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Contents

This week...

08 Avoid Getting Hacked

The news is increasingly full of stories of people having their computers hacked, losing personal data or money as a result. There's no 100% solution to the problem, but you can take steps to make it less likely you'll fall victim to a hacker. David Hayward looks at what they are

18 Graphics Cards For All Budgets

These days, you can get reasonable graphics from your processor, if it features an on-board GPU, but if you want to play the latest games, you're going to need a separate card. As James Hunt shows in this six-page guide, you don't need to spend big if you don't want to

26 The Best Keyboards Money Can Buy

Continuing his series looking at the extreme high end of the computing marketplace, Aaron turns his attention to keyboards. If you've ever wanted keys made from genuine gold leaf, this is the article for you

46 Multi-bay NAS Drives Tested

Network attached storage can be a revelation to a home network. With a NAS, you can easily share files, keep backups and even download things without having your PC turned on. We've been checking out six to see what they're made of

46 Multi-bay NAS Drives Tested

58 Pointless Upgrades

58 Pointless Upgrades

It's no secret that technology companies want the public to spend as much as possible on new computer parts and devices, but do you really need to? Which upgrades are actually worth it and which ones can you leave for now?

62 Raspberry Pi Vs Intel Galileo

The Raspberry Pi has had the lion's share of the micro-computer market for some time now, but could Intel's latest entry into the market shake things up? David Briddock has been looking at what each of them offers to see which might be victorious

66 Intel X99

There's a new chipset on the Intel block and it goes by the name of X99. So what can it actually do, how much does it cost and, perhaps most importantly of all, why would you want it? We asked Mark Pickavance to look over the numbers to see what it's got to offer and what might hinder its success

70 Android Magazine Apps Guide

Reading website content on a mobile device can be a somewhat painful and irritating task. Often text doesn't wrap to the screen properly or pictures are displayed where you can see them. With a magazine app, you can do away with such problems, and one of these Android apps should be just what you need

Also In This Issue...

53 Tech Origins
This week, the history of the personal digital assistant

56 How-to Basics
Take the pain out of sharing a hard drive in Windows

74 PC Tips
How and why you should disable some Windows services

75 Frustrating Things
Sarah Dobbs shows how to get some control over your Google experience

94 Crowdfunding Corner
James Hunt looks at a couple of new games looking for your help

95 App Of The Week
David Hayward gets down to work with Studious

Group Test

Multi-bay NAS Units

46 ZyXEL NSA325v2
47 Netgear ReadyNAS Ultra 4
48 D-Link ShareCenter DNS-320
49 QNAP TS-251
50 Synology DiskStation DS413j
51 Buffalo LinkStation 220DE
52 Sum up

Reviews

38 Ricoh SG-2100N A4 GelJet Printer
40 Kingston MobileLite Wireless G2
41 SanDisk Extreme Pro SSD 240GB
42 Dragon Naturally Speaking 13
43 Fix photo flaws with PT Photo Editor
44 Vodafone Smart 4 Power

Experts

90 Ask Aaron
92 Ask Jason

Specialists

76 Linux Mart
77 Amiga Mart
78 Mobile Mart
79 Retro Mart
80 Gaming Mart

News

30 Your Letters
32 The Latest News

Regulars

54 Subscriptions
82 Ad Index
84 IT Essentials
86 Classifieds
96 Logging Off

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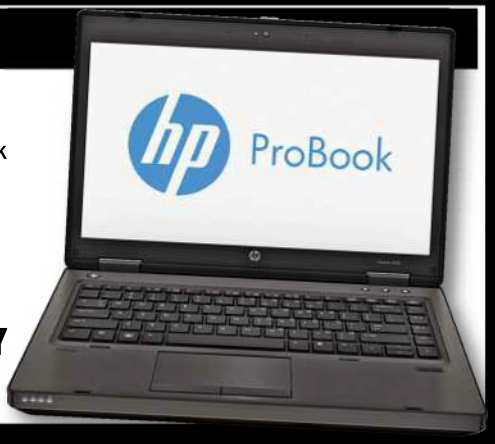

