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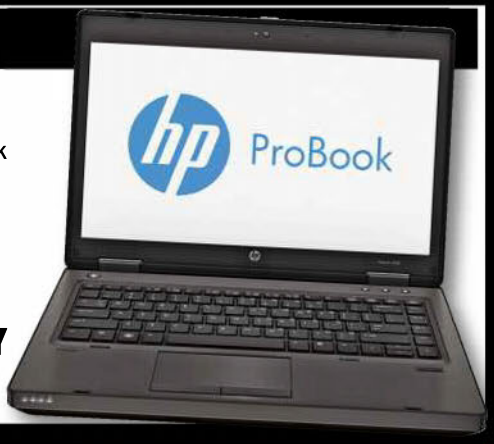

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LAPTOPS FOR STUDENTS

From the humblest netbook to the fastest ultrabook, the notebook PC is arguably the perfect solution for a students

The laptop market has become increasingly fractured over the last couple of years. Netbooks are on their way out, and Ultrabooks are more than a student needs, but picking the right system is still more difficult and confusing than at any other time. Laptops have enjoyed years of popularity as the favoured choice of the casual computer user, and while the position of mid-range devices is looking increasingly endangered by the surge in tablet usage and the general trend away from high-powered computing, there's still life in the form yet.

Indeed, if you don't already have one, an up-to-date laptop is essential for the new academic year. Over the next few pages, we've picked out the best models we could find at a variety of prices, aimed at a variety of uses. Whether you're a heavy user, a casual dabbler, a big spender or a penny-pincher, you should be able to find a laptop that meets your needs right here.

Cheapest Laptop: Lenovo B50 (£170+)

Sometimes you just want to spend as little as possible on a computer. Perhaps you have a tablet you use for browsing and just want a laptop to write on. Maybe your course has a specific piece of software you want to use at home. Or it could be that you just want to keep as much of your loan back as possible in case it's needed.

Whatever your reasoning, when it comes to budget laptops, you won't find anything new that costs less than the Lenovo B50, which is currently available to buy from multiple outlets for just £199.98. Better still, if you take advantage of an Ebuyer cashback offer currently available on the hardware, it can be picked up for the grand total of £169.98. That's an insanely small amount of money for any system, let alone one this fully featured.

Despite the price, the hardware is actually quite serviceable. It's not going to work as a gaming laptop, but only an incurable optimist would think otherwise. We won't pretend it isn't a little slow, but once it's booted up and you're actually working on it, you'll barely notice. In most respects it's perfect for writing essays on, and it can handle a little light entertainment too (we mean that in the sense of HD video and music, not in the daytime television sense – although students would no doubt appreciate that).

Specs-wise, the Intel Celeron N2815 is the least convincing part of the package – a dual-core chip from last year clocked at 1.86GHz – but it'll do the job as well as you need it to. 4GB RAM is an adequate if unimpressive amount (if we were going to upgrade anything, we'd add another 4GB), and while the 320GB hard drive might be cutting corners, it's not going to run out of space unless you consciously fill it with HD videos. Besides which, you can buy an external drive to compensate for a comparatively small amount of money.

Beyond that, it's fairly standard. The 15.6" display is a good size, and the 1366x768 display – while not full HD – is sharp, large and vibrant enough that you probably won't notice that you're getting a slightly lower resolution. Integrated into the top of the screen there's a 720p webcam for video chat, and the laptop has Bluetooth capabilities so that you can attach extra peripherals wirelessly. There's an HDMI-out port, a 4-in-1 card reader, and three USB ports in total (one USB 3.0 and two USB 2.0), so it's compatible with all the latest hardware despite its price. As well as an Ethernet port it also has wireless N built in, so there's no need to buy any extra hardware. Essentially it has everything a modern laptop needs; it just saves on price by having less of it.

Unlike some cheap laptops, this one still has a DVD drive. It isn't strictly necessary for studying, but at least you won't have to buy a separate one to watch films on. At 2.15kg it's not the lightest computer around, but nor is it too heavy to take out and about with you. A smaller battery helps its portability, but it does mean you only get around five hours of use without a mains socket, so beware. It might just about last the day, but an afternoon top-up would be a good idea.

The only real problem is that the operating system is Windows 8.1; hardware like this would benefit from a slightly less resource-intensive operating system, and without a touch-screen it can't even access Windows 8's best features. Unfortunately, there's little alternative to it at this point. If you can handle a Linux installation, this hardware would greatly benefit from one, but even a Windows 7 downgrade would help. Keep that in mind if you're buying one.

All-round Budget Laptop: Asus X551AC (£280+)

Going for the cheapest hardware available might have its advantages, but what are your options if you want something with a little more heft behind it? If you're in the market for a general-purpose laptop that won't break the bank, we think the Asus X551AC is a good choice.

Rather than a low-price, low-performance Pentium or Celeron, the X551AC contains a mobile Intel Core i3-3217U, which is clocked at 1.8GHz and is more than capable of running your operating system, applications and web browsing at a fair pace. You might even squeeze a game or two out of it, though nothing fancy. This CPU gives the system the grounding it needs to have a convincing stab at just about anything you want to do, whereas a Celeron or Pentium will give up. If you're a light-to-moderate user (i.e. planning to use your system most days instead of once or twice a week) then this CPU or a comparable model is the minimum you should be aiming for.

Aside from that, you'll find a lot of similar hardware to other budget laptops. Once again, 4GB of RAM is an adequate amount for a low-price system, but if you can afford more, you'll get a decent performance hike out of it. Adding RAM is one of the cheapest ways to upgrade a system, so do consider it. Although it's not much bigger, a 500GB hard drive is far more convincing than a 320GB one, and it should be more than adequate to run a system off without any particular maintenance with regards to disk space. The screen is 15.6" with 1366x768 pixels (standard for sub-Ultrabook systems), and there's still a DVD-RW and 720p webcam.

The X551AC also runs on Windows 8, but it has an improved touchpad, which helps users take advantage of its touch-features. You can't touch the screen, but a smart gesture touchpad allows you to swipe and pinch as if you were interacting with the screen, which is the next best thing and far more intuitive than a simple mouse-replacement touchpad as found on cheaper laptops.

Asus's X-series is also better suited to entertainment use, particularly thanks to its superior on-board speakers. They use proprietary SonicMaster technology and Asus's AudioWizard to tweak and adjust the audio to give the best sound possible.

Connectivity includes a USB 3.0 port and a USB 2.0 port, Fast Ethernet and wireless N networking, and both VGA and HDMI graphics ports. Storage is augmented by Asus's proprietary WebStorage service, which can sync files across multiple devices, and a 4-in-1 card reader. Like the Lenovo B50, it weighs 2.15kg, and although the battery is slightly better, it still only runs for five hours on a single charge thanks to the greater power demands of the processor.

The only real failing is the lack of USB ports. Two is more than even light users will realistically need, and they're also positioned a little awkwardly. Both are on the left of the device, which means if you want to use an external monitor or a separate input device like a mouse, you have to trail the cord around and hope nothing yanks it in the wrong direction. A minor annoyance, admittedly, but it's a good example of the sort of thing you have to accept at this price.

Still, if the design cuts a few corners, at least you can't fault the internals. A system like this is priced around £300, so while it's almost twice as expensive as the cheapest one on the market, it's definitely worth paying extra for. We'd aim for this type of machine as the minimum you'll need in practical terms. Only pay less if you're desperate for money or don't use a PC often enough to justify spending more than £200.

Cheap Entertainment Laptop: Acer Aspire E1-572 (£370+)

If you want a laptop that'll do more than let you work on it – if you want something that'll be of actual use when it comes to watching movies, playing games and listening to music while you work – then you need something with a little more power behind it. That power comes in the form of an Intel Core i5 chip, more RAM and a bigger hard drive. Core i5 machines start from as little as £370, and we've selected one you should be able to find at exactly that price: the Acer Aspire E1.

The most important component is, of course, the CPU. The Intel Core i5-4200U is clocked at 1.6GHz, and it'll treat most tasks as if they're nothing. Things like HD video and multitasked applications won't even register, and it'll take a huge number of tabs before your web browsing slows down. Without a separate graphics GPU, the potential for gaming isn't large, but the processor is good enough to run indie titles and retro games without any difficulties. It also helps bring out Windows 8's smoothness in design, which is something slower processors can struggle with.

There's still only 4GB of RAM on laptops at this price, mainly because it's an easy place to save money, but as usual if you can upgrade, you should. The 750GB hard drive gives you enough space for running your system and storing games, video, music, and anything else you want to spend your time doing when you're not studying.

Despite the superior internals, it's not a completely different story on the outside when you compare the Aspire E1 to cheaper laptops. Once again we find a 15.6" screen at 1366x768 resolution. An HDMI-out port allows you to connect a high-definition display, and the built-in Intel HD Graphics 4400 chip on the CPU is good for running the video without stuttering or sync problems. It's still cheap enough that it has a DVD player in, but despite this, it's just 25.3mm thin – definitely a step up.

Unfortunately, despite being a little thinner than other cheap laptop models, the Aspire E1 is also heavier: 2.35Kg instead of 2.15Kg. It shouldn't make a massive difference in the long run, but if you're sensitive to weight, it might sway you towards another model.

The DVD-RW drive does have one possible advantage, though: it's M-Disc compatible. M-Disc is an alternative optical disc format that uses discs that have a much longer lifespan than regular DVDs and CDs. Intended for long-term storage, they can survive for hundreds of years without decaying. This isn't likely to be a lot of use for students, but if you want to create ultra-reliable backups of important projects, it might come in useful.

The connectivity and peripherals at this price are noticeably improved as well. A 720p webcam is a standard addition, as is wireless N, but you get gigabit instead of Fast Ethernet, which is especially useful if you're plugging into your halls' network through a wired connection. There's also a fairly standard set of ports: one HDMI, two USB 2.0, one USB 3.0 and a VGA port.

If we were to imagine a typical student user for the Aspire E1, it'd be someone who used their computer for extended periods and who used it most days. Someone who needed a system that could double for a DVD player, television and home cinema, but who also doesn't want to close all of their browser tabs every time they want to watch a film. It's more than capable of being a tool for work and study, and it'll meet the entertainment needs of any average person. Most of all, this is the least you should expect to spend if you want your laptop to just work. There'll be no fighting with the hardware's inadequacies when you're using this system.

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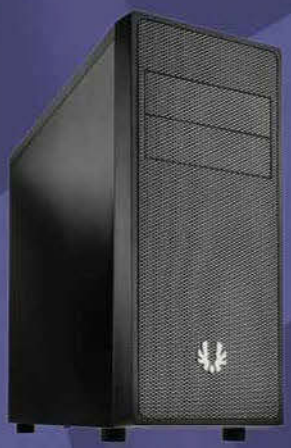

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Gaming-Capable Entertainment Laptop: Asus X550CC (£470+)

If you want a laptop that'll allow you to do everything you want *and* play games, you'll have to start spending serious money. The cheapest reasonable example we've found is the Asus X550CC, and that costs £470 on a good day because it's now well over a year old.

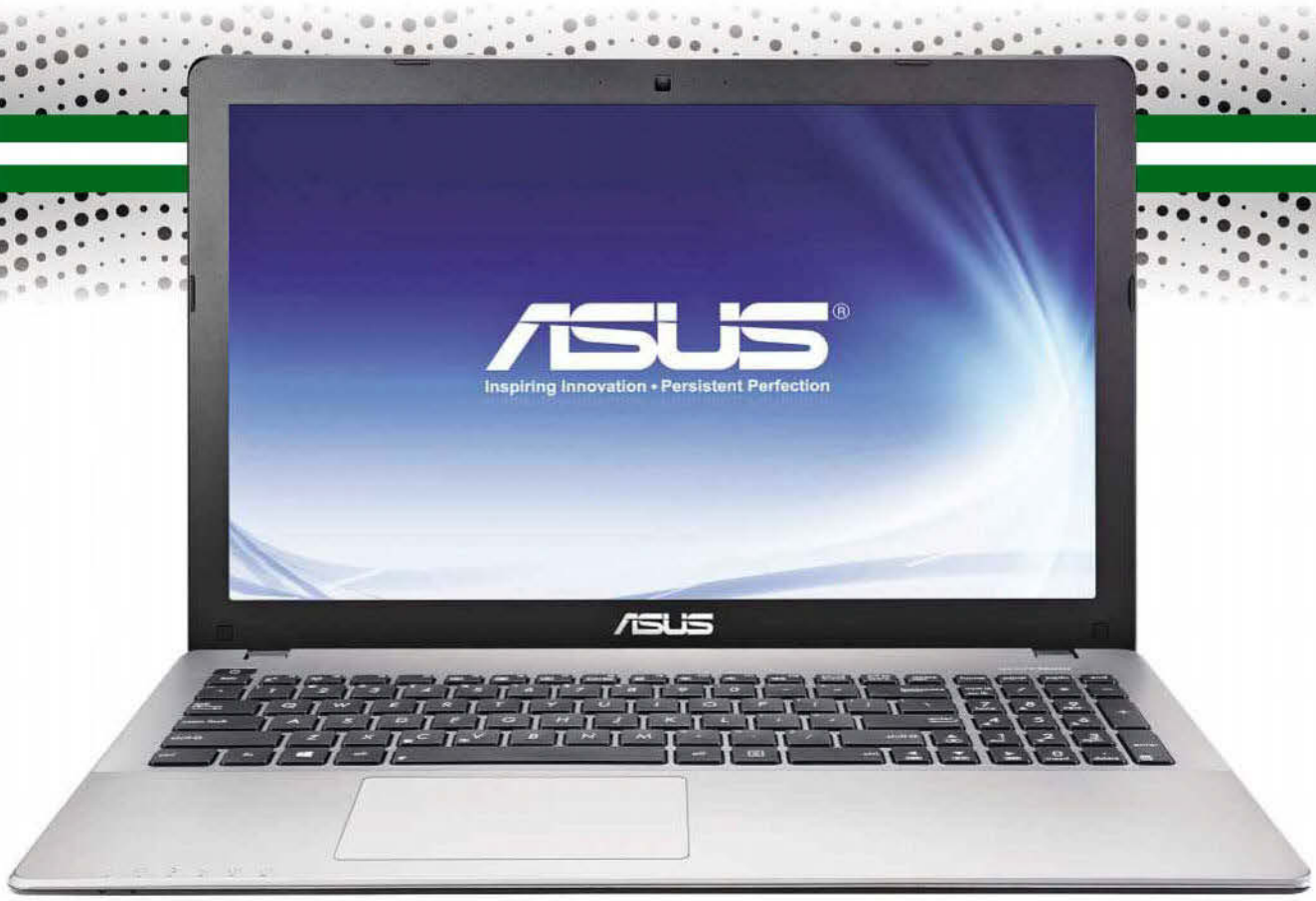
This has the odd effect of meaning that this ostensibly superior laptop has a CPU that's arguably worse than the cheaper version – it's an Ivy Bridge Core i5-3337U clocked at 1.8GHz, as opposed to the (slower-clocked) Haswell chip we saw in the Acer Aspire E1-572. Haswell chips are about 10% faster than Ivy Bridge ones for processing tasks, so the two are very similar in terms of raw processing power. What makes the more expensive system better overall isn't the CPU, though – it's the GPU.

What makes this laptop so much more powerful than its cheaper contemporaries is the Nvidia GT720M graphics processor, which lifts much of the graphical burden off the CPU. As a result, the speed of graphics-intensive tasks is greatly improved. A standard laptop becomes one that can handle gaming to a reasonable degree. High-definition video becomes a cinch to play. Even the operating system's UI is improved, and no matter how many visual effects you turn on, the system will remain smooth and responsive.

This laptop is also the first we've looked at that provides a full complement of RAM. 8GB is enough to meet virtually any consumer need right now, especially if you're running the RAM-hungry Windows 8 (which this laptop is). If you're a student who might find themselves doing visual design work or multimedia editing, those 8GB of RAM will soon show their worth. If not, you can at least be happy they're available to handle your multitasking needs without resorting to slow, disk-churning swapfiles – although should that happen, the 1TB hard drive can more than accommodate.

While the interior is convincingly high end, on the outside things are a little less embellished. This is a laptop that puts the focus on the interior rather than the exterior. So you get the standard 15.6" screen at 1366 x 768 resolution. You get a 720p webcam, smart touchpad and standard optical drive. You get Asus's SonicMaster speakers and WebStorage features. Unlike the cheaper Asus laptop, wireless N is paired with gigabit, rather than Fast Ethernet, but you still only get one USB 3.0 port and one USB 2.0 port.

But the superior performance of the laptop more than makes up for its uninspired exterior. It's clearly aimed at users who want a bargain, rather than a low price, and unlike other systems, which might need significant maintenance (if not a complete replacement!) after a year or two, we can imagine this remaining competitive for the full length of a university course. Look at it this way: while there are things we'd change about the outside (extra USB ports would be particularly welcome), we can't think of anything wrong with the components inside it. That's a pretty good vote of confidence.



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Convertible Laptop:
Lenovo Ideapad Flex 15 (£600+)

The more you spend on a laptop, the more capable they become. At low prices, laptops are more or less competing with tablets in terms of what you can do on them. Get above the £500 mark, though, and the systems become considerably more interesting. Indeed, the Lenovo Ideapad Flex isn't competing with tablets, because in many ways it is one.

The Flex name means that the laptop is a 'dual mode' notebook, meaning it has a tablet mode. It's not like some convertible laptops, where the screen detaches to become a stand-alone tablet. Rather, the screen on the Ideapad Flex is a touch-screen that can be flipped around and folded back on itself to essentially turn the laptop into a tablet-style device.

Admittedly, it's a heavy and quite bulky tablet, but it's got many of the same conveniences: you can easily prop it on your lap while sitting on the sofa or in bed, you can hold it for use on the go, and you can rotate it for portrait or landscape orientation depending on what you prefer.

Hardware-wise, it competes with laptops well above its price. It's got a ten-point touch-screen (perfect for using Windows 8 in tablet mode), an illuminated keyboard, and the CPU is an Intel Core i5-4200U – Haswell based and clocked at 1.6GHz. 8GB of RAM and a 1TB hard drive mean you aren't sacrificing the high-end luxuries for potentially gimmicky functionality, so there's no need to choose between good performance and a feature you might not use.

One thing you don't get is an optical drive. This isn't unusual for lightweight high-end laptops, and it's worth remembering that very little else has fallen by the wayside in favour of the convertible gimmick. Not only does the 15.6" touch-screen compare favourably with every other laptop we've looked at so far (it's the same 1366x768 resolution, but it has vibrant colours and fast response times), it also has a graphics card that's right up to date, coming from NVidia's mobile 800-series. It's technically a GeForce 820M, but you might see it listed as an N15V-GM. Either way, it's a formidable piece of equipment for any laptop.

Other than that, it's fairly standard. Notable features include Fast Ethernet rather than gigabit Ethernet, a super-long nine-hour battery life and Dolby-enhanced speakers. In fact, as laptops go it's actually quite a convincing piece of hardware. It's competing with laptops around a hundred pounds cheaper, but if you use the tablet conversion feature, that's not quite as bad as it sounds. It might actually make using the device more discreet than if you flip open the lid and prop it on your desk. If you can afford the hardware, it's worth trying out. It could be a revelation, but if it isn't, you haven't lost much in taking the risk.

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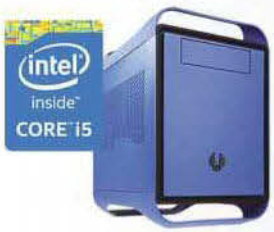

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High-end Laptop: Asus N550LF (£700+)

When you're looking for the best machine you can get to work on, £700 is about as much as you can spend on a system that isn't an excessively overpowered gaming laptop or a deluxe Ultrabook-level device that's priced over the odds. That's not to say that the Asus N550LF isn't suitable for gaming or high powered, because it's quite definitively both.

For a start, it's got an Intel Core i7-4500U chip clocked at 1.8GHz. That's the top tier of mobile Haswell chips, so you won't find better speed or efficiency within the consumer market. As you'd expect, it has 8GB of RAM and a 1TB hard drive, both of which are standard long before you start to spend this much. The 15.6" touch-screen helps you get the most out of Windows 8 too.

As if to bolster this laptop's credibility as a high-end piece of entertainment hardware, it doesn't come with a built-in DVD player. Instead, it has a built-in Blu-ray player. On most of the laptops we've looked at, this would present a slight dilemma due to the screen's low resolution. But in the case of the Asus N550LF, the screen resolution is 1920 x 1080 – perfect for watching high-definition videos and movies.

There are yet more reasons this is a great choice for fulfilling all your entertainment needs. The graphics card, a Nvidia GT745, is good enough to play virtually any game you can throw at it, especially when combined with the Core i7 CPU. Standard speakers are out, and in their place you get four built-in Bang & Olufsen ICEpower speakers, which provide high-quality surround-style audio using nothing but the laptop's hardware.

Furthermore, you don't just get integrated wireless N; you get dual-band wireless N, which allows you to squeeze potentially twice the speed out of your WiFi network. Gigabit Ethernet is, of course, present as well. There are three USB 3.0 ports as well as both HDMI-out and Mini-DisplayPort. Again, everything you'd expect of hardware this price.

One of the few genuine disadvantages is that it's quite heavy. At 2.6kg, it's half a kilo heavier than the cheapest laptops. Mostly that's due to the graphics card and associated hardware, but that knowledge won't make it any easy to carry around with you for a day or two.

Still, if you want a laptop that'll last you the entire length of your course, this isn't a bad one to go for. Its processor and graphics chip are good for a few years yet, 1TB of hard drive space should last a couple of years before it gets filled, and while 8GB of RAM might need an upgrade in a few years, there's space for a second DIMM. We're not sure it's worth a student spending any more on a laptop than this, but if you buy this one, you definitely won't feel as though your money was wasted. **mm**

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TABLETS FOR STUDENTS

A tablet may not be an essential piece of academic equipment, but they're not just for fun, either

The capabilities of tablet devices mean they're still slightly on the side of luxury rather than necessity, but on the other hand there are a lot of ways in which they can make your life easier whether you're studying or using them for recreation. Picking a tablet can be difficult at the best of times, and when you're buying one as a student, the considerations may not be the same as if you were buying one more casually. To try and help you with your decision, we've looked at the most popular tablet and mini-tablet devices and asked ourselves: what would a student want with this?

Mini Tablets

If a device has a screen any less than 8", you'd think of it as a mini-tablet. These (generally 7") devices have been around for a couple of years now and have practically become the default size for tablets, which gives those looking to buy one a lot of choice. The market is also much wider: Apple's dominance doesn't extend to this end of the market in the way it does for full size (generally 10") models. For students, the benefits of mini-tablets are considerable. Primarily, they're cheaper and more portable, but they're also more discreet and compact when you're out and about – and easier to deal with in the limited space of a lecture hall (for example).

Despite this, mini-tablets do have one disadvantage: they're generally too small to work on. Rather than buying a mini-tablet instead of a laptop, you're more likely to buy one alongside it.

Tesco Hudl

Although it's starting to age a bit, the Tesco Hudl was something of a surprise hit when it came out. These days the supermarket giant has compensated for the hardware's decreasing relevance with a £20 price cut, but what that means is that you can get a reasonably convincing tablet for £99, which is a huge bargain.

The idea of a tablet by Tesco might not be particularly attractive on the surface, but in case you've missed the various reviews, let us reassure you: it's considerably better than anything else you'll find at this price or below. Designed as a 'household' device, the Hudl is sold more like a toaster than a computer. It comes in four colours and includes a book of Tesco vouchers, while you can use your clubcard points to obtain a discount of up to 50% off. If you're a cash-strapped student, that could be an attractive offer.

Hardware-wise, it's close in capabilities to some of the more expensive Android mini-tablets. It's got micro-HDMI out and a microSD slot, 16GB of internal storage and a 2MP front-facing camera. One suspects that at just 3MP, the rear-facing camera is a bit of an afterthought, but it's better than nothing. The speakers provide gloriously adequate stereo sound and the resolution of the 7" screen has a decent viewing angle and a 1440 x 900 resolution.

Although the hardware is good, what really pushes the Hudl into praise-worthy territory is its pre-loaded selection of Tesco apps, which includes Blinkbox movies and music. It's not much for gaming or working on, but whether you're playing music, watching a movie, reading Facebook or doing some online shopping, it's got all the capabilities of a larger, more expensive tablet without the price.

Enthusiasts and committed tablet-users will doubtlessly want more out of there hardware, but if you're after a device that can give you portable entertainment and browsing at a low cost, it's ideal. There are various reasons a student might not want it – it's really not a cool brand – but if you don't have a smartphone and want a portable smart device that won't cost a lot, it'll do the job nicely.

Kindle Fire HDX

The latest version of Amazon's Kindle Fire tablet, the Kindle Fire HDX features significant upgrades over the Kindle Fire HD. The screen is now full HD (1920 x 1200), the process or is now a much faster quad-core CPU clocked at 2.2GHz, and there's a built-in microphone as well as the all-important front-facing camera.

At £199, the Kindle Fire HD is still technically competing with extreme budget tablets like the Hudl, but the HDX model is really a salvo at the dominant Nexus 7. Unlike Google's device it doesn't have a rear-camera, although it is available with higher storage capacity. The smallest and cheapest version is a Nexus-matching 16GB, but it also comes in a larger 32GB variety and a Nexus-beating 64GB incarnation, though we find that one too expensive to recommend – it costs at least £259, and as much as £329 with 4G.

In case you're wondering, the Kindle Fire HDX is also the tablet with that rather strange 'Mayday' feature you may have seen, which allows you to video chat (one-way) with an Amazon-trained helper. Not something we're massively keen on doing, but certainly a feature that might intrigue those who have difficulties with tablets in general.

While the higher-end varieties have increasingly little going for them, we can't help but be charmed by the £199 version. Rear camera aside, it's almost as good as a Nexus 7. Amazon's free entertainment packages will definitely provide a way for students to save money, while the added video-chat capabilities give you a way to get in touch with home without spending loads of money on phonecalls.

The only bad thing about the Kindle Fire HDX is that it runs on Amazon's proprietary version of Android, FireOS, which is dumbed-down and somewhat fiddly if you're used to an iOS or standard Android interface. Another concern is over the release cycle. It's now getting on for 10 months old and rumours of a Kindle Fire HDX 2 have been circulating for some time. Buy one in time for University and there's a good chance that you'll find it replaced with a better version for the same price within a month. If you're willing to risk that (or wait for the successor) then the Kindle Fire HDX makes a great student accessory, even if it's only an average tablet.

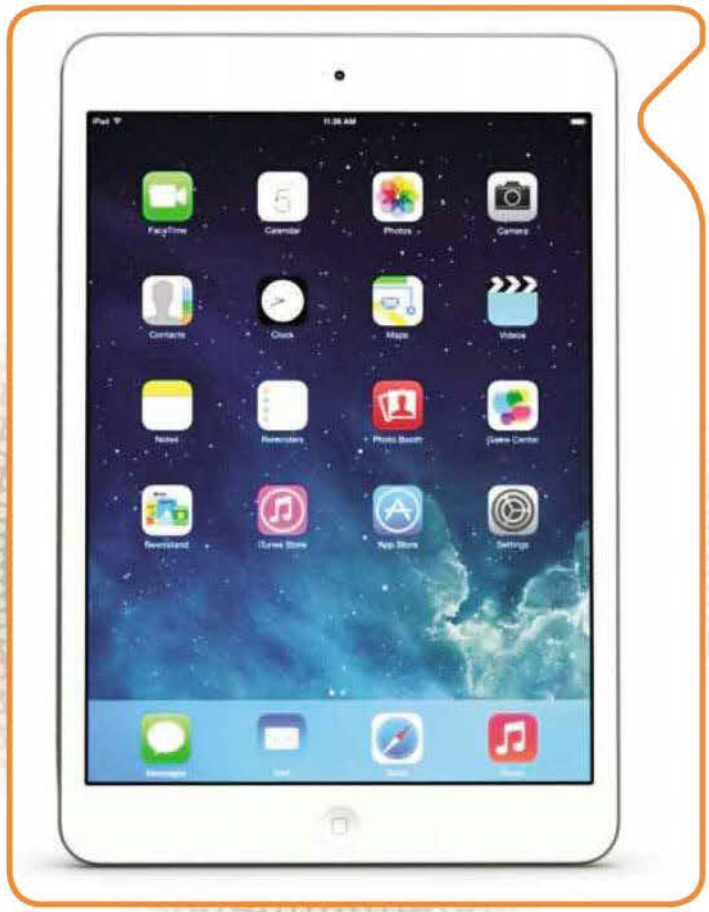
Nexus 7

The Nexus 7 is the device that lit the fuse for the mini-tablet explosion, and while its latest incarnation (it was refreshed in 2013) is still going, there's a definite sense that it's struggling to keep up now that it's more than 12 months old. Still, while it's no longer the strongest choice for people looking for a cheap, light-use tablet, it's undoubtedly the connoisseur's choice of Android tablet, and remains a well-respected piece of hardware.

Unlike cheaper tablets, the Nexus 7 is powerful enough for work and play as well as browsing, emails and video. Because it's maintained by Google (though manufactured by Asus) it also has a 'pure' Android experience, with no custom front-ends and little bloatware. The specs are pleasingly high: 2GB of RAM, a full HD 1920 x 1200 screen and two cameras: 1.2MP front and 5MP rear. Few similarly priced devices can get anywhere near it, even a year on from its original release.

Like its close rival, the Kindle Fire, there's no HDMI-out or MicroSD slot. The latter isn't a huge problem because it comes with a reasonable 16GB by default, with a 32GB version available for the admittedly more substantial-sounding £239. The 32GB model does have the added benefit of coming in 4G variety, too – for £299 you can get Internet access even without a wi-fi connection, and few 7" tablets offer that capability at any price.

Where the Kindle Fire is aimed at families and novices, the Nexus 7 is aimed at people who want the full Android experience, with all the technical features that accompany it. The lack of a Nexus 7 refresh for 2014 has knocked our confidence in the device generally – if they'd come up with one we'd be endorsing it outright as the best mini-tablet – but rumours persist that a Nexus 8 announcement will take the place of a Nexus 7 refresh. Maybe you'll even know by the time you read this. Either way, whether you're buying a Nexus 7 or planning to wait, look out for that. It could be the kind of game-changer the Nexus 7 was.



iPad Mini

To keep matters confusing, Apple has two iPad Mini models. The cheapest, simply called the iPad Mini, is priced at £249 for the 16GB model. It's the cheapest iPad that Apple sells, but the internals are broadly identical to the (full-size) iPad 2, which is now some years old. This cheaper iPad Mini has been superseded by the more powerful, more expensive device Apple calls 'iPad Mini with Retina Display'.

For some reason Apple deems the original iPad Mini to be worth selling in today's market, although we wouldn't be surprised if it disappeared in the next refresh. Its screen resolution in particular (1024 x 768) borders on laughable for a device costing this much. Really, it's Apple's idea of what a low-end device looks like. The problem is that 'Apple' and 'low-end' don't really belong in the same sentence together. It's not just a bad piece of hardware, it's a bad investment all around. If you're that desperate for Apple hardware at a low price, a second hand one would make far more sense.

The iPad Mini Retina (as we'll refer to it from now on) is an altogether different prospect. Aside from a sky-high price of £319 for the 16GB version, it's far more competitive – though as mini tablets go, that high price is hard to get past. The retina display (2048 x 1536) is easily the best screen you'll find in a mini-tablet, and its 64-bit Apple A7 is one of the best processors too. Larger storage capacities are available up to 128GB if you want to pay £559, and you can add 4G onto any device for an extra £100.

The cost makes the iPad Mini Retina is strictly for those who want a small tablet for practical rather than financial reasons, and in that sense it's hard to recommend – particularly for students. The mini-tablet form is mainly attractive because of its ability to offer significantly lower prices in return for its compromised form factor, but if you're not bothered about low prices then you only have to spend £80 more to get a 9.7" iPad Air of equal capacity and superior capability.

What we have, then, are two devices that aren't of particular use to students. One iPad Mini that's massively underpowered and another that's massively overpriced. Access to iTunes U aside, the only reason you might want to go with one of the iPad Minis over any other mini-tablet is if you've already got an iPhone and want your apps and content to sync without any difficulty. If that's worth spending an extra £50-£120 minimum to you, fair enough. We're not so sure it is.

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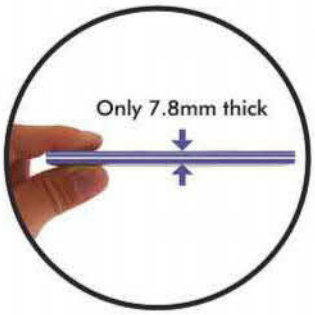

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Full-Size Tablets

Any tablet 8" or larger can be considered a 'full size' device. Their size, cost and greater performance capabilities tends to mean that these tablets are bought instead of, rather than in addition to a notebook PC. In an educational context, they're mostly useful because you it's easier to do your work on them. Combine a full-size tablet with Bluetooth keyboard and you essentially have a system that competes with low-end notebooks in a fraction of the space.

iPad Air

Apple's flagship tablet is due a refresh soon, so now isn't necessarily the best time to buy one. Nonetheless, if you're eager to get a tablet and you're already plugged into Apple's ecosystem through a Mac or an iPhone, this is undoubtedly the one to go for. Everyone else will have to make some hard decisions about whether it's worth the money.

Physically, there's little to complain about: the iPad Air weighs just 469 grams and features a 9.7" screen, and at 7.5mm thick it's one of the thinnest tablets around; at less than a quarter of the weight of an average laptop, it's hugely portable. Unlike earlier iPads, the iPad Air can be comfortably held in one hand, which greatly improves its appeal.

Students will no doubt be pleased that they get free access to Apple's full office suite (Pages, Numbers and Keynote), their multimedia apps (iMovie, Garageband and iPhoto) and their full library of lectures, notes and reference materials on iTunes U. It's everything you need to make your iPad into the ultimate studying accessory.

Internally it's also a major upgrade on previous iPads. The iPad Air was the first to contain both a 64-bit CPU and an Apple M7 motion coprocessor, which extends the device's ability to detect and monitor movement. Peripheral-wise, things look surprisingly familiar: the display is a typical Retina screen with a resolution of 2048 x 1536, and the cameras are the same 1.2MP front / 5MP rear that have been in the iPad for some time now.

The cheapest version of the iPad Air has a standard 16GB of storage and wi-fi support only, priced at £399 in black/space grey or white/silver colour combinations. It also comes in 32GB, 64GB and 128GB varieties, and each is available with or without 4G. The most expensive version of the iPad Air (4G, 128GB) costs an eye-watering £739. But then for Apple hardware, that's to be expected.

It's not unreasonable to call the iPad Air a contender for the best full-size tablet on the market, though it really comes into its own if you have an iPhone or existing iPad that you can synchronise content with. It's expensive, but you are paying for quality as much as the name. The truth is that even after almost a year on the market, no full-size Android tablet can convincingly best the iPad Air. If you can afford one and don't feel tied into Android by your phone, it's worth going for. The only thing that might put students off is the price, but when you can get this much use out of a device it'll practically pay for itself.

Amazon Kindle Fire HDX 8.9

Although it's best known as a mini-tablet, the current version of the Kindle Fire (the Kindle Fire HDX) is also available as an 8.9" device – comfortably within the criteria for full-size tablets.

The key difference is, of course, the screen. It's 8.9" in size with a resolution of 2560 x 1600, but that's not the only thing that's changed from the smaller Kindle. To compensate for the increased power draw of a larger screen (and take advantage of the extra space available) the Kindle Fire HDX 8.9 also has a larger battery, which gives it about an hour's extra use over the 7" version. In addition, you'll find an 8MP rear camera as well as the standard front-facing 1.2MP camera.

Of course, with these extras come some slight disadvantages. The Kindle Fire HDX 8.9 is heavier than its more compact siblings, though not as much as you might think. The difference is a surprisingly conservative 70 grams, pegging it at 374g total. Much lighter than an iPad Air, if nothing else.

A bigger concern is the price. The cheapest version (the 16GB model) costs £130 more than the 7" HDX, and because it's got the same CPU displaying more demanding visuals it's actually a little slower. Like the standard HDX, it comes in 16, 32 or 64GB versions, each with or without 4G. The most expensive combination costs £479 at RRP, which isn't bad (and it's currently discounted to £429, which is only £30 more than the most basic iPad).

Despite some competitive pricing, the HDX 8.9 is still a tough sell. If you love your existing Kindle Fire and simply want one with a larger screen, it's worth the upgrade, but when you place it against other large-form tablets it hasn't really got the capabilities to compete. It's not really designed for working on, and the slow processor can't quite handle that sort of use. Not least because of Amazon's overly simplified FireOS, which is more focused on entertainment than productivity.

In short, it looks like a full-size device, but it still handles like the mini-tablet it is underneath. If you're planning to use it for media and light browsing, that's fair enough, but the contradiction here is that the Kindle Fire HDX 8.9 is priced like a laptop replacement system even though it isn't one. You won't be doing much work with this one, and at a price point above £300, that, unfortunately, is what we're looking for.

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Samsung Galaxy Tab S

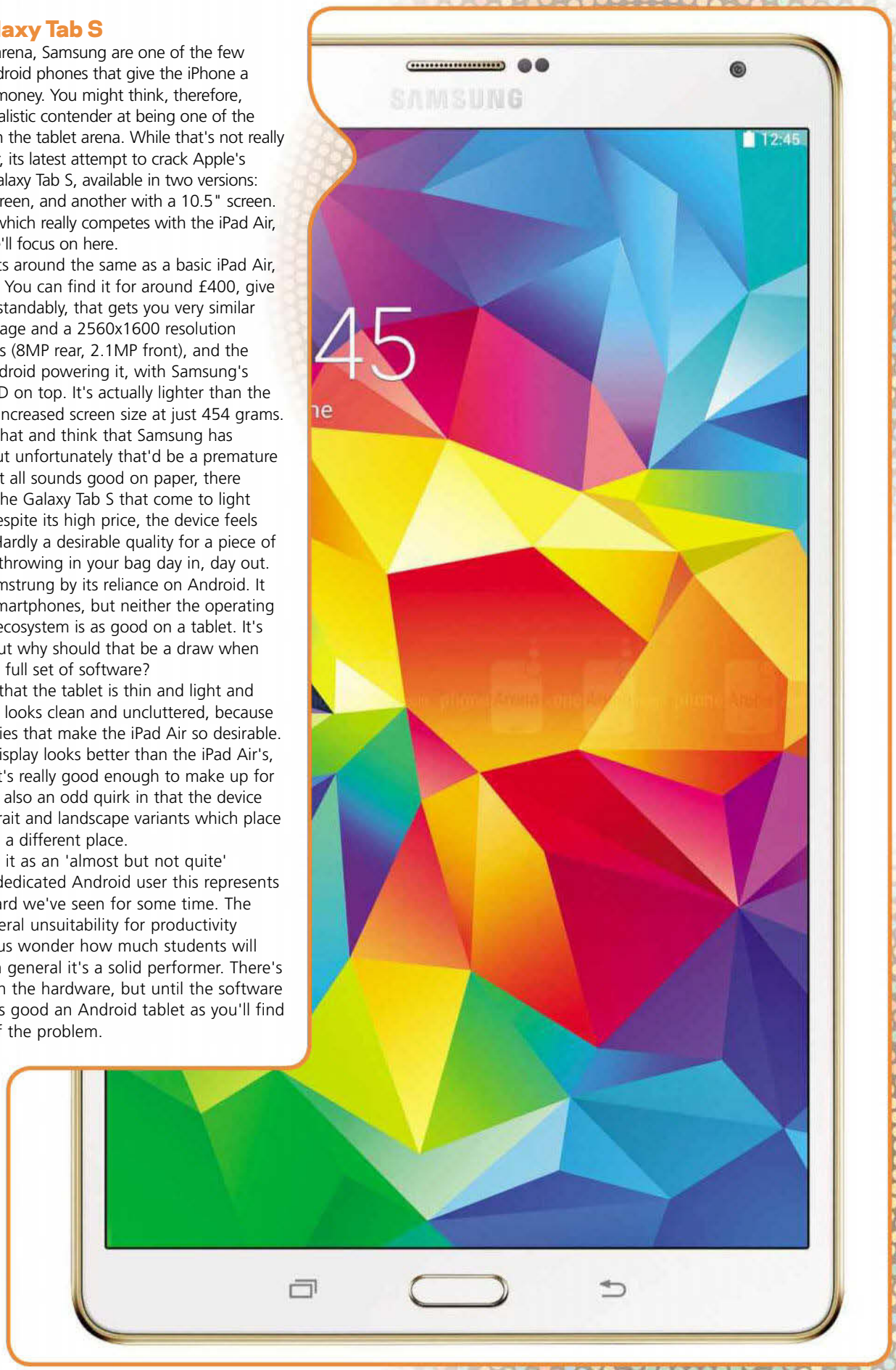
In the smartphone arena, Samsung are one of the few companies with Android phones that give the iPhone a genuine run for its money. You might think, therefore, that it could be a realistic contender at being one of the dominating forces in the tablet arena. While that's not really been the case so far, its latest attempt to crack Apple's dominance is the Galaxy Tab S, available in two versions: one with an 8.4" screen, and another with a 10.5" screen. Since it's the latter which really competes with the iPad Air, that's the model we'll focus on here.

Price-wise, it costs around the same as a basic iPad Air, if not slightly more. You can find it for around £400, give or take £20. Understandably, that gets you very similar specs. 16GB of storage and a 2560x1600 resolution screen, two cameras (8MP rear, 2.1MP front), and the latest version of Android powering it, with Samsung's popular TouchWiz ID on top. It's actually lighter than the iPad Air despite its increased screen size at just 454 grams.

You might read that and think that Samsung has finally cracked it, but unfortunately that'd be a premature assessment. While it all sounds good on paper, there are problems with the Galaxy Tab S that come to light when you use it. Despite its high price, the device feels flimsy and fragile. Hardly a desirable quality for a piece of hardware you'll be throwing in your bag day in, day out. It's also actually hamstrung by its reliance on Android. It might do well on smartphones, but neither the operating system nor its app ecosystem is as good on a tablet. It's improving slowly, but why should that be a draw when Apple already has a full set of software?

It's encouraging that the tablet is thin and light and has an exterior that looks clean and uncluttered, because those are the qualities that make the iPad Air so desirable. Yet, although the display looks better than the iPad Air's, there's nothing that's really good enough to make up for the failings. There's also an odd quirk in that the device comes in both portrait and landscape variants which place the home button in a different place.

While we'd class it as an 'almost but not quite' device, if you're a dedicated Android user this represents the best leap forward we've seen for some time. The high price and general unsuitability for productivity applications make us wonder how much students will get out of it, but in general it's a solid performer. There's nothing wrong with the hardware, but until the software catches up this is as good an Android tablet as you'll find – and that's part of the problem.



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Sony Xperia Z2 Tablet

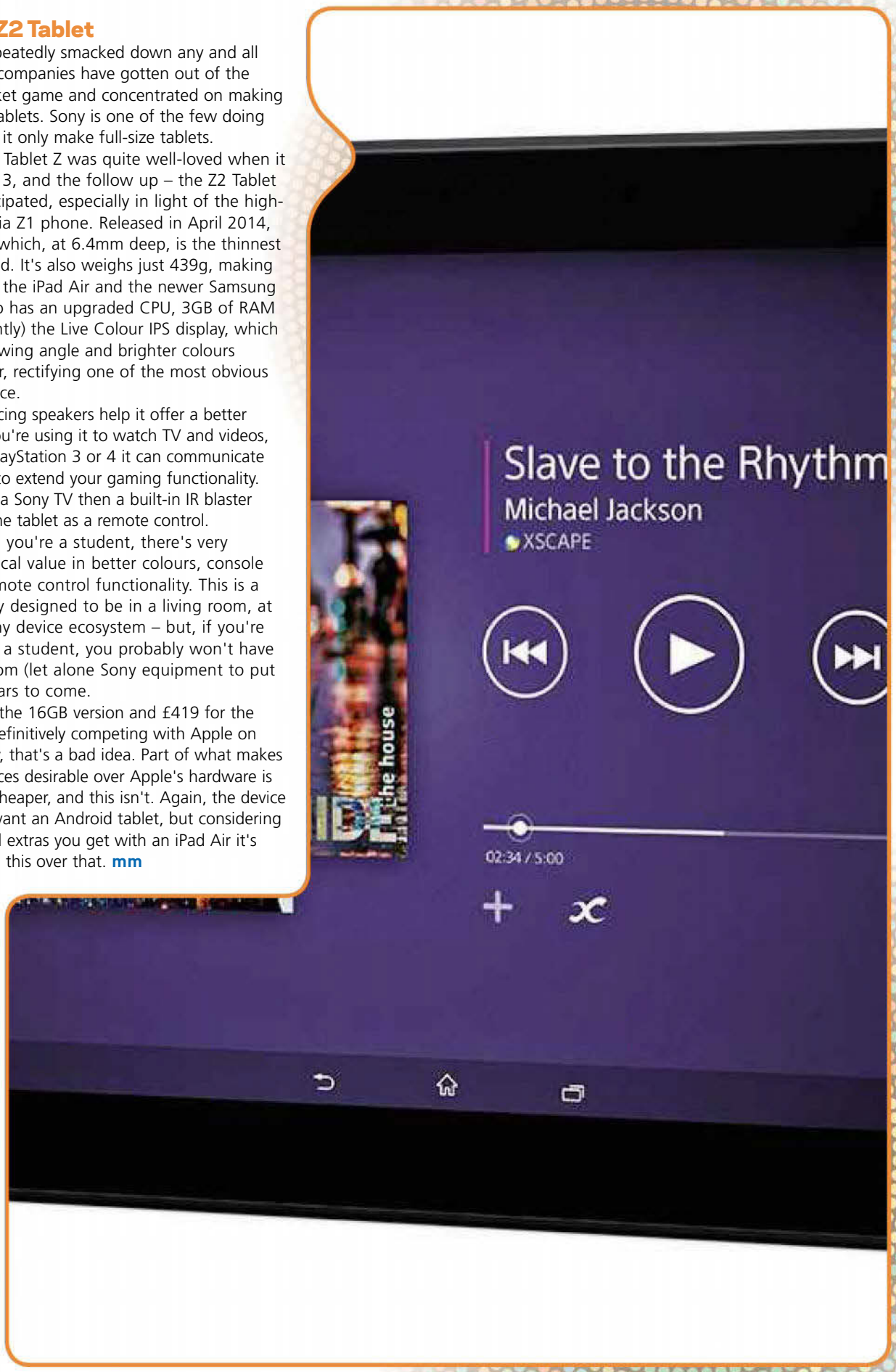
Since Apple has repeatedly smacked down any and all competition, most companies have gotten out of the full-size tablet market game and concentrated on making inroads with mini-tablets. Sony is one of the few doing the exact opposite; it only make full-size tablets.

The Sony Xperia Tablet Z was quite well-loved when it arrived early in 2013, and the follow up – the Z2 Tablet – was eagerly anticipated, especially in light of the high-quality of the Xperia Z1 phone. Released in April 2014, it's a 10.1" device which, at 6.4mm deep, is the thinnest tablet ever produced. It's also weighs just 439g, making it lighter than both the iPad Air and the newer Samsung Galaxy Tab S. It also has an upgraded CPU, 3GB of RAM and (most importantly) the Live Colour IPS display, which gives it a better viewing angle and brighter colours than its predecessor, rectifying one of the most obvious failings of that device.

The Z2's front-facing speakers help it offer a better experience when you're using it to watch TV and videos, and if you have a PlayStation 3 or 4 it can communicate with the hardware to extend your gaming functionality. Indeed, if you have a Sony TV then a built-in IR blaster allows you to use the tablet as a remote control.

Of course, when you're a student, there's very little obvious practical value in better colours, console integration and remote control functionality. This is a device that's clearly designed to be in a living room, at the centre of a Sony device ecosystem – but, if you're just starting out as a student, you probably won't have your own living room (let alone Sony equipment to put in it) for several years to come.

At £399 RRP for the 16GB version and £419 for the 32GB version, it's definitively competing with Apple on price. Unfortunately, that's a bad idea. Part of what makes Android-based devices desirable over Apple's hardware is that they're much cheaper, and this isn't. Again, the device itself is fine if you want an Android tablet, but considering the student-focused extras you get with an iPad Air it's hard to recommend this over that. **mm**



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THE STUDENT GADGET GUIDE

With the right technology, you can make studying a more pleasant affair. James Hunt looks at what's available

When you become a student, your life gets immediately more complicated. Luckily, that provides the perfect excuse to furnish yourself with a variety of gadgets to try to make it much less complicated. Whether or not that works, it's fun to try – and besides which, that student loan needs to get spent on something. That's why we've picked out some of our favourite student-friendly gadgets to try to help you start as you mean to go on: fully prepared and laden with consumer hardware.

