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JIM
MARTIN



The trick every PC owner should know

Replacing your hard drive with a solid-state drive is the best-value upgrade for any PC or laptop

I would apologise for the over-wrought headline, but in this case it's entirely justified. In days gone by, PC enthusiasts would overclock their processor, graphics card and even RAM to eke out a few percent better performance. Although benchmarks would show perhaps an extra 10 or possibly even 15 percent higher scores, the speed boost was often imperceptible in general use.

While this is still a great way to get more from your hardware, there's no better way to speed up a computer than by installing a solid-state drive. SSDs are increasingly standard in new PCs and laptops, but if your machine doesn't have one, now's the time to upgrade.

The traditional hard disk, despite quite astounding improvements in capacity and performance over the past decade, is the last remaining bottleneck to speed. Every other major component inside a laptop or PC can transfer data in the order of tens of Gb/s, but the humble hard drive doesn't even get close to saturating a SATA 3Gb/s bus. An SSD, by contrast, eschews a spinning magnetic platter and uses the altogether more modern flash memory chip to store programs and data. It's easiest to think of it as a giant USB flash drive, but a much, much faster one.

You won't just see an improvement in benchmarks, either. With an SSD on board, your computer will start in a matter of seconds instead of minutes, applications will load virtually instantaneously and files copy in a fraction of the time.

And thanks to the fact that prices have tumbled in the past year or so, an SSD really is the best-value upgrade for your ageing laptop or PC. The older your machine, the more noticeable the boost in speed.

Plus, since there are no moving parts, there's much less chance of damaging an SSD and losing precious data.

Capacities still lag behind the largest hard drives, but you can buy a 240GB model for around £120 - a price that's considerably less than a new computer. If you can manage with a smaller capacity (there's usually only room for one drive in a laptop) you'll be able to upgrade on a much tighter budget: 120GB models start from just £60 in our group test on page 74. ☒

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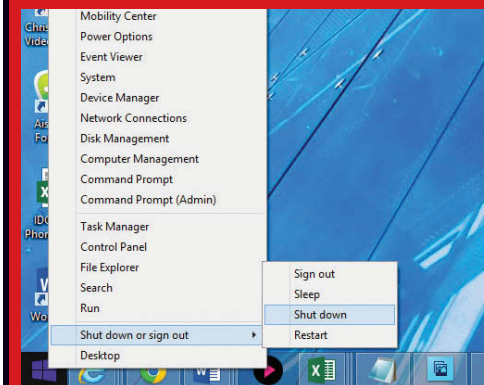
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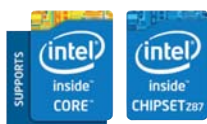
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AMD SKYBRIDGE UNITES x86 & ARM, BRINGS ANDROID SUPPORT

Skybridge will drive down hardware costs, allowing x86- and ARM chips on a single motherboard

AMD is bridging the gap between the x86- and ARM chip architectures and is also bringing Android support to its chips next year through a new development effort called Project Skybridge.

Project Skybridge will provide the plumbing for ARM- and x86 cores to be combined on hardware, and new chips based on the architectures will be released in 2015. The x86 and ARM chips will be pin-compatible, making it possible to configure both chips on a single motherboard.

Different motherboards are currently required for x86 and ARM chips, and it's expensive for developers and users alike to support disparate architectures, said Lisa Su, general manager of AMD's global business units.

"This is the beginning of the family of products that will offer customers capability and flexibility," Su said. "It's going to be ARM and x86. These are the two most important architectures."

AMD showed a Project Skybridge chart where a combined x86-ARM system could support Windows, Linux and Android. Su said Skybridge products are targeted at embedded- and client devices, which could include tablets. Tablets with AMD chips are currently available with Windows 8.1, but it is possible to run Android applications through a Bluestacks virtual layer.

The ARM-based chip will be based on the Cortex-A57 processor design, which is 64-bit and will be AMD's first chip to

support Android, Su said. The x86 chip will be based on the Puma+ core, which is being used in the recently launched 'Mullins' tablet- and 'Beema' laptop chips. With pin compatibility, Skybridge parts could be soldered down on a motherboard.

AMD has so far shied away from supporting Android. The company has said it will not bring Android to x86 chips as the OS runs best on ARM processors.

The ARM and x86 chips will be made using the 20nm process, and could be combined with AMD's latest GPUs. Device makers will be able to combine any number of x86 and ARM cores in products.

But AMD won't go into low-cost phones, Su said, adding that "it isn't in our DNA."

Project Skybridge is an example of AMD's implementation of a chip-design methodology established in 2012, in which multiple intellectual property blocks can be patched together on a computing system. To expand beyond x86, AMD licensed ARM architecture, which is dominant in mobile devices and is gaining steam in servers. AMD's first use of the ARM architecture was for a Cortex-A5 core that provided security for PC chips.

Chips resulting from Project Skybridge could find a use in servers such as HP's

“

This is the beginning of the family of products that will offer customers capability and flexibility

”

AMD's Su said Skybridge could be used in networking hardware, which use disparate architectures for tasks. For example, AMD's Project Skybridge could provide one product that could use x86 for the high-end control plane and ARM for low-end processing. Such an implementation could reduce hardware- and software costs, Su said.

"It's way too expensive to support disparate architectures in an ecosystem," Su said. "It's really about simplifying that use case... for a given software ecosystem."

Project Moonshot, a dense server that aims to combine x86- and ARM processors in a single chassis. The Facebook-backed Open Computer Project has provided specifications for a slot that is compatible with both AMD and x86 processors. However, AMD officials did not say whether the Project Skybridge methodology would be applied to server hardware.

AMD is fighting for its survival in servers, and is relying on ARM for a renewed push that the company hopes will help it regain market share.

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MICROSOFT TO BOOST WINDOWS PHONE WITH NOKIA ACQUISITION

Windows Phone adoption set to accelerate with Nokia buyout, according to Microsoft

Microsoft closed the deal on its Nokia acquisition on 25 April, which should lead to a boost for Windows Phone.

Nokia took the brave step to take on Windows Phone as its main mobile OS, becoming a key partner for Microsoft in its battle against iOS and Android.

Windows Phone acceleration

Microsoft said the move marks a key step toward integration. It will "accelerate innovation and market adoption for Windows Phones", and the company is looking forward "to introducing the next billion customers to Microsoft services via Nokia mobile phones".

Now holding 10 percent of the market share, Windows Phone is the fastest-growing mobile OS of recent times. This summer's launch of Windows Phone 8.1 could give it another boost.

Microsoft revealed that the acquisition will include the nokia.com domain and Nokia's social-media channels for up to a year. Microsoft will no longer obtain Nokia's Korean manufacturing facility.



Apple pays \$3bn for Beats in its biggest ever buyout

Apple buys Beats Music and Beats Electronics to increase its music-streaming business



Apple has bought Beats Music and Beats Electronics for \$3bn in a bid to boost to its streaming business. The deal is Apple's largest acquisition to date.

Beats co-founders Jimmy Iovine and Dr Dre will join Apple as part of the deal.

Apple's chief executive, Tim Cook, said music held a special place at Apple. "That's why we have kept investing in music and are bringing together these extraordinary teams so we can continue to create the most innovative music products and services in the world."

Iovine said he had always known in his heart that Beats belonged with Apple. "The idea when we started the company was inspired by Apple's unmatched ability to marry culture and technology," he said. "Apple's deep commitment to music fans, artists, songwriters and the music industry is something special."

Apple senior vice president of internet software and services Eddy Cue said the addition of Beats would make the companies music line-up even better. "From free streaming with iTunes Radio to a world-class subscription service in Beats - and, of course, buying music from the iTunes Store as customers have loved to do for years."

Subject to regulatory approvals, Apple expects the transaction to close in fiscal Q4.

Beats was founded in 2008 by producer Dr Dre and chairman of Interscope Geffen A&M Records Jimmy Iovine.

Beats Electronics comprises the Beats by Dr Dre family of premium consumer headphones, earphones and speakers, as well as patented Beats Audio software technology and streaming music-subscription service Beats Music, which focuses on providing a personalised music experience.

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Skype Translator tool demonstrated

Microsoft plans to this year release a beta Skype app that will enable real-time translation of people speaking in different languages. Skype Translator appears to be an extension of the real-time translation Microsoft has been developing over 10 years, and the tech has already been seen in Bing Translator for Windows 8.

MORE: tinyurl.com/o55sqrv

eBay users must change passwords

An eBay database containing encrypted passwords and other data was hacked in late-February and early March. eBay users must immediately change their passwords. To find out how visit:

tinyurl.com/qhebvon

VIRGIN DELIVERS NEW SKY SPORTS CHANNELS

Five-year deal gives Virgin Media one up on BT in the ongoing content war

Virgin Media has signed a deal with Sky to offer new channels to its TV subscribers.

Under the new agreement, which the firm says is the "most comprehensive wholesale agreement ever agreed by Sky", Virgin Media customers will get access to Sky Sports 3 HD, Sky Sports 4 HD and Sky Sports F1 HD. Sky Atlantic is not included.

The five-year deal makes Virgin Media the only provider to offer every live Sky Sports HD TV channel. BT Sport offers only Sky Sports 1 and 2.

Tom Mockridge, CEO at Virgin Media, said: "We are excited that our customers will be able to watch even more great TV from Sky on more devices as a result of the most extensive agreement ever signed between Virgin Media and Sky. This promises to be a fantastic summer of entertainment and our customers."

Sky's entertainment channels, including Sky 1, Sky 2, Sky Living, Sky LivingIT and Sky Arts 1 will also join the Virgin TV Anywhere app, which is available for Android and iOS devices.



Virgin Media will also release dedicated apps for customers to watch live and on-demand Sky Sports and Sky Movies content on the move.

Jeremy Darroch, chief executive at Sky, said: "We're pleased to have extended our partnership with Virgin, which increases the reach of our content and reinforces our broadly based approach to growth. The agreement enables us to deliver great channels to even more homes across the UK."

EE Eagle tablet to rival iPad mini and Nexus 7

EE pushes 4G with own-brand devices Eagle, Kite, Osprey and Buzzard



EE has announced a range of own-brand devices, with the 4G-ready EE Eagle, Buzzard, Kite and Osprey joining its Kestrel smartphone.

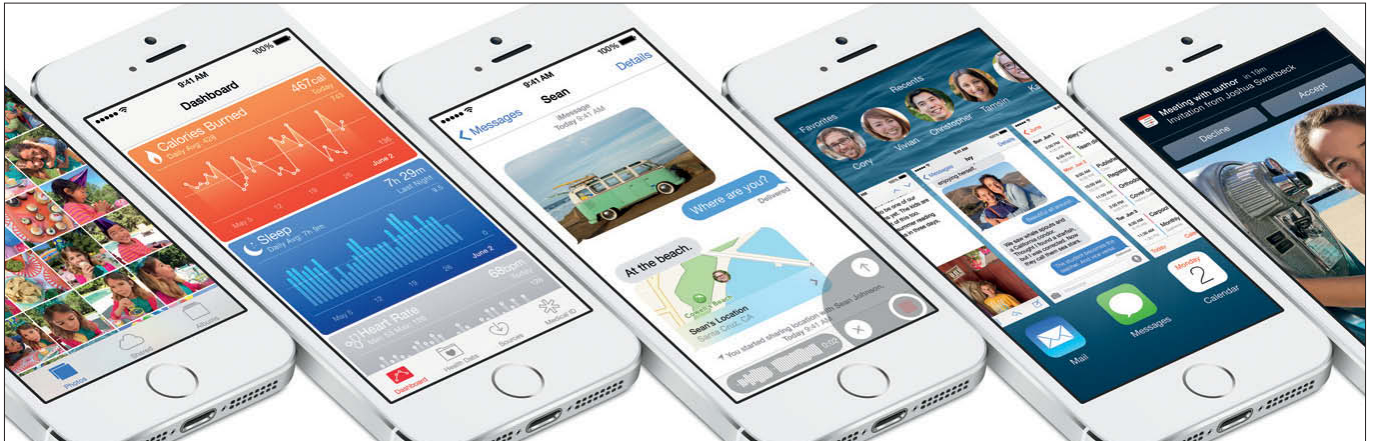
The Eagle, a rebranded Huawei MediaPad M1 with an 8in screen, 1.6GHz quad-core chip and Android 4.3 Jelly Bean, is the UK's most affordable 4G tablet, according to EE. It costs £199 on a PAYG basis.

The Kite is a £69 Wi-Fi hotspot aimed at a younger audience, while the £49 Osprey is the UK's most affordable 4G Wi-Fi hotspot device.

Finally, the £49 Buzzard is the UK's first '4G car Wi-Fi'. The network says it's the first in a line of super-fast in-car devices that plug into a 12v jack and offer a 4G connection to up to 10 users. ☒

APPLE UNVEILS OS X YOSEMITE AND iOS 8 AT WWDC

New versions of Apple's desktop and mobile operating systems are unveiled at WWDC 2014



Apple opened its June WWDC annual developer conference with a keynote speech in which it announced iOS 8 and OS X 10 Yosemite.

iOS 8

Apple's biggest announcement was iOS 8: the latest operating system for iPhone, iPad and iPod.

Apple described iOS 8 as "the biggest release since the launch of the App Store". There are new features for users, and a whole new toolset to allow developers to create new apps.

Apple said that iOS 8 delivers a "simpler, faster and more intuitive user experience". This includes a new Health app, which combines with health monitoring tech and apps to give you a clear overview of your health and fitness. Family Sharing is another key new app. It lets you share purchases, photos and calendars within the same household.

Other features include iCloud Photo Library, which lets you enjoy- and share photos and videos across Apple devices. New Messages features allow you to share voice-, video- and photo messages with just a swipe. iOS 8 also includes predictive typing for Apple's QuickType keyboard. Finally, iCloud Drive lets you can store files and access them from anywhere.

iOS 8 won't launch until later this year. For now, it's available only to registered Apple developers, who will be busy testing the new version of iOS on their devices.

We're expecting iOS 8 to be available as a free upgrade for existing owners in

September, when the iPhone 6 becomes available. Whether the outgoing iPhone 4s will be compatible with iOS 8 is unknown. iPhone 5, 5c and 5s owners can be fairly certain to get it.

OS X 10 Yosemite

Apple also announced the next version of OS X, 10.10 Yosemite. Yosemite will bring new levels of interaction between Mac computers and other Apple devices when it is also made available for free early in the fourth quarter, according to Apple.

Like iOS 8, OS X Yosemite is available now to developers, and will be free when it is released in the Autumn.

With Yosemite, users will be able to answer incoming calls to their iPhone from their Mac desktop or Macbook Pro, for instance. When a call comes in, the caller

ID pops up on the Mac screen and the user can answer it there, using the Mac like a speaker phone.

Another change in is how an activity started on one device can be picked up easily on another. If you're looking at a Safari web page in Yosemite on a Mac, for instance, and then pick up your iPad, swiping up on the screen of the iPad will load that same web page there.

The capabilities come from a feature in Yosemite that Apple calls Continuity. It allows the Macbook to detect other Apple devices in close proximity and share functionality and tasks in new ways.

Apple is also expanding AirDrop, which until now has been used to share files among iOS devices. With Yosemite, AirDrop will enable file sharing among iPhones and iPads, as well as Macs and Macbook Pros.





Security round-up

A look at the security news that's recently made the headlines

It's been a busy few weeks in the security world, with plenty of emerging threats and news reports making the headlines. In this month's Security Advisor/Quarantine, we round up the most important stories that will help keep your data and devices safe.

Hidden Apple security vulnerabilities exposed

The California giant has long boasted that its iOS and OS X operating systems are the safest around. In many ways this is correct, as Macs only account for a small percentage of the computers used in the world, making them a low-yield target for hackers, and iOS is a heavily locked-down environment. It came as quite a surprise, then, when it was revealed that both systems were seriously compromised, not due to a virus or malware attack, but because of an erroneous line of code inserted by an Apple programmer.



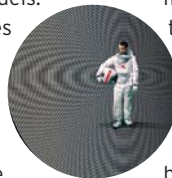
When you navigate to a secure website a certificate is issued by the site to prove its authenticity to your browser. This is an important safety procedure to ensure that you don't become the victim of a spoof site seeking to hijack your data. The SSL/TLS bug in the Apple code meant that this vital step was never completed, making Mac and iDevice users extremely vulnerable to 'Man in the Middle' style attacks. The reason for the failed validation was a simple case of a repeated line of code, where the command **gotofail** appeared twice in a row, resulting in the shocking security breach.

The fault was introduced in both iOS 6 and OS X 10.9 Mavericks, meaning that it's been in the wild for some time. Applications using Apple's SecureTransport API are the ones affected, which includes the Safari browser, Apple Mail, iMessage and FaceTime - among others. Apple has since released patches for both platforms which eradicate the fault, so if you have an Apple device running iOS 6/7 or OS X Mavericks, be sure to install the update as soon as possible.

Linksys owners not over the moon

Reports have emerged from the SANS Institute's Internet Storm Centre (ISC) detailing a strange malware that's seemingly

widespread among Linksys E series Routers and some Belkin Wireless-N models. Dubbed TheMoon, due to images contained in the malware which originate from the 2009 film *Moon* starring Sam Rockwell, this self-replicating program exploits a security breach in the Remote Management Access feature to gain control of the devices. These in turn then look for other routers to infect.



The malware sends a request to the Home Network Administration Protocol (HNAP) to determine the model and firmware versions of a router. Then, if it matches a known vulnerable device, TheMoon sends a script which is executed locally, giving the malware access. So far it's not clear what the program is for, as its primary function seems to be to look for more routers, but there are a few theories that it could be used as part of a botnet that attackers could control remotely.

An official statement reads: "Linksys is aware of the malware called The Moon that has affected certain older Linksys E-series Routers and certain older Wireless-N access points and routers. We'll be working on the affected products with a firmware fix to be posted on our website in the coming weeks."

The company also added that the exploit to bypass the admin authentication used by the worm only works when the Remote Management Access feature is enabled.

"Linksys ships these products with the Remote Management Access feature turned off by default. Customers who haven't enabled the Remote Management Access feature aren't susceptible to this specific malware," the statement continued. "Customers who have enabled the Remote Management Access feature can prevent further vulnerability by disabling the Remote Management Access feature and rebooting their router to remove the installed malware."

A guide for removing the threat is now available on Linksys' site.

Happy birthday mobile malware

This year is the tenth anniversary of viruses and the like appearing on mobile devices. While early efforts were crude, their complex descendents mean we need to remain vigilant when we're out and about.

"It all began in 2004, when the first variant of SymbOS.Cabir was submitted to


security researchers," explains Joe Ferrar, mobile security expert at Symantec. "Back then, the user had to manually accept the file transfer and agree to the worm's installation before the malware could infect the device. Over the past decade, the creators of mobile malware have become more sophisticated and prolific; between 2012 and 2013, Symantec recorded a 69 percent growth in malware designed for mobile devices, mainly Android phones."

Forbes.com carried a report that increased this number to eye-watering levels, with Android accounting for 97 percent of all global mobile malware. The other three percent wasn't made up of iOS, Blackberry, or even Windows Phones - all of which had a remarkable 0 percent of new threats - but the defunct Symbian platform that once graced Nokia phones. Don't panic, just remember - only 0.1 percent of Google Play apps were found to contain malware, and those that do are dealt with quickly.

It seems that the vast majority of infected apps reside in third-party app stores, predominantly in emerging nations. Stick to the official channels and you should remain safe. Of course, that doesn't mean you're immune from attacks, with other vectors remaining open due to your mobile device being connected to the internet.

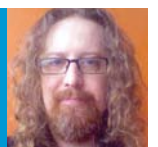
"Mobile threats will continue to evolve as mobile phones are used more widely as identification tokens and payment solutions," Joe Ferrar explains. "We anticipate that scammers, data collectors and cybercriminals won't ignore any social network, however niche they may be."

"As consumers increasingly access their social media profiles on the go, the risks of app-based malware looks set to soar."

"We trust our mobile devices and the apps that run on them to make our lives better. Cybercriminals will take advantage of this trust in 2014. We're not just talking about malware - mobile apps are increasingly going to be behind new hoaxes, cons and scams over the next few years." 



MARTYN
CASSERLY



Is the future of Windows moving online?

Rumours surface about a new, free version of Windows that's powered by the cloud

Microsoft seems to have a big problem with Google. Whereas in years gone by, the main rival to the Windows empire was Apple, that battle played itself out as Steve Jobs steered his company away from the desktop and instead focused on mobile platforms. Although Apple still sells a respectable amount of laptops and iMacs, they're eclipsed by an avalanche of iOS devices which now account for the majority of the company's considerable earnings.

Microsoft has attempted to conquer mobile, even becoming a hardware manufacturer in the process, but so far this has been an expensive, and not entirely successful, venture. Of course, time will tell whether Windows Phone and Surface establish themselves, but there's so much ground to make up that it's a colossal challenge.

During this shift in the technological sands, a strangely vitriolic contest has flared up between Seattle's finest and search giant Google, one which might become even more caustic as the two go head to head on the desktop. Rumours have begun to appear from reliable sources that a new version of Windows could be on its way, one drastically different to those before. Now, before panic erupts that Microsoft is about to unleash another Windows 8-style attack on poor, innocent computer users, be calmed by the knowledge that this one probably won't invent an undecipherable interface that requires Jedi mind powers to open the Control Panel. At least we hope not.

Windows Cloud is the new iteration that began surfacing on tech news-sites at the end of April, and it could be a hugely significant step towards an online-orientated future. Although there are scant details to go on, early indications seem to suggest that it will be a streamlined version of the OS designed for internet-connected use at all times. It could also be restricted in a similar fashion to the old Windows 7 Starter OS that appeared on netbooks a few years ago. The thought is that this particular version of Windows would

be free, and aimed squarely at the home-user market, but with a notable caveat. A subscription model would allow users to unlock the full features of Windows (or at least some of them) making their machine more useful. Whether this would also be accompanied by low-cost hardware that's subsidised by the Windows subscription is another possibility causing speculation. Microsoft has dabbled in this type of inducement before, with Xbox 360s once being offered at discount rates when bought with special two-year subscriptions to Xbox Live Gold accounts in the US. The company also demonstrated an interest in always-on internet connections with its early Xbox One announcements, something that proved so unpopular with potential customers that Microsoft eventually relented and ditched the feature.

Office 365 has possibly paved the way for Windows Cloud, proving that subscriptions can work if priced correctly. Of course, so long as you have an internet connection you could also use Office Online for free, something that might make more sense with the low-powered machines that we'd naturally assume Cloud would run on. How the OS might work is still a complete mystery, with thin-client (most of the heavy work happening on the server end rather than locally on your machine) looking a likely candidate. But how that would affect the user experience very much depends on whether you'd be able to install software locally, what kind of services would be available offline, and how much all this would cost. After all, most people are happy with how laptops work now, so why change it? Would it even be an x86 version of Windows, or could Microsoft take the opportunity to switch to ARM processors for longer battery life, no fans, and cheaper components? So far Microsoft hasn't commented on this potentially interesting development, which isn't unusual in itself, but if Windows Cloud turns out to be true then it could put the company in an awkward situation. An inexpensive, low-powered

MARTYN
CASSERLY

“Satya Nadella, Microsoft’s new CEO, recently outlined his plans for the road ahead, in which he stated that Microsoft would be a ‘cloud first’ and ‘device first’ company”

internet-centric PC already exist in the form of Google’s Chromebook. A device that Microsoft has been bashing for the last few months.

Its Scroogled advertising campaign in the US aggressively mocks the Chromebook for its simple OS and Internet dependent functionality. In one particular ad it has a slew of minor TV celebrities saying, rather unconvincingly, that the Chromebook isn’t even a real laptop, although the rationale for this boils down to the fact that the device doesn’t run Windows or Office. *Really?* Linux and Mac users may well take offence at the opportunistic classification.

A key aspect the advert fails to mention or even address is that Chromebooks are cheap, cheerful and designed to be an almost disposable device while still remaining very useful.

Offline capabilities have slowly improved, with Google Docs now working without an Internet connection, and, to be honest, with so much of modern computing revolving around the Internet for everyday use, this is becoming something of a moot point.

After an inauspicious start, Chromebooks are beginning to gain traction in education markets and pose an interesting alternative for those looking to buy an inexpensive laptop with which to browse the web, email, converse on social media, and do basic office tasks. Sales figures are still minuscule compared to Windows machines, but this year has seen attitudes change as many traditional PC

manufacturers have begun to introduce Chromebooks into their line. Toshiba, Samsung, Acer, HP and Dell all offer at least one of the Google-powered devices in their ranks, with rumours of other big manufacturers joining the party in the months ahead.

This makes sense as the web has developed considerably in the five years since the Chromebook first appeared, and with it the concept of an Internet-focused machine has gone from decidedly hair-brained to actually decent. If Microsoft is to compete in this area, then it will have to differentiate its product from the one it’s been trying to convince everyone is nothing more than a toy. Full versions of Windows running on low-powered, low-cost machines aren’t exactly an attractive proposition, with netbooks (although selling well for a time) proving just how compromised that experience can be.

So a lightweight version, aided by the power of the cloud, would be a far more attractive option, especially for people now having to upgrade from Windows XP, but not particularly enamoured by the baffling Windows 8 interface and its negative public perception.

How Windows can transition, at least in one incarnation, to a cloud-powered OS is going to be causing a few engineers sleepless nights in Redmond. But if they get it right, and Microsoft continues to offer traditional versions of the OS simultaneously, then this has the potential to be a fascinating glimpse into the future.

Satya Nadella, Microsoft’s new CEO, recently outlined his plans for the road ahead, in which he stated that it would be a ‘cloud first’ and ‘device first’ company. Now, while these may well be buzzwords that sound modern and progressive, the concept of the company moving away from the operating system on every desk in every home and instead embracing the possibilities of the web and how powerful its software can be across a multitude of devices, is one we welcome. ☒

MATT EGAN



In defence of the single-use device

Matt Egan has been looking for one device to rule them all. He hasn't found it

Convergence is good, we are told. And sometimes that is the case. The best tool is often not the best tool, but the tool you have when you need to use it. It's why your smartphone camera probably gets more use than does your DSLR. The high-end snapper takes better photos but, during the moments you need to capture something, it is more likely that you will have your smartphone in your pocket. And typing out an email on your phone may not be the most fun you can have, but I bet you send a lot of email from your iPhone or Android.

Good smartphones are good enough to replace both your compact camera for photos and your laptop for email. But it doesn't necessarily follow that one device can or should be your tool for everything.

Of course, that may not matter in a world full of the internet of things. If every device - from your fridge to your table top to your TV - is connected to the web, will you ever need to find the best tool for a single task? I think that you will, as I prefer to use certain devices only for certain tasks (although 'need' might be a strong word in this case).

Possibly I am a crank, but when I was recently on holiday I found that although my iPad is a great e-reader, an E Ink device such as an Amazon Kindle would have been so much better. Why? In part because reading on a backlit screen is no fun in direct sunlight, and also because I had only one plug adaptor and having to charge up my

'book' each night was a pain. The Kindle would have been better, although the iPad was perfectly fine.

Travelling home from the airport I used a standalone satnav device. Either my smartphone or my wife's would have worked, but they have smaller screens, less accurate GPS and batteries that just love to drain quickly. The satnav is good for only one thing, but good it is.

Reader, I even recently bought an iPod classic purely on which to play my favourite music. I commute every day and I like music. I don't always have web connectivity to stream music, and my smartphone and tablet quickly fill up so I don't always have the song I want when I want it. The iPod is perfect for the task in hand. Portable and robust with great battery life, and not half full even though it has more than 20 years of music purchases stinking it out.

No one device to rule them all

Take the change in messaging around Apple's iPad tablet. iPads haven't proven to be the one device to rule them all - and this despite Apple's early messaging being around the iPad being a 'new category of device' leading us to a 'post-PC world'. It just hasn't happened. Don't get me wrong, the iPad family is filled with great, market-making and -changing devices. Apple changed the world with the iPad. But as great and fun as they are, they are principally consumption- and

communication devices. Laptops and PCs are going nowhere, and even Apple now talks about the right tool for the right task, particularly when launching new MacBooks.

Indeed, there is no small irony when you look at the relative lack of success of Microsoft's Surface Pro, the response to the iPad. The Surface Pro is a tablet that is also a perfectly serviceable laptop, and with a screen and keyboard could make a great desktop PC. But it is perfect at none of these things and that, in part, is why Surface Pro is struggling to make an impact. You could avoid the Surface Pro, buy a laptop and a Nexus 7, and still have cash left over from what you would have spent on the Pro.

It's not that the Surface Pro is bad. Far from it - it's a magnificent device. I just don't think that level of convergence is required.

You can see it elsewhere - smartwatches aren't yet popular. Perhaps Apple will be able to change that, but in the meantime single-use activity trackers and runners' GPS devices are popular. Even more so in the US. They do one thing very well. And that's better and cheaper than shelling out for a smartwatch that does everything poorly.

It's possible I am wrong. Stranger things have happened and it's not as though I saw the iPhone, the Kindle or the iPad coming down the tracks. But I suspect that convergence is related to convenience and can go only so far. And the great single-use device is here to stay. ☒



Surface Pro 3: Great tech, poor product

Surface Pro 3 is a fabulous feat of engineering, but it will make a mediocre product, says Matt Egan

It's a crazy world in which Microsoft is the innovator that makes amazing hardware products, and Apple is the manufacturer of mass-market consumer goods... but, reader, that is the world in which we now live. In May Microsoft announced its Surface Pro 3 in an event that was eerily reminiscent of Apple in the pre-iPod days. Lame fanboy cheering? Check. Pitching to journalists rather than the public you expect to buy the thing? You betcha. A room full of people using rival products? 100 percent.

And like Apple pre-Steve Jobs 2.0, Microsoft was announcing great tech. But great tech that will struggle to find an audience outside of a small niche.

I have yet to lay hands on the Surface Pro 3, so I am speaking from my experience of using other Surface Pro devices and the words of my colleagues in our Surface Pro 3 review. And my early conclusion is that Surface Pro 3 is a stunning achievement.

To make a 12in slate that thin and light. To get all-day battery life from a full-spec power PC. To create a true laptop/tablet hybrid. To create a device that you can hold in one hand and on which you can truly edit photos and videos.

These are all laudable aims and impressive achievements of engineering. But they don't a successful product make.

I remember when AMD and Intel used to take out advertisements to boast about the fact that their processors were now officially

the fastest. It mattered to a certain type of geek, but to most tech users what has always mattered is not having the fastest device, but having a device that is fast enough.

Laptop-cum-tablet

Now Microsoft is showcasing a device that can be both laptop and tablet. That is an impressive boast and I expect it will be beautifully realised, but I'm not sure it fulfils a user need.

“

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”

I can't be only one who travels with a laptop and a tablet (and a smartphone). I'm a mugger's dream. But I don't recall ever wishing that I could roll up those devices into one gadget. If you read my column in defence of the single-use device (opposite page), you'll know that I like having the right tool for the right job - especially if that job is playing Football Manager on the train.

As much as I respect the Surface Pro 3, I am happy to make myself a hostage to

fortune. I, Matt Egan, on 18 June 2014 predict that Surface Pro 3 will not be a major success in terms of its own sales or as an inspiration for similar products from other Wintel manufacturers. Although the combination of laptop and tablet is impressive, the additional cost and the fact that it is not as good as either a laptop or a tablet (at being a laptop or a tablet) will mean that people don't buy it. I just don't think there is demand for a hybrid laptop

and tablet, any more than there is for a combination laptop and smartphone, or laptop and iPod (or laptop and toaster).

You just don't need one

No-one *needs* a tablet. But they are nice things to own. And they will remain so, in addition to the laptop that fulfils functional and professional needs.

I may be wrong. I'd like to be wrong. I'd *like* a Surface Pro 3, but I won't buy one. ☒



You're never alone with a clone

Why the rise in the number of clones is a blight on the gaming industry

It's only the summer, but - with respect to the wonderful FTL: Faster Than Light (tinyurl.com/nt7ymmk), our current darling - there's a decent chance we've already seen the best mobile game of the year. Threes is a magnificent puzzle game based around a simple-but-clever sliding-tile mechanic. It stood out at the time as the neatest, smartest and most addictive smartphone puzzler we'd played in months.

Threes doesn't stand out quite as much as it used to, mind you, because its critical and commercial success was swiftly followed, with crushing inevitability, by a flood of inferior clones. There are so many now that it's hard to keep up.

The first copycat was probably 1024; this was succeeded by 2048 (read our review on page 56), and when the makers of 2048 published the code for their game online, things got out of hand. Adding to the

confusion, many of the clones of that game also appear to be called 2048. A search on the App Store for 2048 now shows the unpleasant extent of the problem.

Sill, the swathe of Threes-imitator-imitator-imitators isn't even the worst attack of the clones 2014 has seen.

Remember Flappy Bird? When that game made it big (not a terribly good game, in truth, but one that people had fallen in love with) the clones turned up mob-handed, desperate to cash in. Flappy Bee, Flappy Plane, Flappy Vacuum Cleaner, Flappy Alan Yentob... When the game was pulled from the App Store and players were crying out for an alternative, things swiftly took a turn for the really undignified.

Apple fans have long championed the higher quality of iOS apps in the App Store as one of the reasons why the iPhone and iPad offer a better all-round user experience

than Android tablets and smartphones. They say that the Google Play store is like the Wild West: there's no curation. People can put any old rubbish on there. But it would take heroic feats of one-eyed partisanship to claim that Apple's store keeps out the rubbish entirely, or that the rubbish is even in the minority. Other than the very occasional serious security breach, clones are the big problem.

The App Store is still better than Google Play in terms of both attracting quality apps and keeping out the true scam artists, but it retains a tolerance for mid-level scumbaggery that irritates all of us who prize innovative software design. The shameless carpetbaggers who turn up hungrily after someone else has done the real work are a blight on the industry.

Anyone who puts in the passion and effort required to create something as perfect as Threes knows they will have only

“ Making these tiny games is littered with hard and painful times that are full of uncertainty and self-doubt. You never know if something is really going to work. It's not easy. But cloning or ripping off a design in a week, that's a bit different isn't it? ”

a few months' grace - hell, the way these people operate, it could be a matter of weeks - before they're swamped by virtually identical clones with slightly shoddier design, a free-to-play pricing model and a load of in-app purchases. Why would you put yourself in that position? Why would you take all the risk, knowing that others who risk nothing stand to gain much of the reward?

Policing the clones

Apple and Google are aware of the problem of cloning, and it would be misleading to say they do nothing to stamp it out. When Flappy-mania was at its height, for example, both companies took action against new app submissions that followed that game's template too blatantly. A game, containing some swearing, called Flappy Dragon was rejected, according to its developer, as Apple "found [the] app name attempts to leverage a popular app". When the same game was removed from the Play store, Google told him not to "use irrelevant, misleading, or excessive keywords in apps descriptions, titles, or metadata".

But both companies focus on technicalities, and take an approach that's roughly analogous to the legal idea of 'passing off', which legislates against products that are likely to mislead consumers. So when Flappy clones removed the superficial similarities - Flappy Dragon had only to rename itself Derpy Dragon to get back on to Google Play - they turned a blind eye to their deeper borrowings.

Speaking to Eurogamer, one developer explained that Apple's submission process doesn't require any assurances that an app is original in the way that it works - just in the way that it looks and sounds. "There's the usual stuff in the T&Cs about owning the content you're uploading, but that just covers overtly ripped off assets - graphics, music, and so on - not the core functionality of the app or the gameplay," the source said. "So, technically, clones would be exempt."

The way forward?

None of this is to say that borrowing is a bad thing in itself, as Steve Jobs (borrowing from Picasso) was fond of pointing out. Great creative work always builds on what's gone before, and loads of great games would have been cancelled before they got to a beta stage if a fiercely IP-protecting copyright lobby had its way.

But the creative process is a magic synthesis of ideas: many minds, past and present, contributing to a larger whole. Clones don't contribute anything.

While cautiously preferential treatment for much-copied games - promotion and a higher search ranking - would be a powerful way for Apple to preserve the distinction between its App Store originals and their rivals' messier, lower-quality alternatives, a legalistic or corporate approach probably isn't the best way to do so. It's difficult to copyright the way a game plays, and even if that were possible, Apple needs to be wary going too far the other way.


Bizarrely enough, we're currently seeing the ugly face of both sides of the argument. While clones proliferate on the App Store, King, maker of fiercely unoriginal Bejeweled derivative Candy Crush Saga, has started throwing its weight around over trademark violations. You have to admire the company's sheer brass neck if nothing else.

What I'd like to see is large-scale action from users. If there's a stunningly original

iPhone game and a lazy rip-off side by side, buy the original - even if it costs a couple of quid more. I propose this not out of a displaced sense of morality - although what some of these companies do is shockingly immoral - but because we need to reward innovation. If the likes of Threes can't make money, genuine developers won't be able (or willing) to invest their time and talent in making more of them.

By choosing the rip-off, you're not just harming the developer; you're harming your own long-term choice of games.

If you doubt the work that goes into creating a beautiful little app, I'd strongly recommend the lengthy and bittersweet post about the development process for Threes; The Rip-offs & Making Our Original Game. It concludes:

"Making these tiny games is littered with hard and painful times that are full of uncertainty and self-doubt. You never know if something is really going to work. It's not easy. But cloning or ripping off a design in a week, that's a bit different isn't it?" 

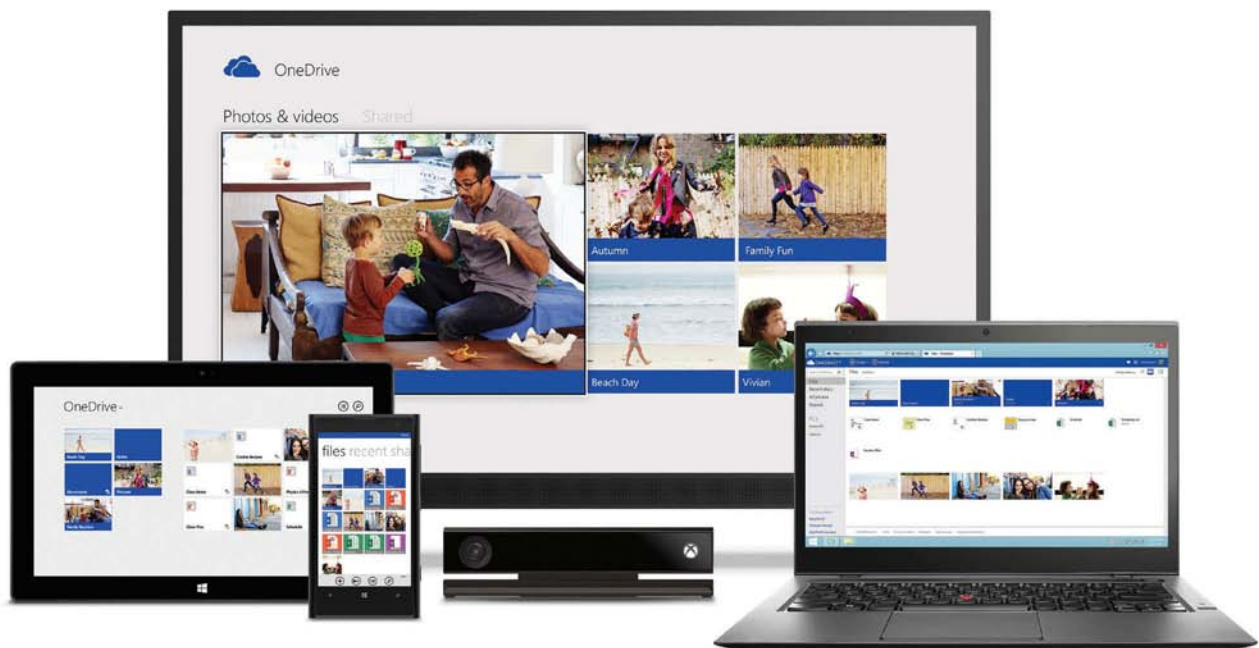
DAVID PRICE



Bejeweled (left) versus its **DERIVATIVE HIT CLONE**, Candy Crush Saga



CHRIS
MARTIN



Simplicity is the key

Why Microsoft needs to keep things simple if it's to survive

You'd think that as one of the world's largest and most successful companies, Microsoft would find it easy to put a roadmap and strategy together. But it doesn't seem able to keep things simple.

Since Windows 8 launched in 2012 we've had what I can best describe as a mess of products, launches and updates, which is confusing for us as technology journalists following this kind of thing day in, day out. I can't start to imagine what it looks like to the average punter, then.

The operating system brought with it this strange concept of that good, old, familiar desktop combined with the tiled Start Screen interface, which none of us, to this day, use on our PCs. The apps weren't, and still aren't, very good – and you have to go round the houses in terms of navigation to do anything.

Then there's Windows RT, which just shouldn't have existed in the first place. It's a cut-down version of Microsoft's OS that still has the desktop and Start Screen, though, you can't install traditional Windows software on it. Plonked on to various tablets, I just haven't found them beneficial or easy to use.

A while ago Julie Larson-Green, EVP of Devices for Microsoft, admitted that the firm

hadn't explained the difference between Windows 8 and Windows RT to users properly, adding that "we're not going to have three [operating systems]". However, we've seen no sign of the demise of RT.

With PC sales consistently falling over the past couple of years, Microsoft needs to keep things as simple as possible to keep users engaged and interested. Most of the older generation who would previously use a laptop or PC are now logging on to Facebook and checking their email on an iPad because it's so darn easy.

The Surface was a good idea, but it's basically too unwieldy as a tablet and too darned fiddly as a laptop – not to mention the price of one with a decent spec.

Going back to Windows 8, Microsoft has fixed a lot of problems with recent updates so at least it's been listening to customer complaints and reading reviews that point out flaws. You can now pin Modern UI apps to the taskbar and they now have a title bar so you can easily minimise or close them. These and other features should have been in Windows 8 from the beginning.

Whoever decided on the naming strategy needs a good talking to because first came

Windows 8.1, which is fine, but it was followed by the unimaginative and plain silly sounding Windows 8.1 Update. I'm sorry, but what's wrong with Windows 8.2? It's a lot easier to understand what's going on that way or will the next version be called 'Windows 8.1 update 1 Service Pack 1'.

At least Microsoft has decided to do this with an upcoming update to its mobile operating system, calling it Windows Phone 8.1 to tie in with its desktop counterpart.

The software giant has recently completed its acquisition of Nokia's Devices and Services business, which it hopes will boost Windows Phone's adoption. It's the fastest growing mobile OS, but that's not too hard when you're starting from around 1 percent market share.

Microsoft has a lot to do in order to catch up with iOS and Android in the fierce mobile market and there are question marks over whether it will even use the globally recognised and trusted Nokia brand. Microsoft could well be ditching it in favour of something like 'Microsoft Mobile', which would be downright ridiculous.

So this is my plea to Microsoft's naming chiefs – keep it simple stupid! ☒

ANDREW
HARRISON

Get more than you paid for

Why cheap can be as bad as free when it comes to products and services

Anyone who knows anything about today's internet knows that if the online service you are using is free, you are no longer the customer - you are the product being sold.

Google learned long ago how sexy and attractive is free. The company launched Gmail to an incredulous public 10 years ago on 1 April 2004.

Many thought it an April Fools' joke, so distracted were they that Google could truly be offering a totally free email hosting service with the then-ridiculously huge quota of 1GB of storage.

Most people were so smitten and keen to sign up that they either didn't read the conditions or they blithely accepted the fact Google was mandating a trade, demanding in return to read every word of every email they wrote, and use those words to build a unique database of them. It could also see with whom they associate, helping colour in the identity picture.

Given the current user base of Gmail users - over 400 million in 2012 - we can see just how successful was Google's gambit, and how little people care about privacy.

But reading your email is simply where the privacy-destroying fun begins. As you then surf the web, a unique user ID is generated for anyone who stumbles upon a Google-connected web property. This is stored in a cookie on each computer and device you use. And alongside cookies are other ways to uniquely identify you - invisible pixels on the web page hosted by a third party, crafty JavaScript tricks, Google Fonts, browser fingerprinting and more.

Given the near-universal use by webmasters of Google Analytics, AdSense, AdWords or DoubleClick, your surfing history is in essence logged for almost every single web page you visit. Where you visited, how long you spent on each page, which links you clicked, and more.

Google Search: where it all started

When you make a search on Google's search page your query is recorded against your unique ID. Everything from 'best restaurant

in Camden' to 'mole skin cancer' to 'new sex positions' to '[insert high-school sweetheart name]' gets logged against you.

Up to this point, it may be categorised as 'anonymised data' since your real name and identity are not yet attached to this profile.

Only now, since you've already given Google your personal details to open a Gmail account, it now knows exactly the 'who' of who visited that site, attaching your browsing UUID cookie to you.

In manifold ways, just starting with your IP address, it can then build up the complete picture of where you live, where you work, your working habits, your sleeping habits... even though you never expressly told Google any of these details. This is advertising dynamite, enabling it to laser-guide lucrative behavioural advertising from its advertising customers more directly at you, its product.

For users of Android mobile devices, avoiding Google's all-seeing eye is all but impossible. Besides everything else, it knows to within metres where you were when you made that search, looked at that web page or took that photo.

What Gmail users give for free is literally worth a fortune to Google. Google's revenue, creamed from brokering advertising, was around \$13bn last year.

The consensual collection of your personal data by a data-collection agency such as Google is not illegal. The user needs to opt in to allow being tracked so effectively, and Google does explain in neutral legalese when you first sign up that it will record all that you do online. Since March 2012 it will also collate all data on you from all its many services, to sharpen further the focus on your life.

He who pays the piper

So what happens when you pay for services on the web? Now you're the paying customer, you're the data boss! Not exactly.

As well as 'free' services, there are also 'remarkably cheap' ones. Hardware products, too, that require some cash payment, but are considerably cheaper than the price at which the competition is charging.



Examples of such subsidising include Google-sponsored smartphones such as the Nexus 5, and tablets such as the Nexus 7.

Returning to Google's core of online services, there is the paid-for Google Apps for Business. This package provides a unified portfolio of Gmail hosting, and Google Docs and Calendar, offered to businesses to manage their online communications and data. Since the unified Privacy Policy of March 2012, each user is required to agree to Google's exact same terms: to being tracked and their data harvested.

Besides businesses relations with employees lies the core issue of personal privacy. You should expect your company email and surfing history to be monitored by your employer. But what about by another company in another country, whose goal is to make money from your data? Equating Google's online ubiquity with safety, it's less surprising that some companies have forsaken personal privacy and taken the 'remarkably cheap' option.

It's not that I resent the passage of money from advertiser to broker; that's capitalism at play. But the distilling of so much of our life into carefully prepared databases has also become an all too tempting asset for those that wish to surveil the population en masse.

That temptation proved too much for the UK and US governments, who now skim Google's servers either by gagged side-door requests through the Prism program, or simply tap personal data in transit.

Thankfully, being tracked by Google requires you to have a Google account, and that's a matter of your own choice. ☒

Linux group builds 64-bit Android KitKat

Linaro has built a 64-bit version of Android 4.4 for developers to write and test applications for ARM-based mobile devices. **Agam Shah** investigates

Google is remaining tight-lipped about when the 64-bit version of Android will be released, but Linux development group Linaro has built a version of the open-source operating system so mobile applications can be written and tested by manufacturers and developers rushing to catch up with Apple.

Android smartphones and tablets could be faster with 64-bit hardware and also carry more memory. Device makers are feeling pressure to catch up with Apple, which jumped ahead of the competition by putting its 64-bit A7 processor in the iPhone 5s and iPad Air. Linaro's Android builds aren't full-fledged distributions of the OS, but they are system builds meant for developers to write and test applications.

The Linaro development group has tested a version of the 64-bit OS - based on the 32-bit Android 4.4, code-named KitKat - on actual 64-bit ARM chipsets, which aren't yet available in Android smartphones and tablets. However, since Linaro's 64-bit developers version of Android offers backward compatibility, third-party developers can run the OS on existing 32-bit tablets like Google's Nexus 7 and 10, and an emulator can then be used to test 64-bit applications.

Linaro is a non-profit organization that includes

top ARM-based chip makers Samsung, Qualcomm, MediaTek, Allwinner, ZTE, Texas Instruments, Advanced Micro Devices, Cavium, Freescale, Marvell and LSI.

Other members include Facebook, Citrix, Hewlett-Packard, ARM, Nokia Solutions and Networks, Cisco, Red Hat and Canonical.

The final release of 64-bit Android will depend on Google, which will take the available open-source code and make tweaks before releasing the OS. Adoption of 64-bit Android on mobile devices will be swift if software, drivers and tools are ready before the OS release, Linaro CEO George Grey said.

"It seems to me, a lot of companies are looking to push phones based on 64-bit architecture later this year," Grey said.

Industry observers believe Google could announce a 64-bit version of Android at the Google I/O conference in late June, although there's no guarantee this will happen.

Qualcomm, nVidia, Marvell and MediaTek have announced 64-bit mobile chips, but have declined to talk in detail about the work they're doing to bring the 64-bit version of the OS to those chipsets.

Linaro's focus is on building Linux-based software, tools and drivers for ARM's 64-bit ARMv8 architecture. The organisation initially focused on servers, but mobile devices became a priority with more ARM-based chip makers announcing 64-bit processors.

Linaro has 200 engineers and it's bankrolled by member organisations, which has helped speed up contributions, Grey said. The company has made contributions to the Chromium browser for 64-bit Android, and also to the Quick EMUlator system model - a special hardware emulator designed to replicate a virtualised OS environment.

Linaro is providing monthly engineering Android builds based on the 64-bit kernel for developers to download. The group has been working on code that Google and other open-source developers have been putting into the Android Open Source Project (AOSP) repository. The engineering images are based on the latest Linux 3.14 kernel and a stable image is provided every three months.

"AOSP provides early access to the next version of Android, although it won't have the functionality and user interface of the final product," Grey explained.

"The emulator that's available on 32-bit platforms isn't quite as versatile as testing code as on actual 64-bit ARM hardware, but it's a lot better than nothing.

"Obviously, the emulator is a little on the slow side, but it's still possible to complete a lot of the Linaro development."

Intel has already demonstrated its own working 64-bit version of Android 4.4, but for its x86 processors. Only a handful of smartphones and tablets use x86 processors, and the Intel build is only an early preview release of "pre-alpha quality," according to Intel's open-source website. [\[X\]](#)



AMD looks to a future based on Android, not Windows

Agam Shah says that it will bring native Android support to a 20nm, 64-bit ARM processor next year



Advanced Micro Devices has finally announced details for bringing Android to its chips as the company looks to support more operating systems in the future beyond Windows.

AMD will support Android on its 64-bit ARM-based chips starting next year, the company said in a recent press conference where it announced Project SkyBridge, a series of products to provide the plumbing for its ARM and x86 cores to be interchanged or combined on a single motherboard.

AMD is bringing Android only to ARM architecture, not to x86, which is used in Windows and Linux PCs. AMD in the past has maintained that Android would work best with ARM processors, which are used in most tablets and smartphones. Intel has already built a flavour of Android for its x86 chips.

The new ARM and x86 chips made as part of Project SkyBridge could appear in ultra-thin client devices – which may include tablets – as well as embedded devices, said Lisa Su, general manager of AMD's global business units, during the media event.

AMD isn't targeting smartphones to focus on products that can deliver a strong computing and graphics experience, Su said.

With Project SkyBridge, device makers will be able to design Android products that will harness the joint computing power of ARM Cortex-A57 64-bit chips and AMD's Graphics Core Next (GCN) GPUs. The AMD-led HSA (Heterogeneous System Architecture) Foundation is developing programming tools

and standards so all the processing units can operate in tandem to speed up a system, but AMD's ARM processors aren't yet compliant with HSA's standards.

"This will also be the first Android platform that we have at AMD that supports our HSA standards," Su said.

A chart showed Project SkyBridge supporting Android, Windows and Linux, and AMD is making a series of new x86 and Android-compatible ARM-based chips that are pin compatible. The chips will be made using the 20nm manufacturing process, and are currently on track for delivery to device makers next year, Su explained.

Android may not be a priority for AMD, but it has to add support for the OS if it wants to compete in the thin-and-light and tablet markets, analysts said.

"Android would go into tablets, and to the extent that ARM makes headway, into clamshells," said Nathan Brookwood, principal analyst at Insight 64.

Unlike Intel, which relies on x86, AMD is trying to keep a flexible chip strategy and wants to offer x86 and ARM chips to customers, Brookwood said.

AMD licensed ARM in 2012, and has announced a line-up of low-power and server cores based on this architecture.

"They are focusing their low-power x86 on Windows, and to get to tablets on ARM, they will do Android," Brookwood explained.

AMD could also tweak Android for embedded devices used in cars, the military

and other areas, said Jim McGregor, principal analyst at Tirias Research. "A good example would be infotainment where you may want to use a third-party app," he said.


Android could open up a new market for AMD's tablet chips, which only support Windows. AMD's previous Z-01, Z-60 and Temash tablet chips were only used in a few niche Windows 8 tablets. Last week AMD launched its latest Mullins chip for tablets, which only supports Windows. However, users can add a virtual layer of Android through the Bluestacks emulator.

But support for Android doesn't mean AMD will abandon Windows altogether.

"Windows has a well-established franchise and is primarily an x86 play," Brookwood said. "AMD is one of two companies that can play with x86. It'd be silly for them not to exploit this opportunity to the fullest."

Support for Android helps AMD achieve its goal of putting its chips in non-PC hardware, McGregor said. AMD is trying to diversify by designing custom chips for products like game consoles and servers.

Still, you may be able to build a dual-boot Windows and Android PC through a Project SkyBridge motherboard with an x86 and an ARM core. But analysts said that dual-boot systems would require many changes in the BIOS, and users may not be attracted to the Windows and Android disconnect with the files residing in two different file systems.

"Dual-boot systems don't make sense for Project SkyBridge," Brookwood said. 

DDR4 RAM coming to desktop PCs this year

The wait for superfast memory is almost over, says [Agam Shah](#)

For gamers and desktop users looking to shift to the new DDR4 memory as quickly as possible, the wait will end in the third quarter this year.

Crucial expects to ship new DDR4 memory for both servers and desktops around the same time in the third quarter, revealed Michael Moreland, worldwide product marketing manager at Crucial.

New DDR memory is usually shipped first for servers and then for desktops, but that trend will change with DDR4, which has been under development for more than five years. PCs will be faster and more power efficient, as the new specification provides 50 percent more memory bandwidth than DDR3 and 35 percent more power savings.

"We expect DDR4 adoption will take place – the parts, the boards, the accessories will be there for customers," Moreland said.

Graphically intense games and high-end server applications are bandwidth sensitive, and DDR4 memory will make computers more responsive, explained Nathan Brookwood, principal analyst at Insight 64.

"As you go to more cores and higher clock frequencies, it's all about bandwidth. [DDR4] is going to be in high-end servers and high-end PCs," he added.

Crucial's DDR4 DIMM shipments will come when Intel ships chips that support the new memory. Intel has added DDR4

support to its server and enthusiast desktop processors, and Crucial's DDR4 DIMMs will plug into these. Intel's upcoming eight- to 16-core, Haswell-based Core Extreme Edition processors and Xeon server chips code-named Grantley will be DDR4 compatible.

As with DDR2 and DDR3, it's safe to assume that initial DDR4 DIMMs could be priced at a premium, Moreland said. The memory industry is volume-sensitive and prices typically come down as adoption grows and more chips are produced. DDR4 is ultimately expected to replace DDR3.

Crucial has already shipped DDR4 modules for testing to motherboard makers and system builders. These include RDIMM (registered dual in-line memory module) with ECC error correction for servers, and UDIMM (unbuffered dual in-line memory module) – which doesn't have error correction – for desktops. Crucial is sampling 4-, 8- or 16GB RDIMM modules and 8GB UDIMM modules. They draw 1.2V of power.

It could take longer for DDR4 to reach laptops, though, Moreland explained. Intel hasn't yet provided details of its next PC chip code-named Broadwell, and shipments have already been delayed by a few quarters.

Indeed, DDR4 could even reach mobile devices before laptops. Qualcomm has announced a mobile chip called Snapdragon 810, which supports the low-power DDR4 (LP-DDR4). Smartphones and tablets based on the chip will ship in the first half of 2015.

The DDR4 specification was finalised in September 2012, but its adoption was delayed after prices of DDR3 stabilised last year. Price stability generated higher profit margins for memory makers such as SK Hynix, Samsung and Micron. They continued making DDR3 instead of moving over to DDR4, which would have cost more to produce. Intel and Advanced Micro Devices stuck to DDR3 in thin and light laptop designs, which were intended to resuscitate the slumping PC market. ☒

“

The memory industry is volume-sensitive and prices typically come down as adoption grows and more chips are produced. DDR4 is ultimately expected to completely replace DDR3

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How to protect your PC from GOZeus and Cryptolocker

Five important things to do to ensure you don't get scammed

The UK's National Crime Agency along with the FBI, Europol and various security software firms have worked together to temporarily pause the attacks from the Cryptolocker and GOZeus malware. Here's what you need to know about keeping your PC and data safe.

Operation Tovar: in a nutshell

Law enforcement agencies, internet service providers and tech security firms from 11 countries have teamed up to try and stop infected computers all over the world from communicating with each other.

It has been fairly effective, but they admit that they can't keep the criminals' network down for long. That's why there are so many headlines telling you that you have two weeks to protect your PC from oblivion.

In fact, the malware has been around for a long while and is thought to have infected over 15,000 computers in the UK already. However, because the criminal network's "command and control" is weakened, the government has said this is a "window of opportunity" to protect your PC.

Cryptolocker and GOZeus: what's the threat?

Both are nasty pieces of malware. Cryptolocker encrypts your files and demands a ransom to decrypt them. However, there's no guarantee that you'll get access to your files if you pay up, and sadly, there's no other way to decrypt them.

GOZeus (GameOverZeus, also known as P2PZeus) is an advanced piece of malware that scans your PC for financial - especially banking-related - details and other valuable personal data which the criminals can sell on.

The two work together with Cryptolocker kicking in after GOZeus has done its dirty work. It's quite an effective combination.

How to stay safe

Our advice is simple, and the same as always:

- 1** Keep Windows up to date with the latest security patches and other fixes. This should happen automatically, unless you have disabled Windows Update. To check if Windows is up to date, run the Windows Update tool. Search for it in the Start menu.
- 2** Make sure your antivirus or internet security suite is up to date and hasn't been disabled. If you haven't installed any antivirus software, or you've let a subscription lapse, re-subscribe or install some free software such as AVG or Avira.
- 3** Don't open email attachments or click on links in emails unless you're certain they're safe. This is how most phishing attacks work, and don't assume that just because an email is from a trusted person that attachments and links are safe. Their email password may have been hacked and the criminals are using their account to send out waves of fake phishing emails.

Expect to receive emails purporting to be from your internet service provider or the government asking you to click on links


or open attachments. These are the ways in which criminals try to fool you and get you to give them personal information. If anything seems suspicious - such as greetings saying 'Dear customer' rather than your full name - delete the email immediately.

If you do click on a link or open an attachment, the malware may install itself automatically, so always be on your guard.

- 4** Back up your most important documents. This is absolutely vital to protect against Cryptolocker. It doesn't matter if your files are encrypted if you have an up-to-date back up. You can simply restore the files, perhaps after reinstalling Windows if it comes to it.

The most important thing is to copy the contents of your user folder (Documents, Photos, Videos and any other files that can't be easily replaced) to a portable hard drive that you can store separately from your PC.

A network-connected backup drive such as a NAS may be susceptible to Cryptolocker, so you need an offline backup to be safe.

- 5** Finally, if your PC or laptop has a webcam, you might consider covering it up with a piece of masking tape as these malicious programs may be able to access your device's cameras and take photos or video whenever you least expect it. If your webcam has a light which indicates it's in use, the malicious software may also be able to disable that as well, so the camera may be on - taking photos and recording videos - when it appears to be safely turned off! 



Motorola Moto E to kill feature phones

A cheap, game-changing smartphone is water resistant and features a 4.3in touchscreen, writes **Mikael Ricknås**

Motorola Mobility hopes its £89 smartphone, the Moto E, will attract consumers that might otherwise have bought a feature phone. For people with a greater budget, the Moto G has been upgraded with LTE and a microSD card slot.

The company hopes it will build on the success of the original Moto G, the best selling phone in its history according to Steve Horowitz, head of global software engineering at Motorola.

The goal with the Moto E is to finally end the feature-phone era, he said, adding that about 70 percent of phone owners still have a feature phone, a term typically applied to phones that can do more than just send and receive calls and text messages, but don't have the flexibility or the processing capacity to run sophisticated downloadable apps.

The water-resistant 3G Moto E uses Android 4.4 and is powered by a dual-core processor running at 1.2GHz. It has a 4.3in screen with a 960x540 screen resolution. The screen is protected with Gorilla glass and has an anti-smudge coating. The Moto E also has a 5Mp camera and 4GB of integrated storage, which can be expanded using a microSD card slot plus 1GB of RAM.

When developing a smartphone that costs as little as the Moto E, some compromises have to be made. The device doesn't have a front-facing camera and also lacks LTE.

However, Motorola has managed to design a device that doesn't feel cheap.

The Moto E also won't come with the various customisation options Motorola offers Moto X buyers through its Moto Maker service. However, Moto E buyers can still choose between a black or white front as well as 20 design and colour combinations with Motorola's own shells for the rear of the device.


The Moto G, launched six months ago, has a 4.5in 720p screen, a quad-core 1.2GHz processor, and 8GB or 16GB of integrated storage. At \$180 without a contract in the US, it showed that affordable smartphones didn't have to skimp on performance.

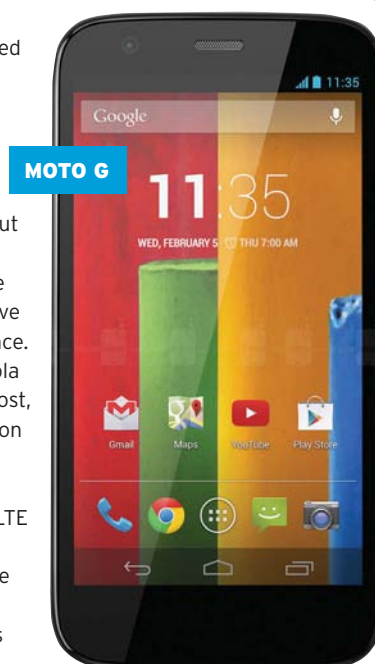
On Tuesday, Motorola gave the G another boost, launching an LTE version which will cost \$219 (£160 in the UK). That the company can add LTE to the Moto G without making it too expensive shows the cost of the necessary components is decreasing rapidly.

In addition to 4G connectivity, Motorola has added a microSD card slot. That omission in the original version was a mistake, but the company has listened to complaints from users and made the change.

The Moto E will be available immediately in the UK and US on Motorola.com and in India, and then in more than 40 countries in the coming weeks. The Moto G LTE will start shipping at the end of this month.

Since the Mobile World Congress in February, smartphone manufacturers have been focusing on the highly contested low-end of the smartphone market.

"The next wave is about selling smartphones to people that don't yet have one, and don't necessarily need one," said Francisco Jeronimo, research director for European mobile devices at IDC. "But if you can offer this group of consumers a smartphone that costs about the same price they paid for a feature phone a few years ago, vendors are hoping they'll take the plunge and get themselves one." 



The rise of vagueness as a service



An unexpected new trend is emerging in apps and web services. Information presented to the user is growing ever more vague. [Mike Elgan](#) explains

In each new app where vagueness is introduced as a feature, exact information is available to the companies providing it. But increasingly, they're providing the service of converting precise information into its vague counterpart. I'm going to tell you why they're doing this. But first, here are a few examples.

Approximating location

Over the past 15 years, the technology that tracks the whereabouts of mobile phones – and their owners – has improved significantly and now delivers extremely precise results. By combining GPS, cell-tower triangulation and Wi-Fi hotspot location data, location services can often pinpoint not only the building you're in, but also the specific room.

Beacon technology, including Apple's iBeacon product, takes location even further,



narrowing down where you are to within a few feet. These systems can determine not only that you're at a restaurant, and not only that you're in the front dining room, but also that you're sitting near the kitchen at Table 7.

That's way too specific. So now both Foursquare and Facebook are offering

“These systems can determine not only that you're at a restaurant, and not only that you're in the front dining room, but also that you're sitting near the kitchen at Table 7”

location vagueness as a user benefit. The feature's tech jargon is “ambient proximity”.

The idea is to broadcast not location, but relative distance. My friend Steve doesn't know I'm at Table 7, in the front dining room or even in the restaurant. He knows only that I'm about a half mile from where he is.

Foursquare's “ambient proximity” feature is the main benefit of a new app called Swarm, which was announced on 1 May.

Swarm creates a feed of your family and friends based on groups. It can tell you that Steve and Janet are 500 feet away, and that John and Jerome are about a mile away.

Swarm is similar to Facebook's Nearby Friends, which also launched recently.

Fudging the numbers

Twitter recently rolled out a series of design changes for the Twitter.com website. However, two of these changes involve the

benefit of using approximate numbers in place of specific ones.

Since the beginning, Twitter displayed the number of Tweets you've sent, the number of people you're following, the number of people who are following you and other precise account information.

Recently, however, it has started rounding these numbers down. For example, Twitter shows me that I've sent 23.8K tweets and a similar number (23.4K) of followers.

Even more vague: Twitter now shows tweets in larger type if they've gotten more engagement. It grades on a curve, so “more

engagement” means more than your other tweets, not more engagement than other users’ tweets – a handy form of comparison.