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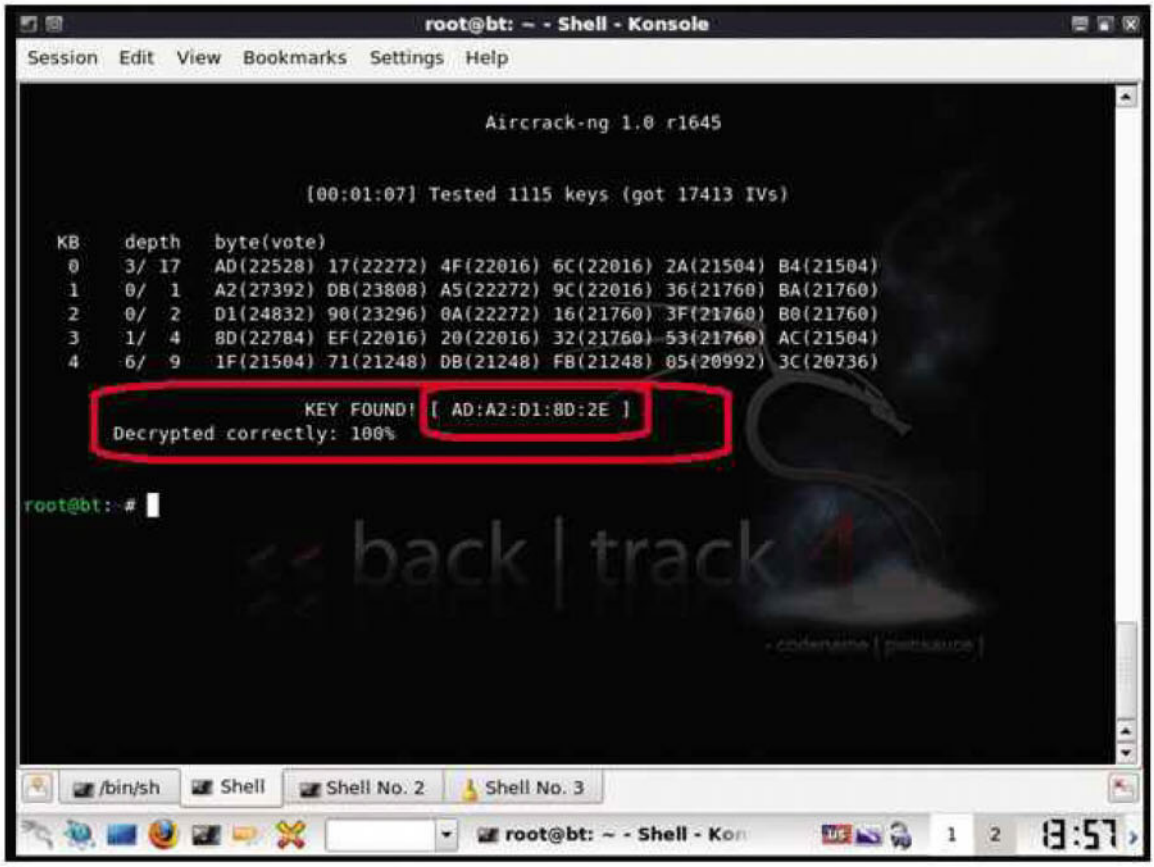
How To Stop Yourself Getting Hacked

Hacking never seems far from the headlines these days, and thinking you're not a target is probably a vain hope. It's important to know a little about how to protect yourself, so step forward David Hayward...

Hacking is still a term that carries something of the semi-romantic cache that it gained back in 80s; the *Wargames*-inspired idea of the savant loner being able to crack into a super secure server using nothing more than a home PC (complete with green text on a black background) while surrounded by discarded pizza boxes and countless mugs of unfinished coffee has become something of a Hollywood trope over the years. The reality is far darker, however. As we've seen in the past, it's not just government departments, missile silos or corrupt dictators that get on the wrong side of these electronic cat burglars (or smash and grabbers, depending on their style), it's more often normal folk like us.

There have been some pretty high-profile hacking cases of late, the most recent being the various celebrities who have had saucy pictures and videos stolen from their cloud storage accounts. These are just the ones that hit the headlines,though; a small handful of hacking incidents, that are nothing compared to the millions of attempts that occur every day to the rest of us.



As you can see from this hack, WEP isn't very secure

There's a violation-induced nausea that can come with the realisation that you've been hacked. Not only is it an invasion of your privacy, where your personal belongings have been rummaged through by persons unknown, it's can also have wider ramifications: it may not just your family holiday pictures that have been accessed, maybe they saw the document containing your bank details that was in the same folder or the ill-conceived text file containing all your known passwords for the many sites you frequent? Maybe they saw the scans of your driving licence, passport, birth certificate, qualifications, marriage licence or medical documentation? Feel like burying your head in your hands yet?

Not everyone has these documents stored on the cloud or even in a digital form, but many do. Those who are looking for a new job and going to interviews where you have to email your identity and qualifications beforehand, for example. Either way, generally speaking hacker aren't after pictures of you in your birthday suit, they're after your identity, and these are the things that can deliver it to them.

Hacking Facts

According to the Trustwave 2013 Global Security Report (**goo.gl/h7E0hG**), there was a recorded 12.6 million victims of hacking and identity theft from a period of a year through 2012 to 2013. A number that roughly equates to one person being hacked every three seconds or so. In 2012 98% of all hacking attacks were credit card or payment data theft used in fraudulent online or at the till transactions. In fact, over $21 billion (£13 billion) was estimated to be have been lost to identity theft from hackers, with a potential loss averaging $4900 (£3041) per household.

The checklist of items the hacker tends to go for are usernames, passwords, PINs, National Insurance numbers, phone and utility account numbers, bank and credit card details, employee numbers, driving licence and passport numbers, insurance documentation and account numbers and any other financial background account details. The methods they use for acquiring this data ranges from acquiring remote access to your computer, SQL injections to a popular website, spoofing a banking or other financial website, remote code execution, exploits in website trust certificates to physical theft and exploiting social media.

> **“There's a violation-induced nausea that can come with the realisation that you've been hacked”**

On the subject of social media there are some interesting numbers associated with it. According to sources (of which there is a list in the boxout), 16% of people under the age of 19 were the victims of a controlled phishing scam, and 72% were victims when they followed links posted by their friends. Furthermore, 68% of all social media users share their birthday information publically. 63% shared the schools, colleges and universities they attended. An amazing 18% of users publically share their phone numbers, and 12% share the names of their pets (more on this later).

If these numbers aren't scary enough, then perhaps the fact that 19% of all wi-fi users worldwide are still using WEP encryption for their home network security; or that 89% of all public wi-fi hotspots are unsecured, unmonitored and available all day, every day. Finally, let's remind ourselves of the estimated 10% of all spam emails that are malicious and/or contain some kind of injection code designed to infiltrate your system if they are opened

Protection should top of the list of your networking priorities

– and the further 7% of all spam emails that contain links to a website that has been designed to steal information or download some element designed to gain access to your locally stored data. It's a wonder any of us go online at all.