Student Security

One of the unfortunate realities of student life is that you're an easy target for criminals. With large numbers of people in close proximity, most of whom are carrying laptops, phones and tablets in easily snatchable rucksacks, the right student union can be a field day for the opportunistic thief. Rather than leave it up to sheer numbers to reduce your chance of being a victim of crime, there are ways you can protect your stuff from theft using some simple and cheap gadgetry. After all, prevention is better than cure!

Kensington ComboSaver Notebook Lock

When you're a student, your laptop can quickly become your life. It helps you communicate with friends, enjoy movies and television, and there's probably something about doing work on there too. But laptops are easy to fence and light enough for a quick getaway, which makes them a particular target for campus theft.

Luckily, there is a way you can prevent your laptop from

being stolen, and that's by using Kensington's signature lock. Never again will you have to worry if you step away from your laptop to get a book or drink. Simply attach the lock, and any would-be thieves will be thwarted.

The ComboSaver lock is great for students, because there's no need for a key. The means to unlock your laptop can't be stolen or lost by accident. All you have to do is keep the code in your head. The 1.8 metre self-coiling cable means you shouldn't have any trouble anchoring your laptop somewhere, while the slim lock head makes it a good fit for all sizes of laptop – even ultrabooks and other slimline models – and it's compatible with the security slot on most, if not all consumer laptops models and makes.

The retail price of £19.99 isn't bad, but if you shop around you should be able to find it for less than £15. Set against the price of a completely new laptop, it barely compares. Whether you're at university or not, this is one piece of hardware that anyone who uses their laptop in public should get hold of.

Philips InRange

If you've spent a lot of money on hardware or you're carrying around something that's particularly precious to you, the last thing you want is to lose track of it. Not least because that student loan only stretches so far, and replacing your beloved tech isn't cheap. The Philips InRange can't protect you from a moment of forgetfulness or stop you lowering your guard at the wrong time, but it can reduce the chance that it'll end in frustration for you.

All the InRange does is tether itself over Bluetooth to your preferred wireless device. Paired with its 'Smart Leash' software, you'll receive an alert the very moment it goes beyond a certain range of your hardware, alerting you to its location and allowing you to quickly locate or retrieve your items before they're gone forever. Place it in your bag, slip it onto a keyring, even slip it in between the pages of a book. You'll never have to worry about getting separated again.

The behaviour of the InRange is configurable to a large extent. You can set times for it to automatically deactivate or hit a button to instantly sound the alert, so you can find an item you've lost. The InRange card is the same size as a credit card and thin enough to slip into a wallet or travelcard case without any difficulty. The battery lasts for months between top-ups, and you can pair up to three InRange cards to a single device, so you'll never have to choose between your bag, tablet and wallet.

> **“Laptops are easy to fence and light enough for a quick getaway, which makes them a particular target for campus theft”**

Smart Safe

We've already established that students are an easy target for thieves, and that doesn't just apply when you're out on campus; it's also a problem in halls of residence. Lots of people are coming and going, there are unfamiliar faces everywhere you turn, and every room is a treasure chest of valuables. For these reasons, it's always a good idea to keep your valuables somewhere they can't be easily seen – but while a shoebox under the floorboard might be traditional, it's hardly appropriate for the high tech age.

Rather than face the inconvenience (and potential security weak point!) of a safe with a key that could get lost, stolen or forgotten, why not buy a Smart Safe instead? For £19.99, you can get your hands on one of these devices, which combine the simplicity of a regular safe with the unbreakable security only a digital device can provide.

So how does it work? Well, a slot in the top of the case provides a

docking port for your smartphone, be it Android or iOS, while the company's free app allows you to set a keycode that prevents the safe from opening. All you have to do is plug in your phone and enter the keycode and the safe will unlock. It's not exactly Fort Knox, but it makes for a difficult-to-circumvent, secure storage locker that will deter casual thieves and snoopers (so it's ideal for households and flats where you're sharing with people you've only just met). And hey, if it makes security fun too, that's just an added bonus.

In Your Room

For most people, the time they go to university will be the first time they've ever lived by themselves. That situation comes with many responsibilities and challenges, but it also comes with the opportunity to finally take control of your own living space. Whether you want to make your room stand out from the rest or just make sure it's a haven where you can get away from the stresses of study, we have the best gadgets to help make that happen.

USB Fridge

One of the downsides of shared accommodation is that you can't leave your room without the risk of bumping into someone. This is fine if you're feeling social, but when you just want to be left alone to work, it can mean the difference between getting your revision done and waking up the next morning with a traffic cone in your room and no memory of how it got there. An in-room fridge is the ultimate student accessory, and while mini-fridges are banned in most halls, no one can do anything about something as innocuous as this: the USB mini-fridge.

Powered entirely over USB, this fridge is the perfect size for a single 330ml can, a few bars of chocolate or whatever else you fancy. You can use it to keep parts of your lunch fresh, save a snack for later or just to make your friends jealous. The built-in cold plate starts chilling within seconds of being plugged in and maintains a temperate of just a couple of degrees without any difficulty.

In case you're wondering, it's only taking power from USB, so it's completely driver-free to activate and works on virtually any port, whether that's on a computer, TV, printer or anything else. It doesn't even need to be that close to a USB socket to work, because it comes with a 4ft cable so that you can easily trail it from your desk to the floor without having to drill a hole or balance it precariously. It won't just keep your drink cool; it'll impress your friends as well.

> **One of the downsides of shared accommodation is that you can't leave your room without the risk of bumping into someone**

Quirky Plug Hub

When you've only got one room to live in, it's a safe bet that you'll find yourself with a lack of plug sockets sooner or later. At the same time, you'll be tripping over all the cables you have plugged in from phone chargers, lamps, laptop power supplies, TV, speakers and whatever else needs power. Luckily, you can solve these two problems in one go: the Quirky Plug Hub.

Rather than let you drown beneath a tide of cables, chargers and plugs all fighting for socket space, the Quirky Plug Hub allows you to organise them all in one fell swoop. Multiple plug sockets allow you to plug in several devices at once, while the cable guard allows you to thread cables through so they don't get tangled up with one another. Built-in cord anchors help you keep excess cabling neatly out of the way, and three openings to choose means you can organise even further.

The Plug Hub is perfect for under-desk management, with a

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rubberised base that prevents it from slipping and the ability to be mounted on a wall if you need extra stability (though don't try that in rented accommodation unless you want to pay). It's not the most exciting gadget, we'll fully admit, but in terms of usefulness, we can't think of many that'll be more useful to practically every student around.

> **If you've ever lived in a student house or halls of residence, you probably know why headphones you can wear to bed are a good idea**

Google Chromecast

Google's Chromecast plug-in has only recently made it to the UK, but it's already proving an absolute godsend to anyone who tries it out. It's an HDMI dongle, which allows you to stream and share content to any screen with an HDMI-in port, effectively turning that device into a smart TV. If you don't have the space (or money) for a smart TV (for example, if you're a student), then it should quickly become clear what this is useful for.

What the device actually allows you to do is wirelessly transmit the visual output of any smartphone, tablet or PC to an HDMI-enabled monitor or TV using your existing wi-fi network. That means you can show off your photos, play media and stream content from apps like Netflix or iPlayer directly onto your TV. You could even use it to play compatible smartphone games on a TV like it's a regular console!

Admittedly, if you own a smart TV or some kind of set-top box already, you might find it can already do these things. But if you're one of the majority of people still using a normal, non-smart TV and don't fancy dropping a few hundred pounds to replace it, this might well be the next best thing. Not only is it substantially cheaper than buying a smart TV, it's also considerably more compact than one (or indeed, any similar set-top box). A wide range of compatible software means you can customise and modify its behaviour to suit your needs. As all-purpose entertainment hardware goes, it has the greatest potential of anything we've seen for a while.

SleepPhones

If you've ever lived in a student house or halls of residence, you probably know why headphones you can wear to bed are a good idea. If you haven't, well, try to imagine what a party sounds like when you're in the room next to it. Now try to imagine that happening while you're trying to sleep. At 4am. And you have to be up for a lecture at 9am. That's why a pair of headphones you can wear to bed is a good idea. If you can't get silence, at least you can control what noise you're hearing.

If you want to try wearing headphones to bed without the risk of yanking your phone off the nightstand whenever you turn over or having the earphones drop out just as your head hits the pillow, then SleepPhones are the answer. For £30, you can buy a pair of these headband-like devices which incorporate two discreet speakers. They can pipe music, ambient noise, podcasts or anything else you desire directly into your ears as you sleep.

SleepPhones are machine-washable and available in a variety of colours and sizes from extra-small to extra-large (although the medium is likely to be enough for most people). The Bluetooth versions work best, but if you want to save money and don't mind tucking your phone under the pillow you can get a cheaper wired pair.

Duronic ACB17 Bluetooth Clock-Speakers

While getting to sleep can sometimes be difficult for students, it's more likely the case that the opposite is true. Trying to get up after a late night is several times harder when you don't have a

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parent or sibling nagging you, so you need to make sure you have a good alarm clock. And while you're at it, why not get yourself a good pair of speakers too?

That's why we think you should consider the Duronic ACB17 Bluetooth speakers, which have a built-in alarm clock function and radio capabilities, as well as a dock for your phone, with two USB charge ports and an aux-in socket. Use it as speakers, an alarm clock, a radio or all three at once, and combine with your favourite alarm clock app to make sure you get out of bed in the morning. You can't muffle this one under your pillow.

It's loaded with features too. The soft white LED clock dims during the night so that you'll never find yourself blinking just to look at it, while the bass-suspension speakers mean that when the morning comes, you'll be appropriately visited by the most bone-rattling sounds you care to inflict on yourself. Or, if you prefer, an FM tuner will gently awaken you with the irritating sounds of breakfast radio. No

> **Of all the available ereaders, it's Amazon's that provides the simplest user experience**

student likes getting up early in the morning, but at least with the Duronic ACB17 you'll feel like you're doing it in the best way possible.

Around The Campus

If anything's true of life at university, it's that you'll spend as much time out of your room as in it. No student is complete without their well-stocked rucksack, and that means making the most of the limited space available to you. In this section, we've picked out our favourite portable gadgets to ensure you get plenty of use out of everything you carry with you!

Kindle / Kindle Paperwhite

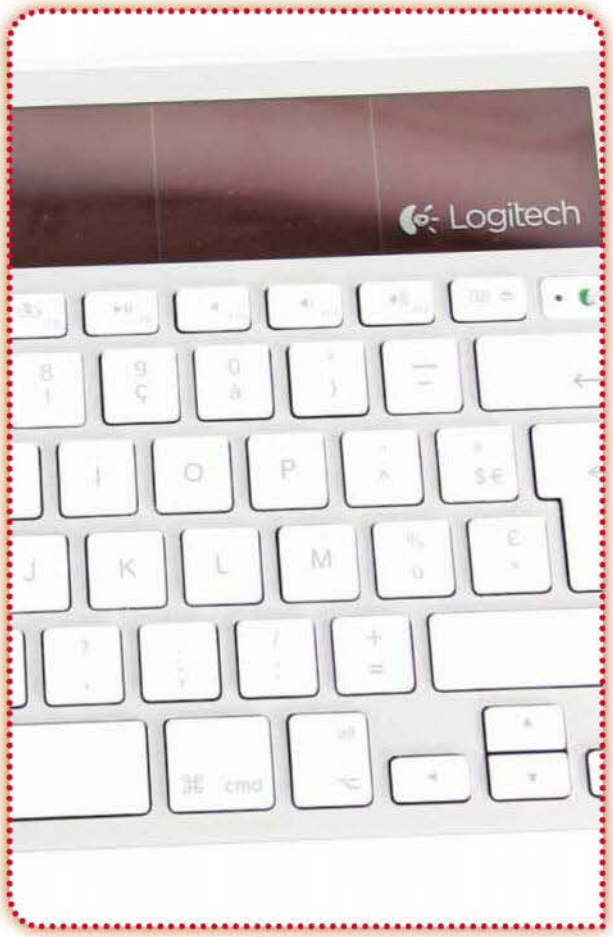
Students are expected to read a lot of books, and nothing's more frustrating than forgetting the one you need – except, possibly, having to carry several books around in your rucksack at all times. Rather than weigh yourself down, it makes a lot of sense to buy an e-reader to take with you wherever you go. And of all the available ereaders, it's Amazon's that provides the simplest user experience.

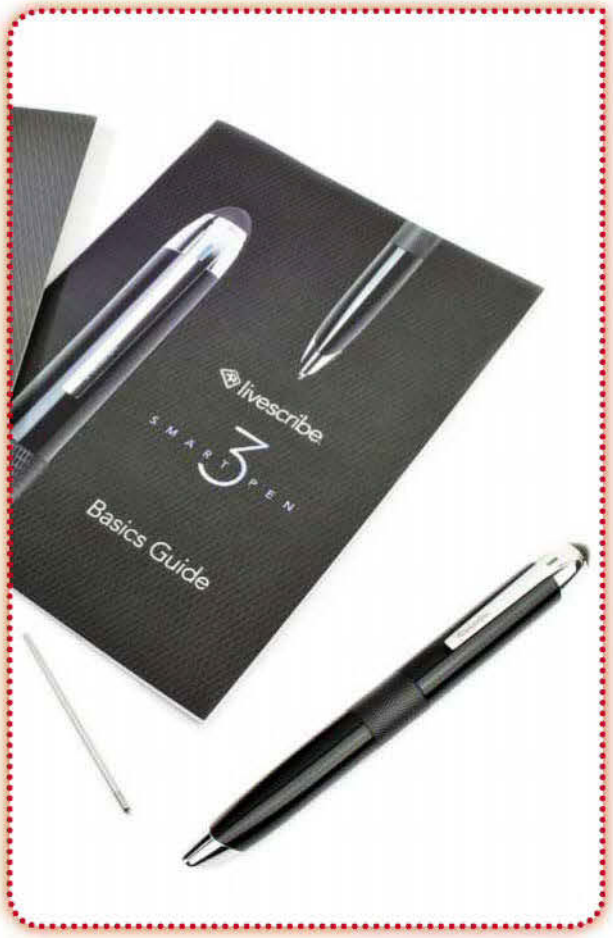
The device comes in two main varieties: the standard Kindle and the Kindle Paperwhite. The current iterations are the fifth-generation Kindle and the 2013 Paperwhite (sometimes colloquially called the Paperwhite 2). Remember that the Kindle Fire devices are a different line altogether; they're more conventional tablet PCs, which lack the E-Ink displays that make Kindles so perfect for reading on.

The Kindle (5th Gen) was released in September 2012 and was fundamentally quite similar to previous Kindle designs. The biggest difference is that it was made available in black, rather than silver-grey, matching the Kindle Paperwhite. It also featured hand-tuned fonts, 15% faster page loads and a slightly lighter overall weight – just 170g. If you're planning to buy one, it'll set you back just £59, and for the discount you get over a Paperwhite, it's definitely the student-friendly option.

By comparison, the current Paperwhite is the latest Kindle hardware. Released in September 2013, it was refreshed a few weeks ago with twice the storage (now 4GB instead of 2GB). This has caused some analysts to suggest that there won't be any new Kindles this year, which means now's a good time to buy either version. They'll remain the most up-to-date versions for some time yet.

In terms of actual improvements, the current Paperwhite features a higher-contrast display than the standard Kindle and a better version of the original Paperwhite's light-up screen that allows it to be read in the dark or in otherwise poor light. A faster CPU gives it quicker page turns and a quicker response to touch input. It's also





£50 more expensive, though, which is almost twice the price of a standard Kindle. Unless you have a roommate who's likely to be upset by late-night cramming, we think it makes more sense for students to save the money!

Logitech K760 Solar-Powered Keyboard

Not everyone wants to carry a laptop around with them all the time, but trying to work on a tablet can be a mug's game. Luckily, a Bluetooth keyboard bridges the gap between tablet and laptop, allowing you to write essays, emails and revision notes without the bother of strapping a computer to your back every time you leave the house.

So once we've established that you need a Bluetooth keyboard, the question remains: why this one? Well, one of the most frustrating things about any Bluetooth device is that even once you have gotten rid of any cables for communication, they still need to be powered. You've effectively swapped the inconvenience of wires for the inconvenience of swapping or charging batteries.

The Logitech's K760 has effectively cracked this problem. As Bluetooth keyboards go, it's not especially different from the rest of the pack. Visually, it adheres to the minimalist Apple aesthetic, it's compatible with the standard range of devices, and it doesn't have any particular portability gimmicks. It does have a multi-device switcher, so you can pair it with multiple systems and swap between them in a single button press, which is a particularly useful function, but that's far from unique.

But the way it rises above the competition is in the way it powers itself: there's a built-in solar panel, which allows it to generate electricity using nothing but the light in a room. You might be concerned if you don't plan to use it outdoors, but don't be – a full charge allows it to operate for three months even in total darkness, so even low light is enough to keep it going. As we say, it might not particularly stand out as a keyboard, but this feature is enough to transform it from average into superior.

> **“Not everyone wants to carry a laptop around with them all the time”**

Livescribe 3 Smartpen

Have you ever wished there was a way you could combine the comfort and speed of writing on paper with the practicality of taking notes on a tablet? If so, then we have good news for you: the Livescribe 3 Smartpen allows you to do just that. It's quite clearly the ultimate lecture accessory.

Don't go thinking that the Livescribe 3 is a mere stylus, though. It's actually a real ballpoint pen, only in this case it's one with a Bluetooth sensor which, if paired with your smartphone or tablet, allows you to transfer your sketches and writing directly to the associated app to be manipulated or saved. Notes become searchable, images become saveable. It's a great idea, giving users the ability to write normally and take easy advantage of smartphone features.

One slight concern is that Livescribe seems eager for you to use its special paper, which is (predictably) more expensive than regular paper. But, on the other hand, given that the dot pattern is what makes it special, it wouldn't be hard to make your own, especially if the campus photocopiers are available to use.

The pen is available in black and chrome and comes with its own mobile app and 50 pages of Livescribe Startpaper in a 50-page notebook. It charges over USB, and if you want a hard copy, all you need to do is insert an ink cartridge and use it like a regular pen. The basic version costs £129.99, while the pro edition (which is darker in colour, has twice as much paper and a free portfolio) costs £169.99. It's expensive, especially for a student, but you won't find features like this in a standard biro. **mm**

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Great-looking and incredibly well made, the Azure ships with a high-quality TV for a great price

STYLISH BED, STYLISH BEDROOM

As the television set rises, the power is switched on automatically. In its viewing position, the TV sits flush with the rest of the bed's footboard on its own platform, at a comfortable angle whether you're sitting or lying in bed. Once you're finished, one-button touch lets the TV glide back down, automatically switching off the power. Whether the TV is in use or stored away, the top of the footboard is flat, so there are no ugly gaps. The TV Bed also holds the patent for the slimmest footboard (just 140mm at its deepest point). So unlike other products on the market, your bed looks elegant and sleek, just like the rest of the room. Easy-to-use cable management within the frame also ensures there are no messy wires showing.

There are four different models of TV Bed so you can find one to suit your style, including The Belmond's steel four-poster design. Simple and elegant, all four designs are available in a range of modern colours and a leather-hide finish.

A PERSONAL TOUCH

Standard bed sizes from doubles to emperor beds are all included in the TV Bed range, and you can choose from a series of premium mattresses to suit your needs. Matching bedside drawers are also available. For the truly personal touch, you can order a bespoke size or finish for your TV Bed and mattress. The handcrafted, UK-based production process allows for all kinds of made-to-order options – you can even order a colour, finish or cover for your bed to match your existing bedroom's décor.

QUALITY IN THE DETAIL

Everything about the TV Bed is designed for you to get the best TV and the best bed. Every TV Bed is built with the latest Samsung 32-inch LED television, for lasting high performance. When you order, you have the option to upgrade the television to the latest 32-inch Samsung Smart TV with Wi-Fi. The television cabling is safely housed within the bed's frame and designed so it's easy to switch from watching TV to DVDs to playing games or even using the internet.

The TV Bed has all you need to keep you in touch with the latest home entertainment, day and night.

A CUT ABOVE THE REST

Since the TV Bed company was founded in 2003, many other companies have started to produce similar products. However, the original TV Bed remains the best-selling range on the market, and for good reason. Based just north of London, the company makes its beds by hand in the UK, sourcing components from the best suppliers at home and abroad. For example, the motor is German engineered and the hatch hinges are precision-made in Austria to ensure the best glide-up, glide-down performance every time you want to watch TV. Along with high-quality wooden frames and upholstery accredited by the UK Leather Association Federation, it's details like these that have set the TV Bed apart from the rest of the market.

EXPERT REVIEW

★★★★★

David Ludlow says 5/5 stars for the TV Bed

David Ludlow at expertreviews.co.uk tested the Azure model in the TV Bed range, assessing it for its entertainment performance but also reviewing it as a key item of home furniture. "Great-looking and incredibly well made, the Azure ships with a high-quality TV for a great price."

There couldn't be a better time to discover the luxury, ease and everyday pleasure of having a well made, hand-crafted TV Bed in your home

- As a **Micro Mart** reader you can now get **25% off the full price of your own TV Bed**
- Prices start at £1,999, with **FREE delivery and installation anywhere in the UK**
- To find out more, simply go to **www.tvbed.com** and quote **MMA962** when you order or call **01707 277777**

THE BEST PORTABLE STORAGE FOR STUDENTS

Keep your essays and other documents safe with one of these...

When you're working towards a degree, writing coursework or collating a portfolio of work, it's essential to maintain a good-quality backup and to store your data in a place where it will remain reliably intact wherever you take it. When it comes to education, proper storage can be the difference between passing your course and failing it (or at least begging for emergency extensions!)

At the moment, students have it lucky. Storage is as cheap as it has ever been, so the important questions aren't about the volume available. Not since the days of floppy disks has running out of space for a project been a real concern, and even the largest documents take up only the tiniest fraction of any storage device you care to name.

Instead, students should be more concerned with a device's integrity, its reliability, its portability and, of course, its cost. Rather than let you do the hard work, we have a few suggestions for devices that should meet – and exceed – your needs as a student.

"The popularity of external hard drives is reflected by an abundance of models"

Best Portable Hard Drive: Samsung M3 1TB (£45)

Despite the advances made in data storage technology, hard drives remain the best all-rounders for data storage: they're cheap, they store more than enough data for one person, and they generally remain functioning for years without any significant errors. If you're a student heading off to university, it's a good idea to get an external hard drive for storing backups of your work and filling out with other important data, like games, movies and music.

The popularity of external hard drives is reflected by an abundance of models and brands out there, but of all the available options we've heard (and personally experienced!) nothing but good things about Samsung's M3 line of devices – particularly the 1TB model, which is priced incredibly fairly at around £45.

The good points about the M3 range are quick to cover: a USB 3.0 interface means super-fast transfer speeds and file access times. Its 1TB capacity gives you enough storage for all manner of purposes. Crucially, it's powered entirely over USB, so there's no need to find a separate power socket to run it. This also makes it compatible with almost anything that has a USB port, from computers and laptops to games consoles, set-top boxes and routers with network storage capabilities. It's also lightweight and portable but reasonably sturdy, and because it's Samsung, it looks great and has fantastic reliability.

If you feel like you need a little more capacity, you can even step it up and get a 1.5TB model for £53 or a 2TB model for £75. Those on a tight budget might prefer the 500GB version, which is available for

£35. Still, the 1TB model represents the best balance between price and value, and based on all these factors and more, we wouldn't suggest looking elsewhere unless you have a really good reason.

Most Secure USB Storage: iStorage DataShur 4GB (£36)

If £36 sounds expensive for a USB drive, you need to take a moment to check out the feature set available to you on the iStorage DataShur line. This is a USB drive that places security above all else, and that's what you pay for.

After all, flash drives are easy to lose track of, especially if you're travelling to and from the campus or dividing your time between work and a laboratory. Happily, the security on iStorage's specially enhanced USB key is so strong that you could drop it in the middle of MI5 and not have to worry about anyone seeing your personal data.

Think we're joking? Not really. A combination of 256-bit encryption and hardware-based access code should ensure that no one but you can get at your drive's contents. Even a keylogger won't stand a chance of stealing your passcode, because you punch it onto the device by hand, and the unit's military-grade, hardware-based data encryption means that without that code, the contents are gibberish even if read directly.

Best of all, the device itself is what contains the security. There's no need for additional drivers or software, and it's compatible with virtually any operating system – just plug it in, enter the keycode, and your data becomes accessible as if it were any normal USB key. Remove the key from the USB port and it locks instantly with no intervention required. You can even configure PIN codes with different rights levels, so 'users' are limited to read-only access, and full access is restricted to those with an admin-level code.

And as if that wasn't enough to convince you of its safety, the device is water-resistant and constructed from shock-proof aluminium casing designed to shield it from the elements. We won't pretend it isn't expensive compared to bog-standard storage, but if security is a priority, then it's tough to beat.

Best All-round USB Key: Lexar Jumpdrive S73 (£8-£125)

If you're in the market for a USB 3.0 flash drive, sooner or later you're going to find yourself staring down the barrel of the Lexar JumpDrive S73. It's not just one of the cheapest USB 3.0 drives on the market, it's substantially cheaper than even most USB 2.0 drives. So what's the catch?

Well, although it's technically a USB 3.0 device, every speed test ever conducted on the S73 pegs it well below the full speeds USB 3.0 is capable of. In fact, most suggest that it's only about twice as quick as a USB 2.0 drive for both reads and writes – some distance short of the ten-factor improvement USB 3.0 devices can potentially boast over USB 2.0.

But on the other hand, it is undeniably faster than a USB 2.0 flash drive. If you're using a system that has USB 2.0 ports (and if you've ever been into a university computer lab, you probably know that's not so far-fetched), you can expect it to max out the transfer speeds without difficulty.

It doesn't help the drive's case that the design is fairly ugly and feels as cheap as it looks. Each different capacity is partnered with its own nauseating hue. You might like them, but they're not going to win many style awards, that's for sure.

Of course, when all is said and done, the price makes most of its inadequacies immaterial. Unless you're buying the 256GB model, the slow speeds will barely stack up enough to be noticeable. The facts that matter most are that it's cheaper than every other USB 3.0 drive, faster than every other USB 2.0 drive and cheaper than almost any other USB storage drive around. You can pay as little as £8 for the 8GB model and £125 for the 256GB model, but we think the 64GB model (£22) is a fair balance. **mm**

Essential Online Services

The internet isn't just good for research, as these services show

In the past, having a portable, well-stocked system was important for making your education as simple and streamlined as possible. Today, most of us have more than one portable device, which can make organising your data and software tricky – or at least it would, if they didn't all have one thing in common: an internet connection. That means that the most useful place to store your data and software is no longer on a single device but online.

Cloud services have exploded in popularity over the last few years, but such a competitive marketplace means you face potential difficulties in selecting the best. It can be difficult to tell which providers are the real deal and which are the pale imitations.

To help you get to grips with the latest cloud services, we've rounded up the best and most popular. Whether you're a student looking to save time and money or a business professional who wants to spend less time and energy trying to keep multiple devices synchronised, we have all the information you need to get the most out of the various cloud services.

Cloud Storage

As convenient as it is to carry a USB key or portable hard drive in your bag all the time, that doesn't quite compare to the simplicity of keeping files online. Storage was undoubtedly the killer app for cloud services, encouraging thousands come to terms with the simplicity of making the internet into an extension of your home PC. All you need is a half-decent broadband connection and you'll never lament being unable to access your most important files again.

Unfortunately, the popularity of cloud storage also means that it's one of the most overcrowded areas in an increasingly competitive market. So which provider is best? And how much do they cost? Read on to find out.

Dropbox – *dropbox.com*

The standard by which all cloud providers measure themselves, Dropbox might not

offer the most space, nor the fastest speeds or the lowest prices, but it does have something most others don't: a large and loyal user-base. Few things inspire confidence like that.

Dropbox might seem like the winner by default, but there's a reason it's so well loved, and it's not just because it was the first to get it right. Support for every major operating system, including tablets and smartphones, and a huge selection of developers taking advantage of its API means every other service struggles to keep up. It's simple to use and easy to understand, so Dropbox deserves its position at the top of the heap.

Free accounts start with 2GB of space, which can be increased using bonus and referral systems. For £7.99 a month, you can up this to a massive 100GB of storage and get a discount by paying £79 for a year up front – although we're inclined to think even 100GB is far more than you can practically upload on a standard broadband connection.

Google Drive – *drive.google.com*
Previously known as Google Docs, the service rebranded as Google Drive last year and vastly improved its feature set at the same time, though it's still a lot more fiddly than many of its competitors. As well as a fully featured online office suite (of which more later), users can get 15GB of storage for free. There are apps for Windows, OS X, iOS and Android, and a huge number of plug-ins that can extend its functionality with all sorts of neat tricks, though unlike Dropbox it's rare for third-party apps to support it.

Close integration with Google's mail service is a particular highlight when it comes to Google Drive, and its competitive pricing is certainly worth taking note of. You can pay $1.99 a month for 100GB, $9.99 for 1TB, and up to $299 a month for 30TB – though again, 100GB should be more than enough for any single user.

Microsoft OneDrive – *onedrive.live.com*
Previously known as Windows Live SkyDrive, OneDrive was an early entrant into the cloud storage race, but managed to get things drastically wrong in terms of both feature set and pricing, which caused the service to quickly languish. In recent years, a Dropbox-inspired overhaul and tighter integration with high-uptake software like Windows 8 and Office 2013 has done a lot for its popularity.

In addition to desktop applications for Windows and Mac OS, SkyDrive software is available for Windows Phone, iOS and Android. As of June 2014, new sign-ups to the service get 15GB of space free, and you can earn up to 8GB more by referring friends and uploading photos. Its pricing is slightly more than Google's, at £1.99 a month for 100GB of storage, but again, the cost is fairly trivial considering the volume you get in return.

Verdict: While OneDrive and Google Drive are both far, far cheaper than Dropbox when it comes to buying extra storage, you can't really beat the compatibility and simplicity Dropbox offers. In an educational context, it's highly unlikely that you'll need much more than 2GB for your documents, so its only real flaw (the small amount of space it offers) is negated by practical concerns. But if you don't like Dropbox or

want the extra storage for less money, then Google Drive is a fair second place.

Office Software

Being able to access your files from anywhere is one step towards true cloud-based computing, but what about the other side of the equation? If you want to get the most productivity out of cloud computing, you need to be able to *work* from anywhere, regardless of whether you have your own device with you or not. Cloud-based office suites are relatively new on the scene, and companies are still feeling their way into the market, but it's a safe bet that eventually, almost all major applications will be delivered in this way.

To evaluate cloud office suites, we've looked for those that offer the most popular features, such as word processing and spreadsheets, but remember that most online suites offer so much more than that as well.

> **Being able to access your files from anywhere is one step towards true cloud-based computing**

Google Drive – *drive.google.com*

We've previously skimmed over the fact, but it's now relevant: the current version of Google Drive incorporates the cloud-based software suite formerly known as Google Docs. This means that if you have a Word-compatible document, Excel-compatible spreadsheet or PowerPoint-compatible presentation anywhere in your Google Drive (including your email), you can view and edit it online, all without leaving your browser.

Google's software packages – called Document, Spreadsheets and Presentation – are all fairly straightforward and simple, and they incorporate all the most widely used features. They're basic but good enough for the kind of low-impact, on-the-fly editing you'll probably use them for. The interfaces are toolbar and icon driven, similar to pre-Ribbon Microsoft Office versions. One of the more interesting features allows you to automatically translate documents using Google's language tools, which is rather nifty, though imperfect in the way only machine-translation can be.

Although good, Google Drive's tools aren't really powerful enough to function as a replacement for a full office suite, but if you're hoping to do some light editing prior to submission, they'll hold up. They're free to access, easy to use and accessible across a range of devices. Definitely worth keeping in mind, though perhaps not good enough to consider your first choice.

Microsoft Office 365 – *office.microsoft.com/en-gb*

Unsurprisingly, Microsoft Office 365 costs a lot more than Google Drive's office editing suite, since Microsoft doesn't give away its software like Google does. Even so, it's far from unreasonably priced and does at least try to justify itself by offering users access to the complete versions of Microsoft Office software hosted on Microsoft's own servers.

The Personal edition of Office 365 costs a little over £50 for a single-device installation, but if you have proof of your higher education status, you can opt for the Office 365 University edition instead. The University edition gives you a licence for two devices (which includes tablets as well as standard PCs), 60 free minutes of Skype and an automatic four-year subscription for one price. All editions include an upgrade to 1TB of OneDrive storage.

On launch, Office 365 gave users access to the 2010 incarnations of Microsoft Word, Excel, PowerPoint, Outlook and Publisher, but rolling updates mean you now get the Office 2013 versions of the software packages, with their features fully intact.

Although it's generally impressive, one potential problem with Office 365 is that it isn't well supported across devices. You can use the main suite on two PCs and the web apps work on any browser, but native apps for devices aren't very well provided and may not even exist on your preferred platform. It is, despite claims of universality, aimed at desktop users above all others.

Zoho – *www.zoho.com*

Zoho is an independent provider of web-based software suites, and its catalogue includes a product called Zoho Docs, which is a Google Docs-style product. Accessible for free and compatible with most major filetypes, it offers users cloud space for online document storage, 50 'workspaces' for real-time collaboration and access to over 25 programs services, from word processors to invoicing suits and an online password manager.

Zoho Docs has three main applications, however, all of which use modern ribbon-type interfaces in the style of newer versions of Microsoft Office. The packages are called Writer, Sheet and Show, and are equivalent to Word,

Excel and PowerPoint. Although largely the same as those they imitate, Zoho's implementations of the software do contain a few advanced features not found in other online suites, such as macro capabilities and PDF export.

If anything's a problem, it's the very fact of Zoho's independence. There's no suggestion of poor reliability, and there are mobile apps aplenty, but you simply don't get the peace of mind that accompanies the use of software from the likes of Google and Microsoft. However, the wide range of applications makes it worth investigating, especially if your course has niche software requirements that aren't catered for by the larger cloud service providers.

Verdict: Unfortunately, there's no clear winner when it comes to office suites. Microsoft's is the most powerful, but it's also quite pricy and mobile support is bad. Google's is probably the most useful if you're using Gmail and Google Drive already, but its close integration with other Google services may prove irritating if you're not. Third-party efforts like Zoho seem attractive but are an inherently riskier proposition. We'd suck up the cost and go with Microsoft, but you'll have to decide whether that's worth it for you.

Antivirus Software

Pretty much every serious anti-virus program has some cloud component these days, whether it's 0-day definition updates or full delegation of virus detection to the cloud. If you're a student, the likelihood that you'll be passing files around while working on collaborative projects is relatively high, and you can't rely on everyone to be as vigilant as you are about keeping their systems clean.

The big problem with most anti-virus programs is that they aren't reliably cross-platform, and they're certainly not accessible on machines they haven't been installed on. That's fine if you only need to keep your PC safe, but if you're using someone else's, you can't exactly use one of your licences on their machines.

Luckily, there are anti-virus programs that work entirely in the cloud. They're no good for providing real-time virus protection, but if you just want to check a file or verify its integrity before opening it on a system that you haven't personally secured, it's far better to use one of these than the alternative.

Trend Micro Housecall – *housecall.trendmicro.com/uk*

Developed by popular anti-virus publisher Trend Micro, Housecall is an online virus scanner, which can check a system's integrity without installing any permanent components. As well as scanning for files for viruses, it can detect trojans, worms, malicious browser toolbars and plugins, and even document-based macro viruses.

As well as in-browser scanning, it pulls substantial elements of its functionality from the cloud, ensuring that it be used on almost any PC, regardless of power or age. Scans can be targeted at individual folders or applied across an entire system, while a 'Quick Scan' option only checks the most vulnerable and critical parts of Windows.

As tools go, it's a good choice, and although it isn't cross-platform, it does allow you to check any Windows PC you want to work from – vital if you're trying to keep infection potential as low as possible.

> **“Pretty much every serious anti-virus program has some cloud component these days”**

VirusTotal – *www.virustotal.com/en-gb*

Acquired by Google (but still operating independently), VirusTotal is an online 'metascanner', which uses as many as 46 different virus scanners to check any individual file you upload to its scanner or any URL you enter into its search engine. This makes it an incredibly useful tool for performing one-off checks. It's even platform independent, meaning you can scan content from your tablets and netbooks as well as any desktop system.

A maximum file size of 64MB more than accommodates any files you might want to check, and although the number of engines does inevitably lead to some false positives on certain checks, it's easy to smooth them out – one positive identification versus 30+ negative ones suggests a problem with the scanner, not the file.

As tools go, it's virtually indispensable. Greater integration with the desktop would improve it, but as far as using the cloud goes, there are few tools that do it as simply and correctly as VirusTotal.

Verdict: The simplicity of VirusTotal's model makes it ideal for students who want to check a few files before they pass them around. Trend Micro Housecall, by comparison, is attempting to do the job of a full-scale anti-virus application, and as useful as cloud-based software is, you can't rely on it for full protection of your system. Use the latter in a pinch, but this is one case where the cloud is only useful if combined with proper offline protection. **mm**

MEDIA STREAMING GUIDE

Everyone needs to relax some time, including students, and there's plenty of entertainment available online

With tuition fees at an all-time high and costs of living skyrocketing, students can have it tough – especially when it comes to portioning out their disposable income. If you're leaving home to go to university, attending a college or simply the parent of a student who needs extra financial support, one of the first ways to cut back on expenditure is to stop spending so much on entertainment. Things like music, cinema and DVDs might be a nice way to spend money, but ultimately they're an easy way to save it as well.

Luckily, there's a way you can get lots of entertainment for a comparatively small price, and that's by looking at media streaming services. There are plenty available to choose from, and they're loaded with more content than you could ever consume, whether you attend lectures or not. But what do they offer? And how are they different? If you want the answers to these questions and more, we can provide them right here.

Netflix

Netflix is, without a doubt, the most popular of the online streaming brands, though as the market leader, it faces increasingly stiff competition both at home and abroad. It was restricted to the US on its initial launch, but by the time it made it to the UK in early 2012, it had already become the most recognised name in online streaming. With a strong position in the market and a considerable history of pleasing customers, the question isn't so much why should you get Netflix; it's why shouldn't you?

Pricing

Netflix's basic subscription – and indeed, the only one it provides in the UK – costs £6.99 a month for access to the company's online library of movies, documentaries and TV series. Don't be confused if you're not paying that much, though. In May, the company raised its price but allowed existing subscribers to retain the old price of £5.99 for up to two years, assuming you don't cancel at any point.

Trials & Restrictions

Anyone interested in trying Netflix can make use of a month's free trial, which can be accessed in advance of payment. The service can be cancelled at any point with no further obligation – although cancellation is instant, and you won't get to use the remainder of the month. As a streaming-only service, it's worth noting that Netflix has no offline mode, although it's available on a huge range of devices and platforms and can even be used over a wireless mobile signal.

Content

Netflix's library runs well into the thousands, though no concrete numbers are available. As with all streaming services, the quality of the library is variable and depends on deals struck between studios, but Netflix's position of having a large library also gives it a lot to lose. In May 2013, Warner Bros., MGM and Universal removed a huge number of titles from Netflix, limiting them to their own streaming site, Warner Archive Instant, which meant the loss of a number of high-profile films (including all of the James Bond library).

Netflix is also one of the few streaming services whose original content is actively pulling in users. Its productions include an exclusive new season of *Arrested Development*, political thriller *House of Cards* and prison drama *Orange is the New Black*, as well as four Marvel TV miniseries due to hit the service starting next year.

Its name power also gives it a good amount of leverage. Netflix managed to secure the day-after airing rights to *Breaking Bad* in the UK, meaning each new episode appeared on the service the day after it was shown in the US.

Finally, while we wouldn't condone it, UK subscribers can also access NetFlix's US service with only a little tweaking, which opens up a far more impressive library. But NetFlix's strength is in its simplicity. One price for one service, which you can access from just about anywhere. The library is strong, particularly its original content. If you don't like the idea of being excluded from the conversation, NetFlix is the service for you.

Amazon Instant Video

The service formerly known as LoveFilm was bought by Amazon in 2011, and in February this year it was folded into the existing Amazon Instant Video brand. This meant the loss of certain subscription tiers, such as the disc-rental service LoveFilm used to offer by post, but it's also given the service a big push that sees it finally competing with Netflix rather than being regarded as the poor, local-market imitator that it originally was.

Pricing

If bought new, Amazon Instant Video costs £79 a year, which includes an Amazon Prime subscription that guarantees one-day delivery. Customers who bought Amazon Prime before February this year get access to streaming media with their Prime subscription for just £49 a year, though that will rise to the full price when the subscription becomes due for renewal.

It's worth noting that this is a few pounds cheaper than LoveFilm, which had a monthly cost of £6.99 (£83.88 a year). Throw in the free Amazon Prime and you'll essentially get a service that cost £121.98 last year for £79 – though that does assume you wanted both.

If you don't want Prime, it's still possible to buy an Amazon Instant Video subscription for £5.99 a month, though the option is difficult to find, and if you run it for 12 months, it'll only save you £8. It's only worth doing if you're planning to use the service for a short time.

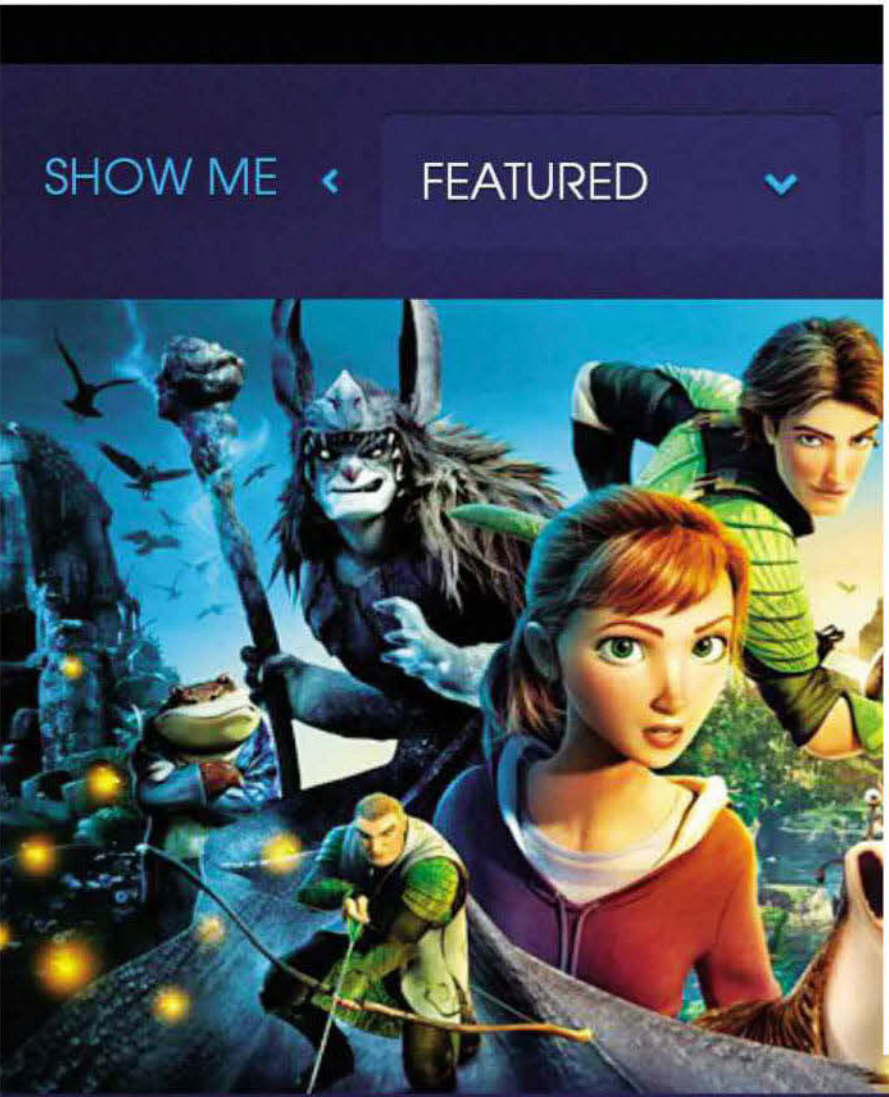
While the service is available on many devices, the Kindle Fire line of devices has free access, which is a perk that might sway your choice of tablet.

Trials & Restrictions

There doesn't appear to be a trial period for Amazon Instant Video on its own, but it is possible to trial Amazon Prime (including Instant Video) for one month. For that month you can enjoy the full benefits of both the Prime and Instant Video services and cancel at any time. Unlike Netflix, Amazon Instant Video does offer some limited offline viewing capabilities, though only on desktop systems and the Kindle Fire.

Content

Amazon Instant Video claims around 15,000 'movies and TV shows', which puts it in a very similar ball park to Netflix. Although the two services have some overlap, there are exclusive titles on Amazon and some original programming. Amazon Studios hasn't had any hits that match Netflix's success, but the company does commission several original pilot episodes a year, with the most successful series being ordered for a full run.



Blinkbox

It's been around since 2007, but Blinkbox has only recently risen to prominence thanks to its purchase by Tesco in 2011. It's now being promoted in-store and through a number of high-profile deals and acquisitions, which have given it a fair chance of becoming one of the major names in the media streaming field. It's still some way behind Netflix and Amazon, but it's fair to say that it's gaining prominence fast.

Pricing

One of the great things about Netflix and Amazon Instant Video is their flat-rate subscription feature. Blinkbox goes another route: it's subscription-free, but you pay for access to every TV episode or movie you view. Even then, it's still cheaper than buying DVDs. In the past, Blinkbox offered some free ad-supported content, but this was a relatively small part of its library and has since been discontinued.

At present, movie rentals start at 99p but are more frequently priced significantly higher: £3.49 for an SD movie and £4.49 for an HD one. If you're a very light viewer, it's possible to save money over Netflix and Amazon Instant Video, but the main way to look at Blinkbox is that it's competing with new DVD releases and the pay-on-demand movies offered by Sky and Virgin, rather than true streaming services.

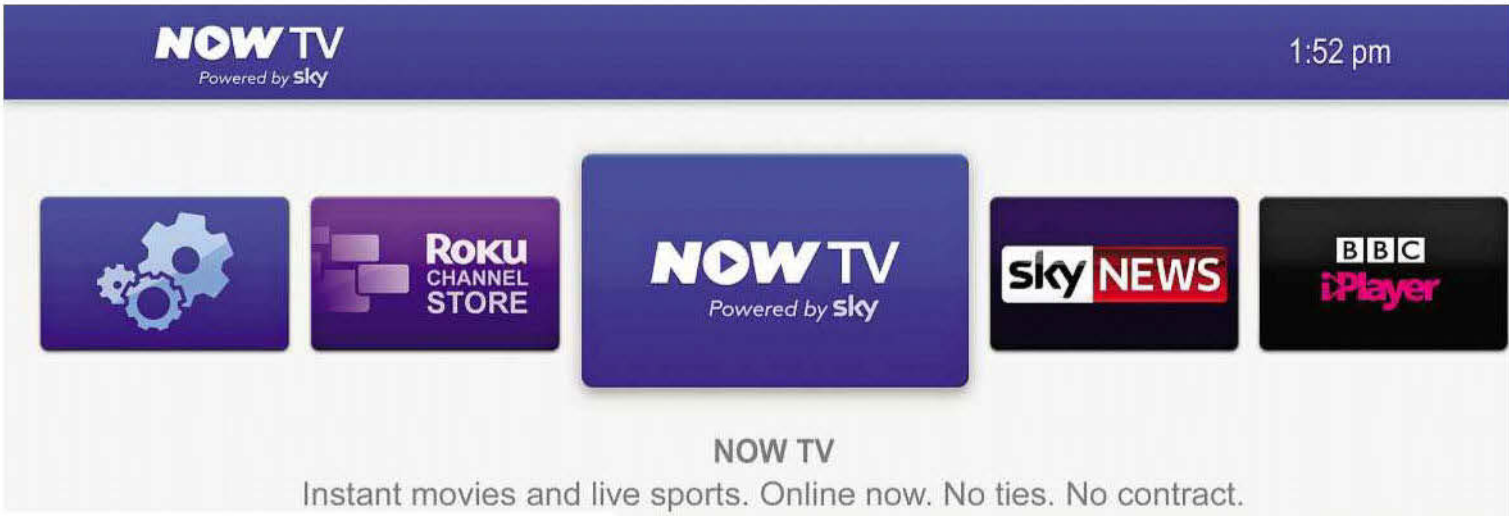
Trials & Restrictions

As a subscription-free service, Blinkbox doesn't require any trial period. However, there is DRM in the downloads and access restrictions for the content you buy. Rentals can only be viewed for 48 hours after the video is first launched and only activated within 30 days after the money is paid. Blinkbox content can only be viewed offline on Windows PCs, not through any other device.

