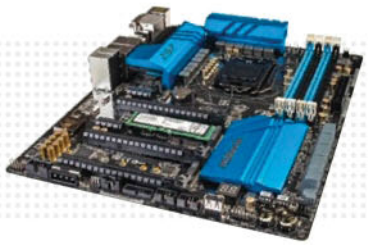
This month we've included the first Series 9-based boards that have come into the labs. We think that if your system is about ready to be upgraded, then go for it. Compatibility with the current LGA 1150 socket is a big plus, and somewhat usual for a new Intel chipset. Perhaps jumping to a new socket standard would have been too much of a disincentive for a new series of motherboards that offered so little?

Later in the year - around September, our spy tells us - the more performance-oriented Z99 chipset will hit. At this early stage the most important new feature we're anticipating is the switch to DDR4 memory. I say that with some reservation, though, as faster RAM is becoming less and less critical to all but the most demanding games, and of course the extreme overclocking scene.

In the meantime, the flood of new Series 9 boards is just beginning, we've a few in this month's Labs. If anything the arrival of a new motherboard chipset from Intel is catalyst for innovation. We know that manufacturers hold back fresh new features, as well as improvements on old ones, for the release of a new series so it can all be packed in for a more impactful release, and there will be plenty of that.

GIGABYTE Z97 SOC FORCE **46**

ASUS Z97 SABRETOOTH **47**



ASROCK Z97 EXTREME 6 **45**

EDITORIAL & PRODUCT SUBMISSION: *PC & Tech Authority* welcomes all information on new and upgraded products and services for possible coverage within the news or reviews pages. However, we respectfully point out that the magazine is not obliged to either review or return unsolicited products. Products not picked up within six months of submission will be used or donated to charity. The Editor is always pleased to receive ideas for articles, preferably sent in outline form, with details of author's background, and – where available – samples of previously published work. We cannot, however, accept responsibility for unsolicited copy and would like to stress that it may take time for a reply to be sent out.

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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.

PC &TECH AUTHORITY A-LIST

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.

PC &TECH AUTHORITY RECOMMENDED

WHAT OUR RATINGS MEAN

OUTSTANDING
VERY GOOD
GOOD
ORDINARY
POOR
VERY POOR

HOW WE TEST

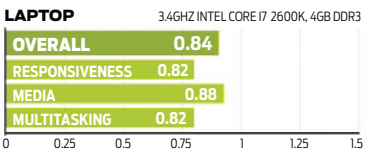
OUR BENCHMARKING TESTS ARE THE BEST IN THE BUSINESS. READ ON TO FIND HOW THEY WORK...

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

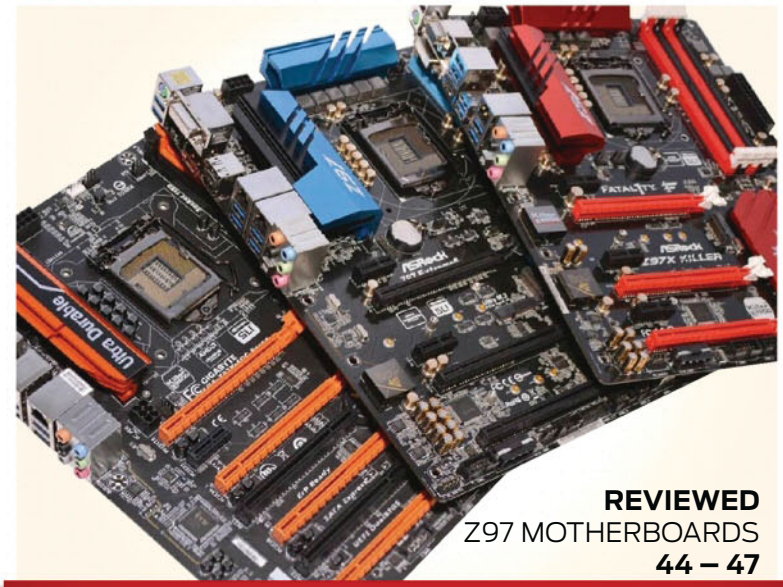
We use pre-recorded demos in Crysis and DIRT 3 to test gaming performance where relevant. We have three standard test settings, depending on the power of the graphics card: Low, Medium and High.

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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CAKEWALK SONAR X3 PRODUCER

THE MUSIC PRODUCTION BEHEMOTH GROWS BIGGER AND BETTER THAN EVER

PRICE US$525
SUPPLIER www.cakewalk.com

Sonar is one of the big beasts of music production, with a breadth and depth of features to rival Cubase, Logic and Pro Tools. Its bundled effects and virtual instruments have always been strong, but when it comes to ease of use, Sonar has historically felt slightly more awkward than its rivals.

For version X3, Cakewalk has focused on streamlining Sonar's comping capabilities – that is, simplifying the process of recording multiple takes, chopping them into sections and compiling a best-of performance.

To that end, Sonar now captures multiple takes automatically, and clicking the Take Lanes button reveals them, along with space for jotting down notes. Takes can be divided into shorter sections by simply dragging across them. Dragging the edge of a section adjusts the split point across all takes, while dragging upwards applies a crossfade between active takes. Hitting Shift+Space invokes Lane Audition Playback mode, in which takes can be auditioned using the cursor keys and selected with the Enter key.

It's a superb system that makes a fiddly process easier to handle, letting the user concentrate on musical decisions. It also works for multitrack recordings such as a live drum kit, with edits to one track also applied to the others. In our tests, however, we found it worked reliably only after we'd enabled automatic grouping of multi-track recordings; trying to group the tracks manually after recording led to problems. This is typical of Sonar – powerful and precise, but only if you do things as the programmers anticipated.

Another big improvement comes in the area of vocal pitch correction. Melodyne Essential – a cut-down version of Celemony's powerful pitch-correction software – is now integrated into Sonar, appearing as an offline graphical editor. It works only with monophonic recordings, and lacks the capacity to sculpt each note manually, but it excels for tidying up the tuning and timing of vocal performances, and is easily a match for Cubase's VariAudio editor when it comes to subtle correction.

What's more, whereas VariAudio is included only in the most expensive version of Cubase ($500), Melodyne Essential is bundled with Sonar Studio (US$209) as well as the more powerful Producer edition. On balance, though, we still prefer VariAudio for its greater manual control and more flexible workflow: in Sonar, once a region was edited with Melodyne, we found certain edits were no longer permitted, or behaved strangely. Based on our experiences, we'd say it's best to complete any comping before starting on pitch correction.

Melodyne also enables Sonar's new audio-to-MIDI conversion capability, which is triggered by simply dragging an audio region onto a MIDI track. The results usually require a fair amount of tidying up, but it's an interesting way to generate material. The only real disappointment is that the fluctuations in pitch aren't then converted to pitch bend data.

Both the Studio and Producer editions gain a new suite of 19 audio effects going by the name of Nomad Factory Blue Tubes FX. It's a solid set, with highlights including a gutsy brick wall limiter and an atmospheric vintage delay. X3 Producer's ProChannel effects also gain a tape saturation simulator, adding yet another way to inject some warmth into recordings, and an updated EQ module with a new spectrum analyser to hone in on frequencies.

Also bundled is Addictive Drums, a virtual instrument that emulates acoustic drum kits. Sound quality is top-notch, drawing on a sample library of immaculately recorded drums and cymbals. The relative levels of the spot, overhead and room mic can be adjusted, and there are synthesis controls for creating more experimental drum kits.

Finally, AAS Lounge Lizard Session is a simplified version of our favourite electric piano plugin. The editing potential isn't quite as deep as in the full version, but it sounds just as luxurious. AAS Strum Acoustic Session simulates acoustic guitar performances, complete with palm mutes and arpeggiated phrases. For us, it isn't as strong as Lounge Lizard or Addictive Drums, but it's still a welcome addition.

▲ Sonar X3 makes comping multiple takes a simple affair

▲ Addictive Drums excels for acoustic drum kit simulation

The quality and quantity of Sonar's plugins make it incredibly good value, now more than ever: we can easily imagine producing release-quality recordings without the need for additional plugins – something that can't be said for all of Sonar's rivals. The new comping features also represent a big step forward for operational efficiency.

Yet there's still plenty of room for improvement in this area. While none of the major workstation packages could be described as beginner-friendly, Cubase fares better for overall speed of use. Sonar offers more potential out of the box, but it takes considerable effort to get the best from it.

Ben Pitt

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

COREL VIDEOSTUDIO ULTIMATE X7

A CASE OF QUANTITY OVER QUALITY; ALTHOUGH THE PERFORMANCE IMPROVEMENTS ARE WELCOME, THEY'RE NOT ENOUGH TO ATTRACT MORE DEMANDING

PRICE US$99.95 (upgrade: US$69.95)
SUPPLIER www.corel.com

Corel VideoStudio isn't the most sophisticated video-editing software around, but it could never be called light on features. It has all the basics covered: arranging and trimming clips; applying effects and transitions; designing titles; and burning discs. It can also create stop-motion animations, animate graphics to track subjects around the frame, capture the Windows desktop as a video file, turn drawings into animated sketches, edit subtitles and export to the web in HTML5 format.

For this update, Corel's focus turns to performance and ease of use. VideoStudio is now available as a 64-bit application, a move that's certainly benefitted other video editors. VideoStudio X6 was able to play five AVCHD streams simultaneously on our Core i7-870 test PC; X7 managed seven, which brings it in line with its rivals.

VideoStudio X6's handling of footage from QuickTime AVC, using Canon compact and SLR cameras, was poor, intermittently struggling to play a single stream. VideoStudio X7 is better, but it still runs into problems with more than one stream. By contrast, Sony Movie Studio 13 Platinum managed an impressive five streams of our test EOS 70D footage.

Export times have also been improved. A project based on the same footage took 6mins 6secs to render to 1080p MPEG4 in X6, and 3mins 12secs in X7 – almost twice as fast. It still wasn't as quick as Movie Studio Platinum. Meanwhile, a simple AVCHD-based project was only marginally faster than X6 to export, down from 1min 29secs to 1min 24secs. Both results were a little faster than Movie Studio Platinum.

Sadly, we didn't notice any change to the responsiveness of the interface. Navigating the timeline and editing clips often resulted in a second's delay while the software performed the action. There were waits of up to three seconds between hitting play and playback commencing, making it tricky to fine-tune edits.

Corel lists a "sleek new look for the user interface" among its new features, but we struggled to spot the difference between X6 and X7. The Capture, Edit and Share tabs are redesigned, but while they look a little neater, there's less room available on the screen for the various panels.

Clicking the Share tab reveals export options, which have been tidied up with individual buttons for the available export formats. Each one comes with profiles at various resolutions, frame rates and bit rates. It looks friendlier than the old dropdown list, but it suffers the same patchy support for frame rates. Having set the region to AU during installation, the software offered 25fps but no 30fps profiles, and 24fps and 50fps options were under-represented.

There's an option to match export settings to the imported footage, but it isn't well signposted, and wasn't available for 24fps, 30fps or 60fps footage. The timeline's frame rate doesn't automatically match the footage, either. These discrepancies make it worryingly easy to end up with dropped or repeated frames.

Although it costs US$30 more than VideoStudio Pro X7, Ultimate X7 is a better deal, since it includes seven third-party plugins. Of these, proDAD Mercalli is the highlight, delivering some of the highest-quality video stabilisation we've seen. It's frustrating that pop-up controls must be closed in order to preview the effect, but considering that the standalone version of Mercalli costs US$179, it seems churlish to complain.

proDAD VitaScene is a comprehensive suite of effects, with an impressive selection of vintage film simulations. NewBlueFX ColorFast offers sophisticated colour tints, and there are further plugins for distortion effects, 3D titles and animated paths – perfect for plotting routes on a map.

VideoStudio X7 also introduces a new standalone editor called FastFlick. It's almost entirely template-driven, with the user picking a theme, importing media, adding a few captions and exporting. Most templates work better for photo slideshows than for videos, but projects can be sent to VideoStudio for further editing.

▲ Layering 1080p QuickTime clips can push VideoStudio to breaking point

There's a huge amount on offer here, and much of it is excellent, but VideoStudio's core editing tools continue to let it down. The timeline can be unresponsive, and frame-rate mismatches diminish editing precision. The main colour-correction controls are crude and can't be automated.

There are a few idiosyncrasies to the UI, too: hitting the spacebar usually commences playback, but in some cases it toggles a checkbox on and off. Effects editors appear in pop-up windows, whereupon the preview fails to display media on other tracks.

The performance improvements make this a worthy upgrade for existing users, but they don't give VideoStudio an advantage over its competitors. It's a decent choice for casual users but more demanding users are better off using a Sony or Adobe editor.

Ben Pitt

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

▶ There's a strong collection of bundled extras in the Ultimate edition

Studio's timeline is elegant and responsive, but its habit of rebuilding offline previews after each edit can be a hindrance when working with 4K footage

The quality of the colour-grading effects is a major selling poin

PINNACLE STUDIO 17 ULTIMATE

STRONG CORE FEATURES AND SOME SUPERB EXTRAS, BUT ITS HANDLING OF 4K MEDIA IS BELOW PAR AND DEVELOPMENT SEEMS TO HAVE SLOWED

PRICE $129.95
SUPPLIER www.pinnaclesys.com

Pinnacle Studio was a major player in the early days of PC video editing, often coming preinstalled on new PCs and bundled with Pinnacle's capture hardware. However, it wasn't until a buyout by Avid in 2005 that Studio's chronic reliability issues began to dissipate. In 2011, it was rebranded, and it changed owners again in 2012, this time to Corel.

Version 17 is the second edition under Corel, and installing it reminded us of how far it has come. The Ultimate edition we tested comes packed with extras; its timeline is straightforward and responsive to navigate; and media, effects, transitions and other assets are well organised.

The effects and template libraries are no longer littered with chargeable extra content. Instead, Studio 17 Ultimate includes some of the best effects of any consumer editor. The highlight is the Red Giant Filmmaker Toolkit, a suite of three effects that deliver sophisticated colour-grading. Other consumer editors claim film-look effects, but the quality available here is in another league.

A key new feature of Studio 17 Ultimate is support for 4K video. We imported 4K footage from a Panasonic Lumix GH4 and GoPro Hero 3 Black Edition, and the software had no problem dropping them onto the timeline. Preview performance on our Core i7-870 PC was unacceptably poor, however, with lots of dropped frames and long waits when navigating the timeline.

These problems disappeared once the software's Playback Optimisation function kicked in, responsible for generating lower-resolution proxies of the timeline's contents. This process took about twice as long to generate as the footage length. It's also important to note that Pinnacle's system develops proxy files for the timeline, not the raw footage. It's able to reuse the same proxy files when trimming or reordering clips, but applying or adjusting effects and overlaying text or graphics requires the proxy file for that section to be rebuilt from scratch. This can take a heavy toll on progress, especially when making subtle tweaks to processor-intensive effects.

It isn't a patch on Sony Movie Studio 13 Platinum when it comes to handling 4K media: Sony's software can convert 4K media on import and render sections of the timeline on demand. More significantly, it was able to play raw GH4 4K footage on our test PC without dropping frames.

Studio's export options leave room for improvement, too. There's a solitary 4K MP4 export template with a fixed frame rate of 25fps. We weren't able to change this even after delving into the advanced customisation options: selecting MPEG Transport Stream (MTS) as the export format and clicking Advanced revealed a frame rate setting, but this format isn't as widely compatible as MP4.

This sort of problem is worryingly common among consumer video-editing software, but that doesn't make it any less frustrating. We also experienced frequent crashes when attempting to export 4K projects based on Panasonic GH4 footage, while other 4K projects were fine.

Other new features are thin on the ground. There's explicit support for the AVCHD 2 standard, which allows for higher bit rates and a wider range of frame rates than the V1 specification. Exports are apparently up to ten times faster – but only if the AVC export template and imported footage match exactly and no effects, transitions or titles are used.

The main attractions are to be found in the bundled extras. There's a screen-capture utility that's been taken directly from Corel VideoStudio Ultimate X7, which captures the desktop or a specific window in WMV format at a choice of frame rates. There's also a bundled copy of iZotope Music & Speech Cleaner, a utility that uses frequency-conscious noise gating to reduce background noise, a common problem with consumer video cameras. It couldn't be much easier to use, but this standalone utility can export only to WAV; it's a fiddly process reuniting the WAV file with the associated video clip back in Studio.

Studio 17 is tricky to rate. It builds on a strong foundation and it hasn't become any worse. It's handling of 4K media is below par, though, and there isn't much evidence that its development is a priority for Corel. We'd be inclined to hang on to version 16 – or buy version 17 only for its colour-grading abilities – but use Sony Movie Studio 13 Platinum for other editing tasks.

Ben Pitt

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

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SONY XPERIA Z2 TABLET

WITH AN EXCELLENT DISPLAY AND SUPERB BATTERY LIFE, THIS IS THE BEST OF THE ANDROID BUNCH

PRICE $599
SUPPLIER www.sony.com.au

Last year's Sony Xperia Tablet Z was a mixed bag of wasted potential and beautiful design. We hoped that in developing the Tablet Z's successor, the Xperia Z2 Tablet, Sony might address some of our concerns, without compromising on the elegant design choices that set it apart from its rivals.

Physically, little has changed, and that's a good thing: the Z2 shares its predecessor's light, wafer-thin chassis. In fact, at 424g, it's 71g lighter and has managed to shave 1.4mm from the thickness, from 6.9mm to 5.5mm. It's a minuscule difference, but we were impressed nonetheless.

It retains its predecessor's tasteful looks, too. The sides are deadly straight, the edges rounded off just enough to prevent the tablet from digging into your palms uncomfortably, but not enough to detract from the lean, spare design. Like its predecessor and smartphone cousins in the Xperia range, the Z2 also has dust- and water-resistant sealed flaps covering its ports, granting it a hardiness its rivals can't match.

It still runs Android; this time it's KitKat onboard, and there's a familiar selection of subtle embellishments, such as the repositioning of the app drawer launcher icon to the top-right corner and the ability to reorganise apps within the app drawer.

The hardware has been improved, too, starting with the 1,920 x 1,200-resolution screen. We found that the Z2's LED backlight topped out at a maximum brightness of 409cd/m², more than enough for outside use. The contrast ratio was impressive, too, at 908:1. It's a significant improvement over the Tablet Z's display, and it compares favourably with the current A-List title-holder, the Apple iPad Air. The resolution is lower, but at the sorts of distances you'll be holding a tablet, the Z2's pixel density of 224ppi isn't an issue; you have to look pretty whard to see the pixels.

The improvements continue under the hood. The Z2 has swapped out the Tablet Z's 1.5GHz Snapdragon S4 Pro for a quad-core 2.3GHz Qualcomm Snapdragon 801 CPU, supported by 3GB of RAM and 16GB or 32GB of storage. It performed considerably faster than its predecessor, with a SunSpider JavaScript test score of 885ms to the Tablet Z's more plodding score of 2,074ms; it also beat the now-ageing Nexus 10's score of 1,362ms.

However, while its overall performance was a clear step up from its stablemate, it found itself unable to match the performance of the market leaders. It struggled to top the Samsung Galaxy Note 10.1 2014 Edition's SunSpider score of 612ms or the iPad Air's fantastic 391ms result.

The Z2 is able to compete with its rivals both graphically and in terms of battery life, however. In the onscreen GFXBench T-Rex HD test, the Z2 achieved a frame rate of 28fps, beating the Note 10.1's 14fps and even the iPad Air's score of 21fps. In our video-based battery test, with the screen set to a brightness of 120cd/m², the Z2 kept going for 14hrs 38mins, 1hr 43mins longer than the iPad Air, and more than three hours longer than the Samsung Galaxy Note 10.1 2014 Edition. The Z2's battery evidently has more than enough juice to keep it going all day.

The Z2's 8-megapixel rear camera is less impressive. It produces superficially sharp snaps, but closer scrutiny reveals that photographs are quite noisy and grainy.

Connectivity options are generous, though, with dual-band 802.11ac Wi-Fi and Bluetooth 4 onboard; an infrared transmitter remains as well, allowing the Z2 to be used as an oversized universal remote control. The ability to throw video or music to DLNA-compatible devices also returns. Elsewhere, you get a microSDXC slot for storage expansion, an MHL-enabled micro-USB socket so you can plug it into your TV's HDMI input, and a 3.5mm headset jack. There's also a 4G version of the Z2 that costs $749.

The Sony Xperia Z2 Tablet is a tremendously attractive and thoughtfully designed tablet. It can't match the iPad Air for all-round performance, but its lower price helps it nudge ahead of the Samsung Galaxy Note 10.1 2014 Edition in the battle for best full-sized Android tablet.

Bobby Macpherson

Sony has retained the sleek design of the original Tablet Z

PC &TECH AUTHORITY RECOMMENDED

KEY SPECS

Quad-core 2.3GHz Qualcomm Snapdragon 801 · 3GB RAM · 16GB eMMC storage · 10.1in 1,920 x 1,200 IPS screen · dual-band 802.11ac Wi-Fi · Bluetooth 4 · micro-USB · microSDXC · 3.5mm headset jack · 8MP rear/2MP front cameras · Android 4.4 KitKat · 1yr RTB warranty · 267 x 5.5 x 172mm (WDH) · 424g

The Xperia Z2 Tablet's Full HD display delivers bright, high-contrast images

BATTERY: VIDEO PLAYBACK 14HRS 38MINS

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

MSI GE70 2PE APACHE PRO

A POWER-PACKED LAPTOP, THE GIANT-SIZED GE70 2PE APACHE PRO DELIVERS THE PERFORMANCE GAMERS DEMAND

PRICE $1899
SUPPLIER www.au.msi.com

MSI's bombastically titled GE70 2PE Apache Pro serves up serious gaming power in a 17.3in chassis. With a quad-core Core i7 processor alongside one of Nvidia's latest GTX 800 Series GPUs, the Apache Pro promises blindingly quick performance for $1,899.

It certainly looks like it means business. It's an imposing piece of kit, measuring almost 4cm thick and weighing a lumpen 3kg, and the chassis feels seriously tough. The metal wristrests hardly flex during typing, and the metal extends all around the keyboard, giving the laptop's entire base reassuring solidity.

One of the Apache Pro's key assets is its dedicated GeForce GTX 860M graphics chip, which sits in the middle of Nvidia's new 800 Series range, and boasts the new, power-efficient Maxwell microarchitecture. In contrast with the previous Kepler architecture, the Maxwell generation distributes its CUDA cores into several separate blocks, each of which can be dynamically toggled on and off to minimise power usage. As a result, Nvidia claims the new Maxwell GPUs deliver twice the performance per watt of their Kepler predecessors.

The GeForce GTX 860M finds itself in good company. Working alongside is a quad-core Core i7-4700HQ CPU supported by 16GB of DDR3 RAM, a pair of 128GB SSDs in a RAID0 array and a 1TB HDD. The pair of SSDs ensures lightning-quick boot-up and application-load times, and achieved sequential read and write speeds of 836MB/sec and 505MB/sec in the AS SSD benchmark. It came as no surprise to see the Apache Pro breeze through our suite of Real World Benchmarks with an overall score of 0.97.

Gaming performance is equally impressive. The GeForce GTX 860M completed our Crysis benchmark – run at 1,920 x 1,080 resolution and High detail settings – at a silky-smooth average frame rate of 65fps. Even with Crysis cranked to Very High detail settings, the Apache Pro kept up a playable average of 42fps.

Nvidia's new Battery Boost feature helps eke the most from the MSI's battery, however. This allows the user to cap the maximum frame rate between 20fps and 50fps in 5fps increments and, once this is set, the GPU's clock speeds and power requirements are adjusted on the fly to minimise power consumption. To put this to the test, we repeated our Crysis benchmark at 1,280 x 720 resolution and Very High detail settings. With the frame rate capped at 50fps, the MSI lasted 53mins, and with the frame rate set to 25fps it lasted 1hr 5mins – a 23% increase in battery life.

The MSI's display is a high point. The matte finish of the 17.3in, Full HD panel all but banishes distracting screen reflections and, thanks to the 1,101:1 contrast ratio, images are eye-poppingly dynamic.

Ergonomically, MSI has kept standards high. The SteelSeries Scrabble-tile keyboard combines a spacious layout with great-feeling keys, and the multicoloured backlighting comes in handy when the lights go down. The laggy-feeling touchpad is a shame, but it's bearable for short periods and, helpfully, is disabled when you plug in a USB mouse.

Connectivity includes two USB 3 ports, a pair of 3.5mm audio jacks, an HDMI port and an SD card reader. Along the right there are two USB 2 ports, a DVD writer, and Gigabit Ethernet and VGA ports. Wireless networking ticks all the boxes, too: there's dual-band 802.11ac Wi-Fi and Bluetooth 4.

Like all gaming laptops, the MSI is expensive. It's also given a run for its money by the considerably more compact Gigabyte P34G v2. However, if you're on the hunt for a big-screened gaming laptop the MSI GE70 2PE Apache Pro comes heartily recommended.

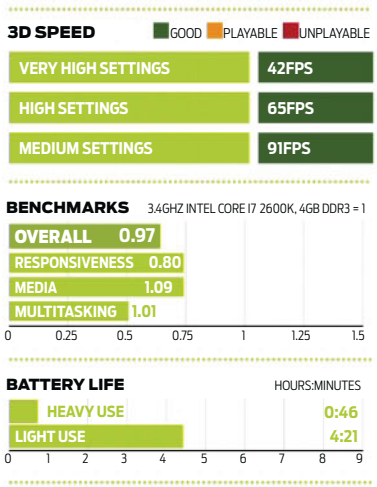
Bobby MacPherson

PC & TECH AUTHORITY RECOMMENDED

KEY SPECS

2.4GHz Intel Core i7-4700HQ · 16GB DDR3 RAM · 2 x 128GB SSDs in RAID0 · 1TB HDD · Nvidia GeForce GTX 860M · 17.3in 1,920 x 1,080 display · Bluetooth 4 · dual-band 802.11ac Wi-Fi · Windows 8.1 · 2yr C&R warranty · 418 x 269 x 39mm (WDH) · 3kg (3.6kg with charger)

A huge 17.3in, Full HD display partners with high-power components



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

CORSAIR K70

A BETTER LOOKING GAMER KEYBOARD THAN MOST, WITH A CLASSY ALUMINIUM BASE AND NOW-UBIQUITOUS CHERRY SWITCHES.

PRICE $160
SUPPLIER www.corsair.com

Ever since the mechanical keyboard craze caught on a couple of years ago it's been a challenge for keyboard makers to differentiate themselves from the competition. The keys themselves by and large feel the same, almost all being based on Cherry switches (Razer is one notable exception, it has been making its own switches for the latest Black Widow series, which we didn't like at all: *PC&TA May*).

Corsair's Vengeance K70 spares us the usual gamer keyboard frippery and instead delivers a well designed unit with the features you need, and no more. It's available in Cherry Red, Brown and Blue variants, and we tested all three and found the key action exactly as expected and *almost* exactly the same as every other Cherry-based keyboard.

However, while the up and down action of the keystroke is fine, there's slightly more lateral wobble on the K70 than seen on most other keyboards which detracts from its otherwise high-quality impression. It's something I was very conscious of as I typed for the few days using this as my main keyboard. The space bar is particularly poor, and lacks any kind of solid feel. It rattles when used, doesn't feel properly anchored to the base and feels like it's made with cheap materials used with cheap manufacturing.

There's a set of media keys with a rather lovely aluminium roller volume control, and – given this was Corsair's only opportunity to do something with the only non-Cherry buttons on the board – they're good with a quality movement.

Three levels of red LED backlighting are there, with the highest brightness quite dazzling. Even the dimmest level of illumination was still very bright. We'd have liked a more subdued option at the lowest setting. The entire board can be lit, or alternatively, easily configured with custom arrays, or, no LED at all. There's a Windows key disable button, and the cable has a USB pass-through splitter with a standard USB 2.0 port located behind the keyboard. You need to pick the keyboard up and turn it around to use the USB port (at least until you master doing it by feel), but we're assuming Corsair placed it out of sight to aid the aesthetics.

▲Optional curved game keys are included.

Which is understandable, because this is just about the most attractive-looking keyboard we've set eyes upon. The keys are raised (which likely contributes to the unsteady wobble mentioned earlier), sitting atop their Cherry switch mechanism on top of a very slick black brushed aluminium surface. The underside of the unit is plastic, but that's out of sight.

This is very much a gaming keyboard, and as such comes with a set of extra gamer-specific keys for W,A,S,D and numbers 1-6. Each is about half the height of the regular keys and is textured and sloped inwards so your fingers fall upon them naturally. The keyboard is fitted by default with regular keys. The red game keys come in a vacuum-sealed pouch with a key-removal tool.

In a variety of gaming tests it was no better than any other keyboard, and with rattling, wobbling keys, a good deal worse than some. It also proved difficult to find a good height and angle. The K70 has only very small flip stands that only barely raise it at the rear, leaving it almost flat even with the stands extended. Unusually, it features another set of stands at the front base, allowing the unit to be raised 1cm above your desk, though with the front stands in use that further reduces the angle.

As a typing board it's only adequate, as it can't be raised to a high enough angle to please some typists, the lateral key wobble makes it a clattery, noisy workhorse and the function keys are placed unusually close to the top numeric key row, leading to frequent accidental hits.

If you like the look of it – and we certainly did – and won't be doing much actual typing, the K70 is a decent option for gaming.

Ben Mansill

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

WD MY PASSPORT PRO

WD DELIVERS AN ULTRA-LUXE THUNDERBOLT DRIVE WHICH IS PERFECT – FOR HIGH-END USERS, AT LEAST.

PRICE $599
SUPPLIER www.westerndigital.com

WD's latest external drive combines a lot of features that are probably too much for what most people are looking for in a storage device. It's a whopping 4TB, for one thing, and uses two drives combined into a single RAID 0 array. In that respect, it's not too dissimilar Seagate's Backup Plus Fast, reviewed in our Briefs. But what really sets it apart, and offers a hint at the market segment it's very firmly aimed at, is its dedicated Thunderbolt connectivity.

This is also what ups its price to nearly $600. But for that asking price, you get just about the fastest, and most cleverly designed, external drives in the market.

If you're wondering who it is aimed at, the fancy magnetic packaging and brushed aluminium case should be a giveaway – the Passport Pro is for high-end Mac-users. In fact, WD's own press collateral on the drive is filled with images of intrepid photographers off in the wilds, with serious DSLRs and accompanying Mac hardware. And in that usage scenario, the Pro is glorious. It's small and bus-powered, which cuts down a lot on weight and space. The attached cable also slots into an integral slot around the case, which keeps cabling safe and secure. The design even makes it look like a part of your machine.

And it performs like the clappers. Copying even giant RAW files is a breeze, and even editing files in Adobe Lightroom that are still on the drive is a lag-free experience – which we cannot say even for USB 3.0 external drives. It's ruggedly designed, though the small fan that keeps the drives relatively cool can get whiny at times, but not for long.

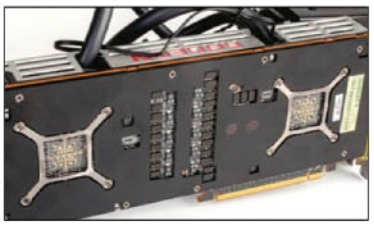
Otherwise, this is an easy drive to like. As we said, if you just want an external backup, or something to carry around media files on, it's overkill. But if you find yourself working with serious file-sizes, you're going to love the responsiveness of the Passport Pro.

David Hollingworth

PC &TECH AUTHORITY RECOMMENDED

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

▲The all-in-one cooling is neatly implemented



▲A sturdy metal backplate supports the card

AMD RADEON R9 295X2

AMD'S NEWEST GIVES ULTRA-SERIOUS PERFORMANCE WITH ULTRA-SIMPLE WATER-COOLING

PRICE $1,799
SUPPLIER wwwamd.com

AMD has boldly gone where it hasn't gone before for its reference designs, adding water-cooling to its newest offering, the 295X2. Just looking at the elegant design of the setup requires a rethink about the usual complexity of water-cooling. It's a card, a fan and two thick cables. That's it. Inside, you have two Asetek 740GN watercooling blocks chained in series with the coolant going through a 120mm radiator before the 120mm air fan takes over the heat-removal effort.

The fan is a rather large one, with dimensions of 153mm x 120mm x 63mm. The card itself isn't small either. While 65mms wide is actually quite reasonable, at 307mm long and 111mm high, it will only just fit into a fairly standard mid-tower. Once you add that to the fan and cables, a roomy case becomes a must-have.

The card retails for around $1,800, and AMD is aiming directly at the hard-core gamer market. Here, though, you only need one card rather than two in Crossfire since the 2952X itself is essentially a Crossfire card all in one sleek metal shroud. This single-slot advantage is the 295's main drawcard over running two separate 295X cards in Crossfire.

It has two fully enabled Hawaii chips on board, which are clocked even higher than the single Hawaii chip on the 290X, AMD's single GPU offering. The memory is similarly high-end with 4GB of 5GHz GDDR5, operating on a 512-bit memory bus on each GPU giving a whopping 1,024 GDDR5 memory bus lines on a single board. The upshot of this is that each GPU gets a generous 320GB/sec of graphical output.

The downside to this is the power draw, which is massive. A 750W PSU will be a minimum in order to handle the load, and one with two 8pin PCI-Express power connectors, each able to push 28 Amps on a 12V rail is recommended. AMD have said that the Typical Power Board (TPB) rating for this card is 500W, which is the first time AMD has put out a card with a power rating that high.

Once you start looking at the power draw, you realise that getting rid of 500W worth of power in the form of heat means that a standard card fan (or two or three) just isn't going to make the grade. This is where the water-cooling system comes into its own and being a both an air and liquid system you are getting the absolute best of both worlds, handling the heat without a problem and relatively quietly.

Unlike previous AMD cards, which often were quite noisy, the addition of water-cooling has made this card so quiet that it's only the cherry red glow of the neon in the 'perfect for a case-window' fan that reassures the card is doing its graphical thing. AMD has obviously worked very hard on keeping the noise down and here it has achieved impressive results. While testing without a case, the noise was minimal, so with a case around it the noisy graphics fans of old are gone without a trace.

In that testing, the card took everything thrown at it in its stride without breaking a sweat. Running 3DMark FireStrike Extreme gave a whopping score of 8139. The Crysis 3 tests in Very High detail showed an extremely impressive average frame rate of 78.91, topping out at over 101 FPS. The standalone Crysis GPU Very High detail test was almost unbelievable at an average of 94.87 FPS. Even running the test at 4K (2160p) resolution gave a mind-boggling result of 60 FPS.

Compared to running two separate 290X cards in Crossfire, the 295X2 saves a slot and has far superior heat dissipation. However, it's not the most economical solution. A pair of 290X cards currently cost around $1500. The downside of the extra power required for those cards, the extra heat generation in your case and the loss of at least most (if not all) of your other motherboard slots is absolutely worth taking into account, making the 295X2 a less extravagant solution than it first appears.

Nichole Tillotson

KEY SPECS

2 x AMD Radeon R9 290X GPU; 8GB DDR5 • 1,018MHz core • 5,000MHz memory • outputs: 1 x Dual-link DVI, 4 x mini HDMI

3D SPEED GOOD PLAYABLE UNPLAYABLE

VERY HIGH SETTINGS	79FPS
HIGH SETTINGS	93FPS
MEDIUM SETTINGS	118FPS

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

MSI RADEON R9 290X LIGHTNING

MSI TAKE AN ALREADY FAST GPU AND CREATE AN OVERCLOCKER'S DELIGHT.

PRICE $629
SUPPLIER www.msi.com

There is no doubt that AMD's 290X GPU is fast. But no matter how fast a GPU is out of the box, overclocking to squeeze just that little bit more out can yield noticeable performance increases, a fact that MSI know very well. And with this card, MSI have given those with a passion for overclocking something to really get their teeth into.

With the Lightening, MSI has overclocked the core from its standard 1,000MHz to 1,080MHz. While MSI hasn't touched the memory, leaving it at its reference 5,000MHz, it has certainly given those with the itch for speed plenty of cooling to allow room for both the core and the memory to be overclocked.

The TriFrozr cooler takes center stage in the cooling design. Three fans (each able to be speed controlled separately), with two larger ones on the outside and a slightly smaller but more tightly-bladed yellow fan in the middle, handle the air removal with a seriously massive dual fin-stack heat sink and seven 8mm thick heat pipes behind. It's this cooler that makes up the bulk of this 30cm x 13cm beast, that weighs in at an impressive 1,580 grams.

Given that weight, during testing it was necessary to prop the end of the board up using a couple of folded anti-static bags, in order to balance the card better and take some of the weight off the SATA connectors the board was leaning on. Once the card is securely screwed into a case, this will be less of an issue, however there may still need to be some extra support put around the card.

While adding this extra bracing might be a little more fiddly, it's worth it when you look at the Military Class 4 components being used. This means Super Ferrite high capacity chokes, copper Mosfets and some seriously reliable tantalum capacitors giving a nice heat-tolerant environment to an extremely efficient cooling unit.

Even with this set-up, MSI has gone a step further and – buried in the beautifully constructed case the card comes packaged in – is a metal plate as well as some thermal pads and screws. This plate fits over the DC-DC converters if you decide to remove the heat sink and use a liquid cooled solution while heading for that extreme overclock. Going extreme with liquid cooling is also helped by a switch that allows you to change from normal to a special liquid nitrogen BIOS. Once you move into this BIOS mode, everything is fully unlocked giving total control to all settings. To assist in preventing a total fiery disaster, there are three white connectors on the board that allow you to directly monitor the GPU and memory voltages in real time.

Also in the case are two 6-pin to 8-pin adapters and a couple of Molex plugs which seems somewhat curious. The card requires a 6-pin and two 8-pin PCI-E power connectors, and will pull 275 watt TDP (maximum power draw).

The high-performance cooling, however, means that the Radeon R9 card runs very well at its factory overclock without further overclocking necessary for most applications. Even with the stock settings, the card performed nicely, showing a score of 5,008 on Firestrike Exteme 3D Mark testing. The Crysis 3 GPU test yielded an incredible 96.85 FPS and a very playable 64.47 FPS in the Very High Spec tests. The card started to show its limits at Ultra High 4K (2160p) resolution, dropping to 37.71 FPS – although to be delivering that kind of frame rate at that resolution shows that it still a capable 4K card.