What To Do

Rather than coming across as a fear-mongers, a role that as seems quite popular these days, we have put together a number of steps to help you try and prevent someone from hacking into your personal space, whether that's in the cloud or on the computer in front of you.

> **"Using the same password on every site you visit is like giving someone the skeleton key to your digital life"**

Naturally you could take all these steps to the extreme and live in an electro-shielded, anti-spy cage complete with tinfoil hat and lead-lined roof, but that's not really an option for most people. There is, though, a happy medium where you can settle for knowing that you've done everything you could reasonably do to protect yourself. More importantly, you will have also educated yourself to spot potential hacking attempts and successfully monitor the security of your home network.

Network Protection

Starting from the home network, there are a number of easy steps we can take to stop a hacker from gaining entry to your systems. Most of these steps you probably already do, and some are surprisingly simple.

Change Router Administrator Passwords

This is one of the most common points of entry for someone to gain access to your home network. The router you received from your ISP may well be up to date and offer the best possible forms of encryption, but they generally all come with a set number of wi-fi SSID's and wireless key's – usually printed on the rear of the router.

It doesn't take much of a genius to trawl the less reputable sections of the internet and obtain a list of SSID's and wireless keys used by that particular ISP. The fact that your router is near permanently advertising itself as a BTHomeHUB, Sky, TalkTalk or whatever model doesn't help much either.

The canny hacker can therefore gain access to the router, establish a connection and even use the list of default passwords, such as login: Admin, password:1234, in order to get into the inner workings of the router itself. Therefore, it's best to change the default router usernames and passwords to something a little more complex and personal.

Check Wireless Encryption

Most routers come with a level of encryption already active, but there are some examples where the default state of encryption may be extremely weak or worse still, completely open. If there's a padlock next to your wireless network, as seen from scanning for wireless networks on a computer, then you at least have some encryption active. If you then access the administration layer of your router and it tells you that the encryption method is anything other than WPA2, then you'll need to change it pretty sharpish.

WEP is the older standard of wireless encryption and as such can be cracked in less than fifteen minutes through a number of clever tools, all of which are freely available (for example, this 20-step process will take something in the region of around 10 minutes on a reasonably powerful laptop: **goo.gl/TM1qp2**). WPA and WPA2 aren't perfect either, but their encryption is generally tough enough to dissuade any street level hacker.

Sources

The various sources for all those hacking numbers can be found by visiting the following sites:

Trustwave 2013 Global Security Report
tinyurl.com/ljt73qj

2012 Internet Crime Complaint Center [iC3] Report
tinyurl.com/an2ao4m

Exploiting SOHO [Small Office/Home Office] Routers
tinyurl.com/bubdplx

Using Dropbox to steal files and deliver malware
tinyurl.com/bltquh9

DropSmack: How cloud synchronization services render your corporate firewall worthless
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Worst Passwords Of 2012 – And How To Fix Them
www.splashdata.com/press/PR121023.htm

60% Of Users Use The Same Password Across More Than One Of Their Online Accounts
tinyurl.com/6xpjpry

How Personal VPN Works
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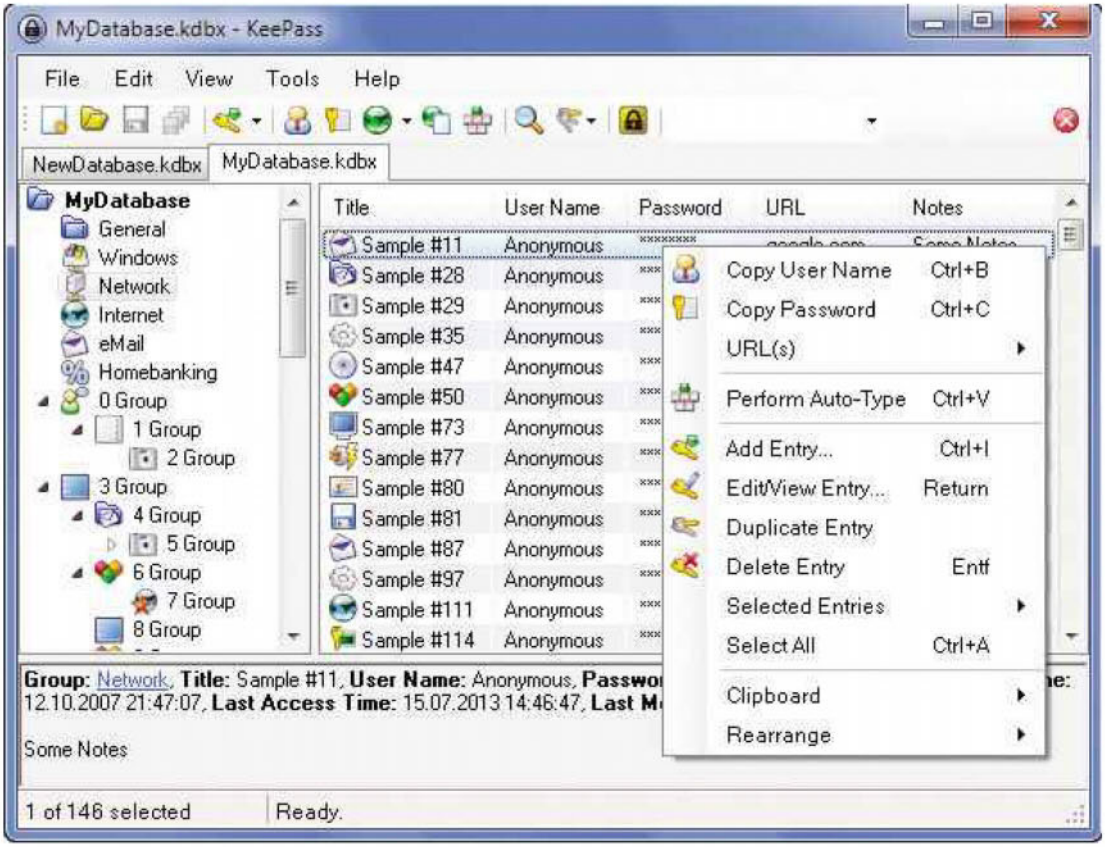