Content

On Blinkbox, rentals are available more or less concurrently with the DVD release – sometimes even earlier. The fact that you pay for individual films and episodes means that content is available to rent months or even years before it arrives on subscription-based streaming services.

Last year, Blinkbox notably struck a deal to bring season three of *Game of Thrones* to its service six months before any DVD and Blu-ray release, meaning it was the only way to legally watch episodes in the UK at the time. This alone was given as the cause of a rather impressive 632% revenue hike, although that arguably reveals more about the low popularity of the service than it does about the high popularity of *Game of Thrones*!



NowTV

Operated by BSkyB, NowTV launched in July 2012 and allows subscribers to watch streaming TV and on-demand content over an internet connection. Originally launched as a film service to rival Netflix, it later added sport and entertainment channels. Its chief selling point is the inclusion of numerous channels that are normally only available through cable or satellite subscriptions. Now TV is the only way to legally view certain subscription channels without a set-top box, which is useful for situations where students cannot install their own hardware (i.e. a hall of residence).

Pricing

Unlike most streaming services, NowTV operates on a subscription-free unlimited access model. There are three types of pass – Entertainment, Movies and Sport – ranging in price from £4.99 for a month's Entertainment pass to £8.99 for a month's Movies pass, and £6.99 for a day's Sport pass. For £9.99, you can also buy a set-top box that will stream NowTV content directly to your TV, although this is an optional component and only necessary if you don't have a smart device you can view the service on instead.

Trials & Restrictions

Although there's no generic trial period, it is possible to get a trial use of some services. The Movies package is currently offering a free 30-day trial, but neither the Sports nor the Entertainment packages are currently doing the same. Again, there's no offline functionality regardless of how you watch the service. Even so, Now TV's contractless model makes it ideal for those who are staying at university or moving into student housing, where a contract could be problematic in both timing and costs.

Content

The movies pass for NowTV offers access to 11 of Sky's movie channels for 24 hours a day while the subscription is in effect. The Sports day pass allows viewers to watch Sky Sports channels 1 to 4, Sky Sports F1 and Sky Sports News for 24 hours. The Entertainment package allows access to 12 live channels and a 13th (ABC Studios) which is available as on-demand content online. In all cases, content from the channel can be streamed as well as viewed live. **mm**

Music Streaming Services

While most people look at media streaming services as ways to watch movies and television, there are several similar ones that allow you to listen to music as well.

Spotify – *www.spotify.com*
The most popular of the music-streaming services, the vast majority of Spotify's library can be accessed for free on the proviso that you don't mind listening to the odd advert. Newer releases are held back for premium subscribers and some labels won't go near it, but at £9.99 a month, even the paid service is an absolute bargain. You can try the full service free for 30 days, and it's available on virtually any device.

Rdio – *www.rdio.com*
Much like Spotify, Rdio has millions of songs in its library and offers a free, unlimited ad-supported service. Facebook integration runs to the very core of it, though, with a large emphasis on sharing tracks and listening to the same stuff your friends are listening to. You can sign up without Facebook, but that's not what they want. Again, it costs just £10 a month, and there are apps on most major platforms.

Napster – *www.napster.co.uk*
It shares a name with the original file-sharing phenomenon, but more than a decade's distance has robbed Napster of anything approximating its original identity, save for the logo. It now offers streaming music with a free 30-day trial period, then £5 a month for unlimited service on a desktop system or £10 a month if you want to add it to up to three mobile devices.

Blinkbox Music – *www.blinkboxmusic.com*
Much like its movie and TV-based sibling, the audio version of Blinkbox takes a different line to its subscriptions. You can listen on a PC for free in radio mode, which doesn't allow you to choose the specific tracks, or you can pay £1 a week to download up to 100 tracks to your mobile device, with no ads. It's ideal if you're frequently in situations where there's no signal or a poor one, but as with standard Blinkbox, you have to compare it to buying new music rather than other streaming services.

10 ESSENTIAL APPS FOR STUDENTS

When they're not distracting you with Candy Crush Saga or Facebook, smartphones can actually help you with your studies...

Smartphones and tablets are essential student accessories, but even then they're no good unless you have the right software to go on them. With thousands of apps to choose from, singling out the best ones to use can be difficult – but we've picked out a selection to get you started.

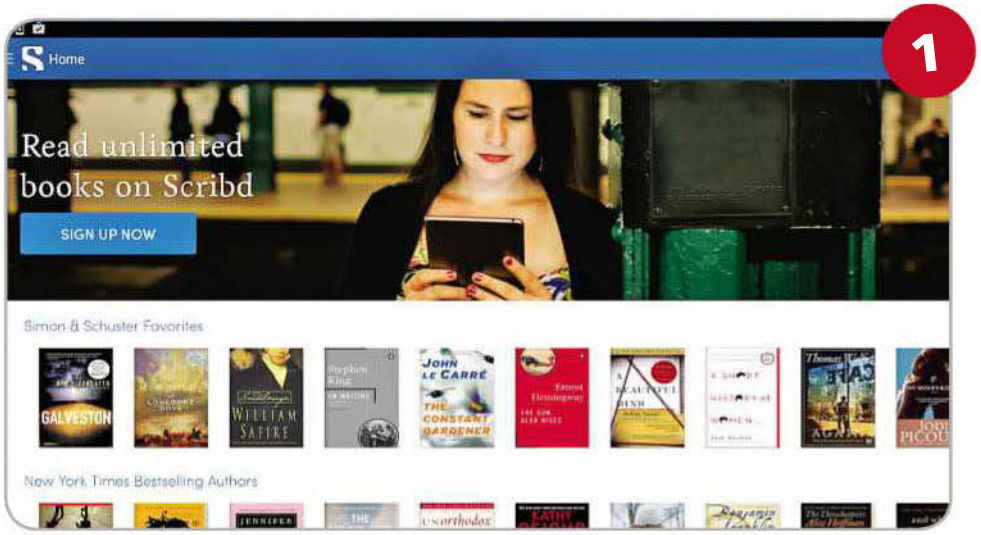
1 Scribd

Even now, students are expected to spend a huge amount of time in the library. Sure, you could buy the books you need on Kindle or through iBooks, but that's expensive. Surely there's a middle ground?

Scribd might provide it. A digital library with over 80 million users, Scribd allows you to access a digital library of over half a million books for just $8.99 a month. Sometimes called the Spotify for books, you can read everything from bestsellers to non-fiction, from prose to textbooks. There's also a huge collection of user-created digital documents to search through. As research tools go, Scribd is a fantastic alternative to getting out of bed.

You can sign up for a month's free trial within the app, and there are no restrictions on how much you can read or where you can read from. Books can sync across devices, and you can even download them for offline reading. Create your own custom library, share content with friends, and do much more. All for less than the cost of a takeaway meal. You don't have to be a student to use it, but if you are, it's an invaluable tool.

> **"Even now, students are expected to spend a huge amount of time in the library"**

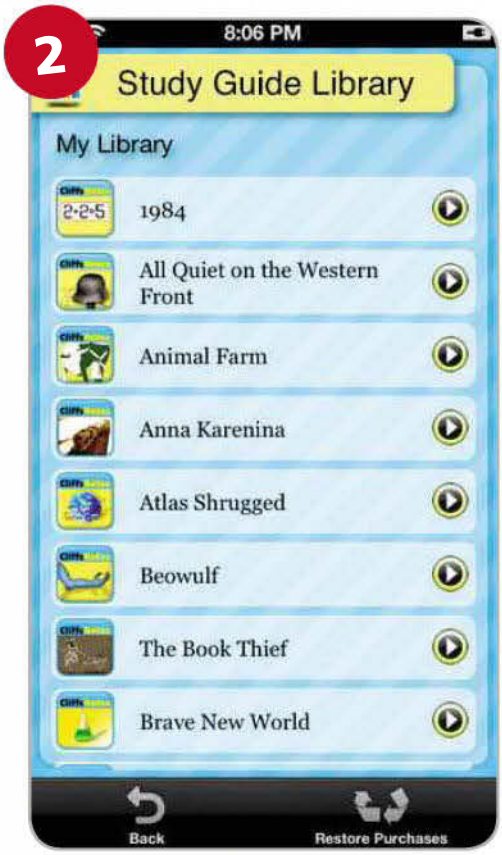


2 Cliffs Notes

They're no substitute for actually reading a novel or seeing a play (at least, not unless you're really good at blagging it), but when you need a quick refresher, Cliffs Notes has long been the go-to organisation to provide it. It's already entered the general lexicon as a by-word for easy-to-understand summaries, and now there's an app you can use on your smart devices too.

Ideal for students of literature, the Cliffs Notes app charges you around £1.49 per guide and gives you information about a work's characters, plot and theme, with sample essay points and clear summaries to help you recap what's going on. Furthermore, you even get access to audio summaries (so you can get a recap while you're literally on the way into an exam), and there are multiple-choice quizzes so that you can test yourself.

We're not entirely sure how useful this app will be if you're studying degree-level work, but it's fair to say that GCSE and A-Level students should consider it an essential tool if they're being asked to study a text. If the book you want isn't on there, you may be out of luck, but the company is adding new ones constantly. Even guides to recent releases like *The Hunger Games* are available!



3 iTunes U

Apple's ecosystem grants you access to lots of exclusive content, much of it you'll probably never want to look at. One of the most astonishingly under-emphasised features is iTunes U, an app which all owners of Apple devices have access to, but which isn't actually included on the hardware. Go and download it from the app store (for free, of course), and here's what you'll find: lectures.

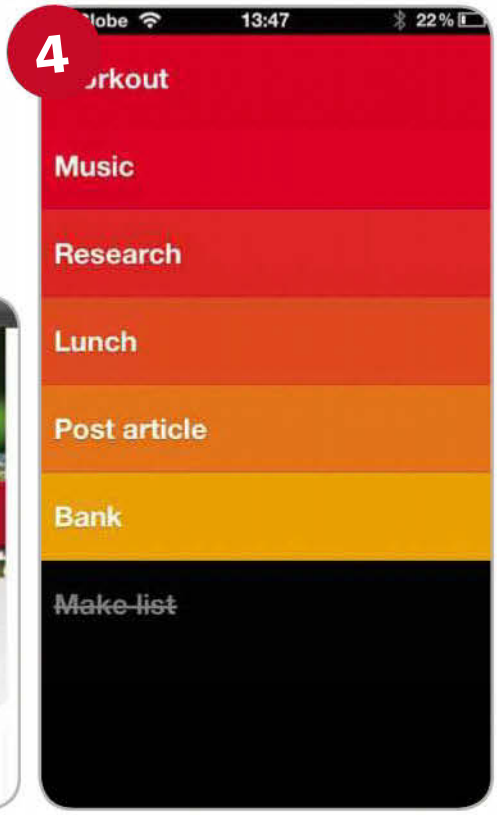
Not just lectures either. Really good lectures. Filmed versions of lectures from universities like MIT, Oxford, Yale and Cambridge, all for you to download and study at your own pace. Clearly it's no substitute for actually attending a university, but if you want to augment your study with a second perspective, fill in some gaps that you've missed or go over something your course doesn't normally cover, this is the ideal resource.

There's a lot more to iTunes U than just lectures: you can also get support material, podcasts, videos and textbooks through iBooks. It's all completely free! The only downside is that you need to have access to an iPad, iPhone or iPod Touch to use it properly, but if you're trying to choose a tablet or phone to take with you to university, this might just be the thing that sways you.

4 Clear

Whether you're worried about forgetting assignments or just trying to come up with a cleaning rota for your shared accommodation, you need a decent To Do list to keep yourself organised. Unfortunately, there are hundreds of to-do lists available on iOS and Android, so picking the right one can be tricky. We can't say for definite that you'll love Clear, but we find it to be one of the simplest and most useful to-do list applications around.

Features include the ability to create multiple lists, a dead easy interface where you simply swipe to add, edit and remove list entries, synchronisation between multiple devices (of course) and much, much more. One of the best things it does is add a secret layer of gamification. You can earn new visual themes by completing tasks. Complete tasks late at night to unlock the Night Owl theme. Send a copy to a friend to unlock the Gifted theme. The genius is that once you know they're available, you keep using Clear in the hope that you'll find more. It's not quite as fun as playing a game is, but compared to glumly ticking items off a list, it's a laugh riot.



5 RealCalc

We've picked out apps for the literature students among you, but what about the mathematicians and scientists? Sure, most smartphones have a calculator function built in, but they're hardly going to help you sort your radians from your degrees. For that, you need a proper scientific calculator. You need RealCalc.

RealCalc is a scientific calculator app that looks and acts like the real thing, so if you forget your actual one or don't want to spend money buying an expensive calculator for one small part of a larger course, it's perfect. Features include standard algebraic operation, results history, unit conversions, percentages, ten memory slots, the ability to work in binary, hexadecimal or octal, a complete built-in help system in case you get stuck and, best of all, no advertising.

If that doesn't meet your needs, there's also a sister application (calles RealCalc Plus), which includes yet more features, such as the ability to calculate times and fractions or operate in landscape mode. RealCalc is free, and you can buy RealCalc plus as a separate app or upgrade from within RealCalc at the amazingly low price of just £1.99. There's no smarter choice to make when it comes to calculators.

6 Studious

Keeping track of lectures, essay deadlines and exams can be a nightmare of organisation. Worrying about getting them wrong is as much of a problem as forgetting them entirely. To save yourself the bother of constantly checking and rechecking your deadlines, why not download Sudious, an app that allows you to keep track of these things?

Studious allows you to keep a mobile copy of your timetable on you wherever you are, delivering reminders so that you'll never miss your class. Enter a deadline whenever you get one, and you'll be able to make sure you don't miss that either. If you have a campus map, you can even link it up directly through the application so that you can find your way to where you're supposed to be.

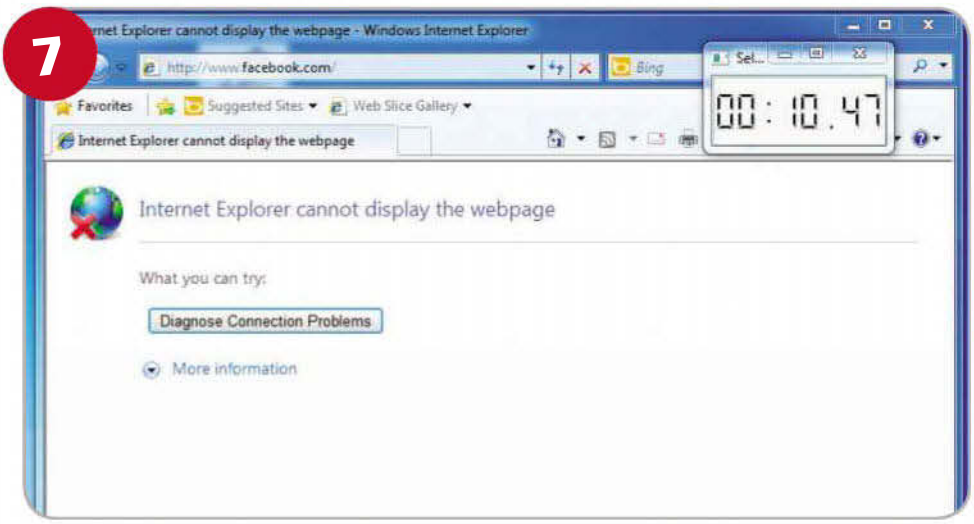
Better still, if you use Studious, it can even make sure your phone goes into silent mode while you're in a class, preventing those awkward stares and mortified fumbling as you attempt to stop a ringtone before the lecturer notices. There are two different versions on the Google Play Store, so make sure you're getting the right one – you want the version from 2014, not 2012!

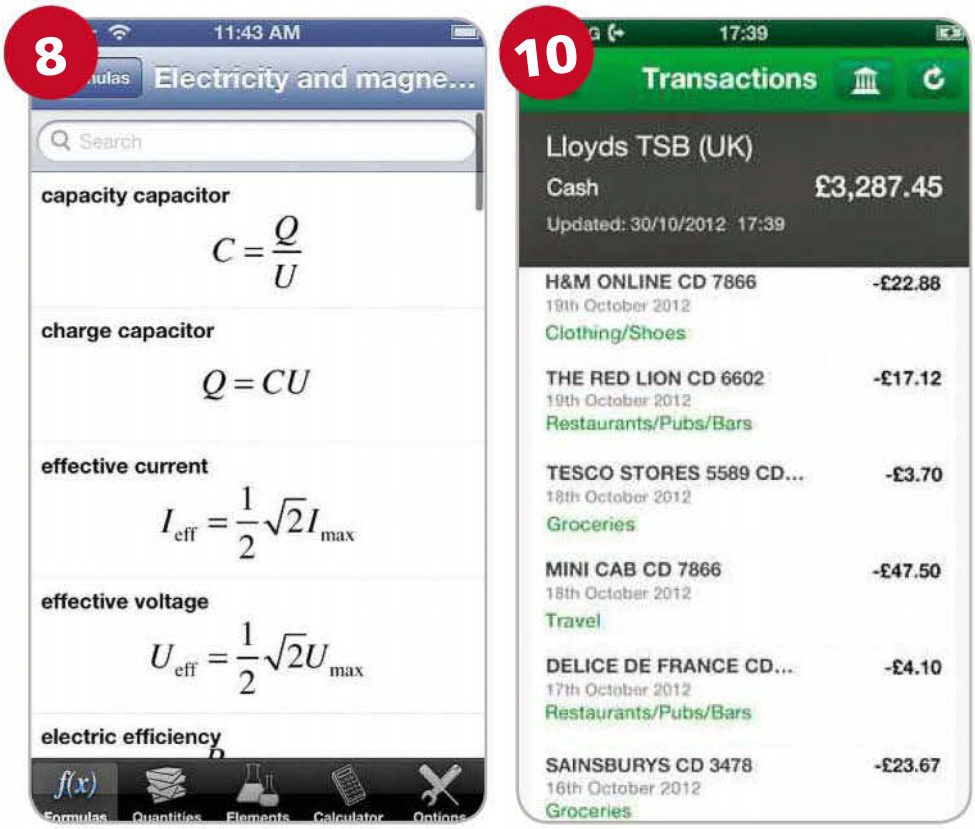
7 SelfRestraint

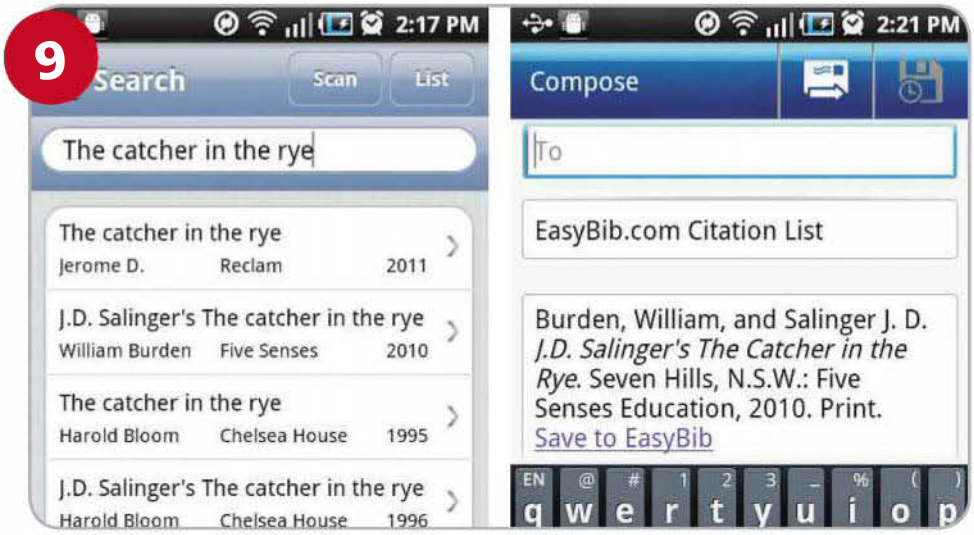
Moving from a very structured learning environment to one where you're the master of your own study is an important part of attending university or college. But it's also the downfall of many a student. With boundaries dissolved at home and at school, most students learn the hard way that the most useful thing to learn is discipline.

However, if that's proving difficult, you could always fake it. SelfRestraint is a piece of software that allows you to temporarily turn off access to parts of the internet so that you can't let your attention wander. Block social media websites, access to your email, even online games. Just open the software, set the timer and enable the block, and you won't be able to get around it until the time is up – even if you restart your computer or close the application.

The program's free and open source, so there's no need to worry about the cost. If you're finding that you struggle to get your work done when there are







so many online distractions or you know yourself well enough to expect it, this is the software you need. This version is Windows and Linux only, but there's also a Mac version available called SelfControl.

8 iFormulas

Another one for science and maths students, iFormulas is an app that contains a huge number of useful formulae, just in case you need to double-check how to do something or are struggling to remember where to take your numbers next. Looking something up in the app is far quicker than breaking out the textbooks, and it's even quicker than trying to Google the answer – with the added bonus that it doesn't need a web connection to work!

The contents are divided by their scientific and mathematical field, which makes them very easy to discover, and they cover everything from the simplest equations to longer series and sequences. It's not just maths-based; it also has all the crucial information for physical, chemistry and electrical engineering, which makes it a great general-purpose program.

Of course, no app can be a substitute for learning these details off by heart, but if you're struggling to get to that point, this is the next best thing. Unfortunately the app itself is iOS-only, but there are alternatives available for Android. One of the most popular is called 'Formulas Lite' and is available free on the Google Play store, though beware: it is ad-supported.

9 EasyBib

What essay writer doesn't like creating citations? Except, you know, all of them. Putting together a bibliography at the end of several hours of writing is never a fun process, and luckily some smart individuals have recognised this and created an app that will do it for you.

EasyBib helps you organise your citations and presents them in the standard format of your choosing so that you can simply cut and paste the entire bibliography once it's ready. A built-in barcode scanner means you only have to photograph the code of a book you've used, and it can automatically look up the details to create the necessary citations. If that doesn't work, you can also search by title, with details for thousands of editions and titles available.

Best of all, the program will save your list as you build it up, so you can quite easily create a bibliography as you go, rather than leaving it to the last minute. You'll never have to cobble together a hurried list of references again! EasyBib is available for both iOS and Android, so most students should be able to use it.

10 OnTrees

Going to university doesn't leave a lot of time for earning money, so it's hardly surprising that many students find themselves spending more than they have coming in, even with student loans. With that in mind, managing your finances is important. There are plenty of money-managing apps and programs around, but we like the look of OnTrees, a program that aggregates your various bank accounts and helps you manage your spending.

Once you sign up, you can connect accounts from every major bank. You're then able to browse and analyse your spending, and even customise their categorisation yourself! Filter by date and time period, find out when and where you spend the most money – there are plenty of options to help you keep track of your money both before and after it's spent.

If you're worried about security, don't be. OnTrees is a 'read only' tool, so it can't be used to move money out of your bank accounts. It's available now for iOS, with Android and Windows versions coming soon. **mm**

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Your Letters

PC Cleaning Tool

Sometimes an idea becomes pretty obvious once you have tried it: and so it proved to be with my attempts to get the perfect vacuum cleaner-based PC cleaning tool. I have tried making and buying various tools, but they turned out to be too inflexible, or too large or too small to be effective. Nothing has turned up which is a good as the somewhat elusive crevice tool that the gas man used to clean up the ash and dirty soot in gas fire appliances. Regardless, today I had another go.

Essentially what was needed was a flexible tube of smaller diameter that would connect to a normal hoover style tube so that the size of the tube at the end was reduced, but also flexible enough to get into the nooks and crannies inside a PC.

Then I found it and its very easy. Just connect up the rubber end of a standard washing machine (water out to waste) hose with the smaller end of a hoover tube: the flexible rubber end of the washing machine hose provide a perfect fit. The tool can also be easily disassembled as it is just a push fit: so no spare parts ruined either!

Harry Deakin

Scratch The Surface

When the original Microsoft Surface was announced, like a lot of people, I was excited about it. Well, the Surface Pro anyway; the whole thing with the ARM processors and Surface RT seemed like a bad idea from the start.

With Surface Pro, I could have a proper touch-screen tablet PC, and not just a thing with little apps, but a proper PC. This seemed like a great idea, but then I saw the price. As Ricky Gervais said in *Extras*, "Are you 'aving a laff?" Clearly, Microsoft thought the best way for it to enter the tablet market was to try to compete with Apple – at least on price anyway.

Needless to say, when the Surface 2 came along, I wasn't expecting anything different from Microsoft, and I was largely right. Now, though, the Surface 3 is out, and first of all that's that a surprise in itself. How did it even make it this far?

Never mind, though; I'll give it a fair chance. Maybe Microsoft is going to realise that it needs to bring the price down for anyone to even consider buying one of these devices. Well, the cheapest one you can get is £640, so you still need a fair chunk of money. Plus, it only comes with 64GB of hard drive space. Take into account the operating system, and you're not left with much.

Now this might be fine with a normal tablet, one that runs small apps, but this is a proper PC with an i3 chip. Taking that into account, 64GB (or what's left of it) is nothing but pitiful. There are a number of other versions, with the next one up having 128GB of space and i5, but then the price goes up to £850. And don't even think about the top model, unless you're rolling around in coins like Scrooge McDuck: it comes with 512GB of storage, and i7 processor and 8GB, but it costs a whopping £1,650.

What's more, you don't even get the keyboard accessory or the pen included in this price. No, Microsoft expects you to spend more.

Nothing in this world is free, I get that, but at the very least when you're paying top dollar for a premium product, you should be treated like a premium customer, instead of feeling like the butt of some huge, elaborate joke.

Tom Griffiths

Actual Reality

Is anyone else worried about virtual reality? I know people have tried to do it before, and films like *Lawnmower Man* predicted bad things would happen, but it never seemed like a threat because it was all blocky and a bit rubbish.

These days, it's actually starting to look a bit realistic, and the reason I worry is that it's already a struggle to get some people to leave their houses and go into the real world. It's surely going to get worse with virtual reality.

Plus, you know, there's always a risk some hyper-intelligent being might fly down the internet tubes and try to kill you…

Barry Edwards

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Component Watch

Extending a wireless network needn't cost the earth... Or your sanity

Extending a wireless network is a difficult process, but it can be done and it can make a world of difference to how you interact with your technology. The easiest way to make it happen is to use a wireless repeater or bridge, but how much do you have to spend? More importantly, how much do you have to spend to get a good one? For this week's Component Watch, we've looked into it.

Deal 1: TP-Link TL-WA730RE
RRP: £20 / Deal Price: £13

TP-Link's hardware is routinely the cheapest on the market, and this single-band wireless N repeater fits in with its competitors exactly where you'd expect it to. It's only compatible with Wireless G, though it does have a function allowing it to automatically extend any unsecured network at the touch of a button. It's ideal for home use if the demands on the network aren't too great, allowing you to simply extend your wireless coverage to any previously unreachable area.
Where to get it: Broadband Buyer (**bit.ly/1phhl5h**)

Deal 2: ZyXEL WRE2205 v2
RRP: £25 / Deal Price: £19

The improved v2 version of the ZyXEL WRE2205 builds upon the original's performance by offering dual-band extension of Wireless G and N networks up to 300Mbps – making it much more practical than the TP Link model. What's also very practical and clever is the design, which means it fits easily into any plug socket (though it's not a poweline adapter). It also offers an integrated Ethernet port, that allows it to extend your network's reach even to wired devices. There's also a master power switch, WPS button and set of LED lights, which mean you get every major feature despite its compact size!
Where to get it: Ebuyer (**bit.ly/1sWLREc**)

Deal 3: Asus RP-N14
RRP: £33 / Deal Price: £29

Asus' hardware might be a little more expensive than some other basic models, but for your money you get a strong Wireless G/N dual-band repeater function and, most interestingly, access to the Asus AiPlayer app, which helps you stream media directly to various devices using the built-in line-out/headphone socket, as controlled from your smartphone. Its clever design and functionality make it worth the extra money!
Where to get it: Ebuyer (**bit.ly/1vlanwM**)

Deal 4: TP-LINK TL-WA901ND
RRP: £44 / Deal Price: £37

The TP-LINK Wireless N Access Point TL-WA901ND extends a wireless network to multiple Ethernet devices such as game consoles, set-top boxes, printers, or network attached storage devices. The built-in access point allows you to control and manage traffic separately from the main network, while passing data on to your other hardware. Ideal for getting rid of cables around the house.
Where to get it: Dabs (**bit.ly/YDfvld**)

Deal 5: Asus EA-N66
RRP: £80 / Deal Price: £65

The Asus EA-N66 is capable of 900Mbps using dual-band, triple-antennae wireless N – ideal for homes with multiple devices that all need a fast, reliable connection. It can be set in to bridge, adaptor and repeater mode so that you can use it to add wireless in any way you like. Easy to install and manage, with simple controls you can alter network settings, mode switching and device configuration all from a single interface. It looks great too!
Where to get it: Currys (**bit.ly/1pNcA3l**)

USB Type-C Agreed On

Samsung's iPhone-Beater?

Galaxy Alpha housed in metal

Samsung's very latest in a long line of mobile phones has been outed as the Galaxy Alpha, and it's quite the looker.

Thin and lightweight, as is the trend of course, probably the most striking aspect of the mobile is its metal frame, something the manufacturer has described as a "fresh approach to design". Alongside the metal side of things, the phone has a soft matte back cover for better in-hand control and by upping its premium materials Samsung is most probably making a play against Apple's iPhone 6 with this release.

Samsung has a little ground to make up after some relatively disappointing months in recent times and while some of that has been attributed to the market in general, it's fair to say that Samsung has been viewed by some industry onlookers as having to up its game.

And so the Alpha features a 4.7-inch HD Super AMOLED display, a fingerprint scanner, advanced 12MP HDR camera, Octa Core or Quad Core processor and 32GB internal memory.

We have to say that we're impressed with this release, although there will be a wish at Samsung for interest in the Alpha to take nothing away from sales of the flagship Galaxy S5. Can the two co-exist? We'll see when the Alpha sees the

Vodafone Worst For Call Quality

Unwanted accolade

So, according to research from Ofcom, network provider Vodafone has the worst quality of calls for its mobile customers in rural areas.

Regulator Ofcom looked over data from EE, O2, Three and Vodafone relating to network performance and EE came out on top across the whole of the UK while O2 performs best in city locations. What is hardly a shock to find out is that, overall, consumers in urban areas are happier with their phone service than those in rural areas.

Turns out, then, that 97 percent of all calls on EE were successfully connected compared with 92.6 percent on Vodafone, with only 79.9 percent of Vodafone's rural calls being successfully completed.

In another, separate study from research firm RootMetrics, Vodafone also ranked last for the speed and reliability of its voice, data and text services, EE again coming out on top of that one.

Come on then, Vodafone – pull your finger out.

QUICK BITS... Sony has rather proudly said that the PlayStation 4 has now sold over 10 million consoles to consumers around

Design now decided

The new reversible USB interface, that of USB Type-C, has now been finalised. Yes, anyone using USB leads – and let's be honest, that's anyone using a computer – can now sleep easy in the knowledge that a design is in place that means we'll be able to place a USB lead into a device either way round. Finally... After all these years.

The new design, which was put together with the input of the likes of Hewlett-Packard, Intel and Microsoft, isn't going to allow newer cables to connect to current USB ports, which means an adapter of some sort will need to be used to allow Type-C cables to fit into existing ports (the cables will be backwards-compatible, it's just a physical fit issue).

With a 2015 date planned for the first of these to actually be in our hands, it's going to take a while longer until any kind of mass adoption of this standard takes place.

HannsG Launches Fresh All-In-One Monitor

Android offering from Hannspree

Perennially busy manufacturer Hannspree has once again dipped its toes in the consumer market, by launching its new All-in-One Android Monitor.

This monitor is all about providing casual PC users with a low-cost, space-saving all-in-one solution for those looking for a tablet for computing. Designed for touchscreen converts, but ones who would perhaps want a larger display to boot, the comapny claims the Android Monitor's large display is perfect for school, hotels and the like, but also for your average consumer.

Kitted out with the Android 4.4 KitKat OS, this 23" monitor features a full HD LED display, ten-point touch control, which is powered by a 1.6GHz quad-core processor and 1GB RAM. With 8GB internal storage and a micro-SD slot for more if you like, there's enough here to store your lovely content which you may have downloaded via the integrated wi-fi. Connectivity also includes on-board Bluetooth, HDMI, DVI and VGA, and all of this could be yours for £249 from **www.hannspree.com**.

Go on, take a look.

the world since launching last November

With August coming to an end, millions of people are preparing for a new year in full-time education. Many, of course, will be headed off to university, and it's often at this sort of time that a new laptop is purchased.

There's no doubt that laptops provide an excellent computing solution for students. These days, though, we also have tablets and smartphones to consider.

While you can't really type a 10,000-word disseration on a 5" phone screen (not easily, anyway), if you want to do a spot of light research while on the bus to campus, mobile devices are ideal. And with cloud computing, you can take notes, bookmark pages and more, and then find it all waiting for you when you log in with your laptop or one of the university's own PCs.

Yes, in terms of technology, there's never been a better time to be student. Sadly, none of this helps with the tuition fees.

Until next time...

Anthony

Editor

Meanwhile... On The Internet...

To our eternal shame, if we had to describe the perfect Meanwhile...-baiting news story, it would probably come out a little bit like the one that arose between Greggs (yes, the baker) and Google recently. It had everything we love: NSFW humour, roguish wit, failing technology, exemplary social networking skills and a positive outcome. If you're not aware of what we're talking about, then let us illuminate a little: if you were lucky enough to have Googled 'Greggs' on Tuesday 19th August (err... maybe you were shopping for a Greggs gift card, which is actually A Thing), you would have been greeted with a fairly conventional looking Google results page, with the usual information panel on the right-hand side (and the usual wikia-derived spiel) that greets the searches for a company or organisation. However, a closer look at the company's logo would have revealed that Greggs usual slogan had been replaced by something a lot less complimentary (**tinyurl.com/MotI1326a**).

The offending graphic appeared to have been sourced from Uncyclopedia (**tinyurl.com/MotI1326b**) and fooled Google's automated algorithms into thinking that it was genuine. This is likely to be because the images for Uncyclopedia are hosted by Wikia (**tinyurl.com/MotI1326c**), a resource that powers many user-generated wiki sites (including one of our favourites, the pun-tastic Wookieepedia: **tinyurl.com/MotI1326d**), and is therefore generally considered to be a reliable source for such images (**tinyurl.com/MotI1326e**). Ooops... Not this time.

It's not the first time this had happened recently. Some of you may remember we covered a similar thing happening to another target of regular snobbish sneering, PC World, earlier in the year (**tinyurl.com/MotI1326f**), and there are probably many more incidents like this that we never get to hear about. As to whether anyone at Google is working on a way for its crawlers to predict sarcasm is anyone's guess (**tinyurl.com/MotI1326g**).

The real star of all of this affair, though, was not the (admittedly quite witty, if a little offensive and condescending) comedian behind the slogan re-write, but the social media team at Greggs HQ in Newcastle. It quickly turned the whole affair to its advantage by light-heartedly responding to the ever-growing number of Twitter users who'd informed it of the gaffe, and then cheekily posting a pic of a tray of delicious looking doughnuts, offering them to anyone at Google who could sort out the issue quickly (**tinyurl.com/MotI1326h**). As everyone knows, there are few better ways of motivating IT people than offering tasty snacks, and Google stepped up to sort out the error in pretty short order.

The murder of American freelance journalist James Foley, graphic footage of which appeared on YouTube, has once again highlighted the problem of policing social media these days (**tinyurl.com/MotI1326m**). Vetting content on sites that have grown so quickly and been appropriated for purposes their creators probably didn't forsee could prove to be a difficult business, but it appears that Twitter is planning to do something – at least about the shocking footage of Foley's demise at the hands of IS jihadists in Syria (**tinyurl.com/MotI1326n**).

Twitter's relatively swift move to act on such content appears inspired by recent negative publicity regarding cases of alleged abuse across the site and a barrage of questions fired at its CEO, Dick Costolo, during a recent Q&A. However, the reality of the situation is that even taking the information from major sites like this, Facebook, YouTube et al is not going to stop the dissemination of the message. Indeed, reports quickly started to come in of IS switching its social media output to the Diapora social platform (**tinyurl.com/MotI1326o**) which, due to its distributed nature, is infinitely more difficult (if not impossible) to police (**tinyurl.com/MotI1326p**).

We've written a lot about Tor in the last year or so, and not all of it has been positive. Last week, however, saw the anonymous network and browser put to PR use by the illusive, somewhat reclusive and devise musician Richard D James (aka GAK, Polygon Window, Caustic Window and many other pseudonyms – the most famous being Aphex Twin), who chose to use a .onion URL to announce the release of his first Aphex Twin LP since 2001 (**tinyurl.com/MotI1326i**).

This typically obtuse promotional ploy quickly drummed up something in the region of 130,000 views for the Designer's Republic-conceived site (if you don't know who they are, they are the graphical geniuses behind the seminal *Wipeout* PlayStation games and umpteen classic LP covers over the years: **tinyurl.com/MotI1326j**), which appeared to have a point to make. While the Tor-accessed page accessed a very utilitarian page that revealed basic track details of the LP and a series of 'Unknown' statements regarding details of the visitor, a version of the site accessible from a regular browser (**tinyurl.com/MotI1326k**) revealed no details about the LP tracks but lots of information about the visitor – including IP address, ISP, installed plug-ins and how many visits they'd made. It was a cheeky little political statement and good promotion for a couple of the perfectly legitimate reasons Tor exists. However, it has led some to muse on whether the network is really ready for the mainstream yet (**tinyurl.com/MotI1326l**).

.AVWhy? Videos For Your Eyes... Not Necessarily For Your Brain

Okay, while we'd totally understand why watching a annoyingly good-looking American 2x2 nuclear unit embarrassingly boogie around to Sir Mix-a-lot may not be your cup of tea, there's something in the Holderness family's *Baby Got Class* that speaks to those of us who've juggled work and kids for six weeks of summer holidays (**tinyurl.com/MotI1326r**). If you're wondering where you've seen them before, they're the viral-savvy clan that was responsible for the equally funny *Christmas Jammies* back at the end of 2013. This is better, for our money.

Aaaaaaaaand Finally...

Here's a nice little feature – and an interesting use of data – courtesy of 'digital artist' Kyle McDonald and the clever bods at Spotify. Serendipity (**tinyurl.com/MotI1326q**), is an online map that pops into life anytime two people begin to play the same song using the music platform at the same time, wherever they are in the world. If nothing else, it proves Rhianna's popularity.

QUICK BITS... In a pilot scheme to run in the UK, online music videos will be handed age ratings

Caption Competition

While these little fellas managed to elicit some of the best caption competition entries we've had in a while, there was a clear and glorious winner this week – but before we get to the back-patting, here's the best of the rest...

- **Doctoryorkie:** "How management thinks a network is fixed."
- **Doctoryorkie:** "MM forum outage explained."
- **PlaneMan:** "The entire UK-based support staff of Virgin Media hard at work."
- **The Duke:** "Big data needs a big network."
- **wyliecoyoteuk:** "Yes, Fred, you're right, the plug's upside down, we'll need another cable!"
- **EdP:** "The pest exterminators cleaning out all the GCHQ bugs."
- **JayCeeDee:** "Honey – I shrunk the Network Support Team."
- **GregB49:** "That cheap local builder chappy that you recommended for our new network build says that you only specified speed, not size."
- **JayCeeDee:** "I said I wanted a Gigabyte switch, and ended up with a BiggerByte switch."
- **Thomas Turnbull:** "I told them I was a big name on the internet and I had all the right connections."

The winner, who we like to think was handed this chunk of wit by a Gilliam-esque hand from heavens, was Doctoryorkie with "Pugh, Pugh, Barney McGrew, Cuthbert, Dibble, HUB."

Basically, if you're anywhere near our age, that so flippin' hilarious it should immediately be followed by a rimshot... To enter this week, head to the 'Other Stuff' section of our forum (**forum.micromart.co.uk**) and say something funny (but not too rude) about the picture below or email us via **caption@micromart.co.uk**.

PlayStation TV Coming This Autumn

Micro-console to offer streaming plus gaming

Sony has revealed a date of 14th November as the target for the UK release of its PlayStation TV micro-console, while US consumers will be able to see what all the fuss is about a whole month earlier.

Costing €99 euros across Europe, the console will also include three games and while the UK price isn't yet known, you'd assume that it's going to be around this mark with competition from Apple and Roku similarly costed up. With access to the likes of Netflix and Sony's gaming library plus 2015 access to PlayStation Now for UK users, this could genuinely take on the likes of Apple if Sony gets it right. By offering casual gaming and streaming in one box, Sony has a real opportunity here to make a name for itself, should it get enough third-party interest.

First Smartphone Turns 20

Happy birthday to the not-so-simple Simon

Image courtesy of the Science Museum, London

August 16th marked the 20th anniversary of the IBM Simon, the world's first smartphone. Naturally, compared to the devices of today this was pretty simple stuff, but it still laid some of the initial building blocks that would eventually lead to success for Apple, BlackBerry and the rest.

As such, it had a calendar, it had email and messaging capabilities – and it could be used to take notes, too. It was a chunky fella, though, weighing over a pound in the pocket.

Simon is being celebrated and displayed at London's Science Museum, and rightly so. A mini-computer for business types at the time, Simon's expensive beginnings (this cost US consumers $899) predated the mobile web, but we all have IBM to thank for what we now take for granted on a daily basis. Cheers, chaps.

Snippets!

Croft Commits To Xbox

In what was a moderately sized surprise, Microsoft was all too happy to announce that the next instalment in the *Tomb Raider* franchise will be exclusive to the Xbox. This is a surprising move for a title that has been available on the PS3, PC and Mac up to now, but the developer was keen to say that the move will help to advance the brand. Remember when *Tomb Raider* was a Sony staple? How times change! Expect to see it some time in 2015.

EE Charge To Jump

Somewhat controversially, network operator EE has introduced a levy that will allow its customers to queue jump when contacting its call centres. The 50p flat rate will allow customers to access the priority service but does rather smack of poor treatment for customers who may have been with the operator for years.

Naturally, EE is claiming that this move is necessary to uphold its standards, but perhaps more investment across the board might have been a better PR move? Just as naturally, customers haven't reacted well with Twitter ablaze with anger.

WoW Expansion On Way

Welcome the *Warloads Of Draenor* for they are the focus of the latest expansion pack for the ever-present gaming goliath *World Of Warcraft*.

The expansion will be released on the 13th November and it will include a new continent – the aforementioned Draenor – for players to cause chaos on, plus there's the promise of a graphics improvement, which is nice. Activision Blizzard launches this at a time when the game is experiencing a dip in gamers.

Let battle commence (once more) in November!

Android Tablets Have Data Reset Flaw

Hudl the highest-profile device to suffer

Owners of Tesco's Hudl tablet might be a little more wary of selling on the device following an investigation into the security of the tablet. Turns out that hiding data on the tablet, via the factory reset option, is actually rather flawed. Indeed, researchers have suggested that the practice does very little to delete sensitive data with those familiar with such things suggesting that a recovery job is really rather simple.

This flaw, among others, have been cited in reports as affecting Android tablets in general but it's the Hudl that's been singled out, most likely because of its popularity among mainstream consumers. Tesco has responded by stating that any tablets returned to its stores would be wiped, as well as recommending the use of data wipe software generally for Hudl

Microsoft: We Thought About Dropping IE

Rename was on the cards

Interesting what a little Reddit discussion can reveal. A developer team working on the browser said that the company had discussed renaming Internet Explorer in order to move away from its damaged image and reputation.

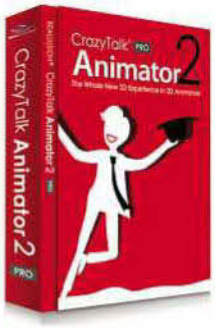
Internet Explorer has, rightly or wrongly, been handed some bad consumer reaction during its long (at least in terms of technology) history, with scorn a-plenty handed down over the years. Some of it has been a bit unfair, in all honesty, but that is the reality – or at least it was in the eyes of the developer team, which did genuinely consider a name change to distance the browser from such views.

The discussion didn't rule out a name change in the future but, as this was a fairly light-hearted bit of banter on a subreddit, you might take that comment with a pinch of salt.

QUICK BITS... **Lenovo's smartphone sales have surpassed its PC sales for the first time**

CrazyTalk Animator 2

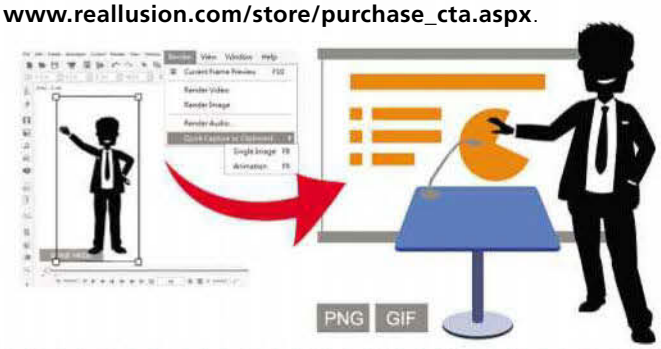
Add some life to your presentations



PowerPoint presentations have had something of a bad reputation in the past. We all, at some point, have had to sit through a boring one, where the orator shows us a load of dull text, with only a few all too familiar clip art images to break the monotony.

With CrazyTalk Animator 2, from Reallusion, you can really bring your presentations to life, whether you're using PowerPoint, Google Docs, Evernote or one of many other supported applications. It lets you add animated avatars and visual effects to your presentations, and includes advanced features such as facial lip-sycning, so your avatars can talk as well as move as you please.

Best of all, prices start from just £37.99, with pro versions also available. To find out more, head on over to **www.reallusion.com/store/purchase_cta.aspx**.



Windows 8.1 Update Causes BSOD

Whoops

Whenever you download and install a recommended security update, you presume that you're doing the right thing for your system.

Shame, then, when that update actually leads to the unwelcome Blue Screen Of Death. According to a support thread over at the Microsoft forum, many people suffered just that upon installing a recent patch for Windows 8.1. Microsoft responded by removing the patch and asking people to uninstall it immediately. It also held an internal investigation into what was at least an embarrassing, at worst damaging, mistake.

We really hope that you were not affected by this.

Ask.fm Sold

Safety issues likely behind decision

Ask.fm's new owners have promised to improve safety on the site following its sale by its previous owners. US firm IAC is reportedly going to invest millions into improving site safety, and the sale also means that its former owners are leaving the firm.

Of course, security is hugely relevant in this case with Ask.fm being linked to cyberbullying in the recent past. Now, the site has already committed to dealing with user complaints within 24 hours and will also remove users involved in multiple complaints against them while an independent safety and security examiner will look into changes and report on its compliance to the US Attorney General's Office for three years.

HP Smartwatch: Yours For $14.5k

Prototype on eBay

The world's first calculator watch came from Hewlett Packard with its HP-01 model way back in 1977.

The HP-01 was quite the thing, weighing about a third of a pound and costing $600 even back then. Coming in a choice of gold-plated of stainless steel – you'd go for gold, surely – the watch is considered something of a collector's item by those in the know, so much so that a prototype of the watch in chrome has recently been posted in a private sale on eBay for $14,500.

This really is a rare beast, but that's a high price to pay for nostalgia. Still, it's good to see something like this, if it is genuine, making its way out into the wild before smartwatches inevitably become de rigueur.

The Samsung UE32F5000A is an exceptional TV for PC gaming

32-inch TVs Suitable For PC Gaming

David Hayward finally has a valid excuse for standing in Currys and drooling over the big TVs

Many of us have a media PC hooked up to our TV and enjoy all the thing a powerful computer can do with a large screen. Further still, most will have a console hooked up as well and can sit back for some gaming action with their PS3, Xbox or whatever. This setup is nothing new and it works well. However, we recently came across something we'd not tried on a big 32" screen before: PC gaming.

Naturally, we've had some experience on smaller and older TVs, and we've been using a dual 27" monitor affair for some time now but, as it turns, out a 32" TV proved to be quite the PC gaming visual champion.

The Samsung 32" F5000 we tested was superb; the reasonably thin bezel made the game area feel larger, the colour and light levels were spot on (although we did find that lowering the brightness significantly helped, without losing detail in the darker or shadowed areas), and the image is clear from angles that a monitor simply can't emulate. And, as we found, anything bigger than 32 inches, and you end up having to sit further away – more

than a metre – due to the pixel density, which in turn lessens the visual appeal of having a bigger and clearer screen for gaming on.