How much more engagement? And how is this defined? Don’t worry your little head about it. It’s deliberately vague information – a case where “less” is apparently “more”.

Hiding details

Another trend is hiding the exact URL of the page you’re looking at in your browser.

I noticed some time ago that Apple’s Safari for iOS browser replaces the actual URL in the address box with just the name of the website. When I’m looking at one of my columns on the PC Advisor website using any desktop browser, for example, the URLs I see displayed by the browser are fairly long and tend to contain information like the headline and the page number in the URL itself – it’s all pretty standard stuff.

But using Safari for iOS on my iPad, the address box shows me not the URL, but simply (and vaguely) pcadvisor.co.uk.

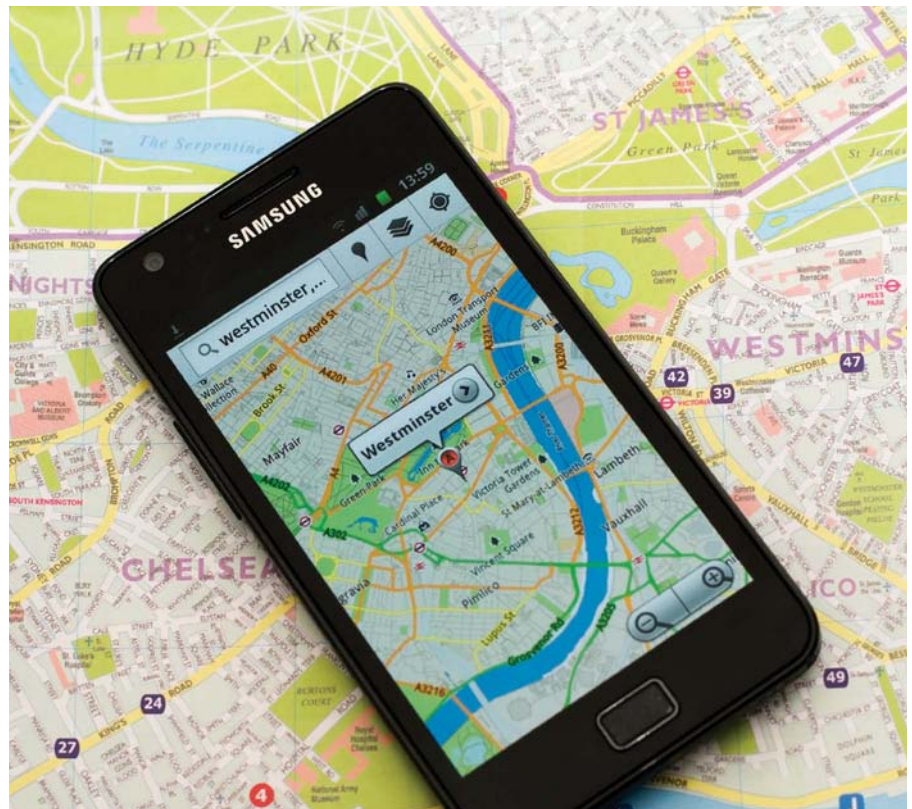
The beta version of the Google Chrome (code-named “Canary”) browser is reportedly also working on a similar feature for the desktop version of Chrome.

Why vagueness is a user benefit

In every case – Foursquare, Facebook, Twitter, Safari for iOS and Google Chrome “Canary” – the companies have access to perfectly specific data and could easily show it to you. But as a service to you, as a user benefit, they’re presenting you with vague information in place of specific information.

Why is vagueness a user benefit? Simple: Vagueness is humanising.

I’ll give you an example. People in real life don’t say: “Wow! I just spent one-hundred and ninety-seven pounds and forty-two



pence at IKEA. The table I just bought is 10.72 inches smaller than my old one.”

They say: “Wow! I just spent a couple hundred quid at IKEA!”

People round numbers, guesstimate how long things will take and speak in generalities. And they do it on purpose. Vague information is easier to receive and comprehend than absolute accuracy.

complete URL, as in Safari for iOS or Google Chrome “Canary” has an important security dimension to it. If the address box shows you the whole URL, your eyes are more likely to glaze over and your attention won’t focus on it. A URL is a de-humanising package of information. However, a simple domain can show you at a glance whether you’re at a real site or a spoofed or fake one. (“Hold on

“**As technology grows more central to our lives, the specificity of information provided by the machines we use becomes a perpetual source of nagging stress**”

As technology grows more central to our lives, the specificity of information provided by the machines we use becomes a source of nagging stress. Companies are finding small and subtle ways to humanise technology by making the information presented to us vague, rather than specific.

In the cases of Foursquare and Facebook, the idea of broadcasting your exact location feels de-humanising. But revealing your approximate location feels nice. I’m giving information in a human way: couched in generality, as well as personal relevance.

Rounding numbers and separating high-engagement tweets from lower-engagement ones by size reduces the information overload effect of the Twitter-post wall.

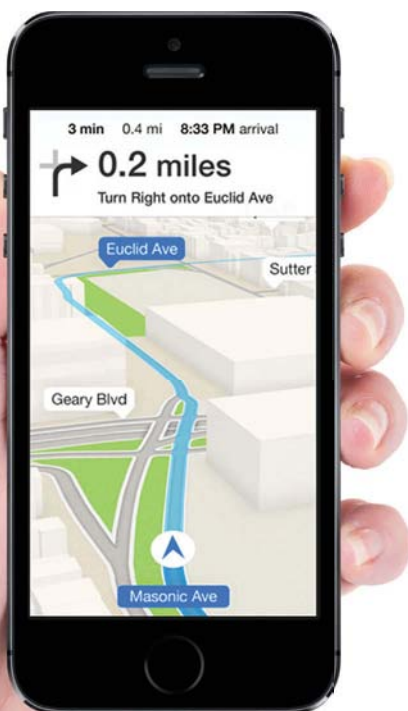
The trend toward showing only the basic name of a website, rather than the

a minute – this isn’t asos.com at all! Get me out of here immediately!”)

Humanising your Web location through vagueness allows your mind to easily engage with, and thereby benefit from, the relative location information that’s presented. You might be more inclined to revisit a particular site which has a memorable URL.

I’m convinced that these examples are only the beginning. I think we’ll see a growing and broad effort by technology companies of all kinds to introduce vagueness of all varieties everywhere they possibly can.

So what of the future? When will vagueness become mainstream? And how far will companies take the trend, exactly? The answers are: pretty soon and pretty far. If those answers both sounds bit vague for you, then you’re most welcome! ☒



Imagining an Apple Smart Home

An automated Smart Home may be a dream come true, but there's always a digital downside, writes [Ashleigh Allsopp](#)

This month, there have been lots of rumours about Apple. Oh wait, that's every month. But in the past seven days there were rumblings about Apple's latest plans to launch a new Smart Home platform. Now, there's something we've not heard much about before.

At first, I brushed off the idea as being kind of boring, but then I got thinking about the possibilities of an Apple Smart Home and decided that it could be incredibly cool.

Think about all those futuristic movies you've seen, where humans don't have to think about anything other than breathing, as the environmental tech does everything else and can pretty much read their minds.

So last night, when I arrived back home, I (perhaps sadly) decided to imagine what it

would be like if my house were an intelligent Smart Home from the future. It would probably all be controlled by the iPhone I'd be carrying in my pocket, or perhaps even that rumoured iWatch I'd have wrapped around my wrist all the time.

I'm certainly not saying that Apple's platform is going to make all of this possible right away, but it could be the spark that propels us towards the gleaming hi-tech future those sci-fi movies envisioned.

If my house were a Smart Home, I'd pull into my driveway and straight into the garage, which would have automatically opened on my approach. I'd get out of the car, which would automatically lock as I walk away, and go towards my front door as the garage automatically closes behind me.

The door would be open because GPS data would pinpoint me on the doorstep, so I'd walk straight in without needing to fumble around in my bag for my keys. My floor would be clean because my robotic vacuum cleaner will have done its job while I was out at work.

If it's chilly outside, the heating would be on already and my house would be the perfect temperature thanks to my smart thermostat. The lights would come on as I

enter the house, and my TV would spring to life and display the channel that's about to show my favourite programme.

My cat wouldn't need feeding because the food would have automatically dropped into the bowl, and the kettle would have just boiled, ready for my cuppa. I wouldn't have to worry about an empty fridge because it would know when I'm about to run out of milk and put in an order for more.

Perhaps I'd even have a smart biscuit tin because I can't function properly without my daily digestive when I get home.

I'm going to guess I'd have to cook my own dinner, though, on average once a fortnight. I'd set up an automatic takeaway order that would arrive 10 minutes after I do.

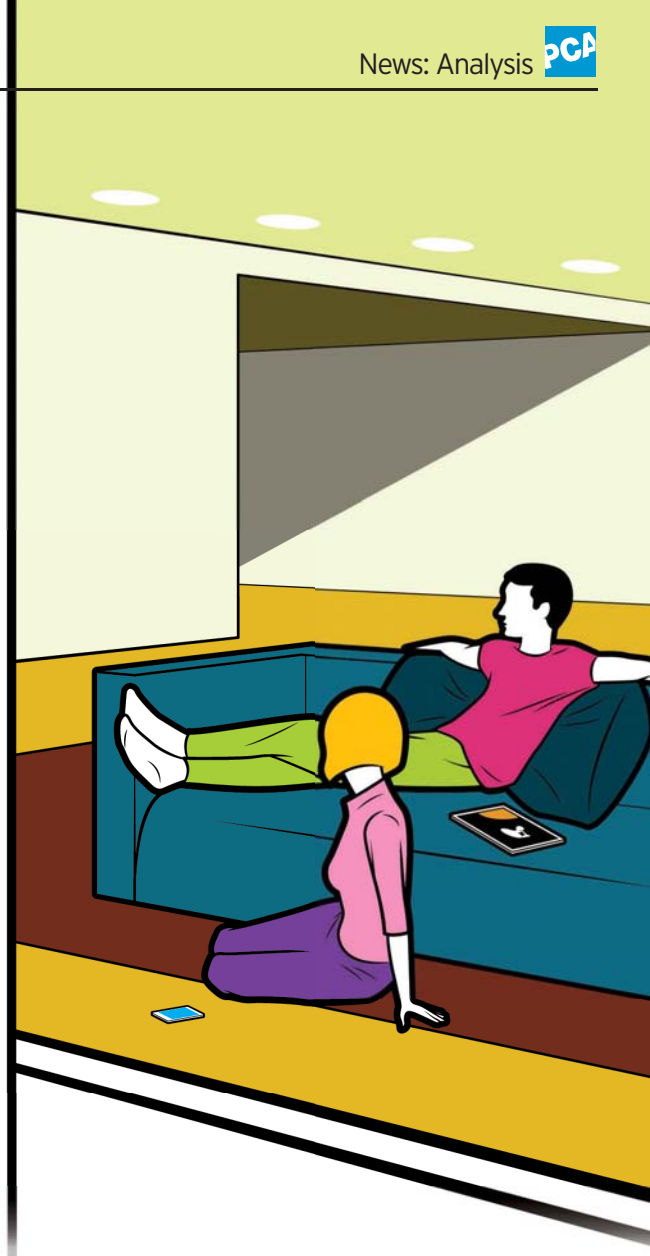
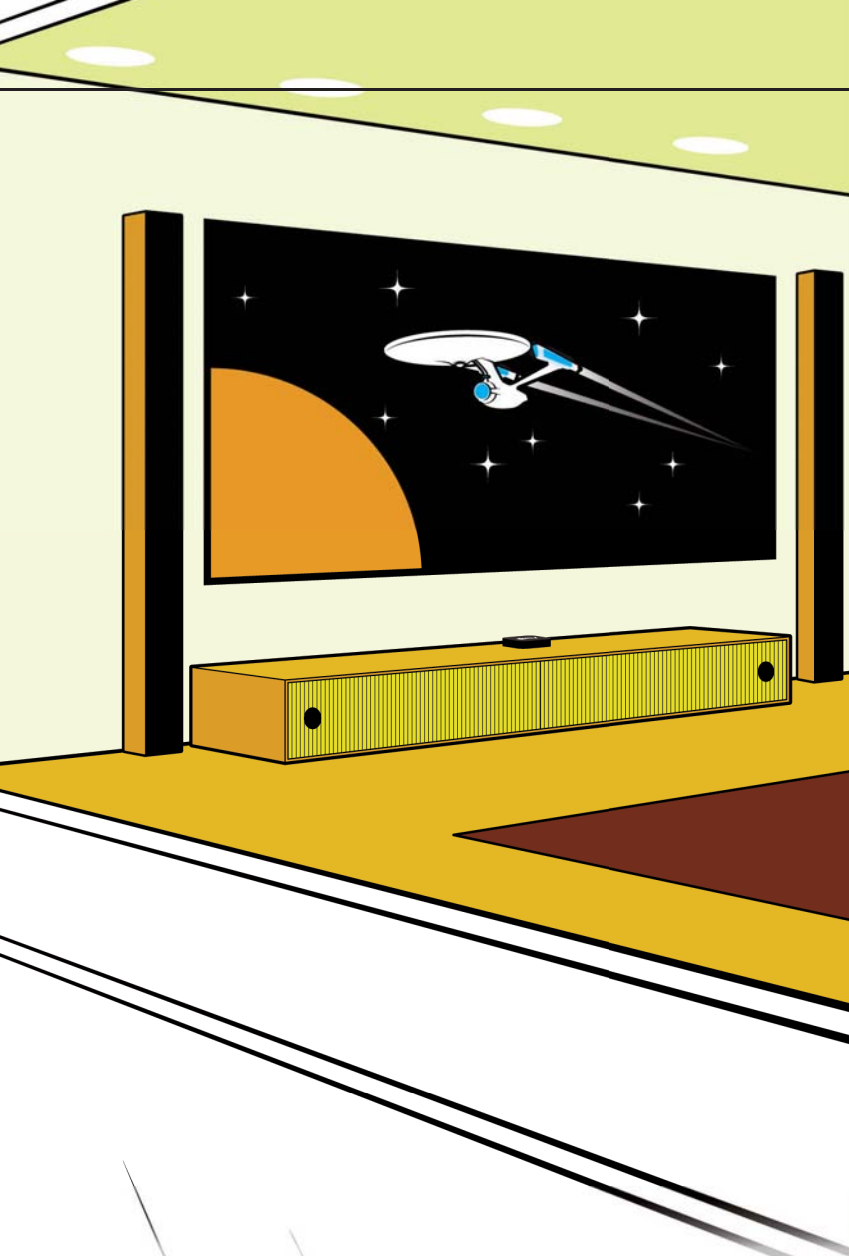
But just like my fridge, my cupboards and freezer would be constantly restocked thanks to their ability to detect when I've used all the pasta, rice or ice cream, for example. They may even be able to present me with some recipes that'll help me use up the ingredients that would go off soon.

As the sun goes down, my lights would get brighter and my blinds and curtains would close. My kettle would boil again ready for a hot chocolate, which I'd pour and leave



THE IROBOT





on my bedside table. Even the table would be smart, keeping my hot chocolate warm by radiating heat while I'm getting ready for bed (as the windows darken in the bedroom).

My bathroom would know that it's me and not my boyfriend, so it'd leave the toilet seat down (finally) when I enter. The door would lock automatically behind me and unlock again when it senses my approach.

We'd never run out of toothpaste because the bathroom cabinet would be smart, too – so that means medicine, shampoo, soap and

more would be automatically ordered when we're about to run out.

In the morning, I'd wake up to another boiled kettle, instead of this hungry cat (I'm afraid I don't think this works with children). My wardrobes would know today's weather forecast and the clothes that are ready to wear, so a touchscreen would present me with a few outfit options to choose from.

I'm still working on how I'd get out of having to dry my hair.

I'd leave the house in the morning, which would automatically lock behind me, and the security alarm would be activated. My garage would be open and I'd hop in the unlocked car, and pull out of the driveway, watching as my garage door closes behind me.

My car would probably even be able to drive itself, too, so I could sit back and read a book on the automated commute to work.

Of course, there's one teeny-weeny problem. Technology has a habit of going wrong. What if, for some reason, my garage door didn't shut itself allowing someone to come and steal my car without me realising?

What if the front door wouldn't unlock automatically and I've been so used to it working that I no longer carry a key?

What if the lights won't come on, but there's no switch because they're supposed to 'just work'. The curtains might not connect to my iPhone or iWatch (they can run out of charge, you know) and therefore get stuck open. The fridge might think I've used all the cheese, when actually I just got it out and then put it straight back in. (This happened to me once with an extremely expensive bottle of wine in a hotel mini-fridge.)

Worse still, most smart technology is open to attack by being hacked. So what if someone was able to access my security system and unlock all of my doors? Or gain remote access to my self-driving car and drive it straight into the hands of a criminal?

So while imagining an Apple Smart Home is really rather fun, the threat of having my home hacked into completely overrides things. I'm beginning to think I'd rather feed my own cat and order my own shopping and vacuum my own floor than let technology take control of my home, and I'm certain that I'm not the only one. However, if someone can figure out an automatic hair drying system (that doesn't involve simply waiting for the water to evaporate two hours later) all the better. I'd pay good money for that. ☒



LG G3 ⬆

Smartphone

With a 5.5in Quad HD screen, LG has pushed things forward in smartphone technology. Its new flagship device trumps rivals with a 1440x2560 resolution and features that we've not seen before, including a camera with a laser autofocus.

£499 inc VAT
lg.com/uk

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CHRIS
MARTIN**Microsoft Surface Pro 3 >>****Tablet/laptop hybrid**

The Surface Pro 3 is Microsoft's latest crack at combining a tablet and laptop in one device. It's thinner and lighter than before and the screen is now larger at 12in. Other improvements include a new kickstand and keyboard cover.

£639 inc VAT**microsoft.com/surface/en-gb****<< Roku Streaming Stick****Media streamer**

A rival to the Google Chromecast is Roku's HDMI-dongle, aptly named the Streaming Stick.

This tiny device plugs into a TV or monitor and streams content from the web over Wi-Fi. Supported services include Netflix, BBC iPlayer, Now TV, 4OD and YouTube.

£49 inc VAT**roku.com/uk**

>> Acer Aspire Switch 10

Tablet/laptop hybrid

Like other hybrids, the Switch 10 can flip and transform between four different modes: laptop, tablet, tent and display. It runs on Windows 8.1, features a 10.1in screen and uses a magnetic 'Snap Hinge' design.

€349 (£285)

acer.co.uk



Samsung UD590



Monitor

This UD590 is Samsung's first 4K widescreen monitor. That means it's packed 3840x2160 pixels into its 28in display - four times that of Full HD. It has a response time of just 1ms and will upscale content to UHD.

£499 inc VAT

samsung.com/uk

>> Huawei Ascend P7

Smartphone

Huawei is still set on cracking the smartphone market and its latest effort is the Ascend P7.

Alongside a premium design consisting of brushed metal and Gorilla Glass (front and back), is a 5in Full HD screen and a 13Mp camera. For further details read our review on page 46.

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Toshiba Satellite Click 2

Tablet/laptop hybrid

With a 13.3in screen, the Click 2 is bigger than most hybrids such as the Surface Pro 3 and Acer Aspire Switch 10. The device has a detachable keyboard dock, runs Windows 8.1, and includes a 500GB hard drive and a fourth-generation Intel Core i3 processor.

£TBC
toshiba.co.uk



EE Eagle



Tablet

The UK network continues to branch out into hardware, this time with a Huawei tablet disguised as the EE Eagle (no we don't have a stutter). It's supposedly the UK's most affordable 4G tablet, and features an 8in screen, 1.6GHz quad-core processor and Android 4.3 Jelly Bean.

£199 inc VAT
ee.co.uk



Moto E



Smartphone

Motorola set a new benchmark for budget smartphones with its Moto G (tinyurl.com/mco5fw4) and is now back with an even cheaper model. The Moto E has cut down specs but a 4.3in HD screen, 5Mp camera and 1.2GHz dual-core processor is a surprisingly good line-up.

£89 inc VAT
motorola.co.uk



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£1,699 inc VAT

Contact

■ alienware.co.uk

Read more

■ tinyurl.com/q6dud64

17.3in (1920x1080) TN display, anti-glare finish; 2.4GHz Intel Core i7-4700MQ (3.4GHz Turbo); nVidia GeForce GTX 880M (8GB) and Intel HD Graphics 4600; Windows 8.1 (64-bit); 8GB DDR3L RAM; 1TB hard drive and 80GB solid-state drive; 802.11b/g/n; Bluetooth 4.0; 1x HDMI 1.4; Mini DisplayPort; 4x USB 3.0; 1x SDXC card slot; 720p webcam/mic; 1x headphone, 1x speaker socket, 1x microphone socket; 86Wh lithium-ion battery; 413.5x299x48.5mm; 4.2kg

Build: ★★★★★☆

Features: ★★★★★★

Performance: ★★★★★★

Value: ★★★★★☆



LAPTOP

Alienware 17

This newly updated version of the Alienware 17 laptop isn't radically different from its predecessors (tinyurl.com/ks5Lnfx), but it's the first gaming laptop we've seen that uses nVidia's new top-of-the-range GeForce GTX 880M. The performance of this new GPU promises to be impressive, especially as it should provide high-end gaming performance at a more competitive price than we've seen before.

The design of the Alienware 17 is unchanged - it's built like a tank, measuring a full 48.5mm thick and weighing 4.2kg. Portability isn't its strong point. And, like all Alienware laptops, it's bedecked with customisable coloured lights that smoulder from beneath the keyboard, trackpad and various other sections of the matt-black chassis. Just to let you know what a bad-ass gaming rig you've paid for.

Added features

One advantage of the laptop's size is more available space for added features. There's a built-in DVD drive - though, it's a shame that Dell doesn't provide a Blu-ray drive even as a build-to-order option - along with gigabit ethernet, four USB 3.0 ports, an HDMI socket that provides both input and output options and a Mini DisplayPort.

Battery life isn't good. Even when using the integrated graphics of the Haswell-generation Intel processor, the Alienware 17 could barely manage four-and-a-half hours (260 minutes) of streaming video from the BBC iPlayer. But that's unlikely to be a major problem for a 17in laptop that will probably spend most of its time indoors.



The 17.3in screen is as attractive as ever, with a 1920x1080 resolution and a bright, colourful image that provides excellent all-round viewing angles. The screen also has a matt finish that helps reduce glare and reflection, ensuring maximum visibility during action-packed gaming sessions.

The Alienware's speakers sound a little tinny at higher frequencies, but they produce a full sound, with enough volume to handle explosions in games and films without needing external speakers.

But while full-HD resolution is perfectly adequate for gaming and HD video presentations, other programs, such as video- or photo-editing applications, would benefit from an even higher resolution. And, at almost £1,700, you could be forgiven for wanting something more like the 2880x1800 resolution of the 15in MacBook Pro with Retina display (tinyurl.com/oLLeaao). But, of course, Apple's laptop isn't a gaming machine, and the Alienware 17 outguns the MacBook when it comes to graphics performance.

Prices start at £1,299 for a model, with a quad-core Intel Core i7 running at 2.4GHz, 8GB of memory, a 500GB hard disk and an nVidia GeForce GTX 860M graphics card. We, however, tested a top-of-the-range model that steps up to the GTX 880M with 8GB of video memory and a 1TB hard drive assisted by an 80GB solid-state module, for a total of £1,699.

The hybrid drive works well, allowing the Alienware 17 to boot on to the main Windows desktop in just 15 seconds when using the Windows 8.1 'fast start' feature. However, it can't match the performance of a dedicated solid-state drive, which was reflected


in its performance with the general-purpose PCMark 7 benchmark.

Its score of 5600 points in PCMark 7 is certainly very strong, but we've seen Core i7 laptops with solid-state drives easily exceeding 6000 points. The Home and Work test suites in PCMark 8 produced stronger scores - 3100 points and 3300 points respectively - but gaming performance is the real test here and is where the Alienware 17 delivers the goods.

The GeForce GTX 880M effortlessly hit 150fps when running *Stalker: Call Of Pripyat* at 1920x1080 resolution, so we then fired up *Batman: Arkham City* to put it through its paces. Even at 1920x1080 resolution with DirectX 11 and all graphics options at their highest settings, the Alienware still managed a solid 46fps.

That's not the highest score we've seen with those settings - the dual-GPUs used by the behemoth Alienware 18 (tinyurl.com/q69qyp5) managed to hit 53fps, but at a cost of more than £3,000. A price tag of £1,700 still isn't cheap, of course, but it's almost mid-range for a gaming laptop. Previous versions of the Alienware 17 have cost well over £2,000, so the GTX 880M does manage to provide high-end gaming performance at a more competitive price than ever before.

Verdict

The Alienware 17 isn't perfect - there's room for a higher-resolution display and battery life is mediocre even when using integrated graphics. However, it's well-suited to its role as a gaming rig, and proves that the new GeForce graphics do provide better performance and value for money than previous generations.  **Cliff Joseph**



£899 inc VAT**Contact**■ chillblast.com**Read more**■ tinyurl.com/p7u28wq**Specification**

14in (1600x900) TN display; 1.8GHz Intel Core i7-4500U (3GHz Turbo); Intel HD Graphics 4400 integrated; Windows 8.1 (64-bit); 16GB DDR3L RAM; 120GB solid-state drive and 500GB hard disk (5400rpm); 802.11b/g/n; Bluetooth 4.0; 1x gigabit ethernet; 1x HDMI 1.4; 2x USB 3.0; SDXC card slot; 720p webcam/mic; 1x headphone, 1x mic socket; 44.6Wh lithium-ion battery; 337x236x21mm; 2.1kg

Build: ★★★★★

Features: ★★★★★

Performance: ★★★★★

Value: ★★★★★

**LAPTOP****Chillblast Helium**

Chillblast is best-known for producing desktop PCs, as well as high-end gaming laptops that, while powerful, do tend to look rather like a slab of concrete. The new Helium is therefore something of a change in direction.

It's no gaming rig, though, as it relies purely on the integrated graphics of its Haswell-generation Intel Core i7 processor. Its relatively slimline design moves Chillblast into the realm of the Ultrabook for the first time.

Like most of the company's laptops, the Helium still uses a generic off-the-shelf chassis, and it's not the most elegant ultraportable we've ever seen. Its dark-grey plastic casing is nondescript and sounds plasticky when tapped, but should be sturdy enough to cope with day-to-day travelling in a backpack or briefcase.

The keyboard has a tendency to rattle when you're typing, however, the keys themselves have a nice, firm feel to them, so you can tap away at high speed when you need to get some work done.

Connectivity is something of a mixed bag, though. We're always pleased to see ethernet on an ultraportable laptop these days, but the Helium has just two USB 3.0 ports, which could prove a bit frustrating when you need to connect several peripherals at once.

Despite being named after the lighter-than-air Helium, the use of a 14in screen means this laptop is at the bigger and heavier end of what Intel would market as an Ultrabook.

It measures 21mm thick when folded flat and weighs 2.1kg, which puts it in the outer limits of Ultrabook territory. But, it does provide considerably



stronger performance than most other Windows laptops that have taken their inspiration from the MacBook Air (tinyurl.com/Ldxfyks).

Chillblast provides a number of build-to-order options for the Helium. We tested a model that costs £899, with a dual-core Intel Core i7 running at 1.8GHz, along with 16GB of memory and a hybrid storage system that combines a 500GB hard drive with 120GB solid-state storage.

Performance

The hybrid storage certainly adds some zip to the laptop – it recovers from Windows 8's 'fast-start' standby mode in just 12 seconds, and wakes from sleep immediately when you open the screen up.

Running the general-purpose PCMark 7 benchmark produced a strong score of 5100 points, which is in line with other laptops we've seen using this processor.

The Home and Work tests in the newer PCMark 8 produced scores of 2450 points and 3100 points respectively, confirming that the Helium provides desktop levels of performance for productivity applications. And, with 16GB of memory and plenty of fast storage, it can also handle demanding video and graphics applications that involve working with large file sizes.

The 14in screen isn't in the same league, though. The image is bright and colourful, but viewing angles could be better, with brightness falling significantly once you move past about 100 degrees either horizontally or vertically.

The speakers are also weak, and you'd struggle to hear anything


over any local din, so headphones or speakers will be necessary if you want decent audio quality.

The lack of a discrete graphics means that the Helium can't match its Chillblast stablemates for gaming performance. Its integrated Intel HD Graphics 4400 could manage just 21fps when running our Stalker: Call Of Pripayat gaming test at its native 1600x900 resolution. Dropping this to 1280x720 did produce a more playable average of 29fps, but the Helium is very much a laptop that's for work rather than play.

With that in mind, we'd have liked to see slightly better battery life. To be fair, though, Chillblast's laptop did manage to stream video for five hours, 20 minutes in our tests.

That was once a respectable result for a laptop with such a decent processor, and lighter use might see you through a little longer, too. It's not in the same league as long-lasting rivals such as Apple's non-Retina MacBook Pro (tinyurl.com/pLkm79o) – but this will set you back an extra £100, so the Helium scores better on price.

Verdict

The display quality on the 14in screen is disappointing in a laptop costing the best part of £900, and if you need true all-day battery life, you may want to look elsewhere. However, the Chillblast Helium manages to provide high-end computing performance at a more mid-range price, so could be a good option for anyone who needs a powerful desktop replacement system more than a lightweight ultraportable.  **Cliff Joseph**



£590 inc VAT

Contact

■ dell.co.uk

Read more

■ tinyurl.com/q3LfYq6

Specification

13.3in (1366x768), matt anti-glare TFT display; 1.6GHz Intel Core i5-4200U (2.6GHz Turbo); Intel HD Graphics 4400; Windows 8.1 Pro (64-bit); 4GB DDR3L RAM; 500GB hybrid drive with 8GB NAND flash; 802.11b/g/n; Bluetooth 4.0; 1x gigabit ethernet; 1x HDMI 1.4; 1 x Mini DisplayPort; 2x USB 3.0; SDXC card slot; 720p webcam/microphone; 1x headphone socket; 65Wh lithium-ion battery; 331x243x34mm; 1.8kg

Build: ★★★★★☆

Features: ★★★★★☆

Performance: ★★★★★☆

Value: ★★★★★☆



LAPTOP

Dell Latitude 3340

Dell's website tells us the Latitude 3340 is "built for school", and its sturdy design and strong battery life are certainly well-suited to that role. It's found within the Business section of Dell's site, though, and its onsite support and choice of operating systems mean it may appeal to some business users that want a budget laptop for office work.

It's not the most elegant laptop we've seen lately. The dark-grey plastic casing looks distinctly old-fashioned, as does the chunky plastic bezel that runs around the 13.3in screen. The Latitude also measures a full 34mm thick along the rear edge, so it's certainly no Ultrabook, although a weight of 1.8kg is slight enough to carry around in a backpack or briefcase without much trouble.

It's sturdy, too, thanks to the shock-absorbing rubber trim that runs around the edges of the keyboard and screen panels, and the keyboard and trackpad are sealed in order to protect against spills. The keys have a nice, firm spring action, so the Latitude 3340 should cope with a bit of keyboard battering.

Just two USB 3.0 ports seems a little sparse and there's no built-in DVD drive, though, there's ethernet for wired networks at school or in an office, along with HDMI and Mini DisplayPort for connecting to a larger monitor.

That will come in handy, as the screen of the 3340 may be adequate



for personal use, but isn't great for showing off work to colleagues or fellow students. The low 1366x768 resolution and lack of touch-sensitive panel are acceptable at this price, and the image is bright and colourful enough to handle web browsing and streaming video. It has a non-reflective matt finish that provides good visibility outdoors in bright daylight. The screen hinge lets you lay the screen completely flat, so a group of students can gather around and work together.

Unfortunately, the poor viewing angles don't help here - the vertical viewing angle is particularly limited, with brightness dropping sharply as soon as you push the screen back to just a 45-degree angle.

The Latitude performs well in other areas. Our review unit was priced at £590 and included Windows 8.1 Pro, a Haswell-generation Intel Core i5-4200U processor running at 1.6GHz and 4GB of memory. Users and school IT managers will be pleased to see that you can opt for Windows 7, or the standard version of Windows 8.1 - saving £23 in the process, too - and

that the price includes one year's next-day, onsite support. There's also a model with an Intel Core i3 processor that's available for £480 if you're on a tighter budget.

The Core i5-4200U processor is widely used in less expensive laptops such as this, but Dell wisely backs it up with a hybrid storage system that combines a 500GB hard drive with 8GB of solid-state storage. This hybrid drive provides a useful boost to overall performance.

The Dell scored 3640 points in the general-purpose PCMark 7 benchmark. It also recorded 2220 and 2840 points respectively in the Home and Work suites in PCMark 8, which put it among the highest scorers we've seen in the sub-£600 category. Gaming performance isn't up to much, though, and it managed just 24fps when running our Stalker gaming test at 1280x720 resolution.

The Latitude 3440 comes up trumps with its long-lasting battery. The thickness of the laptop is primarily due to a large 65Wh battery that bulges out at the back of the keyboard panel, and this gave us a full 10-and-a-half hours of streaming video in our tests.

Verdict

It may not be the most stylish laptop on the market, and the viewing angles of its screen have room for improvement, but the Latitude 3340 provides good value for money. Its application performance and battery life are as good as you'll get for under £600, and Dell's onsite support should provide peace of mind for schools and small businesses that require kit at a competitive price. **Cliff Joseph**



£349 inc VAT**Contact**■ hp.com/uk**Read more**■ tinyurl.com/Ljswav5**Specification**

11.6in (1366x768) IPS display; 2.13GHz (2.39GHz) Intel Celeron N2820 processor; Windows 8.1 (64-bit); 4GB DDR3 RAM; 500GB hard disk; Intel HD Graphics; single-band 802.11n Wi-Fi; Bluetooth 4.0; 10/100 ethernet; HDMI 1.4; 1x USB 3.0; 2x USB 2.0; 1x line-in/line-out; SD card reader (SDXC) 29Wh battery; 301x215x21.9mm; 1.4kg

Build: ★★★★★

Features: ★★★★★

Performance: ★★★★★

Value: ★★★★★

**LAPTOP/TABLET HYBRID****HP Pavilion x360**

We've not seen many hybrids as cheap as the £349 HP Pavilion x360. And this laptop-cum-tablet doesn't even look like a budget machine, thanks to its bright red enclosure and classy interior.

The red plastic is flecked with silver glitter, and it's complemented by a metallic wrist-rest and a glossy black screen bezel. The corners and edges are smoothly rounded and the build quality is good: a strong hinge flips between laptop and tablet modes, and the rest of the system is similarly sturdy. There's a little give in the screen's rear, but it doesn't translate to any desktop distortion.

The Pavilion weighs 1.4kg and is 21.9mm thick – statistics that compare well to small, cheap laptops and expensive Ultrabooks. When compared to tablets, though, it doesn't fare so well: it's at least twice as bulky as most of its rivals, and tablets remain significantly smaller even with keyboard cases.

As with most hinge-based hybrids, it's difficult to use the tablet mode in two hands, and even trickier with just one. It's better as a laptop, but the keyboard is more suited to short emails than lengthy reports: it's got a good layout and a sturdy base, but the keys have little travel and are a tad too small. The touchpad is acceptable, but it's not as smooth or responsive as the hardware on other machines.

There's only one USB 3.0 connector, two USB 2.0 ports, an HDMI 1.4 output and an SDXC card reader – an ordinary selection. It's worse on the inside: the ethernet is only 10/100, and the 802.11n Wi-Fi is single-band and only single-antenna (1x1 MIMO).

As you'd expect, the low price means it's no powerhouse. The Intel



Celeron N2820 uses the Bay Trail architecture found inside the latest low-power Atom processors, but it's only got two cores – new Atoms have four. There's no Hyper-Threading or Turbo Boost, it runs between the modest speeds of 2.13- and 2.39GHz, and its HD Graphics is based on last year's Ivy Bridge technology.

The HP scored 1463 points in PCMark 7. That's several hundred points behind the Lenovo Flex 15D (tinyurl.com/L5c6no7) and IdeaPad Yoga 2 (tinyurl.com/mtwn8rL), and almost 1000 points slower than the Toshiba W30T-A-101 (tinyurl.com/q9x89kq). This all suggests that the Pavilion can only handle entry-level tasks such as web browsing and word processing – and multitasking is sluggish.

This is no gaming system, either. The Pavilion averaged just 12fps in our 1280x720 Stalker: Call

of Pripyat test, and it struggled to 21fps in DiRT 3's lowest settings at a resolution of 1366x768 pixels.

The hard disk's sequential read and write results of 99- and 102MB/s were mediocre, and they contributed to poor loading times. Booting, too, was sluggish – 39 seconds without Windows 8.1 Fast Start-up, and 33 with this option.


The 29Wh battery lasted for four hours, 51 minutes in our streaming iPlayer test: shorter than the Toshiba and Lenovo IdeaPad, but an hour more than the Lenovo Flex.

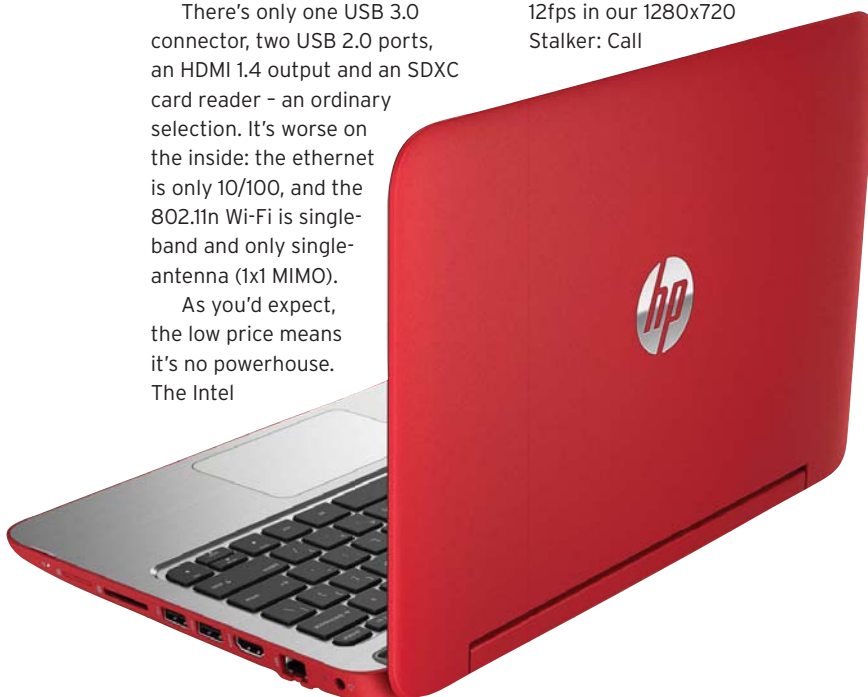
The touchscreen's 1366x768 resolution is what we expect from budget machines – fine for casual tasks, but of little use for work. It lacks quality, too; the average Delta E of 9.79 was poor, and the colour temperature of 7294K was far too cool compared to the 6500K ideal.

The measured brightness of 193cd/m² wasn't good enough for all-day viewing, and made the screen tricky to see outdoors. The measured contrast ratio of 337:1 was poor, and it mirrored how pallid this screen looked rather than vibrant.

The HP's Beats-branded speakers disappointed. The mid-range dominates, but it's tinny sounding, and the treble was worse. Bass was weak, and there's not enough volume across the board.

Verdict

The red design looks good and feels sturdy, but the Pavilion's weight and dimensions make it tricky to use as a tablet, and its lack of power, poor screen and mediocre battery life hamper its usefulness as a laptop. We'd only recommend this if you want a stylish ultraportable for a low price.  **Mike Jennings**



£1,100 inc VAT

Contact

■ mysn.co.uk

Read more

■ tinyurl.com/q4jwvsm

Specification

13.3in (1920x1080) IPS display, matt; 2.2GHz Intel Core i7-4702MQ (3.2GHz Turbo); Intel HD Graphics 4600 (integrated); nVidia GeForce GTX 860M (2GB) Windows 8.1 (64-bit); 8GB DDR3L RAM; 250GB solid-state drive; 802.11b/g/n/ac; Bluetooth 4.0; 1x HDMI 1.4, 1x VGA; gigabit ethernet; 3x USB 3.0, 1x USB 2.0; SDXC card slot; 720p webcam/microphone; 1x headphone, 1x microphone; 62Wh lithium-ion battery; 374x250x37mm; 2kg

Build: ★★★★★
Features: ★★★★★
Performance: ★★★★★
Value: ★★★★★



LAPTOP

Schenker XMG P304

We haven't seen many laptops with nVidia's new GeForce 800M series of graphics cards yet, but Schenker is one of the first off the mark with its XMG P304. Until now, the only system we've tested with this new graphics update is the MSI GT70 2PC Dominator (tinyurl.com/o8f3obd).

The P304 is small for a gaming laptop, with its 13.3in display and weight of 2kg. However, it's designed as a step-up from the integrated graphics of many regular laptops rather than as a hard-core gaming rig, so the idea is to provide good gaming performance while still keeping the laptop relatively light and portable.

Prices start at £725 for a model with an Intel Core i3 processor running at 2.6GHz, and you can step up to an i5-branded part for another £30. The various Core i7 options range from £100 to £335.

Our review machine came in at £1,100, with a quad-core Haswell-generation Core i7 running at 2.2GHz, 8GB of memory and a 250GB solid-state drive. All versions of the P304 have the same onboard graphics processor, though, with the GeForce GTX 860M being the only option currently available.

The design of the P304 is nondescript – a generic, off-the-shelf grey plastic chassis that's sturdy



and functional, and rather dull. Schenker lists the P304 as being 42mm thick on its website, although we measured that at 35mm when it was sitting on a desk in our office.

It's a shame, though, that it couldn't trim a little more weight off it, as 2kg is rather heavy for a 13.3in laptop – especially since nVidia says that the 800M series graphics is designed to provide greater mobility than its predecessors. Even so, the P304 still passes our pick-it-up-with-one-hand test, and you can carry it around in a backpack without too much trouble.

Appealing display

Other aspects of the design are more appealing. The 1920x1080 resolution IPS screen isn't touch-sensitive, but it provides a bright, sharp image with excellent all-round viewing angles, along with a welcome matt finish that reduces glare and reflection.

The speakers sounded rather thin and tinny at first, but Creative's SoundBlaster Cinema software allowed us to coax a more satisfying sound out of it, and the P304 will certainly work well as an all-round entertainment system.

Schenker also told us that it's planning to offer a high-resolution display with 3200x1800 pixels for another £75, although that won't be available until later in the summer.

As you might expect, the Core i7

processor proved strong enough to handle demanding tasks such as video editing, with the P304 managing a sturdy score of 5500 points when running the general-purpose PCMark 7 benchmark.


The Home and Work suites of PCMark 8 showed similar levels of performance, with 2740 and 3100 points respectively.

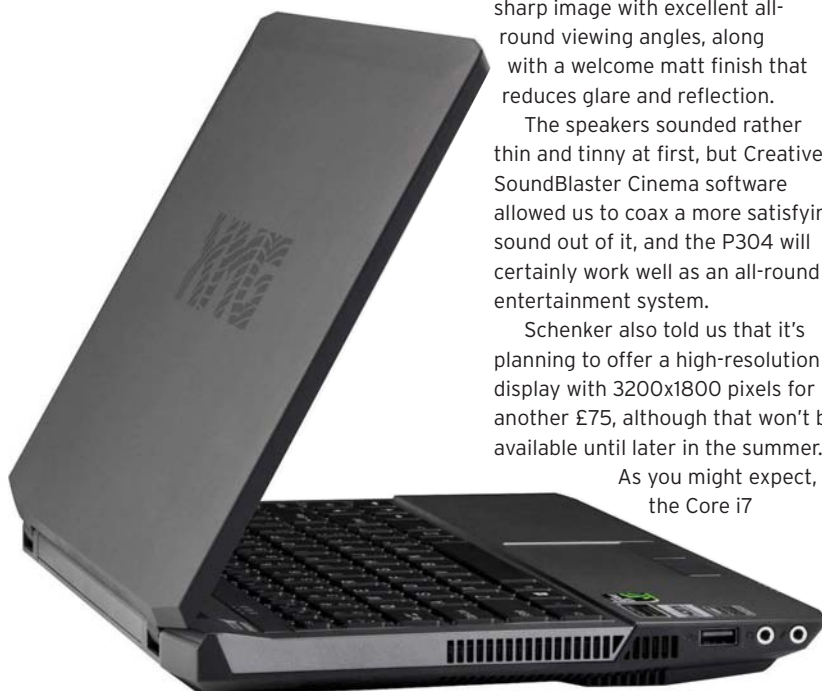
Gaming performance is good, too, although the GeForce 860M didn't strike us as providing a dramatic improvement over its predecessors. It did breeze to 115fps when running our Stalker test at 1920x1080 resolution, but switching to the more demanding Batman: Arkham City at the same full-HD setting with High graphics detail brought that down to 45fps.

That's still pretty good going for a laptop costing £1,100, but it's only slightly faster than laptops, such as Chillblast's Defiant Mini 13 (tinyurl.com/pbzpa65), that use the previous-generation GeForce 765M.

When set to integrated graphics the P304 lasted for just over five hours (305 minutes), streaming video off the BBC iPlayer. That bodes well for when you're out and about; then just plug it into the mains when you get home.

Verdict

The new GeForce 860M doesn't break new ground for gaming performance, but the Schenker XMG P304 still provides strong performance for games and other applications at a competitive price. It's also a lot more portable than most gaming laptops, so it can earn its keep when you're away from home as well.  **Cliff Joseph**



£1,299 inc VAT**Contact**■ toshiba.co.uk**Read more**■ tinyurl.com/qhp9f9t**Specification**

13.3in (2560x1440) IPS display; 1.8GHz Intel Core i7-4500U (3GHz Turbo); Intel HD Graphics 4400; Windows 8.1 Pro (64-bit); 8GB DDR3L RAM; 256GB solid-state drive; 802.11b/g/n/ac; Bluetooth 4.0; 1x HDMI 1.4; 3x USB 3.0; SDXC card slot; 720p webcam/microphone; 1x headphone/microphone socket; 52Wh non-removable lithium-polymer battery; 316x207x19.8mm; 1.26kg

Build: ★★★★★

Features: ★★★★★

Performance: ★★★★★

Value: ★★★★★

**LAPTOP****Toshiba Kira-101**

By its own admission, Toshiba is happy to focus on the 'value' end of the market, and its line-up features a preponderance of budget 15- and 17in laptops. However, there are two notable exceptions to that rule – the 15.6in Satellite P50, with its eye-popping 4K display; and the 13.3in Kira-101, which Toshiba refers to as the 'ultimate Ultrabook'. The P50 hasn't arrived in the UK yet, but we've been able to test the Kira and can't deny that it's one of the slimmest, lightest Windows laptops we've seen so far.

The tapering profile of the Kira and its silvery-grey metallic casing invite the inevitable comparisons with the 13in version of Apple's MacBook Air (tinyurl.com/Ldxfyks).

The Kira is thicker – 19.8mm along the rear edge, compared to 17.5mm for the Air. However, the Kira has a significantly smaller footprint, measuring 316mm wide and 207mm deep, whereas Apple's laptop is 325mm wide and 227mm deep.

When it comes to weight there's little difference between the two – the Kira weighs 1.26kg, while the Air is slightly heavier at 1.35kg. The smaller footprint of the Kira gives it a narrow edge on sheer portability; but the MacBook wins on screen size. Both are specified with 13.3in displays, but since the Air has a 16:10 ratio, it has a larger viewable screen.

Build quality is excellent, with the magnesium casing providing firm support for the screen panel and keyboard. Needless to say, there's no room for a DVD drive in that slimline design, but the three USB 3.0 ports, HDMI and 802.11ac Wi-Fi cover most other connection needs.

The speakers aren't particularly loud, but they do manage to avoid the irritating, tinny sound that afflicts many laptops. It's

a shame, though, that there's no ethernet for an office network.

Mind you, the MacBook Air is no great shakes when it comes to connectivity either, and there's one important area where the Kira completely outguns its rival.

The 1440x900 resolution of Apple's 13.3in laptop hasn't been updated in a couple of years, and its resolution pales in comparison to the 2560x1440 resolution and 221 pixels per inch density of Toshiba's system. The Kira looks brighter and sharper, with crisper colours and contrast. Toshiba doesn't specify the type of screen panel it uses, but it does have the near-180-degree viewing angles we'd expect from an IPS display.

It's touch-sensitive, too, and finished off with scratch-resistant and smudge-resistant Gorilla Glass. Our only complaint is that it throws off a lot of glare and reflection, making it difficult to see in daylight.

At the moment, the Kira is only available in a single configuration in the UK, costing £1,299, with Windows 8.1 Pro running on a 1.8GHz Intel Core i7 dual-core processor, 8GB of memory and 256GB SSD.

It seems odd there's no option to use the standard Windows 8.1 or a slightly less expensive Core i5 processor, but a score of 5100 points when running the general-purpose PCMark 7 benchtest reveals the Kira is one of the fastest Ultrabooks we've

seen so far. In contrast, a MacBook Air with 1.3GHz Intel Core i5 processor scored 4602 points when running PCMark 7.



The Kira's performance with the Home and Work suites in


PCMark 8 was a little lower, at 2200 and 2630 points respectively, but it still has enough horsepower to provide desktop-replacement levels of performance for demanding tasks such as photo- or video-editing.

Gaming performance is limited, though, as the Kira has to rely on its integrated HD Graphics 4400. It managed just 17fps when running our Stalker: Call of Prip'yat test at 1920x1080 resolution. However, that score did increase to a playable 30fps when set to 1280x720, so it should handle some moderate gaming at lower settings.

There's another area where the MacBook Air still has an edge, though. The Kira lasted for seven hours, 10 minutes when streaming video from the BBC iPlayer. Very light use may indeed allow it to come closer to Toshiba's quote of nine hours. The MacBook Air on the other hand can last beyond 12 hours in the same test.

In that respect, it's perhaps fairer to compare the Kira with the 13in version of the MacBook Pro with Retina display (tinyurl.com/oydrnxa). That has an even higher 2560x1600 resolution, for which Apple quotes a similar nine-hour battery life – although in our tests, it gave us almost 10 hours of streaming video against the Kira's seven.

Verdict

The Toshiba Kira can't approach the outstanding battery life of its Apple rivals. It does, however, combine good overall speed and a high-resolution display with a truly ultraportable design.  **Cliff Joseph**



£120 inc VAT**Contact**■ uk.gigabyte.com**Read more**■ tinyurl.com/q7k4esv**System requirements**

2GB GDDR5; 1033MHz core clock (1111MHz Boost); 1.35GHz memory clock (5.4GHz DDR effective); 128-bit memory interface; 640 stream processors; 40 texture units; 16 ROP units; PCI-E interface; DirectX 11.2; 2x DVI, 2x HDMI; 3-year warranty

Build: ★★★★★☆

Features: ★★★★★☆

Performance: ★★★★★☆

Value: ★★★★★☆

**GRAPHICS CARD****Gigabyte GTX 750 Ti WindForce OC 2048MB**

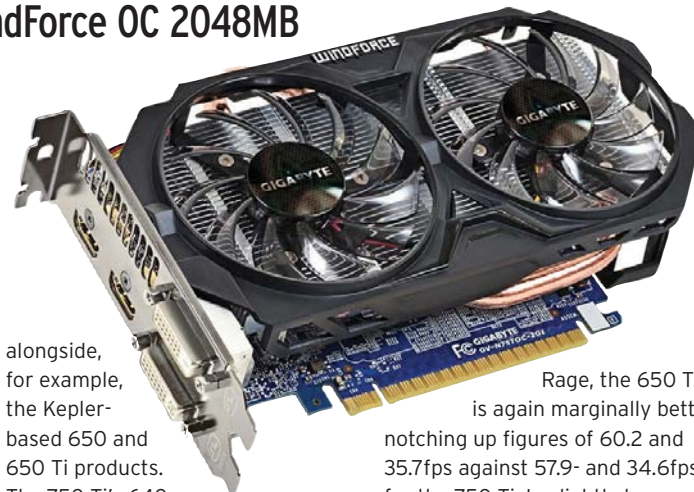
The 2010s have seen a constant eroding of the desktop PC segment, with not just laptops, but also with the huge uptake of tablets and smartphones redefining how we view and use computer technology. Even Intel, the Gigahertz King, has been crafting its recent products with rather more than a nod towards the mobile world.

Graphics card manufacturers, however, have remained defiantly in the court of the desktop PC. Sure, they've been careful to develop products that can play perfectly to the on-the-move crowds. But products have been designed with the desktop market in mind first and foremost, with more power-conscious mobile versions being rolled out some time after. It may not be immediately apparent from this card, but nVidia's 750 series (codenamed Maxwell) marks a very significant shift.

Maxwell is the first series of graphics chips to be designed primarily to conserve energy. Clearly, this is a desktop part, but the chip that sits at the heart of this Gigabyte is geared towards efficiency rather than ultimate power. The secret isn't so much in the manufacturing process. Like Kepler before it, Maxwell is created using 28nm - even bigger energy savings will be possible when the smaller 20nm process is employed, probably some time in 2015.

The key is in the heavily streamlined architecture, which replaces the older SMXes with new SMMes (Streaming Maxwell Multiprocessor). Whereas SMXes shared many resources with one another, each SMM will have its own dedicated version of such features as warp schedulers and instruction buffers. Kepler had to spend much of its time diverting traffic to the right place. Maxwell, in contrast, keeps its traffic streams very much more separate, so more time can be spent cruising through the data itself rather than organising it.

This particular card uses the 750 Ti - a standard 750 is also available. What's important to bear in mind is that Maxwell is often doing similar amounts with considerably less. Specification for specification, it doesn't look spectacular when set



alongside, for example, the Kepler-based 650 and 650 Ti products. The 750 Ti's 640 stream processors are eclipsed by the 650 Ti's complement of 768. Texture handling takes a considerable hit with Maxwell's new technology, and the 750 Ti's 40 texture units look paltry next to the 64 of the 650 Ti. The 750 Ti hits back with some good core speeds, but even with the added boost and the benefit of Gigabyte's overclocking, nothing can atone for the paucity of texture units. The 750 Ti's texture fill rate of 44.4GT/s is marginally ahead of the non-overclocked 650 (on 33.9GT/s), and struggles against the 650 Ti (on 59.4GT/s).

All of these chips are saddled with 128-bit memory interfaces, although the 750 Ti offers twice the memory (2GB) of the typical 1GB 650 and 650 Ti products. Its memory bandwidth - 86.4GB/s - is broadly identical to that of the 650 Ti, and marginally ahead of the 80GB/s of the standard 650. The 750 Ti does up the video encoding though, using its new NVENC to deliver more encoding speed for less power - note that the aim here is conserving energy rather than boosting performance.

Performance

So far, relatively unimpressive. Put the 750 Ti through its paces, and it becomes apparent that this card extracts far more from its modest parts. The performance is similar to that of the 650 Ti. The latter is better in tough texture-heavy games played over high resolutions. In Crysis 3, for example, the 650 Ti scores 28 to the 750 Ti's 27.7fps at a resolution of 1900x1200, and 19.4fps to the 750 Ti's 18.8fps at 2560x1600. In BioShock Infinite

Rage, the 650 Ti is again marginally better, notching up figures of 60.2 and 35.7fps against 57.9- and 34.6fps for the 750 Ti. In slightly less demanding games, the 750 Ti hits the highest figures, though, getting 66.3- and 56fps in BattleForge, as opposed to 63- and 54.8fps for the 650 Ti. In the also-relatively undemanding Stalker: Call of Pripyat, the 750 Ti is victor again, snagging 67.3- and 59.5fps to the 650 Ti's 65.1- and 58.6fps.

So in terms of performance, the 750 Ti and 650 Ti are pretty much identical. If you want lots and lots of textures, the 650 Ti will be marginally better. In older less-detailed games, the 750 Ti ekes out a small lead. What is rather more surprising, though, is that the 750 Ti keeps pace while putting out much less power. This chip has a TDP of 60W, against the 650 Ti's 110W. Those figures are a little exaggerated, although we did find that the 650 Ti was generally putting out an additional 23- to 30W during load testing.

Verdict

The 750 Ti is exciting in terms of what it could deliver for the future. It's less interesting as a product for today. The Gigabyte is very much in line with other 750 Ti cards, but costs around £15 to £20 more than the 650 Ti. Given that the latter offers comparable performance, it's hard to say the 750 Ti is good value. However, the technology is clearly more efficient, and this will allow nVidia to equip future chips with far more firepower - or conserve energy in the case of mobile-oriented products. The future looks bright for Maxwell and its ilk. As a standalone desktop product, though, the 750 Ti makes little sense when viewed alongside the considerably cheaper 650 Ti.  **Robin Morris**

£1,140 inc VAT**Contact**■ uk.msi.com**Read more**■ tinyurl.com/potaogz**System requirements**

AMD Radeon R9 295 X2;
8GB GDDR5 RAM; 1018MHz
clock; 1.25MHz memory
clock (5GHz DDR
effective); 2x 512-bit
memory interface; 2x
2816 (5632) stream
processors; 2x 176 (352)
texture units; 2x 64
(128) ROP units; PCI-E
interface; DirectX 11; DVI,
4x Mini DisplayPort; 2x
8-pin PSU connectors
needed, plus space in
case for 120mm fan/
radiator; 307x111x65mm
(fan/radiator is 153x120
x63mm); 3-year warranty

Build: ★★★★★★

Features: ★★★★★★

Performance: ★★★★★★

Value: ★★☆☆☆☆

**GRAPHICS CARD****MSI Radeon R9 295 X2**

If AMD's 290X (tinyurl.com/npet8er) was the perfect purchase for the gamer who has everything, this new twist will ideally suit the gamer who already has everything, but who then wins the lottery as well.

Tipping the scales at £1,140, this isn't a product for the modestly oiled. The 290X was already tooth-crunchingly powerful, but the 295 X2 takes the same technology and doubles it. In many respects then, the 295 X2 follows in AMD's usual tradition of bringing out a high-end chip, and then crafting a dual-GPU option that blows a new hole through the existing ceiling.

At first glance, that's exactly what you get. So whereas the 290X delivered a towering 2816 stream processors, the X2 has two sets of 2816 instead. (We could say 5632, to be more precise, although it is more technically correct to think of dual-GPU cards as having two lots of everything, rather than twice the raw figure).

Texture units and raster operations are also boosted to two sets of 176 and 64, respectively - or 352 and 128, if you prefer. Even the core-clock speed has been slightly upgraded (from a maximum of 1GHz on the 290X, to 1.018GHz here), although the memory clock of 1.25GHz (or 5GHz when taking into account the quadrupling facilities of the chewy GDDR5 RAM).

The memory complement has been raised, so the X2 comes with two banks of 4GB, making up a sizeable 8GB. The texture fill rate jumps significantly, from 176GT/s on the 290X, to an astounding 358.3GT/s. That 176GT/s of the 290X was already comfortably ahead of the 165.7GT/s of the GTX 780, so the X2 incinerates the competition.

So far, so good. However, the 295 X2 has a surprise up its sleeve. If you know something about high-end cards, you'll be expecting high power consumption, masses of heat, and ear-splitting levels of noise.

Well, the 295 X2 can't do much about the power consumption. This card comes with a TDP of 500W - double that of the 250W for the 290X and 780.

In practice, we shattered the 600W barrier on several occasions, sometimes even exceeding 650W.



The 290X, in contrast, never exceeded 370W in our tests. The expected additional burst of noise and heat isn't evident, though. The 295 X2 is by no means a quiet card, but it created no more noise than the 290X. Given that it has double the technology in several areas, the lack of added volume is remarkable.

For this we can thank one of the unexpected features of the 295 X2 - closed-loop liquid cooling. Many PC manufacturers use liquid cooling already, but it's still unusual in a graphics card - certainly when provided as standard.

Besides the card itself, you'll need to install a separate fan/radiator/heatsink, all connected to the card via pipes. You'll also need a case into which you can mount a 120mm fan, but assuming you have one of these, the extra radiator and other features aren't terribly difficult to install.

(You will also need to have two full 8-pin connectors, plus enough room in the case for a 370mm card.)

What this solution does is to allow AMD to move a lot of the traditional 'cooling' features to their own dedicated radiator. The fan can be considerably larger, and so doesn't need to be rotated as quickly. That, in turn, means that sound levels can be kept down. And, at the same time, the quality of the cooling can be much higher, so the graphics card is kept reasonably well aired without needing a massively oversized cooling system.

It's not as straightforward to use as a standard graphics card, but it's the one way this level of performance can be generated without creating an enormous and prohibitively loud card.

Performance

Actual performance, as you might expect, is stunning. However, while many dual-GPU solutions have failed to mine the technology for anywhere near a doubling of speed, the 295 X2 gets somewhere close to this on a very regular basis.

Take Crysis 3, for instance, where the 295 X2 achieved 58.5fps at a resolution of 2560x1440, eclipsing the 290X's 29.6fps. At a '4k' resolution of 3840x2160, it hit 49.9fps, while the 290X struggled to a mere 24.6fps.


In Thief, the 295 X2 was again vastly superior, tallying 86.8- and 55.1fps, to the 290X's 48.4- and 29.9fps. As a gaming card, the 295 X2 is not just the best. It's almost twice as good as its closest rival. On any terms, this shatters the competition.

Not that everything on this card is so out of this world. In the past, nVidia and AMD have gone head to head at all levels of the market. However, there won't be an imminent product that challenges the 295 X2 in its own territory. The 295 X2's priority will be games, and it won't be trying to revolutionise performance on the high-end Compute applications.

The 295 X2 is no slouch on Compute, but nVidia will be bringing out a dramatically enhanced version of the Titan that pushes new ground in this arena. More to the point, that new Titan should be hitting an even higher £2500+ price tag, so it won't be competition for the 295 X2.

That effectively leaves the X2 as the one viable product for those who wish to play games at the highest level, but who don't need to pay several thousand for the best Compute performance.

Verdict

This card may be an irrelevance to many people - it's simply more expensive than most of us would pay for a graphics card. But its cooling system is a sign of the future, and makes this towering powerhouse a feasible option for home users, provided they don't mind paying for increased electricity too. More to the point, there's no other graphics card anywhere near to it. For those who can afford the best gaming rig, this marvel will be the jewel in a dazzling crown.  **Robin Morris**

£399 inc VAT

Contact

■ huawei.com/uk

Read more

■ tinyurl.com/ozpofn

Specification

5in (1920x10800)
multitouch display (16m colours); 1.8GHz quad-core Hisilicon Kirin 910T; 2GB RAM; 16GB capacity; Android 4.4.2 KitKat; G-sensor; accelerometer; proximity sensor; ambient light sensor; compass; GPS/GLONASS; GPS/A; 3.5mm audio connector; Bluetooth 4.0; 802.11 b/g/n; Micro-USB; 13Mp rear camera, 8Mp front-facing camera; 2500mAh battery; 139.8x68.8x6.5mm; 124g

Build: ★★★★★
Features: ★★★★★
Performance: ★★★★★
Value: ★★★★★



SMARTPHONE

Huawei Ascend P7

The Ascend P7 is Huawei's latest flagship smartphone, and at first glance looks a lot like its predecessor, the P6 (tinyurl.com/qgtfpm).

The main difference between the two is that the P7 has a larger screen - 5in compared to the P6's 4.7in. It retains the rounded edge at the bottom, with Gorilla Glass 3 both the front and back. As before a brushed aluminium frame runs around the edge.

For a phone with a large screen, it's amazingly light and easy to use. We like the spun metallic finish on the rear, made from seven layers. This effect goes outward, centred on the Huawei logo, when light is reflected in the right way. Beside the black/blue model we tested, it's available in white and pink options. Unfortunately, the glass rear cover has the same problem as Google's Nexus 4 (tinyurl.com/d7htpfj) - it's prone to scratches.

HD display

Like every other flagship we've seen this year, the Ascend P7 has a full-HD screen. This looks great and has excellent viewing angles, although its brightness needs setting at the top end of the scale for comfortable viewing, especially when outdoors.

Inside is a 1.8GHz Kirin 910T quad-core processor coupled with 2GB of memory. We found the P7



runs smoother than the P6, but it's not a completely silky experience. The interface often juddered when we pulled the notification bar down, and generally things got a bit sticky when running several apps and tasks. We also had issues such as the P7 refusing to open Twitter by tapping the icon - we could only access it by way of recent apps for a good period of time.

The device is dual-SIM and one of the drawers doubles up as a microSD card slot. You can either have two SIM cards or just one with some extra storage. Internal storage is an Android-standard 16GB.

Camera

The P7 has a 13Mp camera at the rear, with a fourth-generation Sony sensor, and it's a cracker. It's capable of taking high-quality photos in bright sunlight or indoors in candle light. You can double-press the volume key to launch the camera and take a photo from sleep, or switch it to a shutter button.

An 8Mp front camera has a five-piece lens and Huawei has coined the phrase 'groufies' (group selfies) for a group panorama taken with the front camera. It's a central photo, then one either side after turning the phone.

Huawei has loaded the Ascend P7 with Android 4.4.2 (KitKat),

adding its Emotion UI on top. This skin doesn't have an app menu, so the homescreen is similar to that of an Apple iPhone. It seems much nippier than before, though, which was the main down side to the P6 as a smartphone.

What we like about Emotion UI is the amount of customisability on offer. There are lots of themes to choose from and you can further tweak aspects to personalise the software. These include home screen panel transitions, icons and fonts.

Echoing the Samsung Galaxy S5 (tinyurl.com/nhdz6od), the P7 has an ultra power-saving mode, supposedly to make the phone last 24 hours on 10 percent charge. Just like the S5, you get a black-and-white interface and basic functions such as text and calls.