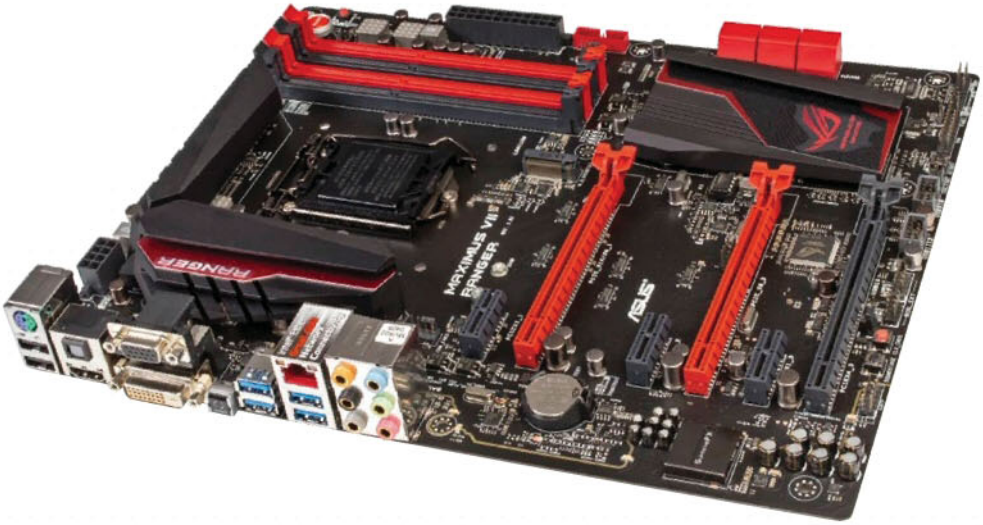
Nichole Tillotson

KEY SPECS
AMD Radeon R9 290X GPU • 4GB DDR5 • 1080MHz core • 5000MHz memory • outputs: 2 x Dual-link DVID, 1 x HDMI, 1 x DisplayPort

3D SPEED	GOOD PLAYABLE UNPLAYABLE
VERY HIGH SETTINGS	65FPS
HIGH SETTINGS	86FPS
MEDIUM SETTINGS	107FPS

▼ MSI Lightening cards are engineered for better than average heat dissipation.

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



It's still overloaded with overclocker features you may not ever use, but the robust engineering is a huge plus.

ASUS MAXIMUS VII RANGER

AT LAST ASUS BRINGS HIGH-END ROG FEATURES AND COMPONENT QUALITY TO A BOARD PRICED TO FIGHT IN THE MAINSTREAM.

PRICE $259
SUPPLIER www.asus.com/au

Asus introduced the Republic of Gamers moniker back in 2006 with the Crosshair motherboard, which was a Ferrari in the Fiat range. Ever since then, ROG products have been supremely engineered with the very best components and were usually the first with new Asus innovations. As a result of their especially robust engineering, ROG boards were favoured by competitive overclockers, and Asus moved to leverage that by including more and more OC-friendly features in ROG boards – from multiple thermal and voltage sensor points to LN2 support.

This all served to add increased cost and complexity to ROG boards with each year's new models. Asus was waging a largely marketing-driven battle against Gigabyte to be the overlocker's board of choice, and leverage the perception of quality to help sell products more relevant to regular users.

Asus had boxed itself into a corner. ROG boards were expensive to R&D, expensive to manufacture, and expensive to buy. Now, finally, the company is cashing in on all that effort with the new Ranger motherboard, which is a genuine ROG-class board, but with dollars saved in areas that, Asus say, won't impact performance – unless you're a competitive overclocker, but even then the difference is marginal. This includes using plastic for component covers when metal would have been used previously.

What isn't skimped is the quality components used in more premium ROG boards, and that includes the newest revisions rolled out for the rest of the Asus Z97 chipset range. The Ranger features higher quality capacitors – an essential ingredient in a performance motherboard – as well as improved electrostatic protection covering the PS2, USB, audio and LAN ports. The ports themselves are encased in stainless steel, with Asus claiming three times the usual lifespan for these items as a result. The rear port cover is also plated with black nickel, which is a concession mainly to aesthetics.

Another 2014 ROG features that made it onto the Ranger is the new KeyBot function. This allows a variety of smart keyboard functions that can be used with any old non-smart keyboard, all controlled with a dedicated IC on the motherboard. They include macro creation and control, keyboard shortcuts and a 'Smart Login' feature which stores your Windows login and password to a single keypress macro. There are obvious security risks with this but it's up to the user top decide whether to use it.

Onboard network bandwidth shaping makes an appearance, thanks in large part to the new Intel chipset, which Asus claims to have tweaked. A set of network profiles can be applied for game, media streaming or, interestingly, file sharing. There's also a default general purpose setting. Effectively it's QoS on a motherboard. The LAN port itself is now better shielded against static electricity and lightning strikes.

More shielding appears around the audio circuitry, which is fenced off in its own area of the motherboard as indicated by a very cool red illuminated trace line, which, unfortunately, will mostly disappear from view as soon as a graphics card is installed.

Audio is a strong suite in the 2014 Asus range, and the Ranger has the same chip and software as the rest. It's an updated version of the now established SupremeFX audio solution, which is built upon a Realtek chip. The software functions include a range of EQ settings as well as Asus' Sonic Radar II – an OSD that shows the location of sounds in a game, like gunshots. We think that's cheating, but the game community seems to have accepted it.

More impressive is a dedicated 'SonicSense Amp' that acts as a dedicated headphone amplifier – but is also able to detect the correct impedance setting for your particular model of cans. That's a genuinely useful function as mismatched headphones and headphone amps can seriously impact audio quality.

The Ranger is a very interesting arrival on the motherboard landscape, and should appeal to those to whom a motherboard should be a budget component. As of a couple of years ago we stopped benchtesting motherboards in the PC&TA labs (apart from when we do major group tests) because the performance difference was becoming so slim it was largely irrelevant. Instead, the focus has shifted to features and the quality of the components, and hence, reliability, and here the Ranger presents a most compelling option for any type of system bar the most budget oriented.

Ben Mansill

PC&TECH AUTHORITY RECOMMENDED

KEY SPECS

ATX • Intel socket 1150 • Intel Z97 chipset • 4 x DIMM (max 32GB) • HDMI/DVI-D/D-sub video out • 2 x PCIe 3.0/2.0 (x16 or dual x8), 1 x PCIe 2.0 x16, 3 x PCIe 2.0 x1 • 6 x USB 3.0 • 7 x USB 2.0

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

ASROCK Z97 EXTREME6

SOLID QUALITY AND CUTTING EDGE TECHNOLOGY WITH A RATHER SPECIAL NEW SSD

PRICE $239
SUPPLIER www.asrock.com

Standing out from the crowd can be difficult when it comes to motherboards and a quick glance over ASRock's Z97 Extreme6 initially doesn't seem to reveal anything particularly unusual.

Sure, it has some nice features like a couple of quick buttons on the board for turning on power and doing a quick reset. Dual BIOS is a nice touch, meaning that if something happens to corrupt the first BIOS, you have a fast way to get up and running again at the touch of a switch.

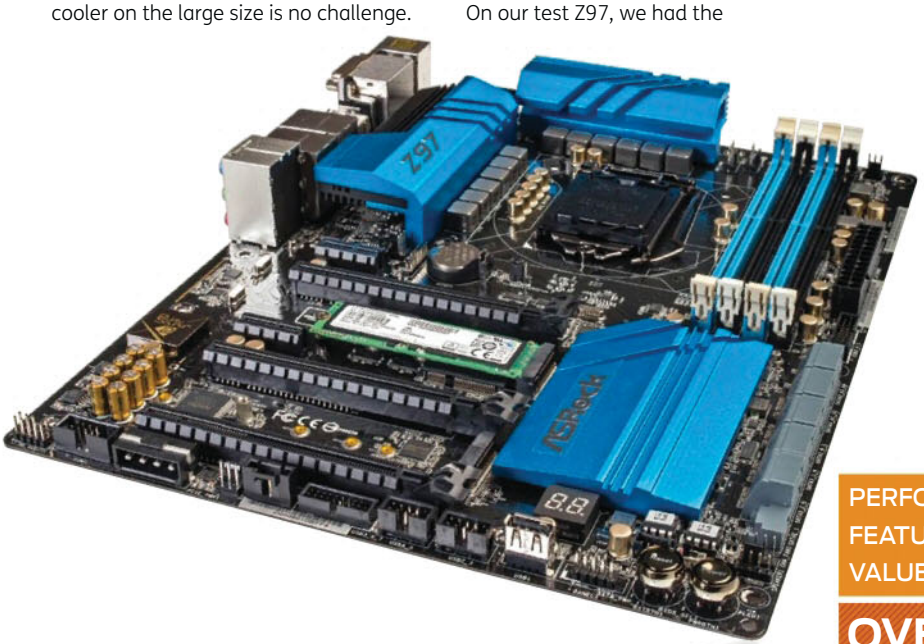
The quality of components is high, with attention paid to heat dissipation over the chips by colourful metallic blue alloy covers and more loving touches in the components all over the board – especially in the sound and power areas. Shielding aplenty (both EMI and PCB isolate) as well as both differential and headphone amps supporting up to 600ohm headsets will keep both gamers and audiophiles happy. Seeing plenty of room between the PCI-E slots is also gratifying, allowing for plenty of space to SLI or Crossfire two graphics cards.

Plenty of room is also around the 1150 CPU socket, meaning that a CPU cooler on the large size is no challenge. A debug display, power for 6 fans spread out over the whole board and easily accessible monitoring points means that overclockers haven't been left out of the design choices either.

However, sitting just near the primary PCI-E slot is something that moves this motherboard well out of the realm of the ordinary and into the cutting edge. The Z97 boasts an Ultra M.2 slot that leaves second generation SSD's in the dust and is creating a new third generation. Given that the M.2 standard was only announced in June 2013, moving PCI-E into the mobile space and shifting mSATA off to the obsolete, and the first revision was only released in December. That ASRock has created yet another generation of this technology less than 6 months down the track is astonishing.

The M.2 standard was designed for mobile devices, and so needed both a small form factor and the ability to give excellent throughput to a low-powered device. Putting this in a large device where space is at far less of a premium and power use is no problem is a huge win for desktop users. Then, going even further in upping the throughput by using 2 PCI-E lanes to directly connect the PCH straight to the CPU (rather than going through the Z97 chipset as is standard for M.2) is the sweet, sweet icing.

On our test Z97, we had the seriously tiny Samsung XP941 SSD plugged into the Ultra M.2 slot. This particular SSD retails between $270 for the 112GB version to $670 for the largest 512GB capacity and, while not widely available, is able to be purchased here in Australia.



▲The Ultra M.2 SSD delivered an astouding 1078.85MB/s read speed in AS SSD.

PC &TECH AUTHORITY RECOMMENDED

KEY SPECS

4 x DDR3 • 2 x PCI-E3.0 x 16 • 1 x PCI-E2.0 x 1 • 2 x PCI • 10 x SATA3 • 1 x M.2 • 10 x USB 3.0 • HDMI/ DVI/ DP • GBLAN, ATX

In our tests we used AS SSD Benchmark to get a good feeling for the kind of speed we were being given. Our labs Intel SATA-3 SSD ran a very workman-like top read speed of 267.42 MB/s. Over at the M.2 SSD, the speed was an astonishing 1078.86 MB/s. This speed even beats out the 870MB/s peak read speed in the MacBook Pro by a considerable margin. The Air uses a proprietary Apple slot, which is setup quite differently to this "direct to the CPU" design; however is the only real speed competitor to the M.2 standard.

While the placement of the M.2 slot has obviously been given a lot of thought, close to the CPU but nicely out of the way, putting it directly under an area which will inevitably be occupied by a powerful, heat-generating card is a little concerning. We haven't seen issues with hot SSDs in the past, though.

Samsung state that system boot from the XP941 is not currently supported in a Windows PC (although it is on a Mac) which seems to defeat the whole point of such a fast drive, although as this standard becomes more widely used that can be expected to change in short order.

ASRock have been quietly producing quality motherboards for some years now, but the Z97 Extreme6 has real potential to make people sit up and take notice. With SSD technology set to explode over the next few years, if you are looking for a future-proof solution then this motherboard, right on the cutting edge, is about as future-proof as is currently available.

Nichole Tillotson

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

GIGABYTE Z97-SOC FORCE

A NEW INTEL CHIPSET USUALLY SEES OVERCLOCKER BOARDS RELEASED FIRST TO CLAIM THE COMPETITIVE HIGH GROUND. HERE'S GIGABYTE'S ENTRY.

PRICE $295
SUPPLIER www.gigabyte.com.au

Gigabyte's 'OC' range first appeared with X58 and has since offered overclockers a board with minimal frills and plenty of overclocking-specific features. The concept has evolved a little over time and now the recent boards have offered a solid overclocking platform for the serious overclocker with enough features to satisfy the daily gamer. Now, Gigabyte has added a new OC board based around Intel's new Series 9 chipset.

The Z97X-SOC Force comes in the instantly recognisable orange and black colours with 8 phase power design, featuring IR Digital PWM and PowIRstage IC for an all-digital design to feed the CPU. This is a very similar setup to the Z87X-OC which managed to push Intel Haswell CPUs to the limit, claiming many world records and hailed as the most used Z87 motherboard on the premier overclocking website HWBOT. The area around the socket has been kept relatively empty in order to facilitate large coolers, or in the case of an extreme overclocker; large copper pots.

As for expansion slots, there are four PCIe slots running in a 8x/8x/4x/4x configuration when they are all in use. There is support for 4-way Crossfire however there is only support for 2-way SLI, as a PLX chip is absent from this board. In between the PCIe slots is one PCIe x1 slot and two PCI slots for those of you still using expansion cards that require them. Also included with the board is what Gigabyte are calling the OC Brace, a handy attachment that supports your graphics cards if you're using the motherboard without a case.

Gigabyte has also included six SATA3 ports, one SATA Express, six USB 3.0, and eight USB 2.0 ports. For video out on the CPU integrated graphics there is a D-SUB, DVI-D, HDMI, and DisplayPort connections, as well as the standard RJ-45 LAN port and audio/mic in. While this is an overclocking board, no sacrifice appears to have been made on providing a good amount of expansion ports.

OC Touch is one of Gigabyte's most important overclocking features on this board. It allows access to tweaking functions via physical switches which would ordinarily only be accessible via the BIOS or a desktop application, or in some cases not at all. The two dip switches allow you to control which PCIe slots are enabled, and which DIMM slots are enabled. This allows you to effectively turn graphics cards, or memory sticks on or off without having to physically remove them -- a handy feature for testing. There is also a button to load a BIOS profile, as well as buttons to control both BCLK and CPU ratio settings. Also worth mentioning is the OC Ignition feature that keeps the board powered up even if you have shut down, a handy feature to keep fans running or to avoid some cold bugs for extreme overclockers.

It's not all about the overclocking though, the board also manages to incorporate a Killer Gaming Network E2200 chip and headphone amplifier, features we haven't seen before on an OC board from Gigabyte and adds to the balance between overclocking and daily use.

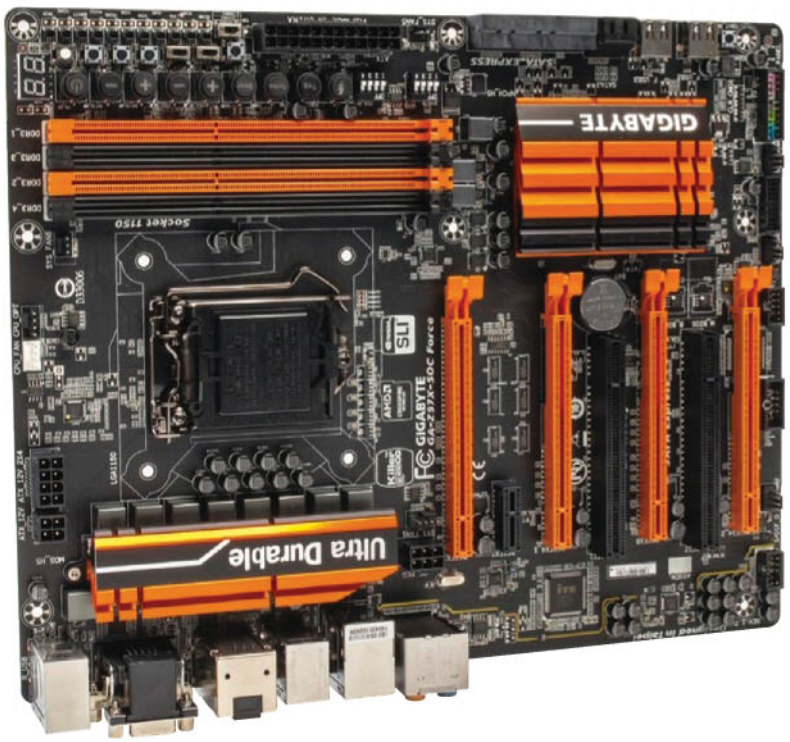
The Z97X-SOC from Gigabyte is once again a solid overclocking base with enough features to suit the average gamer without interfering with the needs of an extreme overclocker. The design and feature set feels a lot like the previously released Z87X-OC, so much so that it almost felt like using the same board. While that isn't a bad thing given how well that board has performed, it isn't quite something new or exciting. That said, it does exactly what we want an OC board to do and comes with a few new things to keep us interested. Given the new Intel release itself is a refresh, it seems Gigabyte has treated the release of this board in the same way – a refresh. The Gigabyte Z97X-SOC Force has hit that market at just under $300. Is it a worthy upgrade? Certainly, but only if you're looking to utilise its support of Intel's yet to be released CPUs.

Jack Coxon

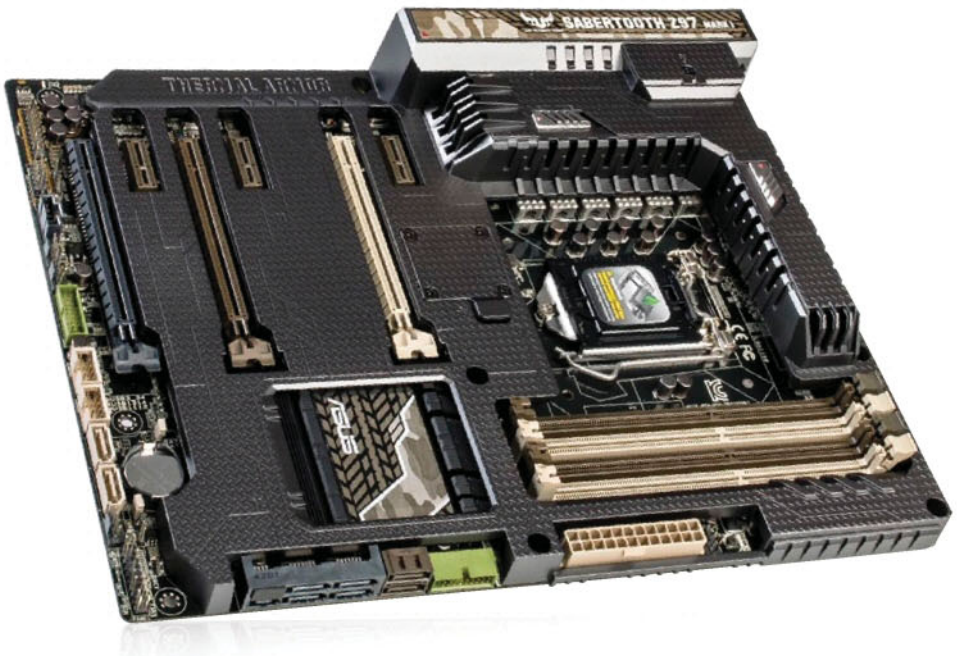
KEY SPECS

ATX • Intel socket 1150 • Intel Z97 chipset • 4 x DIMM • HDMI, DisplayPort, DVI-D, D-SUB • 6 x SATA 3 • 1 x SATA Express • 6 x USB 3.0 • 8 x USB 2.0 • 1 x PCIe 3.0 x 16 + 1 x PCIe 3.0 8 + 2 x PCIe x 4

With D-SUB, DVI-D, DisplayPort and HDMI, there's no shortage of video ports.



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



ASUS Z97 MARK I SABRETOOTH

THE ESTABLISHED SABRETOOTH LINE, ALONG WITH ITS UNIQUE FEATURES, MAKES ITS Z97 VERSION DEBUT.

PRICE $359
SUPPLIER www.asus.com/au

Asus has simplified its motherboard range for the Intel series 9 chipset, with fewer models compared to the Series 8 range. That makes good sense, as there was little to differentiate some models apart from the PCIe slot arrangements. One model, though, that keeps its place in the new line-up is the Sabretooth.

This is a motherboard designed for reliability above anything else, although its most visible bit of toughness – the Thermal Armour cover that encases most of the surface of the board – has certainly been responsible for selling quite a few units based on looks alone. The new Sabretooth, incidentally, comes with the thermal cover by default. Previously Asus sold Sabretooth boards without the cover as an option, and the cover could be bought later.

The cover itself is plastic and it's difficult to imagine scenarios where it could be useful. It's removable, should you need to access the new M.2 SSD connector positioned in the center of the motherboard. There are separate dust covers for unused PCIe slots, which is somewhat useful. The cover has a small hatch in the center that unscrews to reveal a mere fan header a tenth the size of the hole it sits in – but the hatch is in about the right place and is the right size to suit a Northbridge chip, suggesting that this cover is a carryover from a modified design used for an earlier model.

A metal plate covers most of the rear for extra rigidity. This could help with bending during shipping or installation, but certainly would be relevant when very large and heavy graphics cards are used over long periods of time that could cause sag in the motherboard. Asus told us that this is an increasingly important issue, and we suspect that the plate may go some way towards reducing warranty claims from affected motherboards. Asus did also claim that the back plate acts as a heat sink even though the only point of contact with the motherboard itself is in the small area under the chokes near the CPU. Even so, a significant 7 degree temperature drop is claimed for these components. These alloy chokes, incidentally, now have a series of small bumps across the top section to increase surface area and thus improve cooling efficiency.

A dedicated IC manages fan speeds based on the feedback from 12 different temperature sensors. Besides extending the life of the components, in theory at least, this eases the bother of setting up and managing different fan settings manually.

Another innovation which we hope gains popularity is a cooling fan that

▲Exposed areas allow additional cooling access if required.

reverses its rotational direction on boot up for a few seconds to blow out any accumulated dust. It does indeed work, however is limited to just a single small fan near the CPU capacitors. For the fan to operate in reverse it does need a specially designed bearing, so only fans designed for this can do this trick. The single fan that does support it in the new Sabretooth does also include a software control to set the length of time it runs in reverse, so just a second or two would be sufficient as a regular setting and a longer blow infrequently to clear out accumulated dust should you elect not to use it every boot.

More fan control comes with a BIOS option to turn over the graphics card's fan speed control to the motherboard's TUF Ice microprocessor. This option only works with an Nvidia-based Asus graphics card, though wider support is promised in time. The advantages over leaving it to the card itself are claimed to be better fidelity (quicker fan response to temperature changes) and t he convenience of managing all system fan controls in one area.

The Sabretooth series has always been an interesting one. There's no doubt there's a market for extra tough and reliable motherboards. But at $100 dearer than the Ranger (page 44), which is also equipped with high quality components, like capacitors and alloy chokes as well as electrostatic protection (though without the physical motherboard cover and some other features like the reversing fan), it begs the question of who needs this level of reliability? If your new motherboard (any kind) is working after the first week, it's likely to be working well after five years, which is about as long as you'd want to go without an upgrade. Still, there's no doubt that this is an extremely well engineered board that's just right for someone.

Ben Mansill

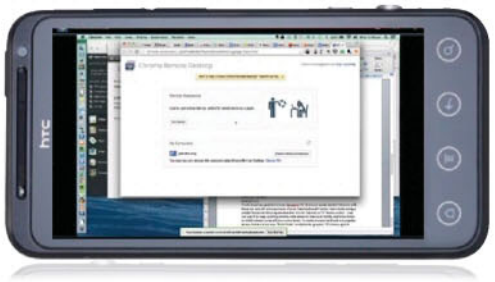
PERFORMANCE	★★★★★★
FEATURES&DESIGN	★★★★★★
VALUE FOR MONEY	★★★★☆☆
OVERALL	★★★★★☆

APPS ROUND-UP

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

CHROME REMOTE DESKTOP

PRICE FREE **DEVELOPER** GOOGLE
PLATFORM CHROME AND ANDROID



If you want a free and easy way to access your desktop computer from your Android device, Chrome Remote Desktop is the way to do it. Once you install the Chrome Remote Desktop extension in the Chrome web browser, accessing your machine remotely is as simple as installing the Google Remote desktop app on your Android smartphone or tablet and selecting the name of your computer in the list.

To prevent any old someone from accessing your remote machine, Google has enabled a few security precautions. As well as signing in with your Google credentials, you'll need to know the remote machine's six-digit password (something you create when you first setup Chrome Remote Desktop). All desktop sessions are also encrypted with Chrome's SSL security, and while a device is remotely connected, a persistent pop-up at the bottom of the screen notifies you and gives you an option to stop sharing.

As you'd expect in a free app, there aren't many features on offer beyond the bare basics. You're limited to scrolling around the screen by swiping across your mobile device's touchscreen, entering text using the pop-up keyboard, and zooming in and out of your desktop using standard touchscreen gestures.

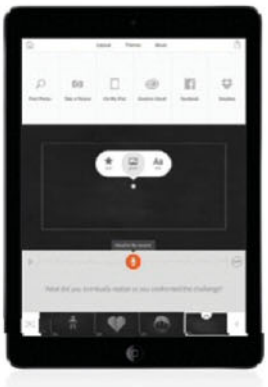
You can forget about transferring files between your local and remote machine, though, which is a feature offered by competitor products like Splashtop and LogMeIn. It doesn't automatically change screen resolution to match the remote device, and you don't get access to any of the special keyboard functions for Windows or Mac, such as the Start key or Mission Control. You can play videos – and it streams pretty smoothly on a fast Internet connection – but the remote device doesn't play any sound.

The most annoying thing about using Chrome Remote Desktop is that the mouse cursor isn't mapped to your touch the way it is on a trackpad. It's about five centimetres off, making it tricky to navigate, select items and move windows around.

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

ADOBE VOICE

PRICE FREE **DEVELOPER** ADOBE
PLATFORM IPAD



If you've ever seen one of those instructional videos on websites that explain how to use an app or a service, you'll be familiar with the sort of content that Adobe Voice produces. It's essentially a hybrid of a PowerPoint presentation and an animated video, and Adobe Voice makes it remarkably easy to create one right from your iPad.

An excellent tutorial takes you through choosing the type of message you're communicating (such as teaching a lesson, telling a story or promoting an idea) when you first open the app. It then shows you how to narrate and populate each slide with an animated icon, picture or text, and gives you an option to change the theme (there are 30 to choose from) and soundtrack. The final step is sharing your video over social media, email or by copying the link, at which stage the video is uploaded and hosted on Adobe's servers. Using the link, you can easily embed the video on your own website.

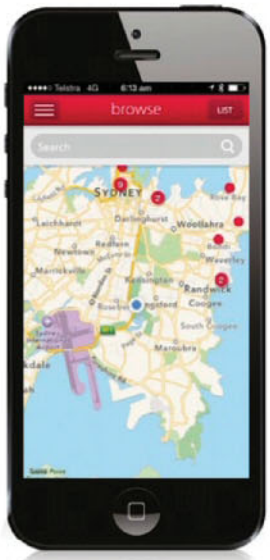
Forget everything you've ever known about complicated Adobe software – this particular app couldn't be easier to use. Adobe has really pared Voice down to the bare essentials, making it extremely straightforward for everyday users to create polished and professional-looking videos. The options to add photos are extensive, and include the ability to import photos from Dropbox, Facebook, your iPad's camera roll and an Adobe Creative Cloud account. There's also an option to search for free photos online that have a Creative Commons license – the app automatically adds a credit to the photographer at the end of the video.

As easy as Adobe Voice is to use, it does lack the ability to tweak the finer details. You can't change the font used in each theme, nor is there an option to create your own using custom backgrounds and fonts. Soundtracks are limited to the 35 that are preloaded – you can't choose your own music.

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

BRIDGE

PRICE : FREE
DEVELOPER E11 LABS
PLATFORM IPHONE & ANDROID



Can't find anyone to go rock climbing or travelling with? Bridge is a social network that helps you find like-minded individuals to share common interests. What makes this network different is that it's designed to help you socialise offline rather than online. You can browse through nearby 'bridges' based on your geographic location, or post your own. Of course, these sorts of things are only as good as the number of people using it, and given it's a fairly new app, the 24 bridges we found was respectable. One person was looking to have a play date for her French bulldog, another was looking for someone to go to music gigs. Most, however, were looking for someone to play sports or exercise with.

OVERALL ★★★★☆☆

CLOAK – INCOGNITO MODE FOR REAL LIFE

PRICE : FREE
DEVELOPER CLOAK
PLATFORM IPHONE & ANDROID

Cloak is ostensibly designed as an anti-social networking app. It scours your Facebook, Twitter, Foursquare and Instagram news feeds to check where all of your friends are so you can actively avoid bumping into them. You can view each nearby person on a map and zoom into street level to see where they are. You can also flag people that you really, really don't want to see so you get an alert whenever they're close by. The creepy thing is that Cloak can also be used in the opposite way, enabling you to stalk friends and exes, and force serendipitous encounters.

OVERALL ★★★★☆☆

SILENCER

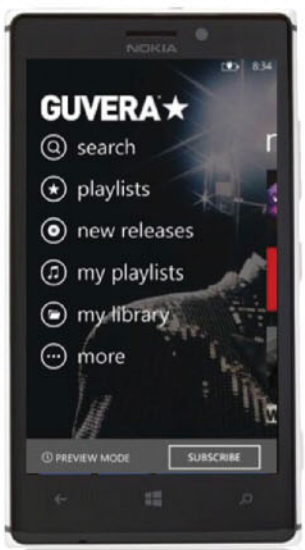
PRICE FREE
DEVELOPER SILENCER.IO
PLATFORM CHROME

Tired of seeing spoilers of your favourite TV shows on social media? Silencer will keep any and all references out of your Facebook and Twitter news feeds using a simple keyword blocking mechanism. It's not limited to TV shows, either – you can use it to keep sporting events, references to the royal family, and even baby- or child-related posts off your news feeds. To make it easier to block out popular terms, there are various 'Mute Packs' available for popular TV shows, sports teams (US-centric, unfortunately) and online services. The only downsides are that it completely blocks the key words that you've muted – not ideal if you want to participate in the non-spoiler conversation – and it doesn't extend to accessing Facebook or Twitter using a mobile app.

OVERALL ★★★★★☆

GUVERA

PRICE FREE **DEVELOPER** GUVERA AUSTRALIA
PLATFORM WINDOWS PHONE



Better late than never? A laggardly one-and-a-half years after the mobile app for the Guvera streaming music service launched on iOS and Android, a version for Windows Phone is finally available, but don't applaud the developer just yet. Unlike the versions available for iOS, Android and desktop, which offer ad-supported music streaming for free, Guvera for Windows Phone only offers previews of each track. You'll need to plump $11.99 a month for a Guvera Platinum subscription in order to get unlimited streaming on Windows Phone, which is similar to the price charged by the superior Spotify and Rdio music streaming services. Perhaps a slow clap is more appropriate?

OVERALL ★★★☆☆☆

LABS BRIEFS

HYPERX CLOUD

PRICE $150
WEBSITE www.kingston.com

The HyperX Cloud headphones are unusual because they come from a company usually associated with memory, but through Kingston's partnership with headphone specialist QPAD, here they are. We did attempt to identify a current QPAD model that resembled this, and couldn't, so this is likely a bespoke design for Kingston.

For the price they're fair value, with impressive build and material quality that's a pleasure to hold and use, and can handle rough handling. We like the removable mic boom, and its small rubber cover that plugs up the hole the mic connects to when not in use. They're extremely comfortable, too, despite the Cloud's heavier-than-usual weight (aluminium is used in the cups and the band). The drivers are 53mm, which is relatively large for gaming headphones at this price. Movies and music had a somewhat neutral tonal balance, but games were clear and crisp. Good all-rounders.

Ben Mansill

OVERALL ★★★★☆☆

CORSAIR RAPTOR HS40

PRICE $69
WEBSITE www.corsair.com

Compared to the headphones covered a step to the left, these, at half the price, stack up quite well. Built around 40mm drivers, the sound is certainly acceptable for what we'd consider budget cans. Music, games and movies were tested, and in general the sound was rich and substantial enough to satisfy, though, unsurprisingly, the HyperX Cloud's were better, with a much larger 53mm driver and better acoustic isolation. We found that the busier the audio got, the worse they sounded. So, if your musical tastes favour sparse sounds these hold up well, but add a few instruments and they start to fall down. As gaming headphones this trait isn't a concern, but if you plan on regular bouts of music and movies their performance approximates their price.

The HS40's are quite large – used on what we'd rate as a large head they needed to be reduced to the smallest band size to fit comfortably. In the land in which they were designed the people must have noggins the size of watermelons...

Ben Mansill

OVERALL ★★★☆☆☆

CORSAIR RAPTOR M45

PRICE $59
WEBSITE www.corsair.com

Raptor's original batch of mice were based off the company's own designs, prior to being bought out by Corsair. They were budget mice, with a very budget design.

Now, the Raptor is still Corsair's budget range, but with the M45 takes its design cues from Corsair's Vengeance line of mice, and the end result is much more satisfying. The M45 feels very comfortable under the hand, and feels precise and accurate in both games and on the every day desktop. It also works very smoothly with Corsair's new line of mouse-pads, but feels good on almost any surface.

What sets the mouse apart from the Vengeance line is a plastic body and one less mouse button. It still has weights so you can adjust balance, and certainly feels much nicer than most 'budget' mice we've known. But for not much more you can get the even better Vengeance M70, making this a tough sell unless you're absolutely counting pennies.

David Hollingworth

OVERALL ★★★★☆☆

SEAGATE BACKUP PLUS FAST

PRICE $365
WEBSITE www.seagate.com

There's something reassuringly retro and rugged about the unusual thickness of Seagate's new backup drive. At nearly two centimeters thick, it stands out from the crowd of similar drives, but with good reason - it fits two slim drives into its plain black chassis, and links them together in RAID 0. This makes the 4TB Plus Fast the highest capacity drive of its type we've seen.

Backed up by USB 3, it also lives up to that Fast moniker, beating pretty much all the competition, and only being surpassed by drives sporting Intel's powered Thunderbolt bus.

In use, the Fast Plus makes an excellent back-up drive, and it comes loaded with software to get you data backing up right away. It also features a second, two-port cable for when you need more power to get the drive spinning up. It runs quitely, as well, and for the money offers great capacity and speed.

David Hollingworth

OVERALL ★★★★★

FRACTAL DESIGN NODE 804

PRICE $169
WEBSITE www.fractal-design.com

The Node 804, Fractal Design's stab at a micro-ATX case, is undoubtedly as well-built as any Fractal Design chassis. It's solid, with a host of great features, and an understated European look that's sure to impress everyone.

It's also just a shade too big for our tastes.

Most people go with micro-ATX builds to save space, but the Node 804's dual-chambered design takes up more space than most tower cases. It's squat and square and kind of awkward to imagine fitting on or under most desktops, and certainly too big to operate as a discrete lounge-room system.

Otherwise it's a clever case. The dual-chamber design separates drives and PSU from motherboard and other components, and there's enough flexibility to make a really neat interior, and keep it running cool. If only it were a little more trim...

David Hollingworth

OVERALL ★★★★☆☆

NETGEAR TREK

PRICE $69
WEBSITE www.netgear.com.au

As far as multi-purpose digital travel devices go, the Netgear Trek is a triple treat. The 802.11 b/g/n Trek operates as both a travel router and a range extender. It's an all-in-one self contained package with the AC power supply built in, so that's one less thing to carry. It can also be powered via USB, which is handy if your hotel power plug is too low down for useful Wi-Fi transmission or reception. It connects to the Internet via a flip-out antenna, and also sports two LAN ports, so you can use one to connect to your hotel/venue's connection and the other to feed that to a device.

A particularly useful trick is being able to act as a secure wireless access point when it is connected to a public Wi-Fi network. The hardware firewall in the device providing a safer connection than would otherwise be used on free Wi-Fi, and that includes all other devices you are sharing with. Unfortunately there's no quick connect WPS button. It's also missing DLNA compatibility, but it seems this was designed as a business device primarily.

And when you're not on the road, it can serve double-duty as a range extender at home orperhaps also on the road if the need crops up.

Ben Mansill

OVERALL ★★★★☆☆

CORSAIR M95 MOUSE

PRICE $79
WEBSITE www.corsair.com

We're continuing with Corsair's massive pre-Computex dump of peripherals, this time with the update to Corsair's dedicated MMO mouse, the M95.

Designed for gamers who need ALL THE BUTTONS, the M95 offers the usual left and right buttons, two buttons easily reached by your index finger, and a whopping nine more all cleverly arrayed around where your thumb sits. These can be actuated easily, and the arrangement doesn't get in the way of your thumb, either, which is something not a lot of other MMO mice can claim - we're looking at your, Razer.

Otherwise it's more great Corsair mouse engineering. The aluminium frame offers strength and a sleek look, the upper surface is grippy and comfortable, and all the switches very responsible. Under the mouse are feet that offer a minimum of friction, too, making it as slick to use as it is to look at. Finally, the mousewheel feels just heavy enough to offer excellent scrolling feedback. It really is one of the best MMO mice on the market.

David Hollingworth

OVERALL ★★★★★★

STEELSERIES SENSEI WIRELESS LASER MOUSE

PRICE $229.99
WEBSITE www.steelseries.com

This is one pricey mouse, so what do you get for almost $230? Just about the best implementation of charging available, which in a wireless mouse is tremendously important, and we've seen some pretty terrible attempts at that. The Sensei is simply plonked on its good-looking stand for a recharge, with lovely pulsing colours to let you know how much juice the battery is sporting. That makes it fiddle-free, and that's the name of the wireless game.

It's super light, too, and is ambidextrous. There must be a battery in there, but you won't feel it with the weight. The surface is a nice grippy material that resists sweat, though you won't find as many buttons as other game mice usually feature with just two on each side. It's a CEO's mouse, for sure, but if a smallish and featherweight device is your preferred type, and the price is not a worry, then it's hard to fault. Worthy of praise, too, is the software, which is beautiful and almost fun to use.

Ben Mansill

OVERALL ★★★★★☆

SMARTPHONES

Power in your pocket

SMARTPHONES HAVE NEVER BEEN MORE POWERFUL, VARIED OR BETTER VALUE, SO WHETHER YOU WANT A COMPACT MODEL WITH AN EXCELLENT CAMERA OR A HUGE SCREEN FOR WEB BROWSING, THERE'S A HANDSET HERE FOR YOU

Smartphones have gone from premium-priced product to near-ubiquity in just a few years. Smartphones just keep getting better, too. We've seen huge improvements in screen quality, quicker processors and image sensors that rival a dedicated camera. A smartphone will do almost anything you need on the move, from surfing the web, pinpointing your location on a map, navigating to your destination, keeping you entertained with films, music and games and much more.

Smartphones are so useful that they're already almost indispensable in our lives, and you don't even need to take out an expensive contract to buy one. This month we've tested 18 models to make sure you get the perfect phone for your needs and your budget.

SYSTEM OF CHOICE

The first decision to make is which operating system you want your phone to run. This will dictate what the phone is like to use, which features it has and the apps you can install on it. There are three main choices: Apple iOS, Android and Windows Phone 8. All are slick, modern operating systems, but each offers a different user experience, and the handsets available with each OS vary widely.