We thought, then, a round-up of three worthy contenders was needed to see which 32" TVs would make perfect PC gaming displays. We needed to find TVs that could be adjusted to a high degree, in terms of colour, sharpness (which needs, we find, to be turned down extremely low to take the edge off the pixels), brightness and contrast. That way, the perfect image can be achieved and stored as a user-defined profile, which can swapped out when you want to use the TV for normal duties. Also, we need to find the TVs that are the right price and don't offer too much technology that will ultimately disable the customisation of the screen – although to be fair, brand-specific TV technology may well benefit the PC gamer.

Samsung UE32F5000A

We'll start with the model we primarily tested our PC gaming with: a decent enough, although a little older now, 32" Samsung.

This is a full HD, 1080p, LED backlit TV with a pair of HDMI ports, scart, USB, LAN port, optical audio and one of those Common Interface connections that no one seems to ever bother with or connect anything to.

This Samsung model uses some advanced picture quality improvement technology that greatly improves the range of colour enhancement, so with a few tweaks you can get a very nice, deep coloured image with excellent blacks against the lighter tones. Just to note, we did find that the F5000 tends to have slightly too much red out of the box in its default preset, but with the two-point white balance controls you can drop the red tint completely. It's down to personal taste really.

The gamma on the F5000 is as near perfect for PC gaming as you can expect; the depth it adds to the image by lowering it slightly is certainly perceivable and makes a significant difference when you get night-time missions in games. Incidentally, *Assassin's Creed 4* during a dark indoor mission looked pretty spectacular, we think.

Samsung use its own S-PVA LCD panel for the F series of TVs, which is highly regarded among TV pundits and, as a result,

Other 32" TVs To Consider

These three aren't the absolute final TV selection for PC gaming. As we said there are many more out there. With that in mind, here are three more to check out, should the selection in the main article not take your fancy.

- **Panasonic TX-L32E5B:** A decent enough TV with good motion detection and image quality.
- **Toshiba 32RL958:** This Toshiba is a couple of years old now but can be picked up for a very reasonable price.
- **Sony KDL-32HX753:** A tad more expensive than the other 32" TVs, but this Sony does output a very good image. And it's 3D, if you're into that kind of thing.

➤ There's plenty of connectivity around the back of the old Samsung

offers a far superior picture quality over the standard A-MVA type that earlier models and some clones use. It makes for far better viewing angles, a more unified screen with better backlighting. Plus, as we mentioned earlier, if you reduce the sharpness down to 0 and set the picture image size to Fit Screen via the OSD, then you're going to be immensely pleased with the results.

The Samsung UE32F5000A is a very good TV on its own, and when you add a PC and enter into some gaming, the results are terrific. Granted it needs a little tweaking to get to that point, but in all fairness, all the TVs we tested needed some tweaking to get the best screen output for PC gaming.

As we said, this model came out about a year or so ago, but it's still available for around £250 or less, depending on where

"The Samsung UE32F5000A is a very good TV on its own. When you add a PC and enter into some gaming, the results are terrific"

you shop. If you have the spare cash and you're in the market for a good TV that can also make for an excellent gaming display, then the F5000 is certainly something to consider.

LG 32LB580V-TA

LG has put together some pretty amazing TVs in recent years, but it's only recently that it's started to up its game and produce sets that are really startling while still being good value for money. The LG 32LB580V-TA is one such TV, and its specifications are incredible.

It's a full 1080p HD TV IPS display coupled with LG's Motion Enhancement Technology 100Hz Clarity Index. There are three HDMI ports, scart and the usual array of TV ports. It also comes with three USB ports, digital optical audio, wi-fi and LAN connectivity, and as an added bonus it's also DLNA certified.

Standard TV functionality aside, it's the IPS panel that's the star of the show here and along with it the excellent colour accuracy and wider than normal angle viewing. Plus the ultra-thin bezel makes a significant difference when playing a game, as the illusion of a far bigger screen enhances your enjoyment of it

The Panel on the LG looks great, and the thin bezel makes for better viewing as well

LG offers plenty it comes to connectivity

more. Added to that is the LG Triple XD Engine, which advertises itself as greatly enhancing the contrast, clarity and colour of an image. However, out of the box, we didn't like the results when it came to PC gaming, but due to the performance of the XD Engine, we were able to drop the sharpness and adjust the colour and contrast to better suit the PC.

This TV also includes something called Picture Wizard III, which is an auto-adjust, preset profile screen setup that's, as before, designed to provide you with the best possible image quality. The problem here is that the image quality is greatly tailored to video or console gaming output, and although good when used for both those elements, it's not the best for PC gaming.

The Picture Wizard III feature can be tuned to greatly improve the output from the PC; contrast, colour and so on all have examples, but the detail is in the slider under these preset examples, which fine tunes everything accordingly.

The image can in the end be tweaked to perfection, and there's no noticeable lag during the faster in-game sequences. Incidentally, this model of LG also has a virtual surround sound feature, which surprisingly does a pretty good job without the need to feed the audio through a soundbar, although the extra oomph a dedicated sound system offers is obviously far better.

As with the Samsung, this LG TV isn't the newest generation of TV, which means it can be picked up for a reasonable price. We found a few examples from various online shops, with an average cost of around £350.

Tesco Technika 32E21B-FHD

Delving into the often dismal world of supermarket electronics isn't something we do all that often. The wise generally nod sagely when recounting an unfortunate entanglement with a TV from the same place that sells frozen pizza. However, we think there may be an exception.

Granted, Technika isn't the first name that pops into one's head when coming up with an article on technology. It's basically Tesco's own brand of in-house electronics,

> **"We thought it would be interesting to throw something different into the mix, and we were shopping for pizza anyway"**

made in some Chinese factory somewhere (probably China, we're guessing!) and produced from the cheapest possible components to maximise the profits. Who can blame them? It keeps the shareholders happy, after all.

Anyway, we came across the Technika 32E21B-FHD, a full HD 32" backlit LED with the bare minimum in terms of features but offering a rather good level of picture customisation for the PC gamer.

It has three HDMI ports, a USB port, VGA, component in and the ever present CI Slot, so in TV terms it does a reasonably good job. What we liked about it, though, was the hardware, monitor-like, OSD controls located around the back of the right-hand side of the TV. This, we felt, gave us much better control over the tweaking of the image and allowed us to balance the colour, contrast, gamma and everything else to get an overall pretty effective PC gaming image.

Fair enough, though, it wasn't perfect; there were moments where the darker colours didn't feel as deep as they could, and there was some obvious and quite excessive pixel distortion during faster sequences, such as racing around the city in *Burnout Paradise*. Dropping sharpness levels helped smooth the rough pixels out somewhat, but the motion handling is purely down to the fact that this is a cheaper brand.

While we're focusing on the more negative aspects of the Technika, we may as well mention the fact that this one of

The Tesco Technika isn't the greatest TV ever invented, but it's reasonable as a dedicated 32" PC gaming TV

the ugliest TVs we've come across in recent years. The shiny, black, thick bezel does nothing to improve the looks of the unit or the image on the screen, and the use of cheap plastic throughout is evident.

So why, then, would we even mention this TV? It's a fair question, we'll grant you. Despite these negatives, this is a really cheap 32" TV – just over £200 in fact – so it makes for an interesting large screen PC gaming display. Once you have the thing installed on a shelf and you've tweaked the settings, then you'll soon to come appreciate the fact that the image for a PC game isn't all that bad, and switching off any instance of motion blur in-game makes the faster sequences a lot easier to view.

4K Call of Duty is pretty exceptional looking

We're sure that once you've played around with this TV, you'll soon stifle a giggle at those who spent nearly twice as much for an image that's not too far off the one you're currently looking at.

It's worth having a closer inspection, at any rate, and if you can manage to smuggle in your laptop for a quick test, you can get the general idea of what you're dealing with.

The Technika 32E21B-FHD, then, isn't the best TV in the world, but saving a good £50 for what is essentially a little motion blur and some pixel distortion may not be as bad an idea as you first think. Either way, we thought it would be interesting to throw something different into the mix, and we were shopping for pizza anyway.

Conclusion

Needless to say, there are plenty more 32" TVs out there that are more than capable of displaying a very good PC gaming image. The trick, of course, is finding them among the not so good.

We think the best models to look out for are the ones that are full HD (1080p). The reason for this, we've discovered, is that the pixels look far better when closer (between one to two metres away from the TV) and are generally better when further away than if the screen was only moving around at 720p.

Also, the full HD TVs we tested appeared to have better controls over the contrast, brightness levels, colour, gamma and sharpness. Obviously if you opt for a more up-to-date model and one that's from a reputable brand like LG or Samsung, then you'll also be able to take advantage of the picture technology they include with their lower-end hardware – since a HD 32" TV these days is considered lower end.

One more thing to consider is the motion handling or, in respect of a monitor, the response time. These days, most monitors are around the 5ms mark, which is more than quick enough for every PC program, including games. Yes, the faster monitors do yield a better image when the action speeds up, but you have to wonder, does the human eye detect the difference between 0.01 of a second (which is 10ms)? If you're like us and you've ruined your eyes by staring into screens for an unhealthy chunk of your working life, then most 32" TVs, which have an average response time of around 9ms to 12ms, will be able to dish out the gaming without being perceivably grainy and without too much loss of quality during faster action sequences.

We enjoyed our time with big screen PC gaming; we felt it added an extra level of depth to the game, despite the 15 minutes or so of tweaking beforehand to get the image just right. Of course, you could instead opt for a larger monitor, but then you're adding to your electric bill, so if you already have a 32" TV or you're thinking of getting hold of a new TV, possibly a second for another room, then check them out for their PC gaming potential. You could be pleasantly surprised by the results. **mm**

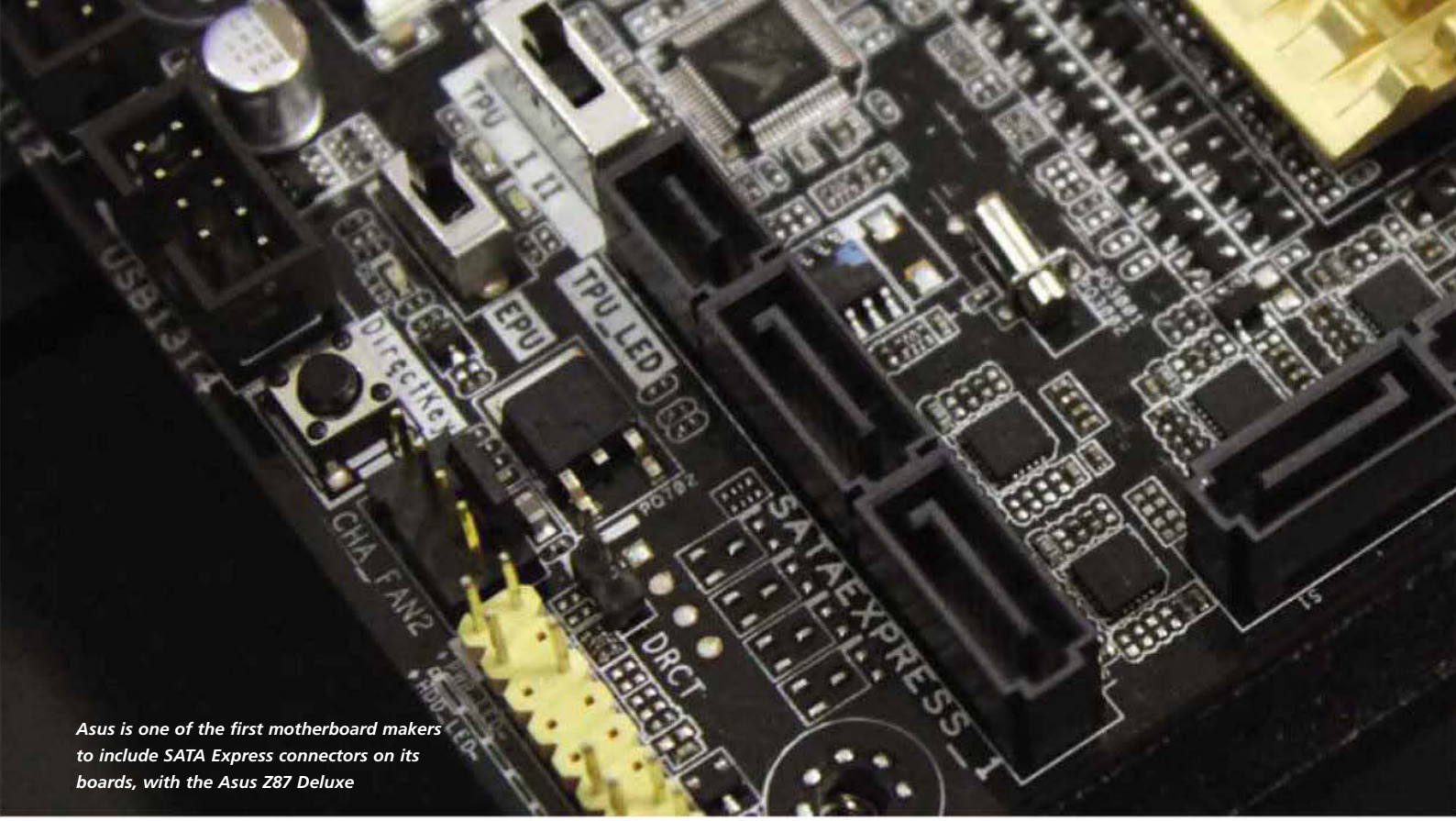
What About 4K TVs?

The must-have technology currently touted by the high streets, 4K TVs apparently upscale everything that's not 4K to the higher resolutions, although the quality falls dramatically when doing so.

We thought, then, we'd see what a PC gaming experience would look like in 4K. For this we collared a friendly Currys worker and press-ganged him into hooking up a gaming laptop to one of the shiny, curvy 4K TVs.

The result wasn't quite as good as we expected. True enough, the screen filled the full 70-something inches of the panel, and the microscopic bezel around the TV made everything feel bigger than normal – that part of the experiment was quite impressive. However, since we were limited to standing four foot away from the massive screen, it felt like we were viewing a zoomed-in image of some 8-bit art. And our laptop was clearly struggling as we upped the resolutions, making loading new scenes resemble *The Hobbit* on the Speccy.

It was fun, but until games catch up and PC hardware becomes cheaper, 4K gaming is out the reach of most users. If you ever get the opportunity to try it out, though, on a better system than the one we did, you're in for a visual treat.



Asus is one of the first motherboard makers to include SATA Express connectors on its boards, with the Asus Z87 Deluxe

Beware Of M.2 And SATA Express

Mark Pickavance details some critical changes to storage standards that might catch out system builders

I found it hard to accept when I researched this point, but we've been connecting drives to PCs using SATA for 11 years. Therefore, if you're still using an IDE mechanism, it's time to pull your digital finger out.

Over this long period, SATA has gone through a series of updates and enhancements, while maintaining physical compatibility with the original connectors. That doesn't make original SATA drives any quicker under SATA 3 interfaces, but they will plug in and generally work for the most part.

That simplicity has progressed from physical hard drives to SSDs, and it's been a significant improvement on the reliability and cabling problems that previous ATA-based standards suffered.

However, changes are afoot that could make the no-brainer SATA connections of today seem like a distant dream.

Watch out everyone! M.2 is coming, and very little about it is set in any sort of standards concrete.

What Is M.2?

Actually, for those who see new motherboards often, the M.2 connector has been making odd appearances for over a year now. What's going to convert that from being the exception to the norm is that many of the higher-end Intel Z97 chipset motherboards carry this interface, making it something that enthusiasts can get excited about.

On Z87, the 18 lanes of the PCI bus were spread evenly over PCIe, SATA and USB, with six SATA ports being offered as standard.

But on Z97, two of them are now specially altered to being either M.2. PCIe or SATA Express. I'll talk about SATA Express shortly, but first let's try to understand M.2 PCIe and what it's bringing to the PC party.

M.2 started life as the Next Generation Form Factor (NGFF), but it's now been rebranded as M.2, a name that hints that this technology is a redesign of the not-often-used mSATA standard.

The M.2 card isn't meant for conventional hard drives but SSD technology, where the actual device can be very small indeed. The original intended target was laptops and mobile devices, but with the Intel Z97 chipset it looks destined to spread into the desktop PC.

The actual interface has two parts: an edge connector and then a semi-circular mounting hole, through which a metal pin stops the card being dislodged while in use.

The problems for potential users start with the physical card, because the term 'standard' seems wholly inaccurate for the wide variations that can be found in both scale and application of the card.

At this time, there are no less than eight different types of cards, designated as S1 to S3 and D1 to D5 respectively. The cards can be single (S) sided or double (D), and they can be 1.2mm, 1.35mm or 1.5mm thick per side, allowing for a possible range of 1.2mm (S1) to 3mm (D5).

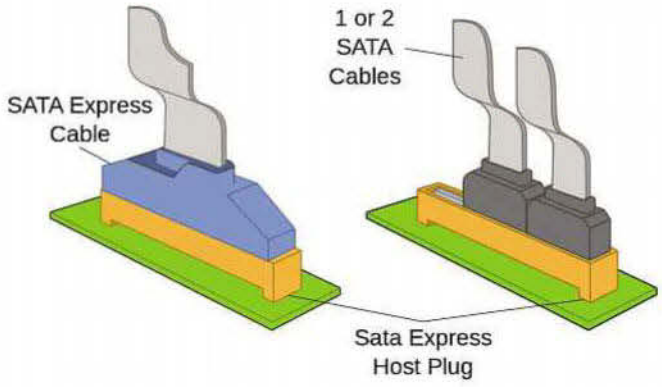
Logic therefore dictates that a slot meant for S1 won't take any other type of M.2 card, and in fact each of these types has an overall thickness that makes it unique.

If that's not enough variation for you, M.2 also allows module widths of 12, 16, 22 and 30mm, and lengths of 16, 26, 30, 38, 42, 60, 80 and 110mm.

Thankfully, most commercial products produced so far have stuck with 22mm wide, though lengths have varied between 30 and 110mm. The convention that's emerging for identifying them is to put width as the first two numbers and length as the second pair. Therefore a module designated as 2280 is 22mm wide and 80mm long.

The reason for all the width variation is that the interface has 75 pin positions, providing a potential for 67 pins on each side, with different pins being pre-organised for PCIe, SATA, USB, DisplayPort, audio and reservations for future technology.

Therefore, if you only intend to use SATA, then you don't need all the pin allocations available. These pins aren't just ignored either.



New SATA Express connectors can be used either with SATA cables or new SATA Express ones

They're physically removed to create a 'keystone' so that in theory you can't put a card that's not made for that specific M.2 interface into use.

Sockets can have a keystone at either end, labelling them as 'B' or 'M' type, and cards can be correspondingly 'B', 'M' or 'B&M' if they will fit into a slot with both keystones. And single-sided cards should fit into double-sided socketed, though not vice versa.

Taking just the single- and double-sided variants (8), and multiplying them by the width (4) provides at least 32 options and 256 if you add length. And with keystone options, that could be even more. The only mitigation that can be offered is that it should be possible to put shorter modules in longer slots with the aid of a simple plastic brace. But exactly what sizes, widths and keystones will become the norm seems very unclear at this point.

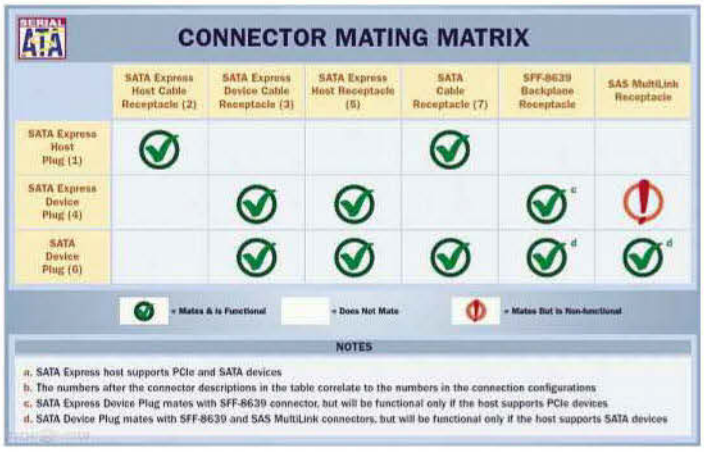
If this all seems like permutation gone entirely bonkers, then wait till you hear about SATA Express, because it doesn't get any less complicated.

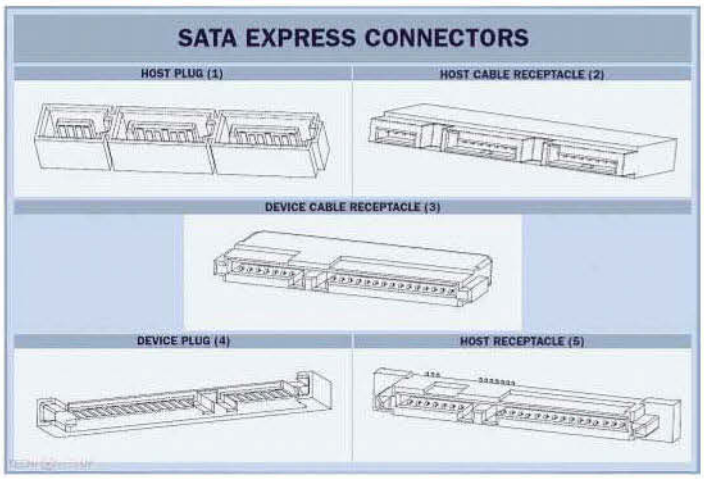
How Does It Relate To SATA Express?

The purpose of SATA Express is to provide an interface that can handle existing SATA devices, hard drives and SSDs, and potentially PCIe devices in a single connection.

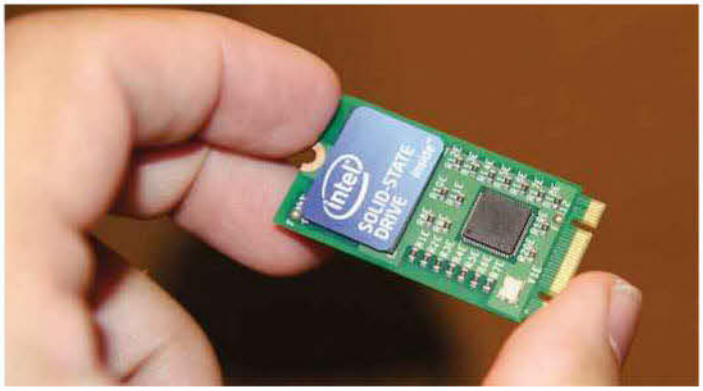
The SATA specification is 3.2, which improves on 3.0 by merging in the PCIe bus to increase the bandwidth while maintaining backwards compatibility with the standard SATA connector for the equipment that needs it.

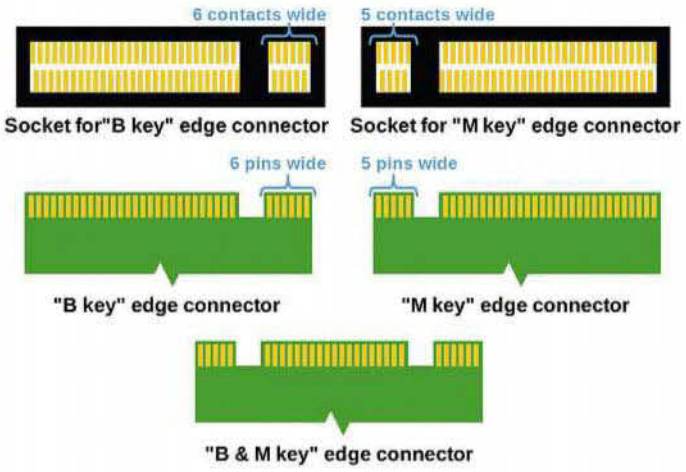
The default SATA Express connector combines two SATA 3.0 6Gbps ports and a number of PCIe lanes, which could scale from





As if M.2 wasn't complicated enough, SATA Express has its own cabling scheme that's designed to be backwardly compatible with original SATA





M.2 cards can have three different keystones, depending on what interfaces the technology on them supports

two upwards. Two PCIe 2.0 lanes alone is equivalent to 1GB/s of bandwidth. Mixing bits and bytes is always complicated, but the bottom line is that a SATA Express connector with dual PCIe lanes and dual SATA could reasonably shift at least 1000MB/s per second or more, if SSDs were made to perform that fast.

But, critically, SATA Express isn't M.2. It's a sister technology that can offer the same performance levels but probably in drive form factors that are closer to what we see today on 2.5" SATA SSDs.

What muddies the waters is that M.2 is being delivered in two flavours, PCIe and SATA, where SATA Express supports both these technologies in a different way.

It is possible to connect a PCIe M.2 card to a PC without an M.2 slot if you use a carrier like this one that Plextor has made. The Plextor M6e can apparently deliver read/write speeds of 770/625 MB/s

Where things diverge is that M.2 cards can only be SATA or PCIe at this time, and they will only work in M.2 slots designed to accept one or the other.

Therefore, if you've got a laptop with a M.2 SSD in it that's on a SATA interface, then you can't replace it with one made to operate only on PCIe.

What's really worrying is that Sony, for example, make VAIO laptops that have M.2 slots in them, in both SATA and PCIe types, for which the drives are not interchangeable. If one manufacturer can't even standardise, what hope is there for the rest of the industry?

It also needs saying that if you use a SATA M.2, SSD then the performance will be almost identical to what you'd see connecting one to a SATA port and therefore no better than mSATA or SATA, where the performance you might see from a PCIe M.2 SSD could be much greater.

As for SATA Express, we'll see drives that support these triple-cable connections delivering 1GB/s speeds, and you'll also be able to use these ports to hook up good old SSDs or hard drives, should you want to access them on your system.

Additionally, PCIe M.2 cards are being delivered on adapters for PCIe slots, for those systems that predate all this wonderment.

If this, and all the different sizes and specs seem intent on confusing you, then you're not alone.

More Road Bumps Ahead

Having outlined the very wide specification differences that M.2 encompasses, it's worth noting that it also takes other parts of the PC architecture well outside their comfort zone.

One of these is AHCI (Advanced Host Controller Interface), which first appeared on motherboards over a decade ago. When AHCI was devised, it was designed to get the most out of physical hard drives and didn't really consider the advent of the SSD.

Completely by accident, it happens to help SATA connected SSDs a little, or they've been reverse engineered to work with it rather than against it.

But AHCI methods are entirely out of their depth when presented with a PCIe-connected SSD, and this was realised before the first technology went out of the factory door.

The solution is called NVMe (Non-Volatile Memory Express), and it was built with SSDs connected through scalable PCIe interfaces in mind, by offering a very low latency model. Early NVMe implementations were enterprise-focused products, like Intel's 18-channel CH29AE41AB0 NVMe controller used on its SSD DC P3700 product. This controller is an evolution of the S3700/S3500 design that Intel previously developed for its enterprise SSD products.

The move into the mainstream for NVMe is expected to progress once the LSI Sandforce SFD-3700 controller becomes more widely available, as this is the one that the likes of Corsair favour.

Since LSI announced this controller, Samsung has countered with the XS1715, a chip designed to drive an NVMe SSD with massive

M.2 cards need a 'triple insertion' method to get them on the board. First you offer them in at an angle, then you push them home while rotating to the perpendicular. And finally, you put the retaining screw in to lock it down

ID	Top Side	Bottom Side	Total
S1	1.20	N/A	1.20
S2	1.35	N/A	1.35
S3	1.50	N/A	1.50
D1	1.20	1.35	2.55
D2	1.35	1.35	2.70
D3	1.50	1.35	1.85
D4	1.50	0.70	2.20
D5	1.50	1.50	3.00
Maximum components thickness on M.2 cards in millimetres			

3GB/s throughput and a staggering 750,000 IOPS. Crucial (Micron) is also supposedly developing its own NVMe technology, as is IDT with its Princeton NVMe controller.

What we're likely to see at the retail end of the SSD market is some initially interesting products offering 700-800MB/s per second performance (a reasonable jump over existing SATA-3 technology), to be rapidly followed by the products that really unlock the potential of flash-based storage on the PC, as we march to RAM-like performance for non-volatile storage.

Final Thoughts

Choice is generally a good thing, until there's so much that it actually gets in the way of making good commercial choices. The M.2 card is the right idea but comes with more flexibility than the typical punter is ready to comprehend.

I can see how this situation has developed, because originally M.2 devices would never have seen the daylight beyond the Ultrabook cases they'd been squeezed into. But, as with all useful technology, someone decided it was great for the great unwashed to handle, and Intel added it to the Z97 specification.

At this time, AMD has yet to bind SATA Express into its product lines, but the next chipset release will most likely include M.2 support. A few manufacturers have announced 990FX boards with M.2 bolted on, including ASRock.

There's also a great deal of variation even within how various motherboard makers are implementing M.2 PCIe, with the Intel standard being to use dual PCIe 2.0 lanes.

ASRock, among other board makers, thought that was pretty silly given the number of PCIe lanes available, and instead gave it 4x PCIe 3.0 lanes on its Z97 Extreme6 board. Because of the increased bandwidth on PCIe 3.0, this bumps the potential traffic to a whopping 3940MB/s – or it would if you could get PCIe 3.0 compatible devices, which sadly you can't yet.

What I take from this is that the pieces are slowly moving into position for great things, even if they're not actually there yet.

What was certainly true was that with SATA-3, the technology had hit the speed buffers, and SATA Express does light the way to greater performance possibilities. Hopefully, those that make M.2 technology will standardise on a couple of sizes and specs that everyone can embrace, and people won't be buying technology that physically fits on their PC but won't work.

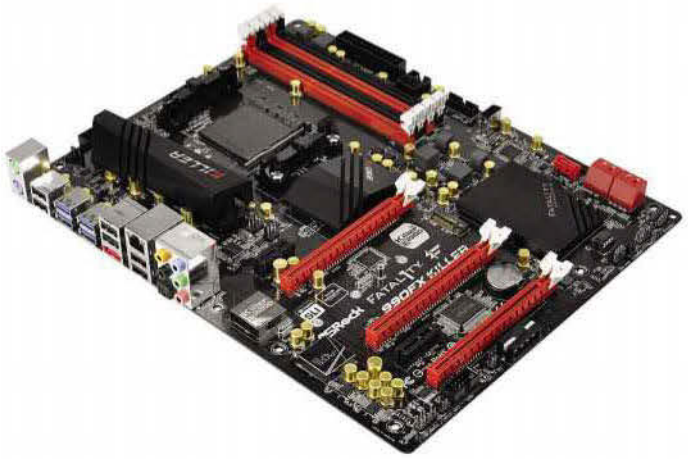
However, based on past experience, there might be a few unexpected detours before we reach that destination.

One that I discovered while researching this article was that only M.2 modules with a single 'M' spec keystone can actually reach the really high speeds, because these are the only ones that can support PCIe x4 channels providing 2GB/s of bandwidth.

The good news is that SSDs are going to get bigger, cheaper and faster in the very near future, if we can rely on those that make them to all pull in the same direction.

Companies attempting to create their own personal standards to lock customers in could easily put a spanner in the works of this transition, so easily.

If you've got a board with M.2 or SATA Express, do plenty of research before ordering an SSD for it, or you might well run into technical difficulties. **mm**



The ASRock Fatal1ty 990FX Killer: one of the first AMD processor motherboards that includes M.2 technology

Plot Your Best Foot Forward...

Learn the basics of GNUPlot with Chris Salter

Excel is bundled with the Microsoft Office suite, and is probably the go to app most people would use for creating graphs – despite Apple and Google now offering their own spreadsheet programs, and there being many free alternatives. This is because nothing out there is as handy for manipulating data, and it doesn't require you to have knowledge of complicated queries and commands for databases. From basic line graphs up to more complex multi dimension axis graphs, it has a knack of providing good results.

However, for some users, Excel can seem limiting. Often the defaults might be enough, but if you want to start creating complicated graphs or a lot of graphs on the same data set, it can get tedious and complicated. Likewise, you might want to create a graph from a command line script, something that Excel can't do. What then? Students are likely to be able to access something along the lines of Matlab through their University. Programmers will have access to Python (and therefore, MatlibPlot). What about the rest of us, though? What if we want to just create graphs from data easily?

GNUPlot is a graphing program that can be installed on all three main operating systems. With a bit of work, it can create professional looking graphs that are more adaptable than anything Excel can offer.

Installation

GNUPlot can be downloaded from it's website – **gnuplot.info**. If you're using Linux, you should be able to download from your distributions repository. Likewise, on the Mac, you can use MacPorts or HomeBrew to install it. There's a Windows installer (however, at writing, it's not the latest version of GNUPlot) that will install it and let you call it from the command line.

Basic Use

Firstly, GNUPlot isn't like Excel. It doesn't have a GUI like Excel does, so you can't just highlight the columns you want to add to the graph and click go. In fact, GNUPlot relies on it not being like Excel, as the data is stored separately to the graphing program (therefore splitting the graphs and data). This means GNUPlot can deal with data in many formats; by default it looks for tab separated values, but is easily changed to use comma separated values.

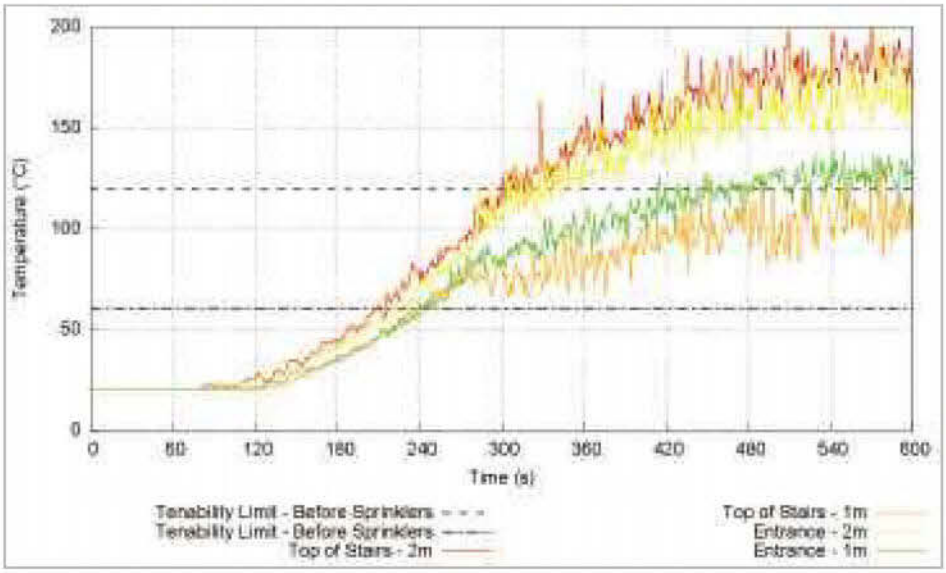
Initially, this division of labour makes things more of a pain than Excel. Once you get used to it, though, GNUPlot becomes easier to handle, and allows changes can be made quickly to lots of graphs at the same time.

GNUPlot can be run interactively on the command line or via a job settings file. Personally, I believe the settings files are the easiest way to work with GNUPlot, as this stores all the job data for a graph within a single file and you can go back and easily make changes if you have to. For the purposes of this tutorial, I'll cover the settings files only (the interactive method is almost exactly the same, but it requires you enter each command individually in the command prompt when you call the GNUPlot program).

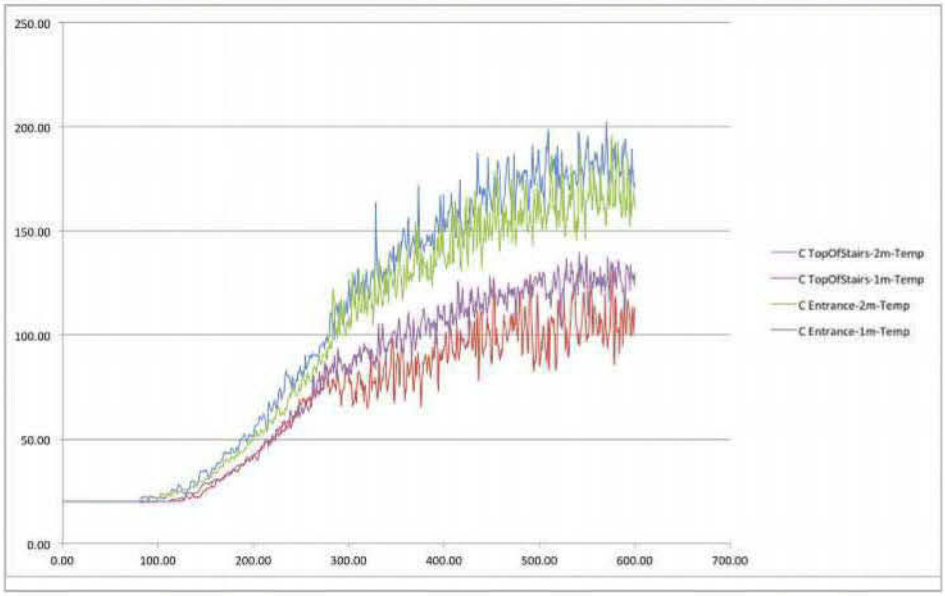
Either load up a command prompt (if you've added GNUPlot to your PATH as per the installation instructions in Windows) and type gnuplot.

This will the show the prompt:

```
gnuplot>
```



Temperature Graph Plotted from FS1_devc.csv in GNUPlot



Temperature Graph. Plotted from FS1_devc.csv in Microsoft Excel

“You can instantly re-run the gnuplot command to get the same style and layout of graph from different data”

This signifies that you've started GNUPlot, and anything you subsequently type will be interpreted by GNUPlot only.

However, we'll type exit to quit, and then move on to creating a setup file. For this article, I'll be plotting data of a fire in a flat – you can get the data yourself at **bit.do/udKq**, which should let you replicate the steps I take.

The setup file is a standard text file that contains all the inputs that gnuplot needs to create the graph for you. For example, this will specify the x and y axis labels and other associated data. This means you can instantly re-run the gnuplot command to get the same style and layout of graph from different data – ideal if the values are in constant flux.

This setup file can created by Notepad, or whatever text editor you use; Windows users should make sure not to use Wordpad, however, as this can lead to trouble interpreting the different line endings used in the files.

The first line is specifies the console we'll be using to plot the graph. This effects the output of the process, whether we save the image as a file and what file it will be.

GNUPlot might need to be told to make sure to use our local decimal system (it might display decimals as commas otherwise. This can be achieved by telling it to use the local decimal system (based on the system locale).

```
set decimal locale
```

This can be changed if you deliberately want a different country's decimal system.

We then enter commands to dictate that we want to use the PNG terminal to produce a PNG image file, that we want to use the enhanced terminal so we can use special characters, that we want to use dashed lines if needed and that the font we will use is Arial and at point size 10. It looks like this:

```
set term pngcairo enhanced dashed font "Arial,10"
```

We then set out that our field separator is a comma by entering:

```
set datafile separator ","
```

You can use anything here, so if the data is in a Markdown formatted table you can set the separator to | if you need to. GNUPlot's default is a tab, so if it's separated by tabs you don't need to sort this.

We then need to set the output file - this is achieved by using the command:

```
set output 'Temp.png'
```

Obviously, you can call it whatever you want, but that's completes the basic information it needs to set up the input and output. Then we move on to configuring the graph to exactly what you want.

For example, we'd want to have labels on the X and Y axis.

```
set ylabel "Temperature (\260C)"
set xlabel "Time (s)"
```

Note that the Temperature has a code (\260) – via the enhanced terminal, GNUPlot interprets this as a degree (°) symbol.

As the graph will be plotting temperatures from various sensors, a key will be needed, so we can see what each line represents (Excel calls this a legend). This is done with:

set key horizontal bottom outside center

GNUPlot is pretty good at specifying different colours for the different datasets, but I can specify my own with the following:

set style line 1 lt 2 lc rgb “black” lw 2

This line isn’t quite as straightforward to analyse as the other commands, but the letters are basically shorthand for: set line style 1 with a line type of 2, in black and with a line weight of 2 (the thickness of the line).

Once the lines are set, the data can be plotted with:

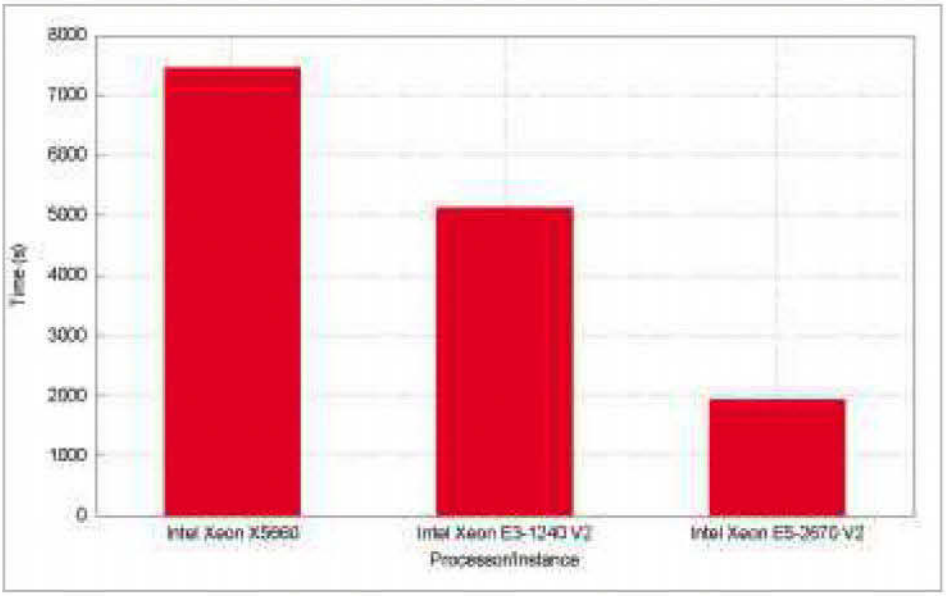
plot 120 title “Tenability Limit - Before Sprinklers” w l ls 1 lw 2, \
60 title “Tenability Limit - Before Sprinklers” w l ls 8 lw 2, \
“FS1_devc.csv” using 1:19 title “Top of Stairs - 2m” axis x1y1 w l ls 2 lw 2

This plot command tells GNUPlot to plot a line at 120, with a title of Tenability Limit - Before Sprinklers with lines, using line style 1 and a line weight of 2. The bottom line tells GNUPlot to plot the data from the file “FS1_devc.csv” using coloumns 1 and 19 (the first number being the x axis and the second the y).

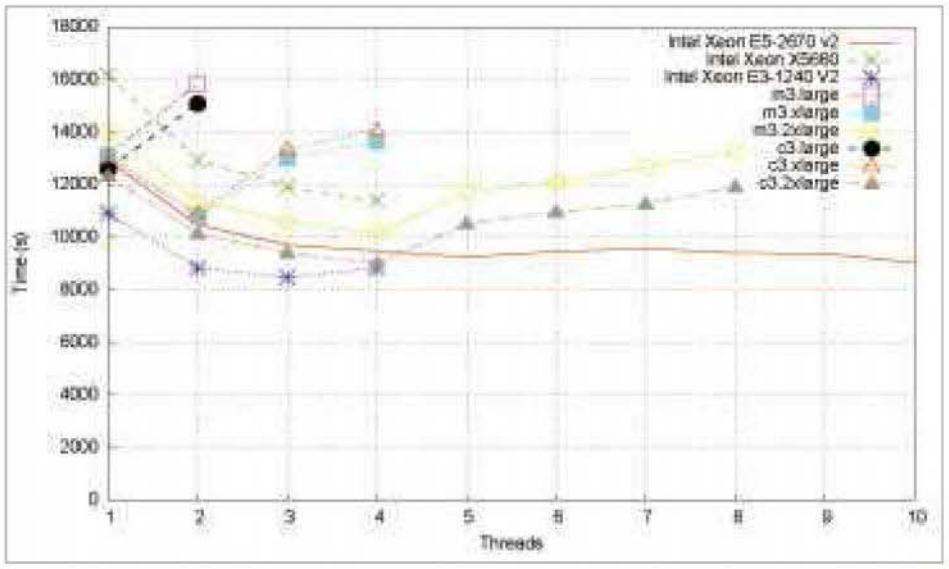
Overall, this gives the following:

```
set term pngcairo enhanced dashed font
“Arial,10”
set datafile separator “,”
set datafile missing “NULL”
set decimal locale
set output ‘Temp.png’
set grid
set key horizontal bottom outside center
set ytics nomirror
set xtics nomirror
set yrange [0:200]
set xrange [0:600]
set xtics 60
set ylabel “Temperature (\260C)”
set xlabel “Time (s)”
set style line 1 lt 2 lc rgb “black” lw 2
set style line 2 lt 1 lc rgb “red” lw 2
set style line 3 lt 1 lc rgb “orange” lw 2
set style line 4 lt 1 lc rgb “yellow” lw 2
set style line 5 lt 1 lc rgb “green” lw 2
set style line 6 lt 1 lc rgb “blue” lw 2
set style line 7 lt 1 lc rgb “purple” lw 2
set style line 8 lt 4 lc rgb “black” lw 2
plot 120 title “Tenability Limit - Before
Sprinklers” w l ls 1 lw 2, \
60 title “Tenability Limit - Before
Sprinklers” w l ls 8 lw 2, \
“FS1_devc.csv” using 1:19 title “Top of
Stairs - 2m” axis x1y1 w l ls 2 lw 2, \
```

Hard Drive Usage on my Raspberry Pi over time



Bar chart example, showing time taken to complete a benchmark test on different computers



Multiple benchmark tests – demonstrating different styles and colours

Abbreviations		
GNUPlot can use the full command or abbreviations for creating the plt file. I've used the abbreviations. These are what they mean:		
Abbreviation	**Full Text**	**Meaning**
w l	with lines	Plots a line graph
w lp	with linespoints	Plots a graph with line and points
w p	with points	Plots a graph with just points
lt	line type	Sets the line type to use (dots, dashes, solid)
lc	line colour	Changes the line colour
lw	line width	Changes the line width
ls	line style	Changes the line style (combination of type and colour

Input Data

Gnuplot reads data from text files, such as comma separated values or tab separated values. So if you have the data you want to graph in Excel, then you need to export this into a CSV file (easily done via the Save As menu within all latest Excel versions). Google Drive and other software let you do this as well, so you should be able to use one of these programs to convert your data into a format you can use.

Scripting

As GNUPlot supports reading information from a file (the .plt file), it can happily run from the command line, using a file to set up and export a file. This can be used to create graphs on data that might change regularly and you want to create a graph of - for example, you might want to show a graph on a static website of data.

```
"FS1_devc.csv" using 1:20 title "Top of Stairs - 1m" axis x1y1 w l ls 3 lw 2, \
"FS1_devc.csv" using 1:31 title "Entrance - 2m" axis x1y1 w l ls 4 lw 2, \
"FS1_devc.csv" using 1:32 title "Entrance - 1m" axis x1y1 w l ls 5 lw 2
```

To get the graph, save this file in the same directory as the data with the extension .plt and open a command window/terminal. Browse to the folder and then use the command:

```
gnuplot *.plt
```

This will get gnuplot to plot all the gnuplot files within that folder and the completed graph should be created in the folder. This should plot the graph shown in the figure on the second page of this article (Temperature Graph Plotted from FS1_devc.csv). This is output as a graph that you can now use anywhere (import in Word or Google Docs, place on a website etc). By playing with the file above, you should be able to construct graphs of your own using the data within the data file.

Additional Commands

Time Format

The example above is a good, simple example because both the x and y axis are single numbers. This makes it easy to plot one number against another. However, GNUPlot can plot dates as well, allowing time series data to be plotted. For this, the axis need to be set as time format, along with the format that the date takes. This is done using the following commands:

```
set xdata time
set timefmt "%d/%m/%Y"
```

> **"GNUPlot can plot functions and trend lines, as well as data already stored within a file"**

This is where x is the x axis and the format is dd/mm/yyyy. To get the right date format, the manual might need to be consulted to get the date right (as GNUPlot can plot days of the week as well in text form) depending on how the data is stored.

Bar Charts

GNUPlot is mainly used for plotting scatter plots. However, you can plot historgrams and bar charts with it.

```
plot "data.dat" using 1:2 with boxes
```

The command above tells GNUPlot to plot data using boxes. By default, it'll be lines, so to get the boxes to be filed in, you'll need to use the command:

```
set style fill solid
```

Functions and Trend Lines

GNUPlot can plot functions and trend lines to help with interpretation of the stats, as well as data already stored within a file. This is done by specifying the formula for the line, for example, f(y) = mx+c for a straight line.