Most users will need to charge their P7 every night. When we used it for emails, a few photos and social networking, it was nearly empty by evening. On a flagship device like this, we expect more.

Verdict

Huawei has produced a stunning smartphone in the Ascend P7, that's good value if priced as expected. There's some decent hardware on offer here, particularly the camera, but the P7 is let down by software performance issues. Chris Martin



£429 inc VAT**Contact**■ sony.co.uk**Read more**■ tinyurl.com/pm7yfwc**Specification**

Processor: 3x HDMI processor inputs (with 4K pass-through)/ one output; optical digital audio i/o; stereo phono input; three DSP modes (Cinema, Game and Voice); DTS HD Master Audio/Dolby TrueHD codec support; dimensions 220X32X157mm; 430g. Headphones: 2.4/5GHz transmission standard; 5-25,000Hz frequency response with 50mm drivers; 320g

Build: ★★★★★☆

Features: ★★★★★☆

Performance: ★★★★★☆

Value: ★★★★★☆



WIRELESS HEADPHONES

Sony MDR-HW700DS

Surround-sound without speakers is hardly a new concept, but Sony's MDR-HW700DS headphones are the first to promise a virtual 9.1-channel listening experience. Here Sony's calculations are based on taking the numbers from regular 5.1, then adding two more rear channels and two front-high ones.

Designed for use with any HDMI source component, these high-concept headphones would seem ideal if you want an uncompromised film session, some late-night gaming or just hanker after anti-social volume. The closed-back design also offers a welcome respite from extraneous domestic noise pollution.

A two-piece set, the MDR-HW700DS package comprises headphones and an HDMI digital surround processor. The latter features three HDMI inputs and one output (with 4K pass through), plus optical digital audio in/out (Toslink) and stereo phono inputs.

While there are low-profile touch buttons on the lid of the processor, to select inputs and effects, everyday control comes via the headphones themselves. A selection of controls on the bottom of the right-hand earpad brings up the system menu on the TV. Once mastered, you can select inputs, volume and DSP effects.

Powering up the headphones causes the television to mute its internal speakers as it registers the MDR-HW700DS' as an external sound source. The headphones connect with the HDMI base station using either 2.4- or 5GHz radio; the same frequencies as Wi-Fi, although not using that protocol. If noise is detected from other devices in the 2.4GHz band, the transmitter moves to the less congested 5GHz space. Signal delivery is uncompressed. Wireless stability is good; we could wander from room to room without dropping a connection.

Much as you'd find on any AV receiver, there are acoustic post processing modes for Cinema, Game and Voice. The movie mode offers the richest mix, probably because it was tested by Academy Award winning Supervising Sound Editor Tom McCarthy.

For the Games mode, Sony turned to the sound designers at

Sony Computer Entertainment. Dialogue here is given a little lift, although it remains to be seen if the spatial imaging offers gamers any competitive advantages. The stereophonic Voice mode, though, proved just a bit too spiky to enjoy.

The processor can handle all the usual codecs, as well as the latest channel-steering algorithms like DTS Neo X and Dolby Pro-Logic 11z.

While standard two-channel PCM is stereophonic, multichannel sound enjoys a most ethereal soundstage. The result is solidly entertaining, be it with TV fare or Blu-ray.

The 9.1-channel experience (the two extra rear channels and a pair of front heights added to the standard 5.1 mix) is created using proprietary HRTF-style Virtual Headphone tech, which models how human ears perceive directional cues. While the surround sobriquet is a bit of a misnomer, sonic placement created by this psycho-acoustic technique actually sounds pretty convincing.

Using the DTS channel check on *The Expendables 2* Blu-ray release, the MDR-HW700DS' authentically placed all the channels in a DTS HD Master Audio 7.1 mix. Out-of-the-head imaging is immersive.

The headphones utilise 50mm driver units, which offer a decent dynamic range; when LFE detonate




throughout *The Expendables 2*, spiking sound-pressure levels cause a spasm of delicious concern.

The HW700DS also perform well as hi-fi headphones. Their comfortable, spacious nature and support for 24-bit/192kHz uncompressed audio, make for easy listening; although in this case, post-processing modes are to be avoided.

While a headful of FLAC flute concerto proved a little too acerbic to be entirely enjoyable, a rip of Megadeth's *Rust in Peace* CD was considerably more agreeable.

The MDR-HW700DS' are extremely comfortable, weighing just 320g, important given the running length of most modern films. The ear cushions are soft and the headband is well-padded. The headphones will need daily USB recharging though, thankfully this doesn't take long to do. Sony rates battery life as 'up to 12 hours'.

Verdict

Although expensive, we rate Sony's wireless surround headphones as a compelling alternative to a physical multichannel speaker setup. They're a great practical solution when it's not possible to crank things up.  **Steve May**

£190 inc VAT

Contact

■ ucam247.com

Read more

■ tinyurl.com/qbdaurt

Specification

IP camera; 802.11b/g/n Wi-Fi; 1920x1080 resolution; weatherproof design for outdoor mounting; UPnP; Android, iOS app support; microSD card slot (up to 64GB); motion detection and event triggering; infra-red night vision

Build: ★★★★★

Features: ★★★★★

Performance: ★★★★★

Value: ★★★★★



SECURITY CAMERA

UCam247-HD01080

IP cameras are great if you want to keep an eye on your home, whether it's for security or peace of mind that your pet is safe and sound when you're away. However, there haven't been many advances in the past decade, with most IP cameras requiring a degree in Computer Science to configure, while delivering poor-quality footage.

Things are improving, though, thanks to smartphone and tablet apps. These make the setup process a breeze, and also allow you to view live footage and even change settings wherever you are.

The UCam247-HD01080 is a particularly good example. In addition to iOS and Android apps, it's a full-HD camera, which can be mounted outdoors and has a ring of infrared LEDs for a good-quality image at night.

The setup process is similar to many existing IP cameras, but it feels easier thanks to the app. You need to first hook up the camera to your router using a network cable. The free app then discovers the camera on the network, and you can immediately view the video feed.

You'll need to choose a new password, but then it's up to you whether you adjust any of its other settings. Most people will want to use the camera via Wi-Fi, and the app allows you to choose a Wi-Fi network and enter its password. Once the settings are saved, you can disconnect the camera from your router and unplug its power supply. When you power it up again, it will automatically connect to Wi-Fi. It supports 802.11n as well as the older 802.11g standard.



Similarly, you'll probably want to enable motion detection and alerts (you'll see a "motion detected" notification on your lock screen), as well as "alarm recording", which means a short video clip is recorded when motion is detected.

The easiest way to record clips is to unscrew the front of the camera and insert a microSD card (up to 64GB). Alternatively, you can set the camera to record clips to a NAS drive.

Through the app, you can select the video quality for the primary and secondary streams. It's best to use the highest (1920x1080 at 20 frames per second and a 4Mb/s bitrate) for the primary stream, as this can be saved to the SD card or NAS drive.

In order to remotely view the footage on your smartphone, you'll want a much lower quality secondary stream. In our tests, we found the default setting - 512x288 at 10fps and 256Kb/s - works well with a 3G connection.

You can also set a prerecord buffer of three, five or 10 seconds. This means you'll get up to 10 seconds of footage before the point where motion is detected, and the recording will continue until there's no more movement.

Via the traditional web-based management interface (similar to a router's), there are a whole load of extra options. These include the ability to turn off the flashing red LED on the front of the camera and define the motion detection area.

If you use the toggle switch in the app, you're enabling motion detection on the entire image. This could lead to a lot of unwanted alerts and recordings, but in the web interface you can resize the detection window, and it's possible to have up to three small rectangles detecting motion in separate areas. For each, you can adjust the sensitivity and threshold sliders, which will help avoid 'false positives' such as trees swaying in the wind.

You can also set a schedule that determines when motion is detected, opt to have a JPEG emailed to you when motion is detected, browse the SD card contents and download individual videos and photos.



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Once we'd honed the detection area(s) and sensitivity, we were impressed with the system. Motion alerts were almost instant and as we'd set up the camera above a front door, we could use it to see who was at the door within a few seconds.

Video quality is very good. Detail levels are comparable with action cameras such as a GoPro HERO3 Black Edition (tinyurl.com/bnzqkja), but framerates of both live and recorded clips were a bit choppy - not as smooth as the 20fps claim suggests. However, both faces and number plates can be recognised and read, so any footage would be useful in the event of a crime. At night, due to the use of infrared LEDs, you'll get a black-and-white image, but it's still nice and sharp and you can see people and objects up to around 15m from the camera.

We mainly tested the iOS app and found it to be a little buggy. UCam247 told us the app is being constantly improved, and to quit and relaunch the app after changing any settings. Live footage is shown along with the video resolution in portrait mode, but you can rotate the phone to landscape mode to see a bigger version.

Verdict

The UCam247 is a big step forward in usability and video quality. Because of this, the price is easy to justify and will be worth the investment if it catches a thief in the act. It might be overkill for keeping tabs on your pets, but to protect an expensive possession such as a car, it's ideal. Jim Martin

£249 inc VAT**Contact**■ isawcam.com**Read more**■ tinyurl.com/nbme57g**System requirements**

12Mp Sony Exmor sensor; f/2.4 lens; 1200p, 1080p, 720p, 480p resolutions; 60fps (1080p) to 240fps (480p); MPEG-4 video format; 12Mp still images; 4x digital zoom; 60m waterproof housing; built-in Wi-Fi (802.11 b/g/n); 2in LCD; waterproof to 60m; full set of mounting accessories; Micro HDMI output; 61x43x32mm; 110g

Build: ★★★★★
 Features: ★★★★★
 Performance: ★★★★★
 Value: ★★★★★

**ACTION CAMERA****Isaw Extreme**

Mention the phrase 'action camera' and the name that comes most readily to mind is GoPro. Yet just as Apple's iPhone defined a standard for the mobile phone industry and is now beleaguered by copycats, so GoPro's imitators and rivals are starting to think and build harder.

The latest contender in the market is the Isaw Extreme, which has clearly been developed as an answer to the GoPro HERO3 Black Edition (tinyurl.com/bnzkqja). It includes many of the same features, but Isaw has shrewdly decided how much to prune and how much to boost, while creating a camcorder that's around £100 cheaper than the market leader.

The Extreme certainly has a more sobering appearance than the HERO3, dispensing with any glittering silver in favour of matt black with dramatic red indicator lights at two corners. It's also markedly larger at 61x43x32mm and substantially heavier (110g compared to the HERO3's 74g), though, much of this is due to the built-in 2in colour LCD on the rear. This allows instant preview and review of the sequence you're setting up. You would have to purchase this as an accessory on the HERO3.

It also means navigating through the menus on the Extreme is a lot simpler and quicker, as you make

use of the Power/REC button on the top and the Setup and Mode buttons on the front to sort through tabs to the settings you need. The HERO3, on the other hand, has to make do with a much smaller mono display near the lens to provide you with the same choices, and scrolling through these is a lot more laborious.

Both cameras have a 12Mp CMOS sensor, but Isaw has opted for a f/2.4 lens as opposed to GoPro's f/2.8. The Extreme's resolution range is less extreme than the HERO3, dispensing with the high-end 4k and 2.7k for full-HD (1920x1080) via 1200p and 720p to 480p. While the GoPro's 4k quality is excellent, you can shoot it at 15fps only, so Isaw's omission may be a sensible cost-saving decision.

The Isaw Extreme's top three resolutions can be captured at either 60- or 30fps, with additional 120fps Slow Motion recordings available at 720p, and 240fps at 480p.

Both the Slow-Mo and the included Time Lapse (one to 30 seconds) effects worked extremely well in our tests, maintaining smooth action with good detail. For underwater filming up to a depth of 60m, there's a dedicated Aqua scene setting that does an effective job of altering the white balance to reduce blue bias.

Where the GoPro HERO3 scores higher is with its additional features such as Auto Low Light, the Ultra Wide Protune FOV for enhanced video quality and a Spot Metre for, say, shooting out of dark cars towards the light.

On the still photo side, the GoPro can also achieve 30 photos per second in burst mode, whereas the Extreme lags behind at 11 photos per second. However, the Isaw does have 4x zoom compared to the GoPro's 3x lens.

The Extreme's accessories package will look very familiar to GoPro fans. The transparent waterproof housing is almost identical - and in our tests, the seal was totally effective. As well as the selection of flat and curved mounts and varied length connectors, you



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can also swap out the watertight backdoor for an open version, which will still afford some protection to the camera while allowing clearer reading of the LCD - a definite brainwave.


The HERO3 was the first in the range to introduce onboard Wi-Fi to allow control via mobile phone app; and the Extreme has followed suit, so you can now remotely stop/start both video and take still images. The range is said to be up to about 120m, using the free Isaw Viewer app for iPhone or Android.

Setup was quick and problem-free and proved to be a handy supplement when it came to filming a friend in action. Software updates can be uploaded via the supplied USB lead, and the HDMI port lets you view all footage captured on the microSD card.

The LCD on the Extreme is a valuable means of checking the levels of Wi-Fi and battery, although red external lights will also warn you when changes are needed.

Isaw claims a battery life of two hours, but using the Wi-Fi drained it rapidly to less than an hour, so it might be worth buying at spares if you're planning a day's snowboarding or diving.

Verdict

It's hard not to like the Isaw Extreme when you see how much is included in the package - both in terms of its functions and the accessories. The big advantage over the GoPro is the built-in LCD and the considerably lower costs. The market leader is still the best all-rounder for serious action photographers, but it's time for GoPro to start glancing over its shoulder.  **Martyn Clayden**



£58 inc VAT

Contact

■ uk.tp-link.com

Read more

■ tinyurl.com/n35ph45

Specification

2.4GHz 3G cellular Wi-Fi router; OLED monochrome display; microSDHC card slot; micro- to mini-SIM adaptor; nano- to mini-SIM adaptor; Micro-USB port for charging; mains charger with USB power outlet; Micro-USB cable; USB 5V/1A charging port; HSPA+/HSPA/UTMS/EDGE/GPRS; 19.2Wh (3.7V, 5200mAh) lithium-ion battery; 100x44x28mm; 156g

Build: ★★★★★

Features: ★★★★★

Performance: ★★★★★

Value: ★★★★★



3G MOBILE WI-FI ROUTER

TP-Link M5360

The TP-Link M5360 is a mobile Wi-Fi hotspot that contains a built-in SIM tray and 3G modem, allowing you to wirelessly share a 3G internet connection to any Wi-Fi capable device. This means you can connect your laptop or tablet to your own private internet Wi-Fi hotspot. It supports up to HSPA+ standard 3G data, but not 4G LTE.

The M5360 allows you to connect up to 10 wireless devices simultaneously, but what differentiates this 3G Wi-Fi router from most similar devices is the decent-sized 19.2Wh lithium-ion battery. TP-Link has even fitted a female USB port, which can provide 5V, with 1A of power for other devices. Used as just a 3G router battery life is a claimed 17 hours, and there's sufficient power to recharge an iPhone or iPad (albeit not a full charge for the iPad). The device is compact at 100mm tall, and the build quality is satisfactory, assembled from hard white plastic. The battery is sealed inside and not designed to be user replaceable.

There are just two buttons - on/off and a recessed reset button. On one side are card trays for a regular (mini) SIM and a microSD card. If you have a micro- or nano-SIM, you can use the provided adaptors. It's worth checking that your mobile's network lets you use



your SIM in such devices. Some companies block the use of a smartphone SIM in a tablet or 3G router. On the front of the unit is a small backlit LCD screen, which contains basic connection and battery-status information.

To test this device we used a Three 3G SIM preloaded with 12GB of data. No setup was required - we simply inserted the SIM card and the hotspot was active and connected to the internet.

The Wi-Fi security key is handily written on the device and the M5360's settings can be changed by pointing your browser to the admin web page at 192.168.0.1.

3G performance

For our first test, the device was placed on a table (indicated signal

strength 4-5/5) and we connected wirelessly to it with a MacBook Pro 17in (early 2011). The laptop ran 10 internet speed tests using speedtest.net; the same process was carried out with an iPhone 4s using a Three SIM on the One Plan (unlimited data).

From the TP-Link M5360, we saw an average speed of 2.53Mb/s down and 0.69Mb/s up, while the iPhone 4s managed 2.09Mb/s down and 1.23Mb/s up.

Given the high variability of the speeds in the 10 trials, and the fact that both devices reached speeds over 4Mb/s down and 1.6Mb/s up, we decided to call this test a draw.

The same test was carried out again in a higher signal strength area (5/5 indicated) over five trials and the results were very similar: the M5360 averaged 2.33Mb/s down and 0.61Mb/s up; while the iPhone 4s managed 2.73Mb/s down and 0.67Mb/s up.

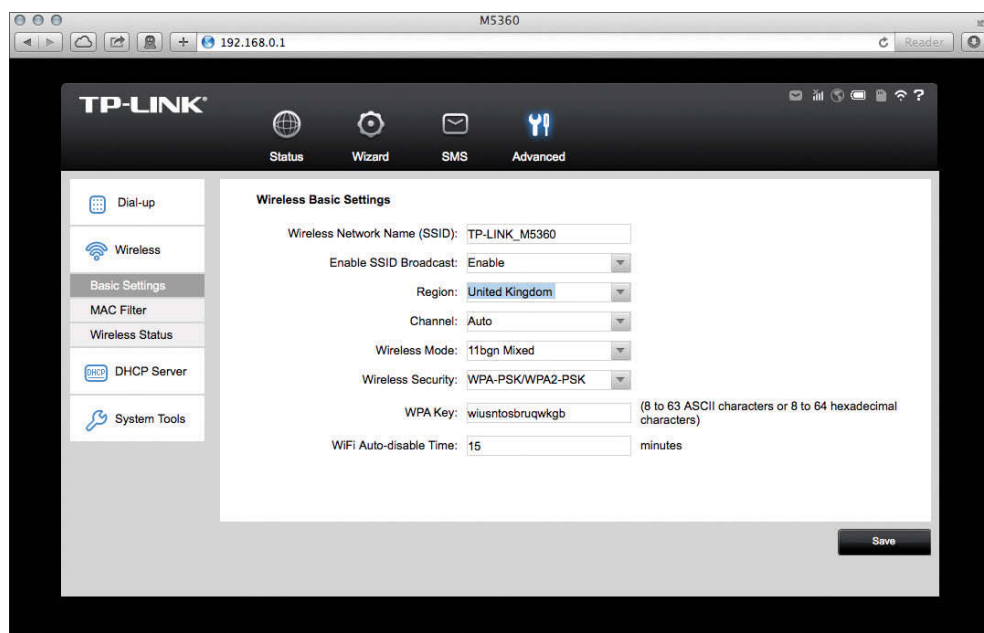
Wi-Fi performance

To test the M5360's Wi-Fi broadcast capabilities, two Macbook Pro laptops (a 15in 2008 model and a 17in 2011 offering) were connected and placed 3m from the M5360 and each other. An iPerf TCP speed test was carried out to determine maximum Wi-Fi throughput.

We recorded an average speed of 11.4Mb/s. This suggests that the M5360 provides adequate Wi-Fi bandwidth for a 3G connection, but not if you want to transfer large files between connected computers.

Verdict

The M5360 provides an easy way to set up a portable 3G hotspot. At £58, it's good value considering £50 is a typical price for a 3G portable hotspot with a small battery. However, you may want the speed of a 4G alternative, which are available from £70 to £150. **✉ John Taylor**



A basic **ADMIN CONSOLE** lets you set Dialup, Wireless and Router functions, such as wireless mode

ETBA

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■ hp.com/uk

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■ tinyurl.com/pmu3fgj

System requirements

27in (2560x1440) LG IPS display; 3.4GHz Intel Xeon E3-1245 v3 processor; nVidia Quadro K4100M; 16GB DDR3 memory; Intel C226 chipset; 1080p camera; gigabit ethernet; slot-load Blu-ray writer; 256GB Micron SSD; 1TB Western Digital Velociraptor; 5.1-channel analogue audio; S/PDIF digital audio; Thunderbolt 2; 2x USB 3.0, 4x USB 2.0, 1x DisplayPort 1.1; 528x660x419mm; 21.3kg

Build: ★★★★★

Features: ★★★★★

Performance: ★★★★★



ALL-IN-ONE PC

HP Z1 G2

The Z1 G2 is the second version of HP's 27in all-in-one PC workstation. It's aimed at professional design studios, and comes with an nVidia Quadro graphics card, and an Intel Xeon processor with up to 32GB of ECC system memory.

Just about every all-in-one PC hides the internal components from the owner, and can't be easily upgraded after purchase. The Z1 is uniquely different in this respect - the unit can be folded over on its hinge, pushed down and opened via two latches at the bottom. The screen then lifts away from the rest of the unit, exposing the innards.

The hard disk, 400W power supply, memory, main system fan and graphics card can be removed with attached handles. You're given easy access to the motherboard and its two full-length mini PCIe slots. There's also a disk bay that lets you fit either one full size 3.5in SATA disk, or two 2.5in drives.

The only restrictions are the MXM (mobile PCI Express) graphics card connector, which means you can't just use a retail graphics card. CPU upgrades are similarly restricted to the processors available during the order process.

Although the first-generation Z1 (tinyurl.com/cj8mcma) was a clever piece of engineering, it was limited slightly by its middling performance compared with desktop workstations. This time, HP has given the specification a boost, with the option of a Quadro K4100M, quad-core 3.4GHz Intel Xeon E1245 v3 processor, 802.11ac wireless, 20Gb/s Thunderbolt 2 connectors for use with displays or external storage arrays and an mSATA SSD.

The front of the Z1 is made from black plastic, with a silver metal backing plate. Four speakers sit underneath the screen, and there's a 1080p webcam at the top.

A slot-loading optical drive is on the left-hand side, while on the right are two USB 3.0 ports, either one or two Thunderbolt 2 connectors, two 3.5mm analogue audio connectors and the power switch. The rest of the ports are inconveniently placed behind the unit, requiring some manoeuvring to access. Here you'll find the power connector, ethernet port, four USB



2.0 ports, DisplayPort, three more analogue audio connectors and one for digital audio.

The HP Z1 G2's 2560x1440-pixel IPS display is top-notch. We measured a maximum brightness of 440cd/m², with no more than four percent deviation across the panel. It managed 100 percent sRGB, 84 percent AdobeRGB and 76 percent NTSC coverage. There's also a touch-sensitive version, though, we haven't tested its colour accuracy.

We received a high-end configuration of the Z1 G2, with a high price to match, but less expensive Quados and Core i3 processor options are available. The Quadro K4100M in our sample is a mobile GPU, roughly equivalent to an nVidia GeForce GTX 770M, with 4GB of video memory, 1152 shaders and a 256-bit memory bus.

Quados aren't great for games, though. Our Tomb Raider benchmark dipped below 30fps at 1080p on Ultimate detail, and hit a constant 60fps only after reducing the resolution to 720p on detail to High setting. However, the professional graphics processors excel at CAD or digital content creation, with CUDA acceleration and certified drivers to provide consistent performance.

In other tests, the Z1 showed itself to be a highly capable machine, able to hold its own against desktop workstations. It chewed through Cinebench 15 benchmarks, managing 107fps in the GPU test and 661 points in the CPU test.


Our storage and wireless performance tests produced middling results. The Micron mSATA SSD managed 42MB/s sequential read speeds, but just 232MB/s write speeds. And its 221MB/s random 4k write speeds (QD=32) wasn't as impressive as the fastest flash drives we test.

The Intel 7260 wireless card is a dual-antenna adaptor, so we didn't expect the best 802.11ac performance possible, but 392Mbps is still far better than 802.11n. The 1TB Velociraptor hard disk spins at 10,000rpm and hit 212- and 208MB/s sequential read and write speeds, some of the fastest speed you'll see from a hard disk.

The Z1's bland appearance and extreme bulk are our only minor criticisms. Its 21.3kg weight is backbreaking, and its folding and opening mechanism may be unique, but is not exactly elegant.

Pushing it down into place needs a hard push, and the unit is many orders of magnitude thicker than an iMac, since the large case is required to provide enough space to access the internal components. The included chunky wireless keyboard and three-button mouse aren't particularly exciting designs either.

Verdict

Although you can't upgrade every component inside it, the HP Z1 G2 is the most flexible all-in-one ever made.  **Orestis Bastounis**

£100 inc VAT

Contact

■ luxa2.com

Read more

■ tinyurl.com/oz77ywp

Specification

Bluetooth wireless stereo speaker unit; 2x 35mm drive units; 70x25mm passive radiator; touch-sensitive controls; Bluetooth 3.0; SBC audio codec; NFC for BT pairing; Qi wireless charging compatible; Micro-USB 2.0 for charging; microphone for hands-free telephony; 8.14Wh internal battery, 14.8Wh external battery; 190x82x65mm; 603g

Build: ★★★★★☆

Features: ★★★★★☆

Performance: ★★★★★☆

Value: ★★★★★☆



BLUETOOTH WIRELESS SPEAKER

Luxa2 Groovy W

The Groovy W Bluetooth speaker is a portable block around the size of a packet of biscuits. Its rechargeable battery is said to be good for 15 hours of play; another booster pack is included, around twice the size. This extra battery is a slim detachable plinth upon which the main speaker can sit. Luxa2 promotes all this stored power as good for charging your gadgets.

The top of the unit is populated with blue lights and finished in gloss-black plastic. Lights indicate battery level, mic operation, Bluetooth. Some lights are touch-sensitive controls, namely play/pause/hangup, as well as - and + areas to control volume.

Pressing the tiny power button on the back elicits a disembodied George Takei voice, informing us, Sulu-like, that "Bluetooth mode has been on..." The subsequent pause, as if for effect, concludes: "Paired".

Providing the sound are two small 35mm speakers, facing the front behind a perforated metal



grille that encircles the case. A passive radiator inside helps augment bass a little.

For Bluetooth wireless audio connections, the Groovy W can use only the lowest-grade SBC codec; don't expect to stream using the preferred aptX or AAC audio.

Build quality is competent, using black plastic, metal grille and fake-chrome plastic trim. A rubber sheet underneath helps the speaker stay in place on the desk.

The sound is functional for a telephone conversation, but music was mangled by poor audio design. The speaker's tone was relatively even, with no strong boost to bass or treble for example, and thanks to a

crossover-less speaker configuration the midband was relatively clear. However, At background levels, the low-level details of music were lost, leaving a bland, featureless sound that encouraged us to turn it up. As we did, though, the sound became spikier and more annoying.

Besides the grey treble evident whenever we raised volume, an annoying background noise was always present, a rustling whispy crackling noise behind every sound.

Verdict

The combination of lo-fi Class D amp and low-grade Bluetooth hampers any quality from this unremarkable speaker. ❌ **Andrew Harrison**

£15 inc VAT

Contact

■ silverstonetek.com

Read more

■ tinyurl.com/p6dgbfs

Specification

Empty drive enclosure for 2.5in SATA drives; 7mm SATA drives only; UASP mode available; USB 3.0 cable; cross-head screwdriver for assembly; 122x78x10mm; 68g (35g cable)

Build: ★★★★★☆

Features: ★★★★★☆

Performance: ★★★★★☆

Value: ★★★★★☆



DOCUMENT SCANNER

SilverStone Technology TS10

Thanks to the interest in thin-and-light laptops, equally thin SATA hard drives and SSDs have become widely available. And with them, portable drives to make use of that thinness, such as the SilverStone TS10.

It's not a working solution out of its box - it's a drive enclosure. You'll need to add your own. It accepts only the 7mm-thick SATA drives, which are available (if rare) for spinning hard disks; but practically every new SSD now comes in 7mm form, often exclusively so.

Comprising a black-anodised aluminium extrusion with plastic end caps, the TS10 is simply constructed. To make a working unit, simply attach a 7mm drive to its SATA connector (which includes all USB/SATA electronics on a tiny PCB), then slide the drive into the slim outer case, where it's supported by friction fit. You then nip up two tiny screws to secure the removable end. There's a tiny screwdriver in the box. Not included is a carry pouch to reduce scratches to the case.

Construction quality is good, and while the drive's electronics may look simple, we noted that the TS10 supports UASP mode, to bolster slow performance of USB 3.0.

To wit, in most USB 3.0 storage drives, USB's default bulk-only transport (BOT) mode is supported, restricting speed to around 300MB/s, regardless of the capabilities of the actual storage technology inside.

Tested with an Apple MacBook Pro, we noted that the SilverStone drive enclosure was recognised as compatible with the USB-attached SCSI protocol (UASP).

We tried a variety of recent SATA Revision 3 SSDs, to gauge best available performance of the USB 3.0 enclosure. Measured with QuickBench, the SilverStone TS1 enclosure could allow maximum sequential reads of 432MB/s and maximum sequential writes of



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429MB/s. Those are very good figures, and as good as we've seen from any USB 3.0 drive.

The UASP mode should also allow higher queue depths - multiple parallel data streams - which can assist the high-speed passage of many small files simultaneously.

SilverStone doesn't support UASP mode in Windows 7, but Windows 8 should include built-in drivers.

Verdict

The SilverStone TS10 is a smart and extremely compact enclosure to connect a 7mm SATA drive to your computer. ❌ **Andrew Harrison**

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SAMSUNG GALAXY GEAR 2

The future of smartwatch apps

Ashleigh Allsopp asks the experts what they think the future holds for smartwatch apps

Smartwatches are expected to be the next big thing in the world of technology. They dominated the 2014 Consumer Electronic Show in January, with many companies launching new wrist-worn gadgets during the event, and it's widely rumoured that Apple will unveil a new smartwatch later this year.

As technology advances and becomes even more integral to our day-to-day lives, many of us want gadgets that can help with our daily tasks. It looks like wearable technology is the answer, bringing something new to our lives that could soon become commonplace, and change our relationship with technology completely.

Currently, smartwatches from the likes of Samsung, Sony and Pebble act as a middleman between you and your smartphone, saving you the trouble of getting your mobile device out of your pocket or bag. They can display information such as text messages, missed calls and other notifications from the likes of Twitter and Facebook. Some models even allow you to carry out simple tasks such as remotely controlling your music playback or even making and receiving phone calls.

Last year, there were few smartwatch apps, and those that were available had limited functionality. However, this is changing. In February, Pebble opened its own app store, with over 1000 apps and watch faces to choose from, and it wasn't long before Sony and Samsung followed suit with their own stores.

Available apps

At the moment, each app is built for a specific smartwatch so, for example, you won't be able to use an app that's been designed for Samsung's Galaxy Gear 2 on a Sony SmartWatch or Pebble Steel.

Popular Pebble apps include offerings from Yelp, Foursquare and Pandora. Currently, there's no official Twitter app, but you can download the third-party Twebble, which lets you post tweets. Other offerings include PebbleGPS, a maps app, and there are a number of weather programs, too. Owners of the Nest Learning Thermostat can use the Leaf Pebble app to control the temperature in their home, while those with Philips Hue lighting can turn lights on and off simply by tapping their watch. There's even an online banking app called Interact that allows users to view their balance and recent transactions, and will vibrate if the user nears their overdraft limit.

Sony's store also offers a reasonable range of apps, including the SmartWatch Universal IM app, which lets you receive notifications from the likes of Facebook Messenger, Skype, WhatsApp, Google

Voice and more on your wrist. There's also an app to help you find a mislaid phone, and one that allows you to record audio by swiping to the right (it's called A007 Spy). There are also games such as Sudoku and a Tetris-like offering called Blocks.

Samsung's store has official apps from the likes of Evernote and eBay. Other offerings include the Path social networking app, Pocket - which lets you listen to articles you've saved in the app - Triplt for flight information, Zite, Feedly, and more. Note, these apps aren't available on Samsung's latest Tizen devices.

That's not to mention all the fitness and health apps available for each smartwatch, enabling you to collect data such as the distance you've travelled, how many calories you've burned, and more.

While there are many useful apps already available, we should expect to begin seeing new, more adventurous and innovative offerings in the future that will help streamline and improve our relationship with mobile in all areas of our lives. Plus, new beacon technology, which can offer you information based on your location as detected by a small proximity device placed at a relevant place, could take smartwatches even further. In a gallery, for example, a beacon could be hidden behind a painting so that, as you approach it, your smartwatch will automatically display relevant information.

The future

To find out what the future could hold for smartwatch apps, we spoke to leading app developers from Fjord, Ustwo and 5K.

"Where the Nike FuelBand on its own provides a mere counter of steps, the ecosystem surrounding fuel points, and all that enables, taps into human nature in a way that changes behaviour," explained



PEBBLE STEEL

**SONY SMARTWATCH 2**

Abbie Walsh, group director at Fjord, the Accenture Interactive design company behind the Adidas miCoach smartwatch. "This is the true potential of the 'wearable' device. Something close to our skin, an expression of ourselves, and yet external to us, can truly lead to the next big leap in our relationship with technology."

"But it needs to have a meaningful and ongoing dialogue with everyone that dons one. That means thinking beyond the device itself and understanding deeply the motivations and needs of the people who will wear it." That's where apps come in.

"Wearable tech feels like the mobile market about seven years ago," added Matt Pollitt from 5K, a digital design company that's set to launch its own Pebble watch face. "It's early days. The tech is still quite clunky, but people are starting to get excited about the possibilities attached to it."

Ustwo visual designer Shaun Tollerton said: "Wearable is going to take off. In fact, it already did, but it reminds me of when 3D took off. Once the gimmick and hype wears off, we can focus on creating functionality that can truly benefit our lives."

Walsh added that: "We are limited to some extent by social expectation, but therein lies the next big challenge for interaction design. What are the gestures, actions, inputs that we will use when the device we're communicating with doesn't have a screen or is buried inside our clothes?"

Additionally, it's too early to know exactly what apps will be popular for smartwatch owners. It's a whole new way of interacting with technology, so it's ripe for exploration.

"I believe many smartwatch app opportunities lie in those that directly affect us, such as our health, lifestyle, and even fashion," argued Abbie. "But talking to our wrist, obsessively checking our watch for notifications, messages, emails? What's the social etiquette around that?"

So what sorts of apps can we expect to see emerging, and, more importantly, succeeding? Most of the experts we spoke to believe health and fitness will continue to be the main uses for smartwatches, but as designers and developers get more comfortable and experiment with new ways of implementing smartwatches, we'll begin to see apps emerging outside of that field.

"Smartwatches still feel like an extension of other devices you would have on your person," said Pollitt. "As we see them mature, I'd like to see them as an alternative to carrying a large phone or as a second screen offering discretion where required. Initially, we expect there might be the usual quick-to-market phone and tablet app ports of big name apps and services, which should give way to some more interesting ideas later on as the adoption curve peaks."

"It's very easy to think of a smartwatch as a smartphone on your wrist, but what's the point, especially if you already own a smartphone?" argued Shaun. "If we can reduce the amount of time that we currently spend glued to our phone screens, I think we'd all be a lot happier and more efficient."


"That could be achieved by surfacing information you want directly to your wrist, before you even think about it (think Google Now). Then there's the rise of health and fitness apps that will continue to gain traction with a huge potential to revolutionise healthcare systems around the world as they tap into the data captured by such apps (with our permission of course)."

Will Apple's iWatch be a game changer?

With so many companies already venturing into the wearable tech market, there's one glaringly obvious tech giant that has yet to take the plunge: Apple. Speculation points to an iWatch later this year, and it's likely that the company will put a big emphasis on apps for the device, as it has done for its other products.

"Apple is once again at the crest of the next technology wave. The big difference this time is that the world has already caught up," Walsh told us. "The question should be: what can they do that will accelerate and open up this new world of possibility to everyone? The answer might be a very different Apple approach. One informed by external design disciplines not aimed at their fan base at all, but finding a place where fashion and service design meet."

Referring to the voice-activated personal assistant currently found on iOS devices, Tollerton revealed that he'd "love something like Google Now, or in Apple's case, Siri. The right information would be displayed on my wrist at just the right time. Train times, flight updates, whether to take an umbrella as I leave home. I can also see potential for iOS apps to have extensions of themselves present on such an iWatch, which would be in constant communication via Bluetooth LE (low energy), for example. A range of interactions could be reduced to just a single tap or two, such as making payments, checking in, RSVPing to meetings. This would be achieved because all of the heavy lifting would be made on the iPhone."

Pollitt added: "We'd like to see it being something self-charging and non-intrusive; with reliable integration across the other devices people would use. It would ideally fill the gap for when people want to discreetly view messages or get bite sized pieces of information delivered to them. Haptic feedback would also be cool." 

**Martin Hajek's concept of the APPLE iWATCH**

GAME 2048

Free

Contact

■ Android, 2048.mobi;
iOS, twitter.com/2048_game

Read more

■ tinyurl.com/Ls5hawy

System requirements

Android 2.2 or later,
6.1MB RAM; iOS 4.3 or
later, 2.8MB RAM



2048 has skyrocketed to the top of the charts in the iOS and Android app stores, and there's a good reason why: it's ridiculously addictive. It's not an original concept - it's based on Threes! (tinyurl.com/qzyqwwL) - but that hasn't stopped a huge number of clones appearing.

The reason for this is that the game runs on open-source code, meaning any developer can take and adapt it. We'll be looking at the most popular iOS and Android versions here - the former created by Ketchapp and the latter by Estoty Entertainment Lab. The main gameplay for both is exactly the same, but they do differ when you start changing modes, so we'll talk a little bit about each below.

Let's start by talking about the classic, main gameplay that both the Android and iOS versions of 2048 have in common.

The aim of the game is to get the 2048 tile, which is no easy feat. You'll start with some low number tiles, such as 2s and 4s, which you can slide in any direction (but not diagonally). When two tiles of the same number touch, they'll join to form one tile, with a higher number created by adding the two together. So two 4 tiles make an 8, two 8 tiles make a 16, and so on.

You'll need to continue merging the tiles until you get that all-important 2048 tile, which will finish the game. There is a catch, though; every time you move your tiles, even if you don't manage to merge any in that move, a 2 or 4 tile will appear on the grid. Run out of space and it'll be game over.

The app will keep track of your best score, and there's a leaderboard that will let you see how well you're doing compared to your friends.

iOS and Android

On both the Android and iOS versions we look at here, the (very similar) interface is easy on the eyes and perfectly intuitive, enabling us to concentrate on the game without getting distracted. They're both free, too, so you'll spot some ads here and there, though, we hardly noticed these.

We'll start by talking about the additional modes in the iOS

version of 2048, as there's just one. By tapping Menu and then swiping to the right, you'll find the Challenges mode. We should warn you now, that they are very hard. We're currently stuck on Challenge 6, but are determined to beat it, even though we've tried more times than we care to think about.

In each challenge, you're tasked with collecting a selection of tiles and you'll have a set number of moves to retrieve them. It's nice to be able to take a break from the main gameplay if you're struggling and have a go at the Challenges. There are currently a total of 48 Challenges, which should keep you going for a while.

The Android version has three additional modes to choose from: X-Tile, Survival and Practice.

In the first of these, there's an annoying tile that can be moved but can't be used, so it adds an interesting new obstacle to the challenge of getting that 2048 tile.

Survival mode involves a timer, which is fun but incredibly hard. You start with 15 seconds on the clock, and each time you merge two tiles with a value of 8 or higher, you'll get an extra two seconds. This one's for when you're feeling ambitious.

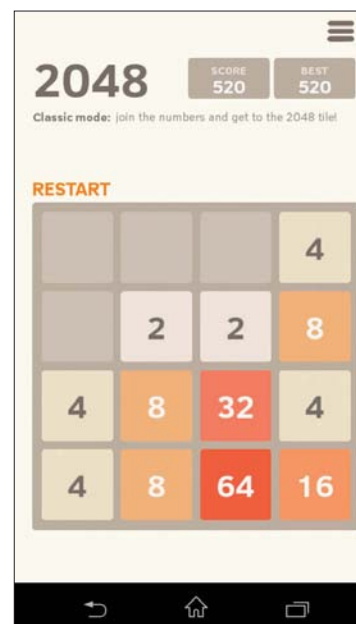
Top tip

Once you've had a play around with the game and understand the concept, you can start to get a proper strategy together to conquer it completely.

There are many different possible ways of attempting to win 2048, but our favourite is the corner technique. We normally say content is king, but here the corner is the king.

Since the game consists of a grid, there are four corners. What you need to do is pick one and stick with it for the entirety of the game. Get your highest number tile in that corner (our personal choice is the top left) and keep it there. This way, you can form the other tiles around it and make that number higher when possible.

There may come a time when you have no choice but to move



Practice mode gives you a total of 20 undos, so if you find you've made a horrible mistake you can go back and change it. This will set you up nicely for Classic mode when you're a bit more confident about getting that 2048 tile.

Verdict

Overall, we love 2048. It's the perfect time-waster, and is so addictive that you'll find yourself playing it in every spare minute you get. **Ashleigh Allsopp**



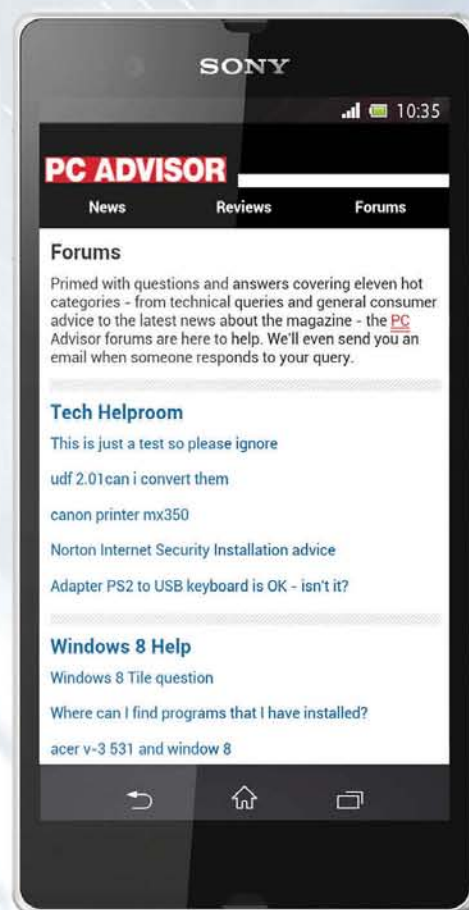
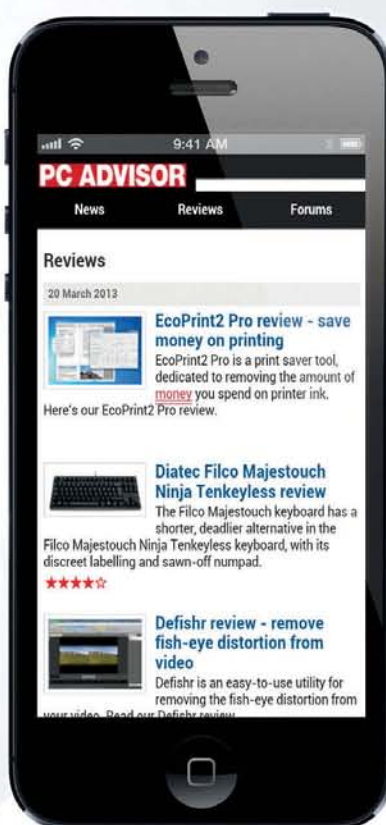
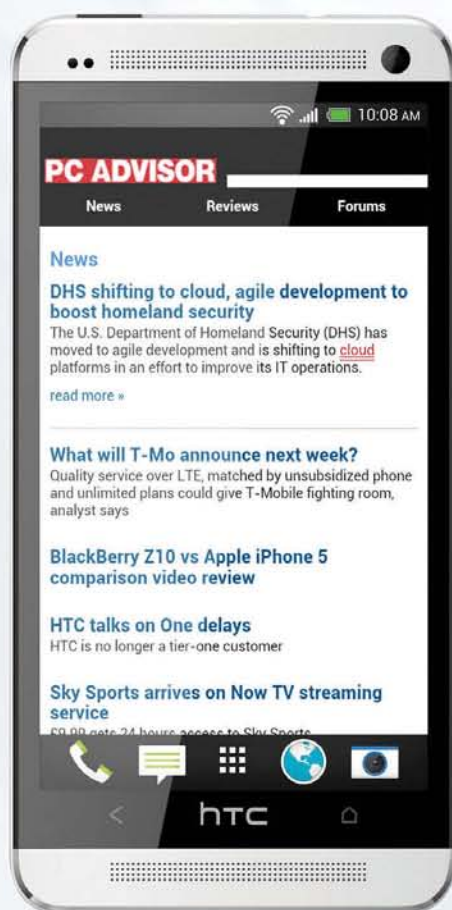
away (see above) from that corner. Don't worry, calmly move away and then back again.

Warning: The corner technique doesn't guarantee that you'll reach 2048. The danger if you need to move away from your chosen corner is that new tiles appears in that space - this isn't good. You can carry on, but the game will be much harder to win, so you might want to start again if this happens.

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MULTIPLATFORM DASHBOARD

AVG-Zen

Free

Contact

■ avg.com

Read more

■ tinyurl.com/mhkdpb6

System requirements

Windows XP/Vista/7/8;

Android device

AVG was the first company to offer free anti-virus protection on Windows PCs and has extended this with its free PC TuneUp software. Both are also available in premium, subscription versions. The company's latest offering, Zen, is built into the current versions of both, and as a standalone product on Android devices, bringing these products together across a wide range of devices.

The software's visual interface is like a dashboard, showing the devices on your 'Zen network' at the top, with the relevant tools below. The service is free of charge and all you need to start your Zen account is an email address and password.

PCs are easy to add, but Android devices take a bit more effort; you have to send them an email and follow a three-stage installation, before the device is added.

Once installed, you can populate the functions within the program as you need. The software reports on four areas: Protection, Performance, Privacy and Identity, and Support. When you click on one of these, you'll see the status of apps you've installed in those areas.

The Android app's options include Anti-Theft, Camera Trap and Device Lock, so it's thorough in what it can do. The second of these takes a picture of anybody trying to



The **VISUAL INTERFACE** shows the devices available on your Zen network

unlock a device unsuccessfully and mails it to a specified address.

While AVG calls Zen an administration console, we see it more as a status tool. We expected to be able to initiate AV scans, start tuneup tools and run other parts of AVG's suites remotely using the software. But instead, it only displays the current state of security and performance, and you'll need to visit the PC or device you're viewing to make any changes.

This gives it limited use. If it acted like a cheap and cheerful network manager, where you could change settings and run AVG utilities, it would have more value. It might be vaguely useful to see the status of a firewall on a remote machine or that a device hasn't been

scanned for a while, but if you can't fix these things remotely, you're not much further forward.

There's still a mix of free and paid-for applications in AVG's suites, with free basic anti-virus and PC tuning. The Pro products, which are downloaded by default, are only there on 30-day trials.

Verdict

AVG isn't the first company to provide 'accounts' on to which you can pool attached devices from different platforms, to handle administration. Zen works smoothly and enables status display of any device from any other. This provides limited extra facilities, but also ties you in to one protection software provider. **Simon Williams**

Usability: ★★★★★

Features: ★★★★★



BACKUP SOFTWARE

Pipemetrics Bvckup 2

\$20 (£11.90)

Contact

■ bvckup2.com

Read more

■ tinyurl.com/L29w4a4

System requirements

Windows XP/Vista/7/8/8.1;

1GHz Intel processor or

greater; 1GB RAM

Usability: ★★★★★

Features: ★★★★★

Value: ★★★★★



There are many ways that you could accidentally lose the information on your computer, such as hard disk failure, or something as extreme as a flood or power surge. A nifty little program that has saved our bacon is Pipemetrics' Bvckup 2.

The software's interface is simple and to the point, eschewing gaudy colours and unnecessary embellishment to remain slick and responsive to use. All of the information you need to keep track of your backups is in front of you on each backup's tile.

There are only two buttons to play with on the menu bar: Go and Stop. That's it. If a backup is running, pressing Stop pauses it, clicking

it again cancels it, and further pressing it disables it. The same is true in reverse for the Go button.

Backing up is a process of copying files from one location to another, and the way this is carried out dictates the overall speed of the backup. Backups that copy every file on every run clearly do a lot of redundant work if the files haven't changed, and for large backups this is time-consuming. It only makes sense to be selective with what to copy. But what if you could copy not just the modified files, but only modified parts of the files?

This is how Bvckup works; it uses an algorithm to check each part of the original file against the

respective part of its existing backup copy and copies across only parts that have changed. This means that if only 2MB changes in a 5GB file, only 2MB of data is copied over. As you can imagine, the time savings can be immense.

One of Bvckup's other key features is its logging system. Being able to understand what's happening during a backup is handy, but it's easy to get buried under all the details. This program addresses this by displaying all backup activity in a hierarchical manner, so it's easy to drill down from the high-level information to really specific details.

What this means in practice is that if an error occurs, you'll have

BACKUP UTILITY

Nero BackItUp 2014

Free (5 Pro £15, 25 Pro £30, Unlimited Pro £40)

Contact

■ nero.com

Read more

■ tinyurl.com/pcpef3k

System requirements

Windows XP SP3 32-bit/
Vista SP2/7 SP1/8/8.1;
2GHz processor, 1GB RAM,
1GB drive space; apps for
Android, Mac OS X, iOS

Nero's BackItUp 2014 aims to make backup a real no-brainer. In the application's basic form, a free download that comes with 5GB of online storage, it's pretty much click and go. You select the files you want to back up and the destination, which can be a local drive, external USB drive, CD/DVD, network storage or online, and away it goes.

If you want compression, encryption or automatic scheduled backup, you'll need to pay for one of the three Pro versions of the software. These provide 5GB, 25GB or unlimited online storage.

The scheduler enables you to quickly set up daily, weekly or monthly backups, or to copy continuously, which means a copy is made every time a file is changed.

The controls are straightforward, many requiring a click on an icon, which makes it an easy program to set up. For example, the different storage types, from local drive to online storage, are shown in a row across the screen, with an indication of their relative protection. This is, however, a program for backing up file sets, not creating system backups. There are no facilities to copy a complete drive; useful for reinstating a crashed system.

People who want more control may also find BackItUp 2014 frustrating. You can't, for example,



BACKITUP 2014 offers a backup solution for Windows, to a choice of media

create a rolling multiset backup, with the oldest being wiped each time a new one is created.


We've also seen criticism of the online backup speed of the program, but this will depend on the upload speed of your broadband link. As a test, we backed up 3.76GB of mixed files over a satellite link, rated at 6Mb/s upload. It completed in just under one hour, 50 minutes, which gives a transfer rate of 4.56Mb/s

After the initial backup, the software is intelligent enough to record changes only, so backups will then be a lot quicker. Data can be restored to the folders it came from, and you can also access individual files within a backup from the original device; or any of up to five

others, signed in to your BackItUp account. This means it can be used for file transfer to and from a mobile device, as well as from a PC.

We installed the free Android app on a Samsung Galaxy S III and had no trouble logging into our account and view and download files from our test backup, or backup contacts, messages, music, photos and videos. There are apps for Mac and iOS, too.

Verdict

For anybody wanting a no-frills backup system to cover all the devices they use every day, Nero BackItUp 2014 fits the bill. If, however, you like to customise how backup sets are kept, you should look elsewhere.  **Simon Williams**



Bvckup 2 has some **POWERFUL OPTIONS** behind a straightforward exterior


all the information about the cause and the context at your fingertips in a couple of clicks.

Other useful features within Bvckup 2 include snapshots of the destination. This means there's no need to rescan the destination each time when comparing it to the source and building the backup plan, which saves time. Scheduled, manual and real-time backups are also available, while the detection of moved or renamed files can save time recopying. Optionally, you can elect to archive deleted files at the destination.

The program doesn't use a proprietary file format either, so you can open your backed up files

just the same as the originals. With the help of Device Tracking, you can tie backups to the specific USB disk rather than a Windows drive letter under which it may appear.

Verdict

Bvckup 2 is one of those applications that you don't need to think about after it's set up: it just works. It's fast and reliable, with well-thought out features to help along the way. Delta copying speeds up the backups when compared to full file copies, and greater reliability comes from intelligent error handling and detailed logging. Bvckup represents great value at \$20 (£11.90) for home users.  **Chris Dugdale**

WEB BROWSER

Mozilla Firefox 29

Free

Contact

- mozilla.org
- Read more
- tinyurl.com/n7vmpca

System requirements

Windows XP SP2/Server 2003 SP1/Vista/7/8; Mac OS X 10.6-10.9; Linux; Pentium 4 or later processor with SSE2; 512MB RAM; 200MB drive space

Usability: ★★★★★☆

Features: ★★★★★★



You can customise **FIREFOX'S APPEARANCE** by clicking on the three-line menu button in the top-right corner

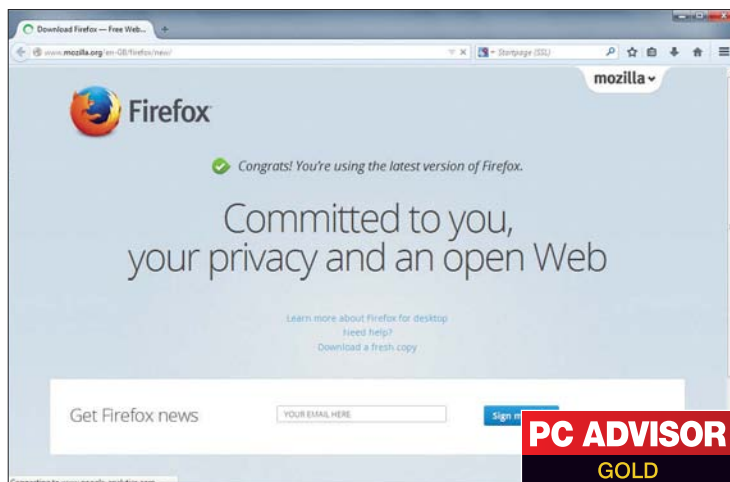
Although Mozilla releases regular updates for its Firefox web browser, on the whole these offer minor improvements only. For example, you may get a message telling you that it's checking plug-in compatibility, but that's about it. Not this time. Firefox 29 delivers a retuned interface that's easy on the eye and simple to use.

The most obvious change is that the drop-down menu has been moved to the right, where Internet Explorer and Chrome have theirs. Like the latter, it's accessible by clicking on a three-line button.

Mozilla has also done a nice job of rendering the new menu with readily recognisable icons. Firefox's settings and features are far easier to navigate than IE's and especially Chrome's, where before we would have said the opposite.

If you're unhappy with Firefox's layout, it's easy to personalise. Click on the menu icon and then the Customise button at the bottom. You'll be shown a number of options, such as Find, Print and Full Screen. If you want to move any of these to the toolbar or tab strip, for example, simply drag-and-drop it to your desired location. When you've finished, click Exit Customise.

The new, rounded tabs are a lot easier on the eye, and Mozilla has also changed the location of the back and forward buttons. The latter



Firefox has a **NEW LOOK** that's akin to Chrome, but with less built-in tracking

is next to the URL field, which will save a lot of mouse movement in the long run. It's also visible only when you can move forward.

Bookmarks

Our favourite new feature is expedited bookmarking. If you find a page you want to return to, click on the star in the top right and a little animation lets you know that the current page has been bookmarked.

There's not much new internally to Firefox 29. That said, there have been some improvements to Yahoo searches (HTTPS) and the way you access your Mozilla Sync account for syncing bookmarks between devices.

We use Chrome, IE, Firefox and Opera – largely to differentiate our work- and private-browsing. They're all more or less technologically equal.

We mainly use Chrome because it's stable and it offers our favourite text-to-speech app in SpeakIt.

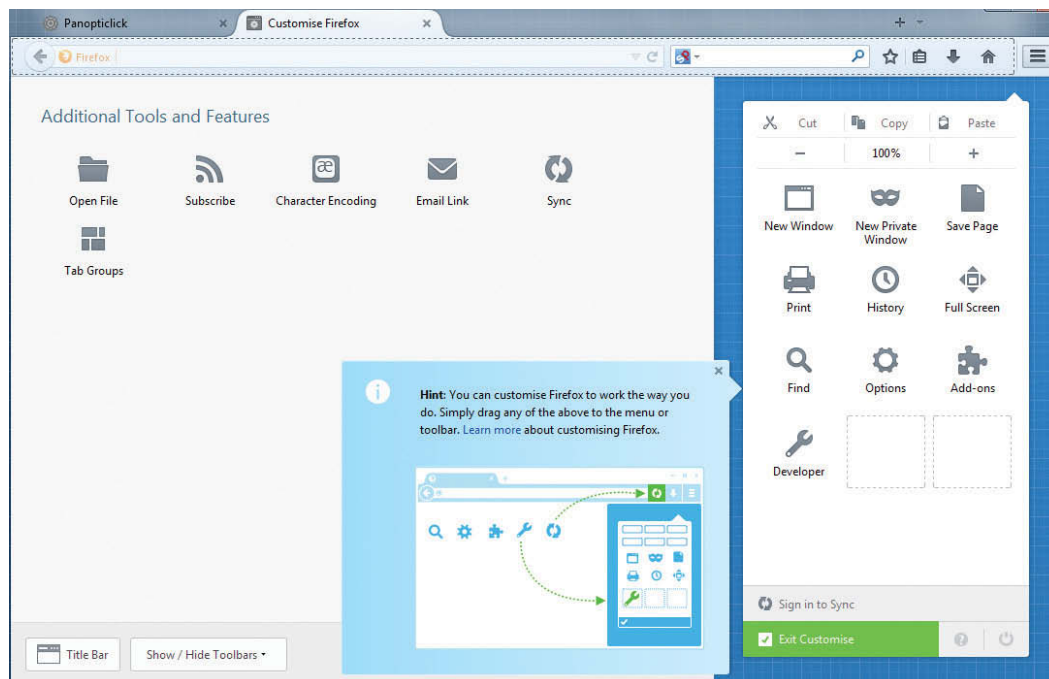
Opera is fun and has some nice interface perks, but the new version of Firefox has us seriously thinking of cutting back to one. We find it the most visually appealing of the bunch, as well as the most intuitive when it comes to changing settings.

Verdict

Opinions vary, but we don't understand the griping we've

seen online about the new interface, or the publicity it's garnered. This isn't Windows 8 – you can turn back the interface clock via the customise tab and basically clone the old interface via a third-party plug-in if you so desire. However, unless you're averse to change, you shouldn't want to: Firefox 29 is a cleaner, easier design, with an improved workflow that will save you time and make your life easier.

Mozilla has cherry-picked the best bits of the competition and added some nice touches of its own. Firefox sports a visual makeover and design, that in our opinion, vaults it to the top in both appearance and efficiency. **Jon L Jacobi**



GAME

Daylight

£11 inc VAT**Contact**■ playdaylight.com**Read more**■ tinyurl.com/nefakhv**System requirements**

Windows 7 SP1/8/8.1
Windows 8.1; 4GB RAM;
5GB hard disk space;
DirectX 11 compatible card;
nVidia 470 GTX or greater,
Intel 4000 or greater



Horror movies – mainstream ones at least – have become notoriously formulaic of late, but that hasn't stopped jump-scares, spooky hospitals and doors opening by themselves from drawing huge and highly profitable crowds. Sadly, horror games seem to be heading in the same direction.

The Slender Man games are innumerable, often amateurish and mostly routine, but their 'Spooky Person Pops Up Behind You' formula has made extremely rich men of many YouTube personalities, who most excel at cartoonish faux-terror. With the whiff of freshly-roasted cash cow in its nostrils, here comes first-person spook 'em up Daylight.

Primarily set in that creepy staple, the abandoned hospital, it hurls about a dozen horror stereotypes a minute at your screen. Horrible sounds in the background, randomly slamming doors or falling furniture, baleful notes scribbled in spidery handwriting, cryptic tattoos and, inevitably, a spooky thin lady with long black hair.

She's a horror archetype/stereotype, and finding out her story isn't at all interesting. She's there to pop up unexpectedly, to advance towards you with skeletal hands outstretched, and to be temporarily chased away by expending a precious, hard to replace flare. Amazingly, despite being such a familiar sight, she's often legitimately scary – you spend so much of Daylight alone, jumping at distant sounds of torment, that when someone does appear, the urge to get away from them as fast as possible is overwhelming.



Adding to the deep desire to avoid this figure is that death doesn't mean simply a loading screen in Daylight – as well as that, the very layout of the level you've been playing is remade. So attempts to reach an exit, or to collect the various scattered items needed to unlock the exit, are further complicated by no longer knowing where anything is and where you've previously been. Die, and you're trapped here with that sinister woman for even longer.

This setup could only be effective for so long, which is no doubt why a Daylight playthrough clocks in at under three hours. This serves to both prevent it from exhausting itself with repetition, and to perhaps inspire playing it again through later, with a different randomised level layout. Frankly, though, the latter is unlikely, because while Daylight does manage scares, it also manages tedium. There's a set amount of notes and letters you need to find in each level, and this always winds


up involving retreading your steps, miserably trying to find the one item you've somehow overlooked. The formula's pepped up by the fact that a climatic object in each level is too big to hold at the same time as the ghost-scaring flares, so the last stretch of each mission is a terrified, helpless sprint to the exit.

The longer you stay, the more appearances the ghost makes, too, so time is very much an issue. The darkness and the twisting, mazelike corridors work to prevent simply sprinting through – you need to peer at every nook and cranny despite wishing you didn't. This adds tension and stress, which a game as hammily acted and leadenly written as this desperately needs.

Daylight would be far better with its sub-Vincent Price narration, and without a protagonist who repeats the same half dozen fearful exclamations time and again. This aspect of the game only adds to the sense that it's built to order to court a very particular market – YouTube and Twitch streamers who specialise in pantomime terror. Twitch support is even built into the game.

Not that there's anything wrong with that, but it does mean Daylight is a one-trick pony, and a cheesy one at that. It does manage some scares, and that's down to some excellent environmental sound creating a sustained atmosphere of dread.

Verdict

Daylight is worth one nervous dash through its short campaign, but it's too heavy on stereotypes and naffness to warrant the repeat visits it's designed for.  **Alec Meer**



GAME

Betrayal

£14 inc VAT

Contact

■ blackpowdergames.com

Read more

■ tinyurl.com/ode9j6d

System requirements

Windows Vista (64-bit);
3GHz dual-core
processor; 3GB RAM;
DirectX 9 compatible
with 1GB video RAM or
better (nVidia GeForce
GTX 460/AMD Radeon HD
6850); 4GB disk space;
Windows compatible
stereo sound card



Betrayal doesn't have to be black and white if you take against it – in fact, the optional colour mode is incredibly pretty. But it lacks the affecting starkness and strangeness of this 17th century-set first person sword 'n' arrow game's monochrome mode. Its take on the New World is dark and ghostly, with *Schindler's List*-style flashes of blood red amidst the newsprint palette, alerting you to threats and oddities.

This is a hybrid of ghost story and action game, which makes sense given many of its developers formerly worked at Monolith, creator of the FEAR series. No machine guns and bullet time here, though; this is lo-fi, historical fare, with a strong supernatural overtone.

You arrive as a colonial soldier exploring a place that has recently been beset by blood and cruelty, and through a combination of found objects and conversations with ghosts, piece together a fractured tale of what happened here.

To do that, you must switch between day and night, each with different foes and different secrets, and engage in desperate fights that lean as much on evasion as they do action. It's a creepy and dangerous-feeling place, and the unforgetting, if simple, combat reflects that.



Enemies will kill you in a couple of hits, so it's crucial to learn their attack patterns and to ensure you don't miss any shots with your agonisingly slow-to-reload musket. Purchasable weapon upgrades help matters a little, but learning the rules of combat is far more important. Especially as all your loot is left with your corpse upon death, and if you get killed en route back to it, it's lost forever.

Unfortunately, it all gets a bit repetitive after an enormously strong first few hours. Enemy types are few and quickly over-familiar,

while too much time is spent following an objective marker to a series of objects, backtracking, then doing it again in Dark mode, too.

Only it's not quite an objective marker – Betrayal bravely attempts an audio location system instead of the usual flashing arrow prompt, but unfortunately it winds up being a matter of repeatedly pressing a button to make a marker appear on your compass, rather than hunting things down via sonic triangulation.

The basis for an excellent game is there, but Betrayal effectively runs out of content by the halfway point and recycles itself. While its writing conjures up an appropriate tone of menace and mystery, it's perhaps a little too detached, so big reveals don't hit emotional buttons in the way they seem intended to.

At least the evocative world props it up far past the point it would otherwise have become unbearably tedious. Trees tremble sadly in the breeze, tall grass flutters, huge and frighteningly empty forts suddenly loom in the distance. Visually, Betrayal is absolutely remarkable, and even if the game on top of that runs out of steam all too soon, let's hope better things are done with its tech later.

Verdict

Betrayal is beautiful and brave, going almost toe-to-toe with big name action games despite its humble indie origins, but despite a clutch of great ideas, it becomes a bit of a grind in its latter half. ☒

Alec Meer



£316 ex VAT
£380 inc VAT

Contact

■ canon.co.uk

Read more

■ tinyurl.com/le9wa5n

System requirements

Mono MFD laser printer; printer, scanner, copier, fax; 1200x600 dpi print resolution; quoted print speed B = 33ppm; actual print speed B = 24ppm; USB 2.0, 10/100 ethernet, 802.11b/g/n; mobile access; 250 + 50-sheet multipurpose tray (expandable to 800 sheets); 50-sheet duplex ADF; 600x600 dpi optical scan resolution; 256MB memory; auto duplex; Toner cost B = £98; print yield (pages) B = 6400; 390x473x431mm; 19.1kg

Build: ★★★★★
Features: ★★★★★
Performance: ★★★★★
Value: ★★★★★



MONO LASER MULTIFUNCTION DEVICE

Canon i-Sensys MF6180dw

Hitting that perfect business sweet-spot where price meets functionality and high performance, Canon's i-Sensys MF6180dw is a brilliantly positioned mono multifunction device. It offers scanning, copying and faxing besides impressive print facilities, and easily pulls ahead of the Kyocera Ecosys M2030dn (tinyurl.com/nrLnszw) in the battle for the mid-£300 business choice.