Apple iOS is available only on Apple's own smartphones. Its big rival Android has made some great gains in terms of smooth operation, but iOS still feels the slickest OS, as the phone never seems to judder or slow down – something that can happen on even high-end Android handsets. Some argue that the iOS interface is a bit simplistic, and it isn't as customisable as Android, but there's no doubt it's incredibly easy to use. iOS is also still the best-supported OS with the widest range of apps, although Android is very close behind. Finally, Apple is very good at providing updates for older handsets, so you should be able to download and install the latest version of iOS when it's released for your model.

Android is iOS's biggest competitor, and is by far the world's most popular smartphone operating system, running

on around 80 per cent of models. Any handset manufacturer is free to make a phone with Android, which leads to a huge choice of smartphones at a wide range of prices. For this reason, most people will end up choosing an Android smartphone, as the range of choice means it's easy to find a device that exactly fits your requirements. There are many different versions of Android available, but Android 4.1 (Jelly Bean) or higher is recommended, as older versions are now outdated and may not have comprehensive app support.

It's easy to customise your Android handset to work just how you want. Much of this is thanks to widgets. These are small programs that you place on your phone's homescreens and which display information from your installed apps. For example, a calendar widget will show you upcoming appointments at a glance, and you won't even have to open the calendar app.

Android is generally a very fast operating system, although it still slightly lags behind iOS for absolute smoothness. It's also hard to categorise Android as a single OS, as handset manufacturers have a tendency to tweak Android, so changing its look and feel. These tweaks can be minor, but some companies go a long way with their customisations, making their version of Android almost unrecognisable compared to most versions. We tell you how each phone's operating system works and how well it runs on a particular handset.

Unfortunately, these customisations mean the Android update process can be pretty painful, with the latest version of Android often taking months to arrive on a particular handset, as manufacturers have to make their operating system customisations work with the new Android version.

There's a huge range of apps available in the Google Play store, and the quantity almost matches the number available in Apple's App Store. Android app quality is also rapidly improving, but iOS apps generally still have the edge. Also, while app makers will almost always make a version of their app for iOS, not all apps make it over to Android.

OPEN WINDOWS

The third main smartphone OS is Windows Phone 8. This is also available on phones from different manufacturers, but Nokia makes by far the most; as you'd expect, as Nokia is now owned by Microsoft. Windows Phone is a highly accomplished OS, which is incredibly smooth and intuitive to use. We love its Live Tiles, which are large icons that display information from apps, such as your latest calendar appointments.

There are a couple of disappointments to Windows Phone, though. The calendar app is poor, with no week view, and the browser isn't as accomplished as that on other platforms. There are also nowhere near as many apps available for the platform as on Android and iOS. However, Microsoft is aiming to fix these problems and many more with version 8.1 of the OS, which will come to all Windows Phone 8 handsets, and the selection of apps in the Store is improving rapidly. Before buying a Windows Phone handset check that there isn't an app missing from the platform which you can't live without.

SCREEN TEST

As most smartphones are controlled with their touchscreens, the size and quality of a handset's display is highly important. A larger screen will make everything easier to read and is particularly useful for web browsing, but a big display makes for a large phone which you may find harder to carry around. Some phones have giant 6in screens or larger, and are sometimes called 'phablets' (phone/tablets). These are fantastic for web browsing, but can be too big to fit comfortably in a pocket, and you may find them hard to use one-handed. It's worth going into a phone shop to hold a few different models in order to find the right size for you.

Screen resolution is important. The latest Android phones have Full HD (1,920x1,080) screens, so everything is incredibly detailed. However, this resolution isn't strictly necessary: a 1,280x720 (or thereabouts) resolution still provides plenty of detail, while an 800x480 screen is fine for a budget model. A screen's pixel density, measured in pixels per inch (PPI), gives you an idea of how clear and sharp text will appear onscreen; a smaller number of pixels stretched across a huge screen, for example, will lead to jagged edges.

Screen technology is also important, with Super AMOLED screens and LCD the two main technologies. In Super AMOLED screens, each pixel is self-illuminated, rather than filtering through light from a backlight as on LCD screens, so you get better contrast with deeper blacks, as well as lower power consumption. The disadvantage is that such screens use PenTile sub-pixel arrangements. In a traditional display, there are three sub-pixels per pixel (one red, one green and one blue), which combine to create a colour; PenTile screens typically use two sub-pixels (one green and alternate red and blue). The result is that AMOLED screens may not have quite the colour accuracy of LCD models. Our reviews tell you how good each screen is.

POWER HUNGRY

A modern smartphone is a proper computer, with most models having at least dual-core processors, if not quad-core. Some phones even have eight cores, with four lower-power cores dedicated to less-intensive tasks.

The speed of a processor determines how fast each handset is, how slick the OS feels, and how the phone copes with complicated web pages. We run a web browser benchmark on each phone, and also a 3D test to see how well a handset can cope with modern games. We also play a video on repeat to test each phone's battery life; some phones will cope with a couple of days away from the mains, but most phones need charging every day.

"The first decision to make is which operating system you want your phone to run."

ROOM TO BREATHE

Having enough storage space is vital. Apps, especially games, take up plenty of room, and you'll also need space for photos, videos and music. All phones have a certain amount of onboard storage, but a handset's preinstalled apps can eat into that. Our reviews tell you if there's not much space left for you to use.

Some phones let you expand their storage with microSD cards. With 32GB cards costing less than $20, this is a cheap way to add more capacity. Generally speaking, a minimum of 8GB of onboard storage is fine if there's a microSD card slot; 16GB should be the minimum otherwise. Some cheap phones have only 4GB of onboard storage and no expandability.

DATA SURGE

All smartphones support 3G, but only some support 4G (LTE). 4G is incredibly fast, but 4G contracts can be expensive. Prices are coming down, however. All smartphones have Wi-Fi built in, which will help you cut down on mobile data use when you're on a network, as well as letting you take advantage of super-fast data speeds.

ACER LIQUID E2

PRICE $505
SUPPLIER www.acer.com/au

Acer is better known for laptops than smartphones in Australia, and the Liquid E2 is unlikely to change this situation. It has a good screen and reasonable performance, but is let down by poor design and is outclassed by the very strong mid-range competition.

The white plastic shell and silver rim resemble a cheap version of an old iPhone mixed with one of Samsung's Galaxy phones. The orgy of plastic coupled with the over-sized speaker grilles on the back of the device mean that at best the Liquid E2's design will divide opinion. One upshot is that the phone feels well built, even if it doesn't look it.

The Liquid E2's 540x960-pixel, 4½in screen is its strongest area. It's not the best display we've seen, but its brightness and contrast levels are acceptable, as are its viewing angles. It didn't handle bright outdoor light very well, however, with the auto brightness setting underestimating how bright the screen needed to be in order to be legible.

The Liquid E2 runs an unaltered version of Android 4.2.1 Jelly Bean. Many will see this as an advantage over the heavily customised Android versions most manufacturers use, as it gives them a blank canvas on which they can install custom keyboards or app launchers from Google's Play Store. However, standard Android does look a bit dowdy compared to the smart customised operating systems available from Samsung, Sony HTC and LG.

The quad-core, 1.2GHz MediaTek processor coped well in our tests. The phone completed the SunSpider JavaScript benchmark in 1,441ms, which is fine for a budget phone and up there with budget rivals such as the Motorola Moto G and Alcatel One Touch Idol S. Performance in everyday tasks such as email composition, document editing and web browsing was good, with the device remaining fairly responsive throughout tougher tasks such as opening image-heavy web pages. Multitasking proved a much trickier challenge for the Liquid E2, though, and it ground to a halt when attempting to browse the web while simultaneously installing an app.

The phone managed a meagre score of 3,195 in the challenging 3DMark Ice Storm benchmark. This is below average by modern standards, falling well short of the Motorola Moto G, which scored 5,412 in the same test. Despite this mediocre score, gaming is still possible on the Liquid E2. Simple, popular games such as Temple Run 2 and Angry Birds Space were smooth, while the slightly more demanding Beach Buggy Blitz and Riptide GP were also playable, with only slight juddering occurring during busier moments of onscreen action.

There are a few Acer apps preinstalled on the Liquid E2, such as Acer's Cloud storage service. Also present is the bizarre Moodagent, which takes your music collection and creates various playlists based on how you're feeling. Moods range from 'sensual' to 'tender' to 'angry', and such an emotional app feels out of place on an otherwise very plain device.

"The 8-megapixel camera looks good on paper, but we didn't rate its image quality"

The best software included as standard is Swype, a keyboard app that allows users to type simply by sliding their digits across the onscreen keyboard. It works well, and predicts with uncanny accuracy. Swype also has a classic typing mode, which offers fast and accurate predictions for those not wanting to use its swiping input method. That said, you can download Swype to almost any Android device for $4.50, so it shouldn't really influence your buying decision. The phone has only 4GB of storage, so you'll most likely need to use the microSD card slot to upgrade if you really want to go wild on installing apps and media.

We don't usually worry about smartphone speakers, as most people accept they're going to be rubbish. Acer, however, has fully committed to the illusion that its device can produce good sound, thanks to the bulging plastic grilles on the rear of the device and installed DTS audio balancing software. The sound is no better or worse than any other cheap smartphone, though: it's tinny, rattly, and you'll need a decent pair of headphones or speakers if you plan on listening to music.

The 8-megapixel camera looks good on paper, but we didn't rate its image quality. Pictures lack detail and colour balance is off both indoors and outside. Budget smartphone cameras don't tend to blow us away, but the Liquid E2's sensor is off the pace compared to the Moto G and Alcatel Idol S's cameras.

The Acer Liquid E2 is competing in a crowded market, and unfortunately doesn't have any outstanding features to differentiate it from its rivals, while also falling short in terms of design and camera performance. While its processor and screen would probably serve you well enough, there are much better phones available that cost significantly less, such as the Motorola Moto G and Alcatel One Touch Idol S.

KEY SPECS

Android 4.2 (Jelly Bean) · 1.2GHz · Number of cores: 4 · RAM: 1GB · HSDPA, 4G · Display 4½in 540x960 LCD · Camera: 8-megapixel · Storage: 4GB · +MicroSD · 131x68x9.9mm, 140g

BATTERY LIFE: 9HRS 48MINS

An impressive screen, but the Liquid E2 is an otherwise unexciting budget smartphone

OVERALL ★★☆☆☆☆

ALCATEL ONE TOUCH IDOL S

PRICE $329
SUPPLIER www.alcatel.com.au

Alcatel may not be the best-known smartphone manufacturer, but the company has a long history of making decent phones at affordable prices. One of the latest models is the One Touch Idol S, and the phone's specification certainly makes a good first impression. Even better is the price. At $329 SIM-free, this is a credible rival to the keenly priced Motorola Moto G.

This model isn't as well stocked in Australian stores as its slightly lower-specced Idol Ultra, but it's well worth huinting one down.

The Idol S is 7.4mm thick and weighs just 110g, which helps make it more desirable than most phones this cheap. We weren't disappointed with build quality, either. It feels just as well made as the tough-feeling Moto G. Our review sample had a fairly uninspiring grey soft touch finish on the rear panel, but it's also available in red and cherry colours for an extra splash of personality.

The phone's 4.7in IPS display certainly has the quality to match the handset's classy chassis, and is a cut above your average budget smartphone screen. With a resolution of 1,280x720 pixels, the screen has a pixel density of 312 pixels-per-inch (PPI), helping text, web pages and app tray icons look perfectly sharp and crisp. The screen has deep blacks and impressive contrast levels, but the screen is slightly cool; whites had a noticeable blueish tinge when we compared the phone side by side with the Moto G. Admittedly, colours in darker shots didn't pop out of the screen quite as much as on the Moto G, but in general use the display still looked vibrant; it's a great screen for the price.

The dual-core 1.2GHz MediaTek MT6577 chipset had no problems running Android 4.2.2; the operating system felt snappy and responsive. We noticed a slight hesitation when swiping through homescreens when we first turned the phone on, but once it was up and running, web browsing was smooth, even on complicated web pages with plenty of nested comments. We found the phone's default web browser was smoother when surfing the web than Google Chrome. With its default browser, the Idol S completed the SunSpider JavaScript benchmark in 1,265ms,

> **"The phone's 4.7in IPS display has the quality to match the handset's classy chassis"**

compared to 1,787ms in Chrome.

The Idol S can just about handle 3D graphics, but it may not be able to run the latest 3D games very smoothly or at the highest detail levels. Real Racing 3, which sets its detail levels automatically, loaded up with low detail, but ran reasonably well with only an occasional stutter and slowdown. In the 3D Mark Ice Storm test, the Idol S managed a score of 4,400, which is around average for a budget smartphone.

The phone's battery life is fantastic. The Idol S only has a 2,000mAh battery, which is smaller than the Moto G's pack, but we still saw an impressive nine hours, 43 minutes in our continuous video playback test with the screen set to half brightness. This is almost 30 minutes longer than the Moto G, and should be enough to get you through the day on a single charge, with some room to spare.

The 8-megapixel camera is another enticing prospect for those disappointed with the Moto G's average 5-megapixel sensor. It's unusual to see such an elaborate sensor on a $300 smartphone, and we were generally pleased with the quality of our outdoor test shots, taken on an overcast day. Colours were perhaps a little washed out for our liking, but there was plenty of detail present and there was very little noise, even in wide expanses of sky. Pixels didn't clump together in blurry patches too often either, but the phone did struggle to expose the sky. This is a problem we've seen with many smartphones, though, and it doesn't detract from what is otherwise a good camera for an inexpensive phone. The Idol S can also shoot video in Full HD at 30fps, which is much better than the Moto G's maximum quality of 720p.

Our only major concern is the Idol S's lack of storage. It comes with 4GB of internal space, but only 1.96GB is available to the user. This doesn't leave much space for photos or videos, but the phone does have a microSD card slot that can take up to 32GB cards. You'll definitely need to fit a memory card if you intend to install games or carry your music collection around with you. At least Android's storage settings make it easy to switch between onboard and external storage when downloading and installing apps.

The Alcatel One Touch Idol S is a seriously impressive phone for the price. It's a shame there's not more storage space, but its excellent battery life and smart design make it a joy to use. It's hard to choose between this and the Moto G. The Moto G is very slightly faster and has 8GB of internal storage, but there's no microSD card slot, while the Idol S has stingy internal memory but expandable storage. Either one is Recommended.

PC & TECH AUTHORITY RECOMMENDED

KEY SPECS

Android 4.2.2 (Jelly Bean) • 1.2GHz • Number of cores: 2 • RAM: 1GB • HSDPA, 4G • Display 4.7in 1,280x720 LCD • Camera: 8-megapixel • Storage: 4GB • +MicroSD • 133x67x7.4mm, 110g

BATTERY LIFE: 9HRS 43MINS

A great-value 4G smartphone with fantastic battery life

OVERALL ★★★★★

APPLE IPHONE 5S

PRICE $869
SUPPLIER www.apple.com/au

For some, the fact that the iPhone 5s looks like the iPhone 5 with a few cosmetic changes was proof that Apple had lost it. Where was the big Full HD screen? After all, the Samsung Galaxy S5 and HTC One (m8) show that large Full HD phones are in vogue.

First impressions can be wrong, though. The iPhone 5s defies naysayers by managing to be a better phone in practically every single way than its predecessor, and more than capable of standing up to its high-end Android rivals.

The iPhone 5s isn't an improvement over the iPhone 5 when it comes to build quality, but this isn't a problem as its predecessor was so well made. Its precision-cut aluminium rear sits flush with glass panels at the top and bottom. Its neat bevelled edges are perfectly formed, and it's more compact than top-end smartphones from other manufacturers, so it's generally more comfortable to hold and use one-handed. The phone weighs just 112g, which is incredible considering its build quality.

The metal-rimmed home button contains Apple's new fingerprint reader, called Touch ID. Rather than having to tap in a PIN to unlock your phone, you can simply hold your finger over the sensor. If that sounds like a gimmick, it's actually not: it's really a brilliant time saver and helps enforce security.

Touch ID can be programmed to recognise up to five fingers (they can be just yours or yours and those of trusted others). All you have to do is hold your finger to the sensor repeatedly, while the iPhone 5s builds up an image of what your print looks like. You're prompted to move your finger around, to get full coverage, and even to use the side of your finger so that you can use Touch ID from pretty much any angle. It works pretty much flawlessly at any angle and, impressively, any rotation, so you can even tap Touch ID with your phone upside down to get it to work.

The same 1,136x640-pixel, 4in screen remains from the iPhone 5. Put it next to big-screen Full HD Android phones and the iPhone 5s starts to look a little small, but that's not necessarily a bad thing. There's plenty of resolution for web browsing and apps, and everything looks incredibly sharp and detailed, as you'd expect from a Retina display with a high pixel density of 326ppi. There's also the excellent image quality. The high-quality IPS panel makes this one of the best smartphone screens. It's evenly lit, bright, produces excellent whites and vibrant colours, and excellent viewing angles mean you can see what's onscreen from anywhere.

For the real changes, you have to go under the surface. Inside, the iPhone 5s is a brand-new phone with a new System on a Chip (SoC), the Apple A7, the first 64-bit consumer-based smartphone SoC. 64-bit chips can address more memory than 32-bit chips. Given the amount of RAM in smartphones now, this doesn't make much difference today, but it will do in the future when smartphone RAM climbs above 4GB.

Apple's figures say the new chip is up to double the speed of the iPhone 5's processor for graphics and system apps. Our tests bore out these claims. In the SunSpider JavaScript benchmark, the iPhone 5 completed the test in 709ms, while the iPhone 5s did it in 416ms. This was the fastest result we'd seen until the Samsung Galaxy S5 came along, with its 391ms, but it still means the iPhone won't have any problem with complex web pages meant for PCs.

The phone's 3D performance is up there with the best phones available. When running the 3DMark Ice Storm Unlimited test, we saw a score of 14,506. The iPhone 5s has now been overtaken in 3DMark by top-end Android phones such as the Samsung Galaxy Note 3 and HTC One (m8), but we still haven't found a 3D game that is anything less than smooth on the iPhone 5s. The same goes for iOS 7; it runs smoothly on the iPhone 5s with none of the slowdown, lag or jerkiness you tend to see even on high-end Android devices.

Rather than increase the pixel count for the new iSight camera, which is still an 8-megapixel model, Apple has fitted a sensor 15 per cent bigger than the iPhone 5's. This means that the sensor's pixels are bigger, which means more light per pixel and better low-light performance. Add in the new f/2.2 aperture lens, which lets in more light than the iPhone 5's f/2.4 lens, and the new model should be able to shoot more detail in low light. In bright light the new sensor makes less of a difference, with both phones producing similarly detailed shots. We'd say the colours and exposure on the iPhone 5s are better, and you get more dynamic range, but there's little to tell between the two in terms of detail. In bright lighting the higher pixel count of cameras in Android smartphones such as the Galaxy S5 means there will be more detail overall, particularly when you zoom in.

In low light we found that the iPhone 5 generally struggled and noise became a big issue. With the iPhone 5s things are a lot better. In very dark rooms, noise was reduced considerably, and the sensor still managed to capture plenty of detail.

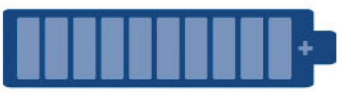
If you already have an iPhone 5 there's probably not quite enough here to make you upgrade, but if you're after a new phone and like the look of iOS, it's a superb handset.

PC &TECH AUTHORITY RECOMMENDED

KEY SPECS

Apple iOS 7 • 1.3GHz • Number of cores: 2 RAM: 1GB • 4G • Display 4in 1,136x640 LCD • Camera 8-megapixel • Storage 16GB • 123.8x25.6x7.3mm, 112g

BATTERY LIFE: 14HRS 31MINS



A staggeringly fast processor, excellent build quality and a great operating system.

OVERALL ★★★★★

GOOGLE NEXUS 5

PRICE $400
SUPPLIER www.google.com.au

Google launched its latest own-brand smartphone with little fanfare. A simple press release, then two hours later the LG-manufactured Google Nexus 5 was available for purchase.

The phone itself is a big deal, though. Its specification may no longer be top-drawer now its Snapdragon 800 processor has been superseded by the Snapdragon 801 in the Samsung Galaxy S5, but it remains amazing value thanks to its Full HD screen and the very latest version of Android, 4.4.2 KitKat. Phones with this kind of specification usually cost more than $800 SIM-free, but the Nexus 5, astonishingly, is over $300 cheaper.

The handset doesn't feel cheap. It's a simple slab with rounded-off corners and a rubberised rear. You don't get the build quality of the HTC One (m8) or the iPhone 5s, but the phone's chassis is classy enough to match its internal components, and a step up from Samsung's current high-gloss plastic obsession.

The Nexus 5 has a 5in 1,920x1,080 display, which is fast becoming the standard for high-end smartphones. We struggled to find fault with the IPS panel. Whites are pure, text is sharp, and the touchscreen surface has just the right amount of resistance to finger dragging to make it a pleasure to use. Side by side with the very best screens, such as the AMOLED panel of the Nokia Lumia 1020, the Nexus 5's display has lower contrast and less saturated colours, but comparing screens of this quality just comes down to splitting hairs as all are very good.

The 2.3GHz quad-core processor provides snappy performance. The Nexus 5 completed the SunSpider JavaScript benchmark in 706ms, making it one of the fastest phones in this test. It also managed a huge 17,496 in the 3DMark Unlimited benchmark, which makes it almost as quick as the Galaxy S5; 3D games such as Real Racing 3 ran beautifully.

It's no surprise that the Google Nexus 5 runs Android 4.4.2 smoothly, ripping through menus, opening apps and panning around web pages with rarely a hesitation.

The version of Android 4.4.2 running on the Nexus 5 is mildly skinned, and it certainly looks much more attractive than the stock edition. The redesigned, larger icons, more modern compressed fonts and coloured backgrounds make it look far more like a consumer interface than an engineer's plaything; the Nexus version of Android has now caught up with the custom editions from Sony and Motorola for attractiveness.

The latest version of the OS has been tweaked to integrate Google's services more tightly. Swiping left from the homescreen takes you to Google Now, which displays a number of cards relating to your recent activities on Google; if you've searched for a place on Google Maps, for example, if will automatically display a route based on whether you usually walk, drive or take public transport. You can also set Home and Work addresses, and Google Now will display weather information for those locations automatically. You can also set it up to display customised stock information or sports results.

The Phone app now searches for local places directly as well as through your contacts, so you don't have to search for a place through Maps or your browser then plug the phone number into the Phone app; you search and phone from the same place. There have also been some improvements to the voice search; we found it worked well, letting us navigate to places with distinctive names, but we'd use the feature to call people when driving rather than for general smartphone tasks where fingers would do..

Android 4.4.2 is more tightly integrated with Google+ than previous versions. Hangouts, the Google+ group chat app, is now the default for messaging, so you can choose whether to send an SMS to a phone number or a Hangout message to someone in your Google+ circles. If your contacts don't use Hangouts on their phones the message will appear when they next log in to Google+, but strangely not in the notification area of the Google homepage. We found this made it easy for messages to be ignored, so we had to be careful to send messages via SMS rather than Hangouts if the recipient wasn't an habitual Google+ user. You could always make sure this doesn't happen by using a third-party SMS app from Google Play.

We weren't keen on the overall design of the camera app, as the options are hidden in various sub-menus, making it fiddly to use unless you just want to point and shoot. Quality, however, was fine. The Nexus 5 has an 8-megapixel sensor, which is low by current standards, but images were fine in daylight, with accurate colours and well-resolved details, if some over-exposure in the sky. You lose detail as you crop in due to the low pixel count, though. Photos were reasonable in low light, but noise reduction led to some smudgy details. It's not the best camera we've seen, and is the only evidence of LG compromising to keep the Nexus 5's price down, but it's still more than adequate for most uses.

The Nexus 5 is a fantastic phone for the money. We love Android 4.4, the Full HD screen is excellent, the phone is fast and, if 16GB of storage on the $400 version isn't enough, the 32GB edition is just a few dollars more, depending on where you shop.

PC &TECH AUTHORITY RECOMMENDED

KEY SPECS

Android 4.4 (KitKat) · 2.3GHz Number of core: 4 · RAM: 2GB · 4G · DISPLAY 5in 1,920x1,080 LCD · Camera: 8-megapixel · Storage 16GB · 138x69x9mm, 130g

BATTERY LIFE: 7HRS 22MINS

The Google Nexus 5 does almost everything right for a very reasonable price

OVERALL ★★★★★

HTC ONE (M8)

PRICE $750
SUPPLIER www.htc.com

The original HTC One was such a design statement that the company has opted not to mess with the formula for its successor. The new handset has faster internals and a larger screen, but its all-metal finish means you could easily mistake the new handset for the original – until you turn it over and spot the unique dual camera; more on that below.

As one of the few Android phones to truly compete with the iPhone in terms of design, the HTC One (m8) is a beautiful handset. It's almost 90 per cent metal, with the few slivers of plastic being used only to ensure the best possible reception for the internal antennas. The curved back fits your hand comfortably and the brushed metal finish on our grey review unit glints in the light, so there's no mistaking that the phone is made from metal.

The HTC One (m8) is slightly larger than the original HTC One, to make room for the bigger 5in LCD display. Both phones have the same 1,920x,1,080 resolution, which means pixel density has dropped from 469ppi on the 4.7in original to 441ppi here, but in practice it's still impossible to see individual pixels. The m8's screen looks incredibly sharp; even the tiniest of fonts are legible and images are incredibly detailed. Image quality is superb, with natural colours and pure bright whites, along with impressively deep blacks for an LCD panel. With a peak brightness of 491cd/m2 and an sRGB colour spectrum coverage of 93.7 per cent, the m8 is among the best LCD screens we've seen in a smartphone, rivalling the iPhone 5s for brightness and contrast.

It's at the back where you'll find the biggest change. The Duo Camera is such an important feature that it almost deserves a review in itself. It uses the same 4-megapixel Ultrapixel main sensor as the original HTC One, which has an oversized 1/3in sensor with larger pixels than most smartphones to help capture more light. However, this time it's paired with a second, depth-sensing camera. Used together, they let you choose the point of focus in an image even after you've pressed the shutter button, or add stylish shallow depth of field effects to your images. Sadly, optical image stabilisation has been cut to make room for this feature.

Because the phone uses physical lenses rather than software calculations to assign depth values to your images, the m8 is much faster to capture dynamic-focus images than competing smartphones. Samsung's Galaxy S5 takes five shots at once then stitches them together, giving you five possible points of focus but taking several seconds to take the photo. With the HTC we could take three or four different shots in the same amount of time. In practice, the effects make portraits and macro shots stand out, but sometimes refocusing an image would blur areas we wanted to keep in focus; there's no way to select the strength of the effect, so you're stuck with what the phone chooses for you.

In terms of picture quality, we were worried that by sticking with the same sensor as last year's model the m8 would suffer from the same issues – namely a lack of detail when taking wider landscapes. In our outdoor shots, the m8 captured plenty of detail in the foreground and middle distance, but objects in the far distance weren't as well defined. Zooming in revealed smudgy details and a fair amount of pixellation. We also noticed a tendency for the sensor to overexpose scenes, with light sources bleeding into an image leaving unwanted bright spots.

If you're more of a night person, however, you'll love the m8's low-light abilities. Moving inside, it captured plenty of facial detail when shooting portraits; it was also quick to focus and quick to save each shot, which could make it the perfect companion on a night out.

The m8 is powered by Qualcomm's latest Snapdragon 801 processor, which seems to have made its way into almost every flagship smartphone in 2014 so far. The quad-core chip runs at 2.3GHz and is paired with 2GB of RAM, which translates to incredibly fast performance. Even with HTC's custom Sense 6 interface running on top of Android 4.4 KitKat, the phone felt incredibly responsive, loading apps quickly and drawing image-heavy websites with no noticeable lag or slowdown.

This translates to impressive benchmark scores too; the m8 managed 662ms in the SunSpider JavaScript benchmark, making it one of the fastest Android-powered smartphones we've ever tested for web browsing.

The Adreno 330 GPU is also more than adequate for playing any game in the Google Play Store; it played demanding 3D titles such as Real Racing 3 smoothly and scored a huge 20,465 in the 3DMark Ice Storm Unlimited test.

All this power doesn't come at the expense of battery life. The HTC One (m8) has a 2,600mAh battery, slightly larger than the original One's pack, and managed 13 hours, 28 minutes in our video rundown test. That's a significant improvement over the original One, which lasted a poor eight hours, 32 minutes.

HTC has played it safe with the HTC One (m8); it isn't a radical departure from the HTC One, but makes all the necessary upgrades to compete with other flagship handsets in 2014.

PC & TECH AUTHORITY RECOMMENDED

KEY SPECS

Android 4.4 (KitKat) · 2.3GHz · Number of cores: 4 · RAM: 2GB · HSDPA, 4G · Display: 5in 1,920x1,080 LCD · Camera: 4-megapixel · Storage: 16GB + MicroSD · 146x70x9.4mm, 160g

BATTERY LIFE: 13HRS 28MINS

Not a huge update, but improves on the original in every way, and the design alone turns heads

OVERALL ★★★★★

LG G2

PRICE $420
SUPPLIER www.lg.com

LG has pulled out all the stops with its latest top-end handset. The LG G2 is a huge 5.2-inch Full HD phone with a powerful quad-core 2.2GHz processor.

LG has done an excellent job of hiding the G2's bulk. A slim screen bezel all round means the handset is both shorter and narrower than 5in phones such as the Sony Xperia Z1. It's also remarkably comfortable to hold; the phone's rounded edges and gently tapered back mean it sits well in your hand, and never feels overly large when you're making a phone call.

There's one part of the G2's design that goes against the grain. There are no buttons around the edge - instead, the volume and screen lock buttons sit on the back. We're not convinced this works. The volume buttons sit within easy reach of your index finger, but we found the lock button hard to locate, and often ended up changing the phone's volume instead of locking or unlocking the display. You can also unlock and lock the phone with a double-tap of your finger on the screen, which we found worked well most of the time. We still missed having a lock button on the side or top of the phone, though.

At first glance, the G2's 5in, 1,920x1,080 screen appears pretty much flawless. It's an IPS model, but we could see levels of contrast and colour vibrancy on a par with AMOLED displays. It took a significant amount of staring at the G2, the Samsung Galaxy S5 and the Sony Xperia Z1 side by side in order to see the strengths and weaknesses of the different screens on offer.

The Xperia Z1, whose screen impressed us when we first saw it, was at the bottom of the pack. We were impressed with its snowy whites, but colours looked insipid next to the competition, especially when we turned up the Z1's brightness to match that of the other phones. The Galaxy S5's AMOLED display has a huge amount of contrast, which really helps show up detail in darker areas of photos, but the display's colour balance tends towards the warm; there's a slight yellow tinge in the white areas.

At first, we though the LG G2's screen had the Galaxy S5 beaten, as colours remain incredibly saturated even at high brightness levels, and whites are just as pure as on the Xperia Z1's display, with no colour tinge of any kind. However, the G2 can't quite match the S5 for contrast and shadow detail. It's a close-run thing, and which display is better for you depends on whether you value colour accuracy over absolute contrast as the priority.

The G2 is quick - there's no doubt about that. Its 2.2GHz quad-core Snapdragon 800 processor is the fastest chip out there, and this showed in our benchmarks. The phone completed the Sunspider JavaScript benchmark in 931ms, which is less than the Galaxy S5's score, and showed its gaming prowess with a huge 15,683 in 3DMark. You'll have to keep an eye on the number of 3D games you download, though; the G2 has just 12GB of storage available for apps and your files, and no microSD card slot to add more.

The phone is slightly slower than the Sony Xperia Z1 in our benchmarks, despite having the same processor. This could be down to software optimisations or the G2's design meaning the chip can't boost up to its maximum clock speed as often. In general the phone feels extremely fast, but we did notice some hesitation when rendering and scrolling around graphics-heavy web pages; something that didn't occur on the Xperia Z1.

Despite having such a big screen and a high-performance processor, the G2's 3,000mAh battery gives it astonishing battery life. The G2 managed to play a film on loop for an amazing 16h 47m before running flat, comfortably beating the Samsung Galaxy Note 3 into second place as the longest-lived phone we've seen.

The G2's camera is terrific. It's a 13-megapixel model with optical image stabilisation, and produces excellent photos in daylight. It blows the Sony Xperia Z1 away for detail and exposures are accurate. Photos were on a par with those from the Samsung Galaxy S4, and almost up there with the Nokia Lumia 1020's images. The G2 also produced excellent shots in low-light conditions, with less noise than the S4's photos. Its optical image stabilisation even helped it to produce relatively blur-free handheld photos, but it couldn't match the Lumia 1020's talent for producing consistently sharp handheld shots in dark conditions. Overall, it's one of the best smartphone cameras we've seen.

The LG G2 is an extremely impressive handset in many ways. The screen is superb, the phone feels compact despite its large display, and its camera and battery life are astounding. We're not keen on the rear-mounted buttons, but like LG's software modifications. The only thing keeping it from an award is the lack of a microSD card slot - not a problem if you don't load your phone with films and games, but not having expandable storage will be a deal-breaker for some.

There's plenty to like about the LG G2 and if you're looking for a great smartphone that's seeing the benefits of prices dropping since launch then this is a serious contender.

PC & TECH AUTHORITY RECOMMENDED

KEY SPECS

Android 4.4.2 • 1.2GHz • Number of cores: 4 • RAM: 2GB • HSDPA, 4G • Display: 5.2in 1,920x1,080 IPS LCD • Camera 13-megapixel • Storage 16GB + MicroSD • 139x71x9mm, 143g

BATTERY LIFE: 16HRS 47MINS

An excellent contender at a nice price that's competitive with other top-of-the-line handsets

OVERALL ★★★★★

MOTOROLA MOTO G

PRICE $230
SUPPLIER www.motorola.com/au

It may not have been launched with much razzmatazz, but the Moto G packs a great spec into a budget handset. It was Motorola's first phone after being bought by Google, so had the advantage that it would most likely get Android software updates in good time, but now Motorola has been sold to Lenovo that advantage has been lost. When we first reviewed the Moto G nothing could match it for value, but a serious challenger has since appeared in the Alcatel One Touch Idol S.

The Moto G isn't a handset that jumps out at you, being very safe, plain and a little boring. It doesn't feel cheap; just no-frills and well made. You can at least accessorise it with some coloured rear panels to add a bit of fun.

The 4½in screen has a resolution of 1,280x720, with a pixel density of 326ppi. This is the same figure as Apple's Retina Display iPhone 5s, which has 1,136x640 pixels over a 4in display. The screen has plenty of detail, then, and after tweaking the brightness up from the automatic setting the display looked great, with deep contrast and accurate and vibrant colours. Whites tend towards the cooler, bluer side, but this isn't a huge problem. It's an excellent display for the price.

Motorola has left Google's OS largely untouched, adding a couple of useful features and tweaking the camera app. The Android 4.4.2 update brings a few changes to the Moto G. The phone dialler has been changed so you can now bring up contacts quickly via the number pad by entering any string of letters or numbers that appear in a contact's name or number. For example, typing 533 will bring up any contact with LEE or JED in their names, or any contact whose number contains that string of numbers. You also get intelligent caller ID, with the phone searching for unknown incoming numbers and providing you with information based on that, so you have some idea who it is before you answer.

Slightly faster browsing is another bonus. The phone's score in the SunSpider JavaScript benchmark in Google Chrome has improved to 1,297ms, which is a small but appreciable improvement over the 1,410ms the phone managed when first launched. This is slightly slower than the Alcatel One Touch Idol S with its default browser, but much quicker than the Alcatel running Chrome. The chipset is a Qualcomm Snapdragon 400 with four cores running at 1.2GHz. This uses the older Cortex-A7 architecture and so can't keep up with the flagship Snapdragon 800 and 801. The chipset is fast enough to run Android smoothly, but complicated web pages with lots of nested comments can take a while to render.

The Adreno 305 graphics chipset isn't the fastest available, but it's pretty good for a phone at this price. In the 3DMark Ice Storm test we saw a score of 5,412, which is significantly more than the Idol S's 4,440, and the Moto G coped with all the games we threw at it, such as Minion Rush and Real Racing 3. Real Racing 3 loaded with low detail levels, but ran smoothly. This handset is more than good enough for some light gaming.

"The 4½in screen has a pixel density of 326ppi – the same as Apple's Retina Display iPhone 5s"

If you're going to install plenty of games, you'll run into the Moto G's Achilles heel: storage. The basic model has just 8GB of space (of which just 5GB is free out of the box), and as such it's not really suitable either for those who want to watch video on the move or carry around lots of music.

Along with storage, the camera is one area where the Moto G betrays its budget nature. It's a 5-megapixel sensor and only shoots video at up to 720p. The front camera is 1.3 megapixels and again can only shoot 720p video. Quality from the main camera is acceptable; colours are accurate but there's a distinct lack of detail compared to the top-end devices. The automatic mode really struggles when there are varying light levels across the frame, and there's a lack of dynamic range even once you've tweaked the exposure. In low light the camera really falls apart, showing plenty of noise. In comparison to other handsets, even around its own price, the Moto G isn't particularly impressive; the Alcatel One Touch Idol S produces better photos from its 8-megapixel sensor.

The phone's back panel may come off, but the battery itself isn't removable. Thankfully, it's a sizeable 2,070mAh battery. In our video playback test the Moto G lasted for an impressive nine hours, 12 minutes, which means it's good for a full day of use without any need for a lunchtime charge top-up.

When it was launched, the Moto G blew us away as the first budget phone we really wanted to own. It's still an excellent handset for the price, but the competition has caught up. Alcatel's handset is slightly slower and has less internal storage, but is slimmer and more stylish, has a better camera and the advantage of a microSD card slot.

PC & TECH AUTHORITY RECOMMENDED

KEY SPECS
Android 4.4 (KitKat) · 1.2GHz · Number of cores: 4 · RAM 1GB · HSDPA · Display: 4½in 1,280x720 LCD · Camera: 5-megapixel · Storage 8GB · 130x66x11.6mm, 143g

BATTERY LIFE: 9HRS 12MINS

The Moto G is a bargain that punches well above its weight, but it's been deposed by the Alcatel.

OVERALL ★★★★★

MOTOROLA MOTO X

PRICE $449
SUPPLIER www.motorola.com/au

When Motorola launched the Moto G last year, it redefined what we should expect from a sub-$300 handset, so we had high hopes it might do the same thing again with the Moto X for a mid-range handset.

We weren't disappointed. The Moto X sets itself apart from other mid-range handsets thanks to its stunning 4.7in AMOLED screen. AMOLED panels are normally confined to top-of-the-range flagship phones, so we were pleased to see one here. It may only have a resolution of 1,280x720, but text looks crisp and clear on desktop and mobile websites, and we had no problem reading the headlines on desktop sites when fully zoomed out.

We were equally impressed with image quality. Colours are bright and punchy and blacks are truly black, matching the phone's glossy black bezel. Whites are pure and clean, too, making this by far one of the best-looking screens we've seen on a handset at this price.