Then the needs to be fitted to the - this is done using the command, where m and c are the parts of the equation and the rest is the columns of the datafile to use as the best fit calculation.

```
fit f(y) 'Data_FIle.csv'     using 1:2 via m, c
```

This calculates the best fit but this then needs to be plotted on the graph - this is done like the standard plot command.

```
plot f(y) title "Trend" lw 2
```

Combined with a data point graph, you can have a trend line on the graph.

Conclusions

This is only a simple tutorial into the use of GNUPlot. We've not even managed to get around to covering the different types of terminal output (you can output as EPS, JPG and many other formats), GNUPlot's ability to create lines of best fit or it's ability to plot equations. However, with a bit of learning, GNUPlot becomes a much more powerful tool than Exce,l and we hope this demonstrates that you can use it to plot almost any graph you could possibly want.

It's real strength lies in being able to rapidly, repeatedly produce a specific style and layout of graph from similar or identical sets of data, and it's ability to be run from a command line and used in scripts. Likewise, you can edit almost every aspect how the graph will appear, a level of flexibility that could mean you need never open Excel to plot a graph ever again. **mm**

Tesoro Gandiva H1L Gaming Mouse

Fancy a gaming mouse that looks like it's about to transform into a robot?

DETAILS
- Price: ~£40
- Manufacturer: Tesoro
- Website: http://goo.gl/vxr7Mm
- Required spec: Spare USB port, Windows XP, Vista, 7 or 8

▲ *The Tesoro Gandiva is an extraordinarily capable mouse*

Tesoro has long been associated with the PC gaming elite, those who demand nothing but the best quality products with which to devastate the opposition. It's also known for its use of creative product naming.

The Tesoro Gandiva is named after the bow of Arjuna, a great warrior of the Mahabharat war, which could bestow invincibility onto its user. It also made the sound of thunder when twanged.

We're not sure about invincibility or the sound of thunder, but for all intents and purposes this is a mightily impressive gaming mouse and one that will no doubt set you apart from your opponents.

Its features are many, with the ability to program 40 individual gaming macros across five gaming profiles, with game script settings and illumination control indicating which profile, macro or script is currently active. In total, the Gandiva can offer up 1,600 recordable actions. To complement its gaming abilities, there's also an incredible level of performance available from the Gandiva from the high accuracy and resolution laser, capable of being adjusted to five levels of DPI: 800, 1800, 4000, 6400 and 8200.

There's a 1000Hz polling rate, 128KB of on board memory, a tuning weight system, two metre braided cable and a high-speed motion detection and acceleration sensor. The Gandiva measures 116 x 72 x 44mm and weighs 135g, which makes it light enough to control without becoming a fly-away device, and its size means it has a comfortable grip and feel in the palm of the hand – especially bigger hands.

The design is quite astonishing. From the moment you open up the isosceles trapezoidal packaging to the point where you plug in the mouse, it's very clear that Tesoro has pulled out all the stops in the design department. Aesthetically, the best description for the Gandiva is that of a Transformer. The gun-metal colouring with default blue LEDs in the gaps certainly puts you in mind of a Decepticon. Added to this is the wheel, which is suspended in the large gap between both left and right buttons, and the Tesoro logo on the palm rest. The effect is rather stunning, to say the least.

Functionally, the Gandiva is every bit as effective as its looks. With the included software installed, you have full control over the extra abilities of the mouse and can begin to tweak it for use in a particular game. If you were to further combine the Gandiva with one of Tesoro's gaming keyboards, then you'd no doubt be in gaming peripheral Valhalla, with countless macros and other gaming abilities available to you.

Outside of gaming, the Tesoro Gandiva makes for an exceptionally responsive and hard wearing mouse. It's accurate, comfortable to use for prolonged periods, and thanks to the use of Omron switches throughout, the buttons feel solid and perform well no matter what the application at hand is.

This is an excellent gaming mouse, and it's also a superb desktop mouse, with added style. Interestingly it's also extremely well priced, and if you shop around you'll probably find one for around £35 to £40, which is nothing short of amazing considering the quality and features this mouse offers.

With its unique look and design, features and price, the Tesoro Gandiva H1L Gaming Mouse would make for a worthy addition to your desktop.

mm **David Hayward**

A mouse with superb performance and features at a great price

Wacom Bamboo Manga Pen And Touch

Mark checks out a surprisingly inexpensive pen tablet from Wacom

DETAILS
- Price: £89.99
- Manufacturer: Wacom
- Website: uk.shop.wacom.eu
- Required spec: On PC – Windows XP or later, 800 MHz CPU, 512MB RAM, 1.1GB HDD space, On Mac – OS X 10.5.8 or later, 867 MHz CPU, 1GB RAM, 1.1GB HDD space

I'd previously had a bad experienced with a cheap drawing pad, and therefore the when this one arrived costing less than £100, I was moderately concerned. Wacom makes some amazing tablet input devices for the PC and Mac, but they can cost more than £400 for the larger work areas.

The Bamboo Manga Pen and Touch isn't that small, having an active area of 147 x 92mm, and it also features 1,024 pressure levels and four customisable 'Expresskeys'. As the title suggests, this pad can be used with either the provided pen stylus or fingers trackpad style.

The success or failure of these devices is often a function of the responsiveness, and in this respect the Bamboo Manga is really impressive on the PC. The delay between your actions and the painting effect in your chosen app is so small that you can truly focus on the objective rather than fighting the interpretation of your movements.

With the pad is a disc that contains some basic tools to get you used to using the device, but it will work with any painting tool once the drivers are installed.

This package also includes licences for full-feature versions of Manga Studio Debut 4 and Anime Studio Debut 8 via software download.

With these apps you can unleash your desire to draw Europeans with disproportionally large eyes, giant mechs or whatever other Manga imagery you fancy creating. While these aren't the very latest versions of either app, they're well worth having if you wish to accurately produce a manga look and feel.

What I especially liked when using these tools was the ability to use finger gestures along with pen actions. It was very natural to pinch zoom with my fingers before drawing a line with the pen or clicking the button on the pen to pan.

There's only one significant problem that I encountered, and that was in respect of the desk space this object occupies, because it needs to be in exactly the same place you'd normally place your mouse. It's entirely possible to do away with a mouse and use this instead as a super-trackpad, but it's not as intuitive at that job.

The possible exception to that is for the Windows 8 tiled interface, where the Bamboo Manga is a perfect way to avoid leaving fingerprints on the screen, while still getting multi-touch and gesture support.

The review version was connected via USB, though a removable panel on the pack allows the installation of a wi-fi module and battery pack accessory. That costs another £35, should you wish to reduce the cable clutter associated with it.

Overall, I'm impressed with the Bamboo Manga. The product works very well, does what most people expect a touch/pen pad to do, and the software extras are appreciated.

Anyone considering the smaller Wacom Bamboo should find the extra cash and get this instead, as they'll be much more satisfied.

mm **Mark Pickavance**

Very effective pen pad and trackpad in one

Lenovo Yoga 2 11.6

Lenovo makes an affordable alternative to Microsoft's Surface designs

DETAILS
- **Price: £399.99**
- **Manufacturer: Lenovo**
- **Website: tinyurl.com/MMrevA**

I've previously reviewed the Lenovo Yoga 10 tablet in Micro Mart and liked the price of that design, if not old technology Lenovo put in it.

The Yoga 2 Pro previously arrived as a 13" laptop and has now been reimagined as something suitable for students in a cheaper 11.6" format.

Looking at the specification, it's hard not to see this as a modern netbook concept built around the Bay Trail Pentium N3520. On paper, this is a quad-core CPU with a 2.166GHz clock that can boost to 2.42GHz when required.

This delivers a very similar level of performance to the dual-core Intel Core i3 3110M 2.4GHz, though the N3250 doesn't offer Hyper-Threading.

For very general office tasks and surfing, there's plenty of power, though this is certainly not ideal for gaming, photo manipulation or video editing. The machine boots from a full shutdown in less than 20 seconds, though that shouldn't be seen as a proof it isn't without performance limitations.

The standard amount of RAM is 4GB, and there's plenty of storage left on the 500GB hard drive that's installed by default. The underside of the Yoga 2 reveals no obvious upgrade opportunities to anyone who isn't prepared to wield a Torx set and void their warranty.

That point aside, I was pleasantly surprised at the general build quality and design. The reversible hinges (for tablet and tent mode) seem strong, and the black-on-silver colour scheme suits it well.

A stand-out feature is the 11.6" IPS panel, which is bright, colourful and sharp. It might only be 1366 x 768, but at this scale that resolution works well with the Windows 8.x touch interface, and the viewing angles are excellent.

My review model turned up with Windows 8 on it, and a list of 94 important updates it required installing, but retail models should come with the 64-bit Windows 8.1 release ready to go. If you don't care for that news, hope that Windows 9 comes along soon, as I do.

For those that use the Metro-style interface, the ten-point screen sensor allows for all the gestures you can muster with both hands, and the built-in Intel HD 4500 GPU handles scrolling and scaling effortlessly.

That feature strengthens the tablet side of this equation, as you can fold the keyboard away and just use it exclusively by screen. Many might want to do that, because the keyboard in this design isn't wonderful.

But then with the amount of space the designers had to work with, I wasn't really expecting any revelation. The main issue I had is that the keys lack any sort of travel or end click to indicate a successful activation. What's also missing is a full numeric pad and any backlighting, but at this price

Specifications
- **Processor:** Intel Pentium N3520 2.166GHz processor.
- **Operating system:** Windows 8.1 64.
- **Display type:** 11.6" HD LED multi-touch 1366 x 768.
- **System Graphics:** Intel HD Graphics.
- **Total memory:** 4GB PC3-10600 DDR3L 1333MHz.
- **Hard drive device:** 500GB 5400rpm.
- **Network card:** Lenovo BGN wireless.
- **Bluetooth:** Version 4.0.
- **Warranty:** One year.
- **Battery:** Four-cell li-polymer (six hours web browsing).
- **Webcam:** 720p.
- **Weight:** 1.45kg.
- **Connectors:** 1 x USB 3.0, 1 x USB 2.0, audio combo jack (headphone and mic), micro HDMI-out, 2-in-1 (SD / MMC) card reader.

> **A very usable system for anyone who needs an inexpensive hybrid**

and spec that was probably never going to happen. I'm sure I'd not want to type a dissertation on one, but it's barely adequate for limited note taking.

Other features I liked more included a small external button that allows you to lock the screen rotation. It also includes two full-size USB ports, one of which is USB 3.0 spec and an always-useful SD card reader.

The quoted battery life of the Yoga 2 is six hours, though I was never expecting it to last that long with a typical usage pattern. A more realistic expectation is about 4.5 or five hours maximum. That should get you through a typical student cycle, if you can find a power point just once in your day. I suspect that with just a 7W power profile, Lenovo could have achieved longer had it chosen a six-cell battery.

It's a testimony to the Yoga 2 that the bit I disliked the most about it was Lenovo's insistence on pre-installing MacAfee Internet Security's 30-day trial – a tool that didn't even allow the installation of system updates without user confirmation. With that and some of the other software fluff de-installed, the Yoga 2 is a very usable system for anyone who needs an inexpensive hybrid.

And that's the rub really, because most people want a laptop or a tablet and not both in one device. That said, this is one of the first devices I've seen that isn't disastrous at being either type of device, and you don't get hit hard for the cost of that flexibility. I just wish it had a better keyboard.

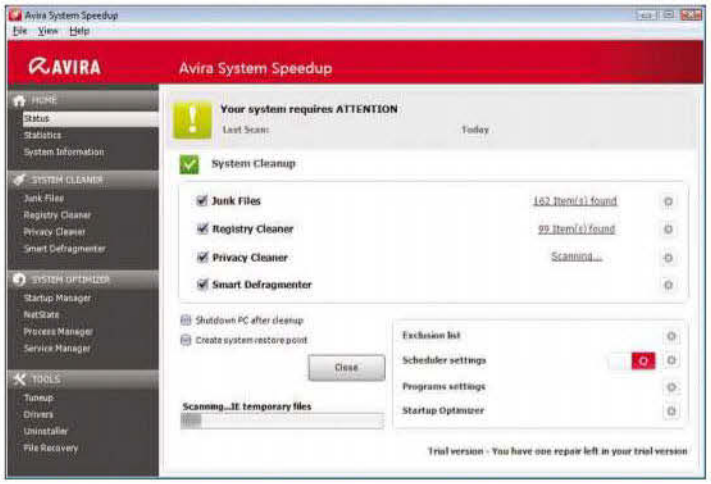
mm **Mark Pickavance**

A hybrid PC that offers good value for money

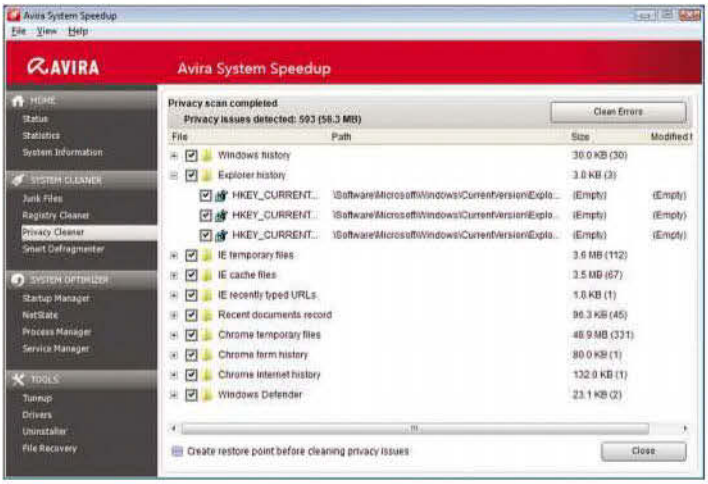
Avira System Speedup

If your PC is running slowly, this collection of tools can help. Roland Waddilove tries it on an old Windows 7 PC

DETAILS
- **Price: £16.99**
- **Manufacturer: Avira**
- **Website: avira.com/en/avira-system-speedup**
- **Required spec: Windows XP or later, 1GB RAM, 1GHz processor, 15MB HDD space**



The status screen provides one click clean up and optimisation



Each of the tools can be run individually and items selected for cleaning

There are several system speed-up and tune-up utilities for Windows, but one you might not be familiar with is Avira System Speedup. The company is best known for anti-virus software, so this product expands its reach and enters a new market. It may cost more than free tools like Ccleaner, but there are many additional features in this utility.

There are four sections, and the home screen shows the status and provides a button to scan, clean up and repair the system. One-click fixes are common with tools like this. The system clean-up tools can be run individually, and there's a junk file cleaner that scans for various log files, temporary files, memory dumps and so on, and then presents a list of items found that you can browse, select and erase. A registry cleaner scans the registry for problems and unnecessary entries, lists them and lets you select and remove them. A privacy scanner looks for web browser caches including Internet Explorer and Chrome, Windows and Explorer histories and recent document lists, and you can view them and delete them.

It is odd that the clean-up button in these tools is named Clean Errors because junk files, your web browser history and other items aren't errors. It's a minor irritation, though.

Smart Defragmenter detects fragmented files, and you can then defragment them. A System Optimiser section provides tools to examine the list of programs and services that start with Windows. It shows whether items are necessary or not, and whether they can be delayed for faster start-up. NetState shows the applications that are accessing the internet in a similar way to a firewall. It doesn't block any programs, but you can select and terminate them manually if you feel it necessary. A Process Manager offers similar features to Task Manager.

Everything mentioned so far is typical of clean-up and tune-up utilities, but Avira System Speedup also has a large collection of tools that set it apart from the crowd. There are four sections, and the main one is Tuneup, which contains 17 tools. There isn't enough space to describe them all, so here are just a few. You can search for duplicate files, zero length files and empty folders, Disk Analyser shows which folders are consuming the most space, and the registry can be backed up, restored and defragmented.

A File Shredder and Disk Wiper securely deletes files so that no one can access them, and a file encryption tool scrambles the contents of files you want to keep private. A Repair Network tool tries to fix faulty network and internet connections, MBR Backup/Restore can fix some disk configuration problems, and Disk Doctor analyses the disk for errors and then fixes them. A PowerPC mode is like game mode in other utilities: it shuts down unnecessary services running in the background to boost performance.

Avira System Speedup packs in more tools and features than free clean-up and tune-up tools, but the single PC licence makes it unattractive compared to rivals like IObit's Advanced System Care 7 Pro. Avira's utility is good for a single PC, but if you have multiple PCs, there are better deals elsewhere.

mm **Roland Waddilove**

A comprehensive collection of tools but a tad pricey

XFX XTS 460w Full Modular PSU

Mark looks at a new passively cooled PSU from XFX

DETAILS
- Price: £89.99
- Manufacturer: XFX
- Website: www.xfxforce.com
- Required spec: ATX system
- Part No: P1460FXTSX

Generally, I associate XFX with heavy duty power supplies delivering 750 watts or more. So I was a little surprised when its latest product turned up on my doorstep with a very modestly specified 460W PSU.

This is the smaller brother of two supplies that introduce a new XTS series design that combines silent operation (no fan) with a fully modular cabling scheme. There is a bigger 520W model, but for many system builders using Intel Haswell or AMD Kalveri APUs in their computers, this PSU has plenty of power.

When I say 'fully modular' in this context the PSU comes with no cables attached, not even the AXT 24-pin line. I'm not sure of the logic of that, because without it the PC won't work, irrespective of whatever else is cabled up.

Cabling is provided for the aforementioned AXT lines, dual PCIe 6+2 pin, six SATA, six Molex and a single floppy drive.

Those who punt for the bigger 520W model get two more each of PCIe and SATA, allowing for greater multi-GPU options. However, there seems little point in using this design of PSU in that fashion, because a PC with two video cards is rarely silent.

Quietness is the big selling point here, because the omission of a fan does potentially make for a silent system, if you have sufficient passive movement of air to stop the PC and PSU from overheating.

If you want to do that, you also have to adhere to some basic rules about using this PSU, in respect of the orientation. The XTS 460W has perforated sides and top, allowing warm air to circulate, but it has a solid base. Printed paper loops that are around the PSU when you unpack tells you which way is 'up' and tell you not to mount it inverted. From this I concluded that should you mount it with the solid base up, then the heat can't escape, and bad things will happen.

While XFX has done many clever electronics tricks to reduce the power consumption and efficiency, there are limits to what is possible. One neat innovation is the use of XFX brands as 'SolidLink', a technology intended to reduce the wire and pathways within the PSU, reducing the power converted to heat.

Typically the heat generated by wiring in a PSU can take 167 watts and convert it to 150 watts plus plenty of heat. In this design, to maintain 150 watts output only 157 watts are required, in theory generating only 41% of the heat.

My immediate reaction to this PSU was that £90 is far too much for a PSU that generates less than 500W. However, after reviewing it, I've achieved a better appreciation of what's on offer here.

Silence aside, this is a very well made and efficient design (80Plus Platinum), which uses the best Japanese capacitors, supports the latest C7 Haswell sleep modes and comes with a five-year warranty. Those who demand a high-quality product will be pleased.

If you build systems that you only use for a couple of years, then this part probably isn't for you, but for those who build their computers to last, this might well be a considered option.

mm **Mark Pickavance**

Power Profile					
DC Output	+3.3V	+5V	+12V	-12V	+5Vsb
Max Output	20A	20A	38A	0.5A	2.5A
Max Combined	100W		456W	6W	12.5W
					Total Power: 460 Watts

A top-notch PSU, ideal for media system use

STM Drifter Medium Laptop Backpack

Mark bags an attractive review item from STM

DETAILS
- **Price: £94.95 (RRP)**
- **Manufacturer: STM**
- **Website: www.stmbags.com/**
- **Part no: stm-111-037P-16, stm-111-037P-29, stm-111-037P-15**

Even if you haven't spent a fortune on your gear, it's never a bad plan to protect it the best you can. That's especially true if your laptop travels with you, as the likelihood of collateral damage is significantly enhanced.

STM Bags makes some very sophisticated solutions to this problem, the latest of which it dispatched to Micro Mart for me to review.

The Drifter is built for laptops with up to 16" displays and all the other paraphernalia that you might need to carry with that. Inside there's a padded pouch for the PC and another sized for an iPad, along with other sections for phones and the associated accessories.

Access is through a zippered top-load panel that contains its own sub-compartment.

There's something slightly old-school about the layout, but it's also very practical in terms of avoiding spilling the contents accidentally.

Outside are three zippered panel pockets, and a couple of open pockets that are ideal for placing water bottles. Adjustable compression straps on these allow you to secure whatever you place in them, yet allow good access.

The majority of the bag is made from water resistant 320D brushed poly, with the bottom being marginally tougher 640D fabric. Being 'water resistant' isn't the same as 'water proof', so STM kindly provides a detachable rain cover, should you get caught in a typical British summer.

The placement of this item at the very bottom of the bag in its own special pouch also provides some extra cushioning for the electronics above, which is welcome.

As I've hinted already, there is plenty to like here in terms of design and build quality. These are many of the traits I was generally expecting, as all the equipment I've reviewed for STM has been exceptionally well made. On this design I especially loved the large metal zip-pulls they used, which looked practically indestructible.

But I was also expecting this bag to be on the expensive side, and it doesn't contradict that assertion either.

At just under £100, this isn't an impulse buy, unless you own a MacBook, obviously. It's not often that I'd suggest looking beyond the price, but in this instance I'd be inclined to bend that way. A bag that saves your laptop from being damaged and yet makes it easy to transport and use must be worth a reasonable amount, or we'd all carry them around in supermarket carriers.

The only question for each person is: what is that function worth to you? The answer to that must lie between the state of your current account and the amount you spent on the laptop. If you've paid £300 on a netbook, then this probably isn't for you, but those who've spent £500 or more might well see this as a good investment.

mm Mark Pickavance

Specifications
- **Main material(s):** Cottna 320D/640D water resistant poly.
- **Lining:** 200g polyester with brushed nylex.
- **Device space:** 25.5 x 37.5 x 3cm.
- **Outer dimensions:** 47 x 31 x 19cm.
- **Capacity:** 18 litres.
- **Weight:** 1.04kg.

A high-quality backpack to keep your tech safe

Risen 3: Titan Lords

Embark on another epic RPG journey with the third instalment of the Risen series

DETAILS
- **Price: $49.99**
- **Developer: Piranha Bytes**
- **Website: risen3.deepsilver.com/en**
- **Required spec: Windows Vista or later, 2.4GHz dual-core CPU, 2GB RAM, Radeon HD 3850 or GeForce 9600, 8GB HDD space**

From simple wildlife to raging demons, you'll have your work cut out

The *Risen* series is hardly known for being classic, lost among the many other superior action RPGs that saturate the genre, but despite this, it still has its own joys to offer to those looking for a role-playing fix. After the second outing dabbled with pirates, a departure from the more traditional fantasy setting of the first, the third game seems to fuse to two together.

You play the son of a famous pirate, who stumbles upon a portal to the underworld. After a demon attacks you and your sister, and robs you of your soul, you're only hope is to find a way to regain your soul, lest you become a demon yourself. So begins an island-hopping action RPG adventure.

Risen 3 is a third-person RPG, and you're in control of your character at all times, with total freedom to explore, investigate and indulge in combat. It's all pretty standard fare, with the usual assortment of weapons, side-arms, magic spells and so on, with combat involving fast and strong attacks, parrying and dodging. The locations you explore are varied enough, with lush desert islands, foreboding temple ruins, dark jungles and more, and enemies run the gamut of threats, from enemy pirates and giant crabs, to hell hounds and demons. Rest assured, there's plenty to sink your sword into, with interesting locales to do so in. The problem is it's all delivered in such a rough, sloppy way.

Although visuals aren't the priority in any game, *Risen 3* does cause concern. This is a new game, yet behind the lighting and depth of field effects lurk mid-2000s visuals, particularly the ropey character models and animations. Some locations look positively dreadful and dated, and although some open landscapes, like desert islands, look nice from a distance, get up close and personal, and you'll soon see the true primitive nature of the title's graphics.

This poor quality carries over to audio. Although the music is passable, the voice acting is pretty terrible, especially the main character, who constantly sounds drunk, on drugs or both. With an RPG, story and immersion are important, and this poor acting doesn't help.

Still, this is all aesthetics, and as long as gameplay is good, it's not all that important. Sadly, *Risen 3*'s gameplay also lets its lofty ambitions down. This is mainly thanks to the clunky, overly sluggish combat, which sees you attack at a snail's pace, while enemies attack with far greater speed. Early on, even a lowly rat or goblin can out-manoeuvre you, and fights are often drawn out, and you're too dependant on AI followers to even the odds. Despite being an action RPG, ranged attacks are seemingly determined by digital dice rolling, meaning you can miss a giant enemy stood right up in your face, which is just silly.

Despite this, combat does feel meaty, with heavy hits and satisfying kills. It's just a shame it isn't more fluid and energetic. It's fun to finally even the odds for a bit, though, when you get a better sword or magic ability, and this adds to the feeling of progression, but it's often more of a chore and not an overly enjoyable one either. The crafting mechanic helps this, and you can find items in the world that allow the creation of new equipment.

Exploring the world is interesting, with plenty of hidden goodies to find and side quests to indulge in, and there are genuine reasons to explore off the beaten path. It's a little irksome, however, that you have to put your weapon away to use or search (attack and use both use the left mouse button). Luckily, using your inventory, such as healing items, is simple, and you can bind items to number key shortcuts.

The most promising aspect of *Risen 3* is its story and world, which is a mix of sea faring and fantasy, and the promise of your decision affecting the plot, primarily due to your ability to choose various factions to follow. This is actually not that bad, and for all its faults and outdated presentation, the game does still draw you in, and elements of it are classic, old-school RPG, which will appeal to fans of the genre. Just don't expect the kind of presentation or polish you may expect from a recent release.

mm Aaron Birch

Clunky but holds some appeal if you can look past its faults

GROUP TEST

Media Centre PCs

A media centre PC can admittedly be any half decent computer hooked up to a TV – even a Raspberry Pi can be tweaked to become a perfectly valid media machine.

But there are some PCs that are solely designed to sit under a TV and provide the best possible visuals for all your media files. David Hayward therefore grabs a handy bag of popcorn and tests out six potential media centre PCs.

Media Centre PCs

Chillblast Fusion Xcalibur

DETAILS
- **Price: £849**
- **Manufacturer: Chillblast**
- **Website: goo.gl/0LCyyP**
- **Required spec: Keyboard, mouse, internet, HDMI for connection to HDTV**

For both gaming and media centre duties, it'll perform magnificently

We previously looked at the Chillblast Fusion Xcalibur a number of months ago, but the emphasis that time was on gaming. This time, though, it's the system's media prowess that's on test.

The Fusion Excalibur is a sleek, slimline Silverstone Raven RVZ01 case measuring 382 x 105 x 350mm. With its well-designed, pinched-in sides, you could be forgiven for thinking that one of the newer consoles was taking up the space in the AV cabinet.

Inside the case you'll find an assortment of high-quality components such as an Intel Core i5-4570 at 3.6GHz, 8GB DDR3 1600MHz RAM, an Asus H81I Plus motherboard, an impressive GeForce GTX760 2GB graphics card, a 120GB Samsung 830-EVO SSD and a further 3.5" 1TB hard drive, all powered by a Silverstone SFX 450W 80 Plus Bronze rated PSU. Interestingly enough, the GTX760 is fitted to a PCI riser board, which allows the card to be fitted horizontally as opposed to vertically. This makes fitting larger and more powerful cards possible within the confines of a smaller case.

Cooling is provided by a Scythe Shuriken low-profile cooler and a nice 120mm quiet fan located on the top of the case. The result, of course, is an extraordinarily quiet PC that gently hums away without distracting from the media it's serving.

Scores of 6375 in PCMark 7 and 5591 in 3DMark aren't too shabby and are what you would normally expect from a system several hundred pounds more expensive than the Fusion Xcalibur. Naturally, it has more enough to cope with high-definition media, including 4K resolutions.

The internal build quality is exceptionally neat and well laid out, with ample clearance for maximum airflow, considering the internal dimensions of the case and excellent cable management. Chillblast has made a good choice when it comes to the default components: they're powerful enough to enhance the usability of the Fusion beyond normal media functions and into the realm of triple-A gaming. Also, you can opt for more powerful or extra items through the customise button on the relevant Fusion Xcalibur page if needed, but the default would be more than capable enough to deliver the goods.

On the front of the case are two USB 3.0 ports, along with headphone and mic ports as well as the on/off and reset buttons. The rear of the system features two more USB 3.0 and four USB 2.0 ports. Gigabit Ethernet and PS2 finish off the motherboard connections, and two DVI with a single HDMI and DisplayPort are on offer from the GTX760 which, thanks to the riser, are now on the substantially neater horizontal plane.

Beyond the hardware, Chillblast offers a five-year warranty with two years collect and return service and a further three years of labour only cover. There's also an optional Chillblast Software Assistance package and a Windows Optimisation Service built into the pricing.

The Fusion Excalibur is an immensely powerful PC and, if we're being honest, it's probably overkill for standard media duties. However, when you start to get into 4K media playback and viewing, then you'll soon come to realise that having a behemoth of a PC under your enormous TV will be just what you need.

Falcon X1 Media Centre PC

DETAILS
- Price: £599
- Manufacturer: Falcon Computers
- Website: goo.gl/19QT6v
- Required spec: HDMI for connection to HDTV, internet

The Falcon X1 is a well designed and thought out media centre PC

There's ample room for further expansion, via the Falcon site

Falcon Computers has an impressive range of PCs available, the specifications of which can all be customised to suit your needs.

The X1 Media Centre PC is a wonderfully compact machine with an assortment of high-quality components, all housed within a Cooler Master Elite 130 Mini ITX case.

The ASRock Mini ITX A88 FM2 motherboard drives the AMD 7850K quad-core 3.7GHz CPU and 8GB of DDR3 1866MHz RAM. There's a 120GB Mushkin 550MB/s SSD configured as the system drive, with a further 1TB Seagate 7200RPM 64MB spinner for storage and media. As standard on this system, there's a 16x LG Blu-ray optical drive, which comes bundled with Cyberlink Media Suite 10.

The 550W FSP Raider Silver PSU provides more than enough power to the system and keeps everything running exceptionally quietly too. Additionally, the X1 comes with Windows 8.1 64-bit installed, along with XBMC, and included with the package is a Sumvision Freestyle Airmouse, complete with QWERTY keyboard and mouse functionality.

The recorded benchmarks for the Falcon X1 come in at 4014 for PCMark7 and a 3DMark score of 1023 which, on the whole, are reasonable enough. However, scores are one thing; actually using the X1 is something else entirely. The Falcon X1 is a superbly built system. The design, matt black finish of the case and internal management of the components makes this a perfect media centre unit. And it can be further configured, via the Falcon online configurator, to include options for a more gaming orientated setup or to cut the overall cost by omitting the OS in favour of a Linux installation, for example.

> **"A wonderfully compact machine with an assortment of high-quality components"**

The Cooler Master Elite 130 case has ample room to fit everything in, including enough space for a decent full-sized graphics card, should you add one to the configurator list. Airflow through the case is handled by a large 120mm fan with an additional 80mm side-installed fan, and as with every other component in this system, the fans can be changed to suit your needs or style.

The media tests we put it through were handled with ease, and the system remained quiet and cool throughout without a hint of a struggle during moments of action and rapid camera work, even at the higher resolutions.

The Airmouse remote was a nice touch. We found it far more responsive than the standard Microsoft compatible media centre remote or even a phone or tablet with a media remote app installed. The only downside was a rather noisy Blu-ray drive which, if we're being honest, is just nit picking. Beyond our obsession of ultra-quiet optical drives, there's nothing we can fault the X1 on.

Needless to say, we were extremely impressed, and considering the price of the default specification of the X1, we think it's a PC that will certainly last you long after the next ultra high definition fad has come and gone. All in all, the Falcon X1 Media Centre PC is an excellent PC that's well worth the money and can handle pretty much any type of media you can throw at it.

Box.co.uk Cube Shiro Media PC

DETAILS
- Price: £699
- Manufacturer: Box.co.uk
- Website: goo.gl/eID5EB
- Required spec: HDMI for connection to HDTV, internet

White on aluminium isn't to everyone's tastes, but it's otherwise a worthy media centre PC

The amount of stock Box.co.uk has available is staggering, but among its many and varied systems you'll find the Cube Shiro Media PC.

This is a Core i5 4570 CPU at 3.2GHz, with a single Hyper X 8GB DDR3 1600MHz 'Blu' stick installed on a MSI H81I motherboard. There's a 120GB SSD configured as the system drive, with an additional 1TB Seagate spinner and a DVD-RW as the optical drive. As an added bonus and a welcome touch in our view, the Cube Shiro comes with an Nvidia GeForce GTX 750Ti 2GB DDR5 graphics card as standard, which instantly improves the overall features of the system.

All this is housed within a Cooler Master 120 white steel mini ITX case, with a 500W PSU. The design of the case is much the same as the Cooler Master 130 from the Falcon X1 Media Centre PC, with the difference being a redesigned front panel. The style, however, is a little odd, being a stark white affair with a brushed aluminium front section and blue LEDs behind the power button. It's a bit of a strange colour to opt for when designing a media centre PC, because it'll stand out when placed next to most AV units, which are normally black.

Admittedly, the colour scheme isn't to our tastes, but you can't deny the fact that this is a PC that's well designed and well conceived to offer the user the best media experience possible, while still having enough power for a spot of gaming on the side.

The internals are cooled by the 120mm front fan and the additional side 80mm fan, as with the Cooler Master 130. The 250mm-long GTX 750Ti takes up over three quarters of one side of the internal space, but thanks to some clever cable management and placement of the drives, there's still enough airflow to keep the entire system below overheating temperatures.

The benchmarks came out with a PCMark score of 6352 and a 3DMark score of 3950, which naturally means you'll be able to enjoy some decent, semi-high-end gaming, as well as the movies and music. In our stand-alone tests, the Cube Media PC did remarkably well, as can be expected from the specifications. All the media files played without any issues, and the higher resolutions were handled with aplomb, even up to the more extravagant 4K.

The Cube comes with Windows 8.1 64-bit edition installed, along with Bullguard Antivirus and an option to install MS Office 365, should you so wish. The Cube Media package also comes supplied with a wireless QWERTY keyboard and touchpad and an Asus Wireless SUB Dual Band network adapter. These extras make for an interesting addition to the entire system and subsequently a more enticing buy.

Although the Box.co.uk Cube Media PC looks somewhat different from the norm, in terms of media PC designs, it's actually an astonishingly good performer and one of the best built PCs we've tested in this group – along with the Falcon X1. Naturally, though, you pay for what you get – not as much as the Chillblast entry, but enough to make you consider an alternative or one that's a different colour at any rate. Overall all, though, it's a splendid system that performs magnificently.

Acer Predator G3-605

DETAILS
- Price: ~£750
- Manufacturer: Acer
- Website: goo.gl/xxlMgr
- Required spec: HDMI for connection to HDTV, internet, keyboard and mouse

▲ *The retractable headphone hook speaks more of a gaming PC than media*

▲ *The Acer Predator has a number of flaws*

This next entry is something of a strange one in that it's not in the strictest sense a media centre PC, despite being advertised and sold as one. However, it's media centre PCs we're reviewing, and if it wants to be classed as one, who are we to say otherwise based, on how you look?

The Acer Predator is a favourite system of online shops: Woolworths online, PC World and a host of other retailers all stock it and heap much praise on the glassy black tower with the fetching orange trim.

Inside you'll find an Intel Core i5 4430 3GHz processor with 8GB DDR3 1600MHz RAM.

> **"The image on the screen became near unwatchable due to the obvious stress"**

There's a single 1TB Seagate hard drive, and depending on where you bought the unit, you'll also find either an Nvidia GeForce 645 or a GTX 760 with 1GB or 2GB of memory.

There's also a DVD-RW drive, multi-format card reader, Bluetooth 4.0, several USB 3.0 ports and a copy of Windows 8.1 64-bit edition to get you up and running. Needless to say, it's a decent enough system that could easily double up as a mid-range gaming machine as well as the main media centre for your home.

The design isn't all that flashy, but it's functional enough and offers good access to the front ports, card reader and so on. But where Acer may have cut down on the looks, it's gone all out for moving case parts. Below the optical drive eject, which is located on the angled side of the unit, you'll find a button that when pressed lowers the front panel to reveal two drive bays. The first is designed to insert a hot-swap second hard drive, and the second is a spring-loaded hook device that pops out to allow you to hang a set of headphones, presumably for when you've finished gaming and want to watch a film.

It's actually quite a neat feature, albeit a tad overkill and rather niche – especially since you can just unplug the headphones and put them away when you're done.

PCMark7 scored 4020 and 3DMark scores just 1512, which seem ludicrously low considering the on-paper specifications for the Predator. We couldn't quite work out why they were so low; the drivers were all up to date and, as far as we could tell, there wasn't anything untoward running in the background.

Our own tests proved to be a little disappointing too. The Predator played the HD content easily enough, but when there were moments of intense camera panning and fast actions scenes, there was noticeable screen tearing. When we knocked the resolution up to 4K standards, the internal fans began to kick in and make a terrible racket, and to add to that, the image on the screen became near unwatchable due to the obvious stress the PC was under.

We've seen this machine being advertised as an extreme gaming PC, the ultimate media centre PC and other such statements from a variety of sellers, though we didn't find it to be any of those things. True enough, you could probably ditch the pre-installed OS and make the hardware work for you with your own installation, but out of the box the Acer Predator just didn't perform as well as the advertising led us to believe and is certainly not worth the £700 price.

Asus VivoPC VC60V

DETAILS
- Price: £560
- Manufacturer: Asus
- Website: goo.gl/hcmPPI
- Required spec: HDMI for connection to HDTV, internet, keyboard and mouse

It has a very stylish-looking case

An upgrade or two would greatly benefit it

Media centre PCs don't necessarily have to conform to the sleek, low-profile looks of games consoles, nor do they have to be ultra-mini like the Dell Zinio or Mac Mini. However, being low profile or offering something similar in that design certainly goes a long way to helping sell it to the punter after a unit for under their TV.

The Asus VivoPC VC60V goes one step beyond the traditional media centre PC design with an extremely stylish, spun-metal, black finish, in a wedge-shaped case that would look suitably at home next to the other AV technologies in the living room.

Within its diminutive case, you'll find an Intel Core i5 3320M dual-core 2.6GHz CPU, 4GB of DDR3 1600MHz SO-DIMM RAM and a 5400rpm 2.5" 500GB hard drive. Graphics are handled by the motherboard's integrated Intel HD 4000 chipset, and other features include a 2-in-1 card reader, built-in wi-fi, Bluetooth 4.0, four USB 3.0 and a pair of USB 2.0 ports, HDMI and Mini-DisplayPort and a set of built-in SonicMaster speakers. There's also, oddly enough, a serial port present.

It's a rather flash design and is available with either a traditional black, metal finish or a more tantalising polished aluminium throughout. Popping the lid off reveals the storage compartment for the hard drive, which slots nicely into place through the use of a set of four rubberised supports that keep down vibration and suppress any sound, as well as holding everything in place. There's a caddy available that will allow you to fit smaller SSD-sized drives without them rattling around should the unit be moved.

Under the drive enclosure there's a screw lid to access the memory compartment, where you can swap out the RAM, and removing further screws will gain you access to the motherboard itself.

> **"The poor VivoPC didn't take too kindly being hooked up to a 4K TV"**

Naturally, aside from the RAM and hard drives, there's not a lot of upgrade potential here, making the VivoPC more laptop in nature than desktop. But the base spec is reasonable enough to enjoy a wealth of media.

The benchmark scores weren't as high as the other PCs in the group, with a PCMark7 score of 3020 and 3DMark score of 695. Our own tests proved to be good enough for most uses, with 1080p media performing well enough, with some minor glitching and tearing during Michael Bay-like action sequences and seasickness-inducing camera action. Unfortunately, though, the poor VivoPC didn't take too kindly being hooked up to a 4K TV and force fed ultra-high definition content.

The Asus VivoPC VC60V isn't a bad media centre PC, provided you don't try to push it beyond its limited resources – although to be fair, it's far from being the best of the media centres in this group test. It's certainly stylish enough to be place under a TV, and we think the addition of a decent-sized SSD would deliver a far more sprightly outcome to the media tests, along with faster RAM too, perhaps?

But the cost of the base specification will probably only appeal to those who require its niche design and looks, instead of performance and practicality.

Packard Bell iMedia S2885

DETAILS
- **Price: £429.99**
- **Manufacturer: Packard Bell**
- **Website: goo.gl/mcA7qz**
- **Required spec: HDMI for connection to HDTV, internet, keyboard and mouse**

Over the years, Packard Bell has diminished somewhat to become the supplier of basic desktop models for sale in Currys and such places. Although it's not quite as lofty a company as it once was, it does still produce some half decent units.

The Packard Bell iMedia S2885 offers an Intel Core i5 4440 3.1GHz CPU with 8GB DDR3 1600MHz RAM and a 1TB 5400 hard drive. This reasonably compact media centre PC comes with a slimline DVD-RW, 5-in-1 media card reader, 802.11 b/g/n wi-fi, Bluetooth 4.0, four USB 2.0 and a pair of USB 3.0 ports and Intel HD4000 graphics. Windows 8.1 64-bit edition comes installed as standard, along with a basic copy of CyberLink Media Suite and a trial run of some anti-virus product or another, depending on where you purchase the machine.

The design of the PC is pretty simple but effective enough for the task at hand. Measuring 280 x 100 x 367mm, you won't be able to extend it too much, though there is room for swapping out the spinner in favour of an SSD or to add a low-profile dedicated graphics card.

It's finished in a matt-black effect, with an extended top front that provides access to the eject button for the optical drive, power and so on. The other ports, card reader, USB and audio are located at the bottom of the front panel and are easily accessible. Other than that, it's a fairly bland affair.

The standard issue Packard Bell iMedia PC, as seen in high-street stores

It's not all that bad and a reasonable price too

The benchmarks came back with scores of 3990 for PCMark 7 and 840 for 3DMark, which means you won't be playing the latest triple-A games on the iMedia. Our own HD media tests proved to be more successful, though, and despite the low scores of the all-knowing benchmarks, the iMedia certainly did a good enough job of playing our 1080p media.

We did find, though, that the wi-fi was a little unstable, at least from the tests we put it through. The LAN connection was rock solid, as you would expect, but for some reason, the wireless connection either kept dropping out or was so unbelievably slow it was virtually impossible to browse the local NAS box for any content. It also had the odd behaviour of affecting our router to the point that all other wirelessly connected devices refused to work once the iMedia was connected, resulting in a reboot of the router to clear itself out.

Whether this is something inherent to the iMedia PCs, we're not sure. We suspect it may just have been some bizarre and random problem we were having. All the same, it did put something of a dampener on the tests.

Saying that, though, the Packard Bell iMedia S2885 wasn't too bad. As we said, the 1080p media content played without any noticeable problems, and it even managed a brief attempt at 4K before throwing its metaphorical hands in the air and giving up. It will no doubt suffice to begin with, but you'll probably require more performance as you begin to notice its limitations.

Falcon X1 Media Centre PC

It may not have scored the highest in terms of the benchmarks, but there was something we really liked about the Falcon X1 Media Centre PC.

It's easy to upgrade, excellently built and packaged, and it comes with the sense that Falcon computers has actually taken care of the system rather than simply splashed out another PC, as so many other retails seem to do.

Box.co.uk Cube Shiro Media PC

The Cube Shiro Media PC from Box.co.uk is very similar to the Falcon X1, in that it's excellently built, has plenty of scope for further upgrades, and as an added bonus, it's quick enough, thanks to the GTX 750Ti, to keep up with some decent gaming too.

How We Tested

Each media centre PC was tested with a variety of HD, 1080p content stored and played both locally via the system's own hard drive as well as stored on a local NAS drive. All machines were hooked up to a 32" LG TV for HD testing, then to an LG 4K TV for something a little extreme to see how far we could push them.

Any included remotes were also tested with their respective PCs.

	Chillblast Fusion Xcalibur	Falcon X1 Media Centre PC	Cube Shiro Media Centre PC	Acer Predator	Asus VivoPC VC60C	Packard Bell iMedia S2885
Price	£849	£599	£699	~£750	£560	£429.99
Dimensions	382 x 105 x 350mm	240 x 207 x 398mm	240 x 207 x 401mm	320 x 450 x 140mm	190 x 190 x 56mm	280 x 100 x 367mm
Weight	5.2Kg	4.4Kg	4.5Kg	13Kg	970g	11Kg
Installed OS	Windows 7 Home Premium 64-bit	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
CPU	i5-4570 3.6GHz	AMD 7850K 3.7GHz	i5-4570 3.2GHz	i5-4430 3GHz	i5-3320M 2.6GHz	i5-4440 3.1GHz
RAM	8GB	8GB	8GB	8GB	4GB	8GB
HDD	120GB SSD, 1TB HDD	120GB SSD, 1TB HDD	120GB SSD, 1TB HDD	1TB HDD	500GB HDD	1TB HDD
Graphics	GTX760 2GB	Radeon R7 series	GTX750Ti 2GB	GeForce 645 1GB	HD4000	HD4000
Media Remote Included?	No	Yes	Yes	No	No	No
PCMark 7 Score	6375	4014	6352	4020	3020	3990
3DMark Score	5591	1023	3950	1512	695	840

Tech Origins
Web Browser

David Briddock examines a technology that changed the world forever

Before the advent of the World Wide Web the Internet was an expert-only domain. The invention of the web browser changed not only the computing landscape, but every aspect of our lives, from office environments to leisure activities, from business practices to health services and from government policy to scientific progress. In hindsight it's quite remarkable how one single innovation can unleash so much change.

The Birth

In the early 1990s many companies and universities were experimenting with technologies designed to make the fast-growing Internet easier to use. However, inside CERN's European Particle Physics Laboratory, scientist Tim Berners-Lee was hard at work building the world's first web browser. By the early 1990 his embryonic code was able to display web pages (**goo.gl/olbgFc**) stored on his NeXT computer web server, which he named the World Wide Web.

As part of this pioneering work, aimed at creating an information-sharing solution for scientists, he also invented the HyperText Markup Language (HTML), Uniform Resource Locator (URI) and Hypertext Transfer Protocol (HTTP).

Mosaic and Netscape Navigator

NCSA Mosaic was the first widely used web browser. Developed by Marc Andreessen and Eric Bina it was released for UNIX systems running the X-Windows user interface in 1993. A short time later a ported version appeared for the Apple Macintosh. It offered many enticing features, including embedded sound and video clips plus online-forms, page bookmarks and navigation history.

After teaming up with Jim Clark to found a company called Netscape, Andreessen started work on the Mozilla browser. Later renamed to Netscape Navigator, it became the first commercial web browser in December 1994.

Mosaic and Netscape Navigator gave millions of PC owners their first online experience. Mosaic's technology is still around today in the form of the popular open source Firefox browser.

Rising Interest

Of course, the potential of the web browser to sell more PCs wasn't lost on companies like IBM and Microsoft. In 1994 IBM launched the Web Explorer browser. It was an integral part of the IBM OS/Warp operating system, which ultimately failed to stop Microsoft dominating the PC marketplace.

However, the most significant move came in August 1995 when Microsoft released their new Windows 95 operating system, which included the free Internet Explorer web browser.

Browser Wars

The release of Internet Explorer, and the threat it posed to Netscape, effectively marked the start of the so-called 'browser wars', where PC users around the globe enjoyed simplified access to the World Wide Web via free web browsers. At around the same time another browser was in development by a research team in an Oslo-based Telenor. Two members of the team, Jon Stephenson von Tetzcher and Gier Ivarsoy, left Telenor to establish Opera Software and continue development of the browser on a commercial basis. Opera was released to the fast-growing Internet community in the summer of 1996.

Yet it was Microsoft's Internet Explorer that soon began to dominate, quickly capturing a third of the total browser market share. Due largely to the success of it's Windows 95 operating system, Microsoft's browser usage grew year-on-year, and by 1999 Internet Explorer had passed Netscape to become the world's leading web browser.

Jim Clark (left) and Mark Andreessen (right)

Windows 95's launch

The Download Directory

James Hunt scours the internet for the best freeware, shareware and paid-for application releases

Welcome again to the latest instalment of The Download Directory. Each month, you'll find us scouring the Internet in the hope of bringing to light the latest application releases, software updates and browser plug-ins that you don't know you can't live without. We cover everything from freeware to shareware to budget-price commercial software, and review everything from giant, multi-application office suites to the tiniest system tray applets. As long as you can download it, we'll take a look at it.

This month's applications include: Rename Master, a program which helps you batch-organise your files; cURL, a wget-style command line tool for managing your downloads; Calibre, an ebook organisation application with more features than you'll ever need, and Paragon HFS+, a piece of software that lets Windows access Mac file systems.