KayPass will help store all your complex passwords

Use MAC address filtering

Every network interface has a unique identifier known as a MAC (Media Access Code) address, regardless of whether it's a computer, tablet, phone or games console. The idea behind MAC address filtering is simple enough: you obtain the MAC addresses of your devices at home and enter them into the router so that only those unique identifiers are able to connect to your network.

Obviously, if you have a significant number of network capable devices, then this could take some time. In theory, though, you should be a lot more secure against a hacker that's trying to access your network outside of the confines of your house.

Unfortunately, MAC addresses can be hacked and spoofed as well, so while a drive-by, uncommited hacker may give up the more determined ones will simply bypass such a hurdle. Think of MAC address filtering as putting a rose bush up against the garden gate, it may stop most opportunists from entering your garden, but those who really want to get in there will find a way.

Disable SSID broadcast

There are two camps for and against hiding your network SSID. The first recommends hiding your router's SSID from the public view, the logic being that invisibility to those around you makes you safer. For the most part it's good advice, but the against camp state that anyone with half a hacking brain is already using some sort of SSID sniffer, and should they come across a hidden network it'll pique their interest more than that of your neighbour's, which is visible. It's a good idea, but consider both sides of the argument. Are you successfully hiding by being invisible or is the best option to hide in plain sight?

Use Static IP Addresses

By default your router will automatically assign an IP address to any device that connects to it so the pair, and the rest of the network can communicate successfully. DHCP (Dynamic Host

“Are you successfully hiding by being invisible or is the best option to hide in plain sight?”

Configuration Protocol) is the name for this feature, and it makes perfect sense, after all who wants to have to add new IP addresses to new devices every time they connect to your network?

On the other hand, anyone who gains access to your router will now have a valid IP address from which to communicate with your network. So to some degree it's worth considering opting out of DHCP controlled IP addresses and instead configuring your devices and computers to use something like 10.10.0.0 or something as their range of IP addresses. Like the last tactic, this will only slow down a half-decent hacker, not stop them.

Router position

Ironically, this simple network protection act is one of the more successful, if done correctly. That's because, by moving your router to the centre of your house or more to the rear (depending on where your closest neighbours or the road is), you are limiting the range of your wireless broadcast signal. Most routers are located in the front room where the master phone socket usually is. This means the router can reach most corners of the house and to some degree beyond the house. If someone was moving down the road, for example, sampling wireless networks then they would come across yours as they passed your house. If the router is situated in a more central location, away from the front window, then the signal may be too weak to get a successful reading without having to stand on your porch. In effect then, the hacker moves on.

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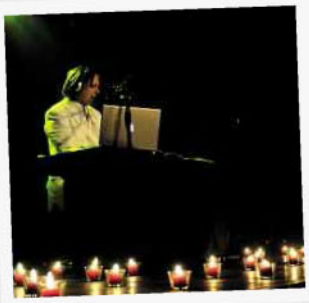

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AUSTRALIAN AUDIO&AVSHOW 14 | InterContinental Melbourne The Rialto, 17-19 OCT

AUDIOWORLD CHANNEL ISLANDS 14 | Radisson Blu, St Helier, Jersey, 11-12 OCT

NEW YORK AUDIOSHOW 14 | Marriott at the Brooklyn Bridge, 26-28 SEPT

CHESTER GROUP | THE SIGN OF A GOOD SHOW

Poor Jennifer Lawrence has found out what it's like to be hacked

Social media security settings need frequent review

Privacy Settings and Tools

Who can see my stuff?	Who can see your future posts?	Friends	Edit
	Review all your posts and things you're tagged in		Use Activity Log
	Limit the audience for posts you've shared with friends of friends or Public?		Limit Past Posts
Who can contact me?	Who can send you friend requests?	Everyone	Edit
	Whose messages do I want filtered into my Inbox?	Basic Filtering	Edit
Who can look me up?	Who can look you up using the email address you provided?	Friends	Edit
	Who can look you up using the phone number you provided?	Friends	Edit
	Do you want other search engines to link to your Timeline?	No	Edit

Switch Off The Router When You're Not Using It

Some people will power off the router before going to bed as a matter of habit; since no one is using it what's the point of using up electricity? A lot of people, though, simply have their router powered on all the time, regardless of whether they are in the house or not. Granted there are those who will be running a server or downloading something while at work or asleep, but the vast majority just keep it on.

It's advisable that if you're not using the internet or any other home network resource, then you power off the router. And if you're away for an extended period, then do the same.

Beyond The Home

Home network security is one thing, and frankly it's not all that often you'll get a team of hackers travelling down your street with the intent of gaining access to you and your neighbour's home networks. Where most of us fall foul in terms of hacking is when we're online and surfing happily without a care in the world.

Passwords

Passwords are the single weakest point of entry for the online hacker. Face it, how many of us use the same password for pretty much every website we visit? Most of us even use the same password for access to a forum that we use for our online banking, which is quite shocking really. Using the same password on every site you visit is like giving someone the skeleton key to your digital life. We know it's awkward having different passwords for different places, but when you stop and think logically about it doing so leaves you so vulnerable to those who have ill intentions over your identity and bank balance.