Our colour calibrator showed the screen was displaying 100 per cent of the sRGB colour gamut, which means it has better colour accuracy than both the Samsung Galaxy S5 and HTC One (m8). Its contrast levels were also off the charts, returning an unprecedented score of 'infinity:1'; in other words, higher than we were able to measure with our calibrator. Blacks were also as deep as they could possibly be, as we saw a true-black score of 0.0cd/m2.

The phone weighs just 130g, and its curved, soft touch, water-repellent chassis is supremely comfortable to hold. Despite measuring 10.4mm at its thickest point, the phone tapers to 5.7mm around the edges so it sits perfectly in your palm. The Moto X feels every bit like a premium piece of kit.

The Moto X is powered by a dual-core 1.7GHz Snapdragon S4 Pro processor, and handles Android 4.4 KitKat beautifully. We saw no hesitation when swiping between homescreens and web browsing is incredibly smooth. It can zoom in and out of large picture-based pages effortlessly, so we were a little surprised when its SunSpider JavaScript score came back as 1,089ms using the Chrome browser. This is by no means bad, but is slower than we were expecting considering its subjective web browsing performance. The Dolphin browser was even slower, completing the test in 1,254ms.

More impressive is the quad-core Adreno 320 graphics processor. This is the same GPU that powers the Sony Xperia SP, but the Moto X was a fraction faster in our graphics benchmarks. It produced an impressive 10,758 in Ice Storm Unlimited. This is excellent for a mid-range handset, and means the Moto X will be more than capable of handling any app in the Google Play Store.

You don't need to worry too much about draining the large 2,200mAh battery, either, as it lasted 12 hours, 30 minutes in our video playback test with the screen set to half brightness. This is great for a phone of this price, and is over two hours longer than the Xperia SP under the same conditions, so you should be able to keep using the Moto X all day without a top-up.

With 16GB of internal storage, there's lots of room for apps and media files. Users also get 50GB of free Google Drive storage for two years, which is handy for sharing photos and videos with family and friends, and on other devices, via the Cloud.

The Moto X continues to distance itself from the competition with its 10-megapixel camera. In our outdoor tests, colours were bright and accurate, and we saw very little noise in larger expanses of colour. The sky was a little overexposed in our outdoor test shots, but unlike other smartphone cameras in this price range, we were pleased to see the Moto X managed to capture some cloud detail rather than a mess of white. The camera has no physical shutter button, but we liked being able to open the camera app simply with a wrist twist gesture instead of having to open the app tray or hit the home button. That isn't the Moto X's only trick, either. The Motorola Assist app, for instance, is by far one of the most useful and truly smart preloaded apps we've seen, as it can affect the behaviour of your phone at different times of the day. For example, it can automatically put the phone in silent mode at night, but still ring if a contact you specify calls or if someone calls you twice within five minutes. You can also use the app in the car, either for reading out text messages, letting you know who's calling, or for playing music over Bluetooth. It can check your calendar for meetings, too, and automatically set the phone to silent so it doesn't disturb you.

We're big fans of the Moto X's Active Display, too. This shows certain pieces of information on the phone's screen when it's off or locked, such as the time, email alerts and app updates. It won't waste the battery either, as Active Display automatically disables itself when the phone is in your bag or pocket, when it's face down, or when you're taking a call. You can also set Active Display to turn off at night or during a period of time of your own choosing. All you need to do to turn Active Display on again is just pick up the phone.

The Motorola Moto X is fantastic value and wins a *PC&TA* Recommended award.

PC &TECH AUTHORITY RECOMMENDED

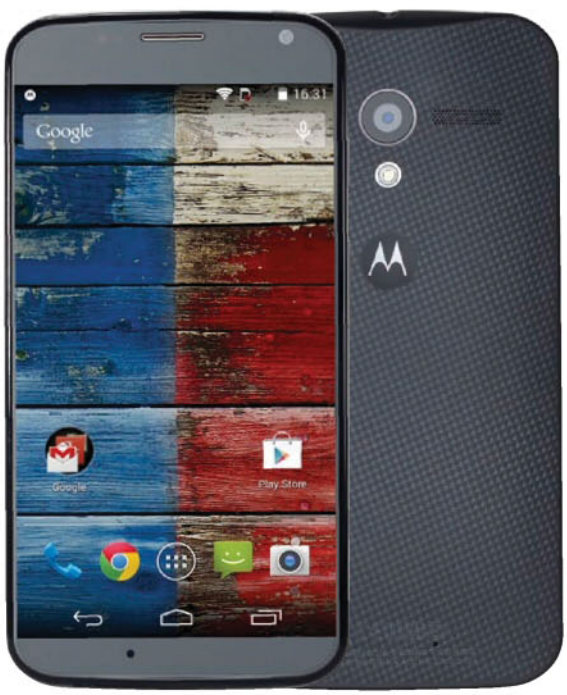
KEY SPECS

Android 4.4 (KitKat) • 1.7GHz • Number of cores: 2 • RAM: 2GB • HSDPA, 4G • Display: 4.7in 1,280x720 LCD • Camera 10-megapixel • Storage 16GB • 129x65x10mm, 130g

BATTERY LIFE: 12HRS 30MINS

Fantastic screen, amazing battery life and premium build quality make it a mid-range champ

OVERALL ★★★★★



NOKIA LUMIA 520

PRICE $149
SUPPLIER www.nokia.com

The Lumia 520 is Nokia's cheapest Windows Phone 8 handset, and is a bit of a bargain all round. You can buy it for $169 SIM-free or an incredible $149 on prepay (Telstra), making it comfortably one of the cheapest smartphones we've seen, and certainly the cheapest Windows Phone 8 model. It's also considerably cheaper than the next phone up in the range, the Lumia 620, which costs $199 SIM-free.

The Nokia Lumia 520 definitely feels cheaper than other Lumias such as the 620, however: the plastic on its rear is less soft-touch than the 620's cover, for example, and we much prefer the 620's rounded edges to the 520's sharper corners. Its screen has the same 480x800 resolution, but the 520's display has significantly less contrast and much less saturated colours overall.

The Lumia 520 didn't do particularly well in our calibration tests, either. It managed a fairly impressive contrast ratio of 863:1, but colour accuracy was low, with the screen capable of displaying just 81.8 per cent of the sRGB gamut. We've seen plenty of other phones with accuracy this low, though, and it won't worry you particularly when just using normal apps and browsing the web. Usefully, the 520's screen is also extremely sensitive, and usefully can be operated with your fingernail or when wearing gloves.

Nonetheless, the 520 still feels like a well-made phone for the price, and the bright snap-on covers add a dose of personality sadly missing from many cheap Android smartphones, with the possible exception of the customisable Motorola Moto G.

It also has all the performance we've come to expect from the Windows Phone 8 operating system. The dual-core 1GHz processor is certainly powerful enough to run the operating system smoothly, and a score of 1,473ms in the SunSpider JavaScript benchmark shows the Lumia 520 to be up there with budget Android phones for web-browsing performance.

Being a Nokia Windows Phone 8 device, you also get Nokia's built-in apps. These are a huge bonus, particularly if you're into music; Mix Radio (formerly Nokia Music) gives you access to thousands of tracks for free. You also have Nokia's powerful navigation apps: HERE Maps for general mapping and HERE Drive for turn-by-turn navigation. A big advantage of both is their support for offline mapping. In Maps, for example, you just need to go to Offline Maps in the menu and select the maps you want to download to the phone's internal storage, which will save you any worry about getting lost in low signal areas or racking up huge data costs when abroad.

You'll probably want to supplement the phone's internal 8GB storage with a microSD card if you want to cover a great deal of the world, though, and neither app can match Google Maps for finding points of interest such as restaurants and petrol stations. Free professional-grade offline maps are a definite bonus, especially on a cheap handset. However, the Lumia 520 does have a big disadvantage in that it doesn't have a built-in compass, which can make orientating yourself a bit trickier when on foot.

"The Lumia 520 has a 5-megapixel camera, and it's an impressive sensor for such an inexpensive handset"

The Lumia 520 has a 5-megapixel camera, and it's an impressive sensor for such an inexpensive handset. Shots taken outside showed plenty of detail and well-judged exposure, with none of the bleaching-out of the sky we often see from phones, even expensive models. Colours are reasonable, if not as vibrant as we'd like, but the camera suffers indoors, producing very noisy shots.

One distinctly budget aspect of the Lumia 520 is its battery life. The phone's 1,430mAh battery only gave it six hours, 36 minutes of continuous video playback, which is less than we're used to seeing from even budget phones. You're likely to find yourself topping up during the day if you're out in the evening.

Considering its price, the Lumia 520 is an impressive handset. Like all Nokia phones it feels well made, and it's a much more interesting design than the boring Android slabs you tend to get at this price. We have no complaints about performance, and the camera is superb for a budget phone, at least in daylight.

You'll also have the option of an upgrade to Windows Phone 8.1, which will bring a host of useful extra features when it is released, which is expected to be in late June. Among the expected improvement is Cortana, the Windows Phone version of Siri and Google Now, as well as a pull-down notifications menu.

If you fancy a change from Android and would like to try Windows Phone's attractive, fast interface, you could do much worse than pick up a Lumia 520. It's not perfect, but it's still an excellent smartphone that delivers much more than the bargain price would suggest.

KEY SPECS
Windows Phone 8 • 1GHz • Number of cores: 2 • RAM: 512MB • HSDPA • Display: 4in 480x800 LCD • Camera: 5-megapixel • Storage 8GB + MicroSD • 120x64x10mm, 124g

BATTERY LIFE: 6HRS 36MINS

Nokia's cheapest Lumia is now better value than ever

OVERALL ★★★★½

NOKIA LUMIA 1020

PRICE $480
SUPPLIER www.nokia.com.au

The Lumia 1020 is Nokia's attempt to build the ultimate cameraphone. It's a Windows Phone 8 handset with an enormous 41-megapixel camera sensor, and it uses some seriously clever tricks to produce the best phone images we have ever seen.

The PureView camera sensor is more than just a huge collection of pixels. At 1/1.5in, it's twice the size of the sensors in phones such as the HTC One (m8) and Apple iPhone 5s, and 1½ times larger than the sensor in the Recommended-winning Canon Ixus 255 HS camera.

The bigger the sensor, the more area there is to capture light and so the less noise and better low-light performance. The Lumia 1020's sensor is also a backside-illuminated (BSI) model, where light strikes the sensor from the rear, avoiding any circuitry getting between the light and the sensor's photoreceptors.

This isn't the only trick up the Lumia 1020's sleeve. When you take a picture with the Nokia Pro Cam app, the phone saves two versions: the full 7,712x4,352 pixel image and a smaller 3,072x1,728 (5-megapixel) snap.

There are two reasons to have the smaller image. The first is that it's small; around 1.6MB compared to the 9MB or so for the full version, making it easier to upload to a social network. The second is down to something Nokia calls oversampling. This examines each pixel in the large image, then works out which it should keep and which should be discarded to make the smaller image the best one possible.

The final advantage of the huge sensor is that it negates many of the problems associated with a digital zoom. Unlike an optical zoom, where physical lenses change the focal length, digital zooms crop into the sensor; using a digital zoom is the same process as cropping into an image in a photo editor and then enlarging the image, with the same corresponding loss of quality.

The Lumia 1020 also employs a digital zoom, but having so many pixels to play with negates much of the quality loss. It also helps when recording video; you can zoom in to the image, and still be recording Full HD video.

We were expecting to be impressed by the Lumia 1020's image quality and weren't disappointed. Outdoor shots taken on a sunny day had vibrant colours and a huge amount of detail; they were significantly sharper than photos taken at the same time on a Sony Xperia Z1, which itself has a huge 20.7-megapixel sensor. The amount of detail the sensor captures is really shown when you zoom in; we could zoom in to 250 per cent and still read road signs. Exposure was well-judged, too, with no bleaching of light areas, even on a sunny day.

In very low light, where most smartphone cameras can capture almost no detail, we saw passable photos. The large xenon flash helps, too, illuminating an entire scene where LED smartphone flashes tend to just light up someone's face, looming out of the gloom.

We performed our standard photo tests of a static scene holding the camera rather than mounted on a tripod, as we usually do, to test the Lumia 1020's image stabilisation. It certainly helped; the dimly lit scene was bright and sharp, with surprisingly little noise and no visible camera shake. When compared side by side with the Lumia 1020, the Sony Xperia Z1's shots were much darker and had more noise.

The Lumia 1020's Pro Cam app can teach beginners plenty about photography. The photo settings are displayed at the top of the screen: flash status, white balance, focus, ISO, shutter speed and aperture. Touching each one brings up a semicircle around the shutter button on the right of the display, which you can drag around to easily adjust settings, complete with onscreen live preview.

You can even go a step further, dragging the shutter icon slightly to the left to display all the settings onscreen at once. As so much of photography involves balancing various settings to get the right shot, this is a great way to tweak several settings at once and see the results. It all works beautifully, but we noticed a bug where the camera got stuck in portrait mode, and would only switch back after we restarted the phone. This only happened once during our testing experience, though.

PC &TECH AUTHORITY RECOMMENDED

KEY SPECS

Windows Phone 8 • 1.5GHz • Number of cores: 2 • RAM: 2GB • 4G • Display: 4½in 1,280x720 LCD • Camera 41-megapixel • Storage: 32GB • 130x71x10mm, 158g

The Lumia 1020 has the same 4½in, 1,280x720 AMOLED screen as the Lumia 925, which is one of the best mobile screens there is, as well as the same dual-core 1.5GHz processor; Windows Phone flies on this handset, and a hugely quick score of 913ms in the SunSpider JavaScript benchmark shows complicated web pages are not a problem. As with any Windows Phone handset, you need to consider whether the platform does what you need; it's slick and great-looking, but not as flexible as Android and doesn't have as many apps, although the situation is improving.

We're blown away by Nokia's Lumia 1020. It's the first phone that properly replaces a compact camera; we can see ourselves doing most of our photography on the phone and leaving a camera at home most of the time, and all in a relatively slim body..

BATTERY LIFE: 12HRS 4MINS

Simply stunning photos make the Lumia 1020 the ultimate cameraphone

OVERALL ★★★★★

NOKIA LUMIA 1320

PRICE $300
SUPPLIER www.nokia.com

The Nokia Lumia 1320 has a large 6in screen for watching films and TV on the go. Its 1,280x720 display provides ample room for apps and icons on the home screen and enough pixels for showing web pages clearly.

The Lumia 1320's huge size takes a little getting used to. It's difficult to use in one hand, but the rounded corners make it comfortable to hold. Nokia hasn't compromised on the Lumia 1320's build quality either, as it has a smart unibody design. We noticed a slight amount of flex in the back panel, but it otherwise feels very solid indeed.

Colours look bright and vibrant on the IPS screen, and when we compared the Lumia 1320 side by side with the more expensive Lumia 1520, the difference in image quality was small enough not to matter much.

The Lumia 1320 is one of the quickest Windows Phones we've tested. Its dual-core 1.7GHz Qualcomm Snapdragon S4 processor makes the operating system feel smooth and responsive. Internet Explorer doesn't lag behind either, as it completed the SunSpider JavaScript benchmark in just 713.4ms. The Lumia 1320 is quicker than other phablets such as the Samsung Galaxy Mega, which took 1,111ms to complete this test. Zooming in and panning round pages is smooth and images load quickly, even on complex and graphics-heavy sites. The screen's resolution means that reading desktop-based web pages when fully zoomed out is a bit of a strain, so you may still need to zoom in slightly.

The only minor annoyance is the behaviour of the back button. Pressing the button while browsing takes you back through previous pages, but once you return to the main home screen and re-open your browser, it won't remember your history. Instead, pressing back simply returns you to the app tray. The recent pages tab in the browser's menu bar is a decent workaround when it comes to finding lost web pages, and you can always install a third-party browser such as the UC Browser to compensate. This will apparently be fixed in the upcoming Windows Phone 8.1 update.

Our normal 3DMark benchmark isn't available for Windows Phone, but we ran the GFXBench T-Rex HD test instead. The Lumia 1320 only completed this with a jerky average frame rate of 7.1fps, though, so it will struggle with demanding 3D games. Despite this, simpler titles such as Temple Run and Jetpack Joyride worked perfectly well.

Another compromise Nokia has made on the 1320 is downgrading its camera to a mere 5-megapixel sensor. This is a big step down from the Lumia 1520's 20-megapixel model, and you don't get Nokia's Pro Cam app either, with its fancy effects. As a result, our outdoor shots weren't much better than those we've seen from budget smartphones. Noise was present throughout the image, and detail lost in muddy patches of pixels. The sky was overexposed, too, with sunlight appearing as searing white patches.

This is mildly disappointing when the rest of the handset is so good, but one area in which the Lumia 1320 truly excels is battery life. In our continuous video playback test, its 3,400mAh battery managed an impressive 13 hours, 22 minutes with the screen set to half brightness, which beats both the Lumia 1520 and 1020 by a good hour. This is superb for a mid-range phone, making it perfect for keeping you entertained on long journeys.

Bear in mind that the Lumia 1320 also has only 8GB of storage, which will limit how many films you can take with you on the move. There's a microSD card slot below the micro SIM card slot under the back panel, though, which can take cards up to 64GB in size.

The Windows Phone Store isn't as wide-ranging as the Google Play Store or Apple's App Store, but you should still be able to find most essential apps, and as time passes more and more apps are added.

The Lumia 1320 comes with a few Nokia-specific apps that are surprisingly good alternatives to Microsoft's. Our favourites are Nokia Beamer and HERE Maps. Nokia Beamer builds on the Photo Beamer app, but rather than simply displaying photos from your photo gallery in another device's web browser, it will also mirror the Lumia 1320's whole screen, turning your phone into a portable projector. You just need to go to **https://beam.nokia.com** on your other device's web browser and use your phone to scan the QR code shown to begin beaming. It's no good for video, though, as there's a delay between each refresh on your other device, but it's a fun way of showing off photos without having to worry about connecting any cable – especially if you find yourself away from home or the office and need to deliver an impromptu presentation.

The Nokia Lumia 1320 is a great mid-range Windows phablet. While the camera's by far its weakest point, it's a superb alternative to the considerably more expensive Lumia 1520 and we greatly prefer it to other Android phablets such as the HTC One Max and Samsung Galaxy Mega. If you're not fussed about taking pictures, the Lumia 1320's great screen and excellent battery life is just the thing for surfing the web and watching video on the move, all without breaking the bank.

PC &TECH AUTHORITY RECOMMENDED

KEY SPECS

Windows Phone 8 · 1.7GHz · Number of cores: 2 · RAM: 1GB · 4G · Display: 6in 1,280x720 LCD · Camera 5-megapixel · Storage 8GB + MicroSD · 164x86x9.8mm, 220g

BATTERY LIFE: 13HRS 22MINS

The camera isn't great, but this is a superb Windows phablet with excellent battery life

OVERALL ★★★★½

SAMSUNG GALAXY ACE 3

PRICE $199
SUPPLIER www.samsung.com.au

The Samsung Galaxy Ace 3 brings 4G speeds to the mid-range phone market. Its silver rim, single central home button and plain white backplate are essentially identical to numerous other Galaxy-branded handsets, but then it's a proven formula from the best-selling smartphone maker on the planet.

The handset's 4in display has a 480x800 resolution. This was a standard resolution for a budget phone until the Motorola Moto G came along with its 1,280x720 display, and the screen itself is pretty good for a handset this price. While it's not the brightest screen we've tested with our colour calibrator, we found its colour accuracy to be acceptable, and it coped fairly well in brightly lit shooting conditions.

Strangely, the Galaxy Ace 3 has no automatic brightness setting for its screen. This means as you move from indoor to outdoor lighting conditions, you will have to adjust the screen brightness manually by pulling down the notification tray from the top of the screen. We tried third-party apps to add automatic brightness adjustment, but to no avail as the handset doesn't have an ambient light sensor. It's an odd, and irritating, omission for a modern smartphone at this price.

The phone runs a heavily modified version of Android 4.2.2 Jelly Bean. While Samsung's TouchWiz user interface divides opinion among consumers, the company has also included a number of unique features that set it apart from the competition.

There are little options such as Smart Alert, which vibrates the phone if you have missed notifications as soon as you pick it up, and a mono audio setting which is designed for listening to music through a single earphone or the mono speaker. There's also a handy option that stops notifications from playing sounds when the screen is turned on. Then there are additions such as Smart Stay, first seen on 2012's Galaxy S3, which dims the screen automatically when the phone thinks you're no longer looking at it. It works most of the time, but can still be annoying if you're watching a film, so we usually turn it off.

The phone has NFC, which is handy for quickly pairing the device with similarly equipped cameras and camcorders. We're yet to see the spread of mobile-based payments in Australia but when they finally take off this phone should be equipped to cope.

"The Samsung Galaxy Ace 3 brings good performance and excellent battery life to buyers on a budget, but its screen resolution isn't fantastic"

As usual with its smartphones, Samsung has included a selection of Samsung Hubs. These give you the option of buying content such as music, books and games from Samsung's own stores instead of Google Play. We're yet to find much use for these, and you can hide them from the app tray if you wish. No word-processing or spreadsheet apps are included, so you will have to download your own from the Google Play store; many of these are free.

The Galaxy Ace 3 has a 5-megapixel camera with LED flash. It's not a great camera by anyone's standards – images lack detail and higher-contrast snaps don't look at all vibrant – but it performs well enough to be useable in good lighting conditions.

The phone is powered by a dual-core 1.2GHz processor backed up by 1GB of memory. Its performance is impressive, beating most of the other smartphones in its price range. It completed the SunSpider JavaScript benchmark in 1,261ms using the default browser, which is faster than the Motorola Moto G, and was able to produce a score of 4,027 in the challenging 3DMark Ice Storm Unlimited benchmarking test. The challenging Real Racing 3 driving game ran at low detail settings, but was smooth, and 2D games will be fine. Browsing the web wasn't quite as smooth as on the Alcatel One Touch Idol S, but it wasn't far off.

The Ace 3's battery life is very good indeed; the phone lasted 11 hours, 46 minutes in our continuous video rundown test. This is an excellent result for a budget smartphone.

The 4G version of the Galaxy Ace 3 comes with a reasonably generous 8GB of internal storage. However, those who have large music libraries or who like to watch TV and movies on their mobiles will need to invest in a microSD card; the Galaxy Ace 3 supports cards of up to 32GB in capacity.

The Samsung Galaxy Ace 3 brings good performance and excellent battery life to buyers on a budget, but its screen resolution isn't fantastic and its camera is merely acceptable. We also think removing the ambient light sensor is a cut too far. It's a perfectly good phone, but there are simply better handsets available at this price. That said, this is a handset you could well find heavily discounted, and would be a good buy at under $150.

KEY SPECS

Android 4.2 (Jelly Bean) · 1.2GHz Number of cores: 2 · RAM: 1GB · HSDPA, 4G · Display: 4in 480x800 LCD · Camera: 5-megapixel · Storage 8GB + MicroSD · 121.2x62.7x9.8mm, 120g

BATTERY LIFE: 11HRS 46MINS

A perfectly good budget 4G handset, but there are better alternatives

OVERALL ★★★★½

SAMSUNG GALAXY NOTE 3

PRICE $549
SUPPLIER www.samsung.com.au

Samsung pioneered the phablet craze for ever-larger handsets with the original Galaxy Note, and shows no sign of slowing down with this third iteration.

The Note 3 stands out from other Galaxy models thanks to a pronounced silver trim and a leather-effect backplate, complete with faux stitching. It's made from polycarbonate plastic, but the ribbed chrome edges give the phone a unique appearance. At 8.2mm thick it fits easily in a pocket, despite the huge display.

The 5.7in screen dominates the front of the phone, but the slimmer horizontal screen bezels mean the handset is almost the same size as the Note 2. We could hold it quite comfortably, but needed to use our other hand to reach the edge of the screen. You can perform many functions one-handed, but remember that the Note 3 is designed to be used with both hands.

The gorgeous 1,920x1,080-pixel AMOLED display has vibrant colours, intense brightness and incredible contrast. Thanks to a high pixel density of 386ppi, tiny text looks pin sharp, even next to phones with higher-density displays such as the Galaxy S5.

The abundance of screen space is ideal for the S-Pen stylus, which is a major highlight of using the Note 3. The stylus slips into the bottom of the handset when not in use and an icon appears in the notification bar when it's removed. There's also an alert that vibrates if you take more than a few steps without the pen attached, so you shouldn't misplace it. The pen uses digitiser technology from specialist digitiser company Wacom, meaning it detects varying pressure levels, so is great for sketching.

Samsung has refined the stylus software, adding several new features such as Pen Window. This lets you create a window of any size by drawing a box on the screen and then choosing an app (from a limited but useful selection) to run within it. The scrapbook tool is much improved, too, organising your cut-outs and clippings in a sensible order that's a lot easier to navigate through. The addition of searchable tags means you can categorise your notes into web links, photos, addresses and videos without worrying about losing them in the phone's storage.

You still get plenty of preinstalled apps designed to work with the S-Pen, including S-Note for taking down scribbles and Sketchbook for Galaxy, a comprehensive artist's tool with over a hundred different brushes, pencils and pens for drawings and designs. Samsung's S Health fitness tracker, S Translate, S Voice personal assistant and WatchOn remote control all make appearances, too.

The Note 3 was around $999 at launch, but it has now dropped to just over $500. This makes it look great value, considering the top-end components inside. The Note 3's Qualcomm Snapdragon 800 chipset runs at a blistering 2.3GHz and is paired with 3GB of RAM, which makes the phone one of the fastest Android handsets we've ever tested. As well as a fast time of 966ms in the SunSpider JavaScript benchmark, we saw a score of 19,093 in the Unlimited version of the 3DMark Ice Storm benchmark, which is one of the fastest 3D scores we've ever seen.

The extra RAM – 1GB more than most smartphones – lets the Note 3 perform some impressive multitasking. You can run two apps simultaneously, dragging one on top of the other to split the screen in half. It's ideal for taking notes while reading a website, or messaging one person while keeping a chat conversation open with another.

Battery life is impressive. The huge 3,200mAh pack helped the phone last 15 hours in our video playback test; only the Galaxy S5 does better.

We tested the 32GB Note 3, and a 64GB version is also available, but Samsung hasn't made a 16GB model. This means paying more initially for the handset, but should mean you won't run out of storage space. A microSD card slot below the rear faceplate lets you add up to 64GB at a later date if required.

Samsung has opted to pair the same 13-megapixel, backside illuminated (BSI) camera sensor found in the Galaxy S4 with the Note 3, along with an LED flash and digital image stabilisation. Several new auto modes have been added, including ones to capture a golf swing and the Google PhotoSphere-mimicking Surround Shot, but the interface is basically the same. Photo quality is on par with the Galaxy S4, but not quite up there with the Galaxy S5's more detailed images. Outdoors, the sensor coped well, creating realistic colours and capturing plenty of detail. Activating digital image stabilisation washes out colours slightly, but makes for clearer images overall.

As a piece of hardware, the Galaxy Note 3 not only improves on its predecessor but manages to stand on its own as a top-class smartphone. Taking its S-Pen functions into consideration, it could be a digital artists' best friend, but even without the S-Pen it's a blazingly fast, long-lasting handset with an above-average camera and gorgeous display.

It's a big handset that certainly won't be suitable for everyone, but it's an outstanding piece of technology.

PC & TECH AUTHORITY RECOMMENDED

KEY SPECS

Android 4.3 • 2.3GHz • Number of cores: 4 RAM: 3GB • HSDPA, 4G • Display: 5.7in 1,920x1,080 LCD Camera: 13-megapixel • Storage: 32GB + MicroSD • 151x79x8.2mm, 168g

BATTERY LIFE: 15HRS 6MINS

Samsung improves the Note in almost every way, making it the giant smartphone to buy

OVERALL ★★★★★

SAMSUNG GALAXY S5

PRICE $750
SUPPLIER www.samsung.com.au

If you believe the hype, the Samsung Galaxy S5 might be the most important Android smartphone released this year. With a new focus on fitness, a range of high-tech accessories and much-improved internals, it certainly improves on its predecessor, the S4.

The S5 has a similar outward appearance to the Samsung Galaxy S4, though the S5 has slightly bolder curves than the S4's flowing corners. A metal effect bezel surrounds both handsets, although the dimpled rear cover on the S5 is classier than the S4's glossy finish.

It looks sleek, and at 8.1mm thick it's also thin, but we're a little disappointed Samsung has stuck with an all-plastic construction. Now the HTC One (m8) is almost completely made from metal, the Galaxy S5 feels a little cheap by comparison. On the plus side, the Galaxy S5 is now IP67 water- and dust-resistant, meaning it's completely protected against dust ingress and can survive a dunking in up to 1m of water.

Samsung has increased the screen size of its flagship smartphone for the fourth time, giving the Galaxy S5 a 5.1in display. It might only be slightly larger than the Galaxy S4's 4.9in screen, but because both use the same 1,920x1,080 resolution it means the newer phone actually has a lower pixel density: 432ppi versus the S4's 441. In practice, however, there's no visible reduction in sharpness or clarity, and it's still impossible to see individual pixels with the naked eye.

Samsung's OLED screens have long been a highlight of its phones and the S5 is no exception; the AMOLED panel covered a phenomenal 99.9 per cent of the sRGB colour gamut in our tests and produced incredibly deep black levels of 0.01cd/m2 – among the best of all the smartphones we've tested.

Although peak brightness doesn't appear to be as high as other smartphones such as the HTC One (m8), at 339.4cd/m2 it's more than bright enough to see clearly in bright sunlight. Viewing angles are excellent and the Full HD resolution makes text and images look pin sharp. There was barely anything to separate the S5's screen from the HTC One (m8)'s with the two phones side by side.

With Qualcomm's latest Snapdragon 801 chipset on board, the Galaxy S5 isn't left wanting for speed. The chip runs at a massive 2.5GHz and is paired with 2GB of RAM, helping it achieve some of the fastest benchmark scores we've seen from an Android smartphone. In the SunSpider JavaScript test, 391ms is on a par with some laptop PCs, and despite a heavily customised interface Android feels snappy and responsive. We could open apps, switch between games and play Full HD video without experiencing any significant slowdown.

With such power on tap, we expected the Galaxy S5 to suffer in terms of battery life, even with its huge 2,800mAh battery. However, the energy-efficient Qualcomm chip helped the handset last 17 hours, 30 minutes in our continuous video test, which is the best score we've ever seen for a smartphone.

The S5's camera takes detailed images with natural colours and even exposure; a notable achievement for a smartphone, as most others struggle with overexposure as soon as a bright light source or sky is introduced. When you inspect images closely it's possible to make out a fair amount of noise, particularly in landscape shots and when shooting objects in the distance, but generally it's unnoticeable and certainly won't affect Facebook or Twitter uploads.

The S5's camera can even mimic the HTC One (m8)'s crowning feature: refocusing your images after you've pressed the shutter. It does so using software, so it isn't as fast, and you only get two points of focus to choose from, but the overall effect is still quite impressive.

The S5 copes equally well taking photos indoors and in low light, thanks in part to a bright LED flash. Again, colours are vibrant and detail exceptional given the lighting, so it should be able to handle a dingy pub. Noise levels jump up as soon as light begins to drop, so the flash becomes more crucial for very low-light shooting. The camera's flash uses only a single LED, rather than the HTC One (m8)'s True Tone dual-flash, so colours can appear less true to life, but only marginally so.

The home button now doubles as a fingerprint sensor, beefing up security and doing away with the need for passwords. It can be used to unlock the device, log in to your Samsung account used for most of Samsung's pre-installed apps, and to pay for PayPal purchases (once you download a companion app). You can also protect files and folders with a fingerprint, keeping them safe in the Private section of the phone.

The system works exceptionally well, requiring a swipe downwards rather than a prolonged press like the TouchID sensor in Apple's iPhone 5s. Both phones unlock in less than a second, although we had more luck with the Galaxy S5 if our hands were a little wet; with the iPhone we had to dry our hands thoroughly for the sensor to work.

If you have an older handset, then the Samsung Galaxy S5 is a great choice, ditto if you're looking for a new phone, especially if you're also interested in Samsung's smartwatch.

PC &TECH AUTHORITY RECOMMENDED

KEY SPECS

Android 4.4 • 2.5GHz Number of cores: 4 • RAM: 2GB • HSDPA, 4G • Display: 5.1in 1,920x1,080 LCD • Camera: 16-megapixel • Storage 16GB + MicroSD • 142x73x8.1mm, 145g

BATTERY LIFE: 17HRS 30MINS

Powerful, with a fantastic camera and incredible battery life, the Galaxy S5 is the most

OVERALL ★★★★★

SONY XPERIA M

PRICE $189
SUPPLIER www.sony.com.au

The Xperia M takes its design cues from Sony's high-end Xperia Z devices while attempting to keep costs down to cater for buyers on a budget. The Xperia M is well built and disguises its cheapness with a soft, rubberised shell that wraps around the device, giving the illusion of a unibody chassis. The round silver power button is distinctive and sticks out both visually and physically, and can be annoying when idly holding the phone in your hand; we found we sometimes pressed it accidentally. At 9.3mm thick and 115g, the Xperia M will fit comfortably in most pockets.

The 4in, 480x854 pixel TFT touchscreen is a little disappointing, as it's not as bright nor has the colour accuracy of other similarly priced phones; our calibrator measured it as showing 81.1 per cent of the sRGB colour gamut, which is one of the lowest scores we've seen, even on budget handsets. The screen's resolution is acceptable for most uses, with even small text appearing crisp and legible. Performance in bright daylight is good, with the auto brightness setting responding rapidly to changing lighting conditions.

The Xperia M runs Android 4.1.2 Jelly Bean, which is the oldest version of Android we'd recommend you consider. The phone uses Sony's custom Xperia user interface, which has many tweaks that set the device significantly apart from phones running stock Android. The app drawer, for example, can automatically sort apps in order of how often they're used, and also allows you to set your own custom order, which is highly useful when you have a great deal of apps installed.

The Xperia M is powered by a dual-core Qualcomm Snapdragon S4 processor running at 1GHz. It performed well in our tests, managing 1,546ms in the SunSpider JavaScript test, which is reasonable for a budget phone at this price.

Running games such as Temple Run 2 and Angry Birds Space was a smooth and responsive affair, showing the Xperia M still packs some punch when required. Putting the device through its paces by loading and browsing image-heavy web pages was a challenge, with some jerkiness and lag, and we had to use some fine pinch-to-zoom actions to zoom in on web pages to make them legible.

The Xperia M's battery life is good, with the 1,750mAh unit lasting a solid 10 hours, 46 minutes in our video playback test. Sony has attempted to aid heavy users with various battery-saving functions. These include Stamina Mode, which turns off mobile data when the screen is off, and Low Battery mode, which lets you set when various battery-intensive features such as Wi-Fi and high screen brightness are disabled.

Typing messages on the Sony Xperia M is a mixed experience. Autocorrect and predictive word recommendations work well, but the time saved there is instantly lost by the lack of immediate access to any form of punctuation. Finding full stops and commas requires navigation to a second page of characters, but if this annoys you it's easy to add them back in using the keyboard settings wizard or a custom keyboard app from Google Play. The phone has only a small 4GB of onboard storage for apps, though, so you'll most likely need to plug in a microSD card.

"The 5-megapixel camera on the back of the Xperia M is a disappointment. Outdoor images appeared washed out and lacked any kind of definition"

The Xperia M comes with Sony's various multimedia services installed, including Video Unlimited and Music Unlimited. Price and the depth of content on offer is on a par with most other digital stores, but if you're already embedded in another ecosystem such as Google or Amazon, there's no compelling reason to switch to Sony's services.

Sony has put the spotlight on NFC technology in its Xperia line, with its NFC music-playing functionality taking pride of place in the product's promotional material. For this to work you need to buy a Sony-branded speaker, so it seems more of a gimmick than anything. However, NFC is becoming increasingly popular for mobile payments and ticketing systems, so having it as standard on a cheaper device is a big plus.

The 5-megapixel camera on the back of the Xperia M is a disappointment. Outdoor images appeared washed out and lacked any kind of definition. Its only saving grace is its performance with close-up objects, where the autofocus works very well. We like the dedicated camera button on the side of the device, which is useful for quick capturing of unplanned photo opportunities.

The Sony Xperia M is a generally a fine budget handset. It ticks the boxes for build quality and performs satisfactorily, and on a good-value contract would be a decent choice. However, its mediocre screen and poor camera are both drawbacks, especially considering that for around the same price you can get your hands on the superior Motorola Moto G or Alcatel One Touch Idol S.

KEY SPECS
Android 4.1 (Jelly Bean) · 1GHz · Number of cores: 2 · RAM: 1GB · HSDPA · Display: 4in 480x854 LCD · Camera: 5-megapixel · Storage 4GB + MicroSD · 124x62x9.3mm, 115g

BATTERY LIFE: 10HRS 46MINS

Bargain-basement specs let down this well-made compact smartphone

OVERALL ★★★★☆☆

SONY XPERIA SP

PRICE $299
SUPPLIER www.sony.com.au

It may be a over a year since Sony launched the Xperia SP, but this mid-range phone still gives high-end Android handsets a run for their money. The SP now comes with Android 4.3 instead of 4.1, with an upgrade for existing users due soon. Even a year on, the Xperia SP still looks stunning compared to newer Android handsets. Its smooth contours make it comfortable to hold, and we're also big fans of its aluminium frame. Not only does this look and feel great, it also gives the phone a much more pleasing sense of weight and durability.

The clear, illuminated antenna at the bottom of the phone also helps give it a bit of character to distinguish it from other mid-range handsets. This can flash different colours to indicate when you've missed a call or a text, and each option is customisable. It can also add a little more flavour to your media by flashing to the beat of your music or matching the dominant colour of your photos. You can turn this off if you'd prefer, but we didn't find it particularly distracting.

The Xperia SP's hardware hasn't aged badly, either. It has a dual-core Snapdragon MSM8960T processor and 1GB of RAM, but its high clock speed of 1.7GHz made a huge difference in our SunSpider JavaScript benchmarks. When we re-ran the test with the latest firmware update using the Chrome browser, it completed the test in 1,173ms, and was even quicker using the Dolphin browser, scoring a super-fast 836ms. This is impressive for a dual-core chip, beating many quad-core phones. It's not far off the latest handsets either, as the HTC One (m8) completed the test in 761ms using Chrome, only 75ms quicker than the Xperia SP's Dolphin score.

The Xperia SP's 3D performance is similarly outstanding. Its Adreno 320 GPU scored 9,450 in the Ice Storm Unlimited benchmark, which is on a par with the powerful Motorola Moto X. You'll have no problems running 3D games smoothly on this handset.

The powerful processor doesn't take its toll on the phone's battery life, either. This is largely thanks to the large 2,370mAh battery, which helped the phone last 10 hours, 13 minutes in our continuous video playback test with the screen set to half brightness, which is above average for an Android smartphone.

The phone's powerful processor makes everyday tasks feel that much snappier, and we didn't encounter any stuttering or jerky movements while scrolling around complex web pages. The screen's 1,280x720, rather than Full HD, resolution meant we still had to zoom in to make text a bit more legible on desktop sites, but the responsive touchscreen is a joy to use.