It lays the groundwork early on, and its clean cream livery and substantial yet not oversized exterior allow it to slot seamlessly into an office environment.

A five-line LCD control panel would perhaps be slightly easier to navigate, but there are some lovely nods to convenience. Providing one-button functionality while not overcrowding the control panel is often a problem for printer manufacturers. Canon, however, uses ingenuity to cut the Gordian Knot.

The fax facilities, for example, offer up to 19 speed dial settings. Yet rather than have this many buttons plastered across the printer, only the first seven settings are placed on view, with the remaining 12 hidden away underneath the flip-up top. Touches like this help make the MF6180dw an intelligent and versatile machine.

There are plenty of options when it comes to the paper handling, too.

A chunky 250 sheets can be fed in as default, with an extra 50-sheet multipurpose tray. That should be enough for most offices, but if you have more demanding needs, the MF6180dw can hold up to 800 sheets.

Such capabilities are very much in line with other printers at this price - the Kyocera M2030dn is identical in this area. The Canon's ADF blends seamlessly with its other multifunction components, allowing for full duplex sheet-fed scanning of up to 50 sheets at a time. Should you not want sheet-fed scanning, you can use the flatbed instead, which offers businesses a range of high-quality scanning options.

Quality is good, and full colour A4 sheets can be scanned in 12 seconds (at 300dpi); or 29 seconds at 600dpi. Attention to detail is good, and the flatbed can even expand to take in books, brochures, and other thicker material.

Connectivity

The ethernet port is a standard 10/100 rather than gigabit specification, although the model remains highly versatile, adding wireless 802.11b/g/n capabilities to the USB. You can effortlessly send prints and other files to USB memory drives using Canon's smooth interface, and Secure Print means that confidential documents don't need to be printed out until the sender is standing in front of the i-Sensys MF6180dw, ready to type in their password. It can also hook up to mobile devices.

For serious users, though, its support for PostScript 3 will be of the most importance - this is one of the key differences between this and the cheaper Canon MF6140dw.

The i-Sensys MF6180dw doesn't compare to the Kyocera M2030dn on speed, but its real-world performance of 24 pages per minute



PC ADVISOR
GOLD


is still very respectable - it's faster than Canon's own LBP7780Cx (tinyurl.com/ccapajf), for instance.

Strangely, Windows defaulted to the Fax driver. That's not the only default setting likely to confuse some users either, and as part of its drive to keep print costs to a minimum, Canon has the MF6180dw default to auto-duplexing mode. This model is pretty proficient at duplexing, with performance falling off by just 43 percent to 13.6ppm. Quality was strong throughout, with a clarity of character and bold texturing that makes beautiful work of the stodgiest of documents.

Mono graphics (17.6ppm) are also capably handled, with plenty of depth to the greyscale, and clean lines. The Canon is consistently excellent across the board for print quality, whereas the Kyocera had a few too many lows for our liking.

The Canon also wins out handsomely on running costs, and is extremely economical to run for a mono laser at this price level. The high-capacity toner allows a cost of just 1.5p per page.

Verdict

We're trying to find fault with the i-Sensys MF6180dw model, but it's beautifully conceived and configured. We might perhaps wish for gigabit networking rather than older 10/100, and the standard memory of 256MB (the Kyocera has double this) is a little skimpy. In general, though, it's a fantastically versatile model.  **Robin Morris**



£2,300 ex VAT
£2,760 inc VAT

Contact

■ kodak.co.uk

Read more

■ tinyurl.com/q2bmb6k

Specification

Combined A3 sheet-fed and A4 flatbed (with Book Edge) scanner; 1200dpi; 48-bit colour; colour duplex; 250-sheet feeder capacity; USB 3.0; 15,000 sheets daily duty cycle (100 pages/day for flatbed); TWAIN/ISIS/WIA compliant; 432x371x257mm; 17.7kg; 3-year warranty

Build: ★★★★★

Features: ★★★★★

Performance: ★★★★★

Value: ★★★★★



SHEET-FED SCANNER

Kodak i3250

Offices with a need for heavyweight scanning facilities will have relished the prospect of Kodak's sturdy i2900 (tinyurl.com/Lwjzedb). Well, the i3250 does a similar job, except that it can handle A3 output. In one single move that makes it the most powerful and versatile model we've tested.

It's no shrinking violet, though. Its 432x371mm footprint will consume a sizeable part of any desk, while its 18kg mass means it'll need a good set of legs to rest on, too.

The size, though, is large only in comparison with typical desktop models. Placed next to industrial scanners, it cuts a rather more compact figure. Its recommended daily volume has been pushed up to 15,000 pages per day for the sheet-fed - half as much again as that of the i2900 - making this a model that should cope with very high workloads.

Assuming you have room for the i3250, you're unlikely to find it wanting. Like its predecessor, it comes with a choice of feeds. Bundles of documents will be swallowed up by the 250-sheet feeder. We found this to be mostly reliable, although a batch of *Vanity Fair* articles, complete with jagged edges, did cause a few mishaps. Most other document types, though, slipped through without a glitch.

The interface works best with USB 3.0, and the i3250's speed of this machine is astounding - a 50-page document went through in 29 seconds at 200dpi. With OCR (optical character recognition) on, it was converted into a searchable PDF within a further 10 seconds. Without OCR, the extra time required slipped to six seconds.



That amounts to a stunning 85.7 pages per minute (ppm). And around four seconds of that time arose from the i3250 dropping everything into place, so larger bundles would complete at an even greater rate.

Higher output rates are available, and 300- and 600dpi scans were completed within 41 and 102 seconds respectively. The model handles A3 just as comfortably as A4, requiring just a second for each sheet of the larger paper size.

As with the i2900, the i3250 has another scanning option up its sleeve - an A4 flatbed component. This scans single sheets at a time, but it means that you don't have to entrust your precious documents to a potentially harmful sheet-fed. Since the pages on a flatbed aren't sucked into the machine, there's no risk of damage.

Book club

This option also benefits from a brilliant book-edge feature, which sees the scanning glass run right up to the edge of the Kodak. If you want to scan a book, you no longer have to cram the entire volume underneath the scanning lid. Instead, you can let half of the book hang down at a 90-degree angle. The other half will be tightly gripped and held flat within the flatbed component. This means you won't see the spine, and every letter of every sentence will be correctly rendered. As a way of successfully scanning books without damaging them or putting up with substandard results, this is brilliant.

It also works better than the book-edge feature on lesser models, as the flatbed component

is situated towards the middle of the machine. This ensures that you have plenty of weight bearing down, so you don't have to hold down the lid in order to stop the books from popping back up.

Quality is, as you'd expect from a scanner in this price range, supreme. Text is boldly defined, even at lower resolutions, while the palette is rendered with immaculate attention to detail. It can jump from text to pictures, to intricate charts and codes without dropping a notch.

We've yet to review a more accurate device, and the Kodak i3250 combines pace and accuracy in one stunning package.

The software drivers are easy to use, and the OCR works very well. Having said that, Kodak expects that, if you're spending this much on a scanner, you'll be using professional third-party software to create the very best results. So while you can scan in high-quality mode out of the box, you shouldn't expect the raft of software titles that you might get with a model lacking a four-digit price tag. The drivers are powerful, though.

Verdict

Next to many smaller models, the price tag may seem prohibitive. It is, however, an extremely powerful device that looks up, instead, to more industrial models - the majority of which cost and weigh even more. For many serious businesses, the price tag won't be much of an issue given the stunning performance. Whether you're feeding in 200-plus page bundles or scanning books, this is a fantastic option for the office with very high aspirations. **Robin Morris**



£540 ex VAT
£649 inc VAT

Contact

■ optoma.co.uk
Read more
■ tinyurl.com/qbfr7r7

Specification

Single-chip DLP projector; 1280x800 (WXGA); 15,000:1 specified contrast ratio; HDMI; 2x USB-A; SD card slot; Micro-USB; composite; 3.5mm analogue audio; VGA; 1.4:1 throw ratio; vertical keystone correction; 3W built-in audio; 145W (bright mode) average power consumption; 270x170x48mm; 1.4kg

Build: ★★★★★☆
Features: ★★★★★☆
Performance: ★★★★★☆
Value: ★★★★★☆



ULTRAPORTABLE PROJECTOR

Optoma ML1500

The Optoma ML1500 is designed to fill the gap between the pico mini projectors that fit in your palm, and larger, more traditional models.

It weighs 1.4kg and comes with a smart soft carry case that will fit neatly in a briefcase or overnight bag. It also succeeds in being very stylish, with a smooth black and silver tapering design that measures an ultra slimline 270x170x48mm.

Setup is quick – there's no bulky power cable and the machine is up and running within seconds thanks to the lamp-less LED technology, which doesn't require extended warm-up and cool-down times.

This projector's predecessor, the ML1000, was acclaimed for being considerably brighter than its equivalent lamp-based rivals, with an LED brightness of 1000 ANSI lumens. Optoma has increased this to 1500 ANSI lumen.

Where the ML1500 shines is in the range of available inputs – as well as the expected VGA, composite video and 3.5mm audio in, there are

two USB-A ports for flash drives; plus an SD card slot, Micro-USB and HDMI.

An automatic vertical keystone correction system helps you line up the image. The projector has a throw distance of 0.52- to 3m and a maximum screen size of 100in.


Canon provides several control options. The supplied slimline remote is small and fiddly compared to a touchpad interface. An additional mini Wi-Fi dongle can be purchased and slotted in via the USB port to display material from a Windows PC, Mac or mobile device. With this installed, you can then make use of the free Wi-Fi-Doc App for iOS and Android phones and tablets to present documents and photos. The projector will read Microsoft Office and PDF files.



The sound quality is never going to be a major consideration, but we found that voice commentary was more prominent than on most projector systems in this class.

As far as the image quality is concerned, the extra LED illumination means colours stand out more vividly over longer distances. However, although the amount of detail has also been enhanced, blacks have a distinctly greyer tone and movie hues tended to favour the redder end of the spectrum.

Verdict

The Optoma ML1500's plethora of connectivity and control options, built-in media and office document players, and expanded brightness make it a good executive companion.  **Martyn Clayden**

£208 ex VAT
£250 inc VAT

Contact

■ brother.co.uk
Read more
■ tinyurl.com/kgg2u68

Specification

Wireless compact scanner; 128MB standard memory; up to 1200x1200dpi scan resolution; 16ppm specified speed for single-sided, 32ppm for duplex; 20-sheet ADF; 802.11b/g/n Wi-Fi; USB 2.0; card reader; 285x103x84mm; 1.5kg

Build: ★★★★★☆
Features: ★★★★★☆
Performance: ★★★★★☆
Value: ★★★★★☆



DOCUMENT SCANNER

Brother ADS-1100W

Brother's ADS-1100W is a compact document scanner, which in its unfolded state measures a trim 285x103x84mm. Styled in black, the smart patterned cover peels back to become the input tray for a 20-sheet ADF. Two document support arms are then released from the cover's top edge and a pair of standard document guides at the bottom allow for sizes up to A4.

A colour touchscreen LCD control panel dominates the front cover below the ADF, with a minimal list of options (Stop, Start, Wi-Fi, Error and four targeted scan functions) and the power button for company. On the back you'll find a card slot, a USB Direct interface, an AIOSS/WPS button and a USB connector.

The built-in card reader works with plastic cards only – business cards have to be fed in via the ADF – but both can be processed with the included NewSoft Presto! BizCard 6. You also get the latest version of PaperPort, the option to scan directly to a USB memory stick,



and receipts can be safely scanned using the transparent receipt carrier sheet provided in the box.


Other features include the ability to scan photos and documents to iOS, Android and Windows devices using the iPrint&Scan app, plus automatic two-sided scanning. If you're willing to spend a bit more to include scanning to cloud services, then you might like to opt for the higher spec ADS-1600W.

We found the claimed two-sided scanning speed of 16ppm for text and graphics documents to be pretty accurate, with single-sided scanning marginally faster. Scanning speeds to phones and tablets was equally impressive, and the ADS-1100W

scored highly for detail and contrast quality of images in particular.

The big disappointment, however, is paper alignment. There's not enough support for the sides of A4 sheets especially, leading to frequent instances of jamming, skewing and ruffling of edges. This will need to be addressed for future upgrades if the 1100W is to be seen as a reliable aid to the workplace.

Verdict

Brother's ADS-1100W is a versatile compact document scanner that creates multiple opportunities to disseminate digital data, though, it's let down by poor paper alignment.  **Martyn Clayden**

FAMILY PCs

While many people are content with a smartphone and a tablet, sometimes a do-it-all desktop PC is just the ticket. **Paul Monckton** tests six of the latest family PC systems from UK systems builders

Every Windows desktop PC in our round-up delivers decent all-round performance and value for money. We look for excellent build quality, a home-friendly design, and useful accessories and peripherals that let you quickly get the PC up and running out of the box. Preinstalled software is also appreciated.

A powerful CPU is a starting point for smooth, frustration-free operation but, unless you're processing large amounts of video or running intensive applications, you don't need the fastest available chip. In fact, you're often better off with a lower-power chip, saving electricity and reducing noise. Most of the PCs reviewed here are a lot more powerful than you'd need for general-purpose use.

Intel's Core series processors are now in their fourth generation, codenamed Haswell they can be identified by a leading '4' in their extended part number - for example Core i3-4130. Haswell chips are an excellent choice for those who want a fast PC without sacrificing value, and the latest versions recently received a small 0.1GHz increase in clock frequency at no extra cost. Due to timing, only Chillblast was able to submit one of these new chips in time for review, but you can expect other vendors to follow suit.

Don't be lead by Intel specs, though. Once you have enough system memory (RAM), it's better to spend available budget on a solid-state drive (SSD) than the fastest CPU. A 120GB SSD will boost

performance and boot times, while smaller-capacity, cheaper SSDs can be configured to act as a cache to accelerate hard drives via Intel's smart-response technology (SRT).

Another alternative is to use an SSHD or hybrid drive, which uses spinning magnetic disk and flash storage in one device. These are slower than true SSDs, but deliver an increase in performance over a standard hard drive while maintaining large storage capacities.

With a separate SSD and HDD system, you'll need to decide which files and applications to install on which drive. With a hybrid drive or SRT in place, you have one storage volume and can let the system manage how they are used automatically.

Some vendors will supply an Intel processor with a 'K' suffix, such as the Core i5-4670K. This means the chip can be overclocked, provided that your motherboard is compatible, and it also includes faster integrated graphics than the standard version of the processor.

With a Core i5-4670 or Core i5-4690, you'll be able to play some of the less demanding games, without the need for a dedicated graphics card. Even cheaper Core i3 chips are fine for full-HD video.

If you want your PC to double as a gaming PC, an AMD Radeon R7 265 or nVidia GeForce GTX 750Ti graphics card would be a good choice. Adding around £115 to the total cost of your system, one of these will let you play most current games at high resolution.



Photography by Dominik Tomaszewski

The motherboard is also important, as this can determine how upgradable your PC will be, as well as the selection of ports and connections that are available. Most of the PCs here use motherboards based on Intel's business-oriented B85 Express chipset. The Business chipsets often offer good value by omitting high-end performance-boosting features in favour of convenience and manageability at a lower cost.

All PCs here are preinstalled with Windows 8.1, but most vendors will install Windows 7 upon request.

Peripherals

If you want a PC for watching films and video, listening to music and chatting with friends, decent speakers are essential. For larger rooms or simply a bigger sound, a 2.1 stereo set incorporates a separate bass speaker or 'subwoofer' and will perform better than a cheap 5.1 setup. (Note that the '5' refers to the number of speakers, while the '1' refers to the subwoofer.) None of the PCs in this group test come with speakers, so you'll have to buy them separately.

Screen quality is crucial. Look out for in-plane switching (IPS) panels, which offer better colour fidelity than budget twisted-nematic (TN) monitors. High-quality IPS displays are now much more affordable and the improvement in quality is such that all

users, with the possible exception of gamers, should aim for one whenever possible. Rarer MVA and PVA displays also feature IPS-like technologies and deliver similar performance.

A good screen with decent viewing angles becomes crucial when two or more people are viewing the screen at the same time. Consider a 23- or 24in full-HD monitor rather than a 21.5in model, especially if you'll be using the PC to watch films.

A Blu-ray drive is finally an affordable option, and the HD films it supports can make the most of your screen. Listening to music or watching films is spoiled by a noisy system, though.

Sound-dampened cases can drastically cut down on the noise produced by fans and drives. Better yet, use quieter fans and solid-state storage. Good-quality CPU coolers can help. Better systems approach the challenge with lower-power processors and passive rather than active cooling strategies.

Beginners may find the automated setup process of PCs from big-name manufacturers useful. This can help you configure your machine and get online. The down side can be a lot of unwanted preinstalled software, which may even slow down your computer.

Finally, don't forget to check the warranty terms. A free collect-and-return service can save a lot of hassle and expense should you need to send such a large item back for repair.

ARBICO FAMILY i3 4185

£675 inc VAT • arbico.co.uk • tinyurl.com/nu7fsgb

At £675, this great Arbico PC looks like a reasonably priced option, offering a significant saving over most of the rest of the group. Unlike some of the other PCs on test which are too powerful for light home use, it features a modest 3.4GHz Core i3-4130 dual-core processor, teamed up with 8GB of memory, a 120GB SSD and 1TB hard disk.

Performance is as you may expect – perfectly adequate, but noticeably lower in benchmark tests than most of the competition. This would be fine were it not for Wired2Fire's Diablo Reactor, which is cheaper than the Arbico and delivers far greater performance.

An MSI-branded AMD Radeon R7 250 is installed, which gives the PC around double the gaming performance you'd get from integrated graphics alone and opens up more gaming possibilities, although the Wired2Fire system offers much better gaming speeds.

One area where the Arbico system beats the Wired2Fire Diablo Reactor hands down is in storage quality; the latter offers no SSD and suffers because of this omission.

The Arbico's CIT Templar system case is one of the more compact, but also feels less expensive. It lacks any front-facing USB 3.0 ports, so you'll have to rummage around at the back to make the most of up-to-date peripherals and flash drives.

A smart, but basic 23.6in AOC monitor is supplied, which keeps the cost down, but can't match the quality of an IPS display. You also get a DVD writer with useful Nero and CyberLink Power DVD software included – both of which aren't supplied with competing systems.

Build	★★★★☆
Features	★★★★☆
Performance	★★★★☆
Value	★★★★☆
Overall	★★★★☆



Logitech's bundled wired MK120 keyboard and mouse combo saves a few pounds over the wireless version, saves money on batteries and also prevents your peripherals from going missing.

VERDICT: The Arbico Family i3 4185 doesn't go overboard with processor or graphics performance, but offers a complete system with a balanced set of features at a modest price. While not fast, it's speedy enough for day-to-day use and even a bit of gaming. The only spanner in the works is its faster, more powerful competition.

CHILLBLAST FUSION PHARAOH

£799 inc VAT • chillblast.com • tinyurl.com/k2kf83u

Fastest overall for both graphics and general-purpose computing, Chillblast's Fusion Pharaoh is the only PC in the group to feature one of Intel's latest Haswell 2014-refresh processors, the Core i5-4960.

As such, it has a slight advantage in the benchmarks. This processor is available at no extra cost over the price of the Core i5-4670, and clocks in 100MHz faster at 3.5GHz. However, by the time you're reading this, you can expect other vendors to have started using the new chips, closing any small performance gap.

This quad-core processor is paired with an AMD Radeon R7 265 graphics card, which in this PC allows the highest gaming framerates of the whole group – if you need that sort of thing.

So it's fast, but speed alone does not a great family PC make. Thankfully, Chillblast has selected a high-quality 23in IPS monitor from Asus and included a Blu-ray drive; this is surprisingly the only system in the group to provide Blu-ray playback.

The Zalman Z3 Plus system case is aimed gamers who like transparent peek-a-boo side panels and blue illuminated front fans. You may like to forgive these unnecessary vulgarities since it's also rather well made, and feels more solid and more expensive than alternative offerings from Yoyotech and Arbico. Unlike those cheap cases, it includes a convenient front-facing USB 3.0 port.

Inside, you get 16GB of memory, a 120GB Samsung 840 SSD for faster boot times and decent system responsiveness, along with a relatively capacious 1TB hard disk for bulk storage.

Build	★★★★☆
Features	★★★★★
Performance	★★★★★
Value	★★★★☆
Overall	★★★★★



**PC ADVISOR
RECOMMENDED**

A Logitech MK270 wireless keyboard and mouse is provided along with a USB Wi-Fi adaptor. Then there's the peace of mind of a two-year collect-and-return warranty, plus another three years for labour only.

VERDICT: The Chillblast Fusion Pharaoh is an excellent PC and offers tremendous value for money, but it's possibly too expensive for a family system unless the speed and gaming are a necessity. In addition to its best-in-class performance, this PC offers stand-out features such as Wi-Fi, an IPS display and a Blu-ray drive for HD films.

MESH ELITE 4670 - PCA**£799** inc VAT • meshcomputers.com • tinyurl.com/ozcshyu

Being built into another Zalman Z3 Plus system case, you could easily mistake this Mesh system for either of the PCs from Chillblast or Wired2Fire – but there are significant differences inside.

The name is a big clue that this PC has an Intel Core i5-4670 processor. This 3.4GHz quad-core chip delivers performance in spades and would be the perfect choice for the more demanding user, were it not for the new Core i5-4690, which because available just too late to be included in most of the PCs in this group test.

Even so, the Elite 4670 offers more speed than most families will use, especially when combined with 16GB of memory and a 120GB SSD. Big storage is covered by a capacious 2TB SATA hard disk that offers double the typical 1TB of room for all your family's digital 'stuff'. A DVD writer is provided for films and backups and input is via a Logitech MK270 wireless keyboard and mouse combo.

This is also a good PC for the family that likes gaming. An nVidia GeForce GTX 750Ti graphics card is installed, which places the full range of PC gaming titles within reach and at good quality settings.

Gamers will also benefit from the fast blur-free response time of the 24in Iiyama E2483HS monitor, which is a fraction higher than the 23in IPS displays found elsewhere in this group test. Unfortunately, it can't match them on picture quality.

At £799, the Mesh is the same price as Chillblast's PC, and although it offers double the storage space, it falls behind in all other areas, from performance to peripherals. The warranty offers a free

Build	★★★★☆
Features	★★★★☆
Performance	★★★★☆
Value	★★★★☆
Overall	★★★★☆



collect-and-return service for only the first three months, whereas both Chillblast and Quiet PC offer the same service for two years.

VERDICT: The Mesh Elite 4670 - PCA is a strong performer in a category where we don't need to be really that bothered about performance. It's reasonably priced and flexible enough to be put to just about any use, including gaming, but we feel it's outclassed by Chillblast's Fusion Pharaoh at the same price. And that's assuming you'd want to spend nearly £800 on either of them in the first place.

QUIET PC ULTRANUC PRO XL**£590** inc VAT • quietpc.com • tinyurl.com/m4gegga

Based on Intel's NUC form factor, the UltraNUC Pro XL is small enough to fit in the palm of your hand. Suitable for the smallest of desks, it's extremely portable – but this could be a disadvantage for a family PC that you might want to keep in a fixed place in the living room. Still, if you want to place it out of bounds for any reason, you can simply pick it up and lock it in a drawer.

Despite its tiny size, the UltraNUC Pro XL finds room for four USB 3.0 ports. Mini HDMI and Mini DisplayPort outputs allow it to drive a pair of attached monitors, although the system comes without one.

The UltraNUC Pro XL is all about convenience and efficiency. Its ultra-low voltage 1.7GHz Intel Core i3-4010U processor offers enough performance for casual home use and web browsing, but falls short of the power offered by full-sized PCs. That's most true concerning its graphics, which rely on the CPU's integrated graphics processor.

Still, this might be a good thing if it will prevent the PC from being used for games that you may deem inappropriate for your family. The size of the PC means there's no prospect of adding a graphics card later; in fact you won't be upgrading the UltraNUC much at all internally. If you want an optical drive, you can hook one up via USB.

Fitted with today's now-standard 8GB of memory, this PC uses a 1TB hybrid SSHD, which adds fast flash storage to a hard disk mechanism to deliver improved performance and responsiveness. It can't keep up with a proper SSD, but delivers better speeds than a standard hard drive such as that found in Wired2Fire's Diablo Reactor.

Build	★★★★☆
Features	★★★☆☆
Performance	★★★☆☆
Value	★★★★☆
Overall	★★★★☆



When it comes to power consumption, the UltraNUC Pro XL is in a class of its own, consuming only 8W at idle and a maximum of 27W under full load. This is around one-fifth of the power used by its nearest rival from Arbico and also means near-silent operation.

VERDICT: The Quiet PC UltraNUC Pro XL makes it a great choice if you don't have space for a full-sized PC and is ideal if you plan to use your TV as a monitor. Performance is fine for most everyday tasks except gaming, and it runs quietly with minimal power consumption.

WIRED2FIRE DIABLO REACTOR

£668 inc VAT • wired2fire.co.uk • tinyurl.com/oa8ukdp

The Diablo Reactor is one of three of our family PCs which, thanks to the large Zalman Z3 Plus system case with its transparent side panel, look rather like entry-level gaming systems. With a 3.4GHz Intel Core i5-4670 quad-core processor at the helm and an AMD Radeon R7 265 graphics card, you know some games are bound to find their way onto it. In our graphics tests, this PC held its own against the competition, turning in joint-fastest framerates alongside Chillblast's Fusion Pharaoh; but costing a whopping £131 less.

Discounting the monitor-less Quiet PC UltraNUC Pro XL, the Diablo Reactor combines the fastest gaming performance with the lowest price for the whole group. An impressive feat, and yet one major omission prevents us from awarding this PC a Best Buy award.

You'll notice that the PCMark benchmark numbers are a little low, especially regarding storage. This is because the Diablo Reactor has no SSD, leaving the slower 1TB hard drive as a serious performance bottleneck. The result is a powerful PC at a fantastic price, which is capable of playing the occasional game at breakneck speeds.

Give us this PC with an SSD or a hybrid hard drive and we'd be all over it. A decent 120GB SSD would have cost an extra £70 and despite the extra cost involved, this would still have made The Diablo Reactor the best value-for-money PC on test.



An AOC 24in TN-based monitor and LiteOn DVD writer are included, both of which are acceptable at this price.

VERDICT: The Diablo Reactor is priced so competitively, it's hard to recommend any other choice. This PC offers a high-speed processor, along with the best graphics performance of the group and decent entry-level peripherals. However, it still lacks a solid-state drive.

	ARBICO £675 inc VAT (£562 ex VAT) ★★★★★	CHILLBLAST £799 inc VAT (£665 ex VAT) ★★★★★ PC ADVISOR RECOMMENDED	MESH £799 inc VAT (£665 ex VAT) ★★★★★	
Product name	Family i3 4185	Fusion Pharaoh	Elite 4670 - PCA	
Processor	3.4GHz Intel Core i3-4130, dual-core	3.5GHz Intel Core i5-4690, quad-core	Intel Core i5-4670 3.4GHz, quad-core	
CPU cooler	Arctic Cooling Freezer 7 Pro	Standard Intel Cooler	Standard Intel Cooler	
RAM	8GB DDR3 1600MHz	16GB DDR3 1600MHz	16GB DDR3 1600MHz	
Storage	1TB HDD + 120GB SSD	1TB HDD + 120GB SSD	2TB HDD + 120GB SSD	
Power supply	Arctic Red 650W	FSP 500W PSU	500W FSP Quiet Power Supply	
Motherboard	MSI B85M-E45	Asus B85M-G	MSI B85M-E45	
Operating system	Windows 8.1 Update 1	Windows 8.1	Windows 8.1 Update 1	
Ports	2x USB 3.0, 6x USB 2.0, HDMI, VGA, DVI-D, line in/out, headphone, mic	3x USB 3.0, 6x USB 2.0, 2x HDMI, VGA, DVI-D, line in/out, DisplayPort, PS/2	4x USB 3.0, 8x USB 2.0, VGA, DVI-D, DVI, HDMI, DisplayPort	
Display	23.6in AOC E2470SWHE (1920x1080, TN)	23in Asus VS239HV (1920x1080, IPS)	24in Iiyama E2483HS-B1 (1920x1080, TN)	
Graphics	2GB MSI AMD Radeon R7 250	2GB AMD Radeon R7 265	2GB nVidia GeForce GTX 750Ti	
Sound	Onboard	Onboard	Onboard	
Connectivity	Gigabit ethernet, wireless option available	Gigabit ethernet, 802.11n	Gigabit ethernet	
Case	CIT Templar	Zalman Z3 Plus	Zalman Z3 Plus	
Keyboard & mouse	Logitech MK120	Logitech MK270 (wireless combo)	Logitech MK270 (wireless combo)	
Optical drive	Samsung DVD RW	LiteOn BD-ROM/DVDRW	24x DVD Writer (read/write CD & DVD)	
Other	Nero & CyberLink Power DVD	None	None	
Warranty	2-year RTB	5-year labour, 2-year collect-and-return	2-year parts, 3-year labour, 3 months free collect-and-return	
PCMark 7 Overall	4800	5953	7304	
PCMark 8 Home	3777	4921	4709	
Sniper Elite V2 (fps) ¹	62, 22, 5	240, 76, 18	195, 68, 16	
Alien vs Predator (fps) ²	22, 11	83, 44	71, 37	
Power consumption ³	44, 133	38, 233	44, 177	

¹Sniper Elite V2 720p Low/1080p Med/1080p Ultra ²Alien vs Predator 720p/1080p, Max ³Measured when idle and under load respectively

YOYOTECH VIRTUE RS1

£859 inc VAT • yoyotech.co.uk • tinyurl.com/pxo6ek9

The Virtue RS1 offers a reasonably good specification including a 3.4GHz Intel Core i5-4670 processor and a fast 2TB Seagate hybrid drive. This uses flash storage technology to significantly improve overall performance. Its nVidia GeForce GTX 750 graphics card ensures that it can keep up with modern action games if required, and it comes with an excellent 23in AOC IPS display for a superior picture. Also included are a DVD writer and a Microsoft Wireless 3000 wireless keyboard and mouse combo.

However, there are two things we don't like about the Virtue RS1. The first is that it's simply not as fast as we think it should be, and the second is that it costs a crazy £859, plus delivery.

Cosmetically, the compact AVP Defender system case offers no front USB 3.0 ports and features a blanking plate for a card reader which hasn't been installed. It's a basic and cheap-feeling chassis, with almost no room for expansion inside – even for hard drives.

The installed Asus H81M-Plus motherboard uses the H81 Express chipset, rather than the B85 Express chipset found in most of the competition. This means only two memory slots are provided, rather than four. As standard, the RS1 is fitted with a single 8GB stick of 1333MHz memory, leaving a spare slot for expansion. It's worth noting that every other system here uses faster 1600MHz RAM.

Build ★★★★★

Features ★★★★★

Performance ★★★★★

Value ★★★★★

Overall ★★★★★



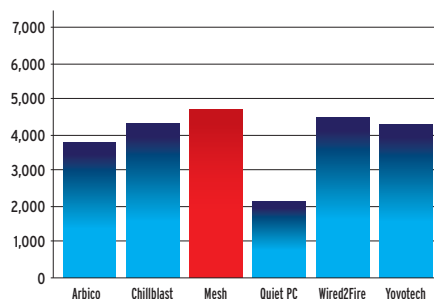
In our benchmarks, the Virtue RS1 delivered decent storage performance, but that was its only highlight.

VERDICT: The Virtue RS1 includes some good-quality peripherals, but delivers uninspiring performance and modest features, while costing more than any other PC on test. You can get far more features and performance for a lot less money by choosing one of those instead.

<div>QUIET PC</div> <div>£590 inc VAT (£490 ex VAT)</div> <div>★★★★★</div>	<div>WIRED2FIRE</div> <div>£668 inc VAT (£556 ex VAT)</div> <div>★★★★★<div>PC ADVISOR RECOMMENDED</div></div>	<div>YOYOTECH</div> <div>£859 inc VAT (£715 ex VAT)</div> <div>★★★★★</div>
UltraNUC Pro XL	Diablo Reactor	Virtue RS1
1.7GHz Intel Core i3-4010U, dual-core	Intel Core i5-4670 3.4GHz, quad-core	Intel Core i5-4670 3.4GHz, quad-core
Internal	Standard Intel Cooler	Standard Intel Cooler
8GB DDR3 1600MHz	8GB DDR3 1600MHz	8GB DDR3 1333MHz
1TB SSHD	1TB HDD	2TB SSHD
Intel external 19VDC, 65W	FSP 500W (Bronze 80 cert)	Storm 650W
Intel D34010WYB	Asus B85M-G	Asus H81M-Plus
Windows 8.1 Update 1	Windows 8.1	Windows 8.1
4x USB 3.0, Mini HDMI, Mini DisplayPort, headphone	3x USB 3.0, 6x USB 2.0, 2x HDMI, VGA, line out, headphone, mic, DisplayPort, PS/2	2x USB 3.0, 6 x USB 2.0, HDMI, DVI-D, DVI, line in/out, headphone, S/PDIF
Not included	24in AOC E2495Sh (1920x1080, TN)	23in AOC i2369VM (1920x1080, IPS)
Intel Graphics HD4400	2GB AMD Radeon R7 265	nVidia GTX 750 OC
Onboard	Onboard	Onboard
Gigabit ethernet, 802.11ac	Gigabit ethernet	Gigabit ethernet, 802.11n
Intel 4th Generation NUC	Zalman Z3 Plus	AVP Defender
Microsoft Wired Desktop 600	Octigen Wireless keyboard and mouse	Microsoft Wireless Desktop 3000
None	LiteOn DVD-RW	Samsung DVDRW
Malwarebytes PRO Lifetime Licence	None	Microsoft Office Home and Student
2-year collect-and-return	2-year RTB (full parts and labour)	First 30 days collect-and-return, 1-year parts and labour RTB, 2nd and 3rd year labour only RTB
3655	3938	5742
2112	4520	4366
33, 8, 5	240, 76, 18	158, 56, 11
9, 5	83, 44	60, 31
8, 27	45, 234	49, 170

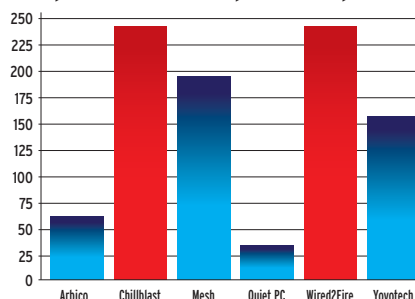
OVERALL SYSTEM PERFORMANCE

PCMark 8 Home (points)



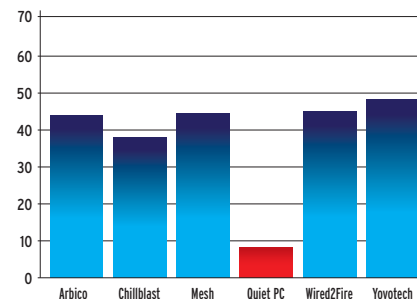
GRAPHICS PERFORMANCE

Sniper Elite, 720p Low (fps)



POWER EFFICIENCY

Idle power consumption (watts)



Conclusion

With the exception of the tiny, monitor-less Quiet PC UltraNUC Pro XL, there's little to distinguish between these family PCs at first glance. Three of them use identical Zalman Z3 Plus system cases and two even use the same motherboard. The Intel Core i5-4670 appears in three out of the six PCs, with an upgraded Core i5-4970 present in another. However, with systems ranging from £590 to £859 there are plenty of key differences.

If space is your prime consideration, you may prefer the Quiet PC UltraNUC Pro XL. It may be the least powerful of the whole group, but it's ideal for most home-computing needs other than gaming. It also operates very quietly and consumes far less energy than any full-size PCs. This option is one of the least expensive, too, even after you factor in paying for a monitor.

The three similar-looking PCs from Chillblast, Mesh and Wired2Fire are all great systems with the same build quality, but they

all look like gaming PCs due to identical large system cases with transparent side panels.

Wired2Fire's Diablo Reactor is the least expensive of the three by £131 and delivers excellent gaming results, but it comes with a lower-quality TN display and crucially lacks a solid-state or hybrid drive. This glaring omission will have a large impact on performance and responsiveness. We believe that having some kind of flash storage or flash-accelerated storage now is a must.

Mesh's Elite 4670 - PCA offers an impressive specification with a roomy 2TB hard drive and 16GB of RAM. It delivers convincing gaming results, but has a lower-quality TN monitor and lacks a Blu-ray drive.

Of the three, Chillblast's Fusion Pharaoh offers the best measured performance, being the first in our lab to feature a slightly speedbumped Haswell processor. Expect other PC vendors to soon follow suit. The Fusion Pharaoh also features the fastest

graphics card and comes with 16GB memory, a Blu-ray drive and a high-quality IPS monitor. With a two-year collect-and-return warranty, it has to be the pick of these three gamer-oriented systems.

Arbico's Family i3 4185 looks like great value for money at £675 and includes an SSD as well as a traditional hard disk. Its Core i3 processor and lower-spec graphics card may leave it looking slower in the performance department but, in truth, is all the power you need from a family PC. Specifying this Arbico system without the included graphics card may improve its value further.

These are all good PCs, but there's one criticism we'd level at all of them with the exception of the Quiet PC. They're still all too powerful and too expensive. If your level of gaming doesn't extend much beyond the odd game of Candy Crush Saga you don't need to bump up the price of your PC by more than £100 to add a graphics card.

How we test

How we test

Using the new FutureMark PCMark 8 v2.0 benchmarking suite, results are divided into Home, Creative, Work and Storage.

The Home benchmark reflects command tasks for typical home use with lower computing requirements such as web browsing, writing, photo editing and video chat, as well as low-end gaming.

The Creative benchmark is aimed more at enthusiasts and professionals working with multimedia and entertainment content. This test is more demanding on the processor and includes taxing transcoding components.

The Work test is geared towards office work tasks such as creating documents, web browsing and video conferencing.

For easy comparison with previous group tests, we've also included scores from our

previous benchmarking suite, PCMark 7, this test suite uses 25 workloads to measure areas such as storage, computation, image and video manipulation, and gaming.

A full-size desktop PC would typically score between 3000 and 7000 points with current hardware and the compact systems on test this month perform equally well.

Gaming performance

A family PC should be able to run most modern games at lower resolutions and quality settings. We use Sniper Elite V2 and Alien vs Predator to test each PC's graphics capabilities. Sniper Elite V2 is configured with Low quality settings at a resolution of 1280x720, followed by Medium and Ultra quality full-HD settings (1920x1080), while

Alien vs Predator is run at Maximum quality and measured at both these resolutions.

Subjective assessment

We also pay close attention to each PC's noise output and build quality, delving inside the case and taking note of the quality of components, cabling and airflow. Good-quality peripherals are assessed, if supplied.

Support

Differences in warranty terms can impact our scoring. Long warranties and good customer support are always preferred, but we also look each system's terms and conditions - specifically, whether faulty systems must be returned to the vendor at your own cost and if both parts and labour are included. ☒

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PC ADVISOR



Super-quick storage

Want to give your PC a massive speed boost that won't cost the earth? Today's SSDs are more affordable than ever. Andrew Harrison picks six of the best...

Solid-state is standard-issue for storing your data in tablets and smartphones, where it's relied upon for its tiny size and knock-proof nature.

The same assets are handy in desktop and especially laptop PCs, but more traditional computers can also unlock SSDs' perhaps most prized virtue - their speed.

Instead of a fragile magnetised disk whirring at 90 or 120 times every second, SSDs store binary data in shock-resistant silicon chips. And besides being physically robust, silent, smaller and lighter than any hard-disk drive, the big incentive to opt for a flash drive remains performance. Data can be read and written hundreds of times faster from electronic non-volatile flash cells.

This speed factor is about so much more than go-faster bragging rights though. Old-school desktop computers may still battle it out over who has the fastest processor or the hottest graphics card, but SSD performance is all about the user experience - applications launch in almost no time, web pages spawn faster and files copy in a fraction of the time.

Put simply, and regardless of whether your processor has 3, 5 or 7 after the 'i', the whole computer just responds so much better to your touch. The only real drawback has been the exorbitant price of entry to the premier-class storage club.

Until now maybe. It's taken six years or more, but we are now at the state where the solid-state drive, the SSD, is a truly affordable component for any computer user. And if your wallet won't even stretch to £100, just juggle your storage budget instead and get a 256GB drive.

Performance has swelled over the years - not just in the drag-race test of copying big files, but crucially with the way that small files can transfer. Much of the background housekeeping of a modern operating system is with the continual reading and writing of very small files of 4kB or smaller. It's

the random access of these all over the platters that can choke older disks that need to physically move a pickup head across spinning platters.

We've reached a point where just about any SSD you put into a computer to replace a hard disk will transform your experience. For performance seekers, there's still a case for finding the fastest. And that fastest metric is still as much about small-file transfers, which we can measure by the number of input and output operations capable in one second - otherwise known as IOPS. The best SATA flash drives



are currently returning figures around 100,000 IOPS, made possible by the way that datastreams can be paralleled together, a major asset of flash over disks. Performance - in terms of the speed with which data can be read and written - has now effectively plateaued among the best SSDs. It's not that flash memory has reached its limit, far from it, but the Serial ATA interface between the flash and your computer is now the bottleneck.

Until the next-generation of data interface is ratified, most PCs still use SATA Revision 3 with its 6Gb/s nominal speed, and circa-550MB/s real-world ceiling. Nevertheless, some are forging ahead with alternatives, notably Apple with its adoption of direct PCIe-connected flash drives in its Macs. This busts the old SATA limit to allow speeds of 700MB/s and more on even its cheapest MacBook Air.

Despite current SATA SSDs' shortcomings, we still test the essential speed, both in large-file sequential transfers and small-file random access, as differences do exist between brands and models.

When buying an SSD, look out for long warranties and high data-write limits if you prize data integrity, although with the help of proper backup routines, data loss is less an issue today. Some SSDs demand more power than others, and where this is known we'd advise against fitting in a laptop if you value your time away from the mains. Also look out for manufacturers that provide accessible support with firmware updates possible on the platform of your choice. Most storage brands are still routed in the Wintel world and don't make it easy to apply maintenance patches on their drives unless you run Windows.

Photography by Dominik Tomaszewski



Build	★★★★☆
Features	★★★★☆
Performance	★★★★☆
Value	★★★★☆
Overall	★★★★☆

PC ADVISOR
BEST BUY

CRUCIAL M550

£374 inc VAT • uk.crucial.com • tinyurl.com/mswd98z

This year's new model of Crucial's 2.5in SATA solid-state drive is a relatively minor revision to 2013's M500 (tinyurl.com/m2ncsmj). The M550 is listed as using 20nm MLC NAND flash again, sourced in-house of course, and there's still a Marvell controller in charge, this time a Marvell 88SS9189, which must be a revised '9187 used in the M500. We asked suppliers to submit the largest drive they could, since larger capacities are more likely to return the best results, but only Crucial acceded with its first 1TB drive.

Last year's M500 was available as a 960GB version, and while it was based on 1024GB of NAND flash, it kept more in reserve for over-provisioning. This helps maintain drive health and longevity, and is useful for preventing significant slow-downs when an SSD is kept under worst-case continual write operation. Now Crucial has opened up its largest SSD to make it truly a terabyte in capacity. While £374 is still expensive, in gigabyte-per-pound terms, it's staggeringly cheap for a high-performance SSD. At the time of going to press, Amazon was selling the 1TB Crucial M550 for £350, a figure of just 35p per gigabyte. That's half the price of Intel's latest 730 Series.

Given the cakewalk test of ATTO Disk Benchmark, the Crucial M550's highest read speeds were 563MB/s using 512kB data. But as you may expect, like all current solid-state drives it can't maintain this speed with smaller data chunks. From 256- to 8192kB data, the M550 could keep to its trademark 550MB/s pace; but by 128kB its read speed had fallen to sub-500MB/s figures, finally settling at 21MB/s with the benchmark's smallest 0.5kB data files.

In CrystalDiskMark, the highest numbers we saw were 478- and 464MB/s for compressible read and write sequential transfers; that already shows a lift in write performance over the M500's scores.

Small-file operations have benefited on the M550. Single-threaded 4kB writes were at around the 100MB/s mark for the M550; and around 30MB/s for reads. But multithreaded transfers broke the nominal 100 IOPS ceiling for 4kB random reads, at 100k IOPS, with writes not very far behind at 91.7k IOPS. In the AS SSD benchmark, a nominal overall score of 1096 points was the highest tested.

VERDICT: Crucial's new M550 has significantly pushed up performance. Most importantly, this new model signposts the trend in falling SSD prices, bringing potentially huge capacities within affordable reach.



Build	★★★★☆
Features	★★★★☆
Performance	★★★★☆
Value	★★★★☆
Overall	★★★★☆

INTEL 730 SERIES SSD

£363 inc VAT • intel.co.uk • tinyurl.com/ks2uanh

Intel's 730 Series is a high-performance consumer SSD, aimed at professionals. In contrast to some recent Intel SSDs that use SandForce controllers (with Intel's custom firmware), Intel has repurposed one of its own designs, the Intel PC29AS21CA0 controller - first developed for enterprise-class flash drives such as the Intel DC S3700.

The company also specifies its own NAND flash, here 20nm MLC, and is sufficiently confident of its endurance to offer a five-year warranty. Up to 70GB of writes per day is promised for the 480GB capacity model, suggesting a total writespan of 127TB.

Intel doesn't specify any RAM cache details, although we understand the larger of the two available models at 480GB uses 512MB of DDR3 DRAM memory. Thanks to overclocking, the controller has been accelerated from 400- to 600MHz, a mighty move of 50 percent. The memory bus has also been tweaked from 83- to 100MHz.

Unfortunately, we currently don't have the facility to measure internal power consumption, but Intel's own figures of up to 5.5W when active and 1.5W idle suggest this SSD would not be a wise choice for laptops seeking decent battery lives. In straightforward sequential runs, the Intel 730 Series could stretch its legs to the SATA Revision 3.0 limit, hitting 559MB/s for reads and 507MB/s in writes.

Tested with both compressible and incompressible data in CrystalDiskMark the results were similar - for example, 459MB/s versus 456MB/s reads and 482MB/s versus 480MB/s writes - indicating the drive's freedom from data bias. Intel's specification rightly focuses on low latency, apparent in measurements as good input/output per second figures. And the 730 Series soundly met and beat its spec of up to 89- and 74k respectively for reads and writes.

In the AS SSD benchmark test, it was close to that spec at 89k reads and 72k writes IOPS, using the default queue depth of 64 threads. Presented with half as many threads in CrystalDiskMark (QD=32) with random 4kB transfers again, we saw almost 94k read IOPS and 82k write IOPS. For single-threaded 4kB operation, the 730 Series returned a good result of 35MB/s reads, one of the highest figures seen here, and a healthy 89MB/s for random writes.

VERDICT: Overall, the 730 Series is the most expensive drive on test per gigabyte, but if you want speed at the SATA limit and a formal guarantee of endurance, the Intel SSD will deliver both.



Build	★★★★★
Features	★★★★☆
Performance	★★★★★
Value	★★★★☆
Overall	★★★★★

PC ADVISOR
RECOMMENDED

OCZ VECTOR 150

£129 inc VAT • ocz.com • tinyurl.com/kbed2w6

Toshiba invented NAND flash at the end of the 1980s, although it may not be the first company you'd think of when looking for an SSD today. Rather than create its own brand of SSDs, it bought one – the bankrupt OCZ Technology Group.

The OCZ Vector 150 was developed before Toshiba picked up the company's assets in January 2014, and still stands at the top of the OCZ range above the more affordable Vector 450 and 460 ranges.

Front and centre in the OCZ SSD is the Barefoot 3 controller, a proprietary device based on technology OCZ had bought with Indilinx. This is an ARM Cortex-based solution with OCZ's own Aragon co-processor, able to drive eight channels of NAND. As with many SSDs, the full capacity has been slightly reduced, aiding long-term longevity and short-term sustained write performance. So our 512GB-class drive has 480GB available to users (447GB for Windows users).

OCZ offers a five-year warranty on the Vector 150, or 50GB per day over that period, equivalent to 91TB of written data.

Build quality is impressive. At 116g, the drive is heavier than most 2.5in SATA hard disks, a solid-feeling lump of cast alloy in a smart blue and black finish. As we'd expect of any premium SSD, the OCZ Vector 150 strolled the simple sequential test, returning peak numbers of 557MB/s reads and 534MB/s writes. And in the nominal overall scoring of AS SSD, the Vector 150 was awarded 1086 points.

Digging deeper through the results, we find great IOPS figures from the same benchmark, 88k for reads and 82k for writes IOPS. These numbers were conspicuously trumped at the lower queue depth available to CrystalDiskMark, which allowed almost 93k read IOPS and 95k write IOPS with its threaded 4kB random data tests.

OCZ points out that its drives happily withstand the steady-state edge cases of data continuously writing without pause, and in our write test with HD Tune Pro, we did indeed see a precipitous drop from around 480 to a constant 200MB/s write speed. But while the speed more than halved, the new lower trace remained relatively steady, a sign of well-mannered behaviour under duress.

VERDICT: The OCZ Vector 150 is a solid-feeling and impressively performing SSD. It compares well with Intel's latest performance drive, yet is closer to 50p per gigabyte rather than 75p. At that price, it deserves a strong recommendation.



Build	★★★★★
Features	★★★★☆
Performance	★★★★★
Value	★★★★☆
Overall	★★★★★

SANDISK EXTREME II

£123 inc VAT • sandisk.com • tinyurl.com/n3ghdce

Prices of SSDs have dropped considerably in the past two years, and with affordable flash drives like this year-old favourite, the SanDisk Extreme II, we can all now 'go flash' for the magic figure of 50 pence per gigabyte. It takes a 7mm high form, and is constructed around a cast aluminium shell with a total weight of 57g.

The Extreme II uses SanDisk's own NAND flash stock, based on 19nm MLC. In charge of this is the Marvell 88SS9187 controller, which we've also seen used to good effect in last year's Crucial M500 and Plextor M5 Pro – both premium products and award-winning drives. One difference may lie with the firmware loaded, which is believed here to be SanDisk's own. Data is buffered by a healthy 256MB of fast DDR3 cache. Firmware upgrades are available through SanDisk to patch defects, although we could only find a Windows utility to do so.

Like any self-respecting SATA Revision 3 solid-state drive, simple sequential tests were nudging the interface limit – with sequential reads at least. The ATTO Disk Benchmark tool here showed reads up to 557MB/s and writes not too distantly behind at 519MB/s.

Probing further with CrystalDiskMark indicated superb small file transfer characteristics. But first the headline sequential speeds: 514MB/s reads and 483MB/s writes. We checked with both default random data and also with the 0x00 string-o'-zeroes test, and found exactly the same performance within measurement error, demonstrating why Plextor can truthfully market its SSDs – which use the same controller – as TrueSpeed. In other words, performance won't vary depending on what type of data you're writing.

Down at the small random file level, the SanDisk Extreme II was essentially at the milestone 100k IOPS level. CrystalDiskMark reported 99,328 IOPS for random 4kB reads at 32 queue depth. Writes here were 78,848 IOPS. For single-threaded transfers, we saw 4k random reads and writes at 35- and 97MB/s respectively, suggesting a bias toward write speed. In AS SSD, the Extreme II gained an overall score of 1062, with faster file reading when stacked to 64 threads – 349MB/s reads versus 280MB/s writes – and great 4k writes of 79MB/s against 28MB/s reads.

VERDICT: The SanDisk Extreme II would have stood out as a well-balanced high-performance SSD among its peers 12 months ago. It still does and now additionally benefits from keen pricing.

SEAGATE 600 SSD

£202 inc VAT • seagate.com/gb • tinyurl.com/n58rb8g

For the current SATA-standard drives, Seagate offers a regular and Pro version, the latter adding in a little more endurance thanks to higher-grade NAND stock and the use of higher over-provisioning. We tested the standard 600 SSD in its 480GB capacity.

Following Corsair's lead and its Neutron GTX SSD (tinyurl.com/kv954fc), Seagate has plumped for a controller from a relative newcomer in such technology, Link A Media Devices, also known as LAMD. In fact, the Seagate 600 SSD uses the same LM87800 chip as Corsair, but different firmware means results could be different.

With 555MB/s reading from the ATTO benchmark, the Seagate 600 SSD isn't troubled by large sequential reads. Its sequential write is a little lower than some of the competition, though, at 458MB/s, where most get closer to 500MB/s. That's the lowest of this group.

As we found with Corsair's implementation, the LAMD controller doesn't employ data compression techniques to inflate performance figures. Looking at the CrystalDiskMark results for 0x00 and random data, we get broadly the same results in sequential testing, 495- and 502MB/s for reads, and 458- and 462MB/s writes.

Looking at small-file transfer characteristics, the Seagate 600 SSD behaved reasonably well with single-threaded 4kB data, hitting 28MB/s for reads and 78MB/s for writes. As queue depth is increased



Build	★★★★☆
Features	★★★★☆
Performance	★★★★☆
Value	★★★★☆
Overall	★★★★☆

the Seagate scales well, nudging 97k IOPS for reads with 32 threads and 8k IOPS for writes, although the performance tails off.

VERDICT: The Seagate 600 SSD is a good value, but high-performance solid-state drive. Now over one year old, it's available at very competitive prices, which work out at a very reasonable 42p per gigabyte for the larger-capacity 480GB capacity model.

	CRUCIAL £374 inc VAT (£311 ex VAT) ★★★★★ PC ADVISOR BEST BUY	INTEL £363 inc VAT (£302 ex VAT) ★★★★★	OCZ £129 inc VAT (£107 ex VAT) ★★★★★ PC ADVISOR RECOMMENDED	
Product name	M550	730 Series	Vector 150	
Capacity tested	1TB	480GB	240GB	
Price per gigabyte	37p	76p	54p	
Other capacities ¹	128GB (£70), 256GB (£116), 512GB (£234)	240GB (£187)	120GB (£64)	
Memory cache	1GB LP DDR2	512MB DDR3	512MB	
Controller	Marvell 88SS9189	Intel PC29AS21CA0	Indilinx Barefoot 3 M00	
Flash	Micron 20nm MLC	Intel ONFI 2.1 20nm MLC	Toshiba 19nm MLC	
Firmware update support	Bootable CD	Intel Solid-State Drive Toolbox for Windows; bootable CD	OCZ Toolbox for Windows & Linux; PC and Mac bootable CD	
Warranty	3 years	5 years	5 years or 91TB writes	
Weight	64g	78g	116g	
PERFORMANCE				
ATTO (peak sequential)	563/514	559/507	557/534	
CrystalDiskMark (Seq 0x00)	478/464	459/482	498/490	
CrystalDiskMark (Seq rnd)	483/465	456/480	489/479	
CrystalDiskMark (4kB rnd)	30/99	35/89	25/97	
CrystalDiskMark (4kB QD32 rnd)	391/358	367/320	363/370	
CrystalDiskMark (peak IOPS)	100/91.7	93.9/81.9	92.9/94.7	

¹All prices inc VAT

TOSHIBA Q SERIES PRO

£295 inc VAT • toshiba.co.uk • tinyurl.com/mawubbe

Pricing is reasonably keen for Toshiba's latest Q Series Pro SSD, which is available in 128-, 256- and (harder to get) 512GB sizes. Bearing this in mind, the Q Series Pro works out at less than 50p per gigabyte.

This drive's controller is labelled with a Toshiba part number, but it could yet be a rebranded Marvell chip. Bucking the trend of most SSDs this may even be a cacheless design, with no additional DRAM to buffer data before writing. It also tips the scales at a mobile-friendly 53g, thanks to its 7mm-thin aluminium case.

Starting with the basic sequential drag race, the Q Series Pro returned figures of 553- and 519MB/s for its reads and writes. In the CrystalDiskMark test, we noted a lift in sequential reads with the Pro drive, but at 510MB/s reads and 470MB/s for writes, results are similar to last year's SSD. Single-threaded random read/write numbers were a little different. The Pro scored around 22MB/s reads and 78MB/s writes; the previous model could hit 22- and 90MB/s, suggesting a little more speed in small-file writing.

Stacked data showed again that Toshiba has elected to tune performance to read tasks, with 379MB/s 4kB random reads and 259MB/s random writes. In the AS SSD test, the overall score was fractionally ahead with the new Pro-branded Q Series. Delving into the results, we can see that the sum of multithreaded write



Build	★★★★☆
Features	★★★★☆
Performance	★★★★☆
Value	★★★★☆
Overall	★★★★☆

operations is slightly higher, now hitting 49k IOPS against the latest version's 58k IOPS. Read IOPS are unchanged at 91.9k IOPS.

VERDICT: The Toshiba Q Series Pro performs close enough to the original Q Series SSD that it can be hard to separate them. We note that Toshiba has expanded its warranty terms, and will now guarantee its Q Series SSD for three years rather than just one.

	SANDISK £123 inc VAT (£102 ex VAT) ★★★★☆	SEAGATE £202 inc VAT (£168 ex VAT) ★★★★☆	TOSHIBA £295 inc VAT (£245 ex VAT) ★★★★☆
	Extreme II	600 SSD	Q Series Pro
	240GB	480GB	512GB
	51p	42p	58p
	120GB (£60), 480GB (£244)	120GB (£85), 240GB (£160)	128GB (£69), 256GB (£110)
	256MB DDR3	Unknown	Unknown
	Marvell 88SS9187	Link A Media Device LM87800	Toshiba TC358790XBG
	SanDisk 19nm eX2 ABL MLC	Toshiba 19nm MLC	Toshiba 19nm toggle mode 2.0 NAND MLC
	SanDisk SSD Toolkit for Windows	Seagate Firmware Update Utility for Windows; bootable Mac CD	None
	5 years	3 years or 72TB	3 years
	57g	78g	53g
	557/519	555/474	553/520
	514/482	502/458	505/469
	514/481	495/462	513/477
	36/97	28/78	22/78
	386/308	378/346	379/259
	98.8/78.8	96.8/88.6	97/66.3

How we test

Each SSD was benchtested on a desktop PC kindly loaned by Chillblast, based on an Asus Z87-A motherboard with Intel Core i7-4770K and 8GB RAM, running Microsoft Windows 7 Home Premium SP1 64-bit. We assessed most aspects of a drive's performance with industry-standard benchmark tests for Windows, namely ATTO Disk Benchmark, HD Tune Pro, HD Tach, CrystalDiskMark and AS SSD.

Measured speeds for storage products are typically in megabytes per second (MB/s) for large files; and input/output operations per second (IOPS) for paralleled small-file transfers.



Conclusion

Sometimes group tests of related products elicit one or two clear winners, making these the natural choice in terms of value or performance. This isn't one of those tests.

In terms of performance, any SSD here will transform a disk-based PC. They will all merrily let you read the entire contents of a 25GB Blu-ray film in less than a minute. They should all allow even Photoshop to launch in just a few seconds. The deciding factors are increasingly now about longevity and price.

Solid-state flash cells will age and wear out, but limited lifespan is a reality of hard disk drives, too, and after some serious concerns in flash technology's early days, we can be reasonably certain that even with very heavy use, the typical user - even a professional designer, for instance - is unlikely to wear out an SSD inside five years.

Most people are conscious of cost and won't spend more than is logically necessary, so on that basis, we must point to the best value drives in this group, namely the Seagate 600 and Crucial M550. At the time of writing, these were both priced around 40p per gigabyte, a most attractive offer - especially when compared to the £2 per gigabyte figures of just a couple of years ago.

For the best performance, the Crucial M550 also stands up well, along with the Intel 730 and OCZ Vector 150. Special mention must also go to two drives not in this group, the Samsung 840 Pro and 840 EVO (tinyurl.com/L5edqoy), which offer superb performance at competitive prices. With prices fluctuating weekly, it pays to shop around. By the time you read this group test, this already tempting upgrade may have hit the 30p per gigabyte level. ☒



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The future of gaming

You wouldn't know it from the miles of coverage generated by the launch of the PlayStation 4 and Xbox One, but console gaming could be on its way out. What's going to replace it?

The current crop of next-generation consoles – the PlayStation 4 and Xbox One, closely followed by the new Nintendo Wii U – may be the last of their kind. Buying games on physical discs, even with the considerable capacities afforded by Blu-ray, is on – or nearly on – its last legs, as domestic internet speeds continue to rise.

The way gaming is delivered isn't the only thing that's likely to change, though. Console gaming has been a staple of the modern living room since Atari launched its assault on the home with the 2600 console – complete with fake wood panelling on the front – in 1977. In recent years, though, console gaming has found itself under threat. Mobile devices pack an unbelievable amount of power: just look at games such as EA's Real Racing 3 on the iPad and Android tablets to see what we mean.

It isn't just mobile gaming that threatens the console: modern console games – and the consoles themselves – are expensive, and sorting the wheat from the chaff is difficult. For every blockbuster such as Grand Theft Auto IV, it seems there are a million derivative first-person shooters, generic racers and dull RPGs. What's more, with big-name game developers able to monopolise advertising space and magazine column inches, it's hard for independent developers to have their voices heard.

Luckily things are changing, and consoles, as they shuffle towards the end of their mortal coil, are leaving a vacuum in their wake that's being filled by a new generation of gaming platforms. Some of those platforms are hardware based, such as Amazon's new Fire TV, designed for both games and streaming media, while others

are software services, including the games streaming service OnLive. Others are a combination of both and bring together high-end gaming hardware with its big-screen SteamOS – Steam's new hardware platform, for example.

All of these platforms promise to change how computer games are made, sold and consumed. Some of them will make gaming cheaper, and all of them will bring the fight to Sony and Microsoft, who will have to fight or die in the face of their new competition.

In this feature, we'll look at what the future of gaming could hold for developers, gamers and hardware makers alike, as well as seeing how you can abandon your console and move to a better, faster, cheaper gaming platform today without sacrificing the ability to play the games everyone's raving about.

OnLive

On the face of it, OnLive seems too good to be true. Download a small piece of software and get hundreds of games, all playable on your home PC, whether you've got a thousand-pound gaming rig or a simple

laptop. All the hard processing work is done by OnLive's servers, which stream the resulting video to your computer in up-to 720p HD, depending on the speed of your internet connection. Your control inputs – and you can use any Windows-compatible game controller or your keyboard – are captured by the OnLive software and delivered to the company's servers. The whole process is akin to Netflix.

OnLive doesn't have a lacklustre library, either. For your £7.99 per month subscription you get unlimited access to OnLive's PlayPack, which includes top-tier titles such as BioShock (2007), Batman: Arkham City (2011), Darksiders II (2012) and Just Cause 2 (2010). You'll notice a shortage of triple-A titles including Grand Theft Auto and Call of Duty, but there's plenty to keep the attention of most gamers.

The question of how well it works is crucial. You don't need flashy hardware – indeed, OnLive sells its MicroConsole, which cuts out the need for a PC and streams directly to a TV's HDMI port, for just £70. What you do need is a



The **XBOX ONE** is a tempting proposition, but how long can Microsoft's commercial model hold the attention of gamers?



decent internet connection. OnLive says the absolute minimum is 2Mb/s, but recommends 5Mb/s for HD gameplay.

Our experience with the system was overwhelmingly positive, with games looking good and playing smoothly, but a 50Mb/s fibre-optic connection undoubtedly helped. OnLive offers new users a seven-day trial, so you can find out how well it works on your internet connection without spending a penny.

Ouya

Crowdfunding, of the type seen on Kickstarter and Indiegogo, is a great way for dreamers to fund projects without having to find individual investors. The designers of the £99 Ouya, a small, Android-powered games console, found that out in 2012, when they outlined their idea of an independent, affordable platform to bring indie gaming into the mainstream. Setting an initial target of \$950,000 (around £570,000), Ouya's creators were taken aback to receive 100 percent of their funding target within eight hours. The money kept rolling in, with gamers tired of the console status quo contributing a total of \$8,596,474 (over £5,000,000).

The allure of the Ouya? It would be the first games console dedicated to independent games. Programmers wouldn't need to send off for expensive development kits as they do with the Xbox and PlayStation, and they wouldn't have to sign over a proportion of their earnings to Ouya either. Being based on Android means porting games over from portable devices is straightforward, and from a consumer point of view, Ouya's appeal – apart from attracting big names such as the Final Fantasy series and Sonic – is all its games have to be initially free to play,

The **AMAZON FIRE TV** is a set-top box that runs games including Minecraft, Despicable Me: Minion Rush and Sonic the Hedgehog 5



meaning you'll never shell out for a game without having the chance to try it out first.

After the fundraising, things started brightly, and Ouya says it offers over 700 games from over 34,000 registered developers, but the console's reception has been frosty. Reviewers pointed out that the hardware – perhaps inevitably given its mere double-digit price in a world of £350 consoles – felt cheap. This was true of the controller, whose buttons were prone to getting caught under the plastic cover. There were other problems too: too few of Ouya's games are exclusive to the platform, and were available on low-powered platforms such as mobile devices. Moreover, whatever your stance on mainstream console gaming, it's hard to ignore that you can now pick up the far more powerful Xbox 360 for just £30 more.

That isn't to say the Ouya is dead and buried, though. Last year, its creators said they planned to release an updated version every year, and in March this year 'Ouya Everywhere' was announced; a plan which would see Ouya and its raft of indie developers turned into a service that could be embedded on other platforms, so you might start finding the Ouya store on mobile phones, tablets or – perhaps – even consoles.