Also, where passwords are concerned, using '12345', 'password' or 'qwerty' aren't going to stop someone from gaining access – and 'P4ssw0rd' isn't much better. Furthermore, as we mentioned earlier, using the names of your pets may seem like a good idea, maybe even mixing their names with the date of your birth as well sounds like a solid plan, but if you then go and plaster Mr Tiddles, Fluffly's or Thumper's names all over the public facing side of social media along with 'it's my birthday today, yippee' then you've just seriously negated any chance of your passwords from remaining secret.

Security questions and two-phase or two-step verification, password techniques are now being employed by a number of credible sites. What this means is basically one than one password to log into your account. Most online banking is done this way now and also include in some instances a visual verification such as a pre-selected thumbnail image selected from a range that the user can click on to verify who they are.

If you have trouble coming up with passwords yourself, then there are a number of password managers available (see boxout) that can help you create highly secure combinations of letters, numbers and special symbols unique for every website you visit. What's more they'll even store them for you in the program itself in case you forget what they are.

Either way, human beings are the weakest link in the secure password chain so any help you can get isn't a bad thing.

Don't Share So Much

Lance Ulanoff, the chief editor at Mashable, recently said. "I hate to say it, but the reality is people need to share a little bit less."

While there's nothing wrong with letting our friends and family know what we're up to via social media, we have to consider the fact that they may not be the only ones watching. Facebook and Twitter often come under fire regarding their security, where the default was once public newsfeeds and you have to run through several clicks before you limit the views for your own timeline.

Make sure you're using WPA2 wi-fi encryption, not WEP

Using a VPN will essentially hide your actual IP address

It's worth taking the time to double-check and check back often, the security settings on all your social media sites. Are the things you're posting on your timeline or feeds viewable by friends only or friends of friends? Has it mysteriously been reverted back to public viewing? Are you sure you want to display that picture of your cool desktop wallpaper complete with conky-like network information in the corner?

As we said before publically announcing private details, like when you're on holiday and for how long, the names and birthdays of you, your partner, your children, pets and so on, isn't a particularly wise thing to do. But we're all guilty of it.

Security In The Cloud

The recent hacking events involving Jennifer Lawrence and other celebrities has bought home to the average user the fact that cloud storage isn't quite as secure as they may have initially thought. More to the point, it's also highlighted that they may not even be aware of cloud storage and what's going on with their devices.

Every device, either Android or Apple, is capable of backing up your photos to its own particular cloud storage solution, sometimes it's even active as a default setting. Most of the time the cloud solutions used are so secure that anyone trying to hack into them will have a pretty rough time of it and no doubt bring down the wrathful vengeance of Google or Apple upon them. How the recent celebrity photos and videos were obtained is something you'll have to find out for yourselves, but if storing stuff on the cloud is alarming you there are a couple of choices.

The first is to encrypt everything locally, on your computer, before uploading it to the cloud. This will take time, we'll grant you, but it means only you'll be able to decrypt the data. Secondly, you could always compress everything first, using Winzip/Winrar etc., then password the compressed file. Breaking a password compressed file takes far longer than it's actually worth, providing you're not a celebrity, so most hackers won't bother.

Finally, there are cloud storage solutions that encrypt the data on the device before uploading it to their also fully encrypted servers. The likes of SpiderOak and Tresorit already do this and no doubt after all this furore is over the other cloud service providers will do the same.

Use A VPN

When you connect to the internet you do so through the IP address give to you by your ISP (your external IP address that is). Essentially this address is a batch that the ISP own, and everywhere you go on the internet that address is highlighted and can be traced right back to your ISP and in particular, you.

If you opt to take out an account with a Virtual Private Network service, like CyberGhost, then the IP address you use will come from their servers, which are located around the world. So the website you visit will highlight your IP address as coming from Iceland, where in actual fact you're located in Barrow-in-Furness.

It's not perfect, but it's certainly a level of protection that's worth looking more into.

Email Encryption

Of the millions of emails sent and received by the hour, only a handful are ever encrypted to disguise their contents. Most internet users have one of the free webmail accounts, such as those offered by Google or Yahoo, and although there is some level of encryption involved it's generally not enough to stop a determined hacker. However, if you want total encryption of your email or webmail for maximum peace of mind, you're going to have to use one of the many encryption programs available that work as a third party tool in conjunction with an email client.

There are plenty around, and they work with Thunderbird, Outlook, Pegasus and countless other clients. Also, there are web-based encryption tools available, like FireGPG, which will install inside of Firefox or other browsers and encrypt web pages and more importantly any emails sent via a webmail service.

Conclusion

Despite all of the above advice, the very fact that you're online makes you a potential target for hackers. There's no use sitting back and saying "they'll have no interest in me", because, frankly, you'd be surprised. If you're easy to get to, easy to hack and don't have the pull to prompt a huge international investigation should you get hacked, we recommend that you just be a bit more aware. **mm**

Password Managers

We mentioned Password Managers in the main body of the article as a good alternative to having to remember your own complex passwords or having to write them down on a post-it note and sticking it to the sides of your monitor.

There are plenty of them out there, but some of the better ones we've come across in the past are:

KeepPass (goo.gl/2kduJG)
A free open source password manager which can help you keep track of your passwords across numerous sites, while still being safely locked away in a secure database.

LastPass for Safari for Mac (goo.gl/3NvIVd)
A free plugin for Safari and Mac users, LastPass allows users to create a single username and password while securely entering the correct details.