Rename Master 3.11

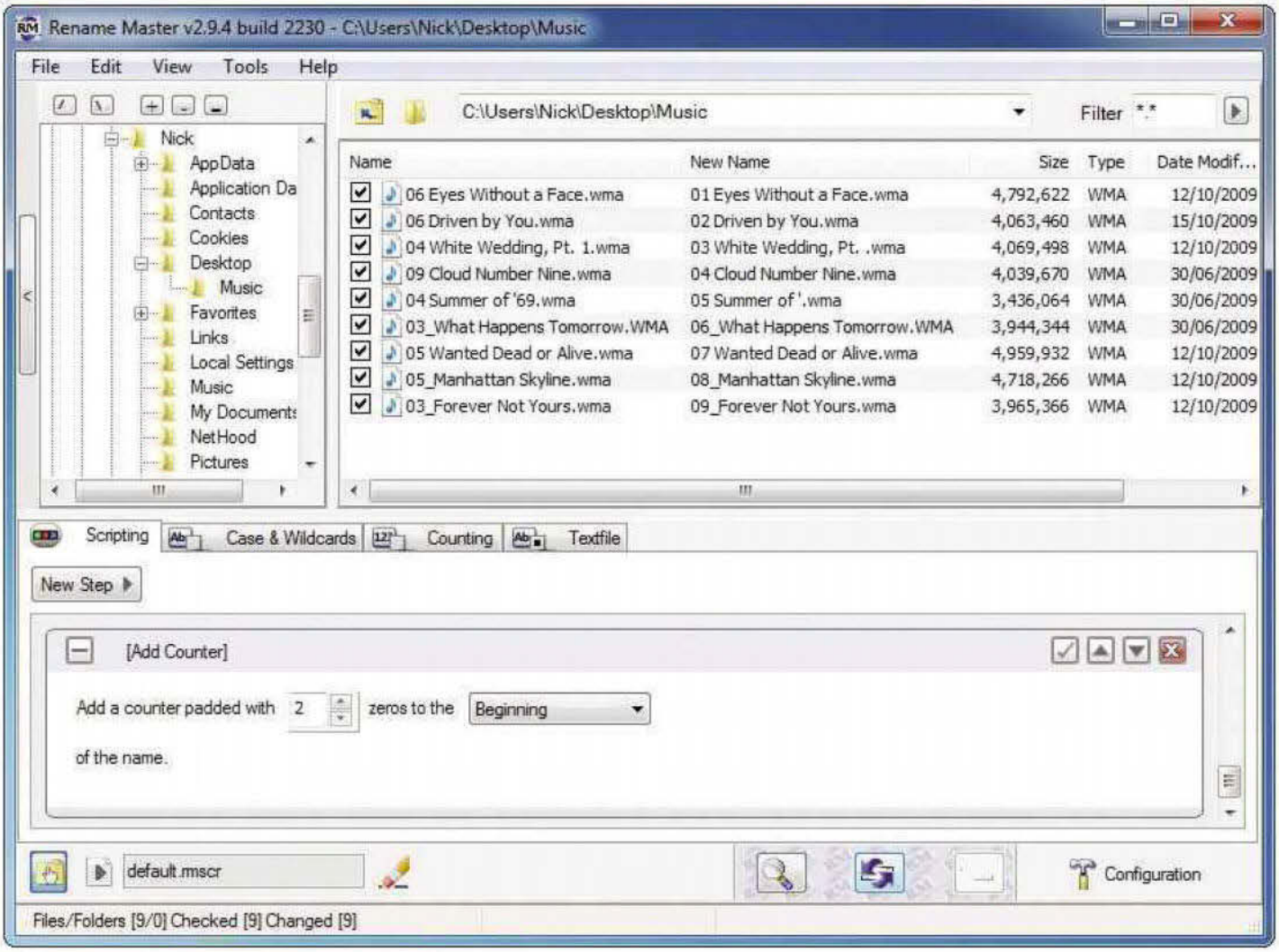
Release Type: Freeware
Official Site: www.joejoesoft.com

One of the things Windows has never been very good at is helping you apply actions to more than one file at once. If you're planning to rename a single file, it's an easy process. Try the same on a batch of files and you'll quickly realise that your only real option is to do them all, manually, one at a time.

If your time is slightly more valuable to you than that, you need to get your hands on a batch renaming program. There are several around that could do the job, but we're specifically looking at Rename Master, a free renaming application from Joe Joe Soft. As well as allowing you to quickly and easily rename groups of files, Rename Master packs in additional functionality along similar times. For some filetypes, like MP3 and JPEG, you can change tags and metadata – ideal for ensuring consistency or correcting small but endlessly repeated mistakes, like typos

The software gives you a wide range of filename-editing options, from simple bulk operations like add, replace and remove portions of a filename, to more complicated actions like filtering by type, or date, or existing name. You can preview your actions before applying them, so if you've made a mistake with your options it's easy to correct in advance of any catastrophes, and before you've wasted the time. Should you miss it that way, there's also an undo button for extra protection.

One way the program improves its power over standard renaming software is by using scripts to run simple tasks. Users can chain these scripts together to create long automated processes that can be instantly applied to groups of files to instantly rename, sort and otherwise standardise them. That might sound complicated, but it's really quite simple.



It's a shame the interface isn't a bit clearer about the application's workflow, since being presented with a screenful of directory trees, pathnames, tabs and unlabelled icons isn't the easiest place to begin if you're coming to the application for the first time, but there's comprehensive documentation on the website and nothing about it is too confusing once you've had a few goes.

Encouragingly, the application is in active development with new features being added all the time. As renaming tools go, it's certainly one of the more powerful examples. It doesn't exactly hold your hard which means a steep learning curve, but once you've got it figured out it'll fast become a permanent addition to your set of preferred tools.

Pros: Hugely powerful for an app of its type
Cons: Could be a little clearer about workflow
Rating: 4/5

cURL 7.37.1

Release Type: Freeware
Official Site: curl.haxx.se

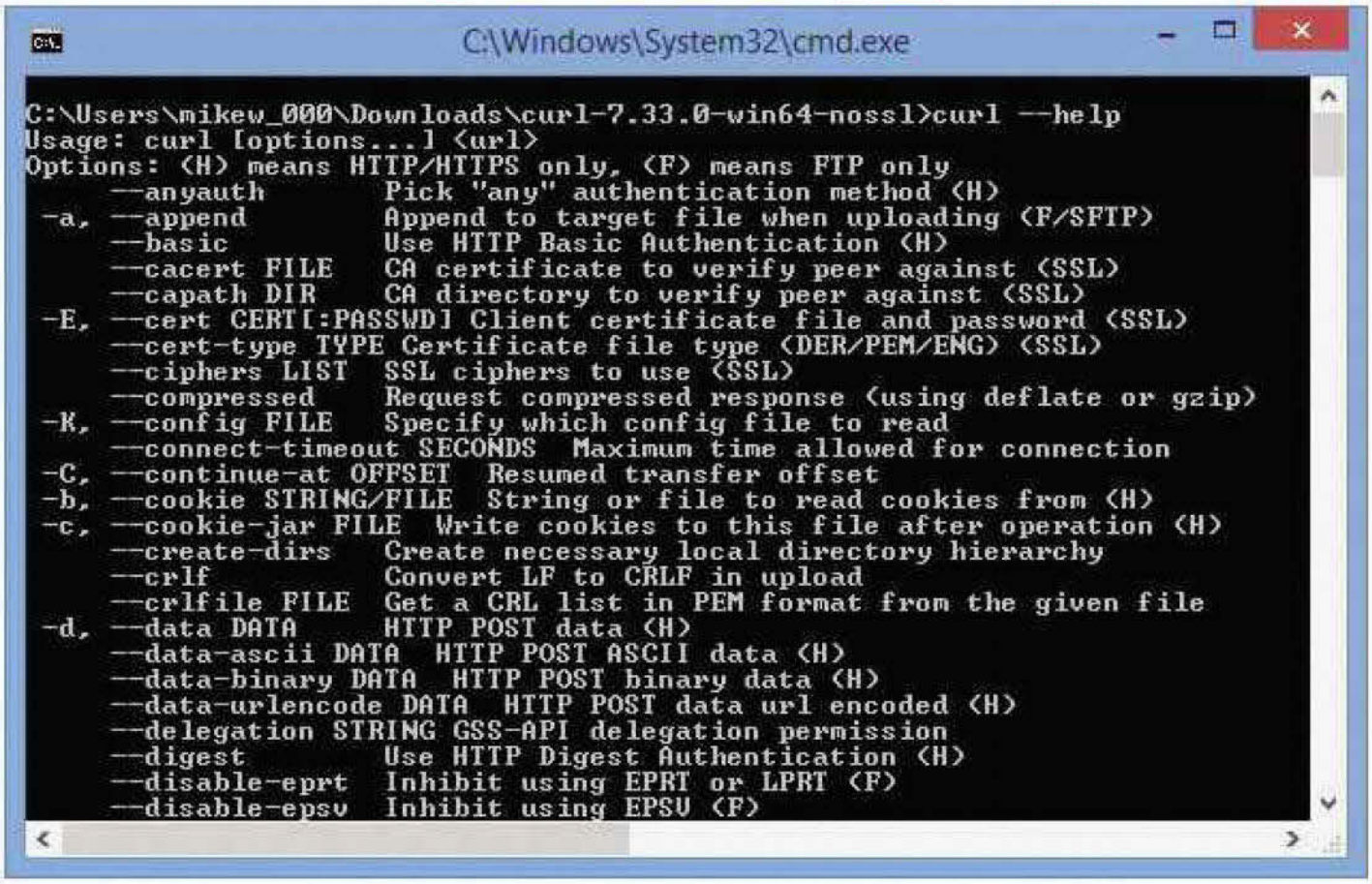
Another frustrating thing about Windows is that, sometimes, no matter how hard you try, you can't make a browser download a file instead of opening it – whether in your browser, or with an associated program. If you've ever used Linux you'll know how simple it is to tell your computer to download a file, rather than do anything else with it. If you want Windows to behave in a similar manner, you can download cURL – a set of command line tools allowing you to transfer data using URLs. It supports an extensive range of protocols: HTTP, FTP, IMAP, POP3, HTTPS, Telnet and virtually any other you can name (yes, even gopher). It supports HTTP post and put requests, user and password authentication, proxy tunnelling, cookies, and more.

It's as powerful as any Linux/Unix download tool is, and maybe even more so, yet it's simple to use – install the suite and type 'curl' in the command line followed by the URL you want it to download form. The default setting will display the file's output in the command line, but it can be easily piped into a file, or you can use the –o switch (similar to wget) to get the original download.

You can use curl as a stand-alone command line instruction, or incorporate it into longer scripts. If you pass more than one URL it'll treat them as separate instructions, so downloading in batches is also possible. The program can also download parts of files, or be instructed to ignore files that are older than the local version. There are hundreds of useful features along these lines just waiting for you to try them out. When downloads are in progress, you'll see a progress bar in the console with the total download size, the number of bytes downloaded, the average transfer speed, time elapsed, expected completion time and more.

Obviously, as a command line tool there's no GUI to speak of, so novice users might struggle to get much out of this. If you're familiar with using a console to perform complex operations, though, cURL adds some much-needed power to Windows. It might replace one set of frustrations with another, but on the whole we think it's a useful program to have around.

Pros: Brings the power of Linux systems to Windows
Cons: If you're only good with GUIs, don't bother
Rating: 4/5



Betawatch

To help you stay on the bleeding edge of software releases, Betawatch is a guide to the experimental and unfinished versions of some of the most popular applications around. Can't wait for new features? Now you don't have to!

Firefox 32 Beta 8

www.mozilla.org

Firefox's recent updates have seen some fairly big changes, and this latest release is no different. This time, though, they're mostly behind the scenes. A completely new HTTP caching system is live (which doesn't mean much to users, but to the developers it's a huge deal) and Public Key Pinning support has been enabled. In more practical terms, you can now see the number of found items in the find toolbar and login metadata – the last used and last changed dates – are now available in the password manager.

Developers will be pleased to learn that code completion and inline documentation have been added to the scratchpad, and that the usual host of HTML5 improvements have been made. A new web-audio editor has been added too. As ever, the latest beta of Firefox can be downloaded for free from the Mozilla site, or you can switch to the beta channel to get them instantly.

iOS 8 beta 6

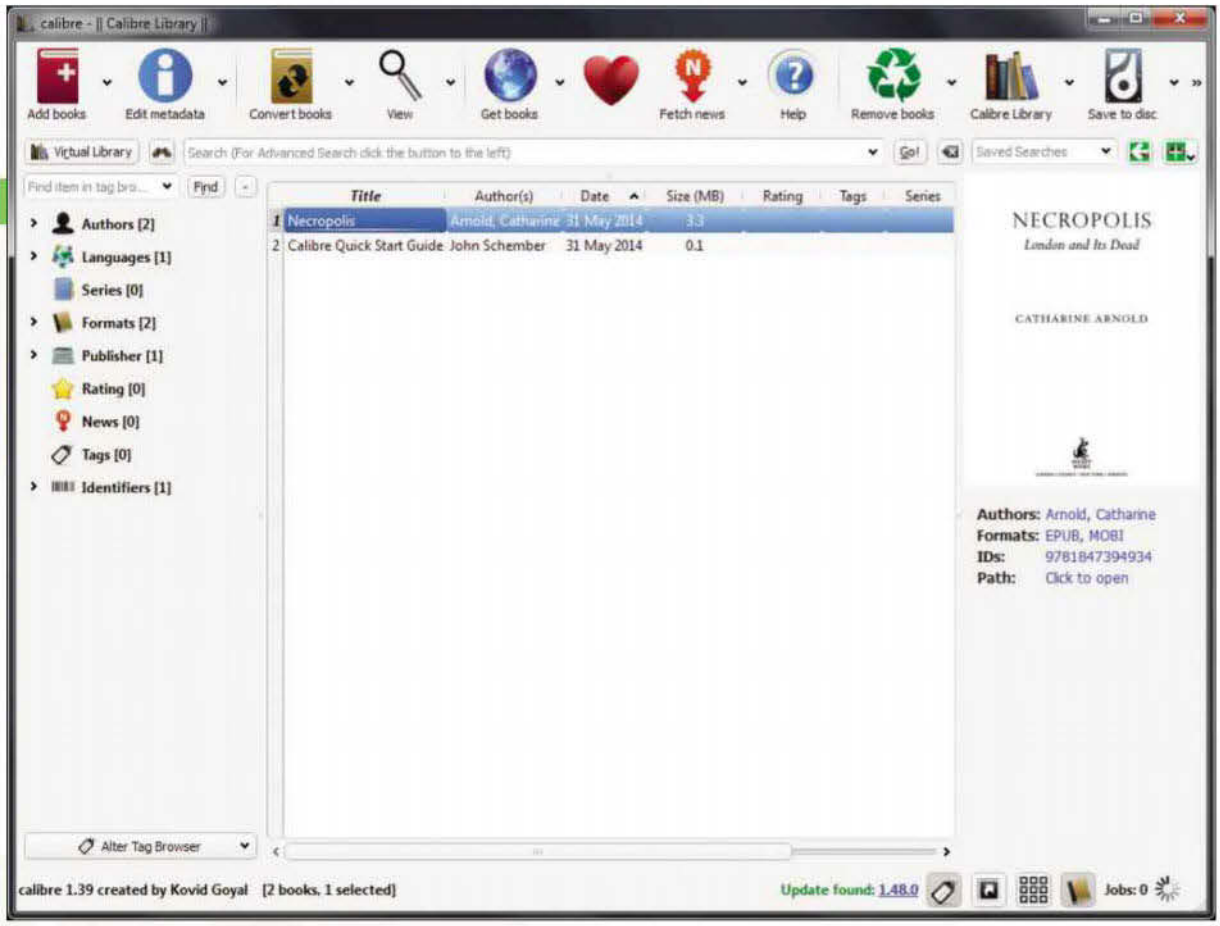
developer.apple.com/ios8

It's not yet available to the general public, but we couldn't miss this chance to point out what's coming to the smartphones and tablets of many of our readers when iOS 8 is released in a few weeks.

The latest version includes tonnes of new features. These include: better direct sharing through different services, improved photo editing capabilities, the ability to create custom action buttons (i.e. translate, add to wishlist, etc.), the creation of a general document storage area which can be accessed by every app, and the ability to add custom keyboards tailored to suit your needs. Of course, many of these features have been in Android for some time, but it's nice to see Apple catching up with its innovations.

All that comes in addition to new things like support for Apple's much-touted, iOS-specific, Swift programming language, improved gaming APIs, and better support for TouchID, camera controls and the HealthKit activity tracking service.

It's still not quite ready for general release, but we're looking forward to the day that it is. No doubt that day will also come with huge fanfare and hyperbole from both Apple staff and fans alike.



Calibre 1.46.0

Release Type: Freeware
Official Site: calibre-ebook.com

Trying to keep your ebooks organised is a chore, especially when they come from so many different sources, get delivered in so many different formats and end up on so many different devices. Buying an ebook and then making it work on both your Kindle and tablet can be a nightmare in itself.

If you're an ebook enthusiast who somehow hasn't already discovered Calibre, now's the time to get on board with it. The program starts by scanning through your ebook library, at which point it'll automatically extract metadata and create a sortable archive, complete with covers, so that you can filter and organise your books depending on all sorts of information. You'll never again be stuck staring at a list of inconsistent filenames wondering where the one you're looking for has hidden itself.

Calibre even incorporates its own eBook viewer, so that you can check files before transferring them to a preferred device. It supports all major eBook features, from contents, style sheets, printing, searching, bundled fonts and more. It's so complete that if you like you can even use it to read books on your PC, though we're not entirely sure that's a satisfying way to experience them.

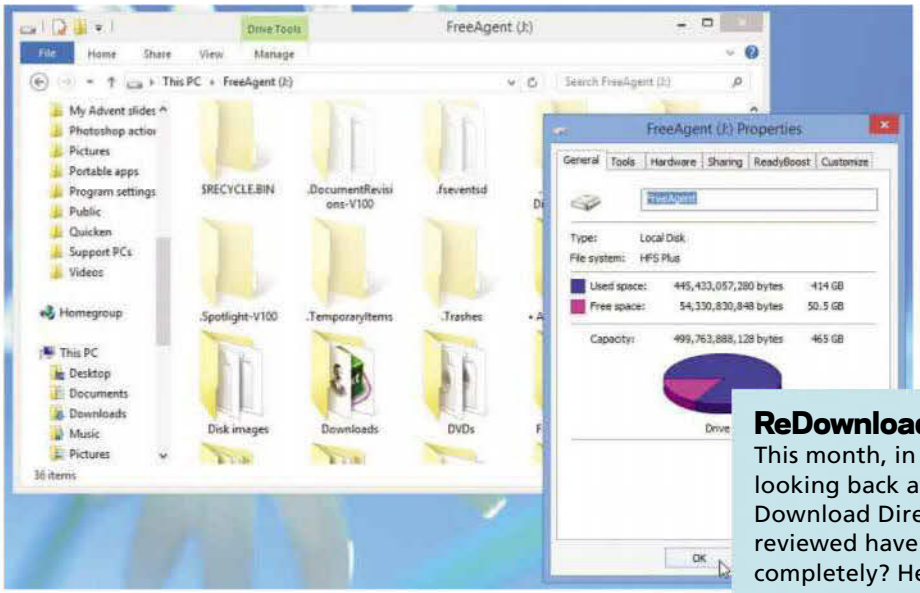
What really pulls in the users is the conversion tool, though. You can convert Mobi and Epub files between one another, and there's support for loads of others. You can even turn HTML (webpage) or CBR/CBZ (DRM-free comics) into ebook formats, so that they'll go on hardware that would otherwise reject them outright. If you've ever tried to get a book you bought from somewhere other than Amazon onto your Kindle, you'll massively appreciate how smooth Calibre can make the process seem by comparison. It's even possible to strip DRM from files, though (of course) we can't condone that.

Beyond its standard features, Calibre also incorporates some interesting extras, such as the ability to convert RSS feeds into fully formatted ebooks, a library sync tool (which works with everything from the Kindle to the iPhone), and a built-in web server that allows you to access your ebook library from anywhere with an Internet connection.

Perhaps the only flaw is that, once again, none of this is very simple to achieve once you move past basic functions. While these individual functions will all find an audience, taken in its entirity, Calibre gives the impression of an application that has developed over time rather than one that was planned to include all these features from the outset, It's often cluttered in appearance and inelegant in its operation.

The truth is, though, you can only forgive that sort of thing when nothing else comes close to doing what a piece of software does. Luckily for Calibre, that's the case here.

Pros: Every feature an ebook user could want
Cons: Overly complicated at times
Rating: 4/5



Paragon HFS+ Free 1.0

Release Type: Freeware
Official Site: www.paragon-software.com

If you've ever tried to get Windows to read an OS X partition, you'll appreciate how frustrating the process can be. Especially if you've got a dual-boot system with Windows and OS X on one hard drive! The reason is that Macs use a different file system to Microsoft-reliant systems. Whether the latter use NTFS, the former uses HFS+. Asking Windows to read HFS+ is like asking a chimp to read Japanese, but as you've probably guessed, Paragon HFS+ is a program that manages to come up with a workable translation.

What's special about Paragon HFS+ isn't what it does, particularly. There are plenty of programs that can do exactly the same job. The interesting thing here is that you don't have to pay for it, and there are few (if any) alternatives which do this job for free.

Compatible with Windows 8, Paragon HFS+ will allow your Windows-powered PC (or a Mac with Windows 8 through Boot Camp) to freely access any drive formatted with HFS or HFS+. Where some programs and drivers restrict you to read-only, Paragon HFS+ does read and write without any trouble at all. It just works, and that's the beauty of it. Once it's installed, HFS-based drives will appear as normal, accessible at full speed, and act just like any other storage area on your system.

There's almost no extra work required. You're encouraged to disable Windows 8's Fast Start-up mode due to the possibility of data corruption, but we didn't and the program let us carry on as normal.

The sole caveat is that if you want to access mac-formatted drives from older versions of Windows (XP, Vista and 7) or access the latest version of the file system (HFSX) which is found on OS X 10.3 and above, you have to get the paid version. However, when a program works this well, it's more than worth paying for.

Pros: Works instantly, straight out of the box
Cons: Free version lacks some features
Rating: 5/5

That's all for this month. As ever, if you've got any programs that you'd like to see us look at - whether it's something you want to find, something you like and want to share, or even a program you've written and want us to review - don't hang around. Get in touch, and we'll make sure it ends up in the download directories everywhere – courtesy of The Download Directory! **mm**

ReDownloaded

This month, in our regular retrospective section, we're looking back at the September 2012 instalment of Download Directory to see how the programs we reviewed have fared. Are they better? Worse? Gone completely? Here, we find out.

USB Disk Security

www.zbshareware.com
Reviewed Version: 6.2, Current Version: 6.4

Designed to secure USB keys by auto-running your virus scanner on them when it's installed, USB Disk Security was simple but slightly too forceful in doing things like changing your homepage to its publisher's. In the years since we looked at it, not much has changed. Despite some minor bugfix updates and Windows 8 compatibility aside, there's nothing new worth looking at here.

WindowBlinds

www.stardock.com
Reviewed Version: 7.4, Current Version: 8.05

For years, WindowBlinds has been the top name in Windows interface tweakers. Two years since we last looked at the software, that remains the case. Most of the updates revolve around giving the software Windows 8 compatibility, but that was necessary and has been well-implemented. If you want to change how Windows looks, it's still the only choice worth making.

BlueScreenView

www.nirsoft.net
Reviewed Version: 1.45, Current Version: 1.52

This application allows you to view the debug information behind Windows BSODs so that you can try to fix the problem. Given how feature-complete BlueScreenView was at the time, we're surprised to see updates, and not just Windows 8 support either. The most useful new feature is a built-in Google function, which checks error numbers for you. Worth a look.

Multiplicity

edgerunner.com
Reviewed Version: 2.0, Current Version: 3.0

Formerly a StarDock application, multi-system remote administration tool Multiplicity has been sold to Edgerunner, who have continued to maintain it. It's as good as it ever was, but now a full version older, so there are more features and a better, more straightforward interface. This is how it should be.

PC Tip Of The Week

The Invisible Web part 1

David Hayward scours the parts of the internet that are normally hidden

The invisible web is classed as the area of the internet that's not scanned by the web-bots, spiders and indexing tools like Google, Yahoo! or any of the other popular search engines.

These normal indexing agents are capable of grabbing content via the many hyperlinks, keywords and other nefarious methods that make up the surface web or the area of the internet that we normally surf on an average day. However, when we talk about the invisible web, we're referring to the likes of scientific journals, minutes taken during meetings, vast databases of libraries, public-fronted intranets of companies – the list goes on.

In fact, it's estimated that the size of the surface web is in the region of 300TB, whereas the estimated size of the invisible web is 98PB, (that's petabytes, by the way) and growing at a considerable rate. So how on earth do we access these invisible areas of the internet, where the web crawlers fear to tread?

InfoMine

The first of these is the scholarly internet resource collection known as InfoMine. A virtual library of resources relevant to scientists, students and researchers, it can trawl the otherwise hidden databases, e-journals, ebooks, bulletin boards, mailing lists and online library card catalogues for information that would normally be well and truly obscured within the traditional confines of a surface Google search.

InfoMine was built by librarians from the University of California, Wake Forest University, the California State University and the University of Detroit using a range of web crawlers and metadata assignment.

The web crawlers used in this project are the Nalanda iVia Focused Crawler, the InfoMine Virtual Library Crawler and the InfoMine Automatic Focused Crawler, with each of these crawlers targeting a different arm of the internet's available resources within the iVia software project (**ivia.ucr.edu**).

The metadata assignment modules classify fields from the incredibly powerful Library of Congress databases, with some clever algorithms involving keyphrase identification and extraction. All in all, the effect is both stunning and vast; see for yourself by visiting **infomine.ucr.edu**. And as an example, enter the following into the search bar: Manhattan Project.

Mining for information that's normally hidden isn't as difficult as you would first think

The results shown range from a scientific journal of the physics behind the first nuclear weapon to other papers concerning the cost of nuclear weaponry to the US, congressional research reports, technical information from OSTI (Office of Scientific and Technical Information) and the Hiroshima Archives.

It's fascinating stuff, ideal for those who are trying to drill down to more specific and not often viewed information.

WWW Virtual Library

What better way to explain what the WWW Virtual Library is than to quote it directly: "The WWW Virtual Library (VL) is the oldest catalogue of the web, started by Tim Berners-Lee, the creator of HTML and of the web itself, in 1991 at CERN in Geneva."

The WWWVL is maintained by a large group of volunteers who look after certain areas of content, following strict guidelines set by the Council of the VL. While it doesn't contain and link to every item of the invisible web, it certainly does an admiral job of pulling in hundreds of results that would never appear on Google.

Additionally, as well as being hosted by mirrors from all over the world, the longest residing in Argentina, you can search directly via the East Anglia mirror located at **vlib.org**.

A quick example of the type of results you would expect from the WWWVL appears when you type in 'Stratospheric Ozone Depletion'. After a brief pause, you'll be presented with a selection of results from various scientific organisations and libraries from across the globe.

Many, Many Deep Web Search Engines...

With Google, Yahoo! and all those other surface web search engines only carving out about 1% of the actual web, the race is on to come up with the all-encompassing search engine that will scan everything.

In the meantime, though, we'll have to settle with a broad selection that tries to hit as much as possible. Here is a list of meta-based search engines available to browse from and, in some circumstances, customise:

- **SurfWax:** This search engine works well for reaching deep into the web for information.
- **Academic Index:** Created by the former chair of the Texas Association of School Librarians, this meta-search engine only pulls from databases and resources that are approved by librarians.
- **Clusty:** Searches through top search engines, then clusters the results so that information that may have been hidden deep in the search results is now readily available.
- **Dogpile:** Despite the awful name, Dogpile searches rely on several top search engines for the results, then it removes duplicates and presents only relevant results.
- **Turbo 10:** This meta-search engine is specifically designed to search the deep web for information.
- **Multiple Search:** Save yourself the work by using this search engine that looks among major search engines, social networks, Flickr, Wikipedia and many more sites.

Gigabyte GeForce GTX 780Ti

The Best Money Can Buy: GPUs

We move on to the sexy side of PC components and take a look at some of the most decadent graphics cards on the market

So far in our look at more expensive PC components, we've covered the motherboard and all-important CPU, the quality of which can greatly affect the performance of any system. Another component that can make or break a PC's horsepower is the graphics card.

Although not essential like the motherboard and CPU because integrated graphics can be used for most things, if you plan to do graphically intensive tasks such as gaming, a good graphics card is a must have. Gamers will be all too familiar with some of the limitations and bottlenecks an integrated graphics card can suffer from, and the need to have power behind your PC's display is paramount.

Dedicated graphics cards come in many guises, and there are so many models and prices to choose from, it can be a bit of a nightmare. It's easier, though, if you're not all that bothered about breaking the bank, and if you're planning to shell out plenty of cash for a high-end card. If this is the case, there are quite a few monstrous graphics card available that can empower your PC with the kind of visual performance consoles can only dream of. And when we say break the bank, we're not kidding. Graphics cards are far more expensive than most PC components, even the CPU, costing thousands at the higher end. If you can afford these beasts, you'll no doubt be the envy of many PC benchmarkers.

So let's waste no more time, and let's look at some of the best and most expensive cards arund, all vying for your money.

Product: PNY Quadro K6000
Price: £4,150

This isn't a card for playing games on, we should make that clear first. This is a card designed for professional graphic artists and animators, so it's immensely powerful and features some of the most impressive core technical specs. Well, it costs over £4,000, so you'd hope it's powerful.

The card is an Nvidia Quadro and incorporates 12GB of memory alongside 2,880 of Nvidia's CUDA parallel processing cores. There's double-precision computation, making for some serious power and the ability to render like no other card.

It's able to output to up to four ultra high resolution displays, including projectors, so you can imagine just how incredible a workstation could be with this monster powering it.

As we said, this isn't a card designed for the home user, and although you could buy one if you could, there's simply no domestic software around that could even make this card think about breaking a sweat. For professional users, though, this is a superbly powerful card.

Product: Sapphire FirePro W9100
Price: £2,550

The Sapphire FirePro W9100 is another workstation-focused card, and like the Quadro, it's designed for high-end graphical applications, such as design, animation and the kind of detail only this sheer power can deliver.

Designed for use with 4K workstations, the FirePro W9100 features 16GB or GGDR5 RAM with a 512-bit memory interface on a 320GB/s bandwidth. The core clock speed of the GPU is 930MHz, and it processes 2,816 streams. The computing power of the parallel GPU allows up to 5.24 TFLOPS of power.

There's minimal latency with the card due to the high data transfer speed and memory, and you can load an entire 4K image into cache memory for processing and manipulation. Also, when you consider that this card supports four-way CrossFire, allowing the use of multiple units, you could have a ridiculous level of power at your command. Pricey, yes, but very powerful to boot.

Product: MSI Geforce GTX TITAN Z
Price: £2,350

Featuring Nvidia's Geforce GTX Titan Z graphics engine, this is a card for gamers, and is one of the most powerful you can get your hands on at the moment. It features two GPUs and 12GB of GDDR5 RAM. This incorporates 5,760 CUDA cores and, using the GPU boost, runs at 876MHz, with a 705MHz base clock. The RAM runs at 7000MHz and has a 768-bit interface. What does all of this mean? Well, in layman's terms, it's very, very fast – that's all you really need to know.

On top of this, the card features GPU Tweak, which allows for real-time control and tuning, and the outputs offered include DVI-I, DVD-I-D, DisplayPort 1.2 and HDMI, and it features an excellent cooler to help keep your system nice and frosty.

In terms of gaming performance, this is simply superb, and it supports resolutions up to 4096 x 2160 on up to four monitors. It fully supports the OpenGL 4.4 API, and benchmarking scores easily overshadow most other cards. It's expensive, of course, but there should be no game or detail level too high for this graphics titan.

Product: EVGA GeForce Titan Z
Price: £2,300

This is another Titan Z card, this time from EVGA, and another option to grab the powerful Nvidia card. Like the MSI offering, this is a 12GB model with powerful GDDR5 RAM, and it features a 705MHz core, 5760 CUDA processors, PhysX support and is SLI ready, for multiple GPU installation.

Overclocking is a strength of the Titan Z, and you really can push the card beyond its out-of-the-box defaults, and to cater for this, it features an efficient and quiet cooling system, with power balancing and a large axial fan coupled with dual vapour chambers. It's capable of running up to 876MHz with boost, and at double precision it can achieve 2.3 TFLOPS.

Outputs include HDMI, DisplayPort 1.2 and dual DL-DVI, and its performance in gaming makes it a great 4K card for those looking to indulge in the latest HD gaming experiences.

Product: Asus Radeon R9 295
Price: £1,200

Billed as 'the world's fastest graphics card', the Asus Radeon R9 295 is undeniably a very powerful card and a superb option for gamers. It features 8GB of 5000MHz GDDR5 RAM and a GPU that can run at up to 947MHz as standard and up to 1018MHz when boosted. It handles 5,632 streams, and more than 11.5 TFLOPS of power. Yes, that's some serious gaming power.

It runs dual Radeon R9 GPUs to achieve this kind of power and uses AMD's Mantle Technology2 in order to get the very best gaming performance, and in our experience, it can run everything with no problems and achieves impressive benchmark scores across the board.

Now, all this power generates a lot of heat, and in order to deal with this, the unit features a factory-fitted liquid cooling setup, which delivers some of the best cooling around, more so than the usual fan/heat sink combo. As it's factory fitted, it's also great for those who have yet to dabble in water cooling. Sadly, though, the card doesn't support CrossFire, which limits the possibilities of increasing the graphical output with multiple cards. Still, with a card this powerful on its own, it's not a major issue for most gamers.

➤ ***PNY Quadro K6000***

➤ ***Sapphire FirePro W9100***

➤ ***MSI Geforce GTX TITAN Z***

➤ ***EVGA GeForce Titan Z***

Product: Palit Titan GTX Black Edition
Price: £740
Yes, it's another Titan card, but this time we're looking at an option for those who have a larger budget, but want to avoid spending over £1,000. In order to get your hands on Nvidia's powerful Titan, you don't have to spend this amount, and Palit has an option for below £1,000.

The Palit Titan GTX Black Edition is a Titan card, but it features a smaller amount of RAM at 6GB, and 2,880 CUDA cores. Despite this, the card still runs at 889MHz, with a boost speed of 980MHz, making it every bit a gamer's card, only for a smaller price.

Palit has also introduced an enhanced overclocking tool called ThunderMaster. As the Titan is already overclocking-friendly, this further boosts the possibilities. It can monitor the card's clock speeds, thus allowing it to run at optimal, safe levels, and it does so intelligently. The adaptive V-Sync also helps to reduce problems with frame rates, smoothing out the image on the fly.

Product: AMD FirePro W7000
Price: £600
The AMD FirePro W7000 is another retail example of a workstation, multi-display card and one that provides plenty of power. If you're a power user working from home and need a card that can handle cutting-edge applications, this is a great option.

The unit is fitted with 4GB GDDR5 RAM and has a core clock speed of 950MHz, with 1,280 stream processors. It has four DisplayPorts for the easy installation of four displays, and this can be increased to six using the DisplayPort 1.2's multi streaming abilities.

AMD claims that this unit is more than five times faster than the competition in single precision, and it manages this thanks to the GCN (Graphics Core Next) architecture AMD has developed. It also boasts intelligent power saving features and has a geometry boosting function that makes the card perfect for CAD designers.

Product: Gigabyte Geforce GTX 780Ti
Price: £530
So you've got quite a bit of cash ready for a new graphics card, but you can't reach the levels of the Titan series? Well, how about the Gigabyte GeForce GTX 780Ti? This may not be as cutting edge as the top-of-the-line Titans, but it's no slouc either.

The Gigabyte GeForce GTX 780Ti features a Geforce GTX 780Ti GPU that's capable of running at a base clock speed of 1085MHz, which increases to 1150MHz when boosted. It has 3072MB of 7000MHz GDDR5 RAM, with a 384-bit memory bus, and there are 2,880 CUDA cores.

When it comes to cooling (always important with high-power GPUs), this model makes use of Gigabyte's 'Triangle Cool' tech, delivering 450W cooling capacity, which should keep temperatures down without sacrificing power.

It's an accomplished gaming card that achieve great benchmark scores and FPS levels in the latest releases, and it's a recommended card, especially in the £500 region.

Product: MSI GeForce GTX 780Ti Gaming Edition
Price: £500
We'll finish up with another 780Ti card, this time from MSI, and costing a little less, at just £500. Like the Gigabyte card, this is a powerful model and has a core clock speed of 1020MHz, with a boost speed of 1085MHz. 3072MB of 7000MHz GDDR5 RAM is present, along with 2,880 CUDA cores.

Performance-wise, it's almost identical to the Gigabyte model, and thanks to MSI's Twin Frozr IV cooling, it always remains cool, even under stress. It supports DirectX 11.2 and features DVI-I, DVI-D, DisplayPort and HDMI outputs, as well as HDCP. This particular bundle also comes with a copy of the upcoming title *Borderlands: The Pre-Sequel* (offer via **Aria.co.uk**). mm

Asus Radeon R9 295

Palit Titan GTX Black Edition

AMD FirePro W7000

MSI GeForce GTX 780Ti Gaming Edition

The Instant Guide

A jargon-free, practical guide to everyday technology

InstantGuide
JARGON-FREE ADVICE THAT MAKES TECHNOLOGY SIMPLE

Instant Guide to Faster Broadband and Instant Guide to Microsoft Word are exclusively available from Amazon.co.uk.

Create a Website is available until 8 May at WHSmith and larger branches of Tesco and Sainsbury's.

Available from

Amazon, WHSmith and major supermarkets

Network Tools For iOS

Fix your networking issues with your iPad, iPhone or iPod Touch with Keir Thomas's selection of six useful apps

It's hard to believe that, just 10 years ago, portable network probing tools were extremely expensive. However, with the boom in smartphones and tablets just about everybody has access to powerful network diagnostic capabilities. With its tendency to lockdown its portable devices in both hardware and software terms there's only so much that's possible on Apple hardware – you simply can't get Ethernet adaptors for an iPhone or iPad, for example – but if the device can join a wi-fi network, then standard network diagnostics is available via apps.

Below, we look at six apps that can prove useful when fixing network issues. As usual, all are free of charge from the App Store, although some come with in-app purchases to unlock features. Note that references to 'iPhone' below should be seen as shorthand for both the iPhone and iPod Touch.

Fing

Fing is a scanner that tells you in seconds what other devices are on the same network as you. The app's description says the scanning applies only to networks, but in our tests we found devices connected to the router via Ethernet also showed up in the table.

Find also does Reverse DNS look-ups so can also potentially discover the name of the device and its manufacturer too. In our test this worked great for high-end devices such as Apple hardware, but a cheap IP-connected security camera was identified by the parent company that manufactured it, rather than the branded name. There isn't much Fing can do about this, unfortunately, but at least Windows machines are usually identified correctly via their host or NetBIOS names.

Tapping an entry in the list opens its details for full-screen viewing and you can enter your own notes, as well as add a physical location for the device to aid identification in future. You can also ping the device, cause it to wake if it's set to do so via LAN (i.e. wake-on-LAN), and port scan it for open services (all the way up to port 65535). If popular services like FTP or SSH are discovered you can then connect to initiate a session although it wasn't quite clear how this works – iOS is pernickety about inter-app communications and our attempt to connect to an FTP server on the network simply switched out to Safari and attempted (and then failed) to connect in a new browser tab. Our attempt to connect via SSH reported that there wasn't an SSH client installed

Fing can scan your network for devices and even port scan each one or wake it from sleep if wake on LAN is activated

iNetTools brings basic command-line network tools to Apple's portable devices but only a handful, with more costing extra

(there was), and offered to bounce us out to the App Store to download one.

The app offers a search function for situations where the list of discovered devices is long, and each network's data can be saved for future reference. A really nice feature is the ability to invoke iOS' Share Sheet function to share the data you're looking at via iMessage, Mail or Facebook. You can also take a screenshot to the Camera Roll, copy the data for pasting in elsewhere or print via AirPrint.

Fing does one thing and does it well, to the extent that we can't find faults. If we really want to pick holes then a built-in telnet/SSH client would be the icing on the cake for quick connections (or perhaps even a VNC/RDP client), but we're very happy with the app the way it is.

iNetTools

iNetTools aims to bring the standard complement of command-line network tools to the iPad and iPhone, including ping, traceroute, DNS lookup, and port scanning. Missing from this list are whois lookups, server monitoring, and network scanning, all of which are available as individual 69p upgrades. Also missing – but this time simply not available – is the ability to look up details of your own network connection, discovering the IP address, gateway, router etc. We'll give the app developers the benefit of the doubt, though, because it might be that such a tool breaks Apple's App Store rules.

On an iPhone, the list of tools is shown full screen when the app starts, while on the iPad this list is shown in the left third of the screen with the rest of the screen taken up with icon-based adverts for other apps the developer offers. The app is locked to run only in landscape mode on the iPad, and in portrait orientation on the iPhone. Additionally, adverts are visible on screen at all times, although these can be removed for £1.49. All of this left a bad taste in our mouth, though.

Once a tool is selected, an input field slides into view and results of the tool's operation appear below. For example, selecting Ping shows a field for a hostname or IP address, beneath which is shown the unadulterated output of the command as you would see it at any command line. A checkbox beneath the input field lets you add the server to your Server List, which provides quick address in future – just tap the My Server List button, tap the address or URL, and then select which tool you'd like to use.

Irritatingly, switching away from one task to start another automatically cancels the initial task. You might be tempted to switch away from a traceroute request that's taking several minutes in order to ping another machine, but doing so will end the traceroute and – even worse – clear the accumulated traceroute data too. However, a Recent Tasks button lets you quickly restart the task. Switching away from the app while it's running by tapping the Home button terminates the task but leaves the data still visible.

> **“The boom in smartphones and tablets means just about everybody has access to network diagnostic capabilities”**

A Theme button on the iPad (not the iPhone) lets you change the background to one of two sample images (a desert vista or a tree in blossom) or you can select your own image from the Camera Roll.

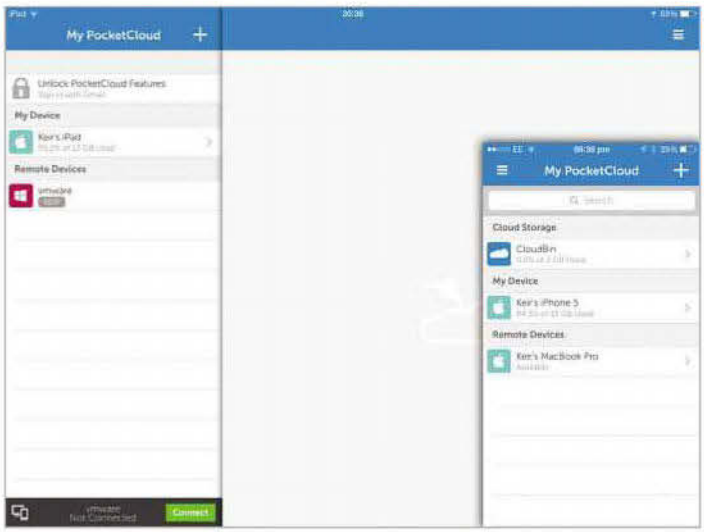
iNetTools feels like an app where the first thought was to make money, and the second to provide functionality. In other words, the shopping cart has been put before the horse. Coupled with the unusual colour choices of grey text against an off-white background that doesn't aid legibility on low screen brightness settings, we're left thinking this app could be significantly better.

WebSSH

Secure Shell (ssh) is a way of connecting to the command line of remote computers via a secure connection. It's used by web developers to run commands on their servers across the Internet, and by most Linux users who simply want to control their computer when they're not sat in front of it. If ssh is available on a remote computer, then secure file transfer (sftp) usually is too, and WebSSH provides access to both services.

The app opens to a blank screen where the listing of recently used servers will soon start building once you add some. The first step is to tap the plus button at the top right to enter details of the server – address, username, port, password, and so on. A nice touch here

WebSSH brings secure shell and secure FTP to the iPhone, all in a neat and good-looking app package



PocketCloud lets you connect to RDP and VNC connections to control desktop computers

is the ability to change the terminal settings to be able to cope with untypical connections – you can change the backspace sequence, for example, and also alter the background/foreground colours as well as the font size. You can also choose between Xterm, VT100 and dumb terminal emulation modes (Xterm being the default).

Connections take a few seconds to occur and, perhaps surprisingly, upon connecting to a new server the SSH certificate is automatically assumed to be safe and the user isn't shown or asked to accept the authenticity of the RSA fingerprint. Nor is there the ability to use a readymade key file. Similarly the password is automatically cached and it's only by experimentation that users might realise that leaving the password out of the configuration screen will mean it will be requested on each connection.

Once connected, the terminal output appears in the top half of the screen, with an always-visible keyboard displayed below. The keyboard is augmented by an additional row of keys at the top without, which the command line couldn't function, including Tab, Esc, Ctrl, and the cursor keys. Additionally, short cuts to the forward slash and colon are provided, avoiding the need to switch to the symbols keyboard. Tapping the spanner icon at the right of this list lets you remove any existing keys and add others, although only from a predefined list that includes a dash, exclamation mark (a.k.a. bang), dollar sign, asterisk, pipe symbol, page up/page down, and two shortcut keys for Ctrl+A and Ctrl+E, which jump to the beginning or end of the current line. Notably missing from that list is the backslash, used to escape characters in certain circumstances.

The SFTP function lets you upload images from the Camera Roll and both create and edit text files. You can also create folders. Text files and images can be viewed, and images can also be downloaded to the Camera Roll, but perhaps surprisingly there's no option to open files with other apps via the Share Sheet system. Tapping an Excel file or Word document, simply does nothing.

WebSSH's core features work very well. There are one or two gotchas to catch out the unwary, including the fact connections are terminated without warning if you return to the server list. But once you've learned where the pitfalls are you'll know to avoid them in future.

PocketCloud Remote Desktop – RCP/VNC

This is a clever app that works with a separate piece of software installed on a Windows computer to let you remotely access files or run apps. However, in this review we're going to entirely ignore that functionality and instead focus on the fact this app is a remote desktop (RDP), Virtual Network Computing (VNC), VMware View and Cloud Client Manager client – one of the best available in the App Store, in fact (at least for zero cost). For non-corporate users RDP and VNC are arguably of most use, and allow you to take over the desktop of a remote computer. RDP allows control of Windows computers, excluding the various Home Editions, while VNC lets you control Apple Mac and Linux computers.

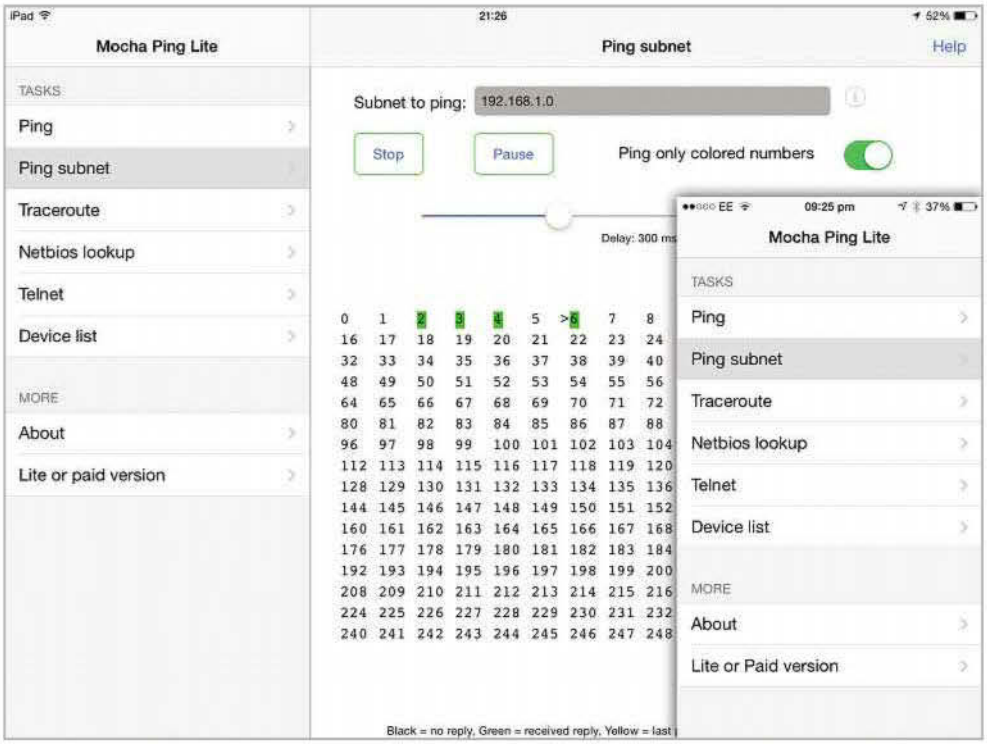
> **RDP allows control of Windows computers, while VNC lets you control Apple Mac and Linux**

To access the RDP and VNC functions of the app you'll need to walk through the tutorial that appears when the app first starts and then, at the end, tap the Advanced Users option. This will then let you set up your first connection. Following this, the list of saved servers appears at the left of the iPad screen, and fills the screen on an iPhone. Tapping any will make a connection.