Steam boxes

Steam is the closest thing the PC has to a unified gaming platform after Windows itself. Now in its second decade, with over 75 million active users and 3000 games available, encompassing everything from blockbusters such as Football Manager 2014 to highly-rated indie games including Spelunky.



Steam's inclusion here isn't because of its position at the top of the PC gaming tree; that's something that hasn't changed dramatically since Steam became the only way to activate Half-Life 2 in 2004. Instead, Steam is beginning to position itself as both a hardware and software company - that is, you'll buy a game using Steam's website, then play it using Steam's approved hardware, in a similar way to how buying games through Xbox Live or the PlayStation Store.

Steam Machines, also known as Steam Boxes, will be hardware of various shapes and sizes that satisfy Steam's minimum requirements for its free operating system, Steam OS. Steam OS is designed to provide gamers with a full-screen (and thus suitable for TVs) interface that allows them to buy games online and play them on either a PC monitor or a living room TV, free of the various restrictions you'll find if you use a traditional games console. One of the chief benefits to gamers will be power: current games consoles look

powerful today, but by the time they're halfway through their lifespan (around five years time if the Xbox 360's lifecycle is anything to go by), they'll have been thoroughly bested by gaming PCs. Built around PC architecture, Steam Machines will be upgradable, although, as with current gaming PCs, they'll also be expensive - expect to pay around £600 or more when they hit the shelves later this year.

Browser gaming

Browser gaming has long been a punch line for serious gamers. The likes of Bejeweled, Peggle, and the slew of Facebook favourites such as Farmville mean anyone who fancies a spot of more grown-up gaming has had to look elsewhere. The modern browser is amazingly powerful,

OnLive has plenty of games on offer - some of them top-tier, such as **BATMAN: ARKHAM ORIGINS**

though, and Mozilla in particular is making significant strides when it comes to browser gaming. In March this year, for example, it used its booth at the Game Developer Conference in San Francisco to demonstrate something truly impressive. Using nothing more than a decent PC and its Firefox web browser, it showcased a game demo that used the Unreal Engine 3. This is the graphics powerhouse behind games including Gears of War on consoles, and Infinity Blade on iOS devices. Mozilla's demo ran without Adobe's clunky Flash plug-in, instead relying on JavaScript to render its graphics. That means nothing extra to download, less work for developers, and compatibility with a broader range of hardware, from cheap-as-chips systems to bespoke gaming rigs.

Mozilla's showcase has since turned into a functional, playable demo, available at tinyurl.com/c3zddxw, and best played in Firefox. The gameplay is deeply derivative, but the thing to note is there's no need to download or authorise a plug-in. The graphics

Tablets are taking on consoles with titles such as **REAL RACING**



Technically impressive demos are one thing, but the importance of native browser gaming goes way beyond flash graphics. For one thing, the browser is perhaps the one piece of software that's truly multiplatform. You can find Mozilla's Firefox and Google Chrome on PC hardware, Apple computers, Android devices as well as iPhones and iPads. You'll also find it preinstalled on Ubuntu operating systems, meaning a developer that produces a game that runs natively in Firefox won't have to tweak their development if they want it to run across different hardware.

Even smart TVs - the current wave of internet-connected HD TV sets, which are already compatible with apps and web browsers - could find themselves becoming viable gaming platforms. Soon, all you might need to play the latest games might be an internet connected device with a web browser: no wonder the console giants are looking over their shoulders. ☒



The Transformers

With serious money being invested in robotics by companies such as Google, Dyson and others, are we about to see robots become an everyday reality? In this feature Martyn Casserly looks at how far the field has come, and what lies ahead in the very near future



Our lives are awash with technology. The internet brings valuable information and freshly cooked pizza to our doors, smartphones organise our lives, while even our cars are beginning to talk to us. But one huge omission blights this electronic utopia, prompting the eternal question: "Where's my robotic manservant?" Well, it might be sooner than you think that we'll be rubbing shoulders with digital denizens, at home, work and even in hospital.

Robots in the home

Books and movies have spun a yarn or two about how robots will serve our every needs: clean the house, cook dinner and walk the dog - unless that's a robot, too, in which case it can walk itself, possibly after making your favourite meal. It might then seem sensible to go to your robot emporium of choice, order the Jeeves-Bot 3000 and sit back to enjoy a life of peeled grapes and microwave-equipped canines. Sadly, things aren't quite there yet.

Although millions of pounds in research investment have been poured into robotics, the practical upshot for the high street consumer is that you can now buy a pretty funky vacuum cleaner. The Roomba 760 (£399) is a disc-shaped robotic device that will spend the day negotiating its way around your house, hoovering as it goes. It joins the family of devices available from US company iRobot that also includes the Scooba (£599), which scrubs your floors, the Looj (£249) cleans your guttering, while the Braava (£259) is a robotic mop. iRobot also sell a variety of military automatons, including the 710 Warrior, but they don't really get into those hard to reach corners of the carpet.

For the more technically astute there are a wealth of home robot kits that can be bought from shops such as Conrad, Jameco, and Amazon, but even these are still not much more than clever Meccano kits with a few sensors.

Other than these humble offerings, and the occasional expensive toy, the options for robot-hungry consumers are all mostly vapour and fairy wishes. Things could be set to change, though, as technology continues to develop at an incredible rate. Sir James Dyson, designer of the eponymous vacuum cleaner, has recently invested £5 million in a laboratory at Imperial College London, which will work with Dyson's company to research and develop domestic robots.

"My generation believed the world would be overrun by robots by the year 2014," Dyson told the BBC. "We now have the mechanical and electronic capabilities, but robots still lack understanding - seeing and thinking in the way we do."

The goal of the research with Imperial College is to improve this aspect of robotics, and solve the problems that have held the area back so far. It will still be years before we actually see something affordable on the shelves of Tesco, but at least the area is now becoming a focal point for many developers and technology companies.

"Mastering this will make our lives easier," Dyson continued, "and lead to previously unthinkable technologies."

Google has spent the past year or so buying a number of robotics companies including Boston Dynamics, who build military devices for the US government. The search giant has remained strangely quiet on its motives, but the sudden move to

acquire so many talented minds in the area illustrates how important it has become. One example of a Google use for intelligent machines is the self-driving car that has been in development for some time. The Chauffeur project has recently celebrated 700,000 accident free miles, many of them on the real streets of California. At the moment, the huge number of sensors and tracking technology in the cars amounts to an eye-watering £90,000 but in time this should come down to make it a far more affordable option. Robots might not be in our homes, but maybe they'll take us there safely.

One country where robots have a domestic presence is, unsurprisingly, Japan. Companion robots have been an accepted technology for many years now, with machines such as the Wakamaru, launched in 2005, used to provide company for the elderly or housebound. Employing a voice interface, admittedly primitive by today's standards, the Wakamaru could engage in basic conversation and also provide its owners with prompting for taking medication or even contacting emergency services in the event of a fall

Paro therapeutic robot, which, rather unusually takes the form of a FLUFFY BABY SEAL



or sudden illness. Such is the need for care assistants, due to a large number of aged citizens, that the Japanese Prime Minister Shinzo Abe announced in the 2013 budget the allocation of around £14m for the development of robots specifically to help in this area. Replacing human carers with mechanical alternatives isn't proving popular yet, though, and the industry still has a long way to go before this becomes a serious alternative to human nurses.

One that's already earning its keep is the Paro therapeutic robot, which, rather unusually takes the form of a fluffy baby seal. This curious device is used to deliver animal therapy to patients in hospitals, in particular to those suffering with Alzheimer's and dementia. It learns from its user, responds to their voice and physical interactions, and the company claims that the robot "has been found to reduce patient stress" and "improves the socialisation of patients with each other and with caregivers". This led the Guinness book of records to certify it as the World's Most Therapeutic Robot.

The UK has also started to embrace the health-related benefits of robots with the diminutive Nao, built by Aldebaran Robotics, being used by a school in Birmingham to help teach children with aspergers and autism. The placid nature of the machine makes it an ideal tool for educational purposes, while its small scale, mobility and voice interaction endear the creation to the children.

There has been a trend in recent years to build smaller, more human-like robots. Some of these - Roboy, iCub and Asimo - are pushing forward the boundaries of design, artificial intelligence, and the 'feel' that Sir James Dyson referenced. Asimo has become something of a celebrity in its own right, with

Built by Aldebaran Robotics, Nao is being used by a school in Birmingham to help teach children with ASPERGERS AND AUTISM



BAXTER
is one of a
new breed
of employee

appearances on TV shows all over the world, such as the UK's *QI* and Norway's *Brille*, conferences, and it even greeted US President Barack Obama on a recent trip to Japan, then proceeded to play football with him.

The Asimo (Advanced Step in Mobility) project has been in development at Honda for around 15 years, and the results are impressive. The robot can run, hop, jump, talk and interact with humans in a variety of ways. In terms of classic robots of fiction, Asimo is definitely the closest yet that any have come. It's the pinnacle of humanoid robotics, but with only an estimated 60 units in the world, it won't be making the transition to a domestic setting for a long time to come.

Career-minded robots

If there's one area of robotics that is beginning to flourish then it's that of robots in the workplace. We've already seen how manufacturing has been automated in recent years so that robots are now a common sight on production lines and in car assembly plants. From a business point of view this makes perfect sense: machines are more efficient at handling repetitive tasks without getting tired, injured or needing the toilet. They also don't take lunch breaks, holidays, call in sick or engage in industrial disputes, although they will no doubt need repairing from time to time. Additionally, there are no regulations on how many hours a day robots can work, and overtime for weekends and national holidays isn't an issue.

Baxter is one of these new breed of employee. His creators, Rethink Robotics, have designed him to be affordable and easily adapted to new tasks. With a starting price of around £15,000 (plus £4,000 per year for maintenance) this certainly meets the first goal, and an innovative programming

system makes the second surprisingly achievable. Baxter has two appendages that are multihinged to allow a wide range of movements. To teach him a task the operator presses a button, then physically moves the arms through the positions required. When finished they press the button again and Baxter will remember and repeat. In essence, it's recording a macro on a giant robot.

"Unlike traditional industrial robots, Baxter is an adaptive manufacturing robot" stated Mitch Rosenberg, Rethink Robotics' VP of Marketing and Production management, in a recent interview. "It contains cameras, sensors and sophisticated software that enable it to 'see' objects, 'feel' forces and 'understand' tasks. The result is a robot that automatically adapts to changing environments."

This awareness also means that the robot is safe for humans to work alongside. Traditionally, industrial machines work in a defined pattern, which can be potentially dangerous if someone accidentally gets in the way. Baxter uses his sensors to prevent this from happening, and while there may be a few bumps they'll be more akin to a fellow employee backing into you rather than a bone-crunching attack.

Another goal of Rethink Robotics is to stem the flow of manufacturing being outsourced to the Far East, a trend that has increased in recent years due to the paltry wages and questionable safety requirements that allow for lower costs. By employing robots rather than impoverished people in another country, there could be serious implications on the nature of manufacturing and the worldwide economy if the idea were to be implemented on a large scale.

Obviously this is still worrying news for the large majority of unskilled workers in

the West, who currently rely on factories and packing plants for their livelihoods. The average UK factory or assembly line employee is thought to earn somewhere in the region of £15,000 per year. That would mean that over five years they would cost their employer £75,000. Baxter, by comparison, would cost a frighteningly low £35,000, and be able to work more than twice as many hours.

It's not only industrial jobs that could be superseded; with voice interactions and increasingly sophisticated chassis that are safe to be around, how long before supermarket aisles are the domain of stacking robots that can also tell customers where they can find Fennel seeds? In fact this year at the Consumer Electronic Show the Furo-S robot was demonstrated by FutureRobot, which can roam around its environment, talk to people, features a touchscreen interface for customers to find information, order items and even has a card slot to take a payment. Whether it can be made waterproof or not might determine whether it will shortly be accosting you on city streets to donate to various charities.

While all of these innovations are fascinating, there's genuine concern that many unskilled or casual jobs will disappear in the coming years as robots become more financially attractive. The need for skilled supervisors will still exist, but for the majority of the workforce, the future could become very uncertain. Amazon has already bought Kiva Systems, whose squat, orange robots fetch and carry entire shelving stacks in the enormous Amazon fulfillment warehouses, to enable pickers to package and send deliveries far quicker than humans have ever managed.

This \$775m purchase will no doubt pay for itself quickly, as productivity is estimated to have been improved threefold. Amazon isn't stopping there, though. With robots doing most of the heavy lifting in the fulfillment process, why not have them actually deliver the items as well? Amazon Prime Air is the new initiative from the retail megalith which involves flying drones delivering your packages. It might sound like an April Fool's joke, but the retailer is deadly serious and is just waiting on FCC approval to allow the company to enter US airspace. Couriers



Amazon's PRIME AIR is an initiative that could see flying drones deliver items

should be concerned about this, although Google may well put them out of business first with their self-driving cars. The International Federation of Robotics expect machines to be adopted in previously resistant areas at an increased rate.

"In 2007, the US Bureau of Labor reported rates of work-related injury or illness for full-time food manufacturing workers were higher than the rates for all of manufacturing and for the private sector as a whole," it says on its website. "Robot manufacturers have designed robots to meet the unique needs of the food industry that comply with food grade equipment standards. The pharmaceutical industry is another industry that has been slow to adopt robots but has pressure to decrease costs, increase production accuracy, and achieve flexible manufacturing. The worldwide demand for pharmaceutical products is on the rise making this another fertile industry for the use of robots."

While the IFR reports that the use of robots could create as many as three million jobs upstream from manufacturing in the next eight years, it's assured that many employment sectors will see substantial changes in the future.

"There's no automatic guarantee that these jobs will appear or that they'll be at good wages," argued author and technology analyst Eric Brynjolfsson in a recent BBC interview. "There's no economic law that says that everyone's going to benefit from technology. It's possible for some people, even potentially a majority of people, to be made worse off."

One area where many people would be happy to see robots employed is when the danger to human life makes machines a preferable option. DARPA, the Pentagon's scientific research department for military technology, has created a competition for robotics companies to design and build machines that can be used for search and rescue missions. These robots must be capable of completing tasks that range from navigating their way through treacherous terrain, operating machinery (for example, pressure valves to avert explosions), using firefighting equipment, locating survivors and carrying them to safety.

This might sound like something still in the realms of science fiction,



Asimo has appeared on TV all over the world, including the Norwegian SHOW BRILLE



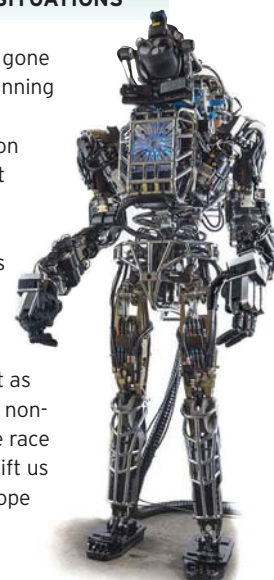
but creations like the Atlas robot illustrate just how far the technology has evolved. It's a six-foot tall, bipedal automaton that bears a frightening resemblance to a Terminator-style metal exoskeleton. It's about as advanced as things get at the moment in terms of strength, balance and

capability in a single model. Demonstrations by its inventors at Boston Dynamics show its ability to balance on one leg after being hit on the side with a weight, climb stairs, walls, and there is also the potential for it to drive a vehicle. Eventually the hope is that Atlas, and units like it, will remove the need for humans to risk their lives in rescue situations, in much the same way as bomb disposal robots operate now.

Capabilities such as these raise the obvious question of military applications, after all Atlas received significant funding from DARPA. The US Department of Defence has gone on record, stating it isn't planning to use the robots in combat situations, but the temptation will prove very hard to resist as these creations become even more powerful.

Like so many other areas in technology, it seems that industry and the military will be the first to see the benefits of robotics. But just as the Apollo missions gave us non-stick frying pans, maybe the race for robotic supremacy will gift us similar benefits. Let's just hope that we get a C-3PO before the Transformers arrive. ☒

It's hoped that Atlas will help save lives in RESCUE SITUATIONS



<Learn to> code)


Coding - or programming - is everywhere and in everything around us. All computers run code: it's what makes them burst into life when the power is turned on and what makes things happen when an icon or menu is clicked.

Code isn't just for PCs, though: smartphones wouldn't be as smart without code for the operating system and apps. Tablets require similar code, as do TV boxes from Sky, Virgin media and others. Websites are powered by code, even cars rely on code these days; enthusiasts use this fact to boost an engine's power by reprogramming it - there's no need to even reach for the toolbox.

You can control the heating in your home using a phone app, and the phone, app and heating are all powered by code. Someone has to write it, couldn't it be you?

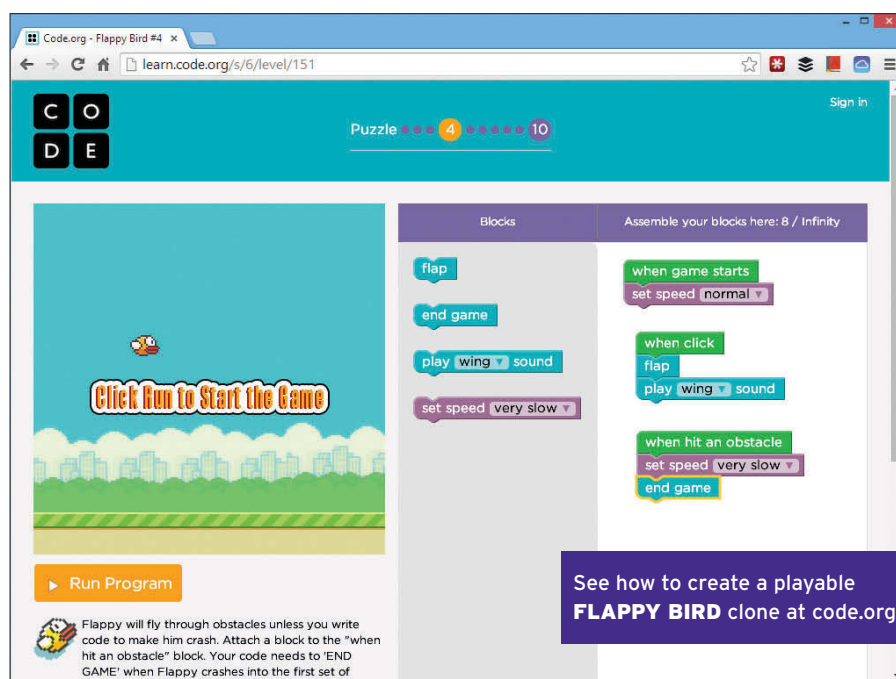
With so many smart devices, gadgets and internet services all requiring code in order to function, there's a demand for people that can code and a shortage of programmers that are good at it. This is the reason why the government announced that this is the Year of Code (yearofcode.org), and it's provided £500,000 to train teachers to show children how to become programmers (tinyurl.com/pdtzvu).

From September 2014 all children from the age of five will be taught to program. Education secretary Michael Gove says that: "The new computing curriculum will give our children the skills they need to succeed in the 21st century."



**START CODING THIS YEAR
IT'S EASIER THAN YOU THINK**

2014 is the **YEAR OF CODE**, so add programming to your to-do list



The scheme was set up with the best of intentions, but quickly ran into problems and one of its advisors, Emma Mulqueeny, quit after just one week. Its launch was a PR disaster and there were many critical stories in the news (tinyurl.com/nbq9hrr and tinyurl.com/kjt3kdq to mention just two). Jeremy Paxman quizzed Year of Code director Lottie Dexter on *Newsnight* (tinyurl.com/p3mbg8n), who admitted she and some of the other advisors couldn't code.

The government has the right idea, though, and everyone should try coding. Of course, not everyone will like or need it, but a few will take to it like a duck to water and become the expert coders that are needed. Do you have what it takes to become a coder? Why not try and see.

Coding is a skill that takes hard work to master. If you think you can code already, try the Fizz-Buzz test (tinyurl.com/ma3oaxn): write a program that prints the numbers 1 to 100, except for multiples of three print

"Fizz" and for multiples of five print "Buzz". If you're good, you'll have a finished and working program in under five minutes. Start Notepad and create a web page that prints Fizz-Buzz using JavaScript. The answer is at the end of the article - no cheating.

Introducing programming to children at school is essential if we are to fill the demand for skilled programmers in the future and the earlier you start programming, the better you'll be. Five-year-olds won't be looking for jobs for another 15 years, though, so who's going to do the coding in the meantime? Could it be you?

Which programming language?

There are many computer programming languages and although some are similar, many are quite different. Some are only used in certain niches and these are easy to spot and to avoid. You don't see many programmers using Lisp, Forth, Prolog, Smalltalk or Fortran these days. Learning



them is pointless unless you're looking for a job in a niche that still uses them.

Programming languages can become popular for a while and then disappear. Pascal was once in favour, but isn't used much these days. And the only people using BBC Basic, Sinclair Basic, Z80 and 6502 machine code are people writing retro games for Sinclair Spectrum and BBC emulators.

You should learn the most popular programming languages, but you must be aware that what's popular this year might not be next year. Programmers frequently have to learn to a program all over again when some new language takes off. Earlier this year Facebook announced it had created its own programming language called Hack (hacklang.org) because other languages couldn't cope with its billion members. If you want to work as a developer for Facebook, you'll need to learn Hack.

So which language should you learn? The best way to discover which ones are

the most used is to look at job adverts. Job sites have large numbers of listings and the most commonly requested skills are for C++, C#, .Net/VB.Net, Java, PHP, and web technologies such as JavaScript, HTML, SQL and Asp.Net. Most jobs require knowledge of several programming languages and knowing just one won't cut it. Many job adverts are aimed at computer science graduates with degrees and this example is typical: "Graduate / Junior Software Developer - C# / ASP.Net / MVC / SQL Server / Degree."

Programming for fun

You don't need to be a computer science graduate to become a programmer and not everyone wants to do it as a full-time career. Learning to program can be fun and for some people it can simply be a hobby. It can also be useful, too, and you might find yourself needing to tweak a web page or add some functionality to a site, such as adding PayPal buttons so people can buy goods. A little

knowledge of how to code for the web can make it a lot easier to build a website. You don't need to know how to build complete Windows programs, and simply recognising a few key commands and functions can provide sufficient knowledge to tweak someone else's code, such as a WordPress template. Although a site can be built by pointing and clicking, knowing how and where to paste in the code for a PayPal button in the HTML or PHP of a web page is useful.

Occasionally apps for mobile phones are created by a single programmer working on their own on their home computer. Flappy Bird, for example, was the most downloaded app for the iPhone in January. It was created by Nguyen Ha Dong in just a few days and was rumoured to be earning \$50,000 a day in advertising revenue.

Learn to program

Coding with the languages and tools that professionals use is hard because you need to know a lot before you can do anything, even just displaying the classic greeting, 'Hello world', on the screen. Avoid pro tools at first and go to sites such as Code.org, which teaches coding to US schools. There is a great Hour of Code link on the home page that anyone who wants to be a programmer should try. There are 20 lessons and before each one is an inspirational video by Bill Gates, Mark Zuckerberg and other celebs. Each lesson involves moving a character through a maze to reach a destination. Programming statements are on jigsaw-like puzzle pieces that you drag and drop to snap together. Join the pieces in the correct order and it makes a program that you can run and watch. (See How To write a PC program on page 116.)

It's simple, graphical and entertaining for all ages. After your first hour of code, you can try some of the other tutorials, such as An Introduction to JavaScript, My Robotic Friends, A Taste of Python Programming, and Build Your Own iPhone Game. Everything

The screenshot shows the Codecademy website for a JavaScript course. On the left, there's a sidebar with 'Introduction' and 'Instructions'. The main area displays a code editor with a JavaScript snippet:

```
1 var speed = 60;
2
3 // Complete the condition in the ( )s on line 4
4 if (speed > 80) {
5   console.log("Slow down")
6 }
7
8 else {
9   console.log("Drive safe")
10 }
11
12 }
```

Below the code editor, there's a purple banner that reads: "Learn to code in popular languages such as JAVASCRIPT at Codecademy.com". At the bottom, there are buttons for "Way to go!" and "Start Next Lesson".

takes place in a web browser window and nothing extra is needed. It's a great website.

There are many similar tutorials using the Hour of Code drag-and-drop puzzle pieces method and you can create a modern Flappy Bird clone (tinyurl.com/pgt95b3), or return to gaming roots and recreate Pong (moshi.kano.me).

Real programming is a lot harder than dragging and dropping the puzzle pieces and the next step is to try some of the Codecademy (codecademy.com) tutorials. It's still browser-based, but is more realistic and there's a choice of HTML/CSS, JavaScript, PHP, Python and others. These are all popular web technologies and are useful to learn. Each lesson has many parts and on the left of the screen are instructions and help, in the middle is a text editor for entering code, and on the right is the output area. This is closer to real programming.

There are other websites that take a similar approach and learnjavaonline.org, learn-c.org, learnpython.org, learncs.org and learn-php.org all have useful tutorials. There is explanatory text, and at the bottom of each web page is a code window and output window. You can click buttons in the tutorials to view the code, then you can edit it on the page, and finally run it and see the output.

Basic was a popular programming language on home computers such as the Sinclair Spectrum and BBC Micro in the 1980s and lots of old programmers started on those. Basic isn't used these days, but the language was invented for teaching programming and so is very simple. Quite Basic (quitebasic.com) lets you write and run Basic programs in a browser window. There are example programs including the

The screenshot shows the Quite Basic web IDE. On the left, there's a 'Line:' input and a 'Level:' indicator. The main area is a text editor with a BASIC program. On the right, there's a 'Canvas' area showing three overlapping circles (blue, green, red) and an 'Output' area showing the program's results. A purple box at the bottom right says: 'Basic (quitebasic.com) reads almost like English, making it EASY FOR BEGINNERS'.

```

2000 CLS
2010 PRINT "This BASIC program is just a sample of
things you can do with Quite BASIC. You will see
drawing on the canvas, user input/output, and in the
program are examples of most of the supported BASIC
commands."
2020 PRINT
2100 LET R = 15
2110 LET X = 20
2120 LET Y = 20
2130 LET M = 100
2140 LET C = "green"
2150 GOSUB 5000
2160 LET R = 6
2170 LET X = 35
2180 LET Y = 30
2190 LET M = 50
2200 LET C = "red"
2210 GOSUB 5000
2220 LET R = 8
2230 LET X = 15
2240 LET Y = 40
2250 LET M = 50
2260 LET C = "blue"
2270 GOSUB 5000
2300 REM User input
2310 PRINT "Three circles, how cool is that?"
2320 PRINT "Press 1, 2, 3, 4, or 5!"
2330 LET A = GETCHAR()
2340 IF A = "1" OR A = "2" OR A = "3" OR A = "4" OR A
= "5" THEN GOTO 2370
2350 PAUSE 100
2360 GOTO 2330
2370 PRINT
2380 IF A = "1" THEN PRINT "Just one? OK, well you

```

Output:

```

This BASIC program is just a sample of things you can do wit
Quite BASIC. You will see drawing on the canvas, user
input/output, and in the program are examples of most of the
supported BASIC commands.

Three circles, how cool is that?
Press 1, 2, 3, 4, or 5!

```

Mandelbrot Set, a recursive Towers of Hanoi solution, Bubble Sort and more.

Beyond the basics

There's nothing harder than sitting in front of a programmer's IDE (integrated development environment) and creating a program from scratch. Interlocking puzzle pieces and guided coding tutorials just aren't the same.

A good place to start is with Microsoft Visual Studio (tinyurl.com/oynrrb). The Express editions are free and there's one version for creating web apps and services, one for designing Start screen apps for the Windows Store, and one for putting together

standard Windows desktop software. Many programming jobs require knowledge of the technologies used in Visual Studio.

Follow the links to the developer's section at the Java website (java.com) and you can download a Java development kit that enables you to create Java software. Before tackling the real thing, though, you should try Alice (alice.org), Greenfoot (greenfoot.org) and BlueJ (bluej.org). These are simplified Java development environments that have been designed to teach programming in a fun way to students. Java is designed to run everywhere so Alice, Greenfoot and BlueJ work on Windows, Mac and Linux. ☒

The screenshot shows the Microsoft Visual Studio Express 2013 for Windows Desktop IDE. The main area is a text editor with a C# program. The Solution Explorer on the right shows the project structure. A purple box at the bottom right says: 'Microsoft's pro tools are expensive, but there are FREE EXPRESS EDITIONS for beginners'.

```

using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using System.Windows.Forms;

namespace PictureViewer
{
    public partial class Form1 : Form
    {
        public Form1()
        {
            InitializeComponent();
        }

        private void tableLayoutPanel1_Paint(object sender, PaintEventArgs e)
        {
            // No code needed here for this sample.
        }

        private void showButton_Click(object sender, EventArgs e)
        {
            // Show the Open File dialog. If the user chooses OK, load the
            // picture that the user chose.
            if (openFileDialog.ShowDialog() == DialogResult.OK)
            {
                pictureBox1.Load(openFileDialog.FileName);
            }
        }

        private void clearButton_Click(object sender, EventArgs e)
        {
            // Clear the picture.
            pictureBox1.Image = null;
        }

        private void backgroundButton_Click(object sender, EventArgs e)
        {
            // Show the color picker dialog box. If the user chooses OK, change the
            // PictureBox control's background to the color the user chose.
            if (colorDialog1.ShowDialog() == DialogResult.OK)
            {
                pictureBox1.BackColor = colorDialog1.Color;
            }
        }

        private void closeButton_Click(object sender, EventArgs e)
        {
            // Close the form.
            this.Close();
        }
    }
}

```

A JavaScript solution to the Fizz-Buzz programming test:

```

<html>
<head>
<title>Fizz-Buzz test</title>
</head>
<body>
<h1>Fizz-Buzz</h1>
<script type="text/javascript">
for(i=1; i<101; i++) {
    if (i % 3 == 0) {
        document.write("Fizz, ")
    }
    else {
        if (i % 5 == 0) {
            document.write("Buzz, ")
        }
        else {
            document.write(i, ", ")
        }
    }
}
</script>
</body>
</html>

```




Set up a new computer

Getting a new PC or laptop will give you a new lease of computing life, but setting it up can be a pain. **Mike Bedford** reveals our tips for installing and configuring a new machine in record time

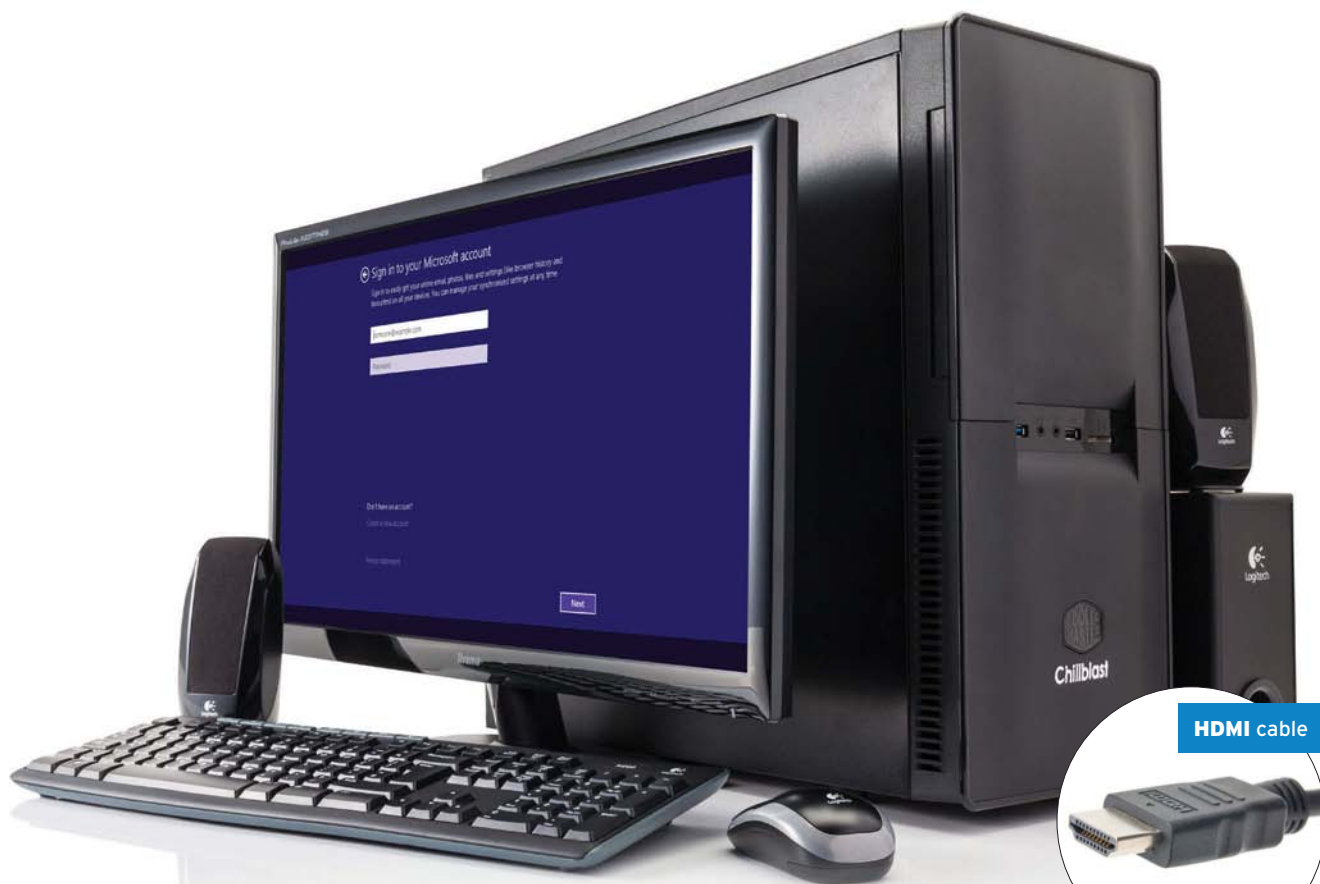
A new computer will provide extra power and disk space – and probably a new version of Windows – while at the same time removing all the clutter that will have accumulated on your old machine.

Making the transition isn't necessarily as straightforward as you might hope, though. First, your old system will have loads of documents, photos, movies and music tracks that you'll have collected over the years and, in all probability, you'll want to move those across to your new computer.

Secondly, the new machine probably won't come with all your favourite software

installed, so that's another job to do. And finally, people rarely use a computer with all its default settings, so you'll want to configure it so things are arranged the way you want.

We show you how to get up and running with a new machine, starting with the physical installation, moving on to addressing the issues we identified above, and finishing with advice on setting up a backup strategy, so that all this good work isn't lost should you suffer a disk crash. Although we used an Asus Transformer Book T100 laptop with Windows 8.1 for much of this feature, much the same applies should you choose to buy a PC.



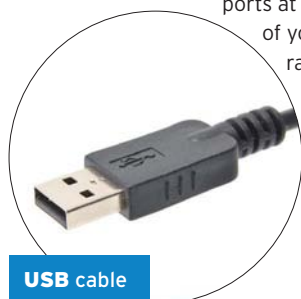
HDMI cable

Initial setup

Setting up a new computer is a relatively straightforward process but, depending on the instructions and diagrams that come with it, you might be left scratching your head about which wire goes where. More often than not, you'll be supplied with a generic image that might look nothing like the PC tower or laptop in front of you, and the connectors might be different, too.

1 These days, all keyboards and mice connect to a USB port. Even if they're wireless, there'll still be a receiver that plugs into one (or possibly two) USB ports.

The USB cable will fit only into a matching socket on your computer. If there's a choice between a black or blue USB connector, use the black one. Blue ports use the new USB 3.0 standard, which is best reserved for fast storage devices such as hard drives. Ideally, plug your keyboard and mouse into USB ports at the back of your system rather than the front.



USB cable

2 Monitors use a variety of standards to connect to PCs, but the main ones are: VGA, DVI and HDMI. You may also have a DisplayPort, which looks a bit like HDMI, though, they're not widely used. If there's a choice, use DVI or HDMI. VGA is best avoided as it isn't a digital connection.

Your monitor may have come with only a VGA cable, but might have DVI and HDMI inputs as well. If this is the case, you should buy an HDMI or DVI cable, and use the VGA cable as a temporary measure. HDMI sends both video and audio to a monitor, while DVI sends just video from the PC to the display.

Some screens with HDMI don't have built-in speakers, and might only have a headphone output. Generally, it's best to connect separate speakers to your computer.

If your monitor has only a VGA input, but your PC doesn't have a VGA output, you'll

need a VGA-to-DVI converter. One should have been supplied with your computer, but if not, they are cheap to buy. When connecting the video cable to your PC, be sure to connect it to the right output. Some PCs have two graphics cards - one that's built in and a separate one that's on a plug-in card (PCI Express).

DVI cable

VGA-to-DVI adaptor

From left to right: HDMI, DVI and VGA ports



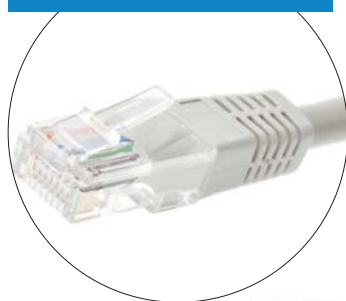
If this is the case, you'll want to connect the monitor to the PCI Express graphics card, which will be located separate to the other connectors on the back of the PC. The general rule is to plug your monitor into the lowest possible port.

3 Unless your computer has built-in Wi-Fi, you'll need to connect a network cable to get internet access. If your system doesn't have wireless networking and isn't close enough to your broadband router, you might need to buy some powerline networking (HomePlug) adaptors.

4 Most PC speakers connect via a standard 'minijack' cable, which has the same 3.5mm connector as most headphones. Connect your speakers to the green minijack output on the rear.

Most PCs will have three minijack outputs, since they can produce surround sound. If you have surround-sound speakers – also known as 5.1 – they should have colour-coded connectors. Green is for the main left and right speakers, orange is for the centre speaker and subwoofer, and black is for the rear (surround) left and right speakers. A pink minijack connector is for a microphone, while light grey is for side speakers in a 7.1-channel speaker system. There may also be green and pink connectors on the front panel of your PC, to which you can connect headphones and a microphone respectively.

NETWORK ETHERNET cable



MINIJACK outputs



5 Virtually all PCs and monitors use the standard 'kettle' lead connector for power. Typically you'll need two power cables, one for the PC and one for the monitor. However, some displays have an external power supply, so you won't plug the kettle lead directly into the display. Once both the PC and screen are connected to the mains, ensure any physical power switches are turned on and then press the power buttons on the front of both devices. Your new computer should spring into life.

KETTLE lead



“ If your system doesn't have wireless networking and isn't close enough to your broadband router, you might need to buy some powerline networking (HomePlug) adaptors ”



Power on

The first time you turn on your Windows 8.1 computer things will be a little different from usual. In particular, rather than going straight to the Start Screen, you'll have to go through the first-time setup process.

Specifically, you'll be asked to select your region and language, agree to the licence terms, personalise the colour scheme and choose a name for your system. You'll also need to select a network connection, decide whether to accept the so-called 'express settings' or customise your own, and either log in to your Microsoft account, skip the step or create a new Microsoft account.

All of this is straightforward and while you can use Windows 8 without a Microsoft account (see Helproom on page 102 for a detailed guide), we recommend that you use one. This will give you access to Microsoft OneDrive for cloud storage, and it also means that all your settings and preferences are stored in the cloud. If you use other PCs this is a major advantage since, whenever you log in, all your saved preferences will be retrieved and everything will look exactly as it does on your home computer.

Remove bloatware

In all probability your new machine will come preloaded with all sorts of software that you weren't expecting. Some of it might just be useful but, for most people, the phrase "bloatware" is a good description because it uses up space and your hard disk, and might slow down your PC.

Control Panel Home

Uninstall or change a program

View installed updates

Turn Windows features on or off

To uninstall a program, select it from the list and then click Uninstall, Change or Repair.

Name	Publisher	Installed On	Size	Version
ASUS AC Reminder	ASUS	18/10/2013	1.77 MB	1.0.1
ASUS Live Update	ASUS	18/10/2013	8.49 MB	3.2.6
ASUS Reading Mode	ASUS	18/10/2013	3.36 MB	1.0.1
ASUS Screen Saver	ASUS	18/10/2013	32.0 KB	1.0.2
ASUS Smart Gesture	ASUS	18/10/2013	50.8 MB	2.2.4
ATK Package	ASUS	18/10/2013	15.2 MB	1.0.0030
Intel® Graphics Driver	Intel Corporation	18/10/2013	74.2 MB	10.18.10.3286
Microsoft Office	Microsoft Corporation	05/09/2013	297 MB	15.0.4454.1510
Realtek I2S Audio	Realtek Semiconductor Corp.	18/10/2013		6.2.9400.4028
WebStorage	ASUS Cloud Corporation	18/10/2013		2.0.3.226
Windows Driver Package - ASUS (AsusHID) Mouse (0...	ASUS	18/10/2013		08/31/2013 3.0.0.13
WinFlash	ASUS	18/10/2013	889 KB	2.42.0

Uninstall PRELOADED PROGRAMS you don't think you'll need

Our Asus laptop was pretty much free of this sort of junk, but it's common for new computers to be loaded up with trial versions of various packages, perhaps most commonly anti-virus software. So, first of all, take a good look at what's already installed. To do this, press the down arrow icon from the Start Screen and you'll see traditional Windows-type applications listed separately from Windows 8-style apps. Now, make a critical judgement on what you need. Certainly you should make sure your new system is protected from malicious software, but the trial version that came preloaded might not be the best bet and you might decide, for example, that the free AVG Antivirus software, which can be installed via Ninite (see next section) would serve you better.

When you've decided what to delete (and if you're unsure of something, it's best to take the safe approach of not uninstalling it), head to the Control Panel (just type Control Panel from the Start Screen), select Programs and then Uninstall an application. Now, one at a time, select the programs you want to uninstall from the list of installed software and click on Uninstall.

Ninite

We'll look at installing individual packages later – either new software or applications you'd installed on your old computer – but, to set the ball rolling, it would be well worth taking a look at Ninite (ninite.com). This useful utility lets you install your choice of several commonly used free

← Sign in to your Microsoft account

Sign in to easily get your online email, photos, files and settings (like browser history and favourites) on all your devices. You can manage your synchronised settings at any time.

someone@example.com

Password

Don't have an account?

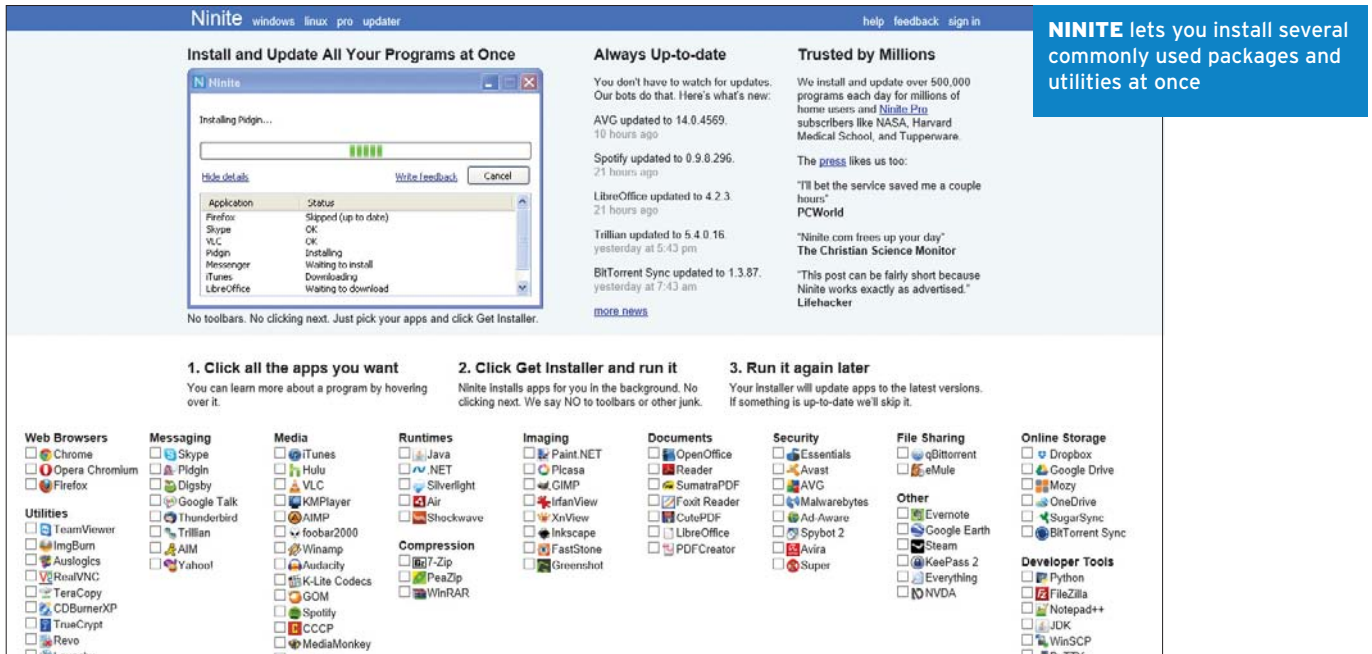
Create a new account

Privacy statement

Next

When setting up a Windows 8.1 PC, you'll be asked to **SIGN IN** to your Microsoft account

94 www.pcadvisor.co.uk/features August 2014



Ninite windows linux pro updater

help feedback sign in

Install and Update All Your Programs at Once

Installing Pidgin...

Hide details Write feedback Cancel

Application	Status
Firefox	Slipped (up to date)
Skype	OK
VLC	OK
Pidgin	Installing
Messenger	Waiting to install
iTunes	Downloading
LibreOffice	Waiting to download

No toolbars. No clicking next. Just pick your apps and click Get Installer.

Always Up-to-date

You don't have to watch for updates. Our bots do that. Here's what's new:

AVG updated to 14.0.4569.
10 hours ago

Spotify updated to 0.9.8.296.
21 hours ago

LibreOffice updated to 4.2.3.
21 hours ago

Trillian updated to 5.4.0.16.
yesterday at 5:43 pm

BitTorrent Sync updated to 1.3.87.
yesterday at 7:43 am

[more news](#)

Trusted by Millions

We install and update over 500,000 programs each day for millions of home users and [Ninite Pro](#) subscribers like NASA, Harvard Medical School, and Tupperware.

The [press](#) likes us too:

"I'll bet the service saved me a couple hours"
PCWorld

"Ninite.com frees up your day"
The Christian Science Monitor

"This post can be fairly short because Ninite works exactly as advertised."
Lifehacker

1. Click all the apps you want

You can learn more about a program by hovering over it.

2. Click Get Installer and run it

Ninite installs apps for you in the background. No clicking next. We say NO to toolbars or other junk.

3. Run it again later

Your installer will update apps to the latest versions. If something is up-to-date we'll skip it.

- Web Browsers**
 - ☐ Chrome
 - ☐ Opera Chromium
 - ☐ Firefox
- Messaging**
 - ☐ Skype
 - ☐ Pidgin
 - ☐ Digibyte
 - ☐ Google Talk
 - ☐ Thunderbird
 - ☐ Trillian
 - ☐ AIM
 - ☐ Yahoo!
- Media**
 - ☐ iTunes
 - ☐ Hulu
 - ☐ VLC
 - ☐ KMPlayer
 - ☐ Winamp
 - ☐ Audacity
 - ☐ K-Lite Codecs
 - ☐ GOM
 - ☐ Spotify
 - ☐ CCCP
 - ☐ MediaMonkey
- Runtimes**
 - ☐ Java
 - ☐ .NET
 - ☐ Silverlight
 - ☐ Air
 - ☐ Shockwave
- Imaging**
 - ☐ Paint.NET
 - ☐ Picasa
 - ☐ GIMP
 - ☐ IrfanView
 - ☐ XnView
 - ☐ Inkscape
 - ☐ FastStone
 - ☐ Greenshot
- Documents**
 - ☐ OpenOffice
 - ☐ Reader
 - ☐ SumatraPDF
 - ☐ Foxit Reader
 - ☐ CutePDF
 - ☐ LibreOffice
 - ☐ PDFCreator
- Security**
 - ☐ Essentials
 - ☐ Avast
 - ☐ AVG
 - ☐ Malwarebytes
 - ☐ Ad-Aware
 - ☐ Spybot 2
 - ☐ Avira
 - ☐ Super
- File Sharing**
 - ☐ qBittorrent
 - ☐ eMule
- Online Storage**
 - ☐ Dropbox
 - ☐ Google Drive
 - ☐ Mozy
 - ☐ OneDrive
 - ☐ SugarSync
 - ☐ BitTorrent Sync
- Other**
 - ☐ Evernote
 - ☐ Google Earth
 - ☐ Steam
 - ☐ KeePass 2
 - ☐ Everything
 - ☐ NVDA
- Compression**
 - ☐ 7-Zip
 - ☐ PeaZip
 - ☐ WinRAR
- Utilities**
 - ☐ TeamViewer
 - ☐ ImgBurn
 - ☐ Auslogics
 - ☐ RealVNC
 - ☐ TeraCopy
 - ☐ CDBurnerXP
 - ☐ TrueCrypt
 - ☐ Revo
- Developer Tools**
 - ☐ Python
 - ☐ FileZilla
 - ☐ Notepad++
 - ☐ JDK
 - ☐ WinSCP

packages and utilities in one go. The home page lists over 90 packages in 13 categories but, to give you an idea of the sort of thing that's included, you can select alternative web browsers, compression/decompression utilities, free graphics packages, media players, anti-virus software, and even the OpenOffice suite. Just make your choice by clicking on the checkboxes, download the installer and run it to install everything automatically in the background. What's more, if you run it again later, Ninite will check if any of your packages have been updated, installing the latest version.

Convenient as it may be, though, don't be tempted to select stuff that you're probably not going to use. After all, it doesn't make a lot of sense to rid your new computer with bloatware, only to then add your own unwanted software.

Other apps

Ninite might be good for installing a good selection of utilities and free packages, but if you have expensive software on disc that you bought for your old machine and which you use regularly, you'll probably want to install it on your new computer. Here we're thinking

primarily of large productivity applications such as Microsoft Office or Adobe Photoshop.

The good news is that your licence will almost certainly allow you to install it on your new system, so long as you don't also continue to use it on your old machine, and most old software will be compatible with Windows 8.1. If you've lost the licence key, then the software won't install on your new computer but, fortunately, even if you can't find the necessary documentation, there may still be a solution.

Belarc Advisor (belarc.com) and Magical Jelly Bean (magicaljellybean.com) are

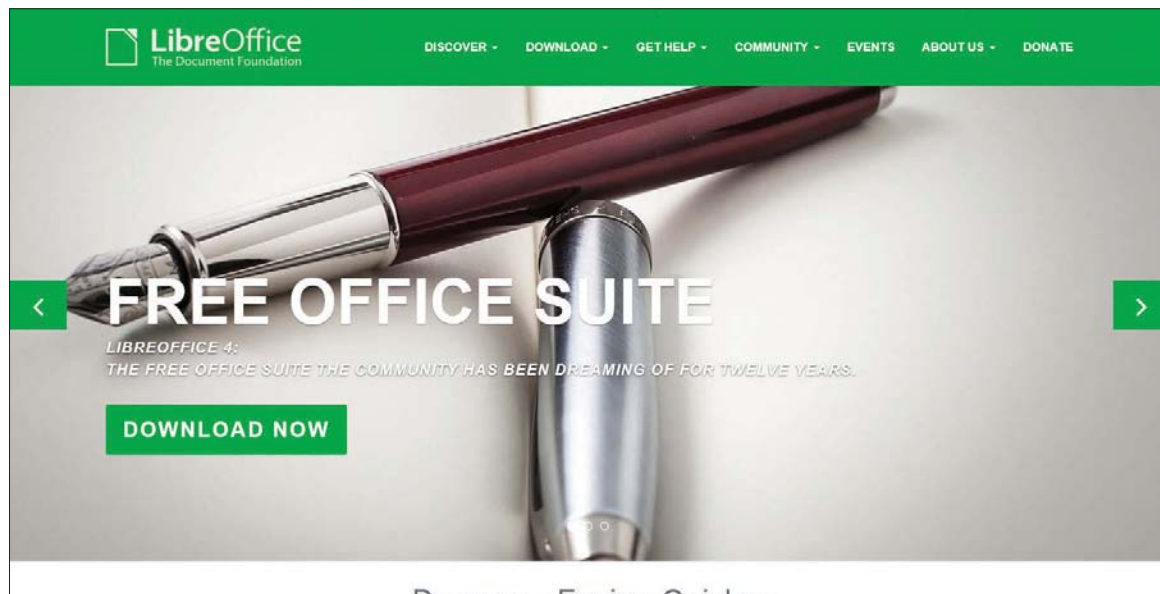


ASUS

Apps by name

ASUS Live Update, ASUS On-Screen Display, ASUS Reading Mode, eManual, WebStorage, WinFlash, Intel® HD Graphics Control Panel, Windows Accessories, Calculator, Character Map, Maths Input Pad, Notepad, Paint, Remote Desktop Connection, Snipping Tool, Sound Recorder

You should be able to use your **OLD COMPUTER'S SOFTWARE** on your new system



LIBRE OFFICE is a free alternative to Microsoft Office

Do more - Easier, Quicker

LibreOffice is a powerful office suite; Its clean interface and its powerful tools let you unleash your creativity and grow your productivity. LibreOffice embeds several applications that make it the most powerful Free & Open Source Office suite on the market

free utilities that are able to extract the licence key from many (but not all) popular packages. Run the utility on your old machine to discover the necessary keys before attempting to reinstall the software on your new computer.

In addition to what you've been able to install via Ninite and any software that you've reinstalled from disc, there may be other applications that you'd like on your new machine, much of it free. For example, if you hadn't previously bought Microsoft Office but want a means of creating textual documents, spreadsheets, presentations and more, look at the free LibreOffice (libreoffice.org), which even provides

compatibility with Microsoft file formats. Alternatively, if you're happy to work in the cloud, try Google Docs (docs.google.com) a try. Similarly, if you don't want to shell out on an expensive commercial package for photo manipulation, the online PicMonkeyphoto editor (picmonkey.com) may well do the trick.

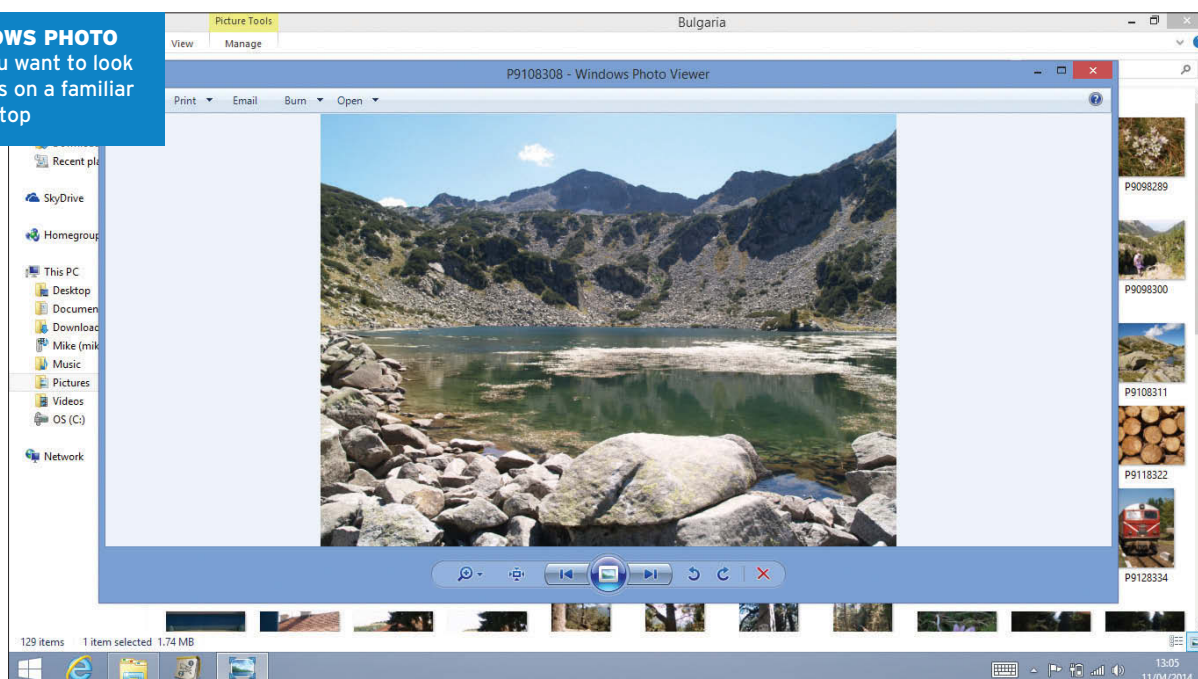
In addition to conventional programs and online services, Windows 8 also introduces you to the world of new-style Windows 8 apps, many of which are free, and which you can obtain from the Windows Store, just as you can obtain Android apps from the Google Play Store. The Windows Store icon (the carrier bag on a green background) is right there on the Start Screen.

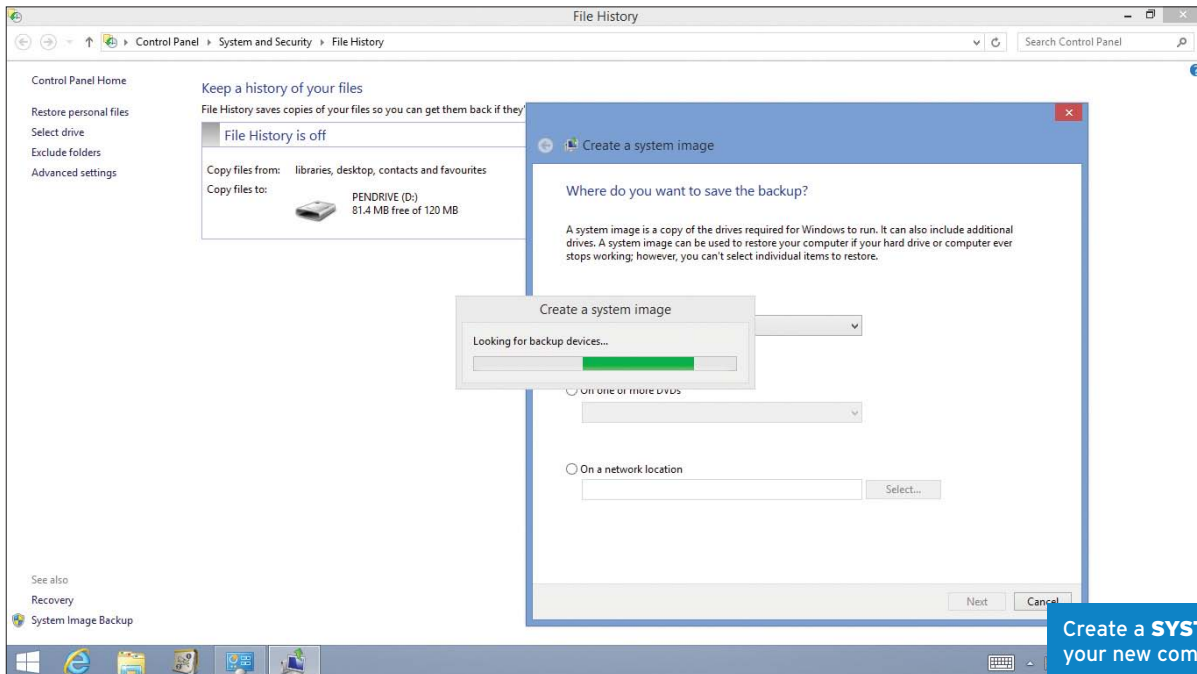
Tweak Windows 8 to your liking

If you don't want to abandon the familiar Windows desktop for the new-look Windows 8 interface, it's possible to make it boot up to a more familiar display. On the Taskbar and Navigation properties window (search for it from the Start Screen), select the Navigation tab and check the option entitled 'When I sign in or close all applications on a screen, go to the desktop instead of start', under Start Screen.

You might also want to view photos on the familiar desktop viewer and videos in Windows Media Player instead of the new default apps. To do that, go to the Control Panel, then Programs and finally Set Your

Select **WINDOWS PHOTO VIEWER** if you want to look at your images on a familiar Windows desktop





Default Programs. Now, from the list of programs, individually select Windows Media Player and Windows Photo Viewer and, for each, click on Set this program as default.

If you do decide to stick with the Start Screen, the main thing you need to know is that it operates much like a smartphone's home screen, so each of the tiles takes you to the associated app. For apps that don't have a tile on the Start Screen, just start typing a name and any matches will be listed allowing you to execute any from the list. Alternatively, click the down arrow to see a list of all the apps. Finally, even if you keep the Start Screen as your default, it will still be useful, on occasions, to use the Windows desktop instead. To switch between the two either press the Windows key on the keyboard or click on the Windows icon, which is present at the bottom left of both the Start Screen and the Windows desktop.

Transfer files from the old system

You'll want to transfer documents, music, videos and photos from your old computer and the easiest way to do this is with Windows Easy Transfer. This utility must be present on both your old and new systems, and although it was only shipped as standard with Windows 7 and 8, if you're transferring from an XP or Vista machine, you can download the software for free from tinyurl.com/y2o5wkr.

Windows Easy Transfer lets you transfer via a special cable, an external drive or a network - the external drive approach will be the easiest and, if you have to buy the necessary disk, you can also use it for regular backups. Don't try transferring Windows settings because Windows 8 is so different from previous versions, and make sure


you select the Advanced option so you can choose exactly which folders to copy across.

It might be tempting to copy everything to your new system, but that's not necessarily the best approach as this is an ideal time to remove some clutter. Do a good spring-clean by copying only the folders you need and deleting unwanted files from those folders you decide to keep. Remember to check the Downloads folder, though, as there might be some stuff there you need, but be sure to avoid copying across the accumulated junk such as installation files for old versions of software that you've downloaded.

Backup strategy

Having spent all this time getting your new computer set up exactly as you like it, it would be a shame if you had a disk crash and all this hard work was lost. The secret is to make an image of your disk on an external USB drive, a networked drive or a stack of DVDs, that you can restore from later. Several

third-party tools, such as Arconis True Image (arconis.com), are well respected or you could use the built-in Windows 8.1 facility that appears as 'System Image Backup' in the bottom-left corner of the File History window, which is accessible from the Control Panel. Suitable USB drives, such as those in the Western Digital My Passport range, provide 1TB of storage for about £55.

If you have to recreate your system from a system image backup, everything will be restored to exactly as it was when you made the system image. In other words, if the image was made immediately after you'd finished setting up your new system, any documents that were created or downloaded subsequently will be missing. For this reason, you'll also need to create regular backups of your files. Windows 8.1's File History also permits this, allowing you to make regular copies, to an external USB or networked drive, of all the files in your libraries, desktop, contacts and favourites. 

...and save this on to an
EXTERNAL USB DRIVE



11 TRICKS FOR EXCEL POWER USERS

Learn these functions - from PivotTables to Power View - and become a spreadsheet savant

There are two kinds of Microsoft Excel users: those who make neat little tables and those who amaze their colleagues with sophisticated charts, advanced data analysis, and seemingly magical formula and macro tricks. Mastering the 11 essential Excel skills presented here will ensure you become the latter.

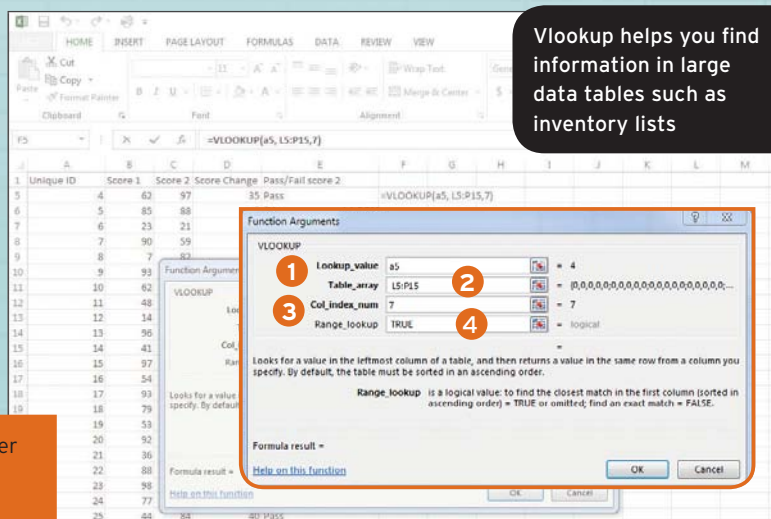


1. Vlookup

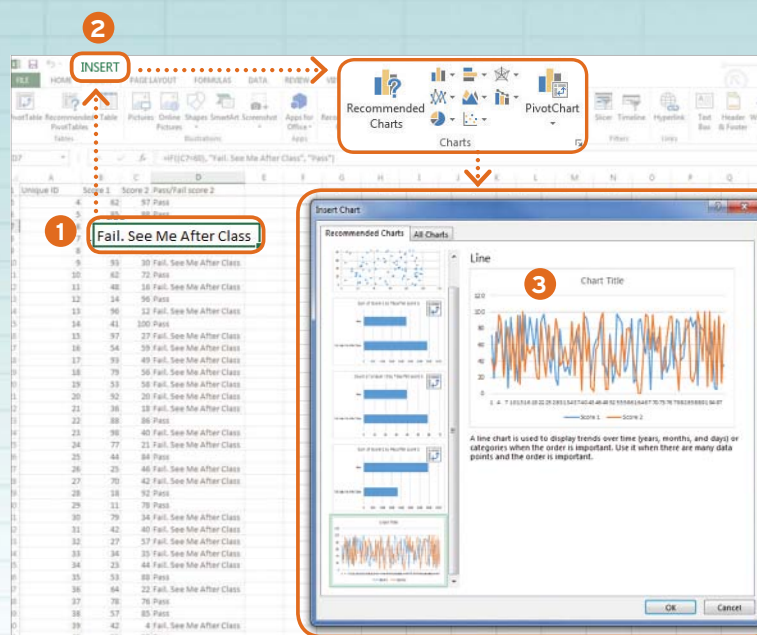
Vlookup allows you to gather data that's scattered across different Excel sheets and workbooks, and bring those sheets into a central location to create reports and summaries.