The display itself is very bright, but there were some noticeable imperfections when it came to overall image quality. Sony claims the phone uses similar technology to its Bravia TVs, but while colours are very sharp and vibrant, blacks are still quite grey. This was particularly noticeable when we placed the Xperia SP side by side with a phone with an AMOLED display, but even other LCD screens produced deeper blacks. These subjective opinions were backed up by our tests with our colour calibrator, which showed the screen as having a contrast ratio of 701:1 – one of the lowest scores we've seen. Colour accuracy is impressive, though, with the phone displaying 96.9 per cent of the sRGB colour gamut.

Where the Xperia SP falls down most is in its photo quality from the 8-megapixel camera. We liked having a physical shutter button, but while our outdoor shots had plenty of detail, colours often looked quite murky, even in bright sunshine. We also noticed quite a lot of noise, and clouds in particular were riddled with a light speckling of colour, even in lighter, whiter areas. Indoor shots were better, but the noise still persisted and the sensor didn't cope well when shooting in low lighting conditions.

This will be disappointing to some, but thankfully Sony goes some way to making up for this by packing the Xperia SP full of extra features. Most of them require other Sony products in order to work, but one we particularly like is the support for Sony's PlayStation 3 Dualshock controller, which allows you to use a PS3 controller with the phone when playing games. The phone's built-in NFC also pairs up with NFC-enabled Sony Bravia TVs so you can mirror your phone's content on the TV screen.

Sony's customisations to the Android operating system are fairly minimal. Sony's entertainment apps, such as its Video and Music Unlimited services, are hidden away on its outer home screens, leaving more room for your own apps on the central homescreen. A small portion of the display is taken up by touch-sensitive Back, Home and Menu controls, but we still had plenty of room to use the rest of the screen, including the keyboard. We were able to type quickly and accurately, and while we initially lamented the loss of full stop and comma keys on the keyboard, these can be easily added back in using the keyboard settings wizard.

The Sony Xperia SP is an impressive phone with excellent performance. It's a stylish handset that carries a noticeable feeling of quality – which is especially impressive at the price. Sub-standard image quality from the camera holds it back from an award.

KEY SPECS

Android 4.3 (Jelly Bean) • 1.7GHz • Number of cores:2 • RAM: 1GB • HSDPA, 4G • Display: 4.6in 1,280x720 LCD • Camera: 8-megapixel • Storage 8GB + MicroSD • 130x67x10mm, 155g

BATTERY LIFE: 10HRS 13MINS

This is a fast, powerful phone but it has been superceded by the Motorola Moto X

OVERALL ★★★★½

SONY XPERIA Z2

PRICE $850
SUPPLIER www.sony.com.au

When Sony released the Xperia Z1 just six months after the Xperia Z, many saw it as a stop-gap phone rather than a proper new model. Six months later, Sony has released the Xperia Z2; could this be the brand-new high-end Sony we've been waiting for?

From the outside, you'd be hard pressed to tell the Xperia Z2 apart from its predecessor. It has the same aluminium frame and glass rear panel as the Xperia Z1, and plastic flaps on the side hide the microSD slot, micro SIM slot and USB port to keep water out up to 1.5m down. The phone's angular edges mean the Xperia Z2 isn't as pleasant to hold as other Sony phones such as the more rounded Xperia SP but, despite the large 5.2in screen, you can still use the phone in one hand.

Android 4.4.2 KitKat runs beautifully on the Xperia Z2's 2.3GHz quad-core Snapdragon 801 processor. Menu animations are lightning fast, and swiping between home screen menus is quick and responsive. We particularly like what Sony has done with its default background animation, as its multicoloured ribbon twirls and twists as you swipe from one screen to another.

The Xperia Z2 wasn't quite as fast in our SunSpider JavaScript benchmarks as we were expecting, though, completing the test in 862ms with the phone's default Chrome browser. This is 200ms slower than the HTC One (m8) managed, and almost 500ms behind the Samsung Galaxy S5. Even the Xperia Z1 was faster when we benchmarked it a year ago, scoring 740ms in the Chrome browser. We weren't able to improve the Xperia Z2's score using other browsers, either, as it still only managed 1,021ms when we re-ran the test in the usually fast Dolphin browser.

This was disappointing, as we would have expected the Xperia Z2 to be as quick as the HTC One (m8), as it uses the same processor. Fortunately, we found it didn't really make too much of a difference in everyday use. Websites loaded quickly and the phone was able to handle complex and image-heavy sites such as The Guardian with ease.

Where the Xperia Z2 really excels is in its graphics performance. The phone's Adreno 330 GPU scored a huge 18,385 in the Unlimited version of 3DMark Ice Storm, which shows it's quick enough to run anything in the Google Play store; Real Racing 3, for example, ran beautifully at maximum detail. This performance is on a par with that of the Samsung Galaxy S5 and HTC One (m8), but the Xperia Z2 has the edge when it comes to playing games, as it comes with Sony's PlayStation Mobile app, which lets you play games from the Sony Entertainment Network, and will let you use a PlayStation 3 controller with the phone.

The Xperia Z2's 5.2in IPS screen is a fraction larger than the Xperia Z1's, with the same 1,920x1,080 resolution. This means its overall pixel density is lower, at 423 pixels per inch compared to the Xperia Z1's 440ppi, but this makes little to no difference; text and images still look incredibly sharp. We were able to read headlines on the desktop versions of websites with no trouble at all.

Image quality is good, but not exceptional compared to other flagship screens. Our colour calibrator showed the Xperia Z2 was displaying an impressive 98.7 per cent of the sRGB colour gamut, but colours didn't look quite as rich and vibrant when we compared it side by side with the Nokia Lumia 1020's AMOLED screen. Whites were a little cleaner, but blacks were noticeably greyer, which reflected our relatively high black level reading of 0.31cd/m2. AMOLED panels, on the other hand, often measure near a perfect zero for black. It's by no means a bad screen, though, and it's still perfectly bright enough to see on a sunny day thanks to its high peak brightness reading of 386.3cd/m2.

For the rear camera, Sony has decided to stick with the same 1/2.3in 20.7-megapixel Exmor RS camera it used on the Xperia Z1, but there have been some improvements. The most important is the inclusion of SteadyShot image stabilisation, which helps eliminate blur and makes video panning a lot smoother when shooting both Full HD and 4K video.

KEY SPECS

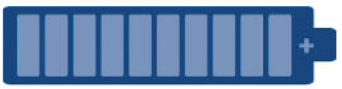
Android 4.4 (KitKat) • Processor: 2.3GHz • Number of cores: 4 • RAM: 3GB • HSDPA, 4G • Display 5.2in 1,920x1,080 LCD • Camera: 20.7-megapixel • Storage: 16GB + MicroSD • 147x73x8.2mm, 163g

Like its predecessor, the Xperia Z2 doesn't take 20.7-megapixel images by default. In its Superior Auto mode, the camera is locked to taking 8-megapixel images, so you'll have to switch to Manual to take larger-resolution photos. In both modes, though, we found that colours looked perfectly bright and vibrant, but objects in the background weren't anywhere near as sharp or clearly defined as shots we took on the Lumia 1020's camera, which has a larger 1/1.5in 40-megapixel sensor, but this was still a little disappointing.

The Sony Xperia Z2 is certainly an improvement on the Z1, but even its huge battery life can't shake the feeling that most of its enhancements are minor updates rather than substantial steps forward. Compared to the Samsung Galaxy S5 and HTC One (m8), the Xperia Z2 doesn't quite cut it.

It still has its merits, such as the waterproofing and Sony's straightforward take on Android, but for us the stylish metal HTC One (m8), and more decisively the Galaxy S5, are ahead of it with better features and performance overall.

BATTERY LIFE: 16HRS 45MINS



A few minor improvements and huge battery life make this a better phone than the Z1.

OVERALL ★★★★½

SONY XPERIA Z1 COMPACT

PRICE $499
SUPPLIER www.sony.com.au

Most big phone manufacturers release smaller versions of their flagship handsets. These are ideal for those who prefer more compact handsets, but they often sacrifice a top-end specification in order to hit a more acceptable price. Examples include Samsung's Galaxy S4 Mini and HTC's One Mini. Now Sony has released its Sony Xperia Z1 Compact, but it's actually very different to its rivals.

The new phone is indeed a smaller version of the Sony Xperia Z1. However, Sony has taken the stance that a smaller handset shouldn't necessarily be a cut-back one and so has, where appropriate, matched the specifications of its larger sibling, so you get all the power in a smaller overall package.

The Xperia Z1 Compact measures a svelte 127x65x9.5mm and weighs 137g. It's much smaller than the recent crop of superphones, and fits easily in your hand. It's 1mm thicker than the Z1, but that's still impressive given its powerful hardware has to be packed in behind a display 23 per cent smaller than that of current high-end smartphones. The display's resolution has been reduced from 1,920x1,080 to 1,280x720, but that still works out to an impressive 342ppi. That's more detail than the iPhone 5s, matches the resolution on the HTC One Mini and is superior to the Galaxy S4 Mini's pixel density, for a very sharp screen.

The screen is an IPS panel, and it's very impressive. Colours are nicely saturated, looking richer than those on the Nexus 5, for example. The screen is bright, and whites are pure too, with no perceivable colour cast.

The Xperia Z1 Compact has the same quad-core SnapDragon 800 chipset as its big brother, running at the same 2.2GHz clock speed. That makes it far faster than any other Android phone this size. It blazed through our SunSpider JavaScript benchmark, which is a good indicator of web-browsing performance, with a time of just 833ms.

The phone's 3D rendering performance is just as impressive, with a score of 19,193 in the Unlimited test. Benchmarks of this calibre were ground-breaking when we first saw the Snapdragon 800 chipset, and they're still hugely impressive now.

Android 4.3 runs very smoothly, with no hint of hesitation as we switched between apps. We like Sony's custom icons and the restrained colour scheme. There are quite a few apps trying to sell you Sony content, but they're easy to remove. You get around 12GB of free space out of the 16GB provided, and you can add up to 64GB thanks to a microSD slot.

"The display has more detail than the iPhone 5s, matches the resolution on the HTC One Mini and is superior to the Galaxy S4 Mini's pixel density"

The battery is smaller than the Z1's, with a 2,300mAh capacity instead of 3,000mAh, as a larger one would have been hard to fit behind the smaller display. However, that smaller screen has a smaller power draw, so the phone still managed a class-leading 12 hours, 32 minutes in our video playback test.

The handset is waterproof, so it will survive a big splash or even a quick dunk, but this does mean that the ports all have to be hidden behind flaps. It makes the handset look smart during the day, but popping open a flap every time we wanted to charge the phone was a nuisance. Overall, however, it's a small price to pay for the waterproofing benefits.

The phone has a dedicated camera button. This won't activate the camera from standby but it will launch the camera app immediately when the phone is awake. The button has a dual-action press, just like a proper camera, with a half-press focusing and locking the exposure so you can then frame your shot and press fully to activate the shutter. The camera interface is excellent, too, with clearly laid-out options and explanations for the various shooting modes.

The camera is identical to the Z1's, using the same sensor with a monstrous 20.7-megapixel resolution. It also has the same optics and the same image processing as the Z1. We weren't that keen on the Z1 Compact's image processing, as by default it takes super-sampled 8-megapixel images, trading in resolution for noise reduction. However, even then it struggled to take good-looking images in our low-light tests. Flick to manual mode and you can get the full resolution the sensor can manage, but we still think there are just too many pixels packed on to its sensor, and in anything less than good conditions, it suffers badly from speckled noise. In bright outdoor conditions the camera performs far better, but the detail in the photos still doesn't stand up to that headline megapixel figure.

The Sony Xperia Z1 Compact isn't cheap, but its specification is unrivalled at this screen size on an Android phone. It's fast, waterproof, has a great screen and a long battery life. The camera is the weak point, so if you're keen on photography you should look elsewhere.

KEY SPECS

Android 4.3 (Jelly Bean) • 2.2GHz Number of cores: 4 • RAM: 2GB • HSDPA, 4G • Display: 4.3in 1,280x720 LCD • Camera: 20.7-megapixel • Storage: 16GB + MicroSD • 127x65x9.5mm, 137g

BATTERY LIFE: 12HRS 32MINS

The Z1 Compact isn't perfect, but it's still a top-end smartphone in a small package

OVERALL ★★★★½

WAR THUNDER

INSTANTLY ACCESSIBLE WWII AIR COMBAT THAT'S ABOUT TO EXPAND WITH PLAYERS IN TANKS, AND SOON, SHIPS.

DEVELOPER Gaijin Entertainment
PUBLISHER Gaijin Entertainment
WEBSITE www.warthunder.com

PLATFORMS
PC • PS4

If you know all about War Thunder, you will have seen the great leaps forward it has made over the past few months. If, on the other hand, you're thinking 'War What?', then sadly you are part of the vast majority. This page is here to bring those with a passing interest up to speed, and hopefully serve as a revelation if this is all a bit unfamiliar.

War Thunder is the competitor to World of Tanks/Planes. Like WoT, War Thunder is Russian. And, it's huge. It is almost identical in all important respects to World of Tanks. That is to say, it is a free to play WWII MMO, with a pay component that is debatably pay to win. It is perfectly possible to have a thoroughly enjoyable regular experience without spending a cent, but the developers are as mercenary as the worst of them, and have structured critical aspects like crew skills and plane performance in such a way that it takes an agonisingly long time to get yourself kitted out with decent gear. Or, spend a few dollars and instantly have a superior plane with a powerful engine, more accurate guns and more damage resistance by throwing a few dollars down.

War Thunder, like World of Tanks, aims to serve up a total war experience. That means land, sea and air. War Thunder started with planes, and is now in the final beta testing stage of its ground units. Naval warfare will be added later, probably next year. Conversely, World of Tanks kicked off with ground units and then added planes. As a comparison, War Thunder's air combat is vastly better than World of Planes, and as good as World of Tanks is, War Thunder's ground forces combat is shaping up to be a very serious competitor.

Where they diverge is in bringing it all together. War Thunder aims to have single battlezones where players flying, driving and sailing all exist in the same space, and with that, a fascinating approach to team gaming. World of Tanks/Planes will always keep their areas separate. Players in planes will never cohabitate with players in tanks.

Furthermore, War Thunder is currently beta testing a PlayStation 4 client, and when that's green lit the plan is to have console gamers join in the same battlezone with their PC cousins. Pretty nifty, and as grand a vision as can be had in a modern gaming space.

War Thunder has three main ways to play split by difficulty. Arcade has a simplified flight model and unlimited ammo, and takes place in fantasy zones with exaggerated canyons and mountains with holes to fly through. Realistic has the full sim flight model, but doesn't require full manual controls (fuel mix, radiator and manifold settings, trim etc), and is set in loosely historical scenarios with semi-accurate maps. While Full Sim forces cockpit view, manual flight controls and removes the player tags that make identifying enemies easy in the other modes.

Each of the nations (U.S. Germany, Russia, England and Japan) has a few dozen planes, and it's not all dogfighting. Medium and heavy bombers are there too. The game is notorious for having the advantage swing for and against bombers with each patch. Right now, following the latest 1.39 patch bombers stand a fighting chance, their spawn points being much closer to targets to let them score a few ground kills before the inevitable swarm of fighters sets upon them.

It doesn't ultimately matter; there are so many different planes that it's tremendous fun to fly whatever suits your inclination on a given day.

Many new planes were added with 1.39, and flight models for existing planes greatly improved. There is always an accusation of Russian bias in War Thunder, and it's hard to deny. Russian planes seem to be constructed of material able to withstand damage better than other nations, but not by a lot, and most players don't specialise in any one nation, there's so much variety on offer in War Thunder, and that's what makes it great.

Once tanks come out of beta specific mechanisms will be introduced to give them a decent lifespan. AI ground units will be tagged on-screen, but humans won't so you will have to go down for a close up to ID enemies – and enter the savage AAA zone where human controlled anti-air guns will be waiting to rip you from the sky.

It's perfectly easy and competitive to fly with a mouse and keyboard, or go with a joystick if you prefer. The graphics are fantastic and generally run well on older systems. An Asia Pacific server has just been added, too. It's the game I've played more of over the last year and a half than any other. I think it is design, coding and gaming genius, and War Thunder is destined for a long life and big bold gaming.

Ben Mansill

atomic WWII-era flight combat for simmers and arcade players alike, about to be joined by tanks.

RATING ★★★★½

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mymagazines.com.au

BATTLE ACADEMY

SLITHERINE TAKES ITS IOS STRATEGY GAME TO STEAM, WITH... UNSURPRISING RESULTS

DEVELOPER Slitherine
PUBLISHER Steam
WEBSITE www.slitherine.com/games/bbc_ba_pc

Managing ports of games from one platform to another is a notoriously tricky process. What might be an ideal control scheme on, for instance, a console will feel rather poor on a PC, and even the process of porting graphics between platforms can be fraught.

However, in this instance we're not talking about a console port, but an iOS port. The Slitherine strategy title Battle Academy is a highly considered and graphically rich game on iPad, but how does it fair on PC?

SQUARE-HOPPING

Battle Academy endeavours to be adhere to that most classic of gaming requirements – simple in execution, rich in strategy. But while the game makes an elegant necessity of the touch-screen controls of a tablet, it comes across as rather limited on a more versatile platform.

The game boasts a tutorial and a handful of campaigns, with more available is in-app... I mean, DLC purchases. The tute gives you the basics of the game and the way it presents each challenge; Battle Academy uses a simple square grid for movement and range-checking, and this is matched with a similarly simple four-colour-comic approach to setting up each campaign. You get a brief comic setting up the historical and strategic narrative, a screen to pick units (you often start with both a set unit list, and a points-buy system to then customise it), and get into the battle itself.

While the turn order is strictly you-go-I-go, opposing units can ambush and fire upon units as they move into range, making the game feel a little less one-sided. Units can be suppressed by fire, directly damaged and subsequently destroyed, or even forced to surrender if locally out-numbered. The game also features a useful way of depicting the fog of war, by suggesting where your units might think the enemy could be hiding. On any turn, a number of squares may feature question mark, which may mean nothing, or could mean a Tiger tank might be hiding there, making scouting and tactical thinking of paramount importance.

What this means in action is the order in which you move and use your units is even more important than where you move them to. You'll need to creep forward with small infantry scouting units, or tanks like the M5 Stuart. As you spot units – usually by having them fire at you – you then need to use artillery and tanks to suppress the enemy, before moving up the mass of your infantry, to deliver the final blow. All through this you need to be aware of flanking moves and more hidden units, making the game a rather tense affair. As you destroy units and advance toward your objectives, you'll received reinforcements, and even have some units gain in experience.

PLATFORMS
PC Only

There's also a good range of units on offer, from both the British and US armies, and campaigns range from the North African desert through to D-Day and beyond. It's not a super rich mix, and you can't play as the Germans at all (which I find personally annoying, as playing as the loser in games like this is always more of a challenge).

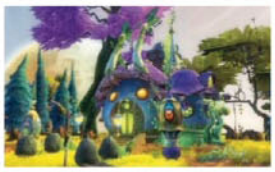
However the tablet limitations get in the way. The square grid feels awkward and overly retro compared to even a more traditional hex-grid. The graphics, too, are on the simple side, and the audio is either flat, or lifted wholly from Close Combat games – which are a stable-mate, but it does make the game feel a little cheap.

Overall, it just feels too casual, too cartoony. On a tablet that can be forgiven, but as a PC game it seems more than a little limiting. It's just deep enough to make a perfect first wargame (so if you have a friend or even a child you want to convert into a beardy grognard, it's perfect), but for everyone else, it's probably not the ideal choice for refighting the great battles of World War 2.

David Hollingworth

atomic Great on iOS, not so great on PC.

RATING ★★★☆☆☆



WILDSTAR

MEET THE LATEST CONTENDER TO THE MMO CROWN, IN SPACE!

DEVELOPER Carbine Studios
PUBLISHER Ncsoft
WEBSITE www.wildstar-online.com

PLATFORMS
PC Only

Trying to launch an MMO in this day an age must be a terrifying ordeal. Not only do you have to deal with a landscape forever altered by World of Warcraft, but you also have to find a way to stand out and hook enough players to make your game viable. We have seen many decent MMOs emerge in recent years, and a whole crapload of mediocre ones, but still nothing has made a dent in WoW's huge subscriber numbers.

Wildstar is the latest title to take up the challenge, and after playing several phases of the beta for the game I'm at that point where it may actually stick beyond the initial enthusiasm. In many ways Wildstar stands in stark contrast to the recently launched Elder Scrolls Online, a game whose charms were obfuscated by a control scheme designed for consoles not PC, and a levelling system that felt slow and lacking in memorable moments.

Developed by a bunch called Carbine Studios, the first thing that strikes when you fire up Wildstar is that it has a similar cartoony look to WoW. This isn't accidental, for Carbine is a studio that was formed by a bunch of developers that worked on vanilla WoW, and the legacy shows through in the art style especially.

The game itself differs at a fundamental level, despite any visual similarity. Wildstar takes place on the planet Nexus, where two factions made up of four races each are trying to eke out an existence, while exploring and learning more about the planet.

Classes are spacey takes on common fantasy archetypes, with Warriors, engineers and medics sitting alongside more magicky classes like the pistol wielding spellslinger or the illusion wielding Esper. This largely just governs how you fight - Carbine has spent a lot of time ensuring that different player types are catered for as well.

This manifests as one of the more fascinating aspects of Wildstar, a system called Paths. This sits alongside your character's class and is designed to let you focus your gameplay on either exploration, research, combat or settlement.

Each of the paths has its own secondary series of quests as you move through the game, for example, Settlers gather resources found around the planet and can use them in towns and player hubs to build improvements. These include things like stations which last a short amount of time and that players can use to get experience, health and speed boosts.

On the other hand, players who choose the Warrior path gain access to special combat events throughout the world, where they take on waves of enemies. Explorers are tasked with finding certain landmarks and are constantly being taken off the beaten path, while Scientists get extra missions to investigate the local flora and fauna.

The paths concept closely mirrors a famous study into MMO player behaviour, which was broken down into these four rough archetypes. They work completely independently from class, which allows you to choose the type of combat you enjoy as well as how you'd like to get sidetracked on the planet.

Wildstar is unashamedly what some refer to as a Theme Park MMO. This alludes to the fact that it is a guided experience through the world, like WoW, rather than some sort of free form emergent gameplay affair like Eve Online (known as a Sandbox MMO). As your character levels you are guided through Nexus by a series of storyline and sidequests, different for each of the two factions. It is an experience that is wonderfully polished for a new MMO, quite clearly Carbine Studios has put the many years of development to good use, and the experience during the game's beta phase has been a lot smoother than the majority of MMOs that we have played in recent times.

At the time of writing the game was a few weeks from launch, and so there still remains a whole lot of unanswered questions about things like the endgame activities and how the MMO part of the game plays out. But we can safely say that Carbine has laid the groundwork wonderfully, and even pre-launch Wildstar is one of the most charming, and polished, MMOs that we have ever encountered.

John Gillooly

THE A-LIST

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

After rather sweeping overhauls of both A-List and Kitlog, over the past two issues, things have settled down a bit.

This month's group test of smartphones provided a perfect opportunity to reconsider our recommended smartphone in A-List. However, we have elected to keep the HTC One m8 in. This handset was added last issue after being reviewed, and the smartphones group test tapped no one phone as the overall best. Furthermore, several staff members have now had the opportunity to use the HTC One m8 for a test period and all agree that it's comfortably the best available at this point.

WIRELESS ROUTER GROUP TEST

In next month's *PC & Tech Authority* a large group test of wireless routers is planned, and testing is currently underway. With that, we expect to be able to update our A-List best router.

EDITOR'S CHOICE PC

Two months in, and the Editor's Choice High-End PC is performing admirably, as expected. After one month a second Radeon 290x was added for Crossfire, however, after a two week experimental run it was removed. Unfortunately (at least in the games we play) Crossfire proved to be more trouble that it was worth, with results varying from stuttering to frame rates lower than what a single card would deliver, to games that required an alt-enter to Windows mode to work properly.

An upgrade to a Z97 board is being considered, though it's likely that we will postpone a motherboard upgrade until the higher-performance Z99 chipset is released later in the year.

PCS DESKTOPS

HIGH-END PC&TA EDITOR'S CHOICE

★★★★★★

PRICE $3414

An extreme PC able to deliver perfect gaming performance, but also be equipped to handle the most demanding desktop apps. See page 18!

SPECIFICATIONS i7 4770K CPU; ASUS Radeon R9 290x DirectCU II OC 4GB graphics; Corsair Dominator Platinum DDR3 16GB; ASUS Maximum 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; WD Black 2 SSD + 1TB HDD

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 T100

★★★★½

PRICE $550 **SUPPLIER** www.asus.com.au

Thanks to Intel's new Atom CPU, the Transformer Book T100 delivers full Windows 8.1 in a tiny, affordable package – the netbook is back. The T100 delivers everything you could ask for, and it's ludicrously affordable.

SPECIFICATIONS Quad-core 1.33GHz Intel Atom; 2GB DDR3; 64GB eMMC; 10.1in 1366x768 Touch LCD; Wi-Fi; Ethernet; HDMI.

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

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 Q.4-3.4GHz 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

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 ASUS DSL-N55U

★★★★½

SUPPLIER www.asus.com.au

A high-speed router that looks striking and delivers everything you could want for home connectivity.

SPECIFICATIONS 802.11abgn wireless router; 4 x Gigabit Ethernet ports; 2 x USB; PPOE; PPTP; L2TP; 145x63x174mm.

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

It's an exciting time to contemplate an upgrade, with the first of the new Intel Series 9 motherboards hitting now. If your PC is running anything earlier than Z87 then we'd suggest considering an upgrade, if anything to take advantage of USB 3.0 and SATA 3 support. But if you're running Z87 then there's little point in jumping in with a new system just yet. There just isn't enough to warrant splashing out – unless of course you plan on being an M.2. SSD early adopter.

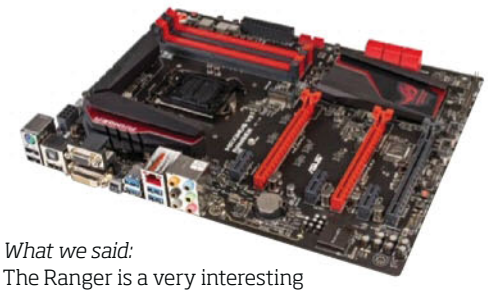
That said, we are updating our Game Box motherboard, swapping out the Asus Z87-Pro (which held the recommended spot for a grand total of one issue, after winning last month's motherboard roundup), with another board from Asus. The Ranger is an especially interesting motherboard, being the first ROG board to be considered 'budget'. The review on page 44 tells the story. At $259 it's also $20 cheaper than the Z87-Pro it replaces. For the Game Box you would do equally well selecting the new Asrock Extreme 6 (page 45), it really is a coin toss between these two excellent mid-range Z97 boards.

As tempting as it is, we are holding off adding a Z97 board to the Perfect PC range just yet. We simply haven't seen enough new boards to make that call, as the first boards are either super high-end OC designs, or decent but unremarkable mid-range boards.

Another potential change we're going to linger on a little longer is changing up the Xonar Essence ST/X to the new model. The new Essence is marginally better, but only to the most discerning ears, and with quality speakers or headphones. At $349 vs around $170 for the original, we're going to recommend the first Essence until stock runs out.

NEW

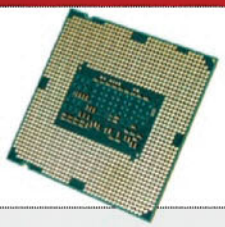
ASUS ROG RANGER (REVIEW PAGE 44)



What we said:
The Ranger is a very interesting arrival on the motherboard landscape, and should appeal to those to whom a motherboard should be a budget component. As of a couple of years ago we stopped benchtesting motherboards in the *PC&TA* labs (apart from when we do major group tests) because the performance difference was becoming so slim it was largely irrelevant. Instead, the focus has shifted to features and the quality of the components, and hence, reliability, and here the Ranger presents a most compelling option for any type of system bar the most budget oriented.

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 and with respectable overclocking headroom, all running off a new Z97 chipset.

MEMORY

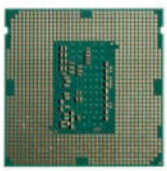
KINGSTON HYPERX BEAST 16GB
PRICE $240
Our roundup award winner, it's well-priced, fast and overclocks very well.

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 4770K
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Intel's top-of-the-line quad-core i7 delivers huge performance and can overclock easily to around 4.4GHz with the K version.

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SYSTEMDRIVES

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DISPLAY

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PRICE $400
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MOUSE

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CORSAIR CS650M
PRICE $140
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SUBTOTAL: $5192 RIG ONLY: $4198

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The only case you'll ever need. Premium luxurious bliss.

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DISPLAY

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PRICE $690
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MOUSE

RAZER OUROBORUS
PRICE $125
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AUDIO

ASUS XONAR ESSENCE ST/X
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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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SYSTEM BUILDER:

As new generation components arrive, so does the gamesmanship.

NEW CHIPSET, OLD RIVALRIES

The lead up to a new chipset launch should, for PC enthusiasts like us, be a time of excitement and expectation. However, what it really is, from our side of the fence, is a time of frustration and mystified arm-waving, as Intel and its motherboard partners jostle around nonsensical NDAs, release dates, and one-up-man-ship.

The Z97 chipset launch (we've got four reviewed in this issue, out of the nearly 50 that have been released – 26 of which are from MSI!) has been a doozy. It got messy enough that a Gigabyte employee pretty much lost all patience in the process.

We're not going to repeat verbatim what he said, but what earned his ire was Asus' decision to start publishing images of apparently NDA-ed hardware on Facebook, and sharing unedited shots of the boards elsewhere online, including even a few benchmarking results. It was essentially being claimed to be a cheap marketing ploy.

That's a bit more direct than we're used to seeing from Gigabyte, especially when it comes to its number one rival, Asus. So why so serious?

NON-DISCLOSURE AGREEMENT

When Intel launches a new chipset, it of course needs to work closely with its motherboard partners on getting new product to market. But Intel is rather fond of controlling the process, which often leads to ludicrous requests from motherboard vendors.

In this case, it meant vendors can't talk about Z97 by name, can't mention Intel, and are not allowed to reveal certain parts of their new motherboards. This in turn leads to truly bizarre levels of obfuscation, like blurring out the '9' in Z97, or blocking out Intel logos on boxshots. And we were asked by more than one vendor to do the same ourselves if we were going to publish anything online.

As if this weren't something that every enthusiast and their overclocking dog already knew about.

"This is someone at Asus saying 'screw it', with a heavy dose of 'we didn't do it first'."

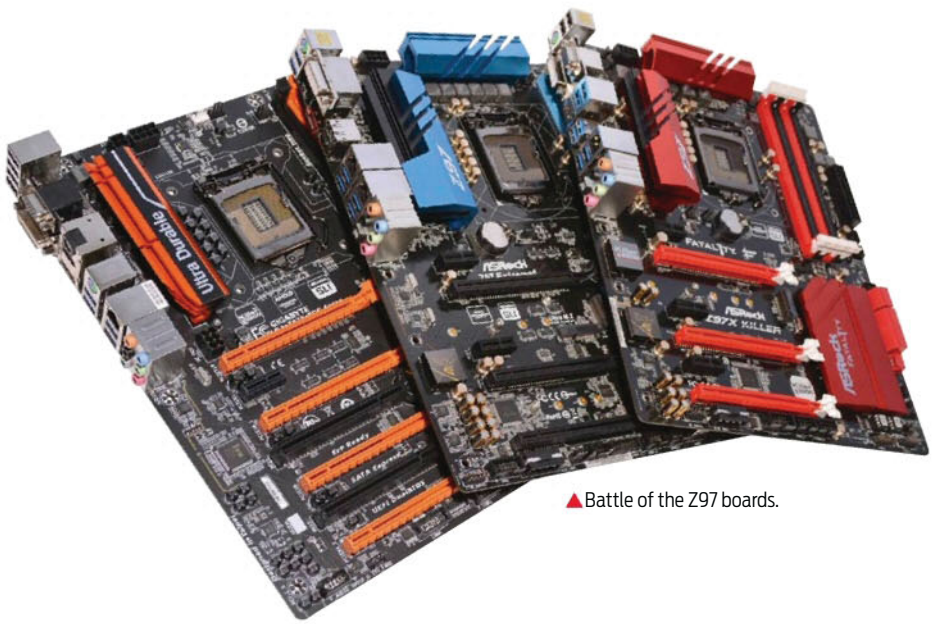
One thing that's always truly verboten when it comes to these kinds of NDAs, though, is performance and benchmarking results. That's all tightly controlled, and we've heard from more than one vendor in the past that Intel really does take its NDAs seriously, no matter how silly some of the details are.

So the fact that Asus seems to have ignored that is raising eyebrows.

It was tech website WCCFTech that pointed out that Asus had splashed un-edited pics of a range of Z97 boards all over Facebook, including shots from an event that our own Editor Ben Mansill attended. The event was NDA-ed, though print publications with their long lead teams were simply made aware of the NDA, rather than having to sign it.

On top of that, website HardOCP has released a review of Asus' new mobos, complete with benchmarks. This would either have been done with Asus' implicit permission – which is not impossible, given Asus' own seemingly blasé attitude – or released early because of Asus' own ignoring of the NDA.

WCCFTech is no stranger to the drama that can surround leaked images and disregarded NDAs. It earned the ire of motherboard manufacturer MSI



▲ Battle of the Z97 boards.

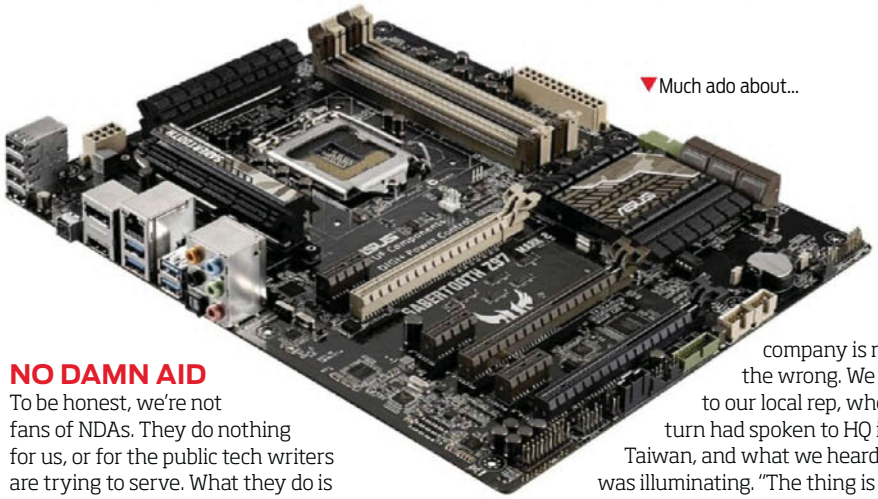
when it published un-edited photos of its upcoming Z97 range. MSI took the step of then supplying to the press pre-blurred shots of the new gear, asking that no other outlets use WCCFTech's shots. MSI then pointed out that publication is a clear breach of MSI and Intel's NDAs, and that such breaches could have very serious internal issues.

In other words, no one wants to mess with Intel. One of the things that hardware vendors try to hold over outlets like us is that possibility of losing access to hardware, and in theory, Intel holds the same power over the manufacturers. However, if we can make the argument (and we have many times) that an aggressive and open technology press is important to vendors, the same can be said of the importance of those vendors to Intel. It could be said to be even more important, as the only option for a hardware maker suddenly left out in the cold by Intel is to move over to AMD.

We were in touch with WCCFTech over the issue, and a site representative had this to say:

"We were not under either MSI or Intel NDA when the leak was posted. After the leak, MSI management contacted us and signed an NDA with us regarding the Z97 Motherboards. Following that we took the article down. So the things that are inaccurate are: we did not break any Intel/MSI NDA, because no NDA existed (for us) at the time the leak was published."

In other words, it was a news outlet following news – just as it, of course, should be doing.



▼Much ado about...

NO DAMN AID

To be honest, we're not fans of NDAs. They do nothing for us, or for the public tech writers are trying to serve. What they do is promise a single, overwhelming drop of reviews and information, meaning that every site all over the world will run the same stories at the same time. It controls the flow of information, to create hype, drown out outlying or dissenting views, and generally co-opt review sites into acting as marketing tools. When you think about it, it makes sense – marketing tech at this level is big business.

It doesn't mean we have to like it, though.

But in cases like this they really do seem to consistently do more harm than good. I can understand a company wanting to hold onto full reviews and benchmarking info, but everyone knows this is an Intel product, and everyone knows it's called Z97. Having to pretend that it's still a secret is simply a source of frustration.

In this case, Asus claims the company is not in the wrong. We spoke to our local rep, who in turn had spoken to HQ in Taiwan, and what we heard back was illuminating. "The thing is this is something that happens a lot, and we're not even the first to break the NDA," we were told. "MSI leaked images first, so Asus feels that the NDA isn't really being broken if it's already all out there."

Asus then pointed out previews of Z97 boards already appearing on Australian sites such as pro overclockers TeamAU.

Essentially, this is someone at Asus saying 'screw it', with a heavy dose of 'we didn't do it first'. That was MSI, and even though MSI was very quick to step on the issue, Asus obviously thinks the NDA is a bit more malleable than its competitors. And now Gigabyte's just as frustrated, because if it plays nice and sticks with the NDA, it's allowing a competitor to steal a march in terms of pre-release marketing.

And Gigabyte is intending to keep playing nice. "Gigabyte is currently the number one motherboard manufacturer in the world," our local rep needlessly pointed out to us. "We work very closely with Intel, a very important partner of ours, and intend to follow Intel's NDA guidelines closely for any future product releases."

It's pure PR boilerplate, but at least it's comment. Intel, who we also approached, was predictably tight-lipped, and wouldn't comment on the matter in any way. Which is fair, because it is all kinds of messy and dubious – but it is Intel's NDA after all, so you'd think some comment might have been forthcoming.

I guess the one major takeaway from all this is that NDAs are essentially meaningless, unless you want to play nice within the rules.

But we hear those guys also tend to finish last, apparently.

◀Z97 boards are landing now.

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Cable management

What the critics say:

The Thermaltake Toughpower XT 875W offers a great combination of features, aesthetics, quality, versatility, and performance. If you'rea person that appreciates quality design and construction, then the Toughpower XT 875W will not disappoint you. – Pure Overclock

HOW TO:

Surf the web from a fake location

SHUT OUT OF US-ONLY WEBSITES AND SERVICES? **DARIEN GRAHAM-SMITH** LOOKS AT WAYS TO FALSIFY YOUR LOCATION ON SMARTPHONES AND PCS

When you search Google for a place to eat, your top hit probably won't be the world's most famous restaurant – it's likely to be somewhere in your hometown. When you go to the US portal of an online shopping website, you'll typically be directed to the AU site. Post to Twitter from your smartphone, and your location will be appended to the tweet. Clearly, online services are aware of where you're connecting from.