Kaspersky Password Manager (goo.gl/XB52nM)
A fully automated and powerful password manager that can store your username and password details, then enter them into the site for you while remaining encrypted throughout.

The perfect time to try the five-star TV Bed

Enjoy high-tech home entertainment in your bedroom with the most sophisticated TV Bed on the market, and find out how you can get an exclusive 25% off with our Micro Mart reader offer

THE WORLD'S NUMBER ONE TV BED

Having a television in your bedroom is nothing new, but having a high-quality set built into your bed takes this everyday luxury to a whole new level.

No longer does a TV have to take up space on a chest of drawers or balance on a chair – with a TV Bed, you simply click a button and the television set glides up from the footboard of your bed, quiet and sleek.

Fully cabled, the TV Bed enables you to watch digital TV and DVDs, and links easily to the internet so you can watch what you like, when you like, with whoever you like.

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

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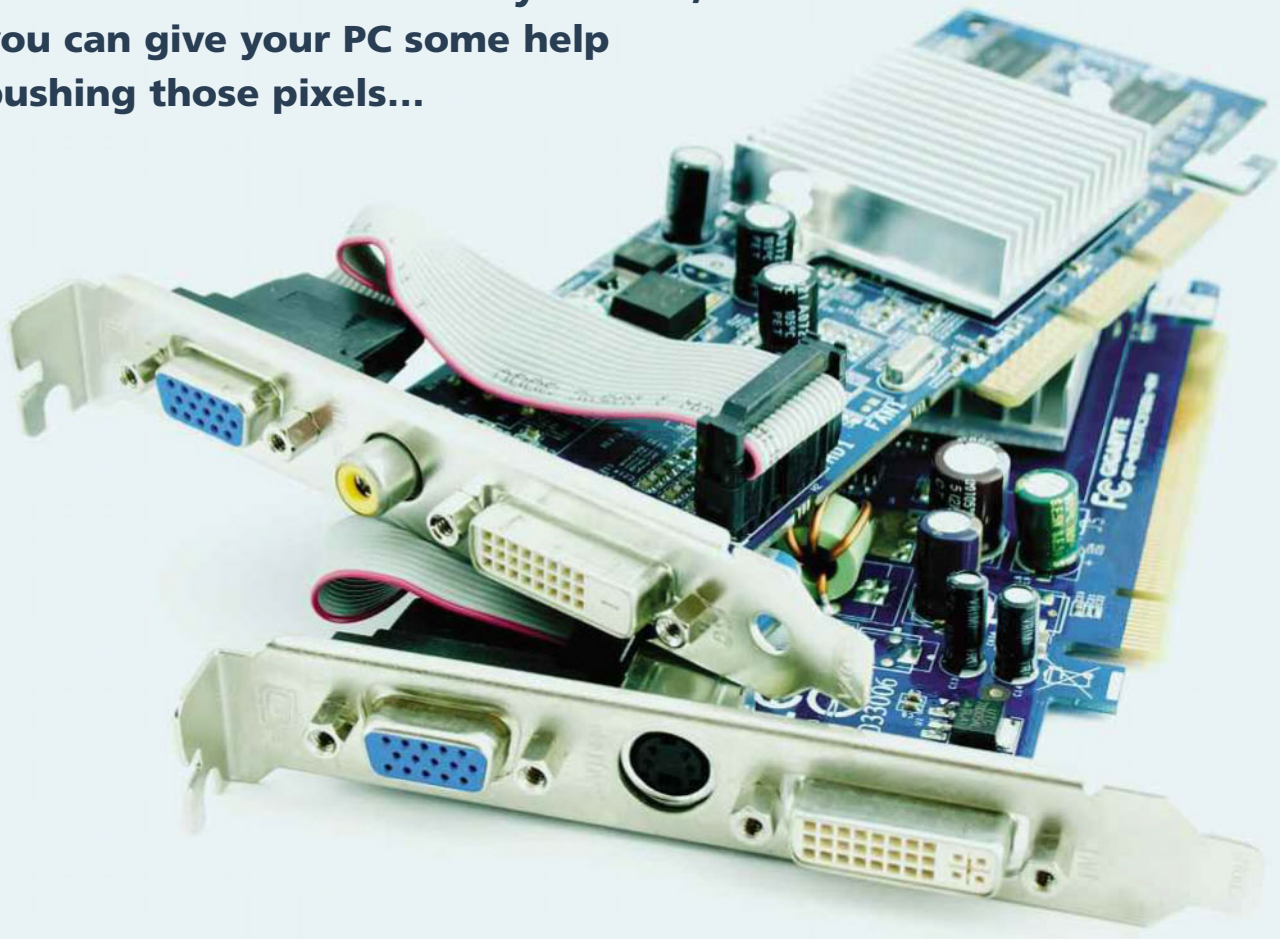
GPUs For All Budgets

No matter how much cash you have, you can give your PC some help pushing those pixels...



Choosing a GPU isn't easy. The market changes fast, with new models and revised pricing coming out all the time. But no matter how much you have to spend, we've looked at price brackets covering the whole spectrum of computing to ask: which is the best GPU for your budget? Whether you're restoring an old system to working condition or building a new PC to rival the best on the market, we've got the card of choice for you right here.

Cheapest Graphics Cards (Under £40)

At this end of the market, graphics cards are primarily aimed at either old systems that need a new graphics chipset due to a failure, or basic use/office systems, which need only minimal graphical abilities. These aren't cards that will help you play games. They'll only just help you run Windows – even HD video will be a struggle.

> **"At present, neither Intel nor AMD is making a line of chips that doesn't feature an on-board GPU"**

For the most part, cards of this power level have been made entirely redundant by the introduction of on-chip GPUs in Intel's Core chips and AMD's Fusion line. At present, neither Intel nor AMD is making a line of chips that doesn't feature an on-board GPU of some ability, though there are plenty still in circulation. If your system is one, there's a chance it'll benefit from a separate graphics card at this price, particularly if you're using the on-board graphics found on your motherboard.

If you do have a chip with an on-board GPU, however, you can safely skip this section. No card here is any better than Sandy Bridge's Intel HD Graphics 2000.

MSI G210 1GB – £16.95

If you're in the market for the most basic graphics hardware possible, Nvidia's G210 is the chip you need to look for. Most major companies have done their own version of the G210 design, but of those it's MSI's that we found for the lowest price

by a full £2.04 – and if you're frugal enough to be buying this card rather than making a more extensive upgrade, we think price is the most important factor to consider. It's important to note that G210-based cards are cheap, rather than good value for money, so getting the cheapest is the best course of action.

Hardware-wise, you're paying for a GPU from 2009, manufactured with a 40nm process. It has 1GB of DDR3 RAM and three output ports: VGA, DVI and HDMI. The GPU is clocked at 589MHz, and the maximum resolution is 2560 x 1600. Despite its cost and age, it does support DirectX 10.1 and OpenGL 3.1.

We mostly imagine this card going in very basic office PCs, but it might also suit a very cheap home cinema system. MSI's version doesn't have much in the way of notable qualities besides its price, but it is silently cooled using only a passive heatsink, which not all G210 cards are. That makes MSI's G210 one of several best aimed at media systems or those that need to run silently for any reason. Just don't expect a lot out of it.

MSI HD 5450 1GB – £21.50

MSI also makes the cheapest version of the G210's Radeon equivalent, the HD 5450, and it's in much the same boat despite being a few quid more expensive. There is slightly more power in the HD 5450 card, but if you look at it percentage-wise it isn't really a good deal. Despite costing around 20% more than the G210, it isn't really 20% more powerful, but the extra power is enough to make it more practical.

Like the G210, the HD 5450 is several generations old and about as powerful as an Intel HD Graphics 3000 or the on-board Radeon GPUs, the HD 6310 and the HD 6320. Again, you get 1GB of DDR3 RAM and support for DVI, VGA and HDMI output with a maximum resolution of 2560 x 1600. One advantage it has over the G210 is that it supports DirectX 11 (as opposed to version 10.1), but we can't imagine this will matter much outside of the games this card isn't powerful enough to play anyway.

Ultimately, while Radeon HD 5450 cards are more powerful than their Nvidia equivalents, it's not really power that matters at this level. If you're interested in playing HD video, then this card will make a slightly better choice, but there are cards out there that would be even more appropriate. Again, we can't see this being much use unless you're building a low-powered media system or looking for a card that'll provide basic Windows functionality for an ailing system.

Budget Graphics Cards (£40-£80)

Whether you call them budget, entry-level or low-end cards, once you cross the £40 threshold you'll discover hardware that

might be a few generations old, might have some functionality removed and might not be particularly powerful. But one thing is certain, and that's that it'll probably be better than any on-board GPU you're using.

At this price, cards are capable of being used for gaming, though obviously the latest high-end titles will have to be turned right down if you're hoping to get any reasonable performance out of the hardware. When it comes to media performance, though, things are far better – there should be no problems with HD video or applications, and older or less demanding games should be fine. If you're a light gamer or need an upgrade to your on-board GPU but don't want to spend too much, this is the price bracket to look in.

Asus GT 730 2GB – £59

Although priced along the lines of the previous generation's GT 640, the GeForce GT 730 has substantially better memory bandwidth, which gives it noticeably superior performance in addition to the improvements that the next-generation GPU provides. There are cheaper examples available, but we like the look of Asus's version – partly due to its notable build quality

> **“Once you cross the £40 threshold you'll discover hardware that might be a few generations old”**

and partly because it's a high-end 64-bit model. There are 128-bit versions of the GT 730 on the market, but they can actually perform slower in some situations (especially in games), because the 128-bit GPU is less powerful.

Other than that, make sure to go for the 2GB version if you're gaming. It's got proper GDDR5 memory, which will make up for the extra cost in sheer performance terms, and if you're tempted by the 4GB version, remember that's the 128-bit model. In this one, the GPU is clocked at 902MHz, and the maximum resolution is 2560 x 1600. Output support includes VGA, DVI and HDMI. The cooling is also entirely passive, so you'll never hear as much as a whisper out of it – a quality that makes it perfect for home theatre PCs.

If you're on a budget, you might want to pay a little less and go for a different manufacturer. You can save as much as £15 by going for someone other than Asus, and more if you go for the 1GB model. Remember not to drop down to the GT 720, though: as a new card released only last month, it's not really well tested, and you'll pay a slight premium to get one that's fresh off the shelves, so even if it costs less, it's likely to be worse value.

Sapphire R7 250X FLEX 1GB – £72

The R7 250X cards are the Radeon cards formerly known as the HD 7770, but don't let the change in their naming scheme put you off. As sub-£80 cards go, they've been the best choice in their category for a while, and even now they're going great. Until very recently it could still scrape through as a serious piece of gaming hardware. Gaming at full HD resolutions should be possible on titles from more than a year or so ago, but you'll probably need to use lower detail settings, and the most modern AAA titles are going to be a struggle.