Let's suppose that you work with products in a retail store. Each product typically has a unique inventory number, and you can use that number as your reference point for Vlookups. The Vlookup formula matches the ID to the corresponding ID in another sheet, so you can pull the item's description, price, inventory level, and other data points into your current workbook.

Summon the Vlookup formula in the formula menu, and enter the cell containing your reference number (1). Then enter the range of cells in the sheet or workbook that you need to pull data from (2), the column number for the data point you're looking for (3), and either True, if you want the closest reference match, or False, if you need an exact match (4).



Vlookup helps you find information in large data tables such as inventory lists



2. Creating charts

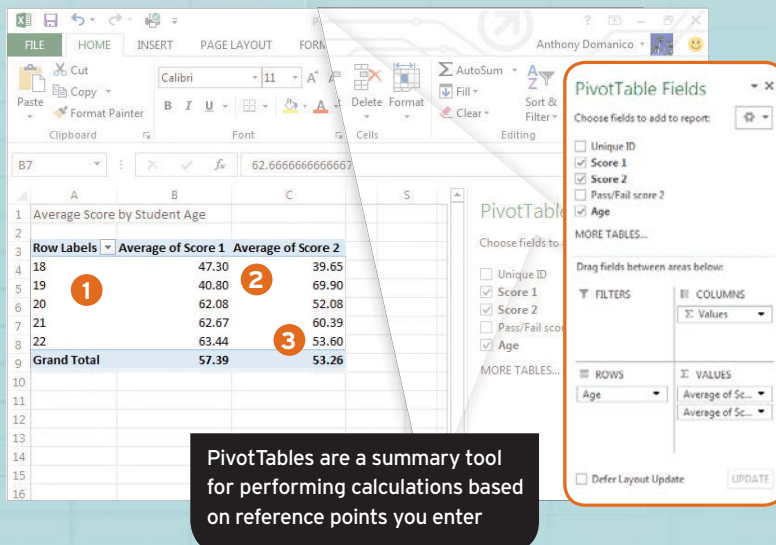
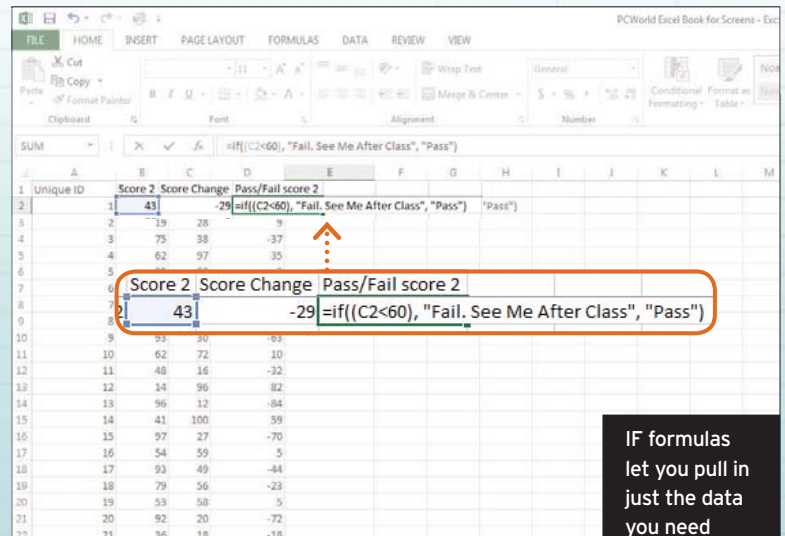
To create a chart, enter data into Excel with column headers (1), and select Insert > Chart > Chart Type (2). Excel 2013 even includes a Recommended Charts section (3) with layouts based on the type of data you're working with. After creating the generic version of a chart, open the Chart Tools menus to customise it. You'll find a surprising number of options to play around with.

Excel 2013 includes Recommended Charts with layouts based on the type of data you're working with

3. IF and IFERROR formulas

IF and IFERROR are the two most useful types of IF formulas in Excel. IF lets you use conditional formulas that calculate in one way when a certain thing is true, and in another way when that thing is false. For example, you can identify students who scored 80 points or higher on an exam by having the cell report 'Pass' if the score in column C is above 80, and 'Fail' if it's 79 or below.

IFERROR is a variant of the standard IF formula. It permits you to return a particular value (or a blank value) if the formula you're trying to use returns an error. If you're running a Vlookup to another sheet or table, for example, the IFERROR formula can render the field blank in any instance where the Vlookup can't find the reference.



4. PivotTable

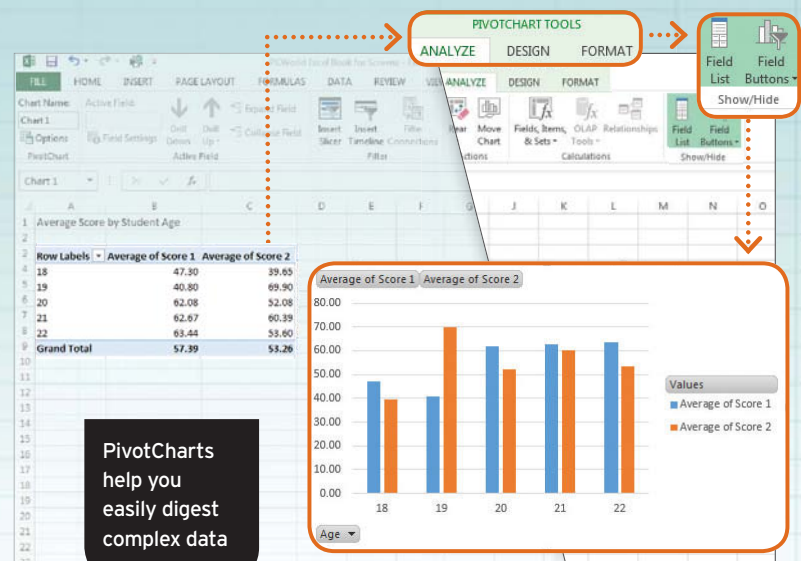
A PivotTable is essentially a summary table that lets you count, average, sum, and perform other calculations based on reference points that you enter. Excel 2013 added Recommended PivotTables, making it even easier for you to create a table that displays the data you need.

For example, to count the number of passes and fails in a chart, put your Pass/Fail column in the Row Labels tab (1), and then again in the Values section of your PivotTable (2). It will usually default to the correct summary type ('count', in this case), but you can choose among many other functions in the Values drop-down box (3). You can also create subtables that summarise data by category, such as Pass/Fail numbers by gender.

5. PivotChart

Part PivotTable, part traditional Excel chart, a PivotChart lets you quickly and easily look at complex data sets in an easy-to-digest way. PivotCharts have many of the same functions as traditional charts, with data series, categories, and the like, but they add interactive filters, so you can browse through data subsets.

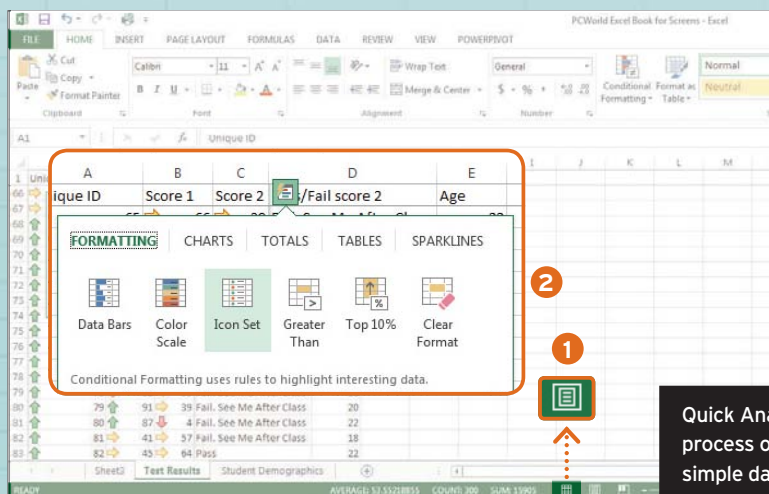
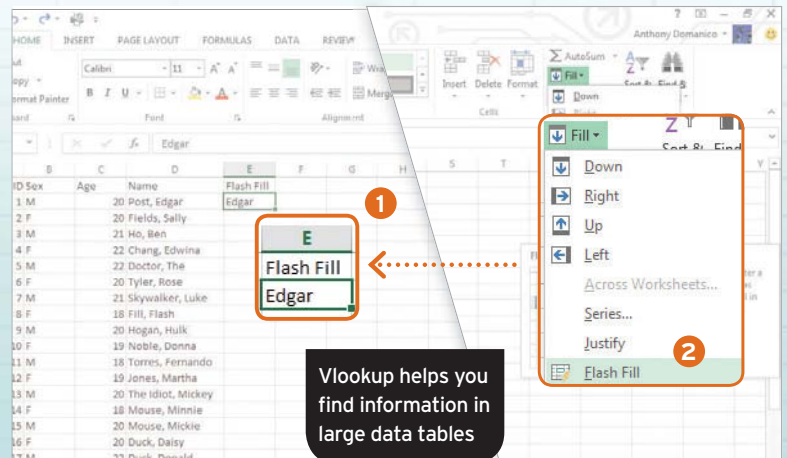
Excel 2013 added Recommended PivotCharts, which you can find listed under the Recommended Charts icon in the Charts area of the Insert tab. You can preview a chart by hovering your mouse pointer over that option. To create a PivotChart manually, select the PivotChart icon on the Insert tab.



6. Flash Fill

Easily the best new feature in Excel 2013, Flash Fill solves one of the program's most vexing problems: how to quickly pull needed pieces of information from a concatenated cell. In the past, when working in a column with names in 'Last, First' format, for example, you either had to type everything out manually or create a (complicated) workaround.

Suppose that you're working with a field of people's names in Excel 2013. You simply type the first name of the first person in a field immediately next to the one you're working on (1), and choose Home > Fill > Flash Fill (2). In response Excel will automatically extract the first names of all of the other people that are recorded in the existing field and fill the new field with them.



7. Quick Analysis

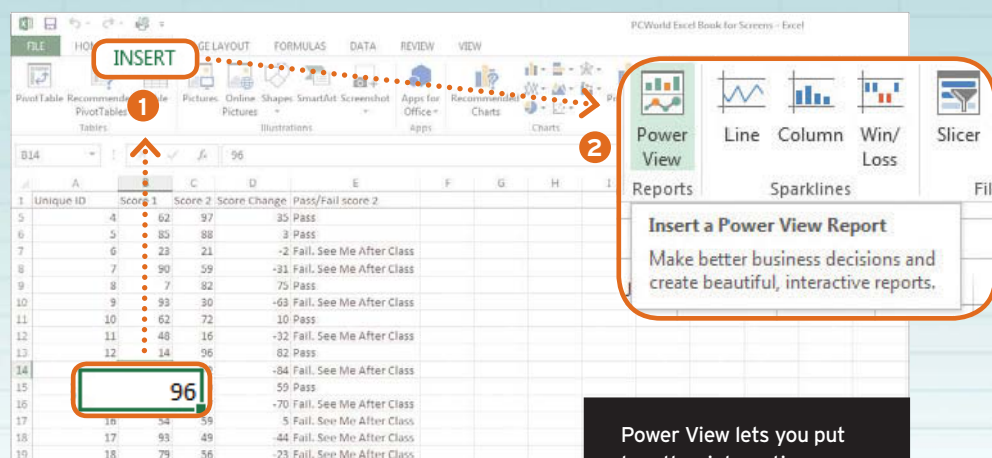
Excel 2013's new Quick Analysis tool reduces the amount of time required to create charts based on simple data sets. When you select your data, an icon will appear near the bottom right corner of the page (1). Click that icon to bring up the Quick Analysis menu (2).

This menu provides tools for Formatting, Charts, Totals, Tables, and Sparklines. By hovering your mouse pointer over each option, you can generate a live preview of it.

8. Power View

Power View is an interactive data exploration and visualisation tool that can pull and analyse large quantities of data from external data files. In Excel 2013, go to Insert > Reports (1) to use Power View (2).

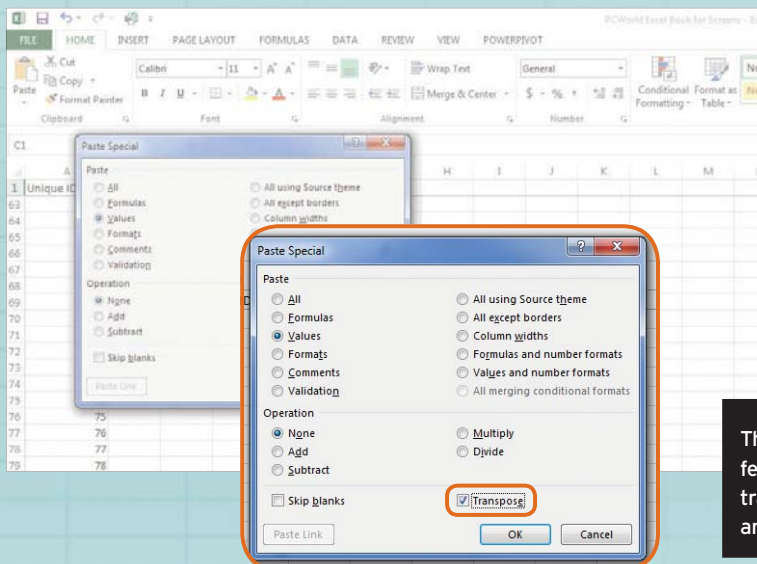
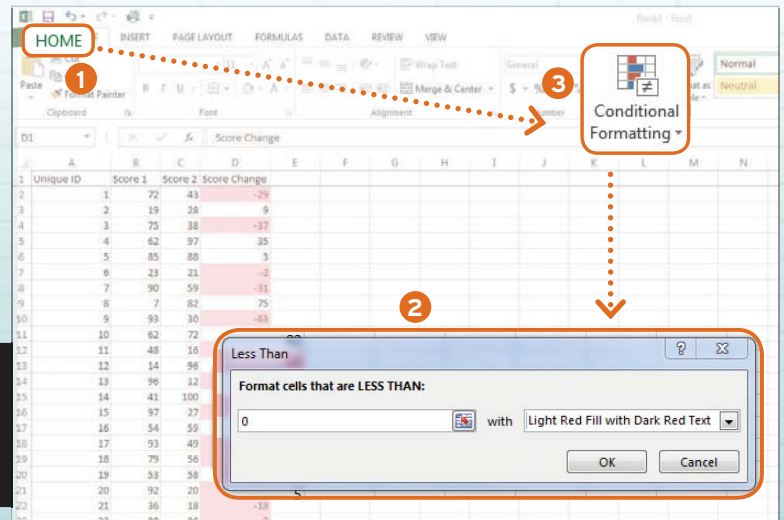
Reports created with Power View are presentation-ready, with modes for reading and for full-screen presentation. You can even export an interactive version into PowerPoint. The Business Intelligence tutorials (tinyurl.com/nqyLVnL) on Microsoft's site will help you become an expert.



9. Conditional Formatting

For most tables, Excel's extensive conditional formatting functionality makes identifying data points of interest easy. This feature is housed on the Home tab in the taskbar (1). Select the range of cells that you want to format, and click the Conditional Formatting drop-down (2). The Highlight Cells Rules submenu (3) serves as host to the features you're likely to use most often.

Conditional Formatting lets you highlight data points of interest with minimal effort



10. Converting columns into rows (and vice versa)

Now and then, you may want to convert data from a column format to a row format (or vice versa). To do so, simply copy the row or column you'd like to transpose, right-click the destination cell and select Paste Special. Then check the box labelled Transpose at the bottom of the resulting popup window and click OK. Excel will do the rest.

The Paste Special feature lets you transpose columns and rows

11. Essential keyboard shortcuts

These eight keyboard shortcuts are especially useful for navigating quickly through an Excel spreadsheet and for performing various other common tasks in Excel. ☒

<Control>-<Down Arrow> or <Up Arrow>	Move cursor to the top or bottom cell of the current column.
<Control>-<Left Arrow> or <Right Arrow>	Move cursor to the cell farthest left or right in the current row.
<Control>-<Shift>-<Down Arrow> or <Up Arrow>	Select all cells above or below the current cell.
<Shift>-<F11>	Create a new blank worksheet within your workbook.
<F2>	Open the cell for editing in the formula bar.
<Control>-<Home>	Navigate to cell A1.
<Control>-<End>	Navigate to the last cell that contains data.
<Alt>-=>	Autosum the cells above the current cell.



YOUR QUESTIONS ANSWERED

Expert computing advice

We tackle readers' hardware and software conundrums

HOOK UP THREE PCs

Q I have two PCs that are connected to a single monitor via a VGA switch and I need to connect a third computer in the same way. Each system has their own keyboard and mouse, so they only need to share the display.

I've searched the internet for an adaptor with one female and two male connections to 'split' the cable from the monitor to the second PC in order to gain a third connection. However, I can only find two male to one female connectors - which are designed for connecting two monitors to a single PC. Can you help me with my setup?

Because VGA connections are analogue, you'll want to maintain a high-quality connection without any interference from other devices, so we'd recommend upgrading your VGA switch to a version with more than two ports rather than trying to cobble together a third connection by splitting a cable between two PCs.

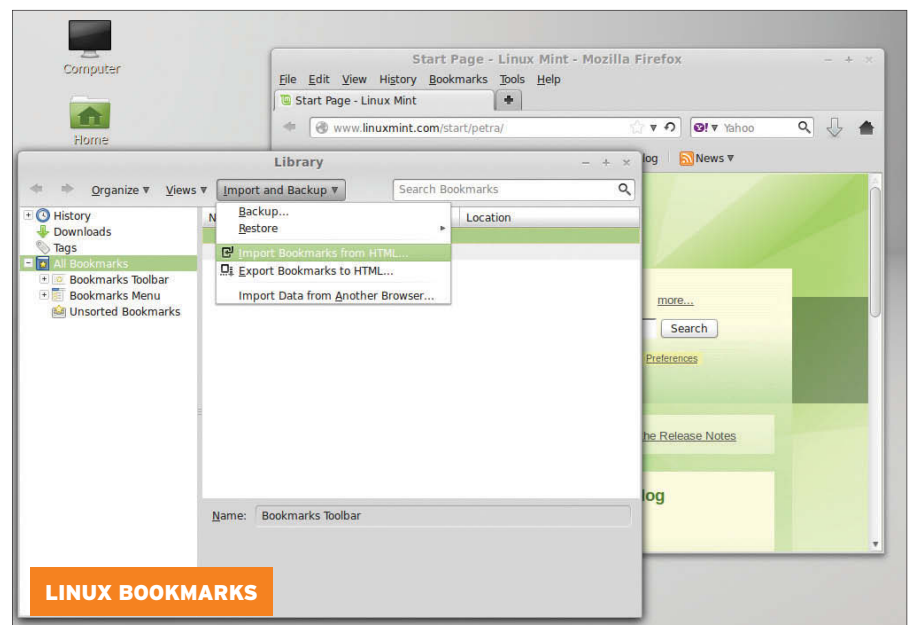
You would also presumably want a way to choose which of your computers is using the monitor without having to turn off those that aren't in use. This will require a switch selector of some kind.

A quick search on eBay for 'VGA switch' reveals that a few four-way VGA switch boxes are available for well under £20, so we'd recommend replacing your existing VGA switch with a version that can accommodate all three displays.

Although you say you have a keyboard and mouse for each PC, you'll also find full KVM switches available for the same sort of price, which you can use to perform the same function. Just keep your keyboards and mice plugged directly into their respective PCs as normal, and use the KVM switch to switch the video only. Before you buy one, check the specifications and ensure that the maximum supported video resolution and refresh rate suits your needs.

LINUX BOOKMARKS

Q I've decided to ditch Windows XP and move to Linux Mint, as I've heard it's one of the easier versions to get along with. My question is, can



I move all my Firefox bookmarks over from Windows XP in one go? I can't see how to do this.

The simple answer is yes. Since Firefox has been written for many different operating systems, it allows you to export and import your bookmarks between different versions.

First, you'll need to export your bookmarks from Firefox on Windows XP. The steps you must take will vary depending on how recent your copy of Firefox is, but the principle remains the same.

Start up Firefox and press Ctrl-Shift-B to bring up the bookmarks library. At the top, you should see the option 'Import and Backup'. Click this and select 'Backup' to make a backup file of all your bookmarks in JSON format. You'll need to access this file from Linux Mint, so copy it to somewhere where you can see it from Linux or put it on a USB flash drive. On Linux Mint, do the reverse: start up Firefox.

On the Windows XP system, start up Firefox and open the Bookmarks Library, then select Restore to load the bookmarks from your backup file.

If you have any problems reading the backup file, or if you want to transfer bookmarks between different browsers such as Internet Explorer or Chrome, you

can try using the Export Bookmarks to HTML option instead, applying the corresponding Import Bookmarks from HTML command on Linux Mint.

ADD ETHERNET PORTS

Q I have a router that has four ports and I need to use ethernet on some computers further around the room. Can I add a device to make the single ethernet cable I have run over the other side of the room into more ports?

This is very simple. All you need is an ethernet switch with the required number of ports. Connect the long cable from your router into the uplink port of your switch, and then you'll be able to use the ports on the switch just as though they were extra ports on your router.

There are, however, a few points to consider when choosing your switch. First, you'll need to ensure you have enough ports for all the devices you want to connect, plus one - the extra port being used to connect to your router. Also consider whether you're likely to add any additional devices in the future. In general, the fewer the ports, the cheaper the switch.

Next, you need to consider the speed of the switch. If your router has Gigabit



ethernet ports, then you'll probably want a switch that also supports Gigabit speeds. Otherwise, you may be able to save some money by opting for a 100Mbit switch.

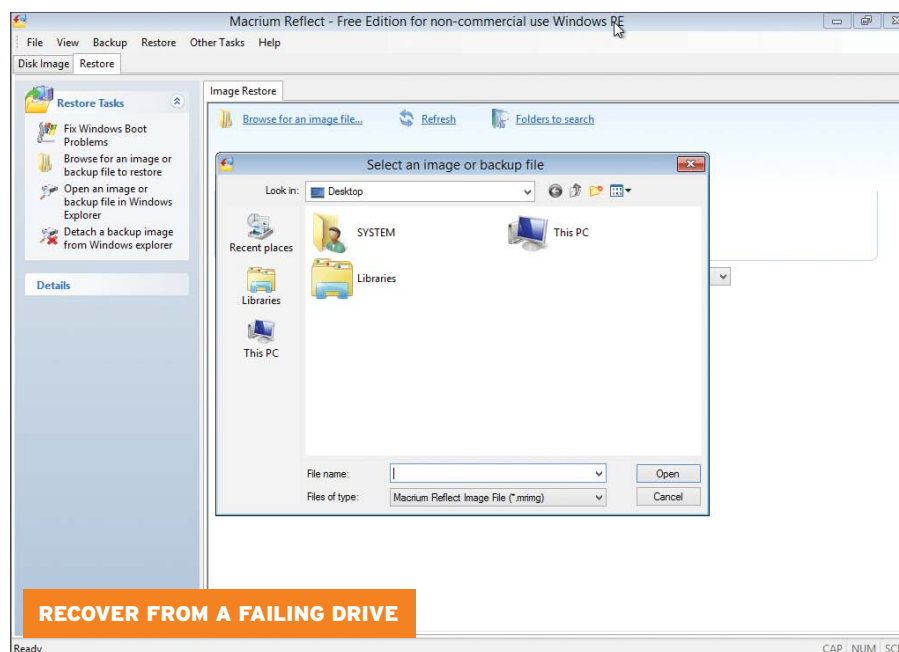
Another factor is power and noise. Larger switches can often include noisy fans, which you really won't want whirring away continuously in your living room. For simple plug-and-play connections, look for auto MDI/MDIX, which means you won't need to worry about using special cables or a specialised uplink port for connection to your router.

A managed switch will allow you to prioritise certain ports or types of network traffic, but for general home use you can go for a low-cost unmanaged switch.

RECOVER FROM A FAILING DRIVE

Q My laptop's hard drive is failing. I can still boot to the recovery partition, but I'm unable to reinstall the operating system. If I put the original hard drive into an external USB enclosure, put a new hard drive into the laptop and boot via USB to the original recovery partition could I then install the operating system to the new hard drive?

The method you describe is likely not to work, as you'll probably find the laptop is



unable to locate the recovery partition when connected externally via USB.

We would suggest you go ahead and purchase a USB drive enclosure and a new internal hard drive, but rather than attempting to boot from the damaged drive via USB, put the new hard drive into the external enclosure and clone the failing

drive on to it using software such as Macrium Reflect. To do this, you'll first make a bootable USB flash drive using your cloning software and boot from that.

This cloning procedure should give you an idea of whether the recovery partition on the failing drive still contains valid data. If the procedure is successful,

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TECH JARGON BUSTER

GAMUT: The range of colours displayable by a device is known as its 'gamut'. On monitors, this is determined largely by the choice of backlight and red, green and blue filters used to create the picture. With printers, it's down to the formulation and colour of the printing inks along with the colour of the paper.

HEARTBLEED: This is the name given to a flaw in digital cryptography software. It was fixed in April 2014, but a large proportion of web servers had already been vulnerable to the attack, which could have revealed personal details, such as passwords, to hackers before the problem was fixed.

ICANN: The Internet Corporation for Assigned Names and Numbers is an organisation that oversees the domain name system (DNS) used to name all sites on the internet and manages the IP address numbering system.

MICROSOFT ACCOUNT: Formerly known as a 'Windows Live ID', a Microsoft account is simply an email address and password used to sign in to Microsoft services such as Outlook.com, Skype or a Windows 8 PC.

PS/2 CONNECTOR: This is a port used to connect a keyboard or a mouse to a PC. Usually coloured purple for a keyboard or

green for a mouse, these small, round six-pin connectors are now considered legacy ports and have generally been replaced by USB connections. However, gaming keyboards are often provided in PS/2 versions to allow an unlimited number of simultaneous key presses to be detected. The use of PS/2 peripherals also allows all USB ports to be disabled where required for security reasons.

802.11AD: This is an industry standard for Wi-Fi compatible wireless communications at up to 7Gbit/s. However, the standard operates in the 60GHz band, which can't usually travel through walls.

you should then be able to install the new drive in the laptop and perform the recovery boot from there.

Of course, there's a good chance that the recovery partition will have been damaged, in which case you'll need to go back to your vendor for a recovery solution or install from any discs provided with your laptop.

WINDOW 8.1 START SCREEN

Q I've read that the latest update to Windows 8.1 is supposed to detect whether or not you're using a touch interface screen, and boot to either the Start screen or the traditional Windows desktop accordingly. I'm using a non-touch desktop PC and Windows is still starting up on the Windows Start screen. How can I change this setting manually?

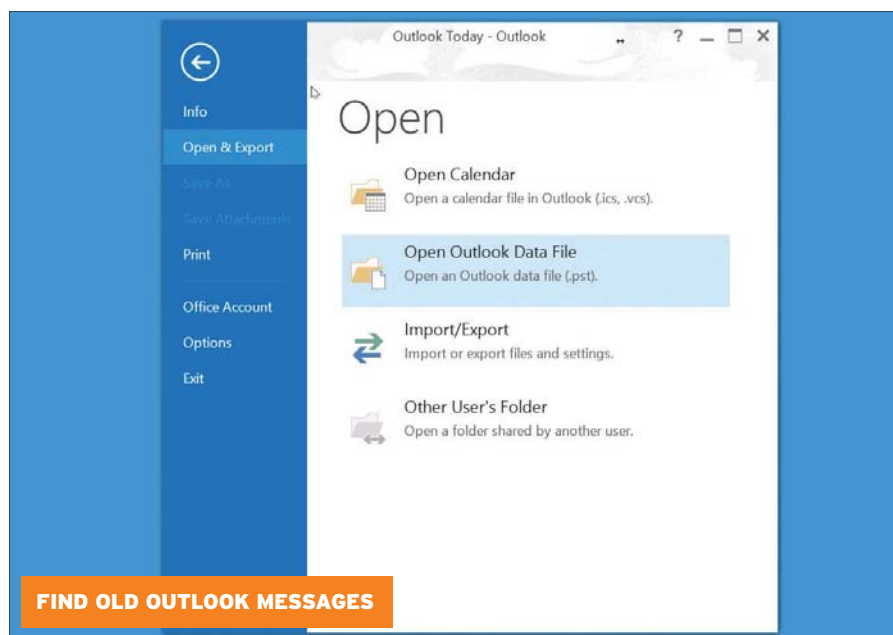
Most Windows settings can be accessed by typing what you're looking for from the Start screen. Unfortunately, this isn't one of those settings.

To change this setting, go to the Desktop, right-click on an empty portion of the Taskbar and select Properties. Now select the Navigation tab. The bottom section here contains options related to the Start screen, including 'When I sign in or close all applications on a screen, go to the desktop instead of Start'. Tick this box. If you're primarily a desktop user, you might also like to click the bottom box to get your desktop apps listed first in the Apps view when it's sorted by category. Now click OK.

TRANSFER IPHONE MUSIC

Q After using an iPhone for the past six years, I've purchased a Samsung Galaxy Note 3. Now the problem is this: there was a burglary at my place a few weeks ago and my laptop was stolen; I still haven't replaced it.

I can't afford to lose all the music I have on my iPhone (most of it purchased on iTunes) and I really can't find a way



to transfer music from one phone to the other without a computer. My partner has a laptop I can use, but since he has an iPhone as well, I don't think I can use his iTunes to do this as he has his own music installed on there. Can you help?

Copying music from your iPhone to another device is tricky as iTunes is designed for the most part to transfer music from a computer to a phone and not in the other direction.

There are, however, third-party tools that can help you do this. Look at Coolmuster iPad iPhone iPod to Computer Transfer, tinyurl.com/q837n7q, or Leawo iTransfer tinyurl.com/p7qyqq. There are many other options out there, too, although you'll need to pay to use most of them. They will allow you to copy music from your iPhone into iTunes on a computer or Mac, but you'll need to ensure that your collection is kept separate from your partner's.

The easy way to do this is to set up a second user on your partner's laptop. You

can then sign in as this second user and have your own personal settings, including your own iTunes library. You don't say whether your partner's laptop is a PC or a Mac, but the principle is the same.

Once you've imported your music into iTunes on the laptop, you can use Samsung's Easy Phone Sync software (to transfer it all on to your Galaxy Note 3).

FIND OLD OUTLOOK MESSAGES

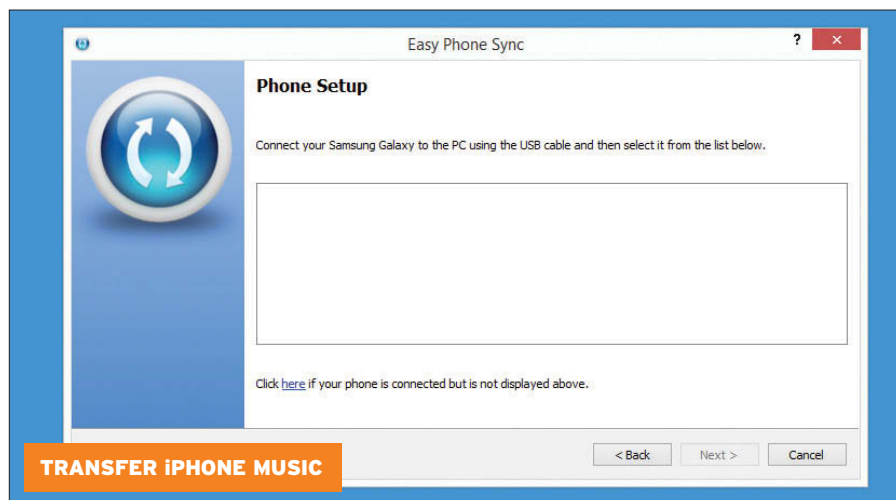
Q How do I find Outlook files on an external hard drive? I'm accessing the hard drive of an old Windows 7 all-in-one PC via a new Windows 8.1 all-in-one and am trying to find a specific email attachment I received about four months ago but without success. I've searched program files and documents, and also made a generic search of the whole hard drive, but nothing comes up. Outlook is on the external hard drive, but as far as I can see, none of the emails.

Microsoft Outlook stores all your emails in a single file, so searching for individual emails by subject or content won't work.

The file you need will have the extension .PST and reside in a folder called X:\Documents and Settings\USER\Local Settings\Application Data\Microsoft\Outlook\, where X is the drive letter of the hard drive containing your old Windows 7 installation and USER is your username on the Windows 7 PC.

You may need to take ownership of the files on the old hard drive, before being able to access them. Windows will prompt you if necessary and do this for you. You may also need to show hidden items from the File Explorer in Windows 8 in order to

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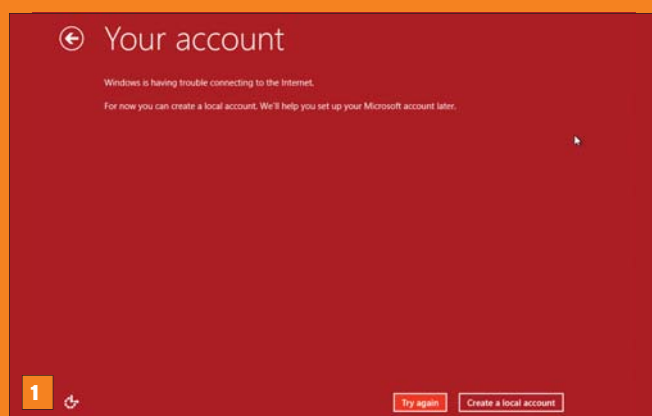


USING WINDOWS 8 WITHOUT A MICROSOFT ACCOUNT

Starting with Windows 8, users have had the ability to sign into their PCs using a Microsoft account rather than choosing a username and password. This is most often associated with one of Microsoft's own email services, but can be any email address you use or one you set up just for your Microsoft account.

There are advantages of signing in with a Microsoft account, including the ability to synchronise settings between the different Windows 8 PCs you use and the ability to easily install apps from the Windows Store. However, if several people use a computer they won't want to use a single Microsoft account, perhaps for security or privacy reasons.

When you first set up your Windows 8 or 8.1 PC, the default option is to set up a Microsoft account, but you don't have to. Microsoft has hidden away the option to create a local account, but it's still there.



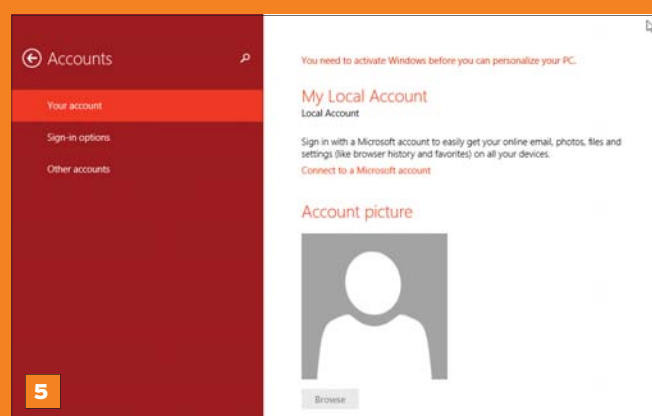
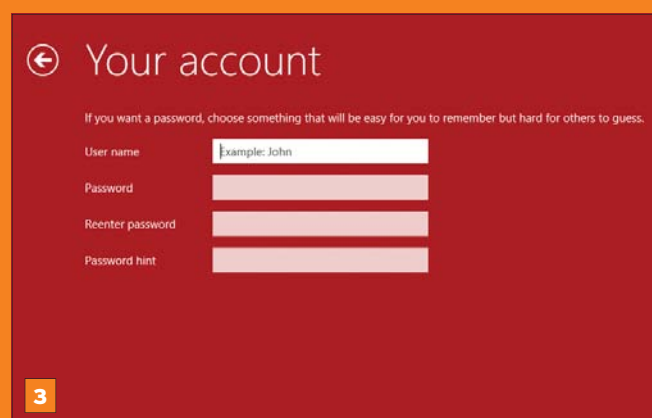
The simplest way is to make sure you're not connected to the internet when you set up your computer. Windows will then automatically suggest you create a local account and display a button to create one. Otherwise, Windows will ask you to sign in to your Microsoft account. If you don't have one, click on Create a new account (**screen 1**). Do this even if you don't want one, because at the bottom of the next page will be a link marked, Sign in without a Microsoft account (**2**). Click this and you'll be able to choose a username and password for a local account (**3**).

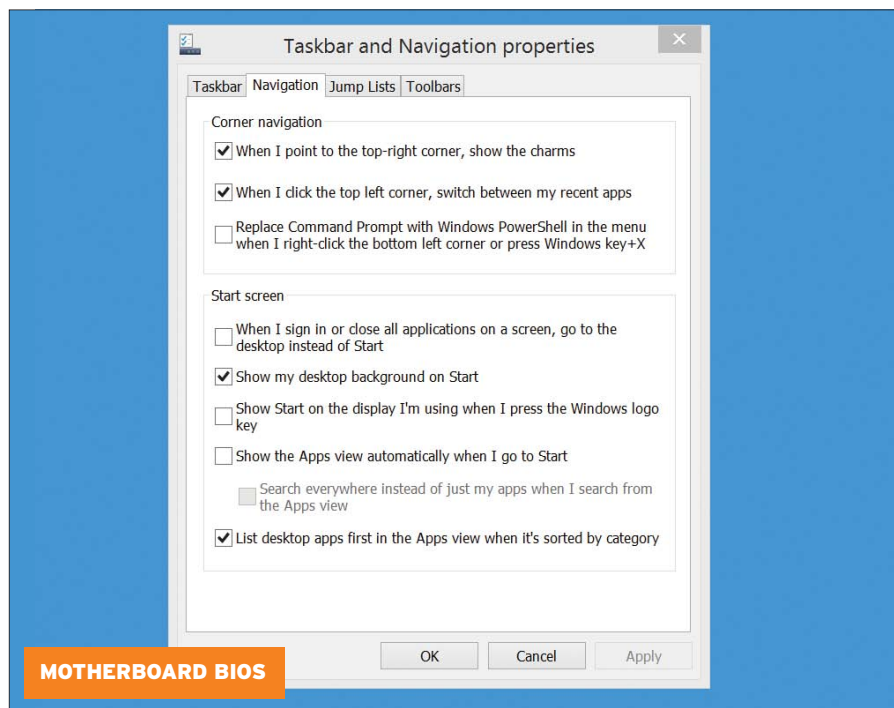
If you've already set up your PC with a Microsoft account, but you'd rather not use it, you can switch to a local account at any time. However, be aware that you'll lose the benefits, mentioned above, that come with using one (**4** and **5**).

If you want to keep all your documents and settings intact, follow these instructions. From the Start screen, type **settings** and select 'PC settings'. From here, select 'Your account'. Next, click on 'Disconnect' to dissociate your Microsoft Account. If you've already set up a local account but want to switch to using a Microsoft account, you can follow the same procedure, but select 'Connect to a Microsoft account'. This will verify your account by text or email and then offer to automatically save your photos document and settings to Microsoft's OneDrive cloud storage service. You can opt out of this if you wish.

If you want to use apps from the Windows Store, it's much easier to be signed in with a Microsoft account, and Windows will strongly suggest that you do so if you attempt to install one.

However, you can still install Windows Store apps on to a local account. Select 'Sign into each app separately (not recommended)' and you'll be prompted to sign in to your Microsoft account temporarily in order to install the app.





see the relevant folders. To do this click on 'View' and then tick the box marked 'Hidden items' in the Show/Hide section towards the right hand side.

To view the files, you'll need to install Outlook on your Windows 8 PC or find another PC with a working copy of Microsoft Outlook. Open Outlook on this PC and select Open from the File menu, then click Import.

Now choose 'Import from another program or file', select 'Outlook Data File (.pst)' and click Next. You can now import whichever emails you like into an outlook folder on the current PC, so you should be able to locate the messages and attachments you require.

MOTHERBOARD BIOS

Q My friend has an Asus Crosshair V Formula motherboard and Asus hasn't released any new BIOS updates since 2012. So I was thinking, would the

BIOS from the Crosshair V Formula Z work with the standard V Formula?

We would strongly warn you against attempting something like this. Flashing a BIOS not intended for your specific motherboard could result in all sorts of problems, including leaving you with a motherboard that no longer works at all.

Although these two motherboards are very similar, it doesn't take much difference to render the BIOS files incompatible. Unless you hear specific information to the contrary, don't try flashing the BIOS from the newer model.

If there's a specific feature you want, then you may be able to get somewhere by visiting one of the BIOS modification sites on the web. A Google search for 'BIOS modding' will set you in the right direction. However, all such modifications come with considerable risk. ☒

CONTACT US



Email your Helproom questions to helproom@pcadvisor.co.uk. Please use 'Helproom' as the subject header and give your full name, the operating system you're using and other product details. We will let you know by email if your query has been selected for inclusion in these pages. If your query is urgent, you may find it useful to visit our forum at pcadvisor.co.uk/helproom.

Helproom aims to give you the best assistance possible. But, given the

limitations of this type of advice, we can't guarantee what we say will work and we can't accept responsibility for any damage arising as a result.

Always back up your system before you make any changes, including software installations.

Please note that we are unable to respond to letters or telephone requests, but we will endeavour to answer queries submitted by email or via our Helproom forum.

For more PC help go to:
pcadvisor.co.uk/helproom



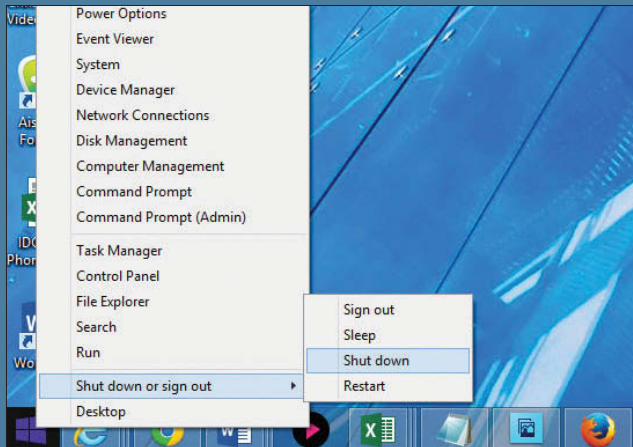
SEARCH THE
PC ADVISOR FREE
ONLINE HELPROOM

The PC Advisor online Helproom contains an indispensable database of answers to common questions regarding all aspects of PC problems. This ranges from general Windows issues to problems with specific apps, and covers all types of PC hardware and software, including system components and peripherals.

Alternatively, you can ask for help from the experts on our online forums. Sign up to be a registered user – which is free – and then browse to one of the discussion forums. In the Helproom your first stop should be the searchable database of frequently asked and previously answered queries. With more than 1.5 million forum posts, you'll almost certainly find your answer in this archive of queries – just enter a few keywords.

If our online database can't solve your problem, try posting a question in the Helproom forum, where more than 200 queries are answered every day. The forum is manned by our team of Helproom Angels, who are ready and willing to lend a hand with anything from system crashes to virus alerts.

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Shut down Windows



The first version of Windows 8 was notoriously difficult to shut down if you had a PC or laptop, since it was designed to work best with tablets that have a sleep/wake button. Jim

Martin shows you how to quickly and easily shut down a Windows 8 PC

GET THE LATEST UPDATE

If you upgrade - for free - to Windows 8.1 or the latest Windows 8.1 Update, Microsoft has made it considerably easier to shut down, restart or switch users.

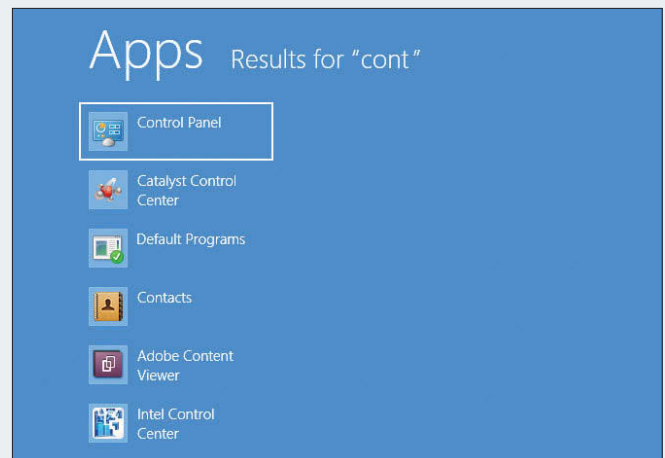
In Windows 8.1, you can right-click on the 'Start button' on the traditional desktop. This brings up a menu, which is also accessible by pressing Windows-X, where you have the old Shut down or sign out menu.



If you prefer using the new Windows interface, you'll benefit from the Windows 8.1 Update, which adds a power button to the top-right corner of the screen (see above). Click this, and you'll get the similar shut down and restart options. There's still the option to shut down when you open the Charms bar and click Settings, then Power.

USE YOUR PC'S POWER BUTTON

There's another way you can shut down a Windows 8 PC or laptop, and it will take you less than 30 seconds to configure:



START

When on the Start screen, begin typing 'Control panel'. Click it in the list of results that appear.



2

In Control Panel's search box, type **power**. Under Power Options, click 'Change what the power buttons do'.



3

By default, 'When I press the power button:' is set to Sleep. Simply change this to Shut Down. If you have a laptop, you can choose separate behaviour depending on whether it's running on battery power or connected to the mains. ☒

Set up an online shop



With so many people shopping online, it makes good sense to create your own eShop if you have products to sell. Martyn Casserly shows you how

Ecommerce has taken off in a big way. After all, why go to the expense of setting up a physical building, with all the inherent costs of rent, electricity and staff, when you can build a retail empire from the comfort of your sofa? eBay and Amazon offer ways to reach an audience, but if you want your own space online, with the ability to display stock and services the way you want, then a professional ecommerce provider is the answer. We'll explain how to assemble a fully-functional retail site from scratch in a few hours. Using the eShop service provided by 1&1 (1and1.co.uk), we'll walk you through the basics of adding stock, as well as setting up payment functions and delivery options.

1 Topic
Welcome to the setup assistant. Please choose the subject of your website.

Topic > Layout > Design > Contact > Settings > Verify

Computers and electronics e.g. Hardware, software or EDP services	Art, culture and education e.g. Museums, theatres or universities	Crafts e.g. Carpenter, electrician or blacksmith
Manufacturing industry e.g. Metal processing, chemical industry or wood-working	Building, living and property e.g. Architects, gardeners or decorators	Lifestyle and fashion e.g. Cosmetics, gifts or decorative ideas
Hotels and trips e.g. Holiday flats, camp sites or travel agent's	Free time e.g. Sport, clubs or events	Automotive and transport e.g. Workshop, accessories or driving school
Clubs and organisations e.g. Church organisations, counselling services or foundations	Services e.g. Agencies, financial services or lawyers	Private websites e.g. Hobby, fan page or club
Trade e.g. Housewares, foodstuffs or home furnishings	Health e.g. Doctors, wellness or pharmacies	Other

Next

START Once you've created an account at 1&1, log in and from the control panel select 1&1 eShop. You'll be taken to the design area where you can start to assemble your store. The first thing to decide is which topic best suits your business.

2 Layout
Select the layout of your website. In the next step you can modify the header image and the colour.

Topic > Layout > Design > Contact > Settings > Verify

Layout options: Navigation pane position (Left, Right, Top, Bottom) and various website templates (Fashion, Electronics, etc.).

2 The next stage is layout. In the left-hand column are options for where the navigation pane will go, then in the central area are the various templates available. Feel free to explore a few, as you can always change them later.

3 Design
Change the header image and colour to adapt the website to your requirements.

Topic > Layout > Design > Contact > Settings > Verify

Design options: Background image, Colour, and a preview of the website design.

3 Once you've chosen the layout, you can begin to hone the design. Each template has different options for changing the background image and the colour of the header area. You can't get at the main pane yet, so click next to continue.

4 Logo & contact information
Enter the most important data for your website and your contact information.

Topic > Layout > Design > Contact > Settings > Verify

Form fields: Company name, What do you want to call your website?, Slogan, Logo, Preview, How can your customers reach you? (First name, Surname, E-mail, Phone, Fax, House no. / Street, Postcode, Town, Country).

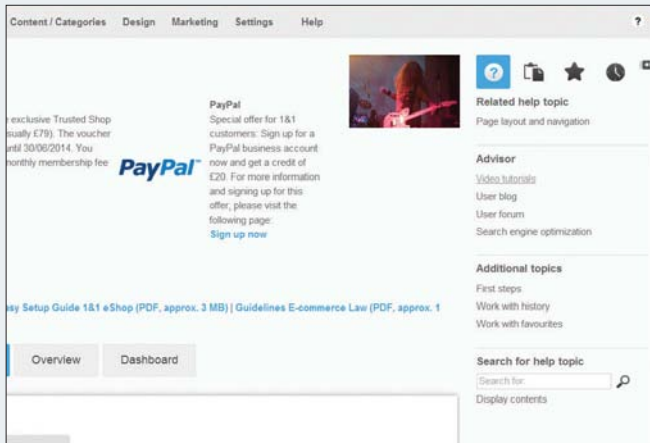
4 Obviously your site will need a name and a way for your customers to contact you. Enter these details into the form on the next page. If you have a JPEG of your company logo, you can also upload it here.

5 Shop settings
Use the following to make the basic settings for your shop. All entries can be changed later.

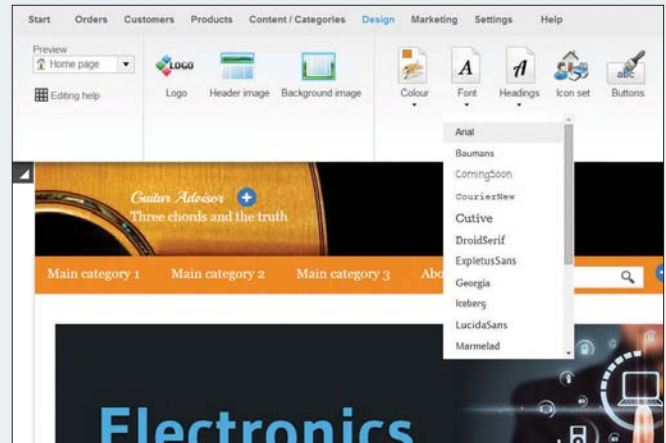
Topic > Layout > Design > Contact > Settings > Verify

Form fields: What tax model do you want to use for your shop? (Net, Gross), What is the VAT ID of your company or organisation?, Would you like to activate collection of statistics for your shop? (Yes/No), Password, Password confirmation.

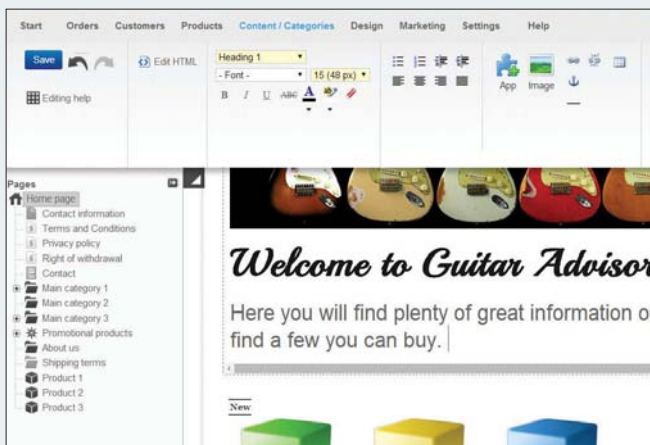
5 If you have a VAT number, then this page lets you register it with your site. On the right is also an option to use the etracker service to collect statistics about your visiting customers. It's useful, but will cost you at least £15 per month after a trial period.



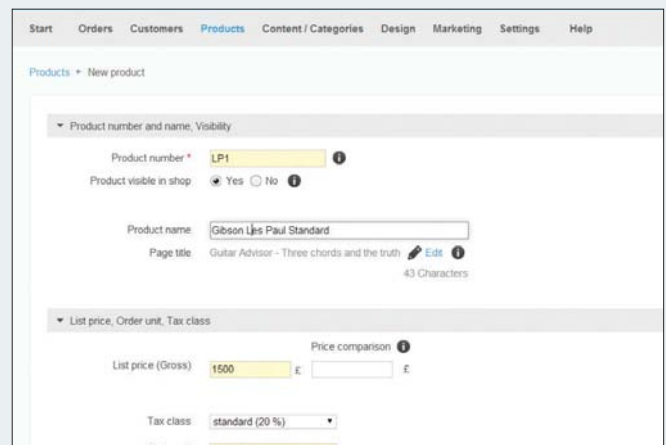
6 Verify all your data is correct, then click Apply. You'll be taken to the Administration page where you'll find several video tutorials and downloadable PDFs that will explain the various options available to you. Take the time to watch a few.



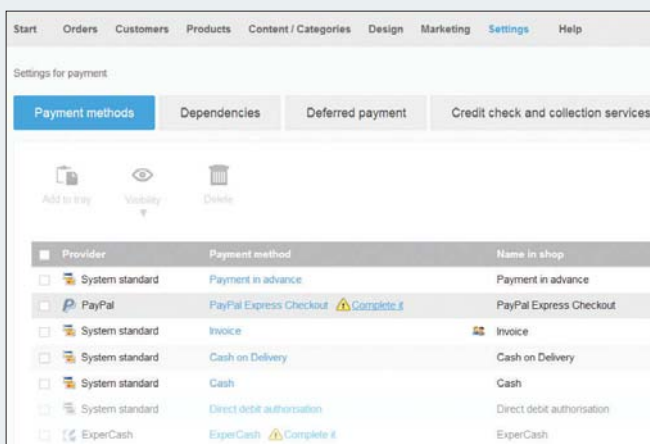
7 Go to the top menu bar and select Design > Quick Design. The main options allow you to upload Header images, change fonts and position various elements.



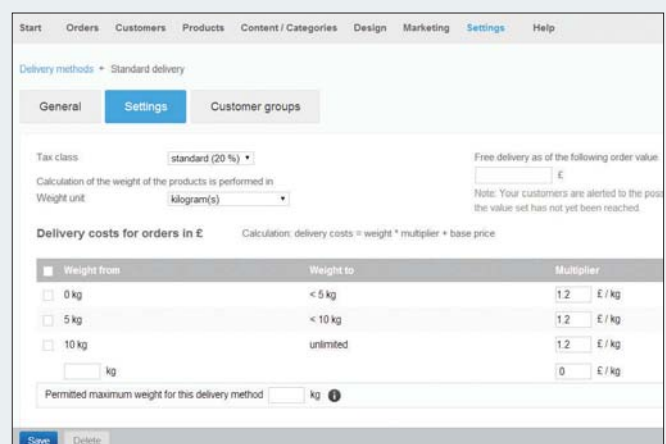
8 To change the main images and text, go to Content/ Categories > Content Preview. Click on the main pane, then choose Image from the top menu. Insert your own image, edit the text, click OK and you'll have a front page.



9 To add sellable items, go to Products > Products and you'll find a database. Click Add > New and fill out the form with all the relevant information. Next, go to Content/Categories > Datasheet View > Products and select the Sort option you prefer.



10 To enable the payment facility, go to Settings > Payment and you'll see a list of payment types. Click on each to edit the account details. When the accounts are set up, make sure the 'display button at checkout' box is ticked so customers can use it.



11 The final part of the basic setup is getting the product to your customer. Click Settings > Delivery and you'll see the available options. Clicking on one and selecting Settings allows you to input the rates for weight, speed and even options for select clients. ☒

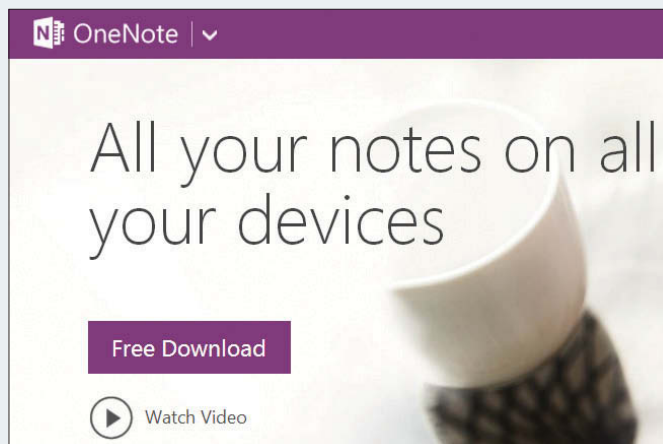
Plan your holiday



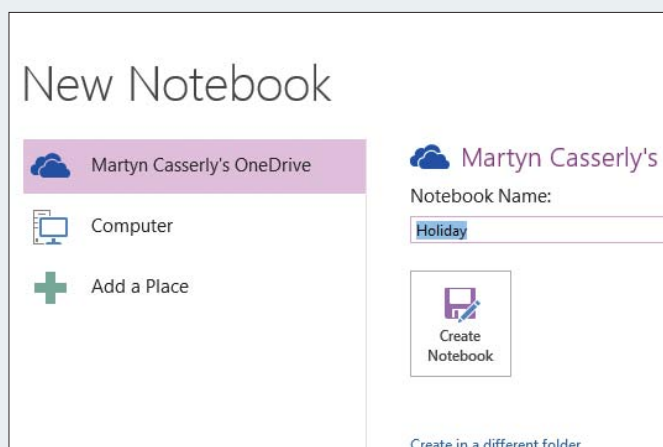
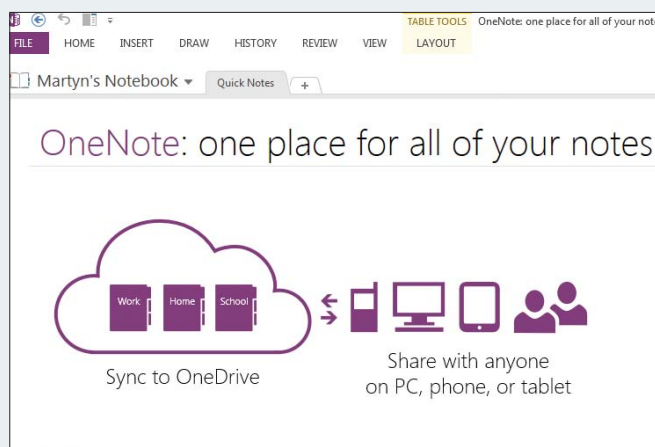
Take the panic out of your yearly break with a helpful organisational tool from Microsoft. Martyn Casserly explains how OneNote can take the stress away

Holidays are supposed to be idyllic, restful experiences that soothe the soul and recharge the batteries that modern life so efficiently deplete. The problem is that before you arrive at your destination, there's the small matter of planning, researching and actually booking the trip itself. Thankfully, there's a very helpful, and free, application from Microsoft that can take care of the heavy lifting.

OneNote is a virtual notebook that lets you clip web pages, make checklists and store any information you need in an easy-to-use format. In this tutorial, we'll show you how the app will make planning your next holiday a lot more fun.

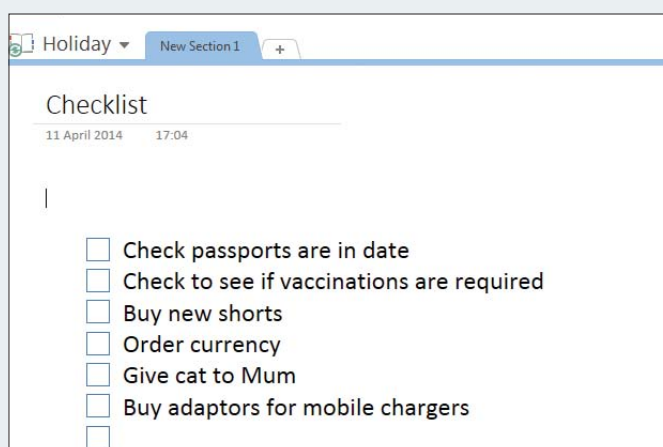
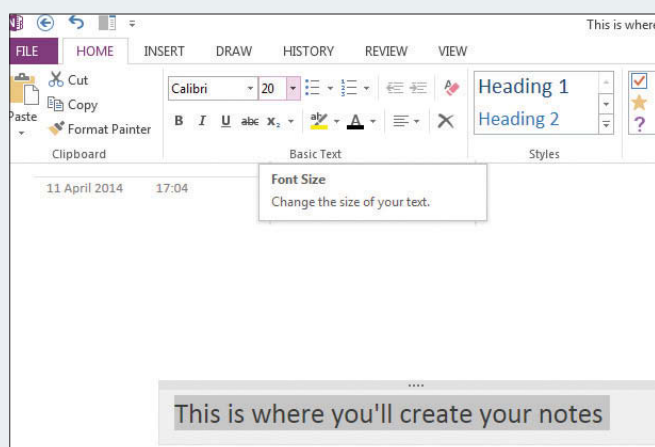


START To download the application for your PC or Mac simply visit onenote.com and click 'Free Download' at the top of the screen. You'll need a Microsoft account to use OneNote and OneDrive, but this is also free and gives you 7GB of cloud storage.



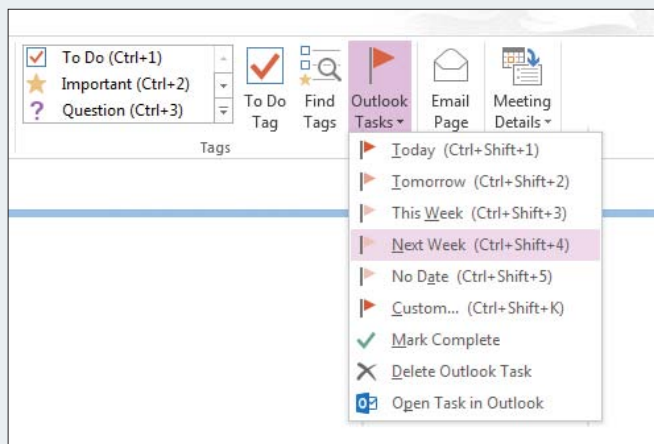
2 Once installed, launch the software and you'll be presented with your general notebook. There are tabs along the top for different sections, and pages in the right-hand column that exist within each section, just like many physical notebooks.

3 Click on the Notebook tab above the main pane, then select Add Notebook. You'll be given the option to create it either on your PC or in your OneDrive folder. Select OneDrive, as it makes the notebook available to all your devices. Then click Create Notebook.



4 The main pane is where you make your notes, but unlike conventional document tools such as Word, the format here is less rigid. You can create notes, lists or paste in images, then drag them anywhere and resize them via the ribbon menu at the top.

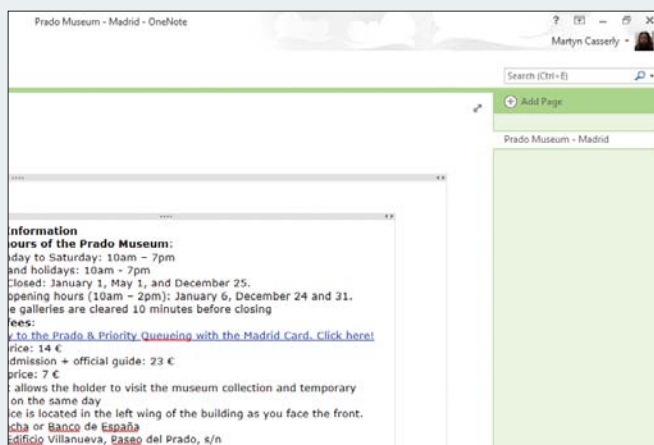
5 To create a checklist, go to the ribbon menu and click Home, then in the section marked Tags, select To Do. A section with an empty box will appear in the main pane, now just type the name of each item and press return, and your list is done.



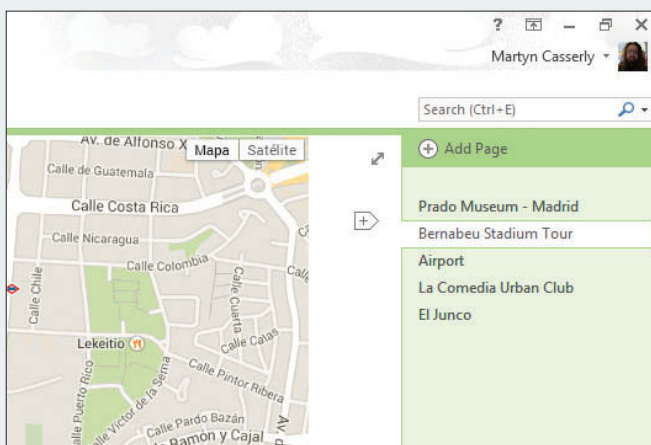
6 A useful feature for Outlook users allows you to set up reminders by selecting an item in your list, then going to the Tags section and clicking on Outlook Tasks. Now you can allocate a timescale and the reminder will automatically appear in Outlook.