They have a few ways of working this out. If you're using a smartphone, then your browser and apps can (with your permission) access your geographical location as determined by your GPS hardware. If GPS is turned off, cell-tower information can be used: by comparing the relative signal strengths of nearby mobile masts, the phone can estimate its own position to a reasonable degree of accuracy – typically within 100m, in an urban area with plenty of coverage.

On PCs and laptops, which lack GPS and radio receivers, secondary information can be used to guess your location. One method is by looking at nearby wireless networks. Google and other location-service providers maintain geographical maps of service-set-identifier (SSID) and media-access-control (MAC) addresses, so if your laptop can see three or more recognised networks, it can work out its own location to a high degree of accuracy, and – again, with your permission – can pass this information on to a remote service.

Failing that, it's always possible for a remote service to look up the registration details of the IP address from which you're connecting. This is a rather blunt approach that can give inaccurate results if your ISP isn't based in your hometown, but at worst it can normally be relied on to get the country right. Via all these methods, online services can easily adapt what they present to visitors, depending on the country from where they're actually connecting.

THE PROBLEM WITH GEOLOCATION

It can be convenient to have online content tailored to your location, but in some situations it can be annoying. Such an example might be if you're trying to order provisions ahead of a foreign holiday: if an online shopping site recognises that you're connecting from outside the country, it may present only international shipping options. Or you might want to access an online resource that has been geographically restricted – for example, you may want to download a smartphone app that hasn't yet been released in your region.

> "Your phone will happily believe you've abruptly moved thousands of miles"

As we'll describe below, there are ways to get around this by "spoofing" your location. The technical measures are the same regardless of what you want to achieve, but some uses of location spoofing come with ethical questions attached. Accessing hidden shopping-delivery options is harmless enough, but if a software developer has consciously chosen not to make its creation available in your country, then it's debatable whether you have the right to circumvent that.

Things become even more dubious when it comes to media streaming. One of the most common uses for location-spoofing measures is to access regional content on services such as YouTube and Netflix, but in these cases the content is usually restricted because the streaming service has the rights to provide it only within a specific region. By tricking the server into playing it from overseas, you're putting the provider in breach of its agreement with the copyright-holder.

In practice, this hasn't so far been a problem, and we've yet to see any significant legal dispute arise over out-of-region streaming. What's more, if you do use software to spoof your location, you're unlikely to get into trouble yourself: it's widely suspected that services such as Netflix unofficially tolerate the use of geo-spoofing tools. After all, the more content customers are able to access, the more likely they are to continue subscribing to it.

All the same, if you're planning to fake your location in order to access products and services that aren't available in your own country, be warned: this is morally questionable territory, and there may be consequences for you or the service you're accessing.

APPS AND PROXIES

If you're using a smartphone, the simplest way to fake your location is to install a spoofing app. There are plenty of these available for Android and jailbroken iOS devices, with straightforward names such as Fake GPS and Location Mockup. Using them is simply a matter of turning off your real GPS and location services, then using the app to manually specify where in the world you want to appear to be.

This approach works, so far as it goes. Your phone will happily believe you've abruptly moved thousands of miles, and the apps won't demur: Twitter and Facebook posts made from your mobile device will be "stamped" with your chosen location.

This trick won't work for services such as YouTube and Netflix, however. These don't rely on your phone to honestly report where in the world it is: they work it out for themselves, based on the particulars of your connection.

A much more robust solution is to use a proxy server – that is, a computer in your target country that can make the connection on your behalf, then forward the data on to you. There are plenty of commercial services that do this, such as Hide My Ass (**www.hidemyass.com**) and CyberGhost (**http://cyberghostvpn.**

com). There's also a community-run proxy system called Tor that does much the same thing. If all you want is to trick websites into thinking you're in a different country, however, this approach is overkill. Such services route all of your traffic through an international channel, often encrypting it en route, thus providing a virtual private network (VPN) service. This is helpful if, for example, you're working with sensitive documents in an oppressive environment, since it lets you communicate with the outside world in a way that can't be traced back to you.

For our purposes, however, encryption isn't necessary – and routing every packet through one or more proxy servers slows things down enormously. Luckily, there is a way: just make a remote server communicate directly with an Australian IP address as if it were an American one.

DNS SEGMENTATION

We mentioned above that a remote server can work out which country you're in by looking up your IP address, but doing so for every single visitor would mean a lot of extra work for the server, and extra load on the network.

A much more efficient approach is to tackle the problem at the DNS level – that is, by exploiting the Domain Name System that translates names such as "www.example.com" into the numeric addresses used by internet servers. DNS works via a global network of name servers that ordinarily all use the same lookup tables – so entering www.example.com will normally take you to the same address regardless of where in the world you're connecting from.

But it doesn't have to be this way. It's perfectly possible for a domain to provide different translation details to different name servers; for example, DNS servers in Canada and France might be configured to direct traffic for the same domain to different addresses. Since connection requests almost invariably go through their ISP's local DNS service, this effectively causes people connecting from different locales to be routed to region-specific servers, without the overhead of looking up each visitor's IP address.

It's a technique that can be used for various purposes. Content-distribution giant Akamai uses this approach for traffic management, so that (for example) someone in Australia trying to connect to **www.microsoft.com** can be directed to a nearby mirror, rather than having to talk directly to the main server halfway around the world. Some services, including Hulu and Pandora, use it to allow or deny access – only clients coming in via a US-based name server are directed to a working service. Netflix uses DNS to determine which shows and movies you're allowed to watch.

All you need to do to fool these systems is hook into a DNS server in a different region – but this isn't quite as simple as switching to a free US-based DNS service such as Google's; although the service is administered from Santa Clara, to minimise latency it dynamically routes requests to a server near you, so you'll still receive AU-specific content. Even if you can connect to a US-only DNS server, your ISP may "hijack" any attempt to connect to it, and route your requests back to its own servers. This is annoying, but from the ISP's point of view it has benefits: using a local name server ensures a speedy service, lets your ISP keep a better record of what's going on, and creates an opportunity to serve up customised content – possibly including adverts – if a lookup fails.

▲Use Tor's browser if you need to access a particular site that's otherwise blocked

One popular tool to beat this is the Hola unblocker (**http://hola.org**), which is offered as both a browser extension to Chrome and Firefox and a standalone application for Windows and Android. Media Hint (**https://mediahint.com**) is a well known alternative.

Inevitably, there's no such thing as a free lunch. Media Hint started out as a free service but recently started charging $4 per month for access; Hola charges only for its "premium" service, but free users may be used as peers, providing DNS services for someone else from a different country.

And there's no guarantee these utilities will work forever. Netflix and other services have every right to block such location-spoofing tools, and conceivably the operators of Hola and Media Hint could be forced to discontinue their services entirely – so don't take them for granted. ■

TOR IS A FREE, COMMUNITY-OPERATED

Tor is a free, community-operated network that routes your traffic through a series of randomly chosen proxies.

The primary purpose of this is to support anonymous web browsing: since anybody, anywhere in the world can operate a Tor relay (and then stop operating it the next day) it's extremely difficult to trace a connection back to its origin.

As a convenient side effect of the way Tor works, when you connect to a remote service via Tor, that service sees your location as that of the last proxy in the chain (your "exit node", in Tor parlance). Thus, it's possible to use Tor as an effective location-spoofing system.

There's one big downside to Tor, however: as a result of the byzantine routing that characterises the network, connections tend to be extremely slow. It's unlikely that Netflix would be watchable over a Tor connection. Indeed, since the proxies are all operated by volunteers sharing their own network connections, it would be antisocial and just poor form to even try to put that amount of traffic through them.

However, Tor is the perfect solution if you need to quickly access a single website that you can't get to directly from your own PC.

It's very easy to use, too: at www.torproject.org/projects/torbrowser.html.en you can download a customised browser (based on Firefox) that automatically routes all connections via Tor, so you can browse from a fake location without messing with your regular browser or network settings.

The only bit of configuration that's required is to specify that you want to use exit nodes only in a particular country – otherwise you could end up anywhere in the world.

To do this, go into the Tor Browser\Data\Tor folder and open the configuration file "torrc" in a text editor such as Notepad.

To use only exit nodes in the US, add these two lines to the end of the configuration file:

```
StrictExitNodes 1
ExitNodes {US}
```

If you want to browse from France, enter {FR} instead, and so forth. Save the configuration file and restart Tor Browser to effect the change. Note that if you select an invalid country code, or a country where no exit nodes are available, Tor Browser won't be able to connect to the internet. You can find out more about Tor, including details of OS X and Android clients, at **www.torproject.org.**

HOW TO:

Make the most of your keyboard

DAVID HOLLINGWORTH UNCOVERS SOME HANDY KEYBOARD TIPS TO HELP YOU DO MORE THAN JUST TYPE.

▲ Corsair's new RGB keyboards offer deep lighting customisation – so you can even light up individual keys to match different macro set-ups!

Something pretty common among dedicated gaming keyboards is presence of extra, dedicated macro keys. These extras keys are often marked with a combination of letters and numbers, and can range from a half dozen up to 12 or more, along with switching keys so you can switch between different recorded sets of macros. Often, the macros themselves are designed to be set up via dedicated software provided by the keyboard manufacturer, either on a disc or via download. Corsair's Vengeance line of keyboards is a great example, coming with models with and without macro keys – and whole lot of other bells and whistles aside.

But macros aren't just for gamers. While it's definitely handy to be able to reduce complex, in-game actions to a single button-click, the same thing can be done across your whole computing experience.

Like the virtual keyboard on your smartphone can recognise some abbreviations, you can use macro software to do the same with your PC, so that when you type – for instance – 'brb', it will register as and actually input 'be right back'. You can create dedicated hot-keys for opening up well-used programs or websites, and produce all kinds of functional macros inside of programs like Photoshop.

AUTOHOTKEY

The applications that come with most gaming keyboards are dedicated to ease of use in terms of creating gaming macros, but there's no need to rely on these programs. For gamers, they're great, but for more complex tasks, a dedicated key-mapping suite is what you need. AutoHotKey is one of the best, and also one that is excellently documented.

AutoHotKey uses an entire scripting language to automate all manner of tasks, and set up any number of dedicated keybinds. It's open source, and free, too. Download it at **www.autohotkey.com**.

To get started, you need to create a script. Once installed, simply right-click on any clear spot on your desktop, and choose to create a new AutoHotKey Script. You can name the file anything, so long as it ends in .ahk – we'd suggest keeping the names of any scripts as descriptive and indicative of their actual function as possible.

> "It's also possible to launch multiple programs with a single key-press"

Once named, you can get scripting, using the various tutorials on the site, but it's this easy. Follow the directions above, and create a script called PCAsite.ahk. Right click the file, pick Edit Script from the menu, and type the following.

```
#space::Run
www.pcauthority.com.au
```

Now save and close the file, before running it by double-clicking it. Once launched, an icon will appear in your desktop taskbar.

With the script running, all you now need to do to go to our website is press the Windows key plus the Space bar, and **www.pcauthority.com.au** will launch in your default browser. In the code the # stands for the Windows key, and space for – obviously – the Space bar. The :: is a signifier than the preceding key combination should execute the following command, in this to 'run', or go to, the P*C & Tech Authority* website.

That's AutoHotKey scripting at its most simple – launching programs that are in some way integrated into Windows itself, like the default browser or Notepad. If you're launching another program, you need to include the full file path.

It's also possible to launch multiple programs with a single key-press, for instance opening up Word and a favourite search engine or reference, like Wikipedia. You just need keep each command on its own line, and remember that multi-line scripts need to end with the 'return' command. So:

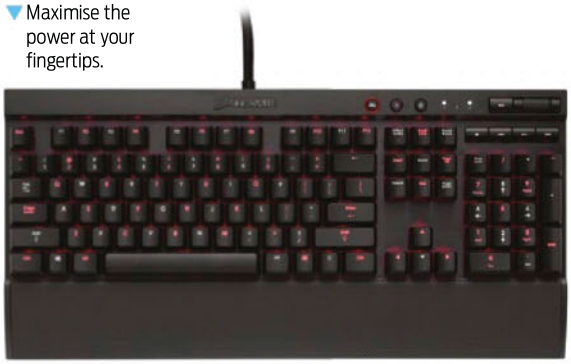
```
#space::
Run C:\Program Files (x86)\
Microsoft Office\Office12\
WINWORD.EXE
Run www.wikipedia.com
Return
```

In a single key-press, you're ready to get writing and researching.

More than simply launching applications, you can also create hotkeys that can recreate certain keystrokes and clicks. If you commonly like to copy and paste text from a series of sources to one common file – say, if you're in the middle of the above research project and are looking at multiple online sources for a single Word doc – you can set up a macro for that too.

For the full capabilities of AutoHotKey, do check out the official tutorials and documentation. It's a very handy, very powerful set of scripting tools that can really save you a lot of time in all manner of tasks, in work and play. ■

▼ Maximise the power at your fingertips.



COMMON COMMANDS

To give you an idea of what AutoHotKey can do in clever hands, here's a list of the most commonly used commands fromthe AHK site:

BREAK Exits (terminates) a loop. Valid inside any kind of loop.
CLICK Clicks a mouse button at the specified coordinates. It can also hold down a mouse button, turn the mouse wheel, or move the mouse.
CLIPWAIT Waits until the clipboard contains data.
ELSE Specifies the command(s) to perform if an IF-statement evaluates to FALSE. When more than one command is present, enclose them in a block (braces).
ENVADD Sets a variable to the sum of itself plus the given value (can also add or subtract time from a date-time value). Synonymous with: var += value
ENVSUB Sets a variable to itself minus the given value (can also compare date-time values). Synonymous with: var -= value
EXITAPP Terminates the script unconditionally.
FILEAPPEND Writes text to the end of a file (first creating the file, if necessary).
FILEDELETE Deletes one or more files.
FILEREAD Reads a file's contents into a variable.
FILESELECTFILE Displays a standard dialog that allows the user to open or save file(s).
GOSUB Jumps to the specified label and continues execution until Return is encountered.
GUI Creates and manages windows and controls. Such windows can be used as data entry forms or custom user interfaces.
IF Specifies the command(s) to perform if the comparison of a variable to a value evalutes to TRUE. When more than one command is present, enclose them in a block (braces).
IF (EXPRESSION) Specifies the command(s) to perform if an expression evaluates to TRUE.
IFEXIST / FILEEXIST() Checks for the existence of a file or folder.
IFINSTRING / INSTR() Checks if a variable contains the specified string.
IFMSGBOX Checks which button was pushed by the user during the most recent MsgBox command.
IFWINACTIVE / IFWINNOTACTIVE Checks if the specified window exists and is currently active (foremost).
IFWINEXIST / IFWINNOTEXIST Checks if the specified window exists.
INPUTBOX Displays an input box to ask the user to enter a string.
LOOP (NORMAL) Perform a series of commands repeatedly: either the specified number of times or until break is encountered.
LOOP (READ FILE CONTENTS) Retrieves the lines in a text file, one at a time (performs better than FileReadLine).
MENU Creates, deletes, modifies and displays menus and menu items. Changes the tray icon and its tooltip. Controls whether the main window of a compiled script can be opened.
MOUSEGETPOS Retrieves the current position of the mouse cursor, and optionally which window and control it is hovering over.
MSGBOX Displays the specified text in a small window containing one or more buttons (such as Yes and No).
RETURN Returns from a subroutine to which execution had previously jumped via function-call, Gosub, Hotkey activation, GroupActivate, or other means.
RUN Runs an external program.
RUNWAIT Runs an external program and waits until it finishes.
SEND / SENDRAW / SENDINPUT / SENDPLAY Sends simulated keystrokes and mouse clicks to the active window.
SENDMODE Makes Send synonymous with SendInput or SendPlay rather than the default (SendEvent). Also makes Click and MouseMove/Click/Drag use the specified method.
SETTIMER Causes a subroutine to be launched automatically and repeatedly at a specified time interval.
SETTITLEMATCHMODE Sets the matching behavior of the WinTitle parameter in commands such as WinWait.
SETWINDELAY Sets the delay that will occur after each windowing command, such as WinActivate.
SLEEP Waits the specified amount of time before continuing.
SPLITPATH Separates a file name or URL into its name, directory, extension, and drive.
STRINGGETPOS / INSTR() Retrieves the position of the specified substring within a string.
STRINGLEN / STRLEN() Retrieves the count of how many characters are in a string.
STRINGMID / SUBSTR() Retrieves one or more characters from the specified position in a string.
STRINGREPLACE Replaces the specified substring with a new string.
VAR = VALUE Assigns the specified value to a variable.
VAR := EXPRESSION Evaluates an expression and stores the result in a variable.
WHILE-LOOP Performs a series of commands repeatedly until the specified expression evaluates to false.
WINACTIVATE Activates the specified window (makes it foremost).
WINCLOSE Closes the specified window.
WINGETTITLE Retrieves the title of the specified window.
WINHIDE Hides the specified window.
WINMAXIMIZE Enlarges the specified window to its maximum size.
WINMINIMIZE Collapses the specified window into a button on the task bar.
WINMOVE Changes the position and/or size of the specified window.
WINWAIT Waits until the specified window exists.
WINWAITACTIVE Waits until the specified window is active.
WINWAITCLOSE Waits until the specified window does not exist.
WINWAITNOTACTIVE Waits until the specified window is not active.

HOW TO:

Bring your images to life with PhotoDirector

DARIEN GRAHAM-SMITH INTRODUCES THE POWERFUL PHOTO MANAGEMENT AND PROCESSING SOFTWARE

CyberLink PhotoDirector 4 is a powerful, do-it-all tool for photographers of all levels. So, whether you're snapping away on a smartphone or producing raw files from a high-end DSLR, PhotoDirector can handle every stage of the process – from importing and usefully organising your images to correcting the exposure, making creative edits and simply sharing your finished product onscreen or in print.

IMPORTING YOUR IMAGES

When you open PhotoDirector for the first timeyou'll see a grey, mostly empty interface. This is the Library module, from which you can browse and organise your images: it's empty because you haven't imported anything yet. Along the top you'll see links to the other modules – Adjustment, Edit, Slideshow and Print – but we'll come to those shortly.

To bring your photos into PhotoDirector, click the Import button at the bottom left of the Library module. If you select "From Camera" from the menu that appears, the Photo Import requester will open and you'll be invited to select a connected camera, phone or card reader. PhotoDirector will scan the device and display thumbnails of all the images it finds – JPEG, TIFF and raw files are all supported.

Note that you might need to tick "Include subfolders" to find them all, and you can simply untick any that you don't want to import.

You can specify where the images will be copied to at the top right of this window – by default they'll be sorted into folders according to their capture date – and below, in the Apply During Import pane, you can choose to enter copyright information and tags that will be automatically embedded in every imported image. At this stage, you can also choose to have an adjustment preset applied to every image (we'll discuss what this means later) and rename your images as you go.

If you want to work with photos that are already on your hard disk, select either Import | Photos to pick individual files, or Import | Folder to select a batch of images at once. The Import dialog will open as before, but at the top right you'll see the additional option to "Keep in current location", so you don't need to duplicate these images into your main library if you don't want to.

> **"It can do everything from organising, to creative edits and sharing finished images"**

THE LIBRARY MODULE

Once you've imported some pictures into PhotoDirector, you can use the Library module to browse and choose which ones you want to edit or export. By default, thumbnails of all the images you've just imported will appear at the bottom, but in the Smart Collection panel at the top left you can opt to see All Photos.

You can also choose to view only images with certain tags or ratings. Freshly imported photos won't have ratings, but you can apply a star rating to an image by clicking the dots below the main view, or by right-clicking on a thumbnail in the browser and choosing a rating from the Rate submenu.

Alternatively, you can simply "flag" the images that you want to work on, and mark as "rejected" all those that you don't want to keep. You can do this in the same way as applying a rating, using either the flag icons below the main view or the Mark As submenu.

There are several ways to view your library. Above the main image view, you'll see buttons to choose a bigger view with the thumbnail strip hidden, or a grid-only view. You can also click to view the selected image in full-screen mode, or to show your selected image on a secondary display.

The icons below the main view let you switch to Comparison mode, which shows two images side by side (so you can choose which you prefer), or Multiple mode to view several images at once. Below that, a row of icons enables you to choose whether to view the thumbnail browser as a strip of images or a more detailed list.

Towards the bottom right of the window there are options to tag faces (*see Tagging faces, left*), to export selected images in a suitable format for sharing, and to upload images directly to Facebook or Flickr.

We'll talk more about these options later, since before exporting or sharing your images you'll probably want to process them in the Adjustment module.

THE ADJUSTMENT MODULE

When you switch to the Adjustment module (by clicking its link at the top of the screen), the browser remains at the bottom of the window, and the selected image fills the centre pane. At the left you'll see a histogram of your image, indicating the overall balance of

TAGGING FACES

One particularly handy feature of PhotoDirector is the option to automatically detect faces, and therefore easily tag your photos according to who's in them. To start using this feature, first select one or more images, then click the Tag Faces button at the right of the thumbnail browser – or right-click and select Tag Faces – to have PhotoDirector find all the faces it can. Depending on how many images you have to analyse, this could take up to a few minutes to complete.

Once done, you'll see a window showing all the different faces that PhotoDirector has identified. Click Select to enter a new name for a group of faces, or – once PhotoDirector has learnt a few names – simply click on a name to identify a face.

After you've done this a few times, PhotoDirector gets pretty good at recognising people, so the first name in the list will normally be correct. You can then filter your photos by who's in them, and if you upload a photo to Facebook using the "Share..." button, it will be automatically tagged with the names of its subjects, although these won't connect to their Facebook accounts.

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CHERRY

THE EDIT MODULE

PhotoDirector's Edit module brings together a varied selection of picture-editing tools. At the top of the pane you'll find tools for working with portraits, including whitening teeth, airbrushing skin and even patching over wrinkles. The results aren't always entirely realistic – the Body Shaper tool has a tendency toward the grotesque – but with care it's possible to make specific improvements as needed.

Under Effects you'll find a selection of photo effects for selectively tinting or blurring areas of your image. The Object Removal tools let you create a Smart Patch to cover up part of an image with a texture based on a different region – or use Content Aware Removal to paint over unwanted elements and let PhotoDirector fill in the gap automatically. This works well in simple images, but less reliably when complicated shapes and lighting are involved.

The remaining tools let you snip away the background of an image, or to overlay a logo or second image onto the picture. Finally you'll find a watermark creator that you can use to produce a standard overlay, to be optionally "stamped" onto your images as you export them – very useful if you expect your pictures to be shared far and wide and need to reinforce your ownership of them.

▲ PhotoDirector's Edit module helps you to apply artistic effects

tones from dark to light in the selected image. Beneath this, under Global Adjustment Tools, you'll find a large selection of tools and sliders.

To get a taste of what these sliders can do, pick a drab photo and click the "magic wand" icon at the top of the Tone section: the colours will instantly brighten, and the overall picture should look clearer and more appealing.

PhotoDirector can guess at the correct colour balance too. To try this out, change the White Balance dropdown at the top of the section from As Shot to Auto. To directly compare the result with the original settings, click the Compare icon beneath the image (it looks like two adjacent pages).

Click the icon to its left when you're ready to go back to the regular view.

MANUAL ADJUSTMENTS

Although PhotoDirector's automatic settings are pretty powerful, you may want to tweak the results to get the exact effect you want. You can adjust the white balance by dragging the blue/yellow and green/magenta Temperature and Tint sliders. Alternatively, you can click on the eye-dropper tool next to the sliders, then on a part of your picture that you want to be a neutral grey. PhotoDirector will automatically adjust the white balance controls to suit, but if you're not happy with the outcome you can simply repeat the process and click somewhere else – or click the Reset button in the White Balance section header to revert to the default settings.

Beneath this, the sliders in the Tone section let you tweak the overall exposure and contrast of the image, and selectively brighten or darken specific tones – you can play with these to get a feel for how each one affects the image. When it comes to major adjustments, you'll tend to achieve cleaner results with raw files than JPEGs, because JPEG compression deliberately discards subtleties that are lost in the shadows or in bright areas to save file space.

Found under Tinge, the Vibrance and Saturation sliders both boost colours. Saturation is a blanket effect, whereas Vibrance targets strong colours, having a lesser effect on subtle ones (such as flesh tones). Clarity applies local contrast enhancement that makes images look sharper and crisp – the best way to understand its effect is to experiment with it.

Once you've found a setting you like, you can apply it to multiple photos by clicking the "Copy..." button at the bottom of the left-hand pane, then selecting at least one other photo and clicking "Paste". If you want to try out several different Adjustment treatments, right-click the image and select Create Virtual Photo to create a second copy of the image, editable independently from the first. Here the image itself isn't duplicated – the program simply creates a second set of Adjustment data.

OTHER ADJUSTMENT CONTROLS

You can do an awful lot with the Basic settings, and if you scroll down you'll find even more controls. HDR Effect lets you apply brightening (Glow) and sharpening (Edge) to create a faux high-dynamic-range appearance. Level and Curve options let you refine the colouring and shading of your image, while HSL/Color settings brighten or adjust colours.

The Detail options can be helpful for cleaning up images shot in low light: it offers both sharpening and noise reduction, which can improve images that appear soft or speckly.

Finally, under Correction, you can fix any distortion and compensate for Chromatic Aberration – that is, unwanted colour fringing around the edges of objects. You can also apply a vignetting effect.

Once you're happy with your settings, you may wish to save them as a preset, so you can apply them to

other images with a single click. To do this, press the "Create..." button at the bottom of the Adjustment settings panel. In the window that opens, choose which settings will be saved, and give your preset a name. In future, you can apply these settings to any image by simply switching to the Presets tab in the Adjustment module and clicking on the preset name. You can also tick "Apply preset" in the Library module's Apply During Import settings to apply your preset to a whole batch of images as soon as they're copied onto your hard disk.

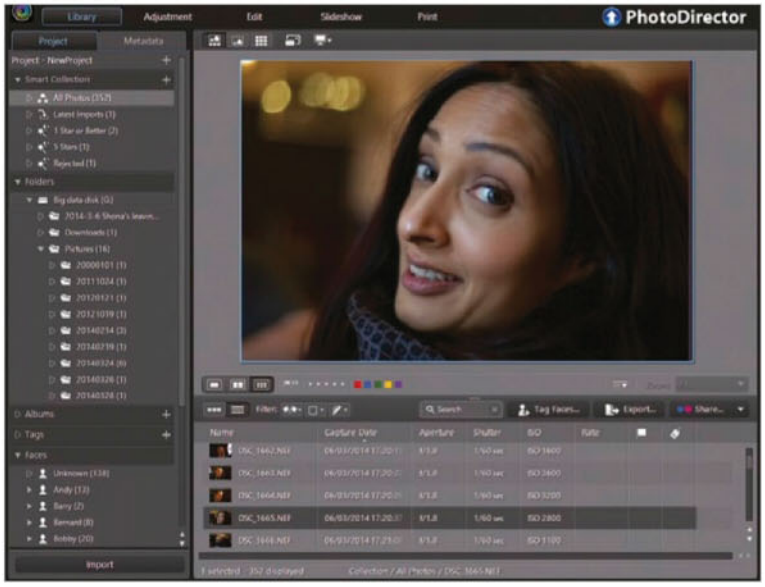
DEVELOPING TOOLS

Even professionals need to touch things up from time to time, and there's plenty of options here. In the Adjustment module, directly below the histogram, you'll find a set of Regional Adjustment Tools that can be used to tidy up particular areas of your image. The first, which looks similar to a set square, is the Crop tool. When you initially click on it, an overlay appears on your image – you simply drag from the corners to adjust the framing. A contextual pane below the toolbar then allows you to set the aspect ratio of the frame, and to adjust its angle. Click Done below the image when you're happy with the result.

The second tool is Spot Removal, which removes blotches or small, unwanted elements from a scene. To use it, click its icon, set the tool to the desired size using the sliders, and then simply click over the area that you want to clean up. PhotoDirector will look for a similar part of the image nearby and uses that as a template to "heal" the selected area.

If the results don't look right to you, manually drag the healing source elsewhere, or else switch over to Clone mode, which duplicates another part of the picture. Drag up the feather slider to soften the edges of the patched area. You can create as many spot-removal areas as you like.

If you need to remove one, click on its edge, right-click on the grey circle that indicates its location, and press the Delete key.



▶ The Library module helps you browse and organise your images

> **"With major adjustments, you'll achieve cleaner results with raw files than JPEGs"**

The third tool, Red-Eye Correction, is simple to use. Click in the middle of your subject's eye and drag outwards to cover the red area of their eye – PhotoDirector will then fix the problem automatically. If needed, you can adjust the pupil size and the darkening factor from the contextual pane itself.

▼ The comparison view lets you see the effect of your adjustments on the original image

The next tool, the Adjustment Brush, is one of PhotoDirector's most powerful features. It lets you apply adjustments to the tone and colour of selected areas of an image by simply painting on to the photo. To use it, click on its icon, then adjust the sliders below – for example, you might pull down the Exposure slider and push the colour temperature towards the yellow end of the spectrum.

The Brush settings adjust the size and hardness of the brush (hold down Alt to erase areas that you've previously painted over). If you tick Fit To Edges, then PhotoDirector will try to intelligently follow edges in the image to help you paint only the areas that you want to adjust. You can also switch to the next tool along, Adjustment Selection, which tries to intelligently select similarly coloured areas for adjustment based on where you click and drag.

The last tool – Graduated Mask – allows you to produce smooth exposure gradients and similar effects across an image. A common use for this is to darken a sky that's too bright. To do this, simply activate the Graduated Filter tool and drag a line downwards from the top of your photo to the horizon. Then, in the contextual pane set to the right, pull the Exposure offset slider down to -1.00. You'll then see the full darkening effect at the top of the frame, then smoothly dropping away towards the middle of the picture.

SHARING YOUR PHOTOS

Everything that happens in PhotoDirector is non-destructive, meaning that when you apply edits and adjustments, the original image

remains untouched. If you want to share what you've produced, you'll need to export your processed image as a new file – or you can upload or print it directly from PhotoDirector.

Exporting images is easily done: in every module except Slideshow you'll see an Export button at the right of the thumbnail browser. Select one or more photos, then click this and you'll be prompted to specify a destination, and offered additional useful options such as image resizing and watermarking. Click Export when you're ready and the job's done.

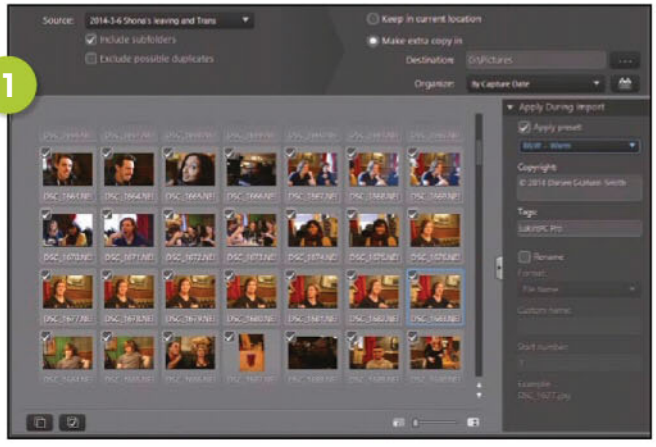
The "Share..." button works in a similar way. Click the dropdown arrow to choose either Flickr or Facebook, then click to upload your images. If you haven't already done so, you'll be prompted to authorise PhotoDirector to upload to these services on your behalf. Once that's done, you can choose to upload your images to a new or existing album, and set options such as watermarking before hitting Upload to complete the process.

If you want to share a sequence of images, it's also possible to turn them into a video slideshow. First, click on the Slideshow module, then drag your chosen images into the main view area. Use the text and colour board tools at the bottom of the window to add captions and backgrounds, and edit the options at the left to change the transitions and timing of the slideshow. Click the play button to preview your images and then – when you're happy with the results – clicking the "Produce..." button will allow you to export the slideshow to a variety of popular video formats and resolutions. Alternatively, you can click the "Share..." button to upload it directly to YouTube.

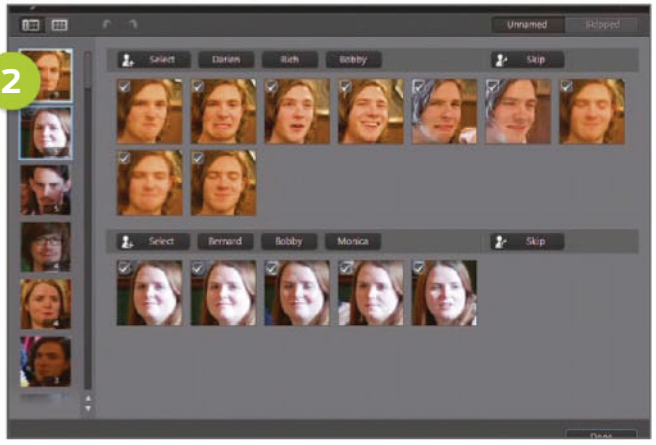
The final module is Print, which helps you to output your images to a local printer. You can arrange multiple images into a grid – simply drag them from the browser into the spaces shown on the template, or reduce the grid down to 1 x 1 and fill the page with a single image.

Inevitably, on these pages we haven't covered every capability of PhotoDirector. There are plenty more convenient and time-saving features to be found. If you see a button or control that looks interesting, try hovering the mouse over it – in most cases a handy tooltip will appear with an explanation of what it does. ■

WALKTHROUGH Importing, processing and exporting photos in PhotoDirector

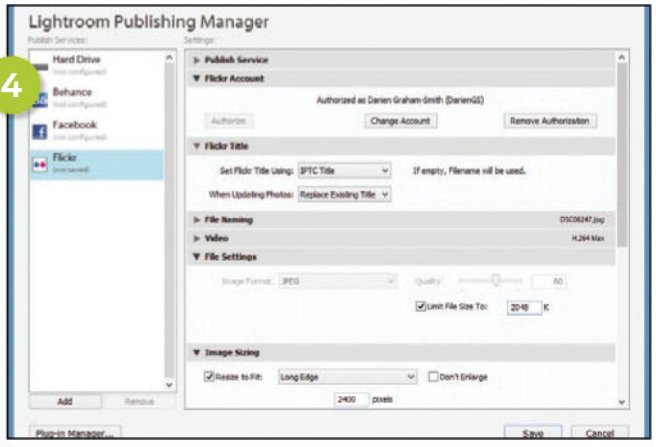


▲ While importing a batch of images, you can use the Apply During Import settings to apply a specified processing preset as a starting point. We've also set up some preset metadata to be added, and tags for this session. By default, PhotoDirector will sort our images into dated folders as part of the import process..



▲ Once all of our images are in place, PhotoDirector can scan them for faces. At first you'll have to manually tell it who everyone is, but as the program learns, this quickly becomes an almost automatic process. We can then filter our photos according to who's in them using the Faces panel on the left..

▲ The Adjustment module allows us to tweak the exposure, contrast and other settings until we're happy with the results. The Copy and Paste buttons make it easy to apply the same settings to multiple images – and before trying experimental edits we can right-click and create a Virtual Photo as a backup..



▲ When we're happy with all the photos we've edited, we can step back to the Library module and upload them all in one go to Facebook or Flickr. Click "Set Up..." to set up your credentials and preferences for sharing with these services – or, for importing them to your hard disk, ready to be emailed to friends..

OneNote set free

SIMON JONES LOOKS AT THE INTRIGUING EARLY DEVELOPMENTS THAT HAVE COME FROM THE RELEASE OF THE ONENOTE API – AND WHAT COULD BE NEXT

I've often said in this column that OneNote is one of my favourite applications. Its free-form approach allows me to gather and organise my thoughts, research and notes without any of the constraints imposed by other more structured applications such as Word, Excel and database managers, whose fixed formats tend to get in the way of free thinking.

OneNote does have a distinction between notebooks, sections and pages, but you can write, draw and paste anywhere you want within those units. Put simply, if you need to jot something in the corner of a page, you simply click and type. And if you're running OneNote on a tablet with a stylus, you can even handwrite your notes, and later turn them into typewritten text with a single click.

OneNote's range of availability has grown over the years since it was first released as part of the top-of-the-range editions of Office 2003. Microsoft has gradually included the application in more editions of Office, but I'm still amazed that so many people who have Office 2013 say they don't know anything about OneNote. Microsoft has also released cut-down, mobile versions of OneNote for Windows Phone, Android phones and iOS. These versions can sync with notebooks held in OneDrive or SharePoint, so that you always have access to them on any device.

> I'm still amazed so many people with Office 2013 say they don't know OneNote

There's even a touch-centric version available for Windows 8 tablets, as well as the browser-based OneNote Online, which is available free for anyone to use alongside the OneDrive cloud storage. Microsoft recently announced new versions for Mac and one for Windows PCs, both of which are free.

The free Mac and PC versions don't include all of the features of the paid-for versions you get with Office 2013 – they're not as severely limited as the web-based or mobile versions, but they do insist on storing your notebooks in OneDrive. There's also a licensing restriction that says these free versions should be used only for "personal or school use". Microsoft has also announced a new OneNote API that developers can use to integrate their own applications and devices with OneNote, and several companies are already using this.

ONENOTE AVAILABILITY BY PLATFORM

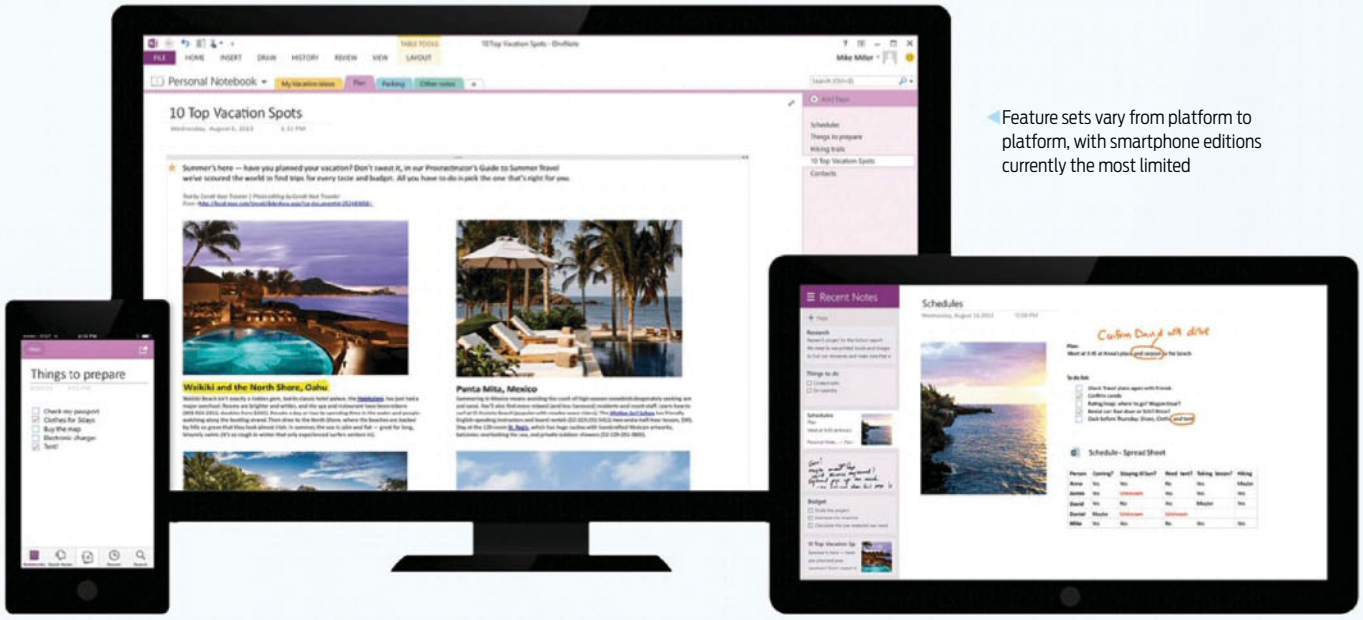
Of the major platforms, only Android tablets aren't currently covered. The smartphone editions are the most limited, and not merely by the small screen size, but they will sync with and display most Notebooks created with more powerful versions. OneNote Online, the web-based edition, has more features than the phone editions, but won't allow you to use ink or record audio. The tablet edition for Windows 8 – OneNote MX – has an interesting floating radial menu system, through which you can access common functions without sacrificing screen real estate to the ribbon interface. Only the premium edition available in a full Office 2013 suite provides all the features.