The Sapphire Flex version of the card certainly looks the part: it's a double-height card that requires its own six-pin power supply. While it's not likely to cause much trouble, there is a chance that weaker PSUs might have trouble supplying it with the juice it needs. While it's only a 1GB card, it's more than capable, thanks to its 1GHz GPU clock. Outputs include one HDMI, one single-link DVI-D, one dual-link DVI-I and one DisplayPort. As a result, it's well suited to multi-monitor setups considering its price – you can connect four screens to it!

We don't expect this card to end up in many hardcore gaming systems, but if you have a respectable mid-level PC that you want to use for some gaming that goes slightly beyond the casual (i.e. *Minecraft* and similarly demanding indie games), then the R7 250X is what you need. If you don't want multi-monitor support, then a non-Flex version can save you around £5, but we like the (no pun intended) flexibility you can get by following this route.

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Basic Gaming Cards (£80-£120)

If you want to turn any system into a gaming one, you'll have to spend at least £80 on a card, and frequently even more. But in return, you'll turn any system into a confident player of games and HD video and convince it to render even the most ridiculous Windows interface effects. It's hard to overstate the degree to which a mid-level card will transform your computing experience. Buy one of these GPUs and you'll easily squeeze an extra year or two out of an aging system, if not more.

One area of potential concern is that at this level, cards start to require a lot more power and need to be paired with a fast CPU to reach their potential. Don't match gaming cards with Pentiums or Celerons, for example, and make sure you're running a decent 400-500W power supply if you want to avoid instability and power problems.

Gigabyte GTX 750 Ti 2GB – £105

Of all of the gaming GPUs around, Nvidia's GTX 750 Ti is the best suited for low-end upgrades. Crucially, it's the fastest card on the market that doesn't require an external power supply, which means that you can convincingly upgrade virtually any system regardless of how low end it is. You don't even need an especially beefy PSU, because the power requirements are a fairly conservative 60 watts – far better than its Radeon equivalent, the R7 260X, which needs almost double the wattage. Nvidia recommends at least a 300W system, which is a bar most retail PCs meet without any difficulty. In every way, it's a perfectly serviceable piece of hardware and one that gives you support for DirectX 11.2 and OpenGL 4.4.

That said, we particularly like Gigabyte's implementation, which has the GM107 28nm GPU clocked at 1020MHz, 2GB of GDDR5, and dual-link DVI/dual HDMI outputs supporting multi-monitor setups and 4K output. But crucially, it does require a six-pin external power input, even though it could draw enough power from the PCI bus. As a gaming or general media card, it's got a good couple of years left in it. You won't be able to crack everything up to maximum, but you shouldn't have any problem buying any game off the shelf and playing it on this hardware unless your CPU is way, way down the performance chart.

The only real concern is the card's double-height form factor. If you're upgrading a system, you'll need to make sure it's got the space for such a large card, and its huge heatsink and dual cooling fans mean it needs even more space around it to keep the heat moving. You could theoretically put it in a small form system, but we'd probably want to leave the case off if we tried it!

Radeon R7 265 2GB – £110

For transparency, we should again point out that the Radeon R7 265 is simply a rebadged Radeon HD 7850 (all the R7 cards are rebadges), but this time it has at least been overclocked slightly. The R7 265 is much faster than the next model down, the R7 260X, and even though it's in the same price bracket as the GeForce GTX 750 Ti, it's considerably faster. Performance-wise, it gets reasonably close to Nvidia's best-priced, best-performing GeForce GTX 660, despite costing a lot less, which makes it an ideal card to go for if you're on a budget.

The Sapphire R7 265 is a particularly good example, with 2GB of DDR5 and a GPU clocked at 900MHz. It supports three monitors through HDMI, DisplayPort and dual-link DVI, so if you're not worried about 4K output or having more monitors than limbs, it makes a good choice. Again, it's a dual-height card, and you need a separate six-pin adaptor to power it, but a 150W TDP means older systems or those with smaller-wattage power supplies might struggle to make it work. Radeon recommends a PSU of at least 500 watts.

As a gaming card, it's about as good as you can possibly find in this price bracket, and it's even better than some more expensive cards – certainly, better value. The only thing that holds it back is its high power requirement in comparison to the GeForce GTX 750 Ti. Since they cost the same, it all comes down to what system you're looking to upgrade. If you're looking to upgrade an old or weak system, that card has the edge. If you're building one from scratch or can afford a potential PSU upgrade at the same time, this is the better option.

High-end Gaming Cards (£120-£200)

If you're building a fresh gaming system and aren't afraid to spend a little money, splashing out on a graphics card is a better way to get decent performance than almost any other alternative. Even a fast CPU won't amount to squat if the graphics card is causing a bottleneck. If your system isn't already formidable, then you might not get the best out of these cards, but in existing gaming PCs and new builds, any serious gamer should be aiming for this price bracket at least.

Gigabyte GTX 760 OC Windforce 2GB – £175
Nestled encouragingly in the high end of this price bracket, the GTX 760 marks a change in the relationship between Nvidia and AMD. Where previously GeForce cards have been cheaper and less demanding than Radeons at the expense of performance, at this end of the market, price and power requirements are less

> **“Picking the right R9 290 is like choosing the right needle from a haystack made of needles”**

of a concern, which allows you to go all out. The GTX 760 is the perfect example of that: a high-end card that's lost a lot of its premium, allowing you to pick it up for as little as £160. If you're determined to keep your budget under £200, it's a strong performer.

The specific version of the GTX 760 that we favour is the Gigabyte GTX 760 OC, which is factory overclocked by around 10% to 1085MHz, and it has a non-standard Windforce cooling system to compensate. With triple-stacked heatpipes and three fans, it's far better than the reference design calls for, which gives you leeway for further overclocking.

Despite its strong performance, the GTX 760 does have a reasonably low TDP of just