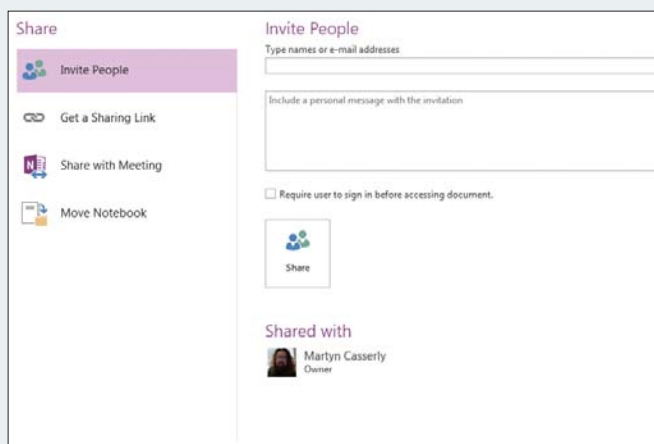
7 Click on the + tab to create a Places section. Look for places of interest through your browser, then copy and paste them into the notebook or press Windows-S to use OneNote's web clipper, which allows you to highlight the area of the web page you want.



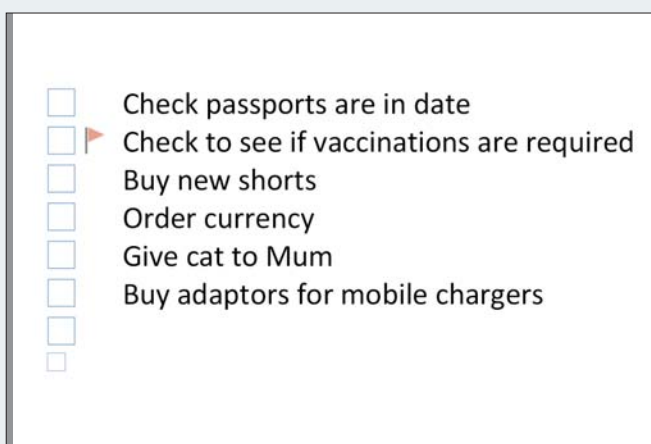
8 Once that information is in OneNote, you can highlight any part of the text and drag it to your preferred place on the screen. This creates a box around it, which you can resize by dragging its edges - very useful for directions and opening times.



9 Click 'Add Page' in the right-hand column and repeat the process until you have all the information on Places that you desire. Add new tabs for other subjects such as Food, History, Maps or whatever you think will be useful.



10 You can easily share your notebook with those joining you on your trip even if they don't have OneNote. Go to File > Share and enter an email address. The drop box at the end also allows you to decide whether they can edit the notebook or not.



11 Go to the app store for your phone or tablet and download the OneNote app. Once logged in, the notebooks will sync automatically and the information will be available offline. All that remains now is to order those eye-catching Bermuda shorts. ☒

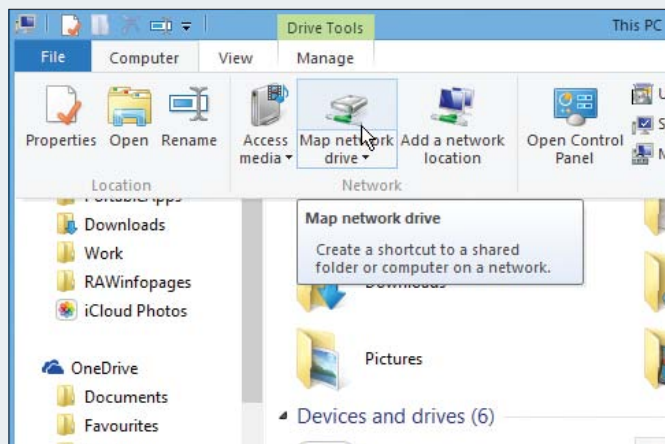
Back up to a NAS drive



Ensure that you never lose another file – use SyncBackFree to manually run backups or schedule them to run hourly, explains Roland Waddilove

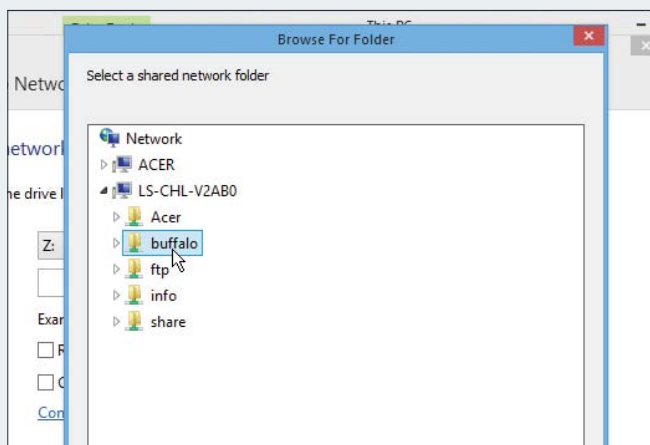
SyncBackFree (2brightsparks.com) is great for creating a mirror image of your most valuable files on a USB disk or a NAS drive. We use the latter in our guide, as it has the benefit of being able to back up from any computer over Wi-Fi.

The software can be used without installation from a USB Flash memory drive (tinyurl.com/nrtqp9n), so you could simply plug one in to back up a PC. Right-click SyncBack and choose 'Run as administrator' to give it permission to back up files not normally accessible, such as files in other users' accounts. There are several ways to restore and the Restore button in the toolbar is the obvious one.

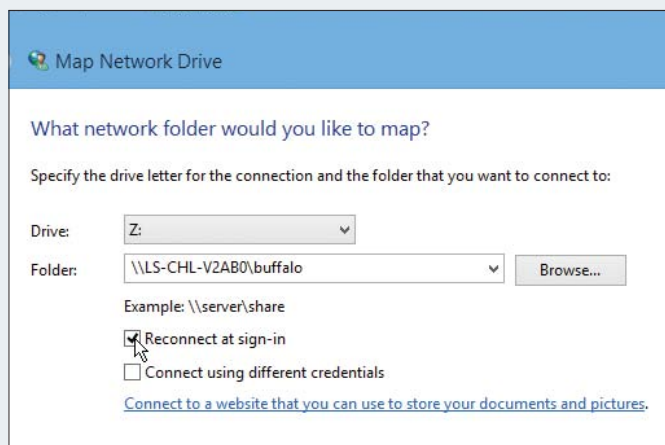


START

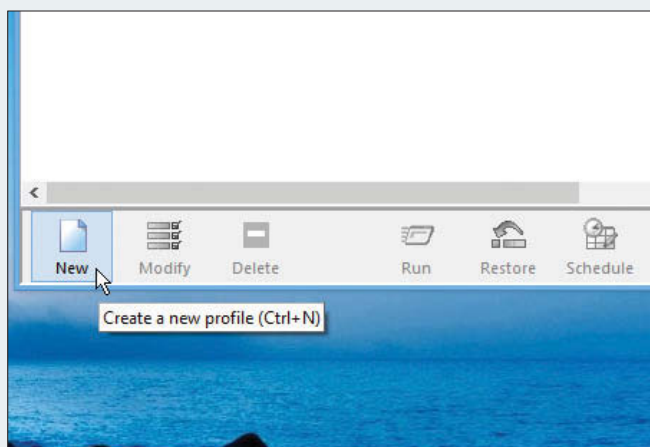
Anyone already using a USB drive for backups can skip straight to Step 4, but if you're using a NAS drive, open an Explorer window and select Computer or This PC on the left. Next, go to the Computer menu and select 'Map network drive'.



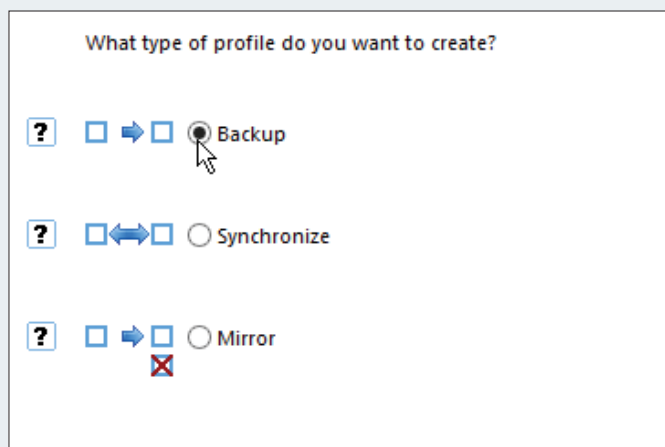
2 You're prompted for the network folder to map, and Z is suggested for the drive letter. Click the Browse button and network devices, such as a NAS drive, will be listed. Select the device and the folder you want to use for backups.



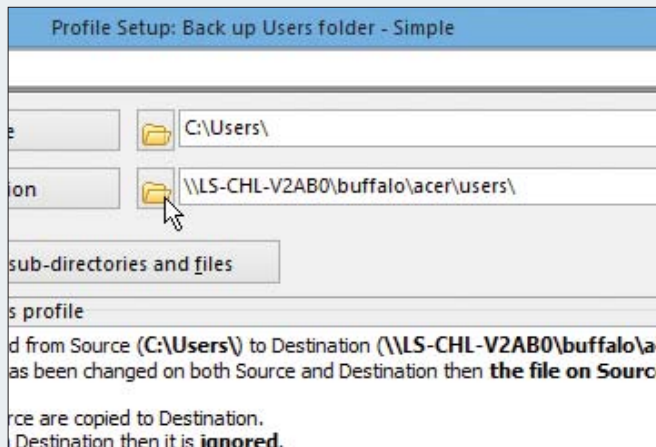
3 The NAS drive can be referred to by the drive letter Z or its network name – in this case LS-CHL-V2AB0. If the drive is always on, it can be useful to tick the option to 'Reconnect at sign-in'. The next time you turn your PC on, it won't need mapping.



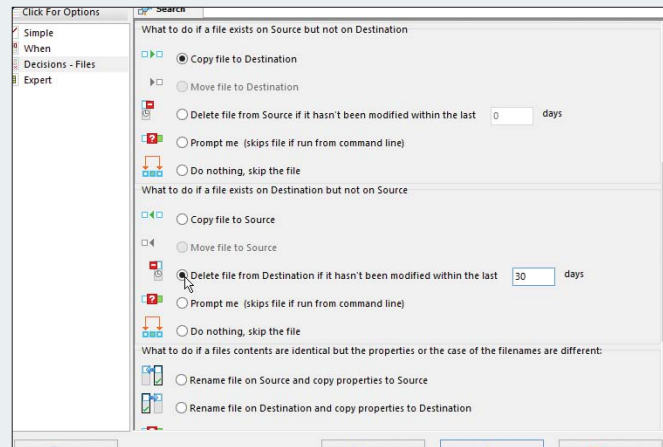
4 After downloading and installing SyncBackFree, run it. The window that appears is mostly empty, but you'll find a toolbar along the bottom. Click the New button to create a profile. This is another name for a backup and you can create as many as you like.



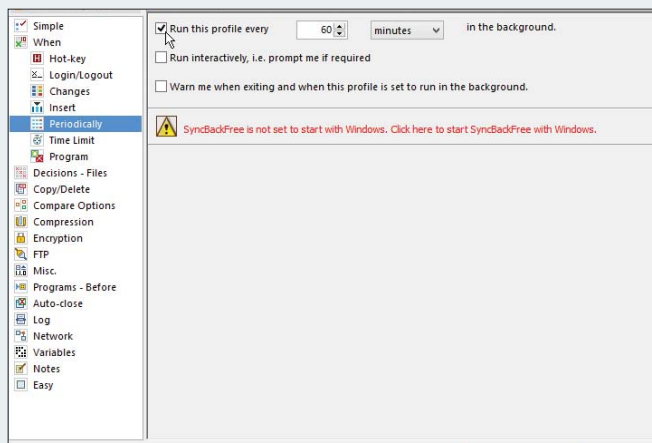
5 Next, you'll have to enter a profile name and select one of three types (Backup, Synchronize, Mirror). These set certain default options and aren't fixed. By configuring certain options you can turn one profile type into another. Choose Backup and click Done.



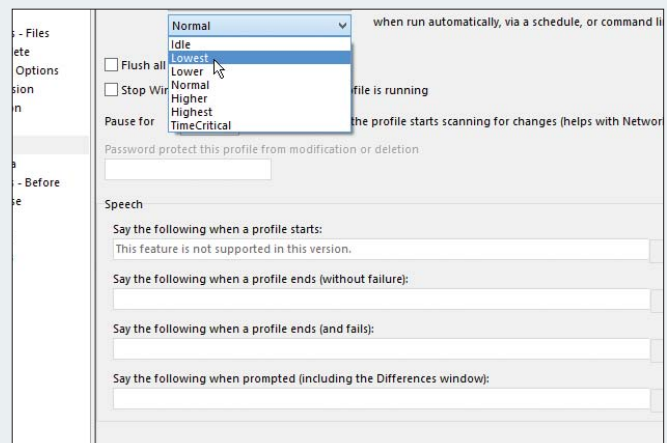
6 A new profile automatically opens after it's been created, but existing ones can be double-clicked. Click the two folder icons next to Source and Destination. Here the C:\Users folder is the source and a folder on the NAS drive is the destination.



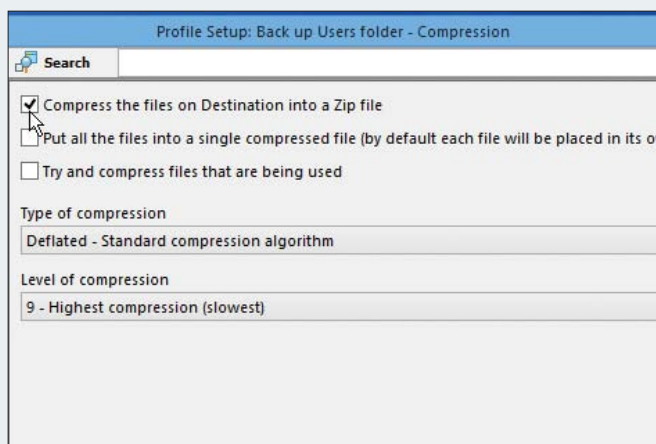
7 Select 'Decisions - Files' on the left and you can fine-tune the backup rules. For example, you can delete files that only appear in the destination (backup) after a certain number of days, or leave them forever. Here they're set to delete after 30 days.



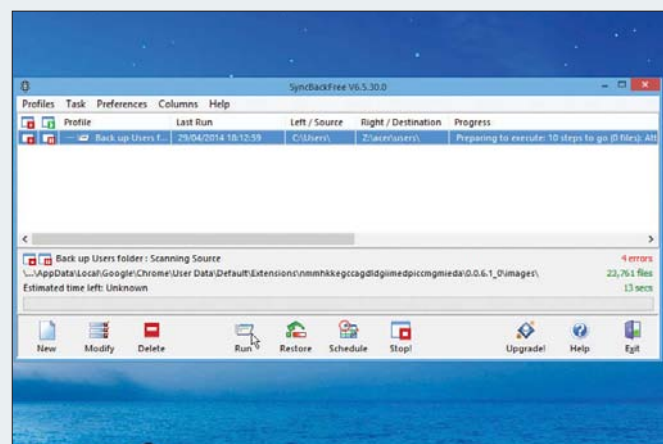
8 Click the Expert option on the left and a long list of configuration settings is displayed. Expand When and select Periodically. There's an option to run the profile (backup) automatically. Choose to run a manual or automatic backup.




9 Select Misc on the left and the program's priority can be set. Automatic backups are best with a low priority so they run in the background without soaking up too much processor power, but manual backups are best set at a normal priority or higher.



10 Select Compression and there's an option to compress the backup as a zip file. If you aren't pushed for disk space, it's better not to use compression because avoiding it altogether makes things simpler to access and restore files should you need to.



11 Finally, to get started on your backup, simply select the profile you created earlier and click Run. Errors, shown on the right, can be clicked to view. Don't worry - these usually mean some unimportant Windows system file is in use. 

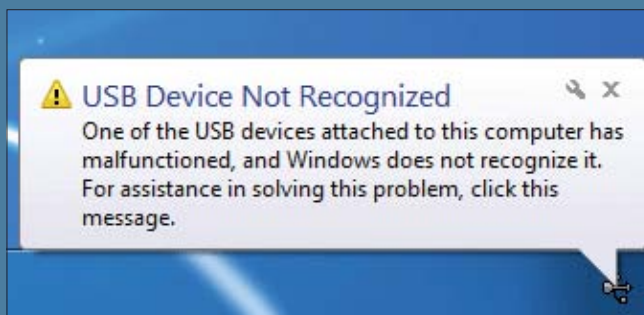


Repair an unrecognised USB thumb drive



It can be frightening when a PC refuses to recognise a USB drive that's full of your precious files. Jim Martin explains how to fix a drive or confirm it's broken

It's never a good thing to see a message telling you "USB Device Not Recognised", but before you give up all hope of ever seeing those files again, there are a few things you can try. Various problems can cause the error message, from faulty USB ports or software drivers to corrupt partitions or even a dead USB drive. We'll explain how to figure out what's gone wrong.



TRY A DIFFERENT USB PORT OR PC

The first thing you should do is plug the drive into a different USB port. Sometimes, this is the easiest solution, and is often overlooked. It's best to try a socket on the back of a PC, ensuring you use one that's directly connected to the motherboard and not on an add-on card towards the bottom. Sometimes, there can be a problem with USB ports connected to the motherboard's headers, which could be why you're seeing the error message when plugging the drive into a front-mounted USB port.

Similarly, exclude any USB hubs from the equation, as these can occasionally cause problems. Connect your drive directly.

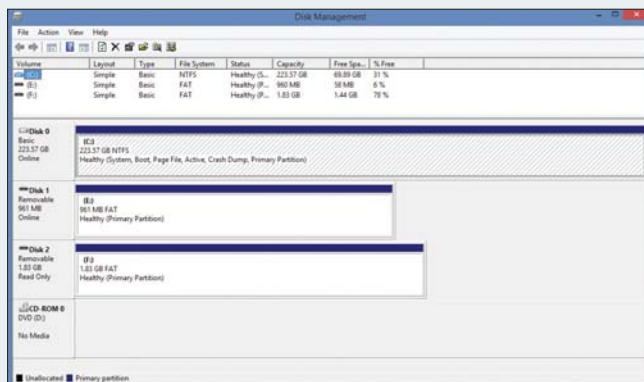
If none of these methods work, try a different PC or laptop. If the drive is recognised, there's a problem with the original computer, but if it doesn't show up, it's a problem with the drive.

DOES IT APPEAR IN DISK MANAGEMENT?

Disk Management is a little-known tool in Windows, and can be your friend whenever you have drive problems. Launch it by searching for Disk Management in the Start menu (or Windows 8 Start screen) and clicking on the 'Create and format hard disk partitions' result. Alternatively, hit the Windows key and R together, enter **diskmgmt.msc** into the box, then press Enter.

A list of drives will appear. You should be able to identify your USB device by its capacity, or the fact it's labelled as 'Removable'. Some USB hard drives may not, however, be shown as removable.

If you can see your drive here, but not in Windows Explorer, there are a couple of things to do. First, check the partition status. If it isn't showing as Healthy, along with a drive letter, this explains why you can't see the files. You can try using a free tool such as TestDisk (tinyurl.com/Lfs2o7n) to fix the partition table. If it

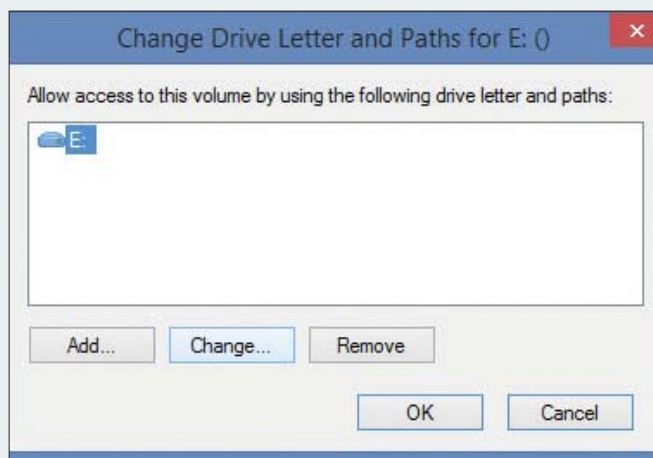


works, you should regain access to the drive and files. If not, then try PhotoRec (tinyurl.com/mcsk2), which looks at the data on the drive even if the partitions are corrupt.

If this doesn't work, or you're not bothered about recovering the data on the drive, you may be able to right-click on the drive in Disk Management and format it so Windows can access it again. A wizard will guide you through the process. If you can see that the drive has unallocated space, it means the partitions have been deleted. File recovery software might be able to help claw back deleted files.

DOES IT HAVE A DRIVE LETTER?

If the drive has at least a primary partitions and appears healthy, it might simply be missing a drive letter, which can happen occasionally. To assign a drive letter, so Windows Explorer can see the drive and its files, right-click on the partition, choose Change Drive Letter and Paths, then add a drive letter. Make sure you choose one that isn't used by any of your other drives.

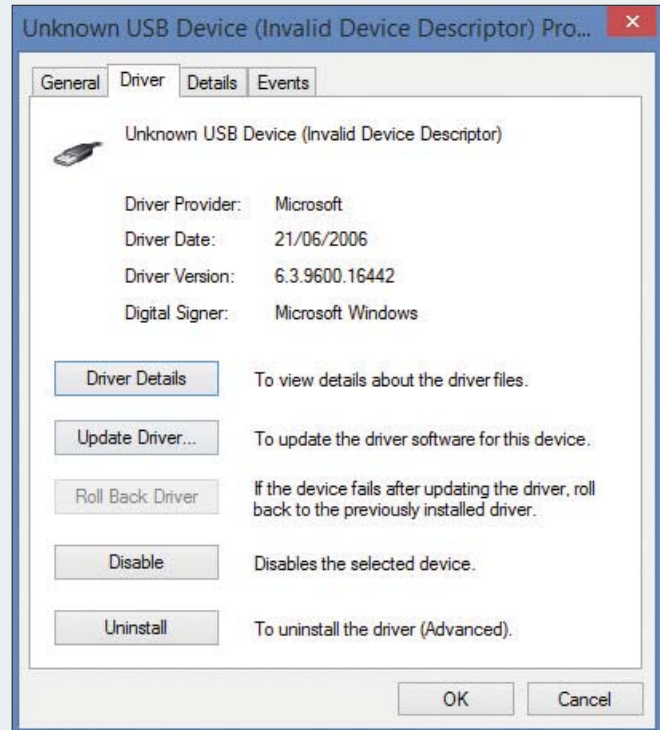


Don't forget, you can plug the drive into a second PC to see if it appears in Disk Management, in order to rule out faulty USB ports.

LOOK IN DEVICE MANAGER

If the drive works on the second PC, then there's a problem with the first computer. This may be a hardware or software issue. First, hit the Windows key and R together, enter **devmgmt.msc** into the box, then press Enter. Alternatively, type **dev man** in the Start menu search box and it should appear in the results.

Next, expand Disk drives and look for any devices with a yellow triangle and black exclamation mark over their icon. If you see one, you have a driver problem. Right-click on the device, choose



Properties and read the error message in the Device status box. If the solution isn't obvious, try searching the internet for any error codes to see what they mean.

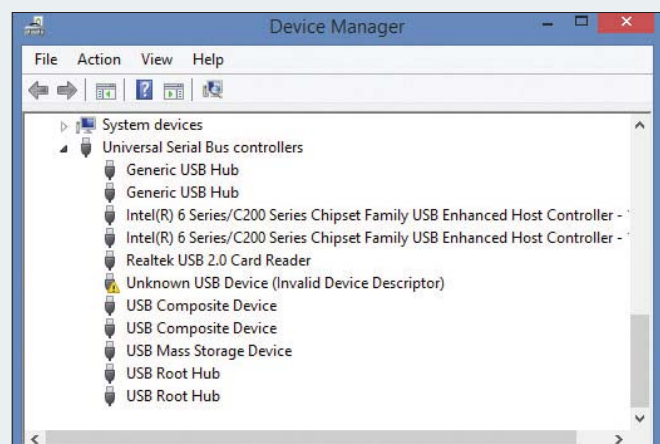
It could be a hardware problem, but if it's a driver issue (click the Driver tab), you may be able to roll back to a recent System Restore point or download the latest driver from the manufacturer's website.

You can also try the Update Driver... button to see if Windows can locate a better driver (or install one you downloaded), or use the Roll Back Driver button if it isn't greyed out. As a last resort, use the Uninstall button to uninstall the driver, then click OK and choose Scan for hardware changes in the Action menu.

Also, look under the Universal Serial Bus controllers section within Device Manager, as there could be a driver problem for one of your computer's USB controllers, which could cause an 'unrecognised drive' message.

It can be tricky tracking down the correct driver, but if you know your motherboard's make and model, or the make and model of your laptop, you might be able to locate, download and install the latest drivers.

Finally, if a USB drive isn't recognised by any computer and doesn't show up in Disk Management, there's a good chance it has failed and - unfortunately - will need to be replaced. ☒

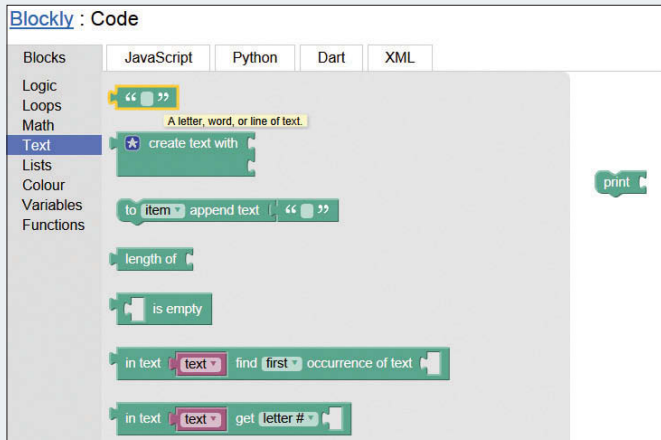


Write a PC program



Thought computer programming was difficult? Think again. Mike Bedford shows you how to write a computer program using Google's Blockly

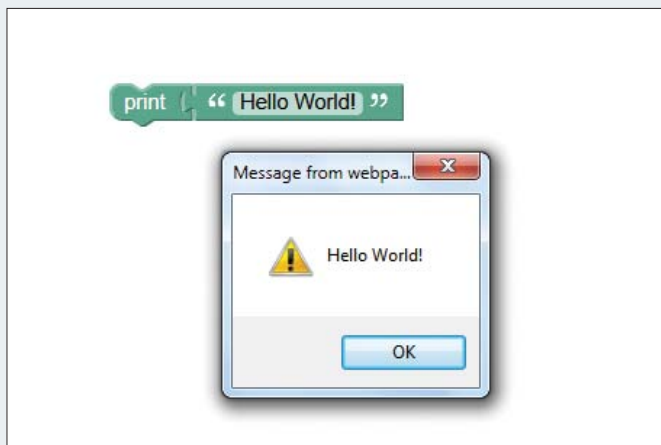
Back in the 1980s, home computer users wrote their own software using the BASIC programming language. As PCs came on the scene, providing a wealth of ready-written applications, programming died out as a hobby. According to some business leaders, this has had a detrimental effect on the skills available for the UK's computer industry. To help reverse this trend, the government has declared 2014 the Year of Code, with the aim of getting people writing software again (see our feature on page 88). We'll be using Google Blockly here, which teaches you many of the principles of programming, but without the need to enter the program as text.



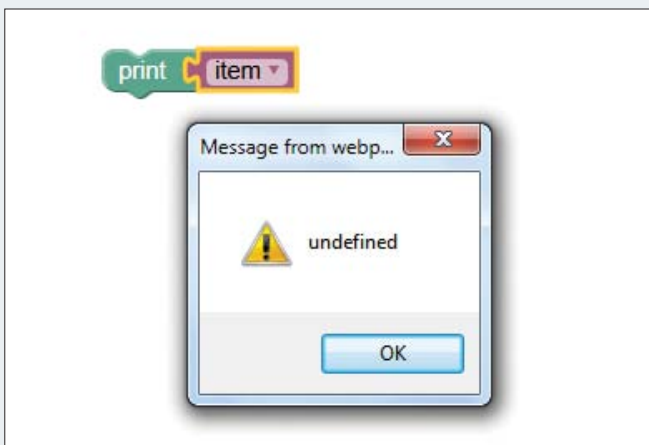
START Access the online Blockly demo at tinyurl.com/nj3gLgz to start creating your program. Click on Text in the bar at the left and then on the Print block - it'll appear onscreen. Next, click again on Text and this time click on the " " block at the top.



2 Drag the " " block to the right of the 'Print' block and they'll join together. Now click in the area between the quotation marks on the " " block and type 'Hello World!' (without the single quotes). Congratulations, you've created your first program.



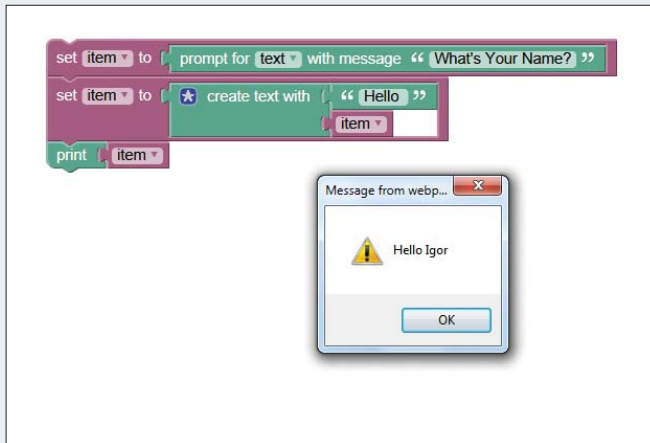
3 Click the play button (a white triangle on a red background icon at the top of the screen). Your program will announce 'Hello World!'. It's not particularly spectacular, but it's a start. We can do better, so click on the bin icon at the top to start again from scratch.



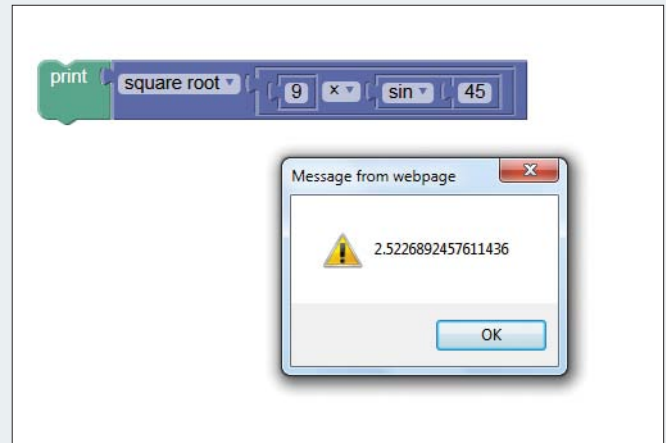
4 Create something like the first program, but with the 'Item' block (under Variables) instead of the 'Text' block. Run the program. It will say "undefined" because Item is a variable (which means it's an area of memory), but we haven't yet defined it.



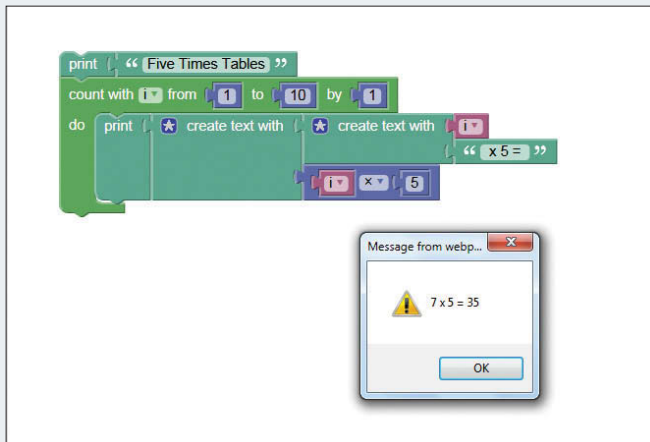
5 To define it, we'll use the 'Set Item To' block (under variables) and drag a " " block into the hole in that block. Type 'Hello World!' between the quotation marks and you'll find that this application works in exactly the same as the initial one.



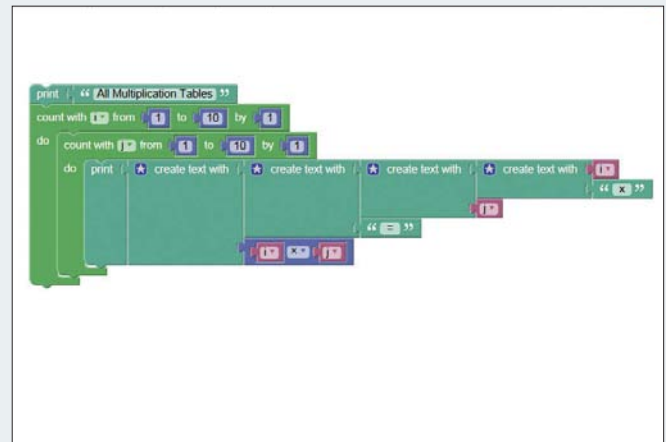
6 That might seem pointlessly complicated, but try changing it as shown in the screenshot and run it. The variable 'Item' ends up as a greeting to you by name. Note that we can have lots of variables each with different names by changing the word Item.



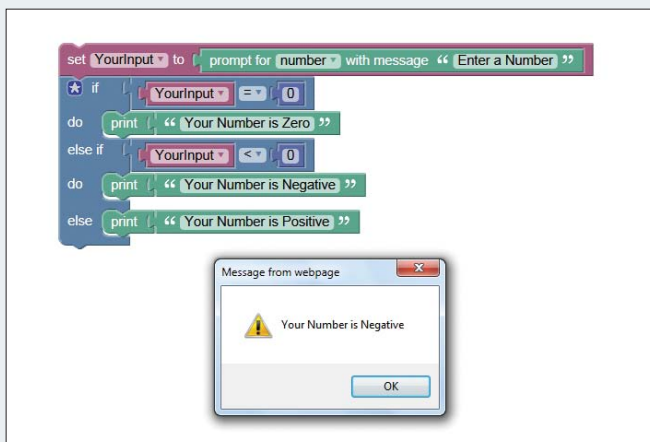
7 Now let's try some arithmetic. You'll find the relevant blocks under Math. Create the program shown and you'll find that it calculates the correct answer. Try modifying it to do more complex sums. Now to generate several results from the one program.



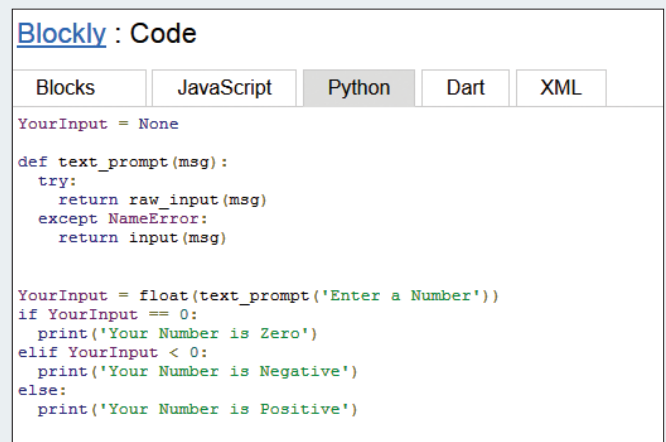
8 Generate the program shown here which contains a common programming concept called a loop. Everything inside the loop is carried out for all value of the variable i from 1 to 10. Run it to print out the five times table.




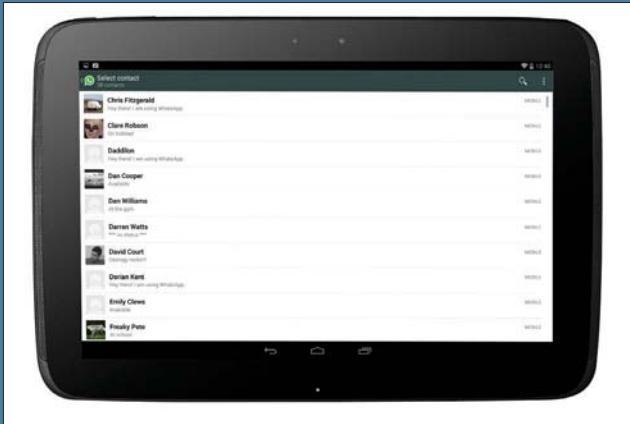
9 You can even have loops inside other loops. Modify the program as shown, which now uses two variables, i and j. You'll find that it now print out the values of all multiplications from 1 x 1 to 10 x 10.



10 Another feature of programming is deciding which instructions to execute depending on the outcome of a comparison. Create the program and try it out supplying positive and negative numbers and zero when prompted. Click on '*' to add the Else if and Else parts.



11 We've now seen some very simple examples of Blockly programs, but if you want to see what you'd have to have typed to do the same sort of thing with a conventional programming language, click on the tabs at the top. 



Get WhatsApp on a tablet



According to WhatsApp, you can't install and use its instant-messaging service on a Wi-Fi-only tablet. Well, as we reveal here, you can. Marie Brewis shows how to use it on an Android tablet with no 3G or 4G connectivity, while David Price explains the steps you'll need to follow to use WhatsApp on an iPad

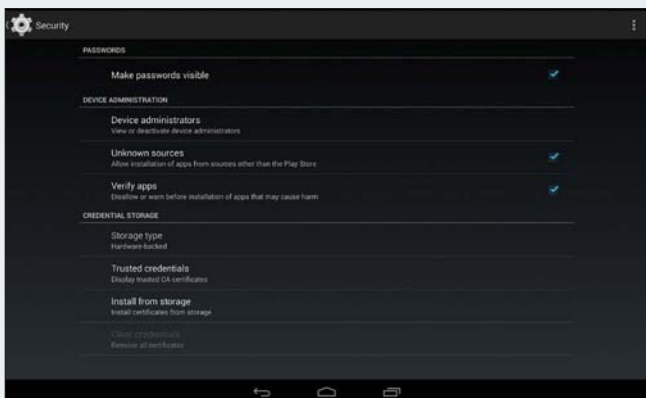


ANDROID TABLET

If you're browsing Google Play on a Wi-Fi-only tablet WhatsApp won't be presented in the search results. To get around this you simply need to download and install the WhatsApp APK file - just Google 'WhatsApp APK' and you'll find loads of download sites.

TWEAK YOUR SECURITY SETTINGS

Before your Android tablet will allow you to install the WhatsApp APK file you've just downloaded, you'll need to enter your tablet's Settings menu, scroll down and select Security, then enable Unknown sources under Device Administration. You can go back and disable this option once you've installed WhatsApp.

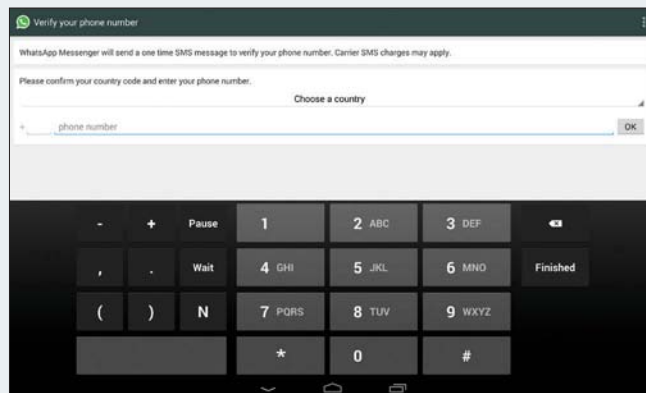


You should now be able to simply click on the WhatsApp APK file-download notification in your tablet's notification bar, then click Install. Once the app is installed press Open.

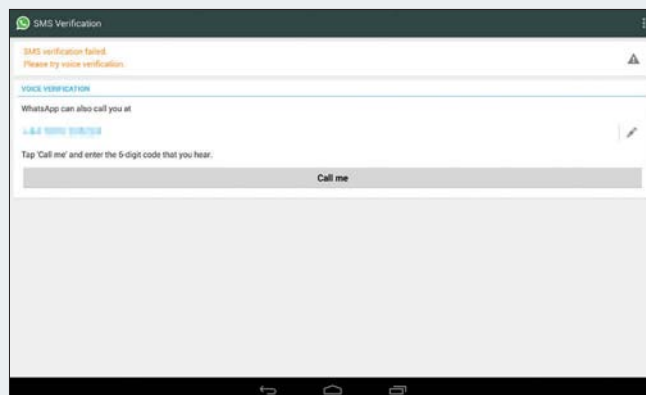
BYPASS WHATSAPP'S PHONE VERIFICATION

The next challenge is to bypass WhatsApp's phone verification system. Enter your usual mobile phone number, then tap OK.

You'll receive a text message on your handset, but, of course, it won't be detected on your tablet.



After five minutes WhatsApp will report that SMS verification has failed and you should try voice verification. Tap Call me, then answer the phone call on your smartphone to get the verification code you need.



You can now enter this code on your tablet and get started using WhatsApp. Note that WhatsApp will ask whether you want to restore your message history from its backup, though, this didn't work for us - presumably because none of that data is stored on the tablet.

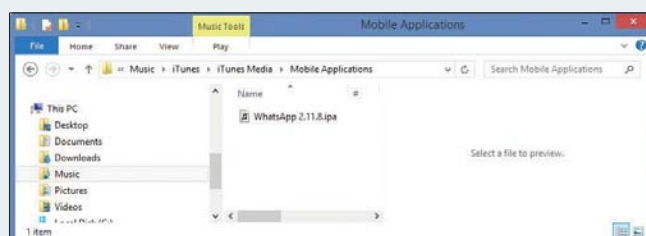
iPAD

First off, you'll need the installation file of the app on a computer (Mac or PC). Go to iTunes, then to the iTunes Store, and type WhatsApp into the search field. You'll see WhatsApp Messenger in the iPhone apps list, but not under iPad. Don't worry. Click to download the iPhone version, and enter your password.

GET THE .IPA FILE

We're going to go off the beaten path a bit now, because we need the installation file itself, which uses the .ipa file format.

Open Explorer (or Finder on a Mac), and go to your music folder - where this is located will depend on which OS you're using. On a Mac, click Go in the top menu bar, then Home. In Windows,



look under My Computer or This PC, then the Music or My Music folder. Then click iTunes, and either iTunes Media followed by Mobile Applications or just Mobile Applications (depending on your OS). You'll see all the .ipa files that you've downloaded. Scroll down to the WhatsApp file and drag it on to your desktop.

DOWNLOAD AND START UP IFUNBOX

Connect your iPad to your computer. You'll need a program other than iTunes to manage the files on our iPad. We're using iFunbox, which is available for free from i-funbox.com. Download the latest version of iFunbox for your platform of choice, and start it up.

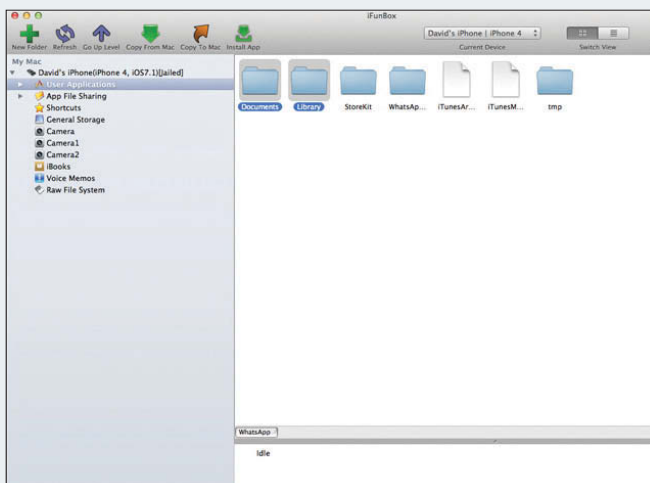
Click Install App, navigate to your desktop and click on the



WhatsApp .ipa file. It will quickly install, and hey presto, you've got the WhatsApp icon on your iPad's screen. But we're not there quite yet – if you click on the icon, you'll see that it doesn't work. We'll fix that in the next few steps.

INSTALL WHATSAPP ON YOUR IPHONE

For this bit, you need an iPhone. Install WhatsApp on this in the normal way – it needs to be a fresh install, so you may need to delete it and reinstall if you had WhatsApp already. Start it up, and then register a phone number – the one you wish to use with WhatsApp on your iPad. You'll have to confirm this using a code sent to the number you give.

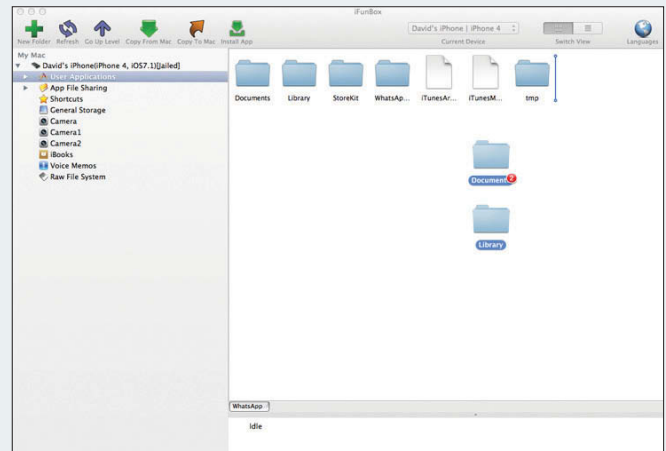


Now unplug the iPad, plug the iPhone into your computer and go back to iFunbox. Click in User Applications under the entry for the iPhone, double-click on the icon for WhatsApp, and then copy the Library and Documents folders in there on to your desktop. This will contain the registration data.

LOAD THE REGISTRATION DATA ON TO THE IPAD

We're nearly there. Unplug the iPhone, plug the iPad back in, and in iFunbox, click on User Applications under the iPad's entry and then WhatsApp – as before.

We will now replace the Library and Documents folders in here with the ones on the desktop, thereby copying the iPhone's registration data on to the iPad.



FINISHED

That's pretty much it. A few people have found glitches at this point, but you should be okay if you've followed the steps carefully. You may need to close WhatsApp on your iPad and start it up again to stop it saying that the device isn't supported.



WHATSAPP ON A PHONE AND A TABLET AT THE SAME TIME

The only real downside to installing WhatsApp on a Wi-Fi-only tablet is that as soon as you verify your account on the device, the service will stop working on your smartphone. That's because a phone number can only ever be associated with one WhatsApp account. This might not bother you – after all, you don't need to view your messages on both your phone and your tablet.

However, you can get around this and use WhatsApp on a phone and a tablet at the same time by using a different mobile number. If you have a second mobile number, for example one you use for business, then you're laughing. You could also take advantage of the free PAYG SIMs routinely offered by UK mobile operators, although these will expire after a few months if you don't use them, and as soon as someone else registers that same number with WhatsApp you'll have to start over. It doesn't matter which number you use for verification, as long as it's a mobile number and you have it to hand in order to answer the call and get the code. ☒

LETITIA
AUSTIN



ONLINE
REGISTRATION
REQUIRED

Abelssoft AntiBrowserSpy 2014

FULL PROGRAM AVAILABLE ONLY ON THE DISC+

Installation details

Go to My Computer. Right-click the disc icon and open the disc. Select Files 229\ Abelssoft AntiBrowserSpy 2014 and open the install file


Online registration required: follow the links during installation before 16 July 2014

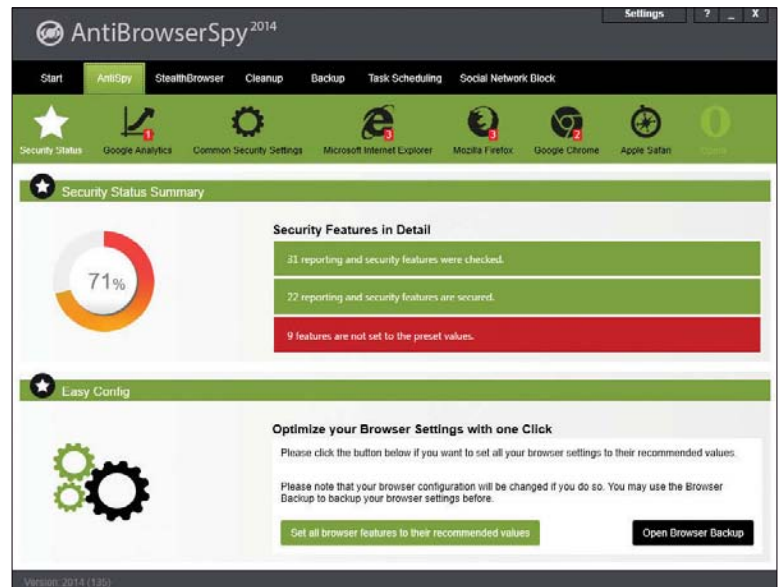
System requirements
Windows XP/Vista/7/8;
internet connection

Web browsers are increasingly being used to collect private data. Sometimes, this consists of a unique ID that identifies a user, while at others it's the URL of a website you visit. AntiBrowserSpy is designed to stop this.

With one mouse-click, you can configure the settings of all your browsers and disable even hidden espionage features. It allows you to remove internet traces such as history entries and web cache, and download lists and typed URLs can be cleaned, too.

AntiBrowserSpy can also create backups of your browser settings, so you can keep your bookmarks and other data in a safe place. It can even automate all its main functions, so, for example, it can clear all cookies on Windows startup. The program offers you a user-friendly interface and plenty of detailed information for every function.

AntiBrowserSpy supports all common browsers: Mozilla Firefox, Microsoft Internet Explorer (Version 8 and higher), Google Chrome, Apple Safari and Opera (Version 15 and higher). (Portable versions of the given browsers aren't supported.) 



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1-abc.net Duplicate Finder 6

FULL PROGRAM

ONLINE
REGISTRATION
REQUIRED

Installation details

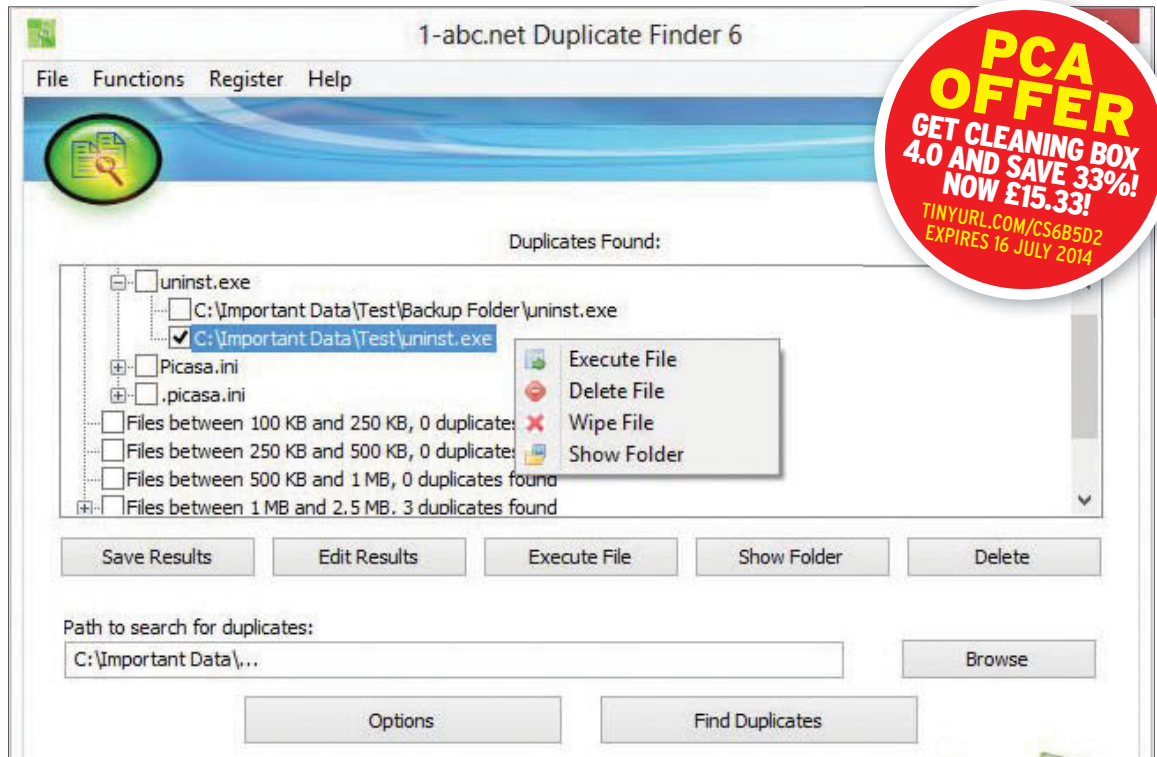
Go to My Computer. Right-click the DVD icon, and open the disc. Select Files 229\1-abc.net Duplicate Finder 6 and open the install file

Online registration

required: follow the links during installation before 16 July 2014

System requirements

Windows XP/Vista/7/8



With thousands of files stored in various folders and subfolders on your PC's hard drive, it can be difficult keeping track of space-hogging duplicates. Duplicate Finder is an easy-to-use application that can spot duplicate files on a computer, an external hard drive, a CD, DVD, USB stick or memory card.

Not all duplicate files will have the same filename, so Duplicate Finder is also able to look at various attributes such as the file size and last modification time - you decide what it should look for. It's also possible to compare unique CRC32 checksums of each file.

Point Duplicate Finder to a drive, and it'll immediately start comparing files in all your folders and subfolders - no stone will be left unturned. A list of duplicate files in size order is returned, from which you can delete items or view the folder in which they are stored.

With 1-abc.net Duplicate Finder, you'll never have to worry about duplicate files wasting storage space on your computer again! ☒

Ashampoo Music Studio 4

FULL PROGRAM AVAILABLE ONLY ON THE DISC+

ONLINE
REGISTRATION
REQUIRED

Installation details

Go to My Computer.
Right-click the DVD
icon, and open the disc.
Select Files 229\
Ashampoo Ashampoo
Music Studio 4 and
open the install file


**Online registration
required:** follow the
links during installation
before 16 July 2014

System requirements

Windows XP/Vista/7/8;
2.4GHz processor;
1024MB RAM; 128MB
memory; .Net
Framework 4.0



Ashampoo Music Studio 4 is an all-in-one solution to create, edit, design and produce your music.

- The software has been completely redesigned, so you can focus on the task at hand.
- Music Studio 4 is snappier than ever. On average, it takes less than three seconds to launch the product and start working, and audio conversion now features multi-core support for lightning-fast results.
- Always wanted to get that beautiful music from your favourite videos on your PC? Video-2-Music makes audio extraction a simple select-and-click process.
- Add variety to your music collection and combine your favourite songs seamlessly with crossfading support. 

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Place disc in drive. Open the file 'Click here to begin.pdf' for extra information.

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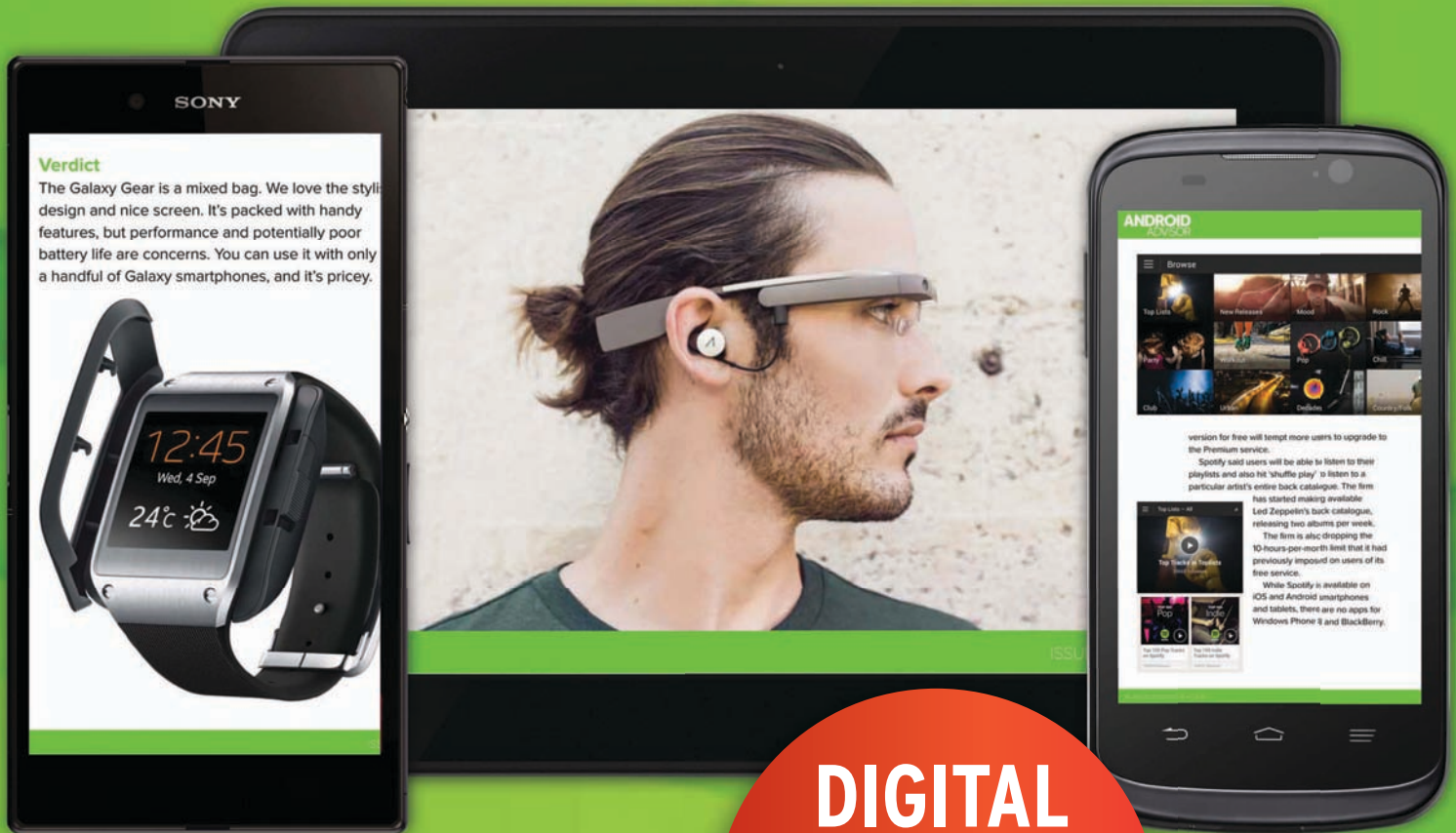
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£1,001+ laptops



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Wireless routers



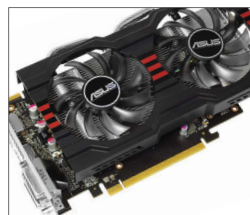
Printers



Projectors



Solid-state drives



Graphics cards



Flat-panel displays

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Prices

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£501 to £1,000
£1,001 and over

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Printers under £150
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	1	2	3	4	5
	Apple MacBook Pro 13in Retina	Apple MacBook Air 13in	Acer Aspire S3-392G	Dell Latitude 14 7440	HP EliteBook 840 G1
Price	£1,499 inc VAT	£849 inc VAT	£900 inc VAT	£1,522 inc VAT	£1,344 inc VAT
Website	Apple.com/uk	Apple.com/uk	Acer.co.uk	Dell.co.uk	Hp.com/uk
Launch date	Feb 14	Apr 14	Jun 14	Jun 14	Apr 14
Build rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Features rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Performance rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Value rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Processor	2.6GHz Intel Core i5	1.4GHz Intel Core i5	1.6GHz Intel i5-4200U	2.1GHz Intel Core i7-4600U	2.1GHz Intel Core i7-4600U
RAM	8GB DDR3L	4GB DDR3L	4GB DDR3	8GB DDR3	8GB DDR3
Storage	512GB SSD	128GB SSD	500GB Hybrid	256GB SSD	500GB HDD
Screen size	13.3in glossy (anti-glare)	13.3in glossy (anti-glare)	13.3in gloss touchscreen	14in matt	14in matt
Screen resolution	2560x1600	1440x900	1920x1080	1920x1080	1920x1080
Graphics	Intel Iris Graphics	Intel HD Graphics 5000	nVidia GeForce 735M GT	Intel HD Graphics 4400	AMD Radeon HD 8750M
Video memory	N/A	N/A	1GB	N/A	1GB
Wireless	802.11a/b/g/n/ac	802.11a/b/g/n/ac	802.11a/b/g/n	802.11a/b/g/n/ac	802.11b/g/n
Ethernet	Optional	Optional	10/100	Gigabit	Gigabit
Bluetooth	✓	✓	✓	✓	✓
USB	2x USB 3.0	2x USB 3.0	2x USB 3.0, 1x USB 2.0	3x USB 3.0	4x USB 3.0
FireWire	x	x	x	x	x
Thunderbolt	✓	✓	x	x	x
DisplayPort	x	✓	x	✓ (mini)	✓
HDMI	✓	x	✓	✓	x
DVI	x	x	x	x	x
VGA	x	x	x	x	✓
eSATA	x	x	x	x	x
Media card slot	✓	✓	✓	✓	✓
Audio	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic
Optical drive	N/A	N/A	N/A	N/A	N/A
Extras	HD webcam, multitouch trackpad, backlit keyboard	HD webcam, multitouch trackpad, backlit keyboard	None	None	720p webcam
Operating system	Mac OS X 10.9 Mavericks	Mac OS X 10.9 Mavericks	Windows 8.1 64-bit	Windows 7 64-bit	Windows 7 Pro 64-bit
Bundled software	iLife 11	iLife 11	Acer bundle	None	None
Fear (Max detail)	Not tested	Not tested	62/34.5fps	22fps	38fps (1080p)
Battery	71.8Wh lithium-polymer	54Wh lithium-polymer	36.4Wh lithium-polymer	47Wh lithium-ion	50Wh lithium-ion
Battery life	9 hrs 55 mins	12 hrs 57 mins	5 hrs	5 hrs 15 mins	6 hrs 25 mins
PC Mark 7 score	Not tested	4602	4282	4706	3100
Dimensions	314x219x18mm	325x227x4-17.5mm	324x255x18mm	337x232x21mm	339x237x21mm
Weight	1.57kg	1.35kg	1.65kg	1.63kg	1.58kg
Warranty	1-year return-to-base	1-year return-to-base	1-year return-to-base	3-year next-business-day	3-year return-to-base
FULL REVIEW	TINYURL.COM/M3TNC29	TINYURL.COM/KNXWZ3	TINYURL.COM/QFGQOOP	TINYURL.COM/QAH43KC	TINYURL.COM/L8HP79T

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	Toshiba Satellite M50-A-11Q	Compaq CQ58-300sa	Asus X102BA	Toshiba CB30-102	Lenovo Flex 15D
Price	£449 inc VAT	£230 inc VAT	£270 inc VAT	£250 inc VAT	£500 inc VAT
Website	Toshiba.co.uk	Saveonlaptops.co.uk	Asus.com/uk	Toshiba.co.uk	Lenovo.com/uk
Launch date	Feb 14	Nov 13	May 14	Jun 14	Jul 14
Build rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Features rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Performance rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Value rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Processor	1.7GHz Intel Core i3-4005U	1.4GHz AMD E1-1200	1GHz AMD A4-1200	1.4GHz Intel Celeron 2955U	AMD A6-5200
RAM	8GB DDR3	2GB DDR3	4GB DDR3L	2GB DDR3	8GB DDR3
Storage	1TB HDD	320GB HDD	500GB HDD	16GB SSD	1TB HDD
Screen size	15.6in glossy	15.6in glossy	10.1in glossy touchscreen	13.3in glossy	15.6in glossy
Screen resolution	1366x768	1366x768	1366x768	1366x768	1366x768
Graphics	N/A	AMD Radeon HD 7310	AMD Radeon HD 8180	Intel HD Graphics	AMD Radeon HD 8400
Video memory	N/A	N/A	N/A	N/A	N/A
Wireless	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11a/g/n	802.11b/g/n
Ethernet	Gigabit	10/100	10/100	Gigabit	Ethernet
Bluetooth	✓	✓	✓	✓	✓
USB	2x USB 3.0, 1x USB 2.0	3x USB 3.0	1x USB 3.0, 2x USB 2.0	2x USB 3.0	1x USB 3.0, 2x USB 2.0
FireWire	x	x	x	x	x
Thunderbolt	x	x	x	x	x
DisplayPort	x	x	x	x	x
HDMI	✓	✓	✓	✓	✓
DVI	x	x	x	x	x
VGA	✓	✓	✓	x	x
eSATA	x	x	x	x	x
Media card slot	✓	✓	✓	✓	✓
Audio	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic
Optical drive	None	8x DVD ±RW	None	None	None
Extras	Webcam	Webcam	Webcam	Webcam	webcam
Operating system	Windows 8 64-bit	Windows 8 64-bit	Windows 8 64-bit	Google Chrome OS	Windows 8.1 64-bit
Bundled software	None	None	MS Office Home & Student	None	None
Battery	4400mAh lithium-ion	47Wh lithium-ion	33Wh lithium-ion	Lithium-polymer	32Wh lithium-ion
Battery life	7 hrs	4 hrs 45 mins	4 hrs 20 mins	7 hrs 25 mins	4 hrs
PC Mark 7 score	2511	1094	1100	N/A	1750
Stalker (Low/High)	30fps (720p)	9fps (720p)	N/A	N/A	20.5fps (720p)
Dimensions	378x250x21mm	376x247x33mm	266x185x29mm	454x268x56mm	381x273x22.2mm
Weight	2.2kg	2.3kg	1.1kg	1.5kg	2.3kg
Warranty	1-year return-to-base	1-year return-to-base	1-year return-to-base	1-year return-to-base	1-year return-to-base
FULL REVIEW	TINYURL.COM/OTK6UZD	TINYURL.COM/MT67W8X	TINYURL.COM/PLAUQCG	TINYURL.COM/LQEBYPA	TINYURL.COM/L5C6NO7

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	Chillblast Defiant Mini 13	Dell Inspiron 15R	HP Pavilion TouchSmart 15	Dell Latitude 3440	Asus V550CA
Price	£899 inc VAT	£549 inc VAT	£650 inc VAT	£576 inc VAT	£570 inc VAT
Website	Chillblast.com	Dell.co.uk	Hp.com/uk	Dell.co.uk	Asus.com/uk
Launch date	Feb 14	Jun 14	May 14	Mar 14	Mar 14
Build rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Features rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Performance rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Value rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Processor	3.4GHz Intel Core i7-4700MQ	1.6GHz Intel i5-4200U	1.6GHz Intel Core i5-4200U	1.6GHz Intel Core i5-4200U	1.8GHz Intel Core i5-3337U
RAM	8GB DDR3	8GB DDR3	8GB DDR3	4GB DDR3	6GB DDR3
Storage	1TB HDD	1TB HDD	750GB HDD	500GB HDD	1TB HDD
Screen size	13.3in matt	15.6in glossy touchscreen	15.6in glossy touchscreen	14in matt	15.6in glossy touchscreen
Screen resolution	1920x1080	1366x768	1366x768	1366x768	1366x768
Graphics	GTX 765M/Intel HD 4600	Intel HD	GT 740M/Intel HD 4400	Intel HD 4400	Intel HD 4000
Video memory	2GB	N/A	N/A	N/A	N/A
Wireless	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n
Ethernet	Gigabit	Gigabit	10/100	Gigabit	Gigabit
Bluetooth	✓	✗	✓	✓	✓
USB	3x USB 3.0, 1x USB 2.0	2x USB 3.0, 2x USB 2.0	2x USB 3.0, 1x USB 2.0	2x USB 3.0, 1x USB 2.0	1x USB 3.0, 2x USB 2.0
FireWire	✗	✗	✗	✗	✗
Thunderbolt	✗	✗	✗	✗	✗
DisplayPort	✗	✗	✗	✗	✗
HDMI	✓	✓	✓	✗	✓
DVI	✗	✗	✗	✗	✗
VGA	✓	✗	✓	✓	✓
eSATA	✗	✗	✗	✗	✗
Media card slot	✓	✓	✓	✓	✓
Audio	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic
Optical drive	None	8x DVD ±RW	8x DVD ±RW	8x DVD ±RW	8x DVD ±RW
Extras	Webcam	Webcam	Webcam	Webcam	Webcam
Operating system	Windows 8 64-bit	Windows 8.1 64-bit	Windows 8 64-bit	Windows 8 64-bit	Windows 8 64-bit
Bundled software	None	McAfee Live Safe (1 year)	None	None	Asus utilities
Stalker (720p/1080p)	150/90fps	32fps (720p)	60fps (720)	24fps	22fps
Battery	62Wh lithium-ion	65Wh lithium-ion	41Wh lithium-ion	40Wh lithium-ion	44Wh lithium-ion
Battery life	4 hrs	8 hrs 15 mins	5 hrs 45 mins	5 hrs 50 mins	3 hrs 25 mins
PCMark 7 score	4720	2934	2860	2699	2463
Dimensions	330x227x35mm	376x259x33mm	386x258x25mm	346x245x25mm	380x266x22mm
Weight	2.1kg	2.6kg	2.6kg	2kg	2.6kg
Warranty	1-year return-to-base	1-year next-day in-home	1-year return-to-base	1-year business	1-year return-to-base
FULL REVIEW	TINYURL.COM/PBZPA65	TINYURL.COM/PK2RGBN	TINYURL.COM/L2JAXH7	TINYURL.COM/KQGO23P	TINYURL.COM/NQALWLF

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£1,001+ laptops	1	2	3	4	5
	Apple 15in MacBook Pro Retina	Alienware 18	Toshiba Qosmio X70-A	Dell Precision M3800	Chillblast Messiah 17 GTX780M
Price	£1,699 inc VAT	£3,109 inc VAT	£1,500 inc VAT	£1,926 inc VAT	£1,799 inc VAT
Website	Apple.com/uk	Alienware.co.uk	Toshiba.co.uk	Dell.co.uk	Chillblast.com
Launch date	Mar 14	Jul 14	Mar 14	May 14	Dec 13
Build rating	★★★★★	★★★★★	★★★★☆	★★★★☆	★★★★☆
Features rating	★★★★★	★★★★☆	★★★★★	★★★★☆	★★★★★
Performance rating	★★★★★	★★★★★	★★★★★	★★★★☆	★★★★★
Value rating	★★★★☆	★★★★☆	★★★★☆	★★★☆☆	★★★★☆
Overall rating	★★★★★	★★★★★	★★★★★	★★★★☆	★★★★★
Processor	2GHz Intel Core i7-4750HQ	2.7GHz Intel Core i7-4810MQ	2.4GHz Intel Core i7-4700MQ	2.2GHz Intel Core i7-4702HQ	2.7GHz Intel Core i7-4800MQ
RAM	8GB DDR3	16GB DDR3	16GB DDR3	16GB DDR3	16GB DDR3
Storage	256GB SSD	1TB/256GB SSD	1TB/256GB SSD hybrid	500GB + 256GB SSD	1TB + 250GB SSD
Screen size	15.4in glossy (anti-glare)	18.4in glossy	17.3in glossy	15.6in glossy touchscreen	17.3in matt
Screen resolution	2880x1800	1920x1080	1920x1080	3200x1880	1920x1080
Graphics	Intel Iris Pro	nVidia GeForce GTX 880M	nVidia GeForce GTX 770M	nVidia Quadro K1100M	nVidia GeForce GTX 780M
Video memory	128MB	8GB	3GB	2GB	4GB
Wireless	802.11a/b/n/ac, MIMO	802.11ac	802.11b/g/n, WiDi	802.11ac, MIMO	802.11b/g/n, WiDi
Ethernet	Gigabit	gigabit	Gigabit	None	Gigabit
Bluetooth	✓	✓	✓	✓	✓
USB	2x USB 3.0	4x USB 3.0	2x USB 3.0, 2x USB 2.0	3x USB 3.0, 1x USB 2.0	3x USB 3.0, 1x USB 2.0
FireWire	✓	✗	✗	✗	✗
Thunderbolt	✓	✗	✗	✗	✗
DisplayPort	✓	✓	✗	✓	✓
HDMI	✓	✓	✓	✓	✓
DVI	✗	✗	✗	✗	✗
VGA	✗	✗	✓	✗	✗
eSATA	✗	✗	✗	✗	✓
Media card slot	✓	✓	✓	✓	✓
Audio	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic
Optical drive	None	None	None	None	BD-RE
Extras	Webcam	None	2Mp webcam	Webcam	2.1Mp webcam
Operating system	OS X Mavericks	Windows 8 64-bit	Windows 8 64-bit	Windows 8 64-bit	Windows 8 64-bit
Bundled software	Apple iLife	None	None	None	None
Stalker (720p/1080p)	62/57fps (Batman)	202fps (1080p)	50/43fps (Batman)	Not tested	64fps
Battery	958Wh lithium-polymer	86Wh lithium-ion	47Wh lithium-ion	61- or 91Wh lithium-ion	77Wh lithium-ion
Battery life	8 hrs 14 mins	4 hrs	3 hrs 5 mins	2 hrs 58 mins	4 hrs 15 mins
PCMark7 score	N/A	6100	6164	Not tested	6316
Dimensions	359x247x18mm	457x328x58mm	418x273x44mm	372x254x18mm	412x276x55mm
Weight	2.02kg	5.5kg	3.4kg	1.9kg	3.9kg
Warranty	1-year return-to-base	1-year Next Day In-Home	1-year European	1-year next business day	2-year collect-and-return
FULL REVIEW	TINYURL.COM/K3QSD9Y	TINYURL.COM/Q69QYP5	TINYURL.COM/P5BD3GB	TINYURL.COM/NTHYU44	TINYURL.COM/PCJP94Q






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Tablets	1	2	3	4	5
	Google Nexus 7 (2013)	Apple iPad Air	Sony Xperia Z2 Tablet	Apple iPad mini (1st gen)	Google Nexus 10 by Samsung
Price	£199 inc VAT	£399 inc VAT	£399 inc VAT	£249 inc VAT	£319 inc VAT
Website	Play.google.com	Apple.com/uk	Sony.co.uk	Apple.com/uk	Play.google.com
Launch date	Jul 13	Oct 13	Apr 14	Nov 12	Nov 12
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Platform	Android 4.3 Jelly Bean	Apple iOS 7	Android 4.4.2 KitKat	Apple iOS 7	Android 4.4 KitKat
Screen size/resolution	7in/1280x800	9.7in/2048x1536	10.1in/1920x1200	7.9in/1024x768	10.1in/2560x1600
Storage/media card slot	16GB/none	16GB/none	16GB/none	16GB/none	16GB/none
Connectivity	802.11b/g/n, Bluetooth 4	802.11a/b/g/n, Bluetooth 4	802.11b/g/n/ac, Bluetooth 4	802.11b/g/n, Bluetooth 4	802.11b/g/n, Bluetooth 4, NFC
Processor	1.5GHz Snapdragon S4 Pro	Apple A7	2.3GHz Snapdragon 801	1GHz Apple A5	1.7GHz Cortex A-15
RAM	2GB	1GB	3GB	512MB	2GB
Claimed battery life	9 hrs	10 hrs	Not specified	10 hrs	9 hrs
Cameras (front/rear)	1.2/5Mp	1.2/5Mp	2.2/8.1Mp	1.2/5Mp	1.9/5Mp
Dimensions	114x200x8.7mm	169x240x7.5mm	266x172x6.4mm	135x200x7.2mm	178x264x8.9mm
Weight	299g	469g	439g	308g	603g
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/QYUDY5C	TINYURL.COM/LSB84EE	TINYURL.COM/M8BZZUN	TINYURL.COM/CLJWUVS	TINYURL.COM/ARL2KDG

Tablets	6	7	8	9	10
	Sony Xperia Tablet Z	Advent Vega Tegra Note 7	LG G Pad 8.3	Lenovo Yoga Tablet 10	Tesco Hudl
Price	£339 inc VAT	£129 inc VAT	£199 inc VAT	£249 inc VAT	£119 inc VAT
Website	Sony.co.uk	Currys.co.uk	Lg.com/uk	Lenovo.com/uk	Tesco.com
Launch date	May 13	Nov 13	Feb 14	Jan 14	Sep 13
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Platform	Android 4.1 Jelly Bean	Android 4.3 Jelly Bean	Android 4.2 Jelly Bean	Android 4.2 Jelly Bean	Android 4.2 Jelly Bean
Screen size/resolution	10.1in/1920x1200	7in/1280x800	8.3in/1920x1200	10.1in/1280x800	7in/1440x900
Storage/media card slot	16GB/microSDXC	16GB/microSDHC	16GB/microSDHC	16GB/microSDXC	16GB/microSDHC
Connectivity	802.11a/b/g/n, Bluetooth 4	802.11b/g/n, Bluetooth 4	802.11a/b/g/n, Bluetooth 4	802.11b/g/n, Bluetooth 4	802.11a/b/g/n, Bluetooth 4
Processor	1.5GHz SnapDragon S4 Pro	1.9GHz nVidia Tegra 4	1.5GHz Snapdragon 600	1.2GHz ARM Cortex-A7	1.5GHz quad-core A9
RAM	2GB	1GB	2GB	1GB	1GB
Claimed battery life	10 hrs	10 hrs	8.5 hrs (actual)	18 hrs	9 hrs
Cameras (front/rear)	2.2/8.1Mp	0.3/5Mp	1.3/5Mp	1.6/5Mp	2/3Mp
Dimensions	172x266x6.9mm	120x190x10mm	127x217x8.3mm	261x181x8.1mm	129x193x9.9mm
Weight	495g	320g	338g	605g	370g
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/ODTP6B8	TINYURL.COM/PMC04H4	TINYURL.COM/N80BC7N	TINYURL.COM/KLV5SDM	TINYURL.COM/MXHXVUK

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Smartphones	1	2	3	4	5
					
	LG G2	HTC One (M8)	Google Nexus 5	Sony Xperia Z2	Sony Xperia Z1 Compact
Price	£329 inc VAT	£550 inc VAT	£299 inc VAT	£599 inc VAT	£401 inc VAT
Website	Lg.com/uk	Htc.com/uk	Play.google.com	Sonymobile.com	Sonymobile.com
Launch date	Sep 13	Apr 14	Oct 13	May 14	Jan 14
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Platform	Android 4.2 Jelly Bean	Android 4.4 KitKat	Android 4.4 KitKat	Android 4.4 KitKat	Android 4.3 Jelly Bean
Processor	2.26GHz Snapdragon 800	2.3GHz Snapdragon 801	2.3GHz Snapdragon 800	2.3GHz Qualcomm	2.2GHz Snapdragon 800
Storage/media card slot	16GB/none	16GB/microSD	16GB/none	16GB/microSDXC	16GB/microSDXC
Screen size/resolution	5.2in/1920x1080	5in/1920x1080	4.95in/1920x1080	5.2in/1920x1080	4.3in/1280x720
Screen type	Capacitive multitouch	Capacitive multitouch	Capacitive multitouch	Capacitive multitouch	Capacitive multitouch
Connectivity	4G, HSPA+, Bluetooth, Wi-Fi	Bluetooth, NFC, Wi-Fi ac	HSPA+, Bluetooth, Wi-Fi ac	4G, NFC, Bluetooth, Wi-Fi	4G, HSPA+, Bluetooth, Wi-Fi
Claimed battery life	Not specified	Not specified	17 hrs/300 hrs	17 hrs/740 hrs	18 hrs/670 hrs
Cameras (front/rear)	13Mp, 1080p video	5Mp, 1080p video	8Mp, 1080p video	20.7Mp, 1080p video	20.7Mp, 1080p video
GPS	A-GPS	A-GPS, Glonass	A-GPS	A-GPS	A-GPS
Dimensions, weight	71x139x9.4mm, 143g	146.4x70.6x9.4mm, 160g	69x138x8.9mm, 130g	146.8x73.3x8.2mm, 163g	127x64.9x9.5mm, 137g
Warranty	1 year	2 years	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/PAFK4SZ	TINYURL.COM/NGBWXY9	TINYURL.COM/PAFK4SZ	TINYURL.COM/NXB5SWV	TINYURL.COM/KAU7DYR

Smartphones	6	7	8	9	10
					
	Sony Xperia Z1	Huawei Ascend P7	Apple iPhone 5s	Samsung Galaxy S5	Motorola Moto G
Price	£430 inc VAT	£399 inc VAT	£549 inc VAT	£549 inc VAT	£129 inc VAT
Website	Sonymobile.com	Huawei.com/uk	Apple.com/uk	Samsung.com/uk	Motorola.co.uk
Launch date	Jul 13	May 14	Sep 13	Apr 14	Nov 13
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Platform	Android 4.2 Jelly Bean	Android 4.4.2 (KitKat)	Apple iOS 7	Android 4.4.2 (KitKat)	Android 4.3 Jelly Bean
Processor	2.26GHz Snapdragon 800	1.8GHz Hisilicon Kirin 910T	1.3GHz Apple A7	2.5GHz Snapdragon 801	1.2GHz Snapdragon 400
Storage/media card slot	16GB/microSDXC	16GB/none	16GB/none	32GB/microSD	8GB/none
Screen size/resolution	5in/1920x1080	5in/1920x1080	4in/640x1136	5.1in/1920x1080	4.5in/720x1280
Screen type	Capacitive multitouch	Capacitive multitouch	Capacitive multitouch	Capacitive multitouch	Capacitive multitouch
Connectivity	4G, HSPA+, Bluetooth, Wi-Fi	NFC, Wi-Fi, Bluetooth, Micro-USB	4G, HSPA+, Bluetooth, Wi-Fi	4G, Bluetooth, Wi-Fi	HSDP+, GSM, Bluetooth, Wi-Fi
Claimed battery life	14 hrs/880 hrs	Not specified	10 hrs/250 hrs	21 hrs/390 hrs	Not specified
Cameras (front/rear)	20.7Mp, 1080p video	13Mp, 8Mp	8Mp, 1080p video	2Mp, 16Mp	5Mp, 720p video
GPS	A-GPS	A-GPS, Glonass	A-GPS, Glonass	GPS, Glonass	A-GPS
Dimensions, weight	144x74x8.5mm, 169g	139.8x68.8x8mm, 124g	59x124x7.6mm, 112g	73x142x8.1mm, 145g	66x130x11.6mm, 143g
Warranty	1 year	Not specified	1 year	2 years	1 year
FULL REVIEW	TINYURL.COM/NJPM4DE	TINYURL.COM/OZPOYFN	TINYURL.COM/MZ8JHLF	TINYURL.COM/KDVCTST	TINYURL.COM/NBUTSET


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Gaming PCs	1	2	3	4	5
	PC ADVISOR GOLD		PC ADVISOR RECOMMENDED		
	Chillblast Fusion Probe	Gladiator Firestorm OC	CyberPower Infinity Perseus XT	Computer Planet GX 760	Yoyotech Warbird RS2
Price	£1,299 inc VAT	£695 inc VAT	£1,499 inc VAT	£983 inc VAT	£1,370 inc VAT
Website	Chillblast.com	Gladiatorpc.co.uk	Cyberpowersystem.co.uk	Computerplanet.co.uk	Yoyotech.co.uk
Launch date	Feb 14	Mar 14	Feb 14	Mar 14	Feb 14
Build rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Features rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Performance rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Value rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Processor	3.4GHz Intel Core i5-4670K (OC 4.4GHz)	3.4GHz Intel Core i5-4670K (OC 4.2GHz)	3.4GHz Intel Core i5-4670K (OC 4.4GHz)	3.4GHz Intel Core i5-4670K	3.5GHz Intel Core i7-4770K (OC 4.3GHz)
CPU cooler	Corsair H55 Liquid Cooler	Be Quiet Dark Rock 3	Cooler Master Seldon 120mm	Corsair H60 Hydro	Corsair H80 cooler
Memory	16GB DDR3	8GB DDR3	16GB DDR3	8GB DDR3	8GB DDR3
Storage	120GB SSD + 2TB HDD	2TB HDD	256GB SSD + 2TB HDD	120GB SSD + 2TB HDD	128GB SSD + 1TB HDD
Power supply	750W Corsair	500W Corsair	750W Corsair	450W Corsair	600W Cooler Master
Motherboard	Gigabyte GA-Z87N-Wi-Fi	MSI Z87M Gaming	Gigabyte GA-Z87-HD3	Gigabyte GA-Z87N-Wi-Fi	MSI Z87M-G43
Operating system	Windows 8.1 64-bit	Windows 8.1 64-bit	Windows 8.1 64-bit	Windows 8.1 64-bit	Windows 8.1 64-bit
Screen	23.6in Iiyama X2377HDS	None supplied	23in AOC i2367fh	None supplied	23in AOC i2369vm
Graphics	Palit Jetstream GeForce GTX 780, 3GB VRAM	MSI nVidia GeForce GTX 750 Ti Gaming, 2GB VRAM	Powercolor AMD R9 290, 4GB VRAM	Zotac GeForce GTX 760, 2GB VRAM	Asus GTX 760 DirectCU II OC, 2GB VRAM
Sound	Onboard	Onboard	Onboard	Onboard	Onboard
Connectivity	Gigabit ethernet, 802.11n	Low-lag ethernet	Gigabit ethernet	2x gigabit ethernet, 802.11n	Gigabit ethernet
Ports	6x USB 3.0, 4x USB 2.0	8x USB 3.0, 4x USB 2.0, 2x eSATA	6x USB 3.0, 4x USB 2.0	6x USB 3.0, 2x USB 2.0	4x USB 3.0, 6x USB 2.0
Optical drive	DVD±RW (Blu-ray optional)	24x DVD±RW	DVD±RW, BD-ROM	None supplied	DVD±RW
Case	Aerocool Dead Silence Gaming Cube	Aerocool Dead Silence Cube Window Red	Cooler Master Dominator 690 III	Fractal Design Node 304	AerocoolDS Cube Red with window
Keyboard & mouse	Gigabyte M6800 mouse, Force K3 keyboard	None	Gigabyte M6900 mouse, Force K3 keyboard	None	Powercool JM-9032U mouse, KB-768 keyboard
Other	Optional family pack	None	None	None	None
PC Mark 7 score	6965	5124	6731	5508	6424
Alien vs Predator score (720p/1080p)	169/93fps	103/54fps	172/96fps	103/54fps	161/88fps
Final Fantasy XIV (720p/1080p)	218/96fps	N/A	167/87fps	N/A	228/95fps
Sniper Elite V2 (Low/High/Ultra)	308/187/49fps	194/81.6/18.6fps	352/155/39fps	261/119/29fps	349/180/46fps
Power Consumption	52/407W	70W/166W	68/484W	53W/271W	81/370W
Warranty	2-year collect-and-return	4-year return-to-base	3-year RTB (2 years parts, 3 years labour)	3-year return-to-base	3-year Silver (1-year parts, 3 years labour)
FULL REVIEW	TINYURL.COM/OWQ24QO	TINYURL.COM/PKDV2NG	TINYURL.COM/NKWN7V4	TINYURL.COM/MJZKS7G	TINYURL.COM/PMWPELY

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Mini PCs	 1 PC ADVISOR BEST BUY	 2 PC ADVISOR RECOMMENDED	 3	 4	 5
	Yoyotech Warbird RS4.0	Chillblast Fusion Xcalibur	Mesh Elite Mini Gaming OC	Dino PC Microraptor GTX 770	Quiet PC Serenity Nano
Price	£999 inc VAT	£849 inc VAT	£1,499 inc VAT	£999 inc VAT	£1,238 inc VAT
Website	yoyotech.co.uk	chillblast.com	meshcomputers.com	dinopc.com	quietpc.co.uk
Launch date	Mar 14	Mar 14	Mar 14	Mar 14	Mar 14
Build rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Features rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Performance rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Value rating	★★★★☆	★★★★★	★★★★☆	★★★★☆	★★★★☆
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Processor	3.4GHz Intel Core i5-4670K	3.2GHz Intel Core i5-4570	3.5GHz Intel Core i7-4770K (4.3GHz OC)	3.4GHz Intel Core i5-4670K (4.3GHz OC)	3.4GHz Intel Core i5-4670K (3.8GHz OC)
CPU cooler	Noctua L9i low-profile cooler	Scythe Shuriken low-profile cooler	Corsair Hydro Series H60 liquid cooler	Corsair Hydro Series H80 liquid cooler	Noctua L9i low-profile cooler
RAM	8GB DDR3 1600MHz	8GB DDR3 1600MHz	16GB DDR3 2133MHz	16GB DDR3 1600MHz	16GB DDR3 1600MHz
Storage	128GB SSD, 2TB HDD	120GB SSD, 1TB HDD	240GB SSD, 2TB HDD	128GB SSD, 1TB HDD	120GB SSD, 2TB HDD
Power supply	Seasonic Evo 520W Bronze-rated	450W Silverstone SFX	750W Cooler Master GX RS-750	600W Corsair Builder Series CX600	FSP Aurum 750W modular PSU
Motherboard	Asus Z87I-Pro	Asus H81I-PLUS	MSI Z87I Gaming AC	Gigabyte GA-Z87N-WIFI	Gigabyte H87N-WIFI
Operating system	Windows 8.1	Windows 8.1/7 Home Premium	Windows 8.1	Windows 8.1	Windows 8.1
Graphics	Asus GTX 770 (2GB)	EVGA GTX 760 (2GB)	AMD Radeon R9 290X (4GB)	Zotac nVidia GeForce GTX 770 (2GB)	Palit GTX 770 Jetstream (2GB)
Networking	Gigabit ethernet, 802.11n Wi-Fi	Gigabit ethernet, 802.11n Wi-Fi	Gigabit ethernet, 802.11n Wi-Fi	2x gigabit ethernet, 802.11n Wi-Fi	Gigabit ethernet, 802.11n Wi-Fi
USB ports	6x USB 3.0, 4x USB 2.0	4x USB 3.0, 4x USB 2.0	6x USB 3.0, 2x USB 2.0	6x USB 3.0, 3x USB 2.0	5x USB 3.0, 4x USB 2.0
Other ports	3x DVI (2x DVI-I), 2x HDMI, 2x DisplayPort	2x DVI, HDMI, DisplayPort	3x DVI, 2x HDMI, 2x DisplayPort, eSATA	1x DVI, 2x HDMI, 1x PS/2	2x DVI, HDMI, DisplayPort
Optical drive	Pioneer BDR-S07XLT Blu-ray writer	Optional	External Blu-ray drive	LiteOn iHAS122 DVD writer	Optional
Case	Cooler Master Elite 130	Silverstone RVZ01	Fractal Design Node 304	Cooler Master Elite 130	Cooler Master Elite 130
Keyboard & mouse	None	Logitech MK520	None	None	None
PCMark 8 score	6403	6334	6678	6861	6403
Alien vs Predator score (720p/1080p)	127/68	104/56	186/104	121/65	127/68
Sniper V2 Elite score (Low/High/Ultra)	303/161/40	263/124/31	387/169/43	313/150/38	303/161/40
Games score (Final Fantasy XIV)	200/76	155/63	183/94	220/81	200/76
Power consumption (idle/max)	49/330W	39/278W	54/548W	71/384W	49/330W
Warranty	3-year Silver (1-year parts, 3-year labour)	2-year Collect and Return (5-year labour)	3-year collect-and-return (2-year parts, 3-year labour)	3-year return-to-base (1-year parts, 3-year labour)	2-year collect-and-return
FULL REVIEW	TINYURL.COM/MQ8POPO	TINYURL.COM/NFQ6EGO	TINYURL.COM/PWCACV2	TINYURL.COM/MXMJ6QT	TINYURL.COM/O4QDH7Y

HEAD TO [TINYURL.COM/PYWN4DA](http://tinyurl.com/pywn4da) FOR OUR DESKTOP PC BUYING ADVICE

All-in-one PCs					
	1 PC ADVISOR BEST BUY	2 PC ADVISOR RECOMMENDED	3 PC ADVISOR RECOMMENDED	4	5
	Dell XPS 2720	Apple iMac 27in (Late 2012)	Medion Akoya P2002	Chillblast Fusion AIO Ultima	MSI Wind Top AE2712G
Price	£1,749 inc VAT	£1,699 inc VAT	£449 inc VAT	£1,199 inc VAT	£1199 inc VAT
Website	Dell.co.uk	Apple.com/uk	Medion.com/gb	Chillblast.com	Uk.msi.com
Launch date	Sep 13	Sep 13	Sep 13	Sep 13	Sep 13
Build rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Features rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Performance rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Value rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Processor	3.1GHz Intel Core i7-4770S	3.2GHz Intel Core i5-3470	3.3GHz Intel Core i3-3220	3.1GHz Intel Core i7-3770S	2.9GHz Intel Core i5-3470S
RAM	16GB DDR3	8GB DDR3	4GB DDR3	16GB DDR3	4GB DDR3
Storage	2TB HDD + 32GB SSD	1TB HDD	1TB HDD	1TB HDD + 120GB SSD	1TB HDD
Screen	27in IPS touchscreen	27in IPS	23.6in TN	21.5in IPS touchscreen	27in TN touchscreen
Screen resolution	2560x1440	2560x1440	1920x1080	1920x1080	1920x1080
Graphics card	nVidia GeForce GT 750M	nVidia GeForce GTX 675MX	Intel HD Graphics 2500	Intel HD Graphics 4000	nVidia GeForce GT 630M
Video memory	2GB	1GB	N/A	N/A	2GB
Wireless	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n
Ethernet	Gigabit	Gigabit	Gigabit	Gigabit	Gigabit
Bluetooth	✓	✓	✗	✓	✓
USB	6x USB 3.0	4x USB 3.0	2x USB 3.0, 4x USB 2.0	4x USB 3.0, 2x USB 2.0	2x USB 3.0, 4x USB 2.0
FireWire	✗	✗	✗	✗	✗
Thunderbolt	✓	✓	✗	✗	✗
HDMI	✓	✗	✓	✓	✓
Media card slot	✓	✓	✓	✓	✓
Optical drive	Blu-ray combo drive	None	DVD drive	Blu-ray combo drive	Blu-ray combo drive
Other	2.1Mp webcam, wireless keyboard and mouse, dual digital microphone array	1.3Mp webcam, wireless keyboard and mouse	Wireless keyboard and mouse, CyberLink software, Kaspersky Internet Security	Webcam, Microsoft Wireless Desktop 3000	2Mp webcam, DVB-T TV tuner, wireless keyboard and mouse, CyberLink software
Operating system	Windows 8	Mac OS X 10.9 Mavericks	Windows 8	Windows 8	Windows 8
Power consumption (idle/max)	54/84/220W	53/84/243W	34/42/92W	32/40/119W	44/53/110W
Sniper V2 Elite (Low/High/Ultra)	6/25/94fps	12/54/197fps	5/5/16fps	5/7/28fps	5/6/17fps
PCMark 7 score	6091	4141	3298	5195	3138
Dimensions	492x664x72mm	650x203x516mm	580x196x430-460mm	338x541x61mm	672x483x66mm
Weight	16kg	9.5kg	10.3kg	9kg	13kg
Warranty	1-year next-day in-home	1-year return-to-base	1-year return-to-base	2-year collect-and-return	2-year collect-and-return
FULL REVIEW	TINYURL.COM/KWZ4KLL	TINYURL.COM/A95Q9VY	TINYURL.COM/MEVSJ9D	TINYURL.COM/LQ4U8FW	TINYURL.COM/MUGFKQ7

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Business PCs	1	2	3	4	5
	Aria Gladiator Logic N200-3220M	Chillblast Fusion Opal	Wired2Fire Business Accelerate	Dino PC Synergy 4430	Eclipse Precision A856F85
Price	£509 inc VAT	£549 inc VAT	£689 inc VAT	£569 inc VAT	£519 inc VAT
Website	Aria.co.uk	Chillblast.com	Wired2fire.co.uk	Dinopc.com	Eclipsecomputers.com
Launch date	Aug 13	Aug 13	Aug 13	Aug 13	Aug 13
Build rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Features rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Performance rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Value rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Processor	3.3GHz Intel Core i3-3220 (dual-core)	3.2GHz Intel Core i5-4570 (quad-core)	3.4GHz Intel Core i5-4670 (quad-core)	3GHz Intel Core i5-4430 (quad-core)	3.6GHz AMD Trinity A8-5600K (quad-core)
RAM	8GB DDR3	8GB DDR3	8GB DDR3	8GB DDR3	8GB DDR3
Storage	500GB HDD + 80GB SSD	1TB HDD	120GB SSD	1TB HDD	1TB HDD
Motherboard	Gigabyte GA-B75M-D3H	Asus B85M-G	ASRock B85M-HDS	Gigabyte GA-H87M-HD3	Asus F2A85-M LE
CPU cooler	Arctic Cooling Alpine 11 GT Quiet	Standard Intel cooler	Standard Intel cooler	Standard Intel cooler	Standard AMD cooler
Power supply	Corsair 430W	CiT 500W	Xigmatek 400W	CiT 500W	Alpine 600W
Screen	21.5in AOC E2260SWDA	23.6in Iiyama X2377	2x 21.5in AOC E2260SWDA	23in Iiyama XB2380HS-B1	23in AOC i2369Vm
Screen resolution	1920x1080	1920x1080	1920x1080	1920x1080	1920x1080
Graphics	Intel HD Graphics 2500	Intel HD Graphics 4600	Intel HD Graphics 4600	Intel HD Graphics 4600	Integrated
Video memory	N/A	N/A	N/A	N/A	N/A
USB	2x USB 3.0, 4x USB 2.0	3x USB 3.0, 6x USB 2.0	2x USB 3.0, 8x USB 2.0	4x USB 3.0, 4x USB 2.0	4x USB 3.0, 4x USB 2.0
Sound	Onboard	Onboard	Onboard	Onboard	Onboard
Speakers	Not specified	Not specified	Not specified	Not specified	Not specified
Case	Cooler Master N200	CiT Fortress	In-Win Em040	CiT Templar	K2 Gamer
Keyboard	Microsoft Desktop 400 keyboard and mouse (wired)	Cherry J82-16001 keyboard, M-5450 mouse (wired)	Gigabyte K6800 keyboard, M6800 mouse (wired)	Logitech K120 keyboard, B110 mouse (wired)	Microsoft Optical Desktop 800 (wired)
Optical drive	24x DVD ± RW	24x DVD ± RW	DVD ± RW	Samsung DVD ± RW	Samsung DVD ± RW
Operating system	Windows 7 Home Premium 64-bit	Windows 8 Professional	Windows 7 Professional 64-bit	Windows 7 Home Premium 64-bit	Windows 8 Professional
Bundled software	None	None	None	None	None
PCMark 7 overall score	3524	4257	5667	3458	2349
PCMark 7 Productivity score	4056	2685	5929	2529	1883
PCMark 7 Computational score	3321	21490	13651	9377	3899
Power consumption (idle/max)	27/69W	47/124W	37/135W	37/115W	34/145W
Warranty	1-year return-to-base, phone support	2-year collect-and-return, phone support	2-year return-to-base, phone support	3-year return-to-base, phone support	1-year return-to-base, phone support
FULL REVIEW	TINYURL.COM/OSW55A8	TINYURL.COM/KGGE98T	TINYURL.COM/PCSKWVS	TINYURL.COM/PF8LUXD	TINYURL.COM/MQFWJ3R

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PC ADVISOR
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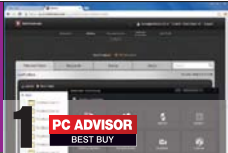
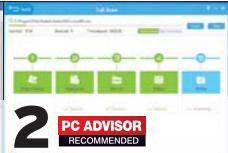



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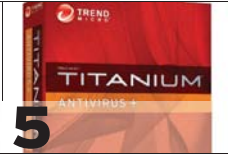
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* Chillblast won more awards in the leading IT press publications PC Pro, PC Advisor and Computer Shopper combined than any other retailer 2010-2013






** World's fastest PC as tested by PC Pro Magazine - <http://www.pcpro.co.uk/reviews/desktops/371152/chillblast-fusion-photo-oc-iv>

Internet security software						
		1 PC ADVISOR BEST BUY	2 PC ADVISOR RECOMMENDED	3 PC ADVISOR RECOMMENDED	4 PC ADVISOR RECOMMENDED	5 PC ADVISOR RECOMMENDED
		Bitdefender Total Security	Qihoo 360 IS 4.3	Symantec Norton 360 2014	Kaspersky Pure 3.0 TS	Gdata TotalProtection 2014
Price		£55 inc VAT	Free	£60 inc VAT	£60 inc VAT	£50 inc VAT
Website		Bitdefender.co.uk	360safe.com	Norton.com/uk	Kaspersky.co.uk/pure	Gdatasoftware.com
Overall rating		★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Number of devices		3	Unlimited	3	3	3
Length of licence		1 year	1 year	1 year	1 year	1 year
Portable support		Android	Android	Android	Android	Android
Anti-malware		✓	✓	✓	✓	✓
Anti-spam		✓	x	✓	✓	✓
Firewall		✓	x	✓	✓	✓
Parental control		✓	x	✓	✓	✓
Online storage		2GB	N/A	2GB	2GB	N/A
50GB AV scan time		140 mins (1.39M files)	39 mins (68,100 files)	20 mins (176,000 files)	81 mins (334,000 files)	32 mins (8,800 files)
Scan rate (files/sec)		166	29	148	69	5
1GB copy with/without AV		41/48 secs	45/55 secs	43/69 secs	44/71 secs	52/54 secs
FULL REVIEW		TINYURL.COM/L9KNK29	TINYURL.COM/LY557M7	TINYURL.COM/LEZ8AHC	TINYURL.COM/N4ER2X2	TINYURL.COM/LZBQKEM






Antivirus						
		1 PC ADVISOR BEST BUY	2 PC ADVISOR RECOMMENDED	3 PC ADVISOR RECOMMENDED	4 PC ADVISOR RECOMMENDED	5 PC ADVISOR RECOMMENDED
		Norton AntiVirus	Bitdefender Antivirus Pro	G Data AntiVirus	Kaspersky Anti-Virus	Trend Micro Titanium AV+
Price		£39 inc VAT	£24 inc VAT	£34 inc VAT	£39 inc VAT	£39 inc VAT
Website		Norton.com	Bitdefender.co.uk	Gdatasoftware.com	Kaspersky.co.uk	Uk.trendmicro.com
Overall rating		★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Number of devices		3	3	3	3	3
Length of licence		1 year	1 year	1 year	1 year	1 year
Signature-based detection		98.7%	97.5%	99.4%	95.7%	98.4%
Malware blocking (full)		96%	68%	84%	88%	88%
Malware blocking (partial)		0%	20%	4%	4%	8%
Clean-up of active malware		80%	80%	80%	80%	80%
On-demand scan speed		121 secs	126 secs	111 secs	103 secs	187 secs
On-access scan speed		272 secs	327 secs	336 secs	310 secs	249 secs
Interface design		Very good	Very good	Very good	Very good	Very good
FULL REVIEW		TINYURL.COM/4P5YCX	TINYURL.COM/66SK77U	TINYURL.COM/6BFXWCS	TINYURL.COM/6HQA2WB	TINYURL.COM/4HUORV3






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Sub-£150 printers					
	1	2	3	4	5
	Samsung Xpress M2070W	Canon Pixma MG5550	Brother MFC-J870DW	Brother HL-1110	HP Photosmart 7520
Price	£130 inc VAT	£75 inc VAT	£140 inc VAT	£59 inc VAT	£127 inc VAT
Website	Samsung.com/uk	Canon.co.uk	Brother.co.uk	Brother.co.uk	Hp.com/uk
Launch date	Mar 14	Apr 14	Jul 14	Jun 14	Jan 13
Overall rating	★★★★★	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Technology	Mono laser	Colour inkjet	Colour inkjet	Mono laser	Colour inkjet
Max print resolution	1200x1200	4800x1200dpi	6000x1200dpi	600x600dpi	9600x2400
Actual print speed	B=17.1ppm	B=11.8ppm C=8.7ppm	B=18ppm C=11ppm	B=16.4ppm	B=17.6ppm C=7.9ppm
Scan/fax facilities	1200x1200 scans	1200x2400 scans	1200x2400 scans	None	1200x2400 scans
Supported interfaces	USB 2.0, 802.11b/g/n, NFC	USB 2.0, 802.11b/g/n	USB 2.0, 802.11b/g/n, NFC	USB 2.0	USB 2.0, 802.11b/g/n, HP ePrint
Cost per page	B=3.8p	B=2.4p C=4.8p	B=3.9p C=2.5p	B=2.7p	B=2.4p C=4.8p
Media card/auto duplex	xx	x✓	✓✓	xx	✓✓
Input capacity	150 sheets	100 sheets	150 sheets + 20 ADF	150 sheets	125 sheets + 20 tray + 25 ADF
Dimensions	406x360x253mm	455x369x148mm	410x374x180mm	340x238x189mm	454x551x220mm
Weight	7.4kg	6.3kg	9.5kg	4.5kg	8.6kg
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/OYZKJKE	TINYURL.COM/LKWLJDE	TINYURL.COM/M52V29R	TINYURL.COM/QE9GLNF	TINYURL.COM/98G9XTE









£151+ printers					
	1	2	3	4	5
	HP OfficeJet Pro X551dw	Kyocera Ecosys P6030cdn	Kyocera Ecosys M2030dn	Canon i-Sensys LBP7780Cx	Samsung Xpress M2875FW
Price	£435 inc VAT	£560 inc VAT	£340 inc VAT	£456 inc VAT	£210 inc VAT
Website	Hp.com/uk	Kyoceradocumentsolutions.co.uk	Kyoceradocumentsolutions.co.uk	Canon.co.uk	Samsung.com/uk
Launch date	Aug 13	Jul 14	May 14	Jun 13	Mar 14
Overall rating	★★★★★	★★★★☆	★★★★☆	★★★★★	★★★★☆
Technology	Colour inkjet	Colour laser	Mono laser	Colour laser	Mono laser
Max print resolution	2400x2400	9600x600dpi	1800x600dpi	9600x600	4800x600dpi
Actual print speed	B=42.9ppm C=15.8ppm	B=27ppm C=27ppm	B=28ppm	B=23.2pp C=16.7ppm	B=21.4ppm
Scan/fax facilities	None	None	600dpi scanner	None	1200dpi scanner, fax
Supported interfaces	USB 2.0, ethernet, 802.11b/g/n	USB 2.0	USB 2.0, gigabit	USB 2.0, ethernet	USB 2.0, ethernet, 802.11b/g/n
Cost per page	B=1p C=4.3p	B=1.2p C=1.7p	B=2.2p	B=1.3p C=7.5p	B=1.7p
Media card/auto duplex	x✓	x✓	✓✓	x✓	x✓
Input capacity	500 + 50 sheet	500 sheets + 150 (2150 max)	250 sheets + 50 sheet	500 + 100 sheets	250 sheets + 1 sheet + 40 ADF
Dimensions	517x399x414mm	345x518x480mm	494x430x448mm	517x530x401mm	401x362x367mm
Weight	17.1kg	29.5kg	18kg	31kg	11.3kg
Warranty	1 year	2 years	2 years	1 year	3 years
FULL REVIEW	TINYURL.COM/CZ05P65	TINYURL.COM/N4MCYLF	TINYURL.COM/NRLNSZW	TINYURL.COM/CCAPAJF	TINYURL.COM/QD5V3NF







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Blu-ray drives	    				
	1	2	3	4	5
	Pioneer BDR-209EBK Retail	Pioneer BDR-209DBK OEM	LG BH16NS40	LG BP40NS20	Lite-On IHES112-115
Price	£61 inc VAT	£57 inc VAT	£70 inc VAT	£90 inc VAT	£54 inc VAT
Website	Pioneer.eu/uk	Pioneer.eu/uk	Uk.lge.com	Uk.lge.com	Liteonit.eu
Launch date	Nov 13	Nov 13	May 12	Jan 13	Oct 12
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Blu-ray speeds	16x -R, 14x -R DL, 2x -RE, 12x -ROM	16x -R, 14x -R DL, 2x -RE, 12x -ROM	16x -R, 12x -R DL, 12x -RE, 12x -ROM	6x -R, 6x -R DL, 2x -RE, 6x -ROM	12x -ROM
DVD speeds	16x ±R, 8x ±R DL, 6x -RW, 8x +RW, 16x -ROM	16x ±R, 8x ±R DL, 6x -RW, 8x +RW, 16x -ROM	16x ±R, 8x ±R DL, 6x -RW, 8x +RW, 12x -RAM, 16x -ROM	8x ±R, 6x ±R DL, 6x -RW, 8x +RW, 5x -RAM, 8x -ROM	8x ±R, 8x ±R DL, 6x -RW, 8x +RW, 8x -ROM
Max storage	128GB	50GB	50GB	100GB	8.5GB
Interface type	SATA (internal)	SATA (internal)	SATA (internal)	USB 2.0 (external)	SATA (internal)
Label technology	None	None	LightScribe	None	None
Software	ArcSoft TotalMedia Extreme	None	CyberLink Blu-ray Suite	PowerDVD, PowerProducer	None
Dimensions	148x180x42mm	148x180x42mm	146x170x41mm	160x153x22mm	158x145x22mm
Weight	740g	740g	749g	380g	700g
Warranty	1 year	1 year	1 year	1 year	2 years
FULL REVIEW	TINYURL.COM/LD47X7K	TINYURL.COM/LD47X7K	TINYURL.COM/8YTUJEF	TINYURL.COM/BS8UAF	TINYURL.COM/8SYECMW






Wireless routers	    				
	1	2	3	4	5
	Apple AirPort Extreme	AVM FRITZ!Box 7490	TP-Link Archer C7	Asus RT-AC68U AC1900	TP-Link TL-WDR4900
Price	£169 inc VAT	£245 inc VAT	£90 inc VAT	£175 inc VAT	£80 inc VAT
Website	Apple.com/uk	Fritzbox.eu	Tp-link.com	Uk.asus.com	Tp-link.com
Launch date	Jan 14	Jul 14	Jan 14	Jan 14	Dec 13
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Standards supported	802.11b/g/n/ac	802.11a/b/g/n/ac	802.11a/b/g/n/ac	802.11a/b/g/n/ac	802.11a/b/g/n
Frequency modes	2.4GHz/5GHz (concurrent)	2.4GHz/5GHz (concurrent)	2.4GHz/5GHz (concurrent)	2.4GHz/5GHz (concurrent)	2.4GHz/5GHz (concurrent)
Antennae	6x internal	3x3 MIMO	3x external, 3x internal	3x external, 3x internal	3x external, 3x internal
128bit/256bit WEP	✓ x	✓ x	✓ x	✓ x	✓ x
Modem/Parental Control	x✓	✓✓	x✓	x✓	x✓
Firewall	NAT/SPI	NAT/SPI	NAT/SPI	NAT/SPI	NAT/SPI
Ports	Gigabit WAN, 3x gigabit LAN, USB	4x gigabit LAN, 2x USB	Gigabit WAN, 4x gigabit LAN, 2x USB	Gigabit WAN, 4x gigabit LAN, 2x USB	10/100 WAN, 4x 10/100 LAN, 2x USB
Average power use	Not tested	Not tested	Not tested	Not tested	Not tested
Throughput (near, far, ac)	124, 105, 578/540Mbps	130, 109, 330/125Mbps	110, 89, 505/468Mbps	98, 69, 610/570Mbps	127, 111Mbps, N/A
Dimensions, weight	98x168x98mm, 945g	245x174x45mm, 476g	32.5x243x160mm, 508g	160x83x220mm, 640g	243x161x33mm, 1.1kg
Warranty	1 year	5 year	3 years	2 years	1 year
FULL REVIEW	TINYURL.COM/MFDLLSC	TINYURL.COM/MUAFBHP	TINYURL.COM/KKJMPCE	TINYURL.COM/K4ZATKV	TINYURL.COM/MUXCBNM

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NAS drives					
	1	2 	3 	4	5 
	Synology DS413j	Qnap TS-421	Synology DS1813+	Asustor AS-604T	Zyxel NSA325
Price	£250 inc VAT (diskless)	£382 inc VAT (diskless)	£775 inc VAT (diskless)	£430 inc VAT (diskless)	£95 inc VAT
Website	Synology.com	Qnap.com	Synology.com	Asustor.com	Zyxel.co.uk
Launch date	Oct 13	Mar 14	Jan 14	May 14	Jun 12
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★★
Drive bays	4	4	8	4	2
Processor	1.6GHz Marvell mv6282	2GHz Marvell single-core ARM	2.13GHz Intel Atom D2700 dc	2.13GHz Intel Atom	1.6GHz processor
Memory	512MB DDR3	1GB DDR3	2GB DDR3	1GB DDR3	512MB DDR2
Remote access	✓	✓	✓	✓	✓
eSATA	✗	✓	✓	✓	✗
USB port	2x USB 2.0	2x USB 3.0, 2x USB 2.0	2x USB 3.0, 4x USB 2.0	2x USB 3.0, 4x USB 2.0	2x USB 2.0
Raid options	0/1/5/6/10/JBOD	0/1/5/6/10/JBOD	0/1/5/6/10/JBOD	0/1/5/6/10/JBOD	0/1/JBOD
Software	DSM 4.1	Backup Station	DSM 4.3	Asustor utilities, App Central	zPilot
Dimensions	184x168x230mm	177x180x235mm	175x340x233mm	230x170x185mm	108x205x147mm
Weight	2kg	3kg	5.2kg	3.5kg	1.8kg
Warranty	2 years	2 years	3 years	2 years	1 year
FULL REVIEW	TINYURL.COM/PL8XM8S	TINYURL.COM/MCYWUB8	TINYURL.COM/PWO4M6J	TINYURL.COM/NX5QO8M	TINYURL.COM/7B9EPW8


USB drives					
	1	2	3 	4	5
	G-Technology Professional	LaCie Little Big Disk	G-Technology Thunderbolt	Toshiba Stor.E Basics	LaCie Fuel
Price	£250 inc VAT	£770 inc VAT	£599 inc VAT	£92 inc VAT	£170 inc VAT
Website	G-technology.com	Lacie.com/uk	G-technology.com	Toshiba.co.uk	Lacie.com/uk
Launch date	Sep 13	Feb 14	Aug 12	Nov 13	May 14
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Capacity tested	4TB	1TB	8TB	2TB	3.5
Capacity range	2TB to 4TB	512GB to 2TB	4TB to 8TB	320GB to 2TB	1TB
Disk size	3.5in	2.5in	3.5in	2.5in	2.5in
Spin speed	7200rpm	5400rpm	7200rpm	5400rpm	5400rpm
Transfer speed	N/A	635MB/s	329MB/s	94MB/s (USB 3.0)	94MB/s (USB 3.0)
Encryption	None	None	None	None	Password protection
Other interfaces	FireWire 800	None	None	None	Wi-Fi 802.11b/g/n
Software	None	LaCie Backup Assistant	None	None	LaCie utilities
Dimensions	235x130x46mm	40x140x85mm	235x130x85mm	119x79x21mm	115x115x23mm
Weight	1.35kg	650g	2.3kg	215g	300g
Warranty	3 years	1 year	3 years	1 year	2 years
FULL REVIEW	TINYURL.COM/NV7F32F	TINYURL.COM/KRCL3VZ	TINYURL.COM/CXEF6MH	TINYURL.COM/LBH8C8L	TINYURL.COM/LK3398C






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SSDs					
	1 PC ADVISOR GOLD	2 PC ADVISOR RECOMMENDED	3	4 PC ADVISOR RECOMMENDED	5
	Samsung 840 EVO	Crucial M500	Samsung 840 EVO mSATA	Plextor M5 Pro	Integral Memory Portable SSD
Price	£295 inc VAT	£175 inc VAT	£250 inc VAT	£142 inc VAT	£277 inc VAT
Website	Samsung.com/uk	Crucial.com/uk	Samsung.com/uk	Plextor.com	Integralmemory.com
Launch date	Nov 13	Aug 13	Apr 14	Aug 13	Feb 14
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Capacity tested	750GB	480GB	500GB	256GB	512GB
Price per GB	39p	36p	55p	50p	54p
Memory cache	1GB LPDDR2	512MB DDR3	512MB LPDDR2	512MB DDR3	N/A
Controller	Samsung MEX (3-core ARM)	Marvell 88SS9187	Samsung MEX (3-core ARM)	Marvell 88SS9187	Phiso
Encryption	AES 256-bit	AES 256-bit	AES 256-bit	AES 256-bit	None
Flash	Samsung 19nm Toggle NAND	Micron 20nm MLC NAND	Samsung 19nm Toggle NAND	Toshiba Toggle NAND	Toshiba NAND
Firmware updated via	SSD Magician for Windows	ISO boot disc	SSD Magician for Windows	ISO boot disc	N/A
ATTO peak sequential	R: 554MB/s; W: 537MB/s	R: 539MB/s; W: 433MB/s	R: 554MB/s; W: 536MB/s	R: 547MB/s; W: 457MB/s	R: 557MB/s; W: 511MB/s
CDM peak IOPS	104k (read)	89.8k (read)	102k (read)	103.3k (read)	92.8k (read)
AS SSD (points)	1141	1038	1147	1124	1057
Warranty	5 years	3 years	3 years	5 years	2 years
FULL REVIEW	TINYURL.COM/L5EDQOY	TINYURL.COM/M2NCSMJ	TINYURL.COM/MNKPM2Q	TINYURL.COM/PTYGG27	TINYURL.COM/PN5Z67G






Projectors					
	1	2	3	4 PC ADVISOR RECOMMENDED	5
	BenQ W1300	Optoma W316	Optoma HD30	ViewSonic PJD7820HD	Dell M900HD
Price	£802 inc VAT	£486 inc VAT	£1,098 inc VAT	£540 inc VAT	£743 inc VAT
Website	Benq.co.uk	Optoma.co.uk	Optoma.co.uk	Viewsoniceurope.com/uk	Dell.co.uk
Launch date	Jun 14	Jul 14	Jun 14	Jun 13	Nov 13
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Projection technology	DLP	DLP	DLP	DLP	DLP
Resolution (pixels)	1920x1080	1280x800	1920x1080	1920x1080	1280x800
Brightness, Contrast	2000, 10,000:1	3400, 15,000:1	1600, 25,000:1	3000, 15000:1	900, 700:1
Image size	300in	300in	362in	300in	80in
Supported aspect ratios	16:9 native	16:10, 16:9, 4:3	16:10, 16:9, 4:3	16:9, 4:3	16:10, 16:9, 4:3
Noise levels (dB)	33 (30 eco)	29db	26db	35 (29 eco)	38 (34 eco)
Connections	VGA, 2x HDMI, USB, 3D	VGA, HDMI, Mini-USB, 3D	2x VGA, 2x HDMI, 3D	VGA, HDMI, CM, USB	HDMI, USB, WiDi
Lamp/lamp life	240W/6000 hrs	190W/10000 hrs	240W/6000 hrs	Not supplied/5000 hrs	LED/30000 hrs
Dimensions	330x257x128mm	315x223x102mm	324x234x97mm	268x221x84mm	232x164x43mm
Weight	3.4kg	2.5kg	3.1kg	2.1kg	1.59kg
Warranty	3 years	2 years	3 years	3 years	1 year
FULL REVIEW	TINYURL.COM/K4FA89Q	TINYURL.COM/OCWTHGW	TINYURL.COM/K4FA89Q	TINYURL.COM/D2HO4CV	TINYURL.COM/MAXQRG3






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Sub-£150 graphics cards	    				
	1	2	3	4	5
	MSI Radeon R9 270	MSI R7 260X OC	Asus GTX 650 Ti	EVGA GTX 650	Sapphire Radeon HD 7750
Price	£138 inc VAT	£66 inc VAT	£100 inc VAT	£87 inc VAT	£80 inc VAT
Website	Uk.msi.com	Uk.msi.com	Uk.msi.com	Eu.evga.com	Sapphiretech.com
Launch date	Jul 14	Sep 12	May 14	May 13	Jun 12
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Graphics processor	AMD Radeon R9 270	AMD Radeon HD 7770	AMD Radeon R7 260X	nVidia GeForce GTX 650	AMD Radeon HD 7750
Installed RAM	2GB GDDR5	1GB GDDR5	2GB GDDR5	1GB GDDR5	1GB GDDR5
Memory interface	256-bit	128-bit	128-bit	128-bit	128-bit
Core clock/Boost	900MHz/975MHz	1GHz/none	1175MHz/none	1202MHz/none	800MHz/none
Memory clock/Effective	1.4GHz/5.6GHz	1125MHz/4.5GHz	1625MHz/6.5GHz	1250MHz/5GHz	1125MHz/4.5GHz
Stream processors	1280	640	896	384	512
Texture units	80	40	56	32	32
Power connectors	1x 6-pin	1x 6-pin	1x 6-pin	1x 6-pin	None
DirectX	11.2	11.1	11.1	11	11
Digital interface	2x DVI, HDMI, DP	DVI, HDMI, Mini-DP	2x DVI, HDMI, MiniDisplayPort	2x DVI, Mini-HDMI	DVI, HDMI, DisplayPort
Warranty	3 years	3 years	3 years	3 years	2 years
FULL REVIEW	TINYURL.COM/MCE7353	TINYURL.COM/BWJ7BL9	TINYURL.COM/OZ6WUYT	TINYURL.COM/AKT2XOM	TINYURL.COM/7ZB5OE3

£151+ graphics cards	    				
	1	2	3	4	5
	Gigabyte GeForce GTX 770 2GB	Gigabyte Radeon R9 280X	MSI Radeon R9 270X	MSI Radeon R9 290X Boost	Gigabyte GeForce GTX 780 Ti
Price	£260 inc VAT	£250 inc VAT	£170 inc VAT	£400 inc VAT	£530 inc VAT
Website	Uk.gigabyte.com	Uk.gigabyte.com	Uk.msi.com	Uk.msi.com	Uk.gigabyte.com
Launch date	Aug 13	Mar 14	Dec 13	Apr 14	May 14
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Graphics processor	nVidia GeForce GTX 770	AMD Radeon R9 280X	AMD Radeon R9 270X	AMD Radeon R9 290X	nVidia GeForce GTX 780 Ti
Installed RAM	2GB GDDR5	3GB GDDR5	2GB GDDR5	4GB GDDR5	3GB GDDR5
Memory interface	256-bit	384-bit	256-bit	512-bit	384-bit
Core clock/boost	1137MHz/1189MHz	1GHz/1.1GHz	1030MHz/1120MHz	1GHz/1GHz	1020MHz/1080MHz
Memory clock/Effective	1752MHz/7010MHz	1.5GHz/6GHz	1.4GHz/5.6GHz	1.25GHz/5GHz	1750MHz/7GHz
Stream processors	1536	2048	1280	2816	2880
Texture units	128	128	80	176	240
Power connectors	1x 6-pin, 1x 8-pin	2x 8-pin	2x 6-pin	8-pin, 6-pin	1x 6-pin, 1x 8-pin
DirectX	11	11	11	11	11
Digital interface	2x DVI, HDMI, DisplayPort	DVI, HDMI, 2x Mini-DisplayPort	2x DVI, HDMI, DisplayPort	2x DVI, HDMI, DisplayPort	2x DVI, HDMI, DisplayPort
Warranty	3 years	3 years	2 years	3 years	3 years
FULL REVIEW	TINYURL.COM/OAG6277	TINYURL.COM/OWVAP37	TINYURL.COM/OYA2DFJ	TINYURL.COM/NPET8ER	TINYURL.COM/O29JMT3

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Sub-£200 flat-panel displays					
	1 PC ADVISOR BEST BUY	2 PC ADVISOR RECOMMENDED	3 PC ADVISOR RECOMMENDED	4 PC ADVISOR RECOMMENDED	5 PC ADVISOR RECOMMENDED
	AOC i2369Vm	BenQ GW2760HS	Philips 234E5	NEC MultiSync E243WMI	BenQ GL2450
Price	£140 inc VAT	£194 inc VAT	£140 inc VAT	£185 inc VAT	£108 inc VAT
Website	Aoc-europe.com/en	Benq.co.uk	Philips.co.uk	Nec-display-solutions.com	Benq.co.uk
Launch date	Jul 14	Dec 13	Jul 14	Jun 14	Jul 14
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Screen size	23in	27in	23in	23.8in	24in
Panel type	IPS matt	A-MCA	IPS matt	IPS matt	TN matt
Native resolution	1920x1080 pixels	1920x1080 (82ppi)	1920x1080 pixels	1920x1080 pixels	1920x1080 pixels
Pixel density	96ppi	82ppi	96ppi	93ppi	92ppi
Brightness	220cd/m ²	300cd/m ²	187cd/m ²	250cd/m ²	261cd/m ²
Static contrast ratio	630:1	950:1	210:1	650:1	610:1
Response time	6ms	4ms	5ms	6ms	5ms
Ports	HDMI, HDMI/MHL, DP, VGA	HDMI, DVI, VGA	2x HDMI (QHAB) or 1x HDMI (QDAB), VGA	DP, DVI-D, VGA	DVI-D, VGA
Dimensions	531x204x398mm	472x191x623mm	532x213x414mm	558x214x380-490mm	579x179x436mm
Weight	3.75kg	4.5kg	3.5kg	6.3kg	4.1kg
Warranty	3 years	2 years	2 years	3 years	2 years
FULL REVIEW	TINYURL.COM/OOEFYPR	TINYURL.COM/NF3WVFY	TINYURL.COM/KLYLW4V	TINYURL.COM/KNCGVOU	TINYURL.COM/OOUPFUE

£201+ flat-panel displays					
	1 PC ADVISOR RECOMMENDED	2 PC ADVISOR RECOMMENDED	3 PC ADVISOR RECOMMENDED	4 PC ADVISOR RECOMMENDED	5 PC ADVISOR RECOMMENDED
	BenQ BL2411	Asus ProArt PA279Q	AOC Q2963PM	Dell UltraSharp 32 Ultra	ViewSonic VP2772
Price	£237 inc VAT	£670 inc VAT	£323 inc VAT	£1,950 inc VAT	£570 inc VAT
Website	Benq.co.uk	Asus.com/uk	Aoc-europe.com/en	Dell.co.uk	Viewsoniceurope.com/uk
Launch date	Apr 14	Jul 14	Mar 14	Jun 14	Jun 14
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Screen size	24in	27in	29in	31.5in	27in
Panel type	IPS	IPS matt	AH-IPS	IGZO	AH-IPS
Native resolution	1920x1200 (94ppi)	2560x1440	2560x1080 (96ppi)	3840x2160 pixels	2560x1440 pixels
Pixel density	94ppi	108ppi	96ppi	140ppi	109ppi
Brightness	300cd/m ²	350cd/m ²	240cd/m ²	350cd/m ²	350cd/m ²
Static contrast ratio	650:1	640:1	530:1	550:1	560:1
Response time	5ms	6ms	5ms	8ms	6ms
Ports	DVI, DP, VGA	DVI, HDMI, 2x DP, 6x USB 3.0	HDMI, DVI, DP, VGA	HDMI, DP, Mini-DP, 4x USB 3.0	HDMI, DVI, Mini-DP, 4x USB 3.0
Dimensions	366x555x236mm	641x560x240mm	714x214x388mm	750x214x483-572mm	643x348x470mm
Weight	6.7kg	10kg	6.9kg	9.2kg	8.5kg
Warranty	3 years	3 years	3 years	3 years	3 years
FULL REVIEW	TINYURL.COM/PMV5L5V	TINYURL.COM/NR8RDQ6	TINYURL.COM/NXDAGMK	TINYURL.COM/O4CTO3S	TINYURL.COM/LLQRWTX

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MARTYN
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All hail the new king

For the past few years, the technology media has been obsessed by Apple. Of course, all of this seemed justified when Steve Jobs helmed the big fruit, as his ruthless streak seemed to be enough to silence the various partners involved in the new products before their often shock big reveals. The iPad was rumoured, but its arrival still caused an enormous stir, which is keenly felt today as PC sales continue to fall and tablets begin their inevitable quest to replace them. Lately, things have been a little less 'magical'. Each of the recent keynote announcements have been preceded by nearly every detail being leaked online weeks before. The iPhone 5c even had YouTube videos pop up exposing its various coloured casings. This makes it harder to keep the sense of theatre that Jobs revelled in as he unleashed the verbal snake oil.

While Apple has been busy turning itself into a balance sheet and supply chain optimised snoozathon, something very strange has happened in the technology landscape - Microsoft has gone mental, making it the most interesting company in the world to watch.

For the longest time now Redmond's finest has been the epitome of a corporate business. Products have been designed and built with more of an eye on the bottom line than the user experience, and this has been an extraordinarily successful way to do things. Then came Windows 8. Now, as almost anyone who has had to live with this new iteration will tell you, user experience wasn't what you'd call pleasant. Trying to navigate around the mystery that is Modern UI especially without a touchscreen, which would account for around 99.9 percent of all users, is slightly less fun than having to sit through Brian Sewell reading the *Twilight* series aloud, while scratching his fingernails down an enormous blackboard.

But at least Microsoft were trying something new. Insane and misguided yes, but new. It didn't stop there though. To capitalise on the huge public outpouring of love for Windows 8, it decided to launch a tablet that featured a knobbed version of the OS, although one cunning disguised to look completely identical to the full version. Steven Sinofsky, then head of Windows, even had one converted into a skateboard that he rode about on to demonstrate how tough the device was. It made complete sense to advertise the product by zeroing in on the most important aspect of this new platform, the unique selling point which would cause the masses to ditch those oppressive iPads. Yes, you guessed it, the magnet that attached the (not-included) keyboard cover. Ho, you crazy guys.

Even the Xbox team, who had been the rockstars of the MS fraternity up until this point, managed to bungle the launch of the new system, by alienating gamers through a series of poorly executed presentations, an always-on internet connection requirement, and the forced inclusion of a Kinect system that meant the price was around £100 more than the PlayStation 4. Sony couldn't believe its luck, selling several million more units in the first few months of their release.

So, has Microsoft managed to bring about its own red ring of death? Not one bit. It could be the best thing to happen to the company in a long time. Apple built its marketplace power on a design-led ethos that allowed it to decide what people wanted and then stick firmly to its guns. This worked because there were excellent designers involved, and the company had a lot less customers to please. When the Windows team took the same bullish attitude to Windows 8 it made a complete hash of the interface, but underneath is an incredibly powerful and well-engineered engine. Why is this important? Because one thing Microsoft is getting good at is listening to users, and then fixing problems. Subsequent updates have moved the OS closer to the one most people want, and upcoming patches will only continue to make things better, so no more moaning right?

The recent release of Office on the iPad also shows that the company is finally moving away from its Windows-centric past, while embracing the idea of cross-platform applications. Office 365 itself is an excellent update to the way the suite works, with OneDrive integration making it again a very transferable product. Even OneNote saw a release on Mac and iOS recently, which should bring greater attention to this truly fantastic application which has, for some reason, always lived in the shadows of its lesser rivals.

Taking chances with design and direction is a very unusual step for large corporations, but Microsoft has been ambitious enough to have a go. It's worth bearing in mind that even with the vitriolic response to Windows 8, worldwide the OS already has tens of millions more users than all of Apple's OS X versions combined. Where the future lies is still anybody's guess, but the thought of Microsoft eschewing the safety of another graduated Windows release and swinging for the stands means it should be a lot more interesting.

So you can keep Apple and its sanitised version of reality, because the real action is happening at Microsoft. It isn't always pretty, and sometimes you're left scratching your head in bewilderment, but at least it's never going to be boring. ☒

“ The recent release of Office on the iPad also shows that the company is finally moving away from its Windows-centric past ”





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