KEY FEATURES MISSING FROM FREE ONENOTE FOR MAC AND WINDOWS

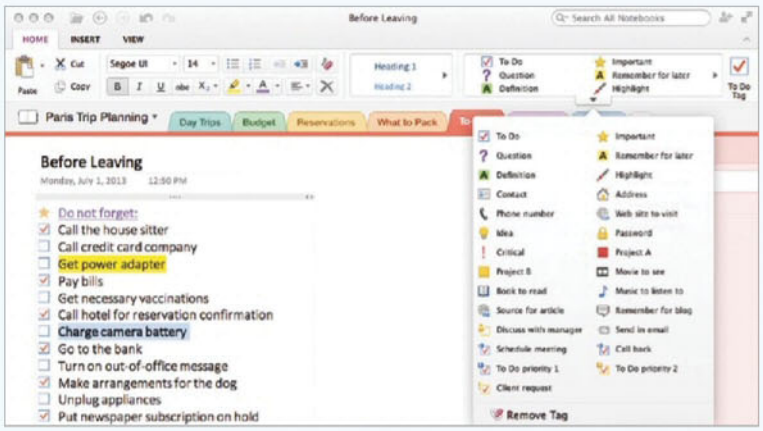
The ability to save notebooks to a local drive only.

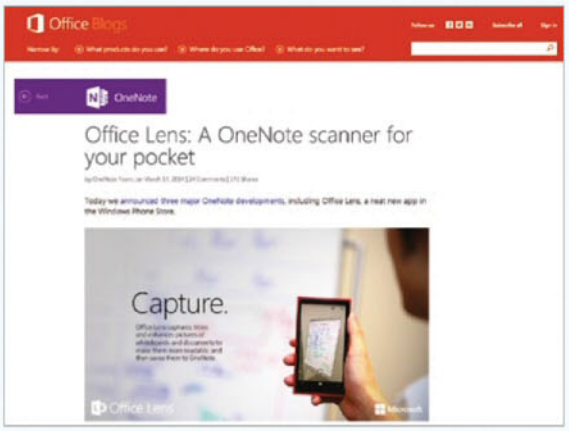
- Printing to OneNote from other applications.
- SharePoint support.
- Integration with Outlook.
- Recording audio and video.
- Password-protected notebooks.
- A business-use licence.

The Mac version of OneNote is still a little, well, "unfinished"



Feature sets vary from platform to platform, with smartphone editions currently the most limited





in places. It has no custom tags, and no access to Office 365 for example, although that is likely to be rectified over time. It's also compatible only with OS X 10.9 (Mavericks). The icons and organisation of the ribbon buttons in OneNote for Mac are far closer to OneNote 2013 for Windows than to any other Office for Mac application, which may be a clue to the look of Office for Mac 2014 when it sees the light of day. Making the Windows and Mac Office products more similar has to be a good thing, as having the Mac version reinvent all the icons and add strange Mac-only UI elements always seemed a waste of time and a barrier to interoperability.

▲ LEFT: Free versions of OneNote require users to store their notebooks in OneDrive
RIGHT: Office Lens can capture pictures of whiteboards in seconds – a great tool for meetings

NEW APPS AND SERVICES

The new OneNote API forms a bridge between third-party applications and OneNote, making use of Microsoft's public cloud services and OneDrive. This employs the OAuth protocol to verify the user's login information for their Microsoft account before it pushes information into OneNote. An application can send text, images, links to web pages, and embedded objects to OneNote, and any images are run through an optical-character-recognition (OCR) engine on the fly so that text within the images becomes searchable content inside OneNote (the text isn't shown, but it is searchable).

Microsoft has released several new apps and services that use this API to demonstrate its usefulness, and some third-party companies have also made use of it to bring new capabilities to their applications. The best offering from Microsoft so far has to be Office Lens, an app for Windows Phone that snaps pictures of whiteboards, receipts, business cards, paper notes and other text objects, automatically de-skews the photographic image and uploads it to OneNote. This works brilliantly from just about any angle, and is a fantastic tool for capturing valuable information quickly – it recognises the outline of the object it's seeing, frames it on screen so you can tell when it has it right, and, when you press the button, it crops and transforms the image to make it rectangular, as though you'd been holding your phone perpendicular to the centre of the object. It even removes glare from whiteboards. When the collective wisdom of your meeting is all written up there on the whiteboard, but you only have ten seconds to get out because the next people need the conference room, this app could be a real life-saver. Not only can you capture the meeting notes in a couple of seconds, they'll in your OneNote notebook before you're even back at your desk.

The development team say they're now working on handwriting recognition from photographs, so that your whiteboard or paper note images will become searchable just as if you'd scribbled them in OneNote in the first place. (Incidentally, if you have an Android phone, iPhone or iPad, you can use Genius Scan to do much the same thing, since its paid-for version now integrates to OneNote in much the same way – see **www.thegrizzlylabs.com**.)

Another interesting Microsoft offering is Clipper (**www.onenote.com/clipper**), which adds a bookmark to any of the major browsers. It sends a copy of the page you're on – along with a link to it – to OneNote. There's always been a Send To OneNote add-in for Internet Explorer, but Clipper adds similar features to Firefox, Chrome and Safari browsers.

One Microsoft service that I'm a bit wary of is the ability for OneNote to accept email. The theory behind this is that any application that can send email can also send data into your OneNote notebooks simply by addressing it to me@onenote.com. The From address, being your own, will direct the message to your OneNote notebook. In practice, text and attachments seem to arrive fine, but my concern here is security. The From address of an email is notoriously easy to spoof and spammers do it all the time.

To be fair, you do have to opt in to this service by telling OneNote to allow email to be sent from yourself – and I'm sure that Microsoft has put in all the spam protection it can think of. However, I'd still be slightly worried in the long run that some ingenious and enterprising scammer might find a way to start bombarding the me@onenote.com address with mail "From" their target mailing list, advertising all manner of things that I don't usually want.

News readers such as Feedly, News360 and Weave are also implementing the OneNote Service to allow their users to save articles directly into OneNote. So, if you're reading an interesting article that you want to keep, you can simply click the OneNote button in the news reader and it will be pushed into OneNote for you. You have to sign in to OneNote with your Microsoft account the first time you use this service, but the connection is remembered for you after that. Yes, you could select and copy the article, switch to OneNote, create a new page and paste to get the same result, but clicking one button is obviously much easier.

Compact or handheld scanners

SIMON JONES
An independent IT consultant specialising in Office Automation, Visual Basic and SQL Server.

	OFFICE 2013			OFFICE 365	
	Home & Student	Home & Business	Professional	Personal	Home
Price	$169	$299	$599	$89 per year	$119
Licences	1 computer	1 computer	1 computer	1 user/2 devices	5 users/5 devices
Word	✓	✓	✓	✓	✓
Excel	✓	✓	✓	✓	✓
PowerPoint	✓	✓	✓	✓	✓
OneNote	✓	✓	✓	✓	✓
Outlook	✗	✓	✓	✓	✓
Access	✗	✗	✓	✓	✓
Publisher	✗	✗	✓	✓	✓
OneDrive storage	✗	✗	✗	+20GB	+20GB (per user)
Skype minutes	✗	✗	✗	60mins/month	60mins/month

are another great way to send information to OneNote - Doxie and Brother are just two of the manufacturers that have been quick to exploit the OneNote API to allow their scanners to push scanned documents in that direction. Doxie (**www.getdoxie.com**) uses its scanning app on your PC to manage the transfer, while Brother's ADS-1500W scanner uses its own Wi-Fi connection to scan pages directly into OneNote. Epson and others are also reportedly working on this technology.

Alternatively, if you still prefer writing your notes using good old-fashioned pen and paper, Livescribe (**www.livescribe.com**) makes a pen that connects to your phone and uses that to collect all of your handwritten notes and push them into OneNote. It employs special paper printed with very small dots that enable a camera in the pen tip to work out where you're writing on the page - you can either buy special notebooks or print your own using a laser printer.

Meanwhile, if you don't want to use a special pen and paper such as Livescribe, Mod (**http://modnotebooks.com**) is a plain-paper notebook that you send back to the manufacturer when it's full; they then scan every page and upload it to OneNote for you. You can use any kind of pen or pencil to draw or write in a Mod notebook, and the purchase price includes both the return postage and the scanning service - the return envelope is inside the back cover. You can even choose whether your paper notebook is recycled or returned to you. This service is great for creative types such as graphic artists or architects who need something physical they can scribble and draw in, but also want to preserve their thoughts in searchable digital form.

OneNote's rivals Evernote and Simplenote are good, but they just can't compete with the flexibility of OneNote. Simplenote isn't available on the Windows platform and Evernote forces to structure your data far more rigidly - you can't just click anywhere and type, for instance. Evernote is also a little stingy about the amount of storage it gives you for free - add a few photographs and you can run up against the monthly data-transfer limit quite quickly. You also need to be online on Evernote's servers to use the application, unless you pay for the premium service. In addition, neither of these rivals has the Microsoft product's digital-ink capabilities. For all things OneNote, including the new free versions and all the add-on apps, go to **www.onenote.com**.

> I'm wary of OneNote's ability to accept email - a scammer could find a way to exploit it

OFFICE 365 PERSONAL

While millions of home users have switched from buying Office outright to an Office 365 Home subscription, this offering hasn't been right for some people. At $12 per month from Microsoft, some people still don't see the value - particularly if they can't make use of all five licences that a Home Premium subscription comes with. So Microsoft has announced a new Office 365 Personal subscription, which gives one person a licence to install Office 2013 on a single PC or Mac and one tablet, and will cost $9 per month. You'll still get 60 minutes of Skype calls per month and 20GB of OneDrive storage, as well as hosted email as part of the package.

You should also remember that Office 365 Home (Microsoft is dropping the word Premium from this offering) and Office 365 Personal include all of the Office applications - not only Word, Excel, PowerPoint and OneNote as you'd get with Office 2013 Home & Student. Office 365 Personal subscriptions should be available later this spring. ■

Livescribe Smartpens collect handwritten notes and push them into OneNote

ONETASTIC

If you want to do even more with OneNote, get the Onetastic add-on (**http://omeratay.com/onetastic**) for custom text styles, image utilities – such as crop, rotate and flip – a calendar of your notes, and macros to automate common tasks.

DVD CONTENTS

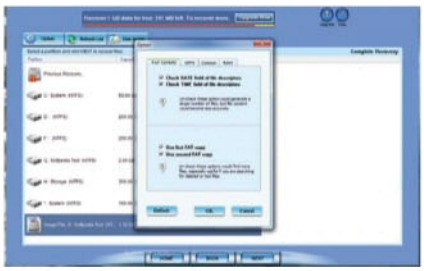
APPS, ESSENTIALS, FULL SOFTWARE, DRIVERS & MORE!

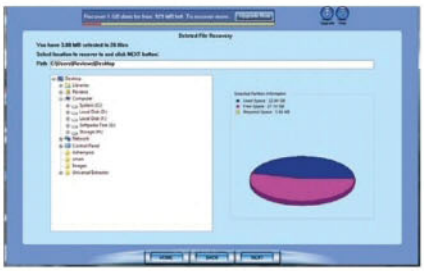
There is a healthy collection of very useful tools and utilities, this month.

Ashampoo Photo Card is a wonderful app that lets you create personal and beautiful cards. Give it a whirl and surprise someone special with an everlasting memory.

We have also included two lifesaving apps – Data Recovery Wizard and Glary Utilities Pro. Both will serve you and your system well, recovering files, deleting those which take up space and aren't used any more, plus a suite of troubleshooting tools – ones that fix what they find!

Have a bit of fun with YouTube Song Downloader and build your media collection!





Data Recovery Wizard Free

EaseUS Data Recovery Wizard Free will solve all data loss problems - recover files emptied from Recycle Bin, or lost due to software crash, formatted or damaged hard drive, virus attack, lost partition and other unknown reasons. Moreover, it can recover data from formatted partitions with original file names and storage paths back.

Ashampoo Photo Card

Ashampoo Photo Card is the intuitive and straightforward solution to turn your photos into stunning greeting cards complete with borders and texts in a few clicks. Show someone you care and send your own custom-made greeting card.

Anyone can do it:
With Ashampoo Photo Card, turning photos into greeting cards becomes a simple point and click operation: select photo or take webcam snapshot, select theme, edit text, send card.

Themes are included:
No matter what the occasion, Ashampoo Photo Card comes with various themes to simply convey thanks or express any feeling in style. And the integrated clipart library helps you add additional subtlety.

Fine-tuning is built in:
Adjust size, brightness, contrast and saturation settings or mirror and flip your photos, all right from within Ashampoo Photo Card.

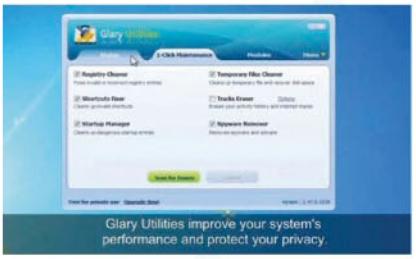
Share, email or modify:
Ashampoo Photo Card gives you several options to share your cards with friends and family. Upload them to Ashampoo Web, share them on Facebook and Picasa or simply email them. Naturally, you can also save your work to disk and make adjustments at a later time.

Glary Utilities Pro 4.7

Automated and all-in-one PC care service with Registry Fix, Privacy Protection, System Cleaning and mored.

Includes over 20+ system utilities to improve your computer performance.

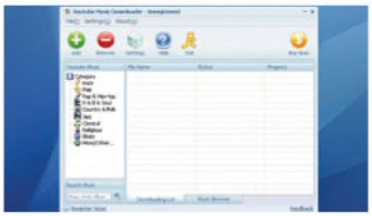
Scans and analyses your PC issues eight times more fast and thoroughly than before.



DID YOU KNOW?

You can find a guide to using ISO files in the Editorial section of the DVD

* Provides a one-stop solution for PC performance optimization
* Boosts PC speed and fixes frustrating errors, crashes and freezes
* Features one-click functionality and easy, automated options
* Protects your privacy and makes your computer faster and cleaner



Youtube Song Downloader

Simply enter the artist or song title in the search box and you'll get great results from the YouTube portal. Afterwards, you can download the video or audio file.
The albums search helps you to find a complete album on YouTube.
The YouTube Song Downloader loads automatically the version with the best quality of each download.

Find music

Simply enter the artist or song title in the search box and you'll get great results from the YouTube portal. Afterwards, you can download the video or audio file.

Make your choice

The YouTube Song Downloader allows you to preview files immediately. Simply select an entry and click the play button to get things going...

Album search

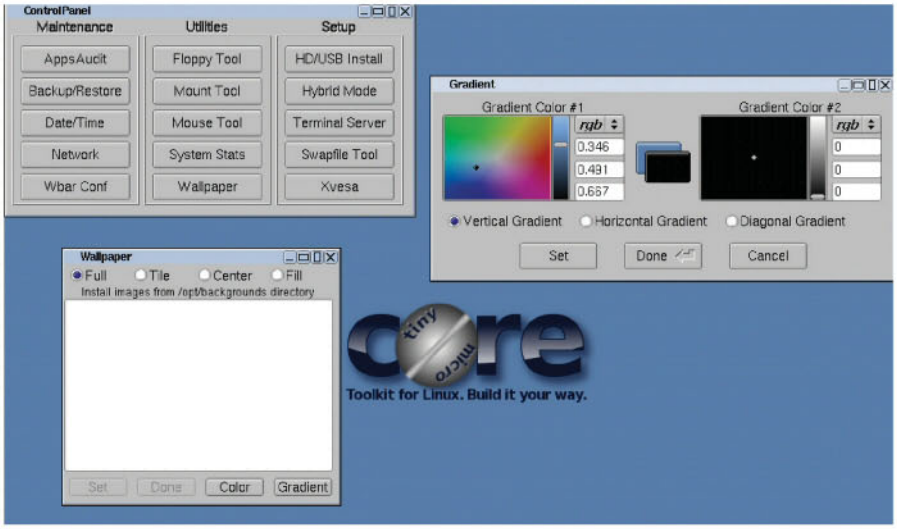
The Album search helps you to find each song of an album on YouTube. For that, you simply need to enter the artist name and select an album.

Keep an overview

The YouTube Song Downloader allows you to get a clean and informative overview about the download status at any time.

Formats

You can download music files in MP3 or OGG and videos is FLV, AVI or MP4.



Tiny Core Linux

The Core Project is a highly modular based system with community build extensions.

It starts with a recent Linux kernel, vmlinuz 3.0, and a 5MB core.gz. MicroCore 8MB is simply the kernel + core.gz - this is the foundation for user created desktops, servers, or appliances. TinyCore is simply the kernel + core.gz + Xvesa. tcz|Xorg.tcz + Xprogs +fltk-1.10.tcz + (user's choice of Window Manager) + wbar.tcz

TinyCore becomes simply an example of what the Core Project can produce, an 12MB FLTK/FLWM desktop.

CorePlus ofers a simple way to get started using the Core philosophy with its included community packaged extensions enabling easy embedded frugal or pendrive installation of the user's choice of supported desktop, while maintaining the Core principal of mounted extensions with full package management.

It is not a complete desktop nor is all hardware completely supported. It represents only the core needed to boot into a very minimal X desktop typically with wired internet access.

The user has complete control over which applications and/or additional hardware to have supported, be it for a desktop, a netbook, an appliance, or server, selectable by the user by installing additional applications from online repositories, or easily compiling most anything you desire using tools provided.

PC & TECH AUTHORITY

DVD CONTENTS

No 200 / JULY 2014

WINDOWS: MALWAREBYTES' A/M + VLC MEDIA PLAYER + APPLE ITUNES + CCLEANER + CUTEPDF + DEFRAGGLER + DEEPBURNER + FOXIT READER + SANDBOXIE + SPYBOT S&D + WINRAR + WINZIP + 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:** TINY CORE LINUX **FEATURES** ASHAMPOO PHOTO CARD + DATA RECOVERY WIZARD + GLARY UTILITIES PRO 4.7 + YOUTUBE SONGDOWNLOADER **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

FOLDERS TO DRIVES, DRIVES TO FOLDERS

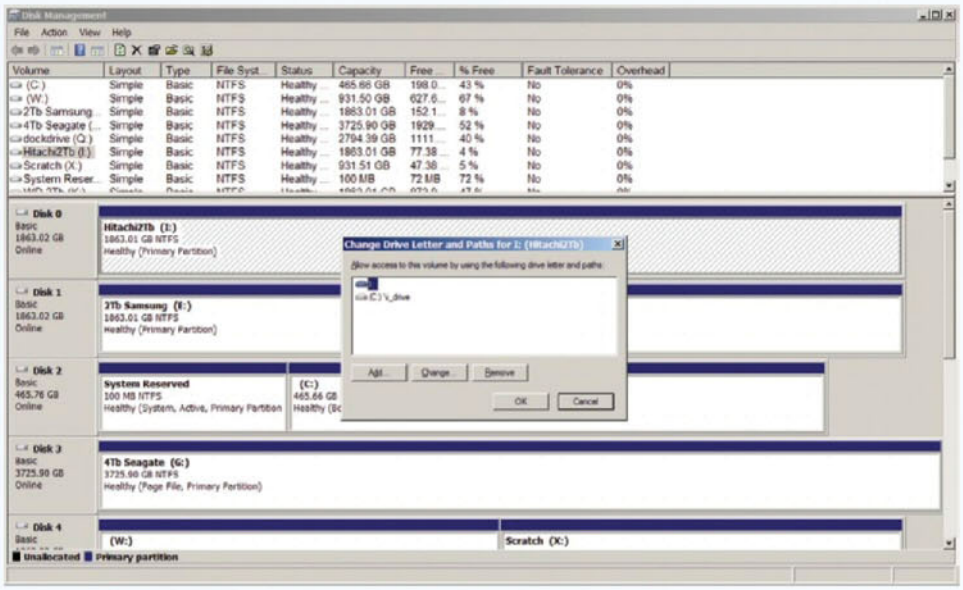
I You recently told a letter-writer how to "mount" a folder as a drive in Windows. Can you do it the other way around - mount a drive as a folder? So there'd be, like, a folder c:\fdrive, which when you open it gives you the contents of F:\?

Den Bryson

O Yes, you certainly can. In Disk Management you just right-click a drive and select "Change Drive Letter and Paths". You can give one drive as many letters and folder-paths as you like. The only limitation is that any folder you want to map a drive to has to be empty. So you can't have the contents of multiple drives all visible in the one folder.

(I can think of situations where having multiple drives appear in one folder could be handy, but Bad Things could happen if the drives contained any files with the same names. You can have multiple drives all as subdirectories of one folder, though.)

The "JOIN" and "ASSIGN" DOS commands let you do things like this from the command line, but they haven't come as standard equipment for several Microsoft OS generations. They may do something peculiar on modern Windows versions.



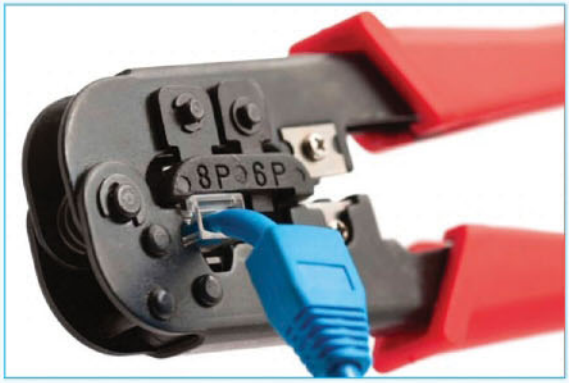
Too many drive letters? Turn 'em into folders!

MELT VERSUS SQUISH

I After about the hundredth time you mentioned how useful it is to know how to solder, I bought a butane gas soldering iron at Aldi. And, as you've said in the past, I looked at online tutorials and practised on some bits of wire until I had the basic idea, then fixed a fractured plugpack cable and added outputs to my PSU, and made my own test leads. I finished impressing myself by replacing the mangled USB cord of a mouse with the cord from an older, deader one!

A lot of connectors inside a PC seem to be crimped on. Is crimping better? Is crimping AND soldering better still?

Sarah Byrne



It may be possible to solder Ethernet connectors on. Please don't try it.

O A crimp, for those readers not wise in the ways of electrical connectors, is a mechanical joint in which the wire goes into some kind of hole in the connector, and the hole is then squished onto the wire, holding it firmly. Crimps, not soldered connections, are used in many PC connectors and cables, such as the plugs coming out of your PSU, and network cables.

A good crimp - which is to say, one done to a connector that's meant to be crimped, and preferably with a purpose-built crimping tool too, not just pliers - is both mechanically and electrically excellent. Adding solder to it doesn't give you better conductivity. Solder does, however, render the joint effectively immune to corrosion, which can be important for automotive and especially marine applications. On the other hand, soldered connections are more susceptible to mechanical damage over time, because solder doesn't like to bend.

If you're neither a good solderer nor a good crimper, though, crimping and then soldering ought to give you better connections.

POSSIBLY A VERY BORING HARRY POTTER SPELL

I A while ago you had a reader with "Unknown Contact" in their user account list, left over from an old Windows install. I've got a mystery user too, but mine is called "UpdatusUser", which sounds like the kind of thing you get from crappily-written malware from Eastern Europe.

Nothing seems to be broken and no virus checkers report any problems on my PC (which is running Windows 7 x64, though I think I remember seeing the same thing when I had a Vista machine a few years ago...). I'm wondering if you had any ideas?

Aidan G.

O Nvidia Update puts that one in there, for no tremendously persuasive reason.

Nvidia's current "GeForce Experience" software may have fixed this, even as it adds its own distinctive glitches and crashes. Uninstall the extra Nvidia stuff, and update your drivers manually, and it should go away.

THEY NO LONGER GO TO ELEVEN

I Back before the invention of dirt, or at least before the invention of the 486, I used to have a PC with some 82%-Sound-Blaster-compatible sound card in it, and a couple of old boom-box speakers plugged straight into the back of the computer.

The sound quality was pretty bad, but I had no complaints with the sound QUANTITY. The speakers didn't play as loud as they did when they were hooked onto the side of the ghetto blaster, but they were more than loud enough for games, even when I sat them far enough from the monitor that they didn't make the CRT go weird.

When I cleared out the garage I found those speakers, complete with the nasty sticky-taped cable adapter that teenage me had made to plug the speakers into the 1/8th inch socket on my old PseudoBlaster card. Just to see, I plugged them into the output socket of my current PC's onboard Realtek audio thing, and... well, there's sound, but it's really really quiet. That socket is OK with headphones, but not with speakers.

Why is this? Is it a conspiracy by companies that now make both sound cards and amplified speakers?

D. Waterfiel

O Many elderly sound cards can drive speakers to a decent volume, because they've got a beefy output amplifier. If you plugged low-impedance headphones into one of those cards and turned the volume up then you could damage the headphones, your ears, or both, but the up-side was that you could indeed plug ordinary speakers, or high-impedance headphones, straight into the back of the computer and get a decent result. There's a grey zone between "headphone level" and "speaker level" output, and those old cards were in it.

(Today, there are dedicated headphone amplifiers that have enough power to drive speakers to reasonable volume, too, but it's not a great idea to push that limit.)

Modern sound-card output levels are in a different grey zone, between "line level" and "headphone level". Line level is low voltage and low current capacity, meant to be used only to connect audio components together, not to drive any kind of output device.

Headphone level is another poorly-defined term - "more than line, less than speaker".

I/O OF THE MONTH

WAYWARD ELECTRONS

I Since my income is dependent on having access to a half-decent computer, I decided not to take any risks when moving to Indonesia. Everybody thought I was mad, but I managed to buy some suitable budget parts in Australia, throw it all into a spare case I had, boot it up and download everything in Oz, wrap it all up in bubble wrap and call it luggage on the plane. It survived the 3 flights that were required with only slight damage to the chassis, so I was happy.

I didn't buy a PSU in Australia though. I thought I may as well buy a local one that has the correct plug. I did this, and have discovered a problem that I haven't encountered in Australia before - the plug only has 2 pins, i.e. it's lacking the ground pin that's found on Australian plugs. Now every time I touch the chassis while the computer is turned on, it electrocutes me! Obviously not deadly since I'm still here, but it's like a sharp burning sensation that I could do without.

What are my options? Is this a common problem with computers in every country that only has a 2 pin power plug?

James Angley

O What you have there is called a "floating ground". It's a quite common electrical fault all over the world, not just in developing nations. It's usually not dangerous by itself.

The casing of your PSU, the casing of your PC, and all the ground conductors on the motherboard and everywhere else inside the PC, are all electrically connected to each other. They are *supposed* to also be electrically connected to the mains ground, via the power cord. With no mains ground, all of that bare metal is still connected, but the closest thing to a path to ground it has is the lousy electrical dissipation provided by your body when you touch it.

The reason why there's a bit of a tingle to be felt when you touch the computer casing - this phenomenon can also cause a distinctive "rough" feeling of smooth metal surfaces - is that in computers and other meant-to-be-earthed devices there are weak inductive, capacitive and/or through-the-insulation electrical links between energised conductors and the stuff that's meant to be earthed.

The current capacity of these various leaks is generally too small to be dangerous; think of it like a plumbing leak that only requires you to change the bucket under the drip once a week. Even if you hold onto a cold water pipe with one hand and slap the computer chassis with the other, you are unlikely to come anywhere near getting a dangerous current across your chest.

This doesn't mean you should ignore the problem, though, since now any further fault that gives a *high*-current path from active to chassis certainly could kill you instead of tripping a breaker/safety-switch. But it also doesn't mean the computer is a major danger... yet.

The Indonesian mains standard seems to have two different kinds of earthed plug to choose from, in addition to the un-earthed two-pin jobbie. So your best solution would be to sort out your possibly-terrifying building wiring and getting some proper earthed sockets. Second-best, and still not cheap, would be running the computer from an isolation transformer, so no circuit can exist between the computer's input power and ground. Third best, and cheapest, is to just bet that a live-to-chassis fault will not develop.

It probably won't.

And if it does, it probably won't actually kill you.

But now you can't say that nobody warned you!

You can run any size of speaker from a minuscule amplifier, as long as you don't turn it up too far and blow its tiny circuits.

Sentimental about XP?

STEVE CASSIDY ON WHY YOU NEED TO UPGRADE FROM MICROSOFT'S STALWART OS, AND THE MEMORY STOCK MUDDLE THAT SUPPLIERS NEED TO ADDRESS

Hello. You've been given this piece of paper because you've asked a techie friend about the end of Windows XP, most likely prompted by some worrying spam emails from computer support companies, or a slew of pop-up error messages on your trusty XP PC(s).

Your techie friend is giving you this paper article because those of you caught up in the misinformation blizzard that accompanies the demise of XP often exhibit tetchy, relationship-spoiling anxiety symptoms. This makes it much safer and infinitely more polite to address your concerns on paper than to embarrass you verbally, or to confuse you by spouting intimidating product names.

Here are the basic edited highlights. Yes indeed, XP has been good to us all. No, it didn't actually stop working on XP D-Day: it merely isn't being supported by Microsoft any more, so you won't see that stream of updates that have been needed to keep it secure (with limited success) against a still-rising flood of nightmarish malware. Unfortunately, a culture has arisen out there that denounces such updates as an imposition, or even an active nuisance: any PCs running within the sphere of influence of this stroppy faction are the malware predators' favourite prey, which is why the smarter techies are putting up so little resistance to the final extinction of XP. So yes, I am implying that your PC is most probably infected, but don't worry, because you're in the majority when it comes to XP and infections. On the bright side, it's quite likely that the evil Dark Web sorcerer to whom it became enslaved has long since moved on to a more promising target.

Trust me, we nerds understand how you feel about that machine you bought in 2004, and which has served you faithfully ever since. Faithfulness is an unusual virtue in the computer business – for almost the whole of the 1990s, and from 2000 to 2008, the dominant mindset was relentless progress via forced obsolescence. Many of us have been surprised at just how long a mid-noughties PC running XP has remained usable. Don't be ashamed to admit that the widely hated beige office computer has become something you now relate to with more than a tinge of sentimentality. A faithful XP PC that's been part of your business "through thick and thin" doesn't deserve to be tossed aside like a leaky fridge, as the marketing gurus would have had you do over the past couple of decades. It's been both a guardian and a participant in your work, in what you make and how you pay for it, not to mention in how your holiday snaps look. Not quite a faithful old dog, then, but certainly as emotionally charged as a cook's favourite knife or a wood-carver's chisel. Such attachment to a long-term active ingredient in your working life is quite natural, although it's equally natural for nerds to deride such sentiment and present you with stark, utilitarian reasons for having your faithful old friend finally put down.

Try not to be drawn into these emotional traps. It's that sort of thinking that gives the virus and malware spreaders an open door into your machines, and while you may not care very much about your own data – a surprisingly common attitude – bear in mind that every infected PC becomes a source of attack and infection for the next one. I'm afraid that we nerds talk about "attacks" and "threats" a lot, and many of the subjects that surround these misfortunes involve concepts and words that may offend you. That's just part of the malware author's stratagem for ensuring successful, long-lasting infection. Try not to over-react to the terminology we employ, because behind all that talk of "porno drive-bys", we're actually trying to further your best interests rather than accusing you of exotic sexual predilections.

Let me say it again: all is not lost with the ending of XP support. But you should no longer assume that you can casually replace like for like now the fatal day has passed. Even though end-of-support means only the end of updates, other things will also end: these will probably attract less comment, but have far more actual real world impact.

I'm thinking specifically about recovery partitions. Most of the laptops sold with XP weren't shipped with recovery CDs, as part of an early attempt to stop doing so. Some of these PCs encouraged you to burn your own CD using a supplied utility, while others contained a hidden hard disk "recovery partition" that could put you back to exactly square one if you felt something really terrible had happened. Normally, such a recovery partition simply fast-tracks the system setup process by supplying

STEVE CASSIDY
Steve mixes network technologies with human resources consultancy work

pre-cooked answers to the questions that setup traditionally asks of the machine's new owner – and usually questions that the process asks Microsoft, too, via the internet.

The end of XP will be followed – although nobody knows exactly when – by such recovery partitions ceasing to work, because the Microsoft end is no longer listening. Microsoft's XP "activation servers" will either go away or else start to refuse activation requests from some recovery processes. You can't test whether or not your machine's Certificate of Authenticity (COA) key – that long string of characters on the sticker (if it hasn't been completely eroded by friction, cosmic rays, tectonic shifts, coffee spills or other acts of God) – will be refused until you actually need to use it. This issue is actually the strongest motivator to do something technical about your much-loved old XP-running PC.

If it's really difficult to discard a PC entirely – and I've seen examples that run a building's air-con system, a CNC milling machine, or contain software that can never be re-licensed or reinstalled – then your techie will be directing you towards utilities that make a backup image of the entire drive of that PC. When considering such measures, it's important to make sure that the restoration process doesn't require you to have a working PC to restore to, which would fall foul of the recovery-partition/COA key gotcha. Personally I tend to use Paragon Hard Disk Manager or Acronis True Image for this job. Buying one of those is a far cheaper option than buying a new PC when you absolutely must protect an XP installation against disasters until the old software it delivers (or hardware it controls) can itself be upgraded.

And remember: don't entrust the crucial backup to a single external USB drive; ideally, you should do it to some kind of server, even if it's only a home NAS box. I certainly won't pretend that cloud backup services are suitable for entire hard disks, mainly because I can't see how the restore process can either be tested or trusted to work properly once it gets rolling. What cloud backup is good for is backing up your My Documents folders, which can then be restored to a different PC (running XP or not), once the terrible day dawns.

For nerds, a far more interesting idea is virtualisation. There are free tools to help you take an image of an old XP machine, and then run it as a virtual machine inside a player running in Windows 8.1 on a modern PC. This isn't quite as simple as I've perhaps made it sound – for once I'll skip over the nerdy details. But I must just point out that if you're going for this option, bear in mind that a freshly virtualised version of an old faithful XP PC will try to reactivate itself with Microsoft before settling down to a virtual life, so no activation servers means no luck. Make sure you do it sooner rather than later.

> Microsoft's XP activation servers will either go away, or else start to refuse requests

If you think you might be suffering separation anxiety about Old Shep, and you're unhappy about the prospect of learning to run his replacement, then you have at least one thing in common with the nerd who's giving you this to read. You should have heard the fuss we nerds made when Windows 8 first came out. At first it made people shaky and uncertain about trying the new-look operating system. However, interestingly, time has shown that while those such as I retain our overall hostility and catalogue of criticisms, regular folk like you can have fun annoying these nerds enormously by adapting readily to Windows 8.1.

Another curiosity is that if you're the type of small business that simply doesn't create that large a volume of data, then don't ignore the option of switching to the RT flavour of Windows 8.1. RT is a less adventurous, more power-efficient platform, currently available only on a small selection of tablet-style PCs. This is a bit of a pity when you think about all those ten-year-old XP machines under threat of retirement. Those big beige boxes could be replaced by something not much bigger than the mains plug that connects them to the mains. Or at least they could, if only Microsoft would have more faith in its own objectives.

THE GREAT MEMORY MISMATCH

Two years ago, I found myself on the receiving end of an unexpected tirade from a Frenchman. This man, from Kingston's European division, was fed up to les dernières dents because of the way in which the memory market wasn't working. His primary gripe was all about the game of matching the memory that a machine can use according to the range of configurations supported in its specification, to the memory that vendors actually shipped with the unit.

This has long been the source of plenty of angst, especially when it comes to server memory. The man from Kingston's angst was further sharpened by the especially confusing and involved choices and constraints of the most up-to-date PCs, which – you may have noticed – nowadays promise stonkingly vast capacities for working memory. Dell showed off its 1TB RAM server – featuring only two CPU sockets – a good four years ago now, so you might expect everyone to have hauled themselves up to this kind of working configuration already, given that adding more RAM to any setup is the easiest shot in the arm there is.

I can certainly identify with his problem: all it took for me was a Dell T7500 workstation, easy to come by these days, and a humble pile of six

All is not lost with the ending of XP support, but if you need to reactivate, move fast

DIMMs, to experience the problem for myself. While the machine would boot and run Server 2012 R2 very happily, and the system properties clearly showed all my chips being counted, it wouldn't say anything other than "4GB available". No useful error message, just a bald statement the hardware had told Windows Server there was a memory problem, and all I was getting was 4GB. This isn't a criticism of the T7500 in particular, but rather concerns the entire memory architecture and approach of machines with a 5500 Series Xeon or later.

To explain in a little more detail, these machines use triple-channel DDR3 memory, which isn't only a little better than DDR2, but also works in a completely different way. For one thing there's the systematic reporting of mismatches, which caught me out, while for another you have to fill your machine with this stuff in sets of three, not two. Mr Kingston's rant admittedly didn't focus on this issue: he was more worried by people misunderstanding the mix and match of single-, dual- and quad-rank modules. He lives in the world of enterprise and cloud data centres, where immense purchasing decisions for thousands of servers can have hugely embarrassing consequences, and where machines run at 99% capacity all day. In such places, the performance differences between machines full of quad-rank DIMMs and those with dual- or single-rankers become starkly obvious, and cause the transfer of much of the angst they generate all the way back to Kingston.

I don't operate at this mega-scale level very often. I bought the six-pack of DIMMs experimentally, on the cheap (which seems to be why they became so annoyingly noticeable). But there are other problems that can crop up once you start buying the latest memory technology – issues so basic you're surprised they ever come up at all. Things such as vendors who refuse to believe DIMMs should now be sold in threes – their website simply repeats the same advice that applied to DDR2, as if nothing had changed. What's worse, it's not only the advice that's left as it ever was, but assumptions about stock levels of this new standard simply don't get mapped from the old rules into the new.