The remote computer appears in a thumbnail preview at the bottom of the screen and tapping it will open it full screen. The desktop view is scaled down so that it fits but on Retina screens it's still possible to make out most details, despite the fact they're so small. The standard pinch-expand gesture can be used to zoom in and out, and tapping a toolbar icon lets you activate the keyboard and also activate a special mouse cursor that includes right-clicking abilities. The keyboard is augmented by a separate row of additional keys that provide access to things like cursor keys and Ctrl that aren't found on the default iOS keyboard. It all works very well, although it did crash once or twice in our tests when connecting to a VNC server.

What's the drawback? The free version can only have one server on the list at any one time, a restriction that also applies to using the PocketCloud desktop client too. This is fine if you only ever want to check on your desktop computer from your iPad, for example, but not great if you've a host of machines you want to access. Annoyingly, the full app is sold via a monthly subscription: three months will cost you £5.49, while 12 months will set you back £16.99. Ouch.

▲ *Subnet Tool Lite lets you test subnet masks to see what network range the IP address concerned will be allowed to access*



▲ *Network Ping Lite can be used by network administrators to monitor uptimes on a LAN*

Subnet Tool Lite

A full understanding of subnetting separates the men from the boys when it comes to network engineering. Most of us know subnets as the number that we type along with the IP address when manually configuring a network adapter, and the number typed is invariably 255.255.255.0. However, a variety of values are possible and each controls whether network data is kept to the local network or sent out onto the Internet.

Subnet Tool Lite isn't a subnet calculator, of which there are literally thousands available for desktop and portable devices. Instead, Subnet Tool Lite lets you test a subnet and see in black and white the resulting non-routable address range. All you need do is type the IP address in use, along with the subnet mask, and you'll instantly be told the maximum number of hosts, plus the first and last available host addresses, as well as the broadcast address. You'll also be shown the CIDR version of the address (i.e. 192.168.1.1/24).

That's about all the app does, though. Notably missing is any way of sharing the information or even copying it out of the app – there's no Share button, for example, offering to let you share the data via iMessage etc. You can take a screenshot manually using the Home and Sleep buttons on the device, but there's not an option to do so within the app.

Because the app name has Lite appended to the end of its name you might think it's a taster of a more sophisticated app but, nope, the app developer only offers three other apps and none are related to networking. Also, it will only work on the iPhone, and lacks an iPad mode other than via magnified iPhone emulation.

Network Ping Lite

Identified when it's running as Mocha Ping Lite, this app is really a tool for LAN administrators. As such, it includes a handful of unique network tools beyond and above the usual ping and traceroute features. Perhaps the most useful is subnet pinging, which is able to ping a range of addresses in order to find which are currently in use. Enter a base subnet address of 192.168.1.0, for example, and you'll be told which addresses from 192.168.1.0 to 192.168.1.255 are in use. The delay between scanning can be adjusted, which can make scanning even quicker.

Addresses in use are indicated via colour coding, so that a green highlighted number indicates an address in use, yellow indicates an address that was responding last time around but has now stopped, while red indicates an address that was responding but no longer does so at all.

Also included within the app is a simple telnet client that lets you connect directly to most routers in order to configure them. Rather neatly, the connection is shown in a faux blue screen, which is just about readable on an iPad screen but has the effect of making the text tiny on an iPhone (and it's hard to understand why you wouldn't just use the router's web interface anyway). There's a few other less typical tools too, such as Netbios Lookup, which can help diagnose Windows File Sharing issues on desktop computers.

Upgrading for £2.49 adds a few interesting extra features, including the ability to telnet to any port number. Perhaps the most useful thing you'll gain is the ability to continuously ping subnets in a loop – in the free version a dialogue box is deliberately shown after 255 hosts have been scanned in order to interrupt the cycle.

It's not hard to criticise this app; it'd be nice to use CIDR-style addresses to specify only a certain subnet for pinging, or simply to specify a subnet range (ie 192.168.0.20-50). Additionally, and as we found with other apps here, it's a little frustrating that the information discovered can't be easily shared or saved for future reference. Frankly, this is just bizarre considering that the Share Sheet technology is built into iOS itself, and easily accessible to developers. **mm**

How-to Basics

Installing Android On The Open Pandora Part 1

David Hayward looks at installing a new OS on this powerful handheld

The Open Pandora project is a fantastic example of handheld engineering, open-source retro gaming and miniature computing. This wonderful little ARM-based device may well be one of the more expensive open-source handhelds on the market, but its potential to emulate and run virtually everything is quite astonishing.

For this experiment, we're going to be installing Android, specifically Gingerbread, on our beloved and well-used Pandora, which is the slightly older 600MHz version overclocked to 800MHz.

It's a fairly easy process to get to grips with, and there's certainly plenty of help on the Pandora forums. And, if anything, this would make a fun summer project to get your teeth into.

Getting The Pandora Ready

There are a few things we need to get in place before we go and install the version of Android built for the Pandora. The first is SuperZaxxon and setting up the Pandora.

We're going to assume that you're fairly new to the Pandora in this scenario and that you've just received it, or you've had a play with it but left it gathering dust for the better part of a year. That being the case, we'll quickly walk you through the installation of SuperZaxxon and the initial setup of the Pandora, so you end up looking at the Ångström desktop. That way, we're all at the same point and can start with the setup of Android.

We're also going to recommend that you start this project with a couple of handy SD cards. Why two? Well, the answer to that lies in some problems that users have had in the past when running Android on their Pandora. In some circumstances, the Android setup has corrupted the SD card and wiped it. Although that may not happen all the time, and it generally doesn't, it is a possibility. So we'll say have one card that will house your usual Pandora apps, games etc, and the second will be the one we'll use for the Android setup – just in case.

SuperZaxxon

What we'll look at in this section is the upgrade of the Pandora to the latest software, SuperZaxxon: how to set it up and how to manage the primary or first SD card ready for applications, stored as PND files and followed by the second card for Android. And finally, how to get Android up and running on the Pandora. The first thing you need to do, though, is make sure that the Pandora is fully charged and ready to go, so take an hour or two and give the battery some juice.

Upgrade To SuperZaxxon

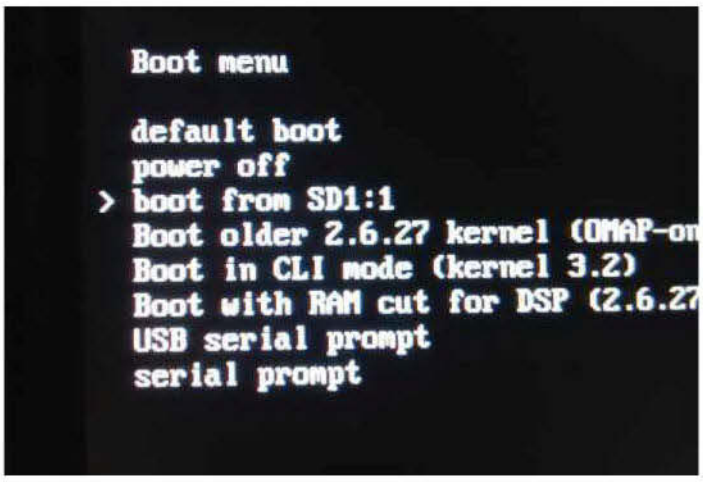
Most Pandora's ship with either hotfix 5 or hotfix 6 installed. You can tell which version it is during the boot splash screen, but there has recently been a new version of the Pandora's software released, along with some nice new features (see the SuperZaxxon feature's boxout) and improved control over the hardware.

SuperZaxxon Download

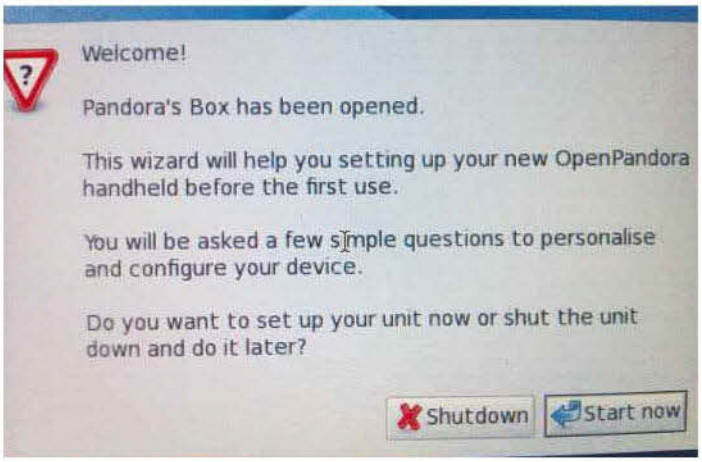
To start with, format both your SD cards to a single partition – FAT32 will be fine. Then, on a separate computer, head to **goo.gl/0aBvK0** and download the 254MB zip file. Once that's done, extract the contents of the file into the root of the formatted SD card.

When that's complete, remove the SD card and place it in the left SD card slot on the Pandora, the one next to the headphone socket.

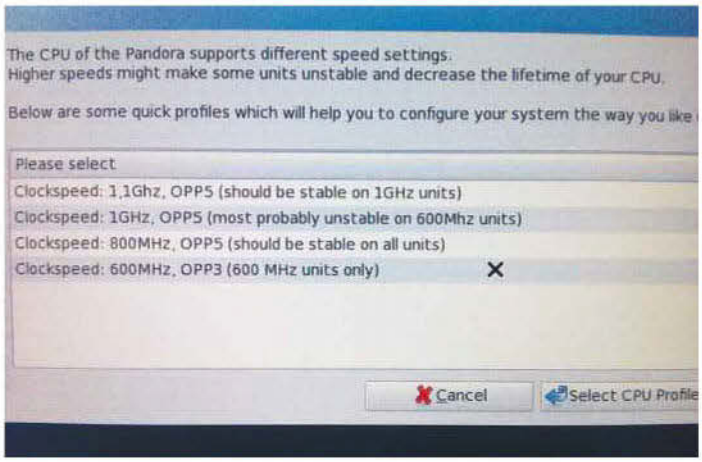
The Open Pandora, a box that's worth opening



Boot while holding the right shoulder button for the boot menu



▲ *With luck, SuperZaxxon will be installed and you can run through the setup*



▲ *The Pandora can be overclocked reasonably well*

Booting And Installing SuperZaxxon

The next step is to boot the Pandora, while simultaneously holding down the right (R) shoulder button. After a few seconds, a menu will appear; from this, select 'Boot from SD1' with the D-Pad and the 'X' button. The system will now boot and begin the upgrade.

A quick warning, though: upgrading the system will place your Pandora back into its default state. All your settings and previously created users will be deleted, but not any of the PNDs that are saved to an SD card; this is only for users who have already set up their Pandora and created a new user.

When the upgrade is complete, you'll be asked to 'Press Enter' to power the Pandora off.

First Time Setup

After pressing Enter, the Pandora will reboot and configure the new settings for the update. After that, it will reboot once more into the GUI setup, with the Welcome Message.

Using the stylus, tap on the 'Start Now' button and enter your full name, tapping in the text box to activate the cursor. Tap 'OK' when you've entered your name and choose a username. Tap 'OK' and enter a password and once more to verify.

The next setting is for the name of the Pandora; usually this defaults to the previous username, followed by 'openpandora', but you can choose what you like as long as it's easy to remember if you end up connecting to and from the Pandora on your network.

When you've named your Pandora and clicked on 'OK', the next option is to allow the autologin function. Normally, for the sake of security, you would opt to log into the Pandora yourself manually, but in this case, as we're the only ones using it in a generic user account environment, we'll go for the autologin option and tap 'Yes' to accept.

The next setting is the choice of default GUI that the Pandora will boot into. Here we have three choices: XFCE4, the full desktop environment of Ångström; the MiniMenu, which is a basic menu that displays icons for the applications and games you have; and finally, a GUI Switch, which will allow you to select the GUI at boot. To be honest, it's recommended to start with the XFCE desktop, purely because you'll get the most use from that to begin with. Once you're familiar with the Pandora and you have everything you need, you can then change the boot GUI into the MiniMenu. For the moment, though, XFCE is fine and you can always switch GUIs from the Start Menu in XFCE whenever you want.

Next, choose your location and city, followed by the correct date and time. The next menu is the choice of CPU speed, which depends on the type of Pandora you have. If you have one of the older versions, then you'll need to choose 600MHz. Likewise, if you have the more recent 1GHz versions, then you go significantly higher. We decided to opt for the 800MHz selection, as this is stable even on the 600MHz Pandoras.

The next screen deals with the calibration of the touch-screen, although the Pandora's touch-screen calibration is pretty much on the ball to start with.

The final menu of the First Boot Wizard has three options: Advanced CPU-Speed and Overclocking Settings, Advanced Startup Settings and LCD settings. If you know what you're doing and you have a particular need to investigate these settings further, then by all means tap on the one you want, but for most users, tapping on 'Finish Setup' will be enough.

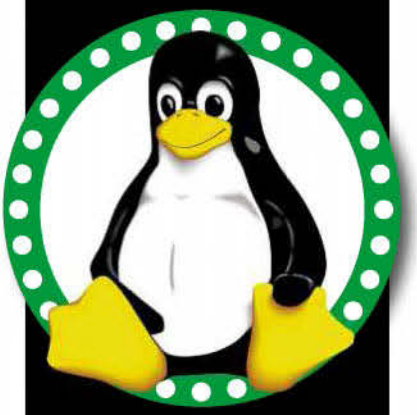
Next Week

That's SuperZaxxon installed, and you now have a fully updated Pandora. Next week we'll begin the Android installation and setup.

SuperZaxxon New Features

Upgrading to SuperZaxxon provides all sorts of wonderful benefits, from improved drivers, to better overclocking support. Here's a brief list (from the Pandora boards) of what great new features SuperZaxxon has over the previous hotfix:

- Aggressive idle power saving and suspend to RAM support.
- More stable SGX kernel driver from Nokia.
- CPU frequency scaling support (disabled by default because of noticeable slowdowns while changing frequency and no additional powersave while idle).
- ZRAM has been included. This is basically a virtual swapfile. Your unit will make use of it before it runs out of memory, so apps like Wesnoth or FireFox won't crash any more when they run out of memory.
- Profiling hardware support (oprofile, perf)
- ext4 filesystem.
- Lots of new USB device drivers.
- DM3730 and 512MB RAM support (missing in 2.6)
- includes Android support modules backported from 3.4.
- Android (Gingerbread in a PND) can be run!
- Workaround for data corruption hardware bug when reading from SD1 on 256M units (often seen when copying data from SD1 to SD2 on 2.6)
- RAM overclocking support.



Igniting Retro Games On The Raspberry Pi

Ignition: a social retro gaming OS

David Hayward has been using Linux since Red Hat 2.0 in schools, businesses and at home, which either makes him very knowledgeable or a glutton for extreme punishment

Kickstarter may have brought us some amazing hardware and software over the last year or so, but it's also the bearer of other less wonderful campaigns. In fact, it's often seen as something of a joke these days, with good ideas taking a back seat in favour of the ridiculous.

However, Ignition for the Raspberry Pi appears to be one of the more favourable campaigns to grace the pages of Kickstarter recently and aims to give the RPi gamer a retro experience.

Ignition is the brainchild of Alex Stubbs, a lifelong retro gaming enthusiast as well as top developer and designer. It's his vision to create an open and modern platform for access to retro games where not only can you play the classics from the golden age of gaming but you can also enjoy more modern features such as gaming achievements, gaming profiles, online play and social interaction.

It's an interesting idea, where you could be playing *Street Fighter II* on your RPi against an opponent from the other side of the world and sharing the fact that you've just trounced most of North America. It certainly sounds good.

The OS Alex is selling, for want of a better word, is very Xbox in design, with access to the games themselves, along with various functions like social achievements and the like. But there's also a hint of the Steam front end in there too, and possibly a soupcon of the PlayStation's graphical splendour.

The OS will naturally support any emulator or game that can currently be run on the Raspberry Pi, including those that are purely command line based too. And any new emulators developed either with Ignition in mind or separately can easily to be added to the OS support list via the set of easy-to-understand configuration files.

Funding Goals

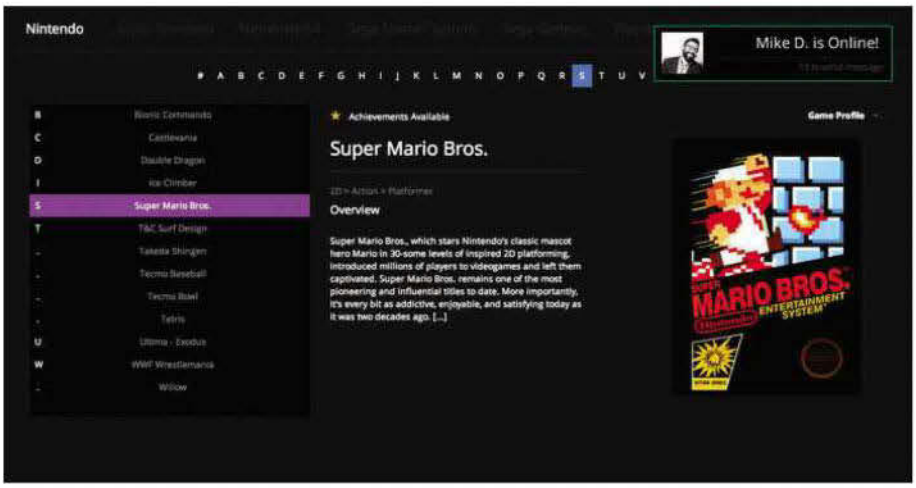
At the time of writing, there were only four days left on this particular project. However, since Alex was only asking for a funding target of $4,500, the current pledges had raised a decent sum of $7,388.

As a result, it looks favourable indeed. And in all honesty, it's something that could really be extended to beyond the Raspberry Pi and introduced into the PC or handheld market.

There have been a few attempts at making an all-encompassing retro gaming operating system in the past, with special reference to Puppy Arcade, but the problem with them is that they're a little too difficult for the average user to get to grips with.

If Alex's idea comes to fruition, then we could be playing with our favourite classics via a very tasteful, easy to use and fluid operating system.

Hopefully in the coming months we'll have something more to report on, maybe even a working model we can review and test. In the meantime, we'll have to make do with the scattered collection of emulators and retro hardware we've gathered over the years.



Ignition is looking to become the best OS for retro gaming on the Raspberry Pi

Notification Censor

Craig Grannell s done with OS X and iOS notifications – and his life is all the better for it

I remember when Growl first took off on the Mac. The tiny add-on helpfully let you know when something important happened on your computer. An at-a-glance notification offered peace of mind when an FTP client was done uploading a ton of files or when BBEdit had worked its way through a massive task in a text file you'd unceremoniously dumped on it.

Eventually, all manner of other apps ended up working with Growl, often through third-party plug-ins, and they were great too. You'd get notifications from iTunes when a new track started playing and notifications from Mail when new email arrived. You felt you were always in the know, lord of your digital domain.

Growl was then superseded by Apple's own Notification Center, which came across to the Mac from iOS. Baked deep into the operating system, it provided further updates on important things, such as software patches, posts in Messages, Facebook and Twitter and people liking photos you'd sent them via an iCloud Photo Stream.

I'm not sure when I snapped, but it happened pretty quickly. All this technological marvel suddenly felt like a deluge, weighing down on my shoulders. Between my iPhone, iPad and Macs, it was like I couldn't get a moment's peace, with everything pinging like crazy when someone sent me a message.

Even those notifications reserved solely for the Mac somehow transformed from helpful to irritating. At the end of every day, my Mac would inform me of software updates that I didn't really want to install; only minutes would go by before yet another email would land in my in-tray, and the apps… the apps just wouldn't shut up.

Fortunately, Apple brought across another feature from iOS: Do Not Disturb. This turns off notifications entirely, and such updates are now blissfully silenced on my Mac Mini. On my iMac, I took a rather more granular approach, keeping those notifications that I really couldn't do without (such as Calendar updates) but removing those that fundamentally aren't all that important (email, tweets, Facebook posts, browser updates). I then took the same axe to my iPhone and iPad, culling notifications down to the bare minimum.

Life's a touch quieter now but a lot more pleasant. However, it makes me shudder when thinking about the future of computing and the onset of wearables. I want technology to enable me to do amazing things, but right now, the future looks a lot like advanced and tiny computers sitting there, whispering into your ear a constant stream of anxiety-inducing guilt about things you need to deal with. Well, nuts to that. It's time to wrest back control from these shiny demons, even if it does mean – gasp! – not seeing that someone tweeted you until a few hours after the event!

If notifications are doing your head in, turn the damn things off

App Spotlight: LaunchBar 6

A major update to LaunchBar appeared quite recently, and it's really rather nice. LaunchBar is still a kind of powered-up Spotlight, appearing via a keyboard shortcut and enabling you to open apps, deal with files and manage events. But with version 6 come some major changes. The app looks a lot better and is easy to configure; importantly, indexing is now a constant background process. There are more actions and indexing rules too. My favourite thing, though, is the integration with iCloud content – LaunchBar can be used to access and amend Reminders and Calendar data. Reminders in particular is a disaster on OS X, so being able to avoid it entirely is a big plus!

LaunchBar 6 costs €24 (€15 upgrade) and is available from **www.obdev.at/products/launchbar**.

Craig Grannell is a writer, designer, occasional musician and permanent loudmouth. He's owned Macs since 1996, when Apple was facing certain doom, and is therefore pleasantly surprised by its current success. Find **Craig** on Twitter at **@craiggrannell**

Eight For 8

With version 8.2 round the corner, Ian McGurren looks at some of the best Windows tablets

Ian is a professional IT analyst, a semi-professional writer and a pretty amateur electronic musician. He likes gadgetry and loves making gadgets do things they were never designed to do

Mobile

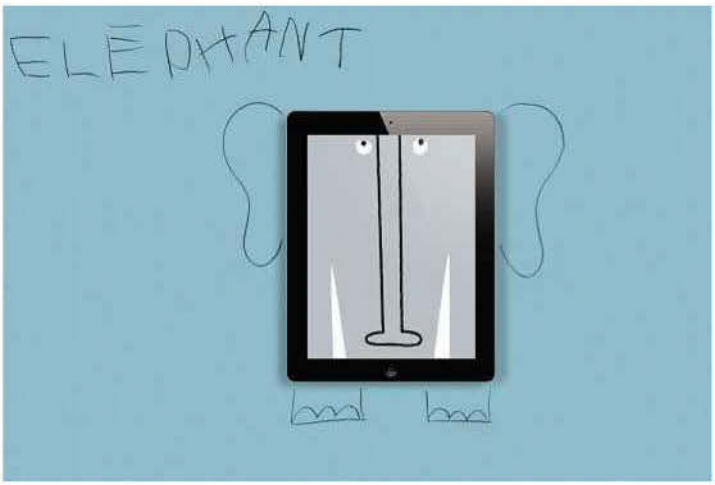
A familiar phrase to those in charge of their darling offspring during the summer holidays, "I'm bored" is also two words that are difficult to counter without substantial outlay or resorting to mindless TV.

Although an iPad can alleviate this boredom, many parents are rightfully concerned about their little ones spending all day staring at one, saucer-eyed, when they could be doing something much more stimulating. Yet while it's true that the iPad has plenty of mindless runners, shooters and candy crushers, there are also an increasing number of games and apps that can stimulate young minds as much as they excite.

Take *Miximal* from Yayatoy, a mix and match game for pre-schoolers that has over 1,000 animal sections that can be mixed and matched to teach about animals as well as problem solving, recognition and more. Each is animated in attractive and fun ways too. *Drawnimal*, by the same team, is for slightly older kids, aiming to teach them to think 'outside of the pad'. There's an animal for each letter of the alphabet, and the child is instructed to first draw round (i.e. outside) the iPad itself, so for example the ears and tail of a cat. On completion they trigger the animation and see their animal come to life. It's simple, clever and different.

Next are a couple of apps ideal for adult and child time: *Foldify* and *Foldify Zoo*. Both are paper cut-out apps, so both again use the iPad as the jumping-off point, with the imagination also taking place outside of the tablet. *Foldify* is a series of cut-out drawing plans that can be drawn onto by the user, with a 3D depiction shown alongside the cut-out plan so any drawing can be seen as a preview. It's not just drawing either, as images can also be used. Want to make a cut-out paper Superman with your child's face on it? Easy to do here.

Foldify Zoo is the same idea but this time with a library of zoo animals. Each animal also has information about it displayed, so it's a great way of having a make-and-do session and learning about the world at the same time, without it being forced learning. Like the *Foldify* designs, the animals can also be customised too.



Remember *Fuzzy Felt*? One of those toys from a simpler age that was literally the practice of sticking bits of felt on a playboard to make a scene. *Easy Studio* takes a similar idea but adds stop-motion animation into the mix for a really simple way for kids to make their own animated video shorts. The interface itself is very simple: you use different shapes to build your scene up, take a shot, move some parts, take another shot and so on. It's the simplicity that appeals but, like Lego and other creative toys, it's something only limited by the child's imagination. You can also add music, use seasonal templates (for fun at Christmas, for example), and even make animated greetings cards. All of this can be exported into the photo library for sharing too.

Finally, for those kids who have a creative and logical mind, there's *Hopscotch*, a very simple introduction to programming that's not dissimilar to the old BBC Micro Logo turtles those children of the 1980s may remember. *Hopscotch* uses a cast of cool monsters and a logical instruction language to guide kids in programming anything as simple as drawing shapes to animation, simple games and more. The code is drag and drop, so it's easy to edit and to play around with to encourage experimentation too. They say app programming may well be a key skill in the future, comparable to the web design of now, and where we had BASIC in the 1980s to hone future coder's skills, *Hopscotch* might just be the ticket to fire up the inquisitive young minds of today and foster their future ambitions.

Oricium

There's a new Uridium inspired shoot-'em-up for the Oric-1, as Shaun explains

▲ *Oricium for the Oric-1 and Atmos by Defence Force*

The Oric group Defence Force has a new game for the Oric-1 and Atmos technologies called *Oricium* which is a fast, bi-directional horizontally scrolling shoot-'em-up heavily influenced by Andrew Braybrook's superb 1986 hit title *Uridium*.

Oricium began life as test and experimental code to see how much of a pacy and professional shooter the Oric hardware could handle. What has been produced is an excellent blast-fest with 42 levels in total, with some touches present in games from more popular formats such as layered parallax scrolling and lots of enemies to pit your wits against.

Strange beings from another dimension have been listening and observing planet Earth and have decided on an inter-dimensional attack. And despite Earth's best efforts, the only way of penetrating the defences of these attacking beings is to deploy a small-formed and well-armed spacecraft, and guess who's been volunteered for this perilous mission?

The task is to pilot a 'Skimmer-class' ship to attack the defences of the alien scum, de-activating the enemy shields in the process.

There is some manual configuration of your visual display unit if you're playing this on a real Oric machine, with all of the relevant information and download being available from **oricium.defence-force.org** and a YouTube preview of the game in action over at **youtu.be/qUl7Agnp1Gw**.

Thanks to Old School Gaming (**oldschool-gaming.com**) for the heads up on this story; it's good to see this site back with a bit of life.

By The Baker's Dozen

The annual RGCD.co.uk 16KB Games Development Competition is off to a flying start. This event invites developers old and new to create entertaining software that will fit onto the default cartridge size of the Commodore 64 (16KB), then RGCD will publish all entries as well as judge each entry to decide on which is the best of the lot. And it's off to a flying start as well, as there have been 13 entries so far, with the standard being set very high from previous years.

From the confirmed entries so far is the typical mix of 2D arcade action that you'd expect, including the shoot-'em-up and platform genres, with a few catching my eye including a Bruce Lee-type game called *Tiger Claw* by Matthias Bock and Saul Cross, a bi-directional horizontally scrolling shooter (*Uridium*-like but viewed side-on rather than bird's eye) by Achim Volkers which is as yet unnamed, and an interesting looking pollination game called *Honey Bee* by Richard Bayliss, which is a game idea by Wayne Womersley.

I'd like to one day take on the challenge of entering such a competition, but not this year. Still, like everyone else, I can enjoy the software that's produced from it. For more information, head over to **tinyurl.com/mmretro1326.html**.

Touch-screen

Before touch-screen cellular mobile telecommunication devices were all the rage, personal computers had such devices as 'light pens', with the same sort or technology being used for 'light guns', with both the Commodore 64 and Sinclair ZX Spectrum computers being bundled with these latter devices, including compatible games. The problem, as I recall, was the accuracy of such devices, but back in the day, I'd convince myself that all was fine and it was only my aim that was out. Of course, the reason for the lack of entertainment software that used such devices wasn't just down to my poor aiming abilities.

Burnin' Pen '64 is a new game that has been released for the Commodore 64 which, as you might have guessed, uses a light pen as the main controller. It has been developed and released into the public domain by the group DaCapo and was the winning entry of the 'Mixed Game Competition' at the Evoke 2014 event. To download this release, point your web browser at **csdb.dk/release/?id=132241**.

Shaun has a passionate interest in 8-bit computing and gaming and has been finding novel ways to use retro technology since 1994

Retro

Ryan Lambie has loved videogames since he first stared up in awe at a *Galaxian* arcade cabinet in his local chip shop. 28 years on, Ryan writes about gaming for Micro Mart. He's still addicted to chips and still useless at *Galaxian*

The Road Warrior

While EA seems reluctant to make a new Road Rash game, indie dev Dark Seas games is making a spiritual successor – the racing brawler, Road Redemption

This week, Ryan checks out the forthcoming successor to the classic Road Rash, and takes a look at Sony's zombie survival MMO, H1Z1...

Plug & Play

As if tearing down a highway at ludicrous speeds on a motorcycle wasn't dangerous enough, EA's *Road Rash* series added an assortment of blunt instruments to make the pastime even more lethal. First appearing on the Sega Mega Drive back in 1991, the racing combat series is arguably one of the most unfairly neglected in recent memory. *Road Rash 64* (released, as you might have guessed, on the Nintendo 64) was the last we saw of it, and that came out 15 years ago.

Yet while EA doesn't seem to be in much of a hurry to revive *Road Rash* – there were suggestions that *Burnout* developer Criterion might be making a new entry, but that appears to have fallen by the wayside – indie studio Darkseas Games is stepping in to fill the breach. *Road Redemption* is a love letter to the 90s franchise, and its genesis began about five years ago, when game designer Ian Fisch wrote in his blog for **www.gamasutra.com** about his desire to see a new *Road Rash* from EA. Realising that an official *Road Rash* wasn't going to happen any time soon, Fisch decided to make his own, and the project successfully raised $170,000 on Kickstarter last year.

Since then, Fisch has been busily refining *Road Redemption*, and the game's now at the point where it's ready to appear on Steam Early Access. It's clear that Fisch has a real passion not only for the original *Road Rash* games, but for the minutiae of what he's making, too; in one of his recent developer blogs, he talks at length about how real-world motorcycle tyres behave, and how he's simulating the physics in *Road Redemption*.

This means that, although the basic mechanics are the same as EA's original series from the 90s, with racers battering one another with a range of chains, clubs and other weapons, *Road Redemption* will contain the believable physics and detail we'd expect from a modern game. It will, of course, still be an arcade racer, but the addition of real-world forces should make *Road Redemption* even more thrilling and blackly comic than it was 20-or-so years ago.

"Having real physics and rigid bodies, that's something you could never do in the *Road Rash* series, even on the N64," Fisch told Eurogamer back in May. "It just creates all kinds of emergent situations, where you're causing wrecks, cars are spinning over the road. We're planning a way to have either harpooned enemies, or maybe lassoing them and flipping them into stuff. With physics there's an infinite possibility of amazing and funny and awesome situations."

From what we've seen so far, *Road Redemption* looks like a worthy successor to *Road Rash*'s anarchic, battered crown. And with the addition of modern conveniences like online multiplayer, plus a range of extra weapons (including grenades and shotguns), *Road Redemption* could even prove to be the ultimate racing combat game.

You can find out more at **www.roadredemption.com**.

Online

There's no shortage of zombie apocalypse-themed games to choose from at the moment, but Sony's forthcoming, free-to-play *H1Z1* may be worth a second look. Its developers describe the MMO as a "hardcore survival game", with the emphasis less on relieving zombies of their heads and more on gathering resources, building a safe retreat and living to see another day. To give a flavour of just how 'hardcore' *H1Z1*'s survival will be, Sony recently launched a trailer detailing one of the game's main ideas: Air Drops, where vital resources such as ammo and medical supplies will come

Sony wades into the crowded zombie MMO market with H1Z1, a brutal world where resources are hard to find and likely to be stolen by other players. Look out for it this autumn

plummeting down from passing planes. There is, however, a catch: you'll have to pay for those precious resources via the in-game shop, and then make a mad dash to the drop zone to pick them up. This is because other players could be hanging around nearby, ready to steal all the stuff you've just purchase - which could easily lead to what Sony Online Entertainment boss John Smedley describes as "a tense standoff".

H1Z1 is set in what would once have been a sleepy, idyllic part of middle America, where a zombie virus has wiped out much of the local population. As one of the few survivors, players will live off the virtual landscape, with Sony revealing that up to 2,000 players will fit into any one instance of the game.

"The main thing that differentiates *H1Z1* from the other great games in the genre is the emphasis we are putting on player ownership and building," Smedley told the website Polygon. "We want you to be able to form roving gangs that are headquartered out of an abandoned warehouse that you've taken over, or a house you've built from scratch after having cut trees down and secured the resources to make it. We are giving players the tools to make their own towns, camps and defences, and they can decide how to set up their base."

H1Z1 will have a tough fight on its hands, given that such zombie survival games as *DayZ* and *Dead Frontier* are already available, but Sony may have the clout to make sure it thrives in a tough, competitive MMO landscape.

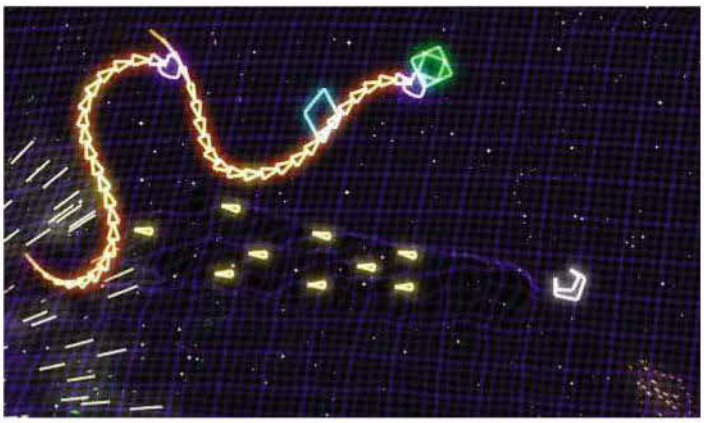
H1Z1 is scheduled for launch this autumn.

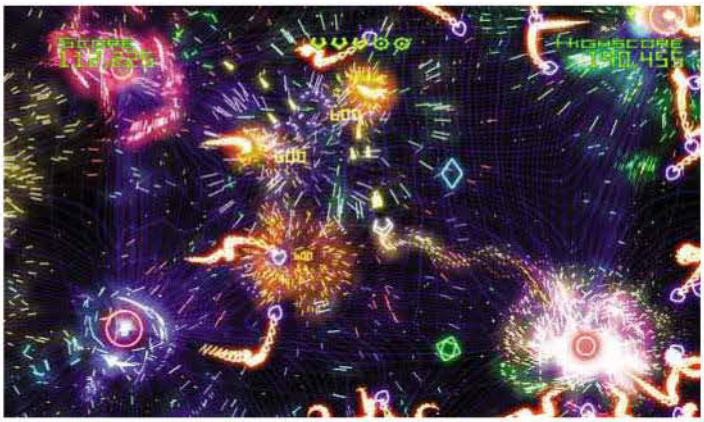
Incoming

When British developer Bizarre Creations closed its doors in 2011, it seemed likely that we'd seen the last of *Geometry Wars*, the wonderfully hectic top-down shooter it first released in 2003. Thankfully, however, *Geometry Wars* will live on in the hands of a new developer, Lucid Games, and will be released through Sierra – the veteran label recently revived by Activision as a purveyor of digital-only indie titles.

The second sequel will be called *Geometry Wars: Dimensions*, and will, according to Lucid's boss Pete Wallace, be "an exciting new evolution of the fast-paced, frenetic *Geometry Wars* gameplay fans love". In other words, expect lots of eye-melting, neon vector graphics and relentlessly fast shooting. Worryingly, Games Industry.biz has reported that *Geometry Wars: Dimensions* will also include "full 3D action" as well as a pair of multiplayer modes. While we can definitely imagine *Geometry Wars* working well as a multiplayer game, we've yet to be convinced that it needs to be 3D; the retro elegance of its top-down perspective was all part of the first two games' appeal. Given that *Geometry Wars*' original designer Stephen Cakebread isn't involved with Dimensions, we'll have to wait and see whether Lucid can successfully capture the magic of the previous games.

Geometry Wars: Dimensions is due out later this year.





Bizarre Creations may be sadly gone, but Geometry Wars still lives on at the studio Lucid Games. Its sequel, Geometry Wars: Dimensions, is out this year

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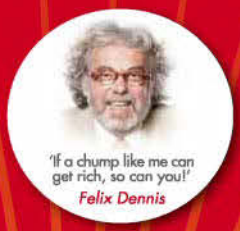

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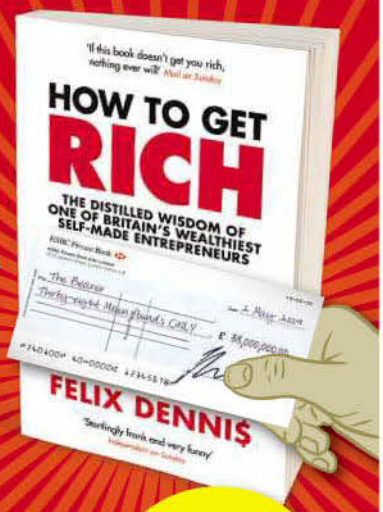

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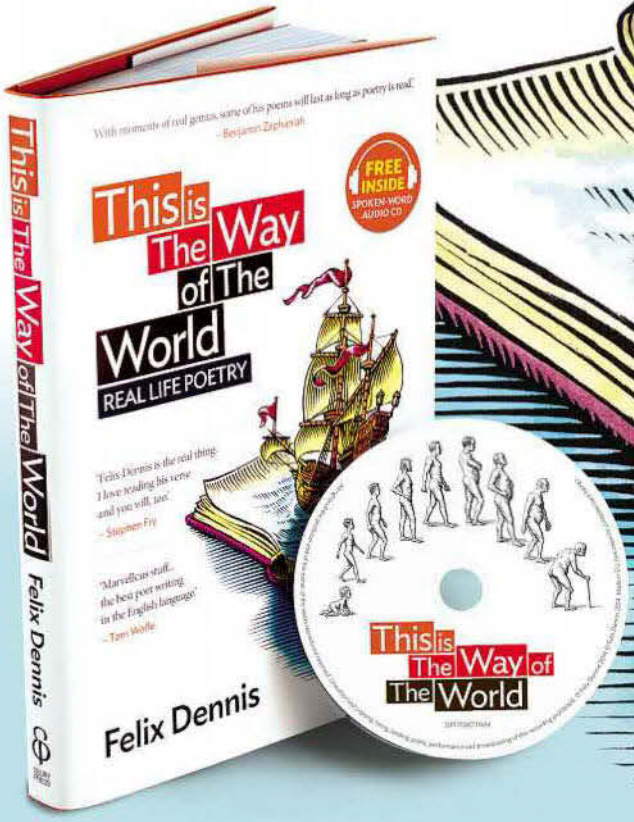

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Tel: (01964) 622867 Email ian.macklin@mypostoffice.co.uk

Custom PC. AMD FX-4100, 8Gb Ram, 500Gb HD, DVD Writer, AMD HD-6750 GPU, Keyboard & Mouse, 19 inch LCD Monitor, Genuine Windows 7 Pro, £250 + delivery.
Tel: Mike Whittington (07533) 270020 Email: mike.whittington@blueyonder.co.uk

XFX HD 7950 GPU. I have 2 for sale, both have 6 months guarantee, willing to split, £180 for pair or £100 each + delivery.
Tel: Mike Whittington (07533) 270020 Email: mike.whittington@blueyonder.co.uk

Nvidia GeForce 9500GT Super+ 1GB DDR2 Video Card (Palit). Unboxed. Great Condition. Not Been Overclocked. £30 Inc P&P
Tel: Steven Saward (01354) 656578 Email: steven_saward@sky.com

16GB Corsair Vengance DDR3 RAM (2 X 8GB). £120 ONO. Brand new and unopened
Tel: Chris Paul (07827) 447779 EMail: cmpaul25@gmail.com

New Cooler Master HAF X USB 3.0 XL ATX Case. No PSU. Reason for sale it will not fit in my computer station. Buyer collect only. £80.
Email: paul_999@sky.com

Two laptop hard drives for sale. 1- HITACHI 250GB - SATA3 - 5400rpm. Sell for £25. 2- WD SCORPIO BLACK - 250GB - SATA3 - 7200rpm. Sell for £30. Paypal only please.
Tel: Wolfgang Dahm (07590) 440475

Intel Core 2 Duo T5600 Dual Core Laptop CPU. Removed from working Dell D630 Latitude laptop due to Gfx chip failure, Now no longer needed. Tested and fully working using CPU Burnin test. £15. Price includes P&P.
Tel: Carole Walker (07551) 293083 Email: omendata@gmail.com

Mini-Usb Finger Optical Laser Mouse. Attaches to your finger and has two side buttons. Great replacement for standard mouse. Ideal for disabled users or for use where a normal mouse would not work. £10 p&p included.
Tel: Carole Walker (07551) 293083 Email: omendata@gmail.com

Arima HDAMA rev G serverboard. Dual Opteron 250 cpus included.Totally unused stock. Extended format. 4GB SDRAM, Socket 940. Updated bios to 2.18b, Windows 7 compatible. A real bargain. £45 courier incl.
Tel: (01223) 360986 Email: jhturner77@outlook.com

ASUS P5N-Sli Motherboard with SATA and IDE sockets. Includes manual cables and Intel 2 core panel, cables and Intel 2 core 2.4 ghz. CPU cooling fan and 4GB RAM. £75 including postage.
Tel: (01359) 270218

Gateway MT6220G Laptop. Dual Core CPU, 2GB memory, 200GB HDD, 15"4 WXGA screen, Vista license. Excellent condition long battery life. Wireless superb, some disks. £120 with free postage.
Tel: (01619) 501218 Email medicineman@ntlworld.com

Toshiba Satellite L350-159 17 inch screen laptop. 320GB HDD, Vista license, 4GB memory. Restore disks, charger, WED lightly. Wireless excellent, long battery life, excellent condition. £165 with free postage.
Tel: (01619) 501218 Email medicineman@ntlworld.com

ASUS P8B75-m socket 1155 motherboard. With Pentium 620 processor and 4 gigs memory drivers for XG7.8 on disk. Original box and rear 1/0 cover £50. Free postage, please ask questions.
Tel: (01619) 501218 Email medicineman@ntlworld.com

Be Quiet Power Zone 750W '80 Plus Bronze' Fully Modular Power Supply. I won this in a competition, brand spanking new. This PSU normally retails for £100, selling for a bargain-tastic £75.
Tel: Martin Welch (07971) 528739 Email: welch_martin@yahoo.co.uk

Mini-USB finger optical laser mouse. Attaches to your finger and has two side buttons - great replacement for standard mouse. £10 p&p included.
Tel: Gary Gemmell (01415) 712822 or (07551) 293083 Email: omendata@gmail.com

HP PO2015dn extra lower 250 page feed tray. £20.
Tel: Gary Gemmell (01415) 712822 or (07551) 293083 Email: omendata@gmail.com

New, boxed Belkin 24-Port CAT 5e Patch Panel. Part # F4P338-24-AB5. The RJ45 CAT 5 patch panel is 19 inch rack mountable and supports both 568A and 568B installations. Compatible with both 110 and Krone punch down tools. £15.00.
Tel: Robin Hewlett (02083) 930301

TP-Link TD-W8968 wireless N USB ADLS+ Modem Router. Unused, boxed, with all cables and set up CD and installation guide.£20.00 plus postage.
Tel: (01748) 886885 Email: hsturner@hotmail.co.uk

ALPS floppy drive (3.5"). Originally purchased as one of a batch for spares but never used. £5.00 plus £1 for P&P.
Tel: Alan (01258) 446500 Email: alan@asandco.co.uk

SATA/64MB Cache, Model No: WD20EARS. £40.00 inc p&p.
Tel: Michael (01452) 303732

HD 5850 XFX Black Edition for sale. It has been flashed with the Asus Bios and can be made to run as fast as a HD 5870. This is a high end card, has no problems playing all the latest games. Comes with box. £65 including P+P.
Tel: Martin Welch (07971) 528739 Email: welch_martin@yahoo.co.uk

Nvidia Geforce GTX 670 2GB. Made by MSI O/C model. Not overclocked. VGC. £110 plus postage.
Tel: Tim Stirland (01623) 624509 Email : tim.stirland@btinternet.com

4 Belkin Master Cube Surge protectors. Not only mains but telephone line protection too. Three were used for a short time, one is brand new. The part number is F9T110ukCW. £15 inc p&p.
Tel: Alan (01258) 446500 Email: alan@asandco.co.uk

1 TB SATA drive 3.5 inch, formatted ready for use. I can load genuine XP Professional from Microsoft with genuine Certificate of Authenticity for an extra £10. Refurbished. £35 + £3 p&p.
Tel: Dave Thomas (01942) 706572 Email: davethomas96@aol.com

Dell OptiPlex 745 (80 GB, Intel Core 2 Duo, 2.33 GHz E6550, 1GB memory, DVD/CDRW). Ultra small form factor. Fantastic small and very fast computer. You will need to load the drivers. XP Pro or Vista Business can be loaded for an extra £10. The hard drive and memory can be upgraded for an extra cost. £60 plus £10 for delivery.
Tel: Dave Thomas (01942) 706572 Email: davethomas96@aol.com

Intel Core i3 3220 3.30GHz processor. Pulled from working PC due to upgrade. Will be provided in anti static packaging. £50.
Tel: Mark Sullivan (01142) 745864 Email: mark.sullivan34@aol.com

Toshiba Satellite L350.17 inch screen laptop. 4GB memory. 300GB HDD vista License and Vista installed. Ready to use. Excellent wireless, excellent condition. Please ask any questions. £165.
Email: medicineman@ntlworld.com

Two laptop hard drives, formatted and ready to go. 100GB, 2.5 inch and 120GB and 2.5 inch. The smaller is a WD1000BEVS. The other, Toshiba mk 1255GSX. £35 with free postage.
Email: medicineman@ntlworld.com

Gateway MT622oG Laptop. 15.4 inch screen. 200GB HDD 2GB memory. Duel core CPU. Excellent condition, wireless supurb, £129.95. Tracked post, £7.50. Please ask any questions.
Email: medicineman@ntlworld.com

MSI KT4AV-L Socket A motherboard + Athlon 2200 CPU + 1GB DDR memory. 1 X AGP slot, 6 X PCI slots, 3 X DDR DIMM slots. Excellent condition, £25 + P/P.
Tel: Rod Theobald (01706) 345418 Email: mail@rodtheobald.force9.co.uk

ASUS Fonepad with neoprene slip case. 16GB 7" Android tablet with Wi-Fi & unlocked 3G phone functions,
Micro-SD slot, Model K004 (ME371MG). Warranty to 31 May 2014. £135 plus P&P
Tel: Ian Bonnett (01932) 856971 Email: a2345@btinternet.com

Dell Ultra small form factor GX620. Pentium D 2.8 /512/80 CD includes AC adaptor. Fantastic small machine that is very powerful ONLY £25 plus £8 for p&p. I can upgrade the memory and hard drive for an extra cost. You will need to load the drivers yourself. Refurbished.
Tel: Dave Thomas (07828) 982930 or (01942) 706571 Email: davethomas96@aol.com

11 Quality Peach compatible sealed CLI-8 cartridges. Yellow (3), magenta (2), cyan (2), black (2),PGI-5 black (2).
Won't fit new printer. £11 plus £3 postage.
Tel: John Beech (01928) 733622. Email: johnbeech@dsl.pipex.com

E6300 CPU with stock cooler. Fully working, available due to upgrade. £10 plus £3 postage.
Tel: John Beech (01928) 733622. Email: johnbeech@dsl.pipex.com

Intel Core i3 3220 3.30GHz processor. Pulled from working PC due to upgrade. Will be provided in anti-static packaging. £50.
Tel: Mark Sullivan (01142) 745864 Email: mark.sullivan34@aol.co.uk

PC for sale. Athlon Dual Core 3Mhz CPU, cooler, Asus M3A board, 2GB DDR2, Nvidia GT8600 500MB, 750W PSU, XPSP3, Sony 17" Monitor, £150.
Tel: Ray Dawson (01202) 893997 Email: ray.dawson02@btinternet.com

Gateway MT6220G Laptop. Core 2 CPU 2 GB memory, 100GB HDD, excellent 15.4 inch WXGA screen hinges. Excellent condition, excellent battery lasting 2 and a half hours. Wireless. £129.
Tel: (01619) 501218 Email: medicineman@ntlworld.com

ASUS P5QLD Pro motherboard. 3GB. Dual core CPU, 6GB man memory, set up disk and 1/0 plate. Heatsink and fan, comes in brown box £70 plus £5 postage.
Tel: (01619) 501218 Email: medicineman@ntlworld.com

Toshiba L350-169 17 inch screen laptop. 2 GHZ Core 2 processor, 120GB HDD, 4GB memory, Windows Vista. Excellent condition, lightly used. £170 post free, email me any questions.
Tel: (01619) 501218 Email: medicineman@ntlworld.com

PC with AMD Athlon 6000+ dual core 3Mhz CPU, quality cooler with external speed control, Asus M3A motherboard, 2 GB DDR 2 RAM, Nvidia GT8600 graphics 500MB, 750W PSU, Audigy sound card, case fans front and rear, XP with SP3 and original XP CD - together with Sony 17" LCD Monitor (no missing pixels). £150, sensible offers considered.
Tel: Ray Dawson (01202) 893997

Enermax Galaxy 1000 watt Gaming PSU. Modular, 80+ Gold with all accessories, boxed. Perfect for bitcoin mining, not new but unused. VGC. £80.00.
Tel: Tim (01892) 689054 Email: wryrat@hotmail.com

Antec 900 ATX Gaming Case. Not new but unused, VGC. Boxed, with all accessories. £57.00.
Tel: Tim (01892) 689054 Email: wryrat@hotmail.com

Free CPU and RAM. Athlon 64 3200 socket 939 CPU and 4 x 512MB ddr 333 strips.SAE and I will post back to you.
Tel: Jo Barden (01255) 870690 Email: cornsnake@cornsnake.plus.com

Sapphire Radeon HD 6770 1GB in original box with power supply conversion cable and driver CD. £50 inc P&P.
Tel: John O'Regan (01525) 862933 Email: t2o@greenbee.net

MSI Motherboard G41M-P28 LGA775 socket. Also two 2GB matched Kingston DDR3 1333 RAM. Both unused in original packing. £35, inc postage.
Tel: JG Moorhead (01606) 852461 Email: moorhead373@btinternet.com

3 x Devolo dLAN Highspeed II adapters (used, working, unboxed). CD containing software utilities and documentation. £17 collection in Oldham or £20 posted to UK.
Tel: Ken Vickers (01616) 78 6139 Email: mail2luzl3y-gym@yahoo.co.uk

Linksys WMP54G Wireless PCI card. £8 collection in Oldham or £11 posted to UK.
Tel: Ken Vickers (01616) 78 6139 Email: mail2luzl3y-gym@yahoo.co.uk

USB printer cables, assorted. Blue see-through with silver tips, black with gold tips. 1.8m, £1.00 each. IDE cables, grey, £1.00 for 2. Some round, black and colours £2.00 each.
Tel: (01582) 612716 Email: alex.1922@hotmail.co.uk

Gateway Dual core laptop excellent condition. 100 GIG HDD 15.4 inch WXGA screen. Long battery life, 2GB memory, charger, legal Windows Vista. £129.95 plus £10.95 postage.
Tel: (01619) 501218 Email: medicineman@ntlworld.com

PNY Europe GEFORCE GT520 DDR3 1GB PCIE 2.0. £22
Tel: (02393) 117877

TP-LINK 32-BIT PCI 10/100M fast Ethernet adapter TF-3239DL. £11.
Tel: (02393) 117877

Belkin 32-Bit boot Rom socket desktop network card F5O5000. £11.
Tel: (02393) 117877

Mini-Usb Finger Optical Laser Mouse. Attaches to your finger and has two side buttons. Great replacement for standard mouse. £10 p&p included.
Tel: Gary Gemmell (01415) 712822 Email: omen-data@tiscali.co.uk

500GB IDE drive 3.5 inch formatted ready for use. Only £20 plus £3 for p&p. Refurbished.
Tel: Dave Thomas (07828) 982930 or (01942) 706571 Email: davethomas96@aol.com

Creative Gigaworks T40 Series 2 PC Powered Speakers. As new, fully operational. See reviews and prices on Amazon. My price £40. Delivery £6.
Tel: Peter Van Win (01702) 559210 Email: vanpwin1@googlemail.com

E-mu 0404 PCI Professional Audio card. Works perfectly with Windows XP, 7 and 8 32 and 64bit OS's. Optical, Co-ax, MIDI inputs/outputs as well as analogue. Price £50, delivery £3.50.
Tel: Peter Van Win (01702) 559210 Email: vanpwin1@googlemail.com

Akai Apc40 MIDI Controller. As new, in full working order with software, paperwork, etc in original carton. £240 ovno Delivery £6
Tel: Peter Van Win (01702) 559210 Email: vanpwin1@googlemail.com

Hitachi Deskstar T7K250 HDT722525DLA380. 250 GB, Internal, 7200 RPM, 3.5". Used only for storage, taken from working PC, no bad sectors. £20, price includes P&P.
Tel: (01202) 826057 Email: geoffandcynth@themailspot.com

250GB SATA drive 3.5 inch formatted ready for use. Only £14 plus £3 for p&p. Refurbished.
Tel: Dave Thomas (07828) 982930 or (01942) 706571 Email: davethomas96@aol.com

iMac G4 15inch. Iconic Mac PC, unique design, 700mhz CPU, 512MB RAM, 80GB Hard Drive, DVD/CDR, Apple USB Keyboard & Mouse, OS X 10.4 Tiger with other software installed. Boxed with disks. £80.00 Buyer collects.
Tel: Wayne Deeley 07748170828 wdizz55@gmail.com

HARDWARE WANTED

Trying to breathe life back into an old machine? Why not submit a wanted ad to MicroMartClassifiedAdverts@gmail.com and see if any of the thousands of computer enthusiasts who read the magazine each week have what you're looking for?

Wanted: Fully working mainboard for AMD socket AM3/AM2+, DDR2, micro-ATX size.
Email: Brian bmorgant@yahoo.co.uk

Wanted: Factory system restore disc for a Dell Inspiron 1750.
Tel: Darren Day (07707) 556193 Email: ddshaggy@btinternet.com

Wanted: 4GB (2 x 2GB) of Corsair DDR2 RAM. 800Mhz XMS2-6400. Must be in good working condition.
Tel: (01928) 733808 Email: wilsal9@aol.com

Wanted: One Series Printer HP DESKJET 610c in good working order. One servicing manual (Not Users Instruction Manual) for the HP DESKJET 610c Printer. Old Zip Discs.
Tel: (01214) 777691

Wanted: A socket LGA 775 motherboard to enable me to build a computer for a local Royal British Legion member. He's able to pay for a 2nd hand board as long as it's not too expensive. I've got the other components.
Tel: Ken Driver (01890) 820295

Wanted: Gigabyte G41MT-D3 1.3 motherboard in good condition. Please notify price and postage.
Tel: 0121 455 8526 Email: j.cleary@virgin.net

Wanted: I am looking for 2gb (2x 1gb) of Muskin Redline PC3200 at 500Mhz.
Tel: (07817) 861011

Wanted: 2 sticks of 2GB - PC2-4200 (533MHz) desktop memory, 2 of 1GB. To complete a computer for a disabled ex-serviceman who has little money. Any other donations of bits & pieces of computers would be most welcome as I put together units for hard up ex-service people. Free of charge.
Tel: Ken Driver (01890) 820295 Email: ken@branxton.plus.com

WANTED: Foxconn H61MXL-K I/O backplate. Please state price & postage cost.
Tel: Steve Wilson (01617) 939906 Email: sb.wilson1@ntlworld.com

Wanted: Texas Instruments Laptop Power Supply Cable. Mine has failed and without it, I cannot use or charge batteries. Have complete working system with all software.
Tel: (01525) 288072 Email: jauung2@btinternet.com

Wanted: DDR2 800mhz, 4GB. 2x2GB.
Tel: (07817) 861011

Wanted: The Pet Companion. Has anyone a copy of the 1981 book "The Pet Companion"? This book collected the first 12 issues of Microcomputer Printout Magazine. Will pay £20 for a copy.
Email:Thomas Turnbull turnbull50@sky.com

Wanted: A fully working and proven Compaq (HP) DC7600 PSU. HP part number is 462434-001. Also a Compaq (HP) DC7900 PSU. HP part number is 379294-001 381023-001. Both must be 365 watt, not 240 watt versions. Must also be correct fit for SFF, not tower, CMT or USFF models. Thank you.
Tel: Mr Earl (07872) 495140

Wanted: Motherboard with 3GB CPU or higher wanted. Must have AGP interface.
Tel: (07817) 861011 Email: medicineman@ntlworld.com

Wanted: SDRAM laptop modules. Either PC100 or PC133 for elderly Dell Latitude CPt C Series Laptop. Wanted x2 SDRAM modules up to 254 MB for Dimms A + B (Non Parity).
Email: cjevans@fsmail.net

SOFTWARE FOR SALE

Windows Small Business Server 2003 Premium Edition. 7 Disc Set. £30.
Email:omendata@gmail.com

Windows Server 2003 R3. 2 Disc Set. £20.
Email:omendata@gmail.com

Windows Vista 32bit for sale. Genuine item with genuine product key. £35 including P&P.
Tel: Ian (01132) 629028 Email: ianmatthewuk@yahoo.co.uk

Windows 7 Professional. I have both 32 and 64 bit versions. NEW software and license (certificate of authenticity) 100% genuine and unopened software. ONLY £35 including P & P.
Tel: Dave Thomas (07828) 982930 or (01942) 706571 Email: davethomas96@aol.com

Windows 8 Professional 64 bit. NEW software HP branded. 100% genuine and unopened software. ONLY £15 including P & P.
Tel: Dave Thomas (07828) 982930 or (01942) 706571 Email: davethomas96@aol.com

Windows 2000 Professional. NEW software and license (certificate of authenticity) 100% genuine and unopened software .ONLY £15 including P & P
Tel: Dave Thomas (07828) 982930 or (01942) 706571 Email: davethomas96@aol.com

Windows Vista Business. New and sealed. Book, software and license (certificate of authenticity) 100% genuine and unopened.(Dell branded but will install on any machine) ONLY £15 including P & P.
Tel: Dave Thomas (07828) 982930 or (01942) 706571 Email: davethomas96@aol.com

Windows 7 Home Premium NOT BRANDED 32 and 64 bit versions. NEW software and license (certificate of authenticity) 100% genuine and unopened software. ONLY £35 including P & P.
Tel: Dave Thomas (07828) 982930 or (01942) 706571 Email: davethomas96@aol.com

Office 2007 Pro Plus for sale. Includes Word, Excel, PowerPoint, Excel, Publisher and Outlook. Disk only with serial number. £40 including postage.
Email: ianmatthewuk@yahoo.co.uk

Windows XP Professional. New, 100% genuine. Disc, manual, certificate of authenticity. Dell branded but will load onto any computer. £15 including delivery.
Tel: Dave Thomas (07828) 982930 or (01942) 706571 Email: davethomas96@aol.com

Trend Micro Titanium Maximum Security 2014. Genuine licence key directly to email. 3 devices for 1 year, for smartphones, PC, and Mac. £6.50 incl delivery.
Tel: 0203 519 7628 Email sales@bitsmith.it

Windows Vista Business edition disc and certificate of authenticity. New and 100% genuine. Only £15 including postage and packing.
Tel: Dave Thomas (07828) 982930 or (01942) 706571 Email: davethomas96@aol.com

Microsoft Office Professional 2007. In original wallet with original licence Code. £100. Price Includes P&P.
Tel: Carole Walker (07551) 293083 Email: omendata@gmail.com

SOFTWARE WANTED

Wanted: LG GSA 2164 D software disc to replace broken original.
Tel: Glen Fremantle (01387)248976 Email:bldamsys@yahoo.co.uk

Wanted: Nero 9 reloaded for Windows 7. £80 given.
Tel: (01629) 732623

Wanted: SmartDisk HD250 Installation CD. Novice Linux CDs with instruction manuals reasonable prices will be paid.
Tel: Alun (01525) 288972 Email: jauung2@btinternet.com

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We work very hard to police our classified ads, and make them as secure as possible. However, please do your bit too and use the following guidelines:

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• Be wary of anyone who insists on you paying by the above methods if in doubt, get us to check them out by mailing editorial@micromart.co.uk

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If in any doubt, feel free to mail us at editorial@micromart.co.uk. Every year, thousands of successful transactions take place through our classifieds, and that's just how we like it. Help us help you keep them one of the safest and most secure places to buy and sell computer kit.

ASK AARON

Meet Aaron Birch. He's here to help you with any general upgrading, software and system building issues. He's got advice aplenty, and you're very much welcome to it!

Send your questions to:
Aaron Bich
Micro Mart
Dennis Publishing
30 Cleveland Street
London
W1T 4JD

Contact Aaron by email at:
aaron@micromart.co.uk

Please try to keep your queries brief and limit them to just one question per letter, simply so we can squeeze in as many as we can each week. Please include relevant technical information too.

Aaron

SSD Re-rask

Three years ago I copied a flagging XP installation to a brand new Kingston 120GB SSD, as I still needed some of the 'stuff' for work and hadn't seen my XP installation disc in years. It did the job and the very sluggish XP system became quick enough to use for another year.

I'm now retired and no longer need the XP stuff so was planning on using the SSD to give an old laptop a boost by replacing the HDD. It already runs Windows 7 and is only used for email, web browsing and internet banking. I have the disk to reinstall this system.

Am I correct in thinking that a standard format and Windows 7 reinstall will still leave the SSD memory cells full of old XP data, with consequent poor performance due to having to clear old data before writing the new?

Do I need to try to clear the old data properly before installing a new system or will TRIM do the job as time goes by? I quite like the idea of a system getting quicker with use, or is that just wishful thinking on my part?

Also, how would I clear out the old data in the first place? There seem to be loads of utilities saying they can work wonders but this fool is trying not to part with his pension money too soon!

Huw

You are correct in your assumption that a reinstall and quick format will leave old data in place, as a format simply allows old data to be overwritten. Once this happens, the data is gone, unable to be accessed again by normal means. However, I don't think you need to worry too much about the overall performance once Windows 7 is installed.

Unlike Windows XP, Windows 7 fully supports the TRIM function, and so the removal of old data will be handled more efficiently. So, for your purposes, a quick format during reinstall should be fine. It's the best method to use with SSDs in this regard, as it reduces overall wear and tear on the NAND cells.

> **"Unlike XP, Windows 7 fully supports the TRIM function"**

*If you're more concerned with data security, and would rather ensure there will be no issues with someone ever retrieving what you've formatted at a later date, you can perform a secure erase, something all SSDs support. Kingston has its own advice on how to go about this, using a free program called HDDErase (**tinyurl.com/qf234gz**). This is a DOS-based program, and so needs a DOS boot disk, but using it is simple enough. Kingston provides details on exactly how to complete the process, however.*

*Of course, there are plenty of other free secure erase tool around, including Eraser (**eraser.heidi.ie**), but many users prefer to stick with their SSD vendors own or recommended tool, such as the Kingston option above.*

Free tools like HDDErase can securely wipe an SSD, and are recommended by SSD vendors

```
Special diagnostic areas, HPA and/or DCO exist on the drive.
Total size of these areas is: 4138665809 SECTORS

DO YOU WANT HDDERASE.EXE TO ERASE THESE SECTORS? (Y/N): y

Unable to reset Maximum LBA.  Continuing...
*********************************************
! Continuing will permanently erase your drive !
*********************************************
Press C to continue or E to exit: c

Security erase...
This may take anywhere from 20 minutes to a few hours
depending on the size of your drive

Secure erase complete
Audit log file created successfully
Audit log successfully written to LBA sector 0

Do you wish to view LBA sector 0? (Y/N): y

This drive: Serial number = CVEM83830098080DGN  , Model = INTEL SSDSA2MH080G1GC
                was successfully erased on...Mon Nov 24 02:45:00 2008

To go back to the options menu press ENTER . . .
```

More Mint Print Problems

I had exactly the same problem [as the reader in Ask Aaron, MM1323] with using my Canon Printer IP 4850 when I upgraded to the latest Mint (17). Although I installed the 'missing' file, it still did not work.

As I tend to use Mint over Windows (triple boot with 8.1 and 7), and I really wanted to use my printer with Mint, but after reading a comment in your magazine. some time ago I decided to give Lubuntu a try. I installed my printer in Lubuntu with no problem. More amazingly, when I reselected Mint, the printer now worked! I do not understand why, but it might help.

While I am on the subject of Linux, I have a number of fixes written down to remind me when I install a newer version, like how to stop Linux messing with my windows time, my favourite programs to reinstall, and most import settings to get my soundcard working and other handy things.

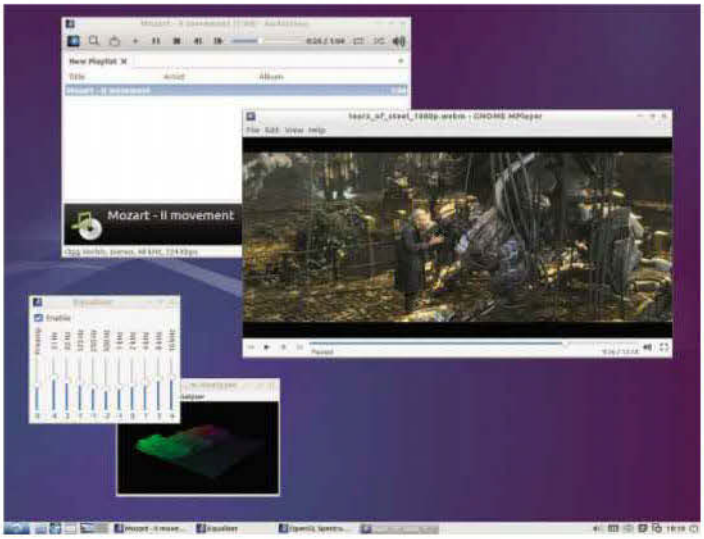
I have three separate small drives, one for each OS. So, of I need to reinstall any of these I pull out all the SATA plugs except the on I want. Works a treat. These are the tip of my iceberg with solved past problems.

David

Thanks for your input, David. Issues like this can be very convoluted, and are sometimes not down to just one factor, so it's always great to have multiple options to consider – even something like considering an alternative flavour of Linux can help or, as in your case, even fix the initial problem. If more readers are having similar issues, always consider every possibility, especially when getting towards your wits' end.

When it comes to your method of reinstalling, or updating Linux to new version, that's a great setup. Updates to anything, especially operating systems, can be fraught with problems, and when you're running multiple at any one time this can escalate. Isolating your other drives ensures nothing untoward happens, keeping your other systems safe. A reinstall check list is also very helpful, especially for people that use a lot of different programs, or have hardware that requires specific drivers.

Having issues with a version of Linux? Maybe it's time to consider another...



Scansoft

I'm a new PC user, and my new PC with Windows 8 on it is my first real experience. I have used PCs before through work, of course, but never bothered with my own at home, until now.

I'm writing to ask about a possible cheap scanner I've been offered. I'm not sure of the exact model, but I do know it's a HP flatbed scanner, with a printer and card reader. I can grab it for £20, but the issue is the lack of software that comes with it. The person selling it has said that you can't get the driver online any more, which is why he's selling it so cheap (he said he may even drop the price to £10).

I'm wondering if there's any point in buying the scanner from him. I do need a scanner, but am on a very strict budget at the moment, so can't afford a new one. I'd be grateful for any advice, and I'm sorry if this is a stupidly simple question, I am a newbie.

Mel

Never apologise for asking about something you're not sure of, Mel. Things are only easy and simple if you know the answer, and at Micro Mart, we're always happy to help with any problem.

When it comes to your scanner, I find it very hard to believe that there's nowhere online that hosts the drivers for it, even if its an old model. HP's own site contains an archive of drivers for its out-of-production models, and there are plenty of driver websites and software archives online that should provide them. If you're overly concerned about it, though, contact the seller and get the exact model of the device, then have a look online at HP's site and then via Google and/or your favourite search engine.

Even if the drivers cannot be found, often Windows can detect a scanner using its own built-in drivers, so all you need to do is plug it in. The device should then appear in your list of devices, and you'll be able to right-click and scan from there, using Windows' image importer to save any scanned images. No extra drivers or software would be needed in this case.

Of course, very old scanners may not work as well with Windows 8, so this method will depend upon the age of the specific scanner in question, but I've used very old devices with Windows personally, and have rarely had issues, so it's worth a punt.

Ideally, I'd see if the seller would let you try the scanner first. As long as everything is legit, I don't see any reason why this would be a problem, and you'd avoid any wasted time and money. Good luck.

ASK JASON

Meet Jason D'Allison, a veteran of Micro Mart's panel of experts. He's here to help with any technical questions, including anything to do with tablets or smartphones, as well as PCs

Send your questions to:
Jason D'Allison
Micro Mart
Dennis Publishing
30 Cleveland Street
London
W1T 4JD

Contact Jason by email at:
jason@micromart.co.uk

While we try to cover as many questions as we can, we regret that Jason cannot answer your questions personally, but he'll cover as many as he possibly can each week. Please ask one question per letter and remember to include the full specification of your computer, including its operating system.

Jason

Get Your Cards

I'm a photographer, and I've recently given one of my PCs to my nephew. The specs are below:

- CPU: Core 2 Quad Q6600 (quad-core, 2.4GHz)
- Motherboard: Asus P5Q
- Memory: 2 × 4GB DDR2-1066
- Drives: 1GB HDD; DVD rewriter
- Graphics: 128MB Matrox P650
- OS: Windows 7 Home Premium (64-bit)

It's an old setup, but he's hoping to turn it into a modest gaming rig. Is it suitable for that? It was built specifically for use with Photoshop. Will a gaming graphics card fit and work? I can't see why not, but I'm no expert. Also, will the current PSU be all right? The label says it's a 400W unit, but there's no obvious make or model. Is there a utility I can download to find out exactly what it is?

Robert, Virgin Media

As a base unit, it's fine, Rob. Don't worry. The CPU would hold a top-end gaming card back somewhat, but by the sound of it your nephew's not in the top-end market (nothing wrong with that!). Partnered with a mid-range card, any modern game running with medium detail and a 1080p resolution should run perfectly satisfactorily.

The PC's motherboard is bog-standard (but high-quality), with a regular PCIe 2.0 graphics slot. Most of the latest gaming cards use PCIe 3.0, but of course they're backwards-compatible. Again, a top-end card would possibly have some of its performance choked back, but the impact on a card a few rungs lower down the ladder will be negligible.

Regarding the PSU, this is electrical rather than electronic. It's 'dumb' and doesn't pass any information to the PC. As far as identification goes, therefore, the label on the side is everything. Very expensive PSUs such as Corsair's Link Digital models connect to a motherboard USB header and allow fan speed and voltage and amperage levels to be monitored and customised, but even on those I'm not sure the PC receives an ID string. I'll let you know, Rob, if I ever save enough money to buy one. The base model, the 760W AX760i, costs £150. You can very nearly buy a new laptop for that!

The lack of detail on your PSU's label is informative in itself. I think we can assume the PSU's a cheap, generic thing. If he uses it to run a half-decent gaming card, your nephew had better hope he's got healthy batteries in his smoke alarms. The Matrox P650 draws only about 20W, compared to 200W or more for what your nephew's after, so the person who built the PC probably used reasonable judgement and cut costs.

For the replacement, ensure your nephew buys a unit with two six-pin/eight-pin PCIe power plugs (or more). Depending on the card he chooses, two plugs may not be required, but it's a reliable indication of decent power – as long as the PSU's a quality brand, that is. Corsair, Antec, Cooler Master – those are the sort of names to consider. I recommend a unit delivering at least 42A/500W at +12V. That needn't cost the earth – Corsair's 600W CX600 (46A/550W at +12V) can be bagged for under £50.

For the graphics card, a good bet about half-way up Nvidia's GeForce ladder is the GTX 760 – around £160. Dropping down to the next level, a GTX 750 Ti would cost around £105, with performance falling by maybe 30%. From AMD's Radeon stable, a similarly performing card to the GTX 760 is the R9 280 – something like £170. On the next rung down, an R9 270 would cost about £120, with performance dropping by roughly 20%.

Note – Get an SSD in there! That would give a transformation!

Corsair's 1500W AX1500i PSU is the business – and you need to be the CEO of a business in order to afford one

Time's Up!

I've got an annoying issue with my Android phone. When a call comes in, I'm only given about ten seconds to answer it. Sometimes I haven't even managed to take the phone out of my pocket before the call's cut off. How can I change the ring time? I've been through all the settings, but there's nothing obvious.

Nigel Scott, Anglesey

What you need to change is the delay before an incoming call gets diverted to voicemail. And you're right: there's no obvious way of doing it. That's infuriating, as it's a setting loads of people are going to want to alter. What's Google playing at?

*Anyway, Nigel, open up your phone's dialler, enter *#61#, then hit the call button. This should bring up a window showing the current delay and also your voicemail number. Make a note of this number – it'll be different to your phone number. The format will be +447777111111, where +44 is the UK international dialling code and the remainder is a standard mobile number with the 0 knocked off the front.*

Now, if no voicemail number comes up, you'll need to dig for it. On never versions of Android (typically 4.x), it'll be listed in the dialler settings. On older versions (typically 2.x), it'll be listed under the Call menu in the phone's general settings.*

*Once you're sorted, enter the following into the dialler: **61*nnnnnnnnnnn*11*tt#. Where I've put the lower-case Ns, enter the voicemail number in the format above, including the leading 44 (the + symbol isn't necessary). There should be twelve digits. Where I've put the lower-case Ts, enter the required delay. This is in seconds, and the choices are 05, 10, 15, 20, 25, and 30. To finish off, hit the call button and wait for the window declaring that registration was successful.*

** If *#61# doesn't reveal the voicemail number, that's usually because voicemail is actually disabled. In that case, incoming calls should ring for 30 seconds (the maximum allowed) and then be cut off. If 30 seconds isn't enough, tough cookie. Oddly, disabling voicemail is easy – just pop into the settings mentioned above (one group or the other).*

▲ ***This code will set your Android phone's self-destruct timer (or something)***

Not-So-Mighty Mouse

A year or so back I bought a Cooler Master Sentinel Advance II gaming mouse. It used to be the best mouse I've ever used, but a couple of months ago the left-click button started 'ghost clicking', producing click after click after click. There was no outward sign of a jam, however.

More recently, the only things that work are the DPI-changing buttons and the movement sensor. If I disable the mouse's pretty lights, though, the left-click and right-click buttons start working again, but only until I use the central scroll wheel. Maybe the mouse isn't getting enough power?

I've reinstalled the Cooler Master drivers and software, disconnected all other USB devices, and even tried the mouse on another PC. No change. Is the problem hardware, software, or the mouse's firmware? I was going to get the mouse swapped under warranty, but by 'coincidence' the serial number's printed on a sticker on the base, and of course that's rubbed off. Any ideas on how I can get sorted without having to shell out another £50?

George, Gmail

I think your results on another PC prove the mouse is dying a slow death. There's little doubt, I'm afraid. Interestingly, on its website, Cooler Master boasts that the Sentinel Advance II now comes with a 'new sensor'. Does that suggest there was something not altogether right with the old one?

I believe most Cooler Master mice carry two-year warranties, so yours should certainly be covered, George. As you've no doubt discovered, the online warranty check does require the serial number, however. The fact yours has rubbed off smacks of sharp practice on Cooler Master's part. To my mind, no-one puts a product through numerous testing phases without picking up on such an elementary design flaw.

*Do you not have the sales receipt? Even if the mouse is out of warranty with the shop you bought it from, the receipt will prove its age. That *should* be good enough for a claim direct with Cooler Master. Or do you have a bank or card statement showing the purchase date and the shop's name? That should be just as good. You'll probably need to be like a dog with a bone, of course – companies deliberately set up hurdles when money's involved, hoping folks will simply give up. You're in the right, so pester Cooler Master to death until you get a new mouse or a refund.*

▼ ***Do £50 mice last any longer than £5 ones?***

Crowdfunding Corner

Two interesting implementations of well-established technology this week...

Slice Media Centre

If you're wondering whether the Raspberry Pi will ever live up to its promise, the Kickstarter for Slice might finally give you your answer. A media player which connects to your TV over HDMI, the Slice media player contains a Raspberry Pi at its core, but manages to feel like so much more.

Not only can it store and play all of your videos, music and pictures in full HD, it's got a carefully designed user interface and custom remote control that designed to make it effortless to use. The anodised case is solid aluminium, so it's lightweight but durable, and there's even a customisable LED light ring that gives you something in the way of visual feedback, and an opportunity to tailor the system's aesthetics.

Accessing the device is easy – just use the USB port and you can access its contents like you would any other hard drive. It's small enough to take around in your bag or rucksack, and as well as an internal hard drive it has two USB ports for extra storage and support for Ethernet network connections to access content on other systems.

Built on open technologies, the idea is that the Slice will be fully capable of running alternative open-source software, though because its current interface is based on the wildly popular XBMC, you may not want or need to do that. Fully customisable, incredibly stylish and powerful, the Slice could well become the essential part of many tech-savvy, connected households. You can back this product for as little as £129, which will get you a hard drive-less version, or £169 for a model with a 1TB drive provided.

URL: tinyurl.com/lswt52l
Funding Ends: Thursday, September 25th 2014

Noke Bluetooth Padlock

We've covered Bluetooth locks before, but so far they've always been single-purpose, custom-integrated pieces of hardware that can't be easily transferred from one use to the next. The Noke is different. It's a standard padlock that uses Bluetooth instead of a key, which means you can use it anywhere a normal padlock would work: luggage, bikes, lockers, gates. You name it.

Once you've shut the lock, all you need to do is use the app (for Android or iOS) to pair your phone or tablet with the padlock. Once the devices recognise each other, you'll be able to pop open the padlock only as long as they're in Bluetooth range of one another. Disable Bluetooth or walk away, and the lock becomes completely secure. You don't even need to access the app manually.

If you do use the app, you can enable and disable auto-unlock, manually lock and unlock it, and even set up a push notification so you'll always know exactly when it's been unlocked. It's not a perfect system (if your phone battery dies or gets stolen, you're in trouble) but it's no less risky than trying to carry keys with you all the time, or storing them in those 'safe' places you can never seem to find again – and it's a lot less likely to get picked!

For a padlock it's pricey, though. Backers can get hold of a Noke for $59 plus $15 shipping outside the UK, which is a Kickstarter exclusive price (and $30 off the expected retail cost). However, the goal of $100,000 was blown past in a matter of days, so it's safe to say there's plenty of demand, and that the Noke is going to be a big hit by the time its campaign ends in September!

URL: tinyurl.com/knymm5d
Funding Ends: Wednesday, September 17th 2014

Disclaimer: Images shown may be prototypes and Micro Mart does not formally endorse or guarantee any of the projects listed. Back them at your own risk!

App Of The Week

CyberGhost 5 For Android

David Hayward uses a secure stick with which to beat the prying eyes of the internet

We've covered a number of programs in the past that are designed with your online security, privacy and anonymity in mind. Most of them are good and do their jobs very well. However, there's one program that stands head and shoulders above the rest.

CyberGhost 5

We reviewed CyberGhost 5 ages ago for the PC and iOS, and it received top scores all round, but now it's time for the ultimate protection for your Android device.

We won't go into too much detail regarding the necessity of privacy and being anonymous when online; it's an area that been covered many times already. And we imagine we don't need to lecture you on the importance of security while using free wi-fi hotspots and other pits of unsecure despair. Needless to say, if you're online, no matter how long for, then it's worth protecting your right to privacy.

CyberGhost 5 for Android is an extension of the excellent smartphone and tablet protection areas of the Premium and Premium Plus plans, and it's incredibly simple to use. All you need to do is sign up for one of the aforementioned plans via the CyberGhost site (**goo.gl/aeSGDu**); the Premium Plan costs just £24.99 for a year, and the Premium Plus Plan comes in at £44.99 for the 12-month period.

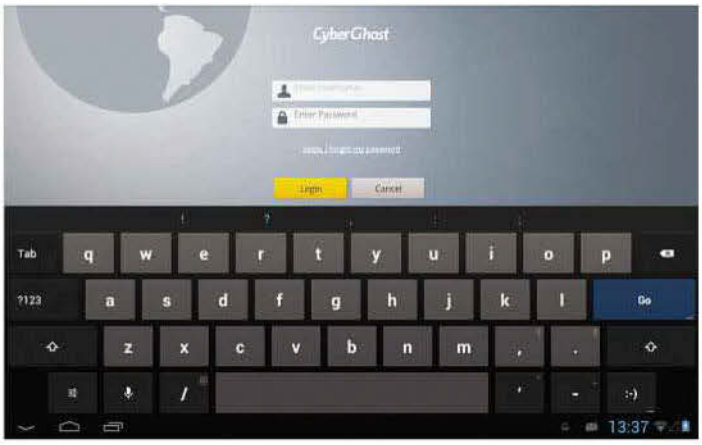
Once you have your account up and running, download and install the CyberGhost 5 Android app from the Google Play store and enter your account details to log in with. When you're in, you'll be connected to the many servers that the CyberGhost team operate through the secure L2TP VPN protocol with a separate IPSec encryption technology. This means that once you're connected to the CyberGhost encryption tunnel, it's virtually impossible to be hacked while you're on a public network.

In addition to the protection against tracking cookies, data miners and other unpleasant things, and as with the desktop version of the CyberGhost software, you can choose to mask your IP address to any one of the 24 different countries around the world. That means your connection to the internet will identify you as being in the USA, when you're actually in eastern Europe, for example.

Conclusion

If you're determined to remain secure when on the move and you have an iPhone, then we can't recommend CyberGhost enough. If you value your online freedom and privacy or you want to have access to the content restricted to the country of its origin, then again, CyberGhost 5 is the one app to rule them all.

In a nutshell: it's easy to use, secure, safe and doesn't have any detrimental effects on the operation of your device. CyberGhost 5 is perfect for those on the go, who use hotspots and for those who just want security peace of mind. **mm**



Login into your CyberGhost account...

... and become invisible to the internet

Features At A Glance

- Protects your privacy online.
- Allows unlimited anonymous and secure web browsing.
- Protects passwords and other sensitive information from hackers and criminal data hunters in public networks (e.g. for safe online banking transactions).
- Free proxy to access content you love.
- Bypasses web-blocking by government and business oriented censors.

CyberGhost is the best and most secure VPN there is

Logging Off

One of the things that humans do relatively easily and machines find really challenging is contextualising. That's the ability to take a small piece of information, like a word or action, and build meaning on that based on prior information.

That allows us to communicate quickly by referring to commonly understood concepts and relationships, rather than implicitly detailing everything.

Making computers do that is a real challenge, not least because the database that we draw on to build context is assembled over our entire lives, and we're continually adding and enhancing it. That said, it can still manage to lead us in the wrong direction when we add the wrong context to a conversation.

Those working in technology have been working on this problem for some considerable time, aware that if we ever want to converse with an artificial intelligence like we do with another human, it is the critical feature.

But now we're nearly there and we're close, suddenly this seems a much less attractive idea.

Over the past couple of weeks, we've been seeing the first signs of Microsoft preparing the ground for Windows 9, the replacement for the much unloved Windows 8. I mention this only because Microsoft hinted that its Siri-like technology from Windows Phone, Cortana, might be included in the desktop OS.

I'll be straight. My immediate reaction is that I don't like that idea at all. Why? Because I've seen how the one on Windows Phone works, and it's creepy. Where it goes from being something useful (such as telling you where the nearest pizza can be bought) to fully disturbing is how it contextualises based on data it has collected from you using your device. Doing this, it works out without being implicitly told what the relationship is between you and the people on your address book and other personal aspects of your life. That allows it react smartly when you say 'Send a text - I'm on my way - to my sister'.

That's disconcerting enough, but I've noticed Apple filing many health-related patents in the past year, with the possible move towards making the iPhone a collator of biometric data and a monitoring tool for the health obsessed everywhere.

I'm not sure I want a device or company checking my blood pressure for commercial gain, and the thought of what information might be trawled from a desktop PC doesn't bear thinking about –

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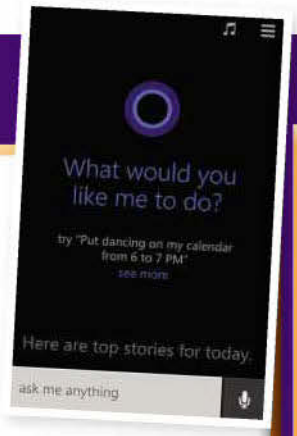
especially when that data might fall into the wrong hands, be that criminal or bureaucratic.

Perhaps I'm part of a previous era where computers were meant to be tools and not imaginary partners. If I take an axe to a tree, I don't want a discussion of environmental concerns with it.



In the same way, I'm happy to use a computer and a phone without the real possibility that it's informing on me about my health to an insurance company or connecting the dots in my well-spaced family picture.

The argument coming from the makers of this technology is that when the device better knows you, it can be more helpful. It all appears to be a rather thin excuse to get people to invisibly give up control of their personal info to benefit from moderately slicker ways to send messages. It all smacks of being too cosy, for too long, with the NSA and GCHQ.

Mark Pickavance

LAST WEEK'S CROSSWORD

Across: **7** Atomic Piles, **8** Assume, **9** Ironic, **10** Abridge, **12** Essay, **14** Acute, **16** Pioneer, **19** Absurd, **20** Binhex, **22** Neutron Star.

Down: **1** Mass, **2** Moduli, **3** Diverge, **4** Spain, **5** Gluons, **6** Estimate, **11** Backbone, **13** Big Bang, **15** Taurus, **17** Ninety, **18** Adorn, **21** Euro.

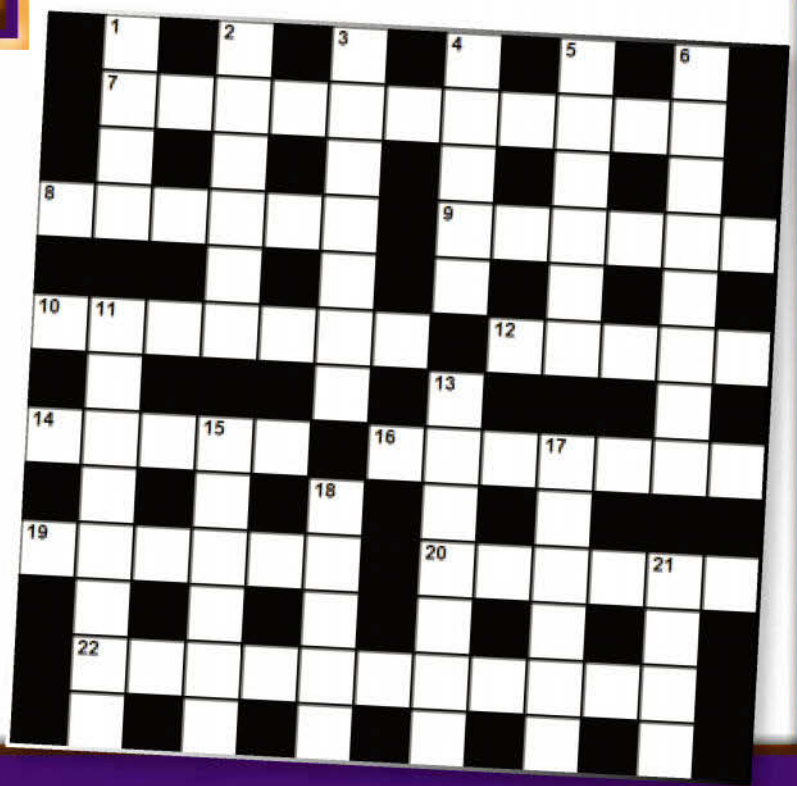
THIS WEEK'S CROSSWORD

Across

7 In astrology, a grouping of several planets in a sign. (11)
8 The distinguishing feature of a type of mechanical bandit. (3-3)
9 A list of items to be discussed at a formal meeting. (6)
10 Most favourable conditions or greatest degree or amount possible under given circumstances. (7)
12 That which follows... (2,3)
14 A compiled computer programming language designed for business use. It is imperative, procedural and, since 2002, object-oriented. (Acronym) (5)
16 HTML <!--...--> (7)
19 A series of 3D computer graphics acceleration cards manufactured by 3dfx Interactive. (6)
20 Serving one's own interests in an unemotional, analytical manner. (6)
22 An information storage device for a computer in the shape of a round, flat plate, which can be rotated to give access to all parts of the surface. (7,4)

Down

1 The regular old-fashioned telephone system? (Abbr) (4)
2 Large dark low clouds. (6)
3 The home of the 12 greater gods... or Avro Vulcan power. (7)
4 The largest satellite of Saturn. (5)
5 Marked by the absence of sound. (6)
6 A tiny or scarcely detectable amount. (8)
11 A set of rules that define an exact format for communication between systems. (8)
13 An instrument consisting of displays and an input device that an operator can use to monitor and control a system. (7)
15 The quality of being strange or peculiar. (6)
17 Net sales minus the cost of goods and services sold. (6)
18 A standard Unix program used to change a file's access and modification timestamps or to create a new empty file. (5)
21 A website for which the content can be easily edited and altered from the web browser in which you are viewing it. (4)



DISCLAIMER
The views expressed by contributors are not necessarily those of the publishers. Every care is taken to ensure that the contents of the magazine are accurate but the publishers cannot accept responsibility for errors. While reasonable care is taken when accepting advertisements, the publishers cannot accept any responsibility for any resulting unsatisfactory transactions. It is surely a time for rejoicing, for Tony has his internet connection back. Well, sort of. Having moved house, his computer is now located in a room far, far away from the router, instead of right next to it, as it used to be. So now he's relying on powerline adaptors to access the internet. The result is that his download speeds have dropped from 152Mbps to a not quite so impressive 20Mbps. If there's a more distressing first-world problem than this, we've yet to come across it. At the time of writing an AC wi-fi adaptor is on its way, so that could well prove to be the solution. In the meantime, he's come up with a genius solution, one that he likes to call "A really long Ethernet cable." As you might have guessed, this consists of a really long Ethernet cable, which he runs from the PC, through a landing, down the stairs, through the hallway and into the front room, where the Sacred Router of Enticknap resides. Sure, there's now a very real risk of tripping over the wire and falling down the stairs to his death, but good bandwidth doesn't come without sacrifice.

The Things That Frustrate Us About...

Amazon

Sarah tackles the niggling problems with Amazon (but can't help with the bigger issues)

Amazon has hit the headlines for yet another unfortunate reason lately: it emailed all of its direct publishing authors and asked them to harass the head of a publishing company for not bowing to Amazon's demands for lower prices. Which is a bit embarrassing for Amazon, frankly.

It also points to a bigger problem with the online shopping giant, which is that it's managed to bend pretty much every distributor in every market to its will and has pushed smaller companies out of business as a result. The whole tax avoidance thing doesn't exactly encourage warm and fuzzy feelings either. But we've addressed those things in this magazine before, and there's nothing we can do about them, so let's get on with the thing this column is designed to do: moan about minor irritants.

Ick! Information Overload

Imagine you want to buy a DVD. You go to the Amazon website, type in the name of the film, and hit Enter. And then you're presented with tons of information. If the title's unique enough, you'll usually find a DVD version plus a Blu-ray version, plus maybe a Lovefilm version or Amazon Instant, which is a confusing enough array of options… but then you'll get a range of prices for all that too, with Amazon Marketplace sellers offering new and second-hand ones at a range of price points, with varying shipping fees.

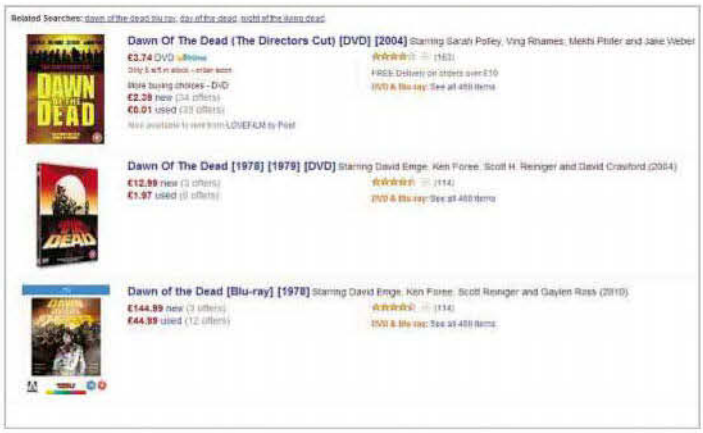
Pick something that's been remade, is a remake or just has a generic title, and the options could go on forever. Seasoned Amazon shoppers can learn to tune out the noise to find what they're after, but it's kind of a mess.

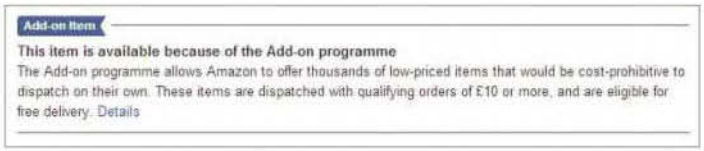
Fix it: You can't, really. Now that Amazon has so many third-party sellers, you'll just have to get used to cutting through the crap.

Argh! Aggravating Amazon Prime

Found your purchase? Great! Now Amazon wants you to sign up for Amazon Prime. And it'll push its service at you every step of the way, even offering you free trials or flaunting the cheaper shipping rates as if it's a done deal. You do get quick, free shipping with Prime, plus free books and movies, but it's not exactly cheap: it costs £79 a year. Sign up for a free trial, and you'll need to remember to cancel it in time or you might get a nasty surprise.

Fix it: Again, you just have to learn to ignore it. Nrghhh.





What? Weird Shipping Prices

Originally, you had to spend a certain amount of money to get free shipping from Amazon. That amount was decreased and decreased until it disappeared, and you could order pretty much anything from Amazon, to be delivered to your home for free.

But not any more. Now, the threshold is back: you have to spend over £10 to get free shipping. And some products are listed specifically as 'add-ons', which means you can only buy them if you're buying stuff for over a tenner. Confusing? Yup. Annoying? Definitely.

Fix it: I've given up. You can't. Try eBay.

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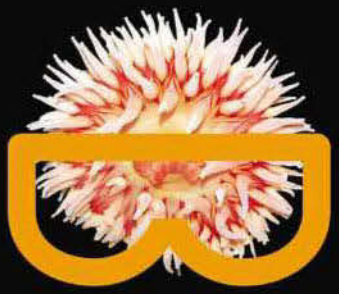

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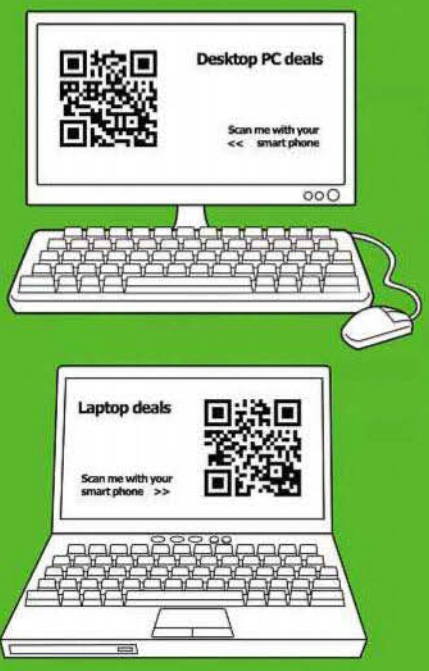

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