Kingston knows all of this. Ring them up and they'll have a sensible conversation with you about your server, and email you an absolutely authoritative link to what they advise you to buy for it, which you can then send on to one of their resellers. This is exactly what my clients did, simultaneously made cautious by my tale of woe and emboldened by the way Kingston responded (for free) to their request. The online retailer looked rather askance at our request for 18 smallish DIMMs and treated that as "nine pairs" rather than "six triples, three per socket", which was all the same to us. What wasn't, however, was their promise to deliver in three days. Clearly this was just a stylesheet for the e-commerce site, and didn't apply to RAM specified very precisely by Kingston's Expert System (made of humans, I hasten to add).

My Dell T7500 misreported the amount of memory available – a common issue in machines with a 5500 Series Xeon or later

This e-tailer was in no mood to admit that it had been caught on the hop. Once those three days had come and gone, the upgrade weekend followed, and the project progress meeting hoved all too rapidly into view – none of these milestones being accompanied by a memory delivery. I expect, based on other orders made in different circumstances, that specific combinations of DDR3 server memory are actually much rarer than we might think. After all, pretty much everywhere I go, I advise the business to spend a tiny fraction of what they did on their server on a decent dollop of memory for it to work with. I wouldn't need to do this so frequently if there were already a widespread RAM-buying impulse.

It's an absolute fact of the market that you're no longer safe mixing and matching memory by feeding whatever you can dig out of the ops room drawer into your machines. Kingston is right on the money – reducing its rate of broken returns and unhappy customers is profitable. But if only the frontline of memory retailers could also keep up with the real situation, and grasp that there are now too many subtypes to keep in stock, too many permutations that depend upon your machine, and too many ways to end up with a non-bootable server over a weekend when there's nobody's there on call and no help in prospect. (Most major server work is done at weekends: I know, I lost all my April and May bank holidays of 2013 that way.)

So, I hear you ask: who was that retailer, and what was wrong with simply using one that presents a detailed selection mechanism, so that you could work off the system specification sheet and order from the bottom up, as it were, instead of taking Kingston's "top-down" approach of asking what the server is used for? I don't see much of point in naming and shaming, I'm afraid, since all online retailers seemed to be taking this same cavalier attitude to RAM, and all made identical, untrue promises as to stock and availability. I think this was in fact a failure of omission, of just rolling their standard site templates forward to another pallet-load of little plastic boxes of memory.

As for vendor sites with dropdown choosing boxes and downloadable system profilers: they need to sharpen their stock control too. All too often I've had to send back or redeploy what arrived in response to some model-matching exercise, because it seems that pretty much every PC vendor is now in the habit of making subtle changes and updates within an ostensibly identical collection of computer models. ■

TWAS EVER THUS

I regret to say that such memory shenanigans are far from being a 21st-century novelty affecting only mega-fast, hypervisor-ready, virtualisation supercomputers: my first such ego-bruising experience of this particular trick concerned a room full of Compaq Deskpros with 486/25 CPUs.

Dealing with the Adobe Reader rogues

DAVEY WINDER WARNS OF THE DANGERS THAT COME WITH TRUSTING SPONSORED SEARCH RESULTS – AND THE DODGY DOWNLOAD LINKS THAT MAY LIE WITHIN

Love it or loathe it, the Portable Document Format (PDF) – developed by Adobe and released to the world in 1993 – is a fact of online life. If you do any kind of internet research, you're sure to find documents in this format, and while most web browsers have built-in PDF viewers, they're typically less well featured than the real Adobe Reader. Regulars to these pages will know that I've been bashing Adobe for the past few years due to various security vulnerabilities in its products, not to mention the seemingly endless torrent of fix patches, but for once I'm putting these security matters aside to concentrate on a different complaint.

Buy any new PC these days and it will almost certainly come stuffed with crapware (sorry, there's really no more pleasant word). You know the kind of stuff – unwanted commercial software trials supposedly bundled to add value to your purchase, but in fact included purely to boost the vendor's profits through partnership deals.

The first thing I do when I'm configuring a new computer is to uninstall as much crapware as possible, and replace it with software I actually want. Most people I know do the same, including Real World Computing editor and technology guru Dick Pountain. He told me recently he'd just bought a new laptop that came with a fairly horrible commercial PDF reader preinstalled, so he went straight to Google to grab a link to the kosher Adobe Reader download site.

I wasn't too surprised when he told me the first two links returned were both "fakes", by which he meant that although the Adobe Reader XI software was genuine, it came wrapped inside a modified installer that wanted to shovel all sorts of potentially dangerous – and most definitely unwanted – software onto his laptop alongside it. The URLs included the word "adobe" in order to appear legit and thus entice the unwary into downloading instead of going to the official Adobe site (which lay third in that particular listing). Other links claiming to be Adobe Reader will be adverts, sponsored links or – worse still – malware-ridden scams in disguise.

> I've evolved to a point of sponsored-search blindness; I head for the organic results

Over the years, I've evolved to a point of sponsored-search blindness where I simply don't see such links any more; I always head straight for the organic results. However, as Dick pointed out, not everyone is as cynical as we are. Others may believe that Google's corporate motto of "Don't be evil" is reflected in the real world, and that all adverts returned in search lists are genuine, helpful and harmless.

If you don't mind your computer being clogged up with unwanted software, particularly of the browser toolbar and adware variety, go ahead and ignore my advice. For everyone else, here it is: don't be fooled by the Google AdWords manipulators, and never click on an advert at the top of the results list. Organic search results are easy enough to distinguish if you take the time to look a little closer at the URLs, so always go direct.

This advice applies to a multitude of high-risk online scenarios: an email from your bank asking you to log in via a helpful link, a Facebook post that includes a link to a vendor's special offer, and search results for software.

If you want Adobe Reader, get it direct from Adobe – go to **www.adobe.com/au,** scroll to the bottom and look in the footer for the download link. Alternatively, jump straight to **http://get.adobe.com/reader** for a direct download instead.

This advice also applies to any well-known brand of software: bypass Google search and the dodgy download sites and head straight for the obvious home domain, from where you'll be able to progressively navigate to a download section to ensure that you install the real thing.

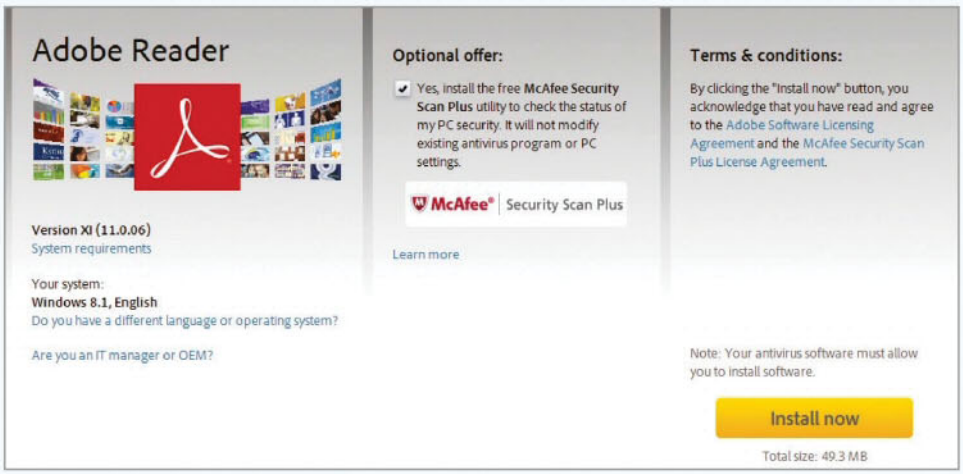
The problem is – and to confuse matters still further – the official Adobe Reader download plays the same game. As you can see from the screenshot below, when you go to Adobe's site and try to download Adobe Reader, it tries to force a "free" copy of McAfee Security Scan Plus on you. I use the terms "tries" and "force" deliberately here, because the checkbox for adding this product to your download package is

automatically ticked – you have to opt out, rather than opt in, which is never welcome. I'm not saying the McAfee product is rubbish, since I haven't tried it. But when I download a PDF reader, I want something to read PDFs, not something to perform a security scan; I already have more than one of those...

But what if you've already fallen for a fake Adobe Reader – or fake anything – software scam? Hopefully you'll have been protected from any malware installations by the security software you're running (and you are running *something*, aren't you?). Perhaps you have double-whammy protection, such as my default setup these days: Eset Smart Security and Malwarebytes Anti-Malware Premium, which seem to run in perfect harmony and provide a good level of broad threat protection. But even with this added safety net, there's still a chance that when you signed the end-user licence agreement (EULA) you agreed to install lots of unwanted apps.

Search toolbars and assorted adware – some of which may evade your security measures, depending on how you have them configured – are common examples. I have a templated response for anyone who contacts me about an "accidental install", as they're prone to calling them, which has caused their security software to go haywire and throw up warning after warning about blocked installations and quarantined files. (Of course, such warnings are a good thing, since they mean your defences are doing what they should, but they don't guarantee that you haven't been infected by something.) This is the type of scenario where my cleanup template comes into play:

- Create a new restore point.
- Download AdwCleaner (**www.bleepingcomputer.com/download/adwcleaner/**) and run a scan.
- Use AdwCleaner's "clean" function to remove anything it finds.
- Download Junkware Removal Tool (**www.bleepingcomputer.com/download/junkware-removal-tool/**).
- After disconnecting physically from the internet by switching off your router, close your security software (to prevent any conflict) and then run a scan.
- Once complete, with any toolbars or search bars removed, restart your security software and reconnect your router.



▲ Even the kosher Adobe Reader defaults to downloading an "optional offer"

- Then, download RogueKiller (**www.bleepingcomputer.com/download/roguekiller/**).
- Remove any external drives (including USB ones) and start the scan.
- Once the RogueKiller scan has finished, click "delete" and allow it to kill any rogue processes.
- Finally, delete all of the above tools from your computer. You should now be free of adware, crapware and malware.

I'd also encourage less tech-savvy family members and colleagues of *PC Pro* readers to install the freeware FileHippo.com Update Checker (**www.filehippo.com/updatechecker**). This scans for installed software and gets updates when available without pop-ups or the danger of spyware or rogue updates.

PHOOLING THE PHISHERMEN

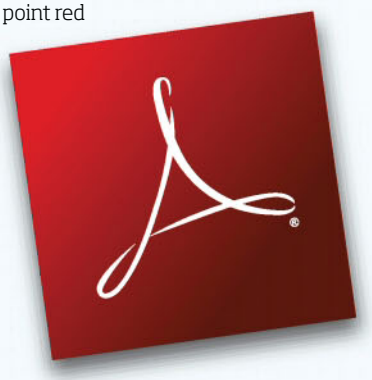
As I write this column, there's been much coverage online of what's being described as a "dangerously convincing" and "clever and tricky-to-spot" phishing scam involving Google Drive. One tech journalist even said it was "almost impossible" to know it was a fake.

I can only assume that it's the use of a google.com URL and Google SSL encryption that is leading people to describe it in these terms. After all, it starts with an unsolicited email with the subject "Important Google Document" and comes complete with a Google Drive link. I admit that there's always a danger you might get such an email from a friend, work colleague or member of your social networking circle whose account has been hacked, which would add conviction through the old leverage-of-trust issue. Even then, it's still not convincing enough. The message itself says simply: "Please view this document I have uploaded using Google Docs" and goes on to stress that "it is very important" without even trying to explain why.

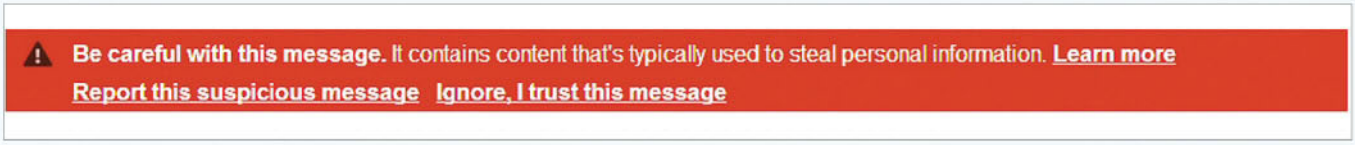
In the event that you were foolhardy enough to fall for this not-at-all-convincing spiel, that's when things became interesting (I use the past tense because Google removed the fake pages sharpish). The fake login page was actually hosted on Google's servers by using a public folder inside a Google Drive account, to make it appear more genuine, with Drive's preview function enabling the use of a publicly accessible URL for the link. Once you logged in via this fake page, your credentials were scraped off to a compromised server while you viewed the pointless document.

Beyond the obvious advice – don't click links or open attachments from anyone who sends you an unexpected email that says "view this document" – there are two simple tips that can save you from such login scrapers.

First, always deliberately get your login details wrong at the first attempt: have a fake username/email and stupid password ready for every initial login. If the site you're looking at is genuine, it will spit back the credentials and ask you to try again, but most fakes will accept the first thing you enter without question, at which point red



DAVEY WINDER
Award winning journalist and small business consultant specialising in privacy and security issues.



flags should be raised and the words "run away" should be ringing in your ears. You might also like to refer to my "emergency response template" above, just in case of drive-by downloads.

More observant readers will have spotted that I qualified this by saying "most fakes". Here's the thing: some login scrapers are clever enough to automatically refuse your first attempt to sidestep such a defence, or – in the case of some man-in-the-middle attacks – buy time by retrying the logins and performing their nefarious activity while you're attempting to log in over and again. However, I'd say that we're talking about at least 95% of all fake login sites here, so the ruse is still a very good first line of defence to adopt.

What you then need is a strong second line to shore this up, and this is where I get back on my two-factor soapbox again, I'm afraid. The use of two-factor authentication (2FA) or verification is growing, and is available on many sites now, including Google. If you had two-factor authentication up and running, then even if you'd fallen for the Google Drive scam and given up your login and password, these would have been worthless to the phishermen. They wouldn't have been able to access or compromise your account from an unverified device without the passcode that would be texted to your smartphone or generated by your authentication-code app.

Sure, it can be a faff, especially when you first set it up and have to go through the rigmarole of verifying your devices, but once that's done it really isn't a huge inconvenience for the superior protection it confers.

In fact, I'd go so far as to say that someone with a poor password and 2FA is better protected than someone with a complex password but no 2FA. You can improve the odds by using a complex password and 2FA

DANGEROUS ROUTE

Routers, while essential, are pretty dull, so when they're promoted from the review pages to news headlines in the tech press, you know that something bad is happening.

The breaking bad here is an ongoing story about backdoors and vulnerabilities in router firmware. The latest twist in the tale is that more than 300,000 wireless routers around the world have fallen under the control of a cybercriminal gang, or gangs, who exploit DNS redirection to point unknowing small-business and home-router users at sites that install drive-by-download malware, or change the adverts being displayed for the referral money. Routers from D-Link, Micronet and TP-Link are among the models being hit, and research suggests that as many as 80% of installed routers in this sector could have critical security vulnerabilities.

This should come as no surprise to anyone who's had the misfortune to delve into the dark art of router firmware updates. It's a smelly can of worms, so most folk don't bother updating. But they should. Indeed, as far as the average user is concerned, "if it ain't broke..." applies, but these routers are badly, badly broken and need to be fixed.

Educating people that their router needs to be kept patched and up to date as much as their computer or smartphone is proving to be difficult, so I fear that this is an exploit vector that will only grow and grow, especially as the type of DNS redirection that's come to light is particularly profitable when exploited on a highly organised scale.

Your mum may have her PC secured fairly well these days, but you can bet that her router hasn't been touched since it came out of the box – it will almost certainly still have its default admin login settings intact. I'm advising anyone who will listen to log on to their router via the admin interface (a quick Google will reveal how to do this if you're not sure, including bringing up the default admin password for your particular model) and check that its DNS settings are as they should be for your ISP – your ISP's tech support will be able to provide this information if you don't have it to hand. They certainly shouldn't be 5.45.75.11 or 5.45.76.36, which are being used in the current redirection attack.

Don't rely on browser tools – you should use a bit of common sense to beat the phishermen

> Router firmware updates are a can of worms, so most folk don't bother. But they should

While you have your router at your mercy, change your admin login and password. Finally, look for the update settings and check to see if any new firmware update is available.

Many people have been repeating the obvious advice that doing your online banking or checking your email using free public Wi-Fi in a coffee shop or an airport lounge isn't safe. This is hardly a myth, and it's easy for someone to eavesdrop on your session using readily available packet-sniffing tools. Alternatively, they may just set up their own free Wi-Fi hotspot and log every connection and transaction made. I've used various freely available tools for my laptop and Android tablet that let me sniff out login data – for research purposes only, I hasten to add – and they work remarkably well.

Encrypted sessions are a different matter and can't be easily circumvented, so it is possible to use public Wi-Fi securely. However, the idea of having a fully encrypted online session is a non-starter. Even using a VPN won't circumvent the problem of anyone who has the Wi-Fi network password being able to packet-sniff unless WPA2 802.1X enterprise code is being employed, and this ain't gonna happen in your local coffee shop.

The best advice, then, as far as using free public Wi-Fi goes, is don't bother. ■

Download from a trusted source such as Bleeping Computer

BE PREPARED

Research from the Economist Intelligence Unit and Arbor Networks has revealed that only 17% of business leaders feel "fully prepared" for a security incident, while 38% have no incident response plan in place at all. Maybe it's not surprising, then, that 57% will not voluntarily report incidents unless they're required to legally. Please, dear reader – don't be one of them.

Peripheral vision

PAUL OCKENDEN TAKES A LOOK AT KEYBOARD PROTOCOLS, SOUNDS OUT SOME NEW BLUETOOTH SPEAKERS, AND FIXES A READER'S PHONE CONNECTION PROBLEM

Is there any bit of computing kit more emotive than the keyboard? We all have our favourites. Old-school IT types hanker after the loud clickity-clackity keyboards of 20 years ago, officially known as Model M. Younger folk, meanwhile, swear by the minimalist, almost silent Scrabble-tile offerings sported by MacBooks and other hip machines.

Laptop reviewers often concentrate on processing power or screen resolution, but ask any civilian what they think of their machine and they'll probably mention the keyboard before either – it's the part of the computer you physically interact with most, so finding the right one for you is certainly quite important.

With a desktop PC it's possible to change the keyboard to one you prefer, whereas with laptops you're tied to the keyboard that the manufacturer provides, so you should spend as long as possible playing with a potential new purchase before parting with your cash. Laptop users sometimes resort to using an external keyboard, especially in desk-based environments, but this solution comes unstuck when you want to use the device in your lap, in bed or on a train, for example.

For those using desktop computers, I've recently been playing with a couple of the latest keyboards from Microsoft: the Sculpt Comfort and the Sculpt Ergonomic. At first glance, you may think that the only real difference between them is that the latter is a split keyboard. However, once you start using them you'll discover they offer very different experiences.

The Sculpt Comfort's keys are more like a traditional keyboard: they're not clicky, so you can type quite quietly, but they do have sufficient travel. It's nicely made and solidly bolted together, as is the mouse.

The Sculpt Ergonomic takes a completely different tack: it has a split layout – great for touch-typists, but not for two-fingered hunters-and-peckers such as me. It's supposed to be helpful to people who suffer from repetitive strain injury (RSI) and other hand/wrist problems, so I lent it for a few days to a friend with RSI. He said that with a conventional mouse and keyboard he'd be in pain after a few hour's typing, but the Sculpt Ergonomic let him type all day without discomfort. He did point out something I'd failed to spot, though – that the mouse design is completely useless for left-handers.

Microsoft claims the Sculpt Ergonomic keyboard allows you to type comfortably all day

PAUL OCKENDEN
Owner of one of the UK's oldest web agencies, Paul works on award-winning sites for many blue-chip clients.

One great feature of the Sculpt Ergonomic is its separate numeric keypad. Normally you'd use it either for bashing numbers into Excel or as a glorified set of cursor keys, but this one has an extra trick up its sleeve. Someone clever noticed that it was around the same size as a calculator, and so put a "calc" button at the top: press this and it fires up the computer's calculator application. For all of those tasks where you used to reach for a calculator to add up a few figures or work out the GST on an invoice, you can now just use the numeric keypad. You can use it on the desktop, or pick it up as you would a calculator, and the beauty of it is that you can simply copy and paste the answer into whatever you're working on, without the danger of transposing digits.

The Sculpt Ergonomic features Scrabble-tile keys and is comfortable in use. In fact, the way that your hands sit arched over the split keyboard means that the lighter presses needed by tiled keys fit the configuration brilliantly. Likewise, the accompanying mouse imposes a more arched handgrip, which is partly what relieves RSI sufferers.

NO STRINGS ATTACHED

Of course both of these keyboard and mouse combos are wireless, hence their inclusion in this column. There's a debate currently going on in techie circles about the correct way to build wireless peripherals. Everyone agrees that kit from a few years back – and even very low-end kit of today – is pretty terrible, with laggy connections subject to interference.

That older style of wireless peripheral usually employed 27MHz, the same band once used for CB radio and still used by cheap radio-controlled toys. Most high-end wireless mouse and keyboard manufacturers have now switched to 2.4GHz, but the market still seems split between those that use Bluetooth and those that employ proprietary protocols and dongles. The obvious advantage of Bluetooth is that in most cases you won't need a dongle at all, since most business-class laptops and even some desktops come with Bluetooth built in. Even where a dongle is needed, Bluetooth means you can use the same one to connect a mouse, keyboard, phone, tablet and more, avoiding port clutter. Microsoft's two products eschew Bluetooth, however, and instead use a proprietary wireless system.

In fact, both products use a slightly different version, so you can't even use the dongle for the Sculpt Comfort with Sculpt Ergonomic or vice versa. The

keyboards and mice are paired to the dongle using a 32-bit ID at the factory, and as far as I know there's no way to override this.

At first glance, using proprietary protocols and hardware might seem crazy, but there are advantages. For one, having your device and dongle pre-paired lets you get the kit up and running quickly – keyboard and mouse just work straight out of the box. Also, the majority of Bluetooth dongles on the market don't yet support Bluetooth Low Energy (BLE) and, as a result, any Bluetooth-attached keyboards and mice are going to chomp through battery capacity considerably faster than those that use proprietary dongles. Third, there's a cost advantage, since Bluetooth transceivers will cost around two to three times the price of dedicated units. Lastly, being especially designed for mice and keyboards, these proprietary dongles can have faster throughput, which makes for more responsive keystrokes and mouse clicks. The difference in latency I'm talking about here may be tiny – only a few milliseconds – but it's perceptible even in general use, and especially when playing games. Having said all this, Microsoft does also sell Bluetooth-based keyboards and mice in its product range, but not in the same quantity or quality as these proprietary-interfaced devices.

Overall I've been impressed with these latest Microsoft keyboards and mice, which are a great improvement over earlier models. They would be a useful upgrade for anyone who is still using a desktop computer, and particularly for those suffering from RSI or muscle pain.

ARE YOU SPEAKING TO ME?

While on the subject of 2.4GHz communication, I've recently been auditioning a small army of Bluetooth speakers. It all started because I wanted something for my home office that would allow me to stream audio easily from an iPad (especially the auto-ripped versions of everything I've ever bought on Amazon, via the company's Cloud Player). But I've also had a query from a reader asking for recommendations for speakers that are "business-quality", for use in a small boardroom. For iPad streaming, there are two options available: AirPlay or Bluetooth.

AirPlay works using Wi-Fi, and also potentially supports better audio quality than Bluetooth. However, it's a proprietary Apple protocol, so although I could use it for streaming from my iPad, I'd have to find a third-party app to stream from my Android phone. Besides which, Apple is starting to impose its FairPlay digital rights management system on AirPlay products – it did this last autumn with an OS upgrade to Apple TV, and many owners weren't pleased about this retrograde "improvement". So although AirPlay does have tremendous benefits, especially in being simple to set up, for this investigation I confined myself to Bluetooth.

Pop into your local PC superstore and you'll find the shelves packed with wireless speakers, but the range of products seems to be polarised. There's a deluge of plastic products to be found at the bottom end, of rattly construction and thin sound quality. At the upper end, there are products that look like spaceships, and have price tags to match.

The problem seems to be a dearth of kit sitting between these two extremes, and especially of speakers suitable for business use. For the boardroom it's wise to steer clear of the wacky designs with flashing displays; you need build quality that's capable of surviving a knock or two off the table.

After a lot of searching, I finally came up with a couple of candidates from Toshiba: the snappily named TY-SP1 and TY-SP3 (I'm assuming that TY-SP2 was lost somewhere on the drawing board). The former boasts a ball-shaped form factor and is about the size of a squashed apple, while the latter is more of a brick-shaped device.

For such a compact speaker, the Toshiba TY-SP1 certainly makes a big sound

> There's a dearth of wireless speakers between the budget and high-end extremes

Unlike most of their competitors, both products are very well built – yes, they're made of plastic, but they feel solid. Each can also be turned up far louder than you'd expect given their size, and without any noticeable distortion of sound quality.

The key difference in audio terms is that TY-SP1 is mono, while the TY-SP3 is stereo. Given such a small box size, though, the stereo separation is fairly minimal. Both products are rechargeable, capable of lasting a typical business day, and – usefully – both can also act as hands-free speakers should you be streaming music from your phone when a call comes in.

Although the TY-SP3 is probably the better speaker for my reader's boardroom (it certainly looks more "corporate"), the TY-SP1 is my favourite; I'm amazed that something so small can produce such a loud and rich sound. As well as its top-firing speaker, it also contains a passive bass radiator that fires downwards (*see Pump up the volume, below*). Although this bass radiator is only small, it has a significant impact – if you watch carefully when playing bass-heavy music, you can see it vibrating, even though it isn't being directly driven. It's what enables such

Microsoft's Sculpt Comfort Keyboard uses a proprietary 2.4GHz dongle

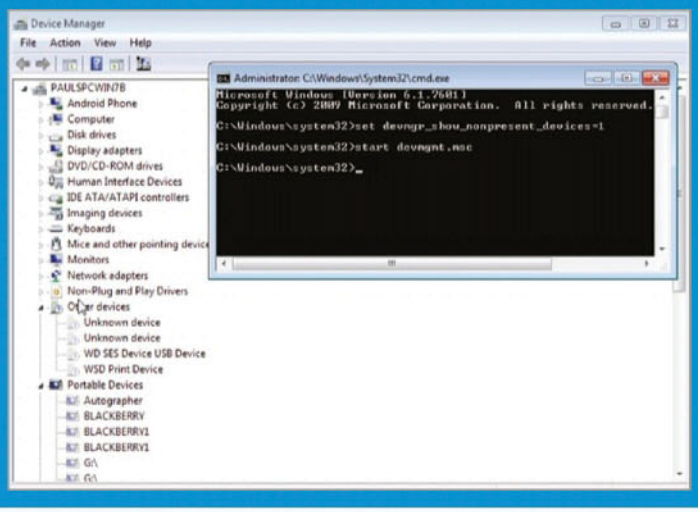
EXORCISING THE GHOST PHONE

Another reader query, this time from Karen East, who's having problems when she plugs her Nokia Lumia 620 phone into her laptop's USB socket. She sees the usual "New hardware, what do you want to do?" message, but it quickly disappears, then appears again, then disappears... in an endless loop. She's looked in the Windows Device Manager but can't see any problems, and isn't sure what to do next. I've seen this issue before and it seems to affect all versions of Windows from XP onwards. It doesn't happen only with Windows Phone devices, either – any hardware can cause the problem.

The reason you can't sort this out via the Device Manager is that it can only display non plug-and-play devices, even after you've clicked "Show hidden devices" on its View menu. Devices that aren't currently connected – such as an unplugged, USB-connected phone – won't be shown, and since the currently installed drivers aren't allowing the phone to connect properly, it will never show up in Device Manager, and so you can't sort out its drivers – a genuine Catch-22. Thankfully there's an easy solution: open an elevated command prompt (type "cmd" into the search box and then hold down Ctrl+Shift and press Enter). From this command prompt, type:

```
set devmgr_show_nonpresent_devices=1
start devmgmt.msc
```

This opens up Device Manager, but now when you click "Show Hidden Devices" in the View menu you'll see more devices listed. What Karen needs to do is look for old Nokia USB devices, and remove them. Once these are gone, shut down Device Manager, close the command prompt, and reboot. When it starts up again, connect the phone via USB and the correct drivers will install properly and life will be tickety-boo!



◀Microsoft's Sculpt Comfort Keyboard uses a proprietary 2.4GHz dongle

a small device to generate such a big sound. Sure, it isn't "hi-fi", but it now has pride of place on my office desk.

IF IT LOOKS TOO GOOD TO BE TRUE...

Finally, a quick word about Ovivo. This company was a mobile virtual network operator (MVNO) that operated in England, where I'm based. It bought airtime from Vodafone via the aggregator Cognatel. Ovivo's charges were extremely low, sometimes even free. Low-usage subscribers could buy a SIM for £20 (AU$36), then wouldn't have to pay any mobile charges ever again. Each month they'd receive 150 minutes, 250 texts, and half a gigabyte of data, more than enough for many average users.

The company's business model relied on selling adverts. Fire up the web browser on an Ovivo-powered phone and every ten minutes or so you'd be taken to an advert prior to opening the web page you really wanted. For many users that was a sufficiently small price to pay, and for those using a non-smartphone it was a no-brainer, because without a web browser they were never going to see the ads at all – perfectly acceptable within the Ovivo terms and conditions. But on 19 March, all of that came to an end, when the plug was pulled on the service.

With a three-party setup such as this one (Ovivo, Cognatel and Vodafone), it isn't easy to find out why things came to a head, and at the time of writing I've yet to see an official announcement from either party; I've heard rumours about the parties blaming each other, however. There's been speculation in some quarters that the problems were down to delivery of special software to identify individual customers – and money.

> We live in a subscription age, where companies are trying to maximise their ARPU

To be honest I wasn't too surprised when the Ovivo service folded. We live in a subscription age, where from every angle companies are trying to push you into paying a regular monthly fee rather than a one-off purchase. Newspapers, television, software, and, yes indeed, magazines such as this one. And one thing that subscription-based companies will always try to do is maximise their average revenue per user (ARPU). That's one of the key financial indicators for a company such as Sky, for example, and it's why that company will try to get you to sign up for its phone and broadband service, not only the TV package.

It's also the reason behind your mobile operator trying to sell you bolt-ons, and why *PC & Tech Authority* wants you to subscribe to its digital editions as well as the paper magazine (and really, you should). Yet in an ARPU-maximising world, Ovivo had a customer base, many of whom were consuming services yet contributing no revenue at all.

My simple brain struggles to see how that could ever have been thought sustainable. I did have a couple of Ovivo SIMs, but always treated them as a "good while it lasts" facility – I would never have dreamt of porting my main number to one of them, nor indeed any of the slightly similar rivals out there. ■

PUMP UP THE VOLUME

The Toshiba TY-SP1 makes such a big sound because of its use of a bass radiator. It gains extra punch through cleverly leveraging the rear sound waves that the driver generates to add sound pressure.

The perfect resume

FIONA TEAKLE SHARES WISE ADVICE TO HELP WITH JOB HUNTING, WHETHER IN IT OR ANY OTHER INDUSTRY.

Resumes are something that everyone needs, yet most people don't take time to keep up to date. It's always seen as one of those annoying things that we keep putting off. Yet having an up to date resume can do you more value than harm. Be prepared for any opportunity that may come your way, as you never know where it may lead.

While there are jobs available in the industry there is an increased focus on ensuring the right people for the roles in terms of skills and experience. Ensuring you are showcasing your skills correctly is critical and unfortunately lots of people make small mistakes that may cost them in the long run.

When writing resumes there are some common mistakes that everyone seems to make which you should try and avoid these are:

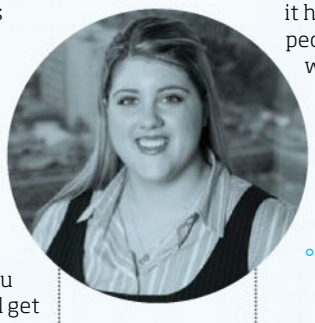
- Making grammatical and spelling mistakes: this demonstrates unprofessionalism and a lack of attention to detail. Once you have your resume complete, provide it to a friend or colleague who can read over and give you solid advice.

- One resume for every job: most people think they can get away with using the same resume for whatever they are applying for. Unfortunately this is not the case, a resume needs to be tailored to best suit the position you are applying for. If not, how can you be sure that you are show casing the best part of your achievements that they are looking for?

- Including too much information: your resume should be a concise summary of your achievements, with specific comments, not general statements. I.e. "Reduced cost by 50%", not just "helped reduced cost". If you resume is good enough you will get taken to the next stage, which will give you an opportunity to expand upon your achievements.
- Formatting and style: this is a simple yet critical thing and demonstrates attention to detail. You need to ensure it aligns correctly, but isn't over the top.

- Relevant information: While the reader wants to get a better understanding for you who are as a person, you need to ensure the information is relevant. For example, majority of jobs won't require you to list your date of birth. On the other side, the information needs to be accurate, don't lie as the interviewer will see straight through it.

> "Most people think they can get away with using the same resume for whatever they are applying for."



FIONA TEAKLE is Director of the ACS Young IT Board. You can contact her at fionateakle@acsmail.net.au

While it's critical to ensure you have a resume that has the fundamentals right, the next step to consider is how you can you be better than the next person? Some of the tips provided previously have been:

- Volunteer positions/charity work: showing an interest in something outside work, or that you are willing to give up your time to help others, demonstrates the type of person you are and can help put you ahead.

- Personal website/onsite presence: as the increase focus on social media and internet takes shape, it has started to interfere with people's impression of you. You want to ensure that when they look you up online that they are going to have a positive experience. A professional looking LinkedIn profile, a blog that is relevant or interesting.

- Recommendations: leading on from the professional LinkedIn profile an essential part of that is the recommendations section. Who better to advocate for your behalf than people you have worked for previously, in an open and professional environment?

- Follow up with a phone call: once you have applied, most people leave the application in the system and let it follow the process. However a follow up phone call can do wonders and set you apart. If you don't get them, leave a professional voicemail outlining your excitement for the opportunity and look forward to hearing back from them. It shows that you are interesting in working for that company, not just looking for any job.

The Young IT board around the country is always running resume writing workshops with HR professionals who will be able to give you targeted advice on how to fix or tailor your resume. As a member you also have access to the presentations and other material on the member section of the website. Head to the website to find out when the next workshop in your state is on.

Whether you are looking for a new job or not, I encourage you to spend some time updating your resume. Doing a little bit once a year could save you lots of time in the future! Ensuring your resume is of a high standard is critical, at the end of the day you are likely to be up against 100 other people and the reader will be trying to find a reason to stop reading, so make sure they continue to the end!

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JON HONEYBALL relives computing's misspent youth, and wonders what is to come

In the past week, I appear to have had a birthday. Not just any old birthday, but The Big Five Oh. Frankly, I have no idea how this has happened. I certainly don't feel 50, even if the occasional twinge and ache might indicate otherwise. The day itself did give pause for thought, though. About what has happened in the computing world over the past 30 years, and where things might be by my 80th.

When I was 20, things were really very simple. BBC Model B, early PC, the first Mac, HP engineering workstations driving expensive test equipment over the HP-IB/IEEE-488 bus. Nothing talked to anything else, other than through specific scientific interfaces such as HP-IB, but there was no need. Floppy disks were everywhere, and hard disks were exotic.

It was a period of rapid evolution: within a few short years, we had Windows 3, the arrival of the TCP/IP on anything and everything, and suddenly the internet had totally and rapidly transformed the planet.

But we still thought we were special. Making this work wasn't easy. Getting KA9Q running defeated many, and that was fine. Trying to render a font for an HP LaserJet – and installing it to Windows so that it both downloaded the font to the printer and correctly displayed in Word – required deep knowledge, cunning and guile. We were a priesthood. I too had a T-shirt that said: "The internet is full, go away."

Then the public found our little secret garden, and everyone wanted to come and play.

With the floods came money: credit-card processing, Amazon, and banking. It was no longer safe to run an SMTP server as an open relay, because spammers would misuse your generosity. I needed now to add a firewall between my computers and the raw internet.

Microsoft didn't help things. It moved its legions of Windows 9x users to the NT kernel, and decided it was alright to let everyone have Administrator access with no password. The malware flooded in, and our beautiful internet garden started to look trampled, unpleasant and decaying, a situation that still exists even today. Some, including myself, wonder whether the PC will ever fully recover.

Much of the trust went, but the new world order had fascinating capabilities. Apple brought together the right people with the right vision, and turned the world on its head with the iPhone and then the iPad – smart, secure, portable devices with amazing power and long battery lives. We could carry a computing device that was more powerful than our recent PCs, and have it with us all the time. It would stay connected to our beloved internet, too; wewere even happy to move the centre of our information away from our own device onto this new-found cloud model. The world had indeed changed.

All of this would have been a glorious new beginning; a fourth wave after scientific workstations, the PC, and the internet. It would have been magnificent except for the actions of our governments. They put the poisoned apple into the garden of Eden. Within a few short months of increasing disclosure, it was clear we had been lied to. That our stuff wasn't safe and secure. That government agencies would happily use our taxpayer money to collect everything. And that it wouldn't even necessarily be our own elected governments, but the agencies of others. I had a first sniff of this when I kept pushing Microsoft to respond to my questions about Patriot Act attacks on European customer data. I should go back and listen again to the recordings of phone interviews I had with Microsoft lawyers. I suspected they were lying at the time, and I was proved… well, I'll stop there or the *PC & Tech Authority* lawyers will be on the line.

"We should be rejoicing in this fourth wave of computing that is about to happen. Yet all I feel is a sense of disappointment"

Suddenly, it's all gone cold. We have the most incredible technology available to us, with a new era of interconnectedness among devices of all sizes, from smart TVs to wearable pins. We should be rejoicing in this fourth wave of computing that is about to happen.

Yet all I feel is a sense of disappointment, of being let down and lied to. The one green shoot to give me encouragement is that bright programmers may decide that enough is enough, and we can move to a new era where we control our security in a way that works. Trust has gone, and it won't return – not in my lifetime. But maybe the next 30 years will see a way to build workable, interesting and exciting solutions that keep the front door firmly shut when we want that too. I would like to hope so, but I'm not confident.

PC & TECH AUTHORITY

Level 6, Building A, 207 Pacific Highway, St Leonards NSW 2065
Locked Bag 5555 St Leonards NSW 1590
Chief Executive Officer David Gardiner
Commercial Director Bruce Duncan

EDITORIAL
Managing Editor: David Hollingworth: dhollingworth@nextmedia.com.au
Editor: Ben Mansill: bmansill@nextmedia.com.au
Art Director: Tim Frawley

REGULAR CONTRIBUTORS
Rosalyn Page, Jon Honeyball, David Fearon, David Bayon, Barry Collins, Sasha Muller, Tim Danton, Tom Arah, Ian Wrigley, Simon Brock, Jonathan Bray, Dan Rutter, Fiona Teakle, Mark Williams, Jenneth Orantia, John Gillooly

PRODUCTION
Advertising Coordinator: Jacqui Winters
Production Manager: Alison Begg
Circulation Director Carole Jones
Printed by: Webstar
Distributed by: Network Services Company, Australia; Netlink, NZ

ADVERTISING
Phone: (02) 8399 7603 Fax: (02) 8399 3622
Group Advertising Manager:
Joanne Ross: jross@nextmedia.com.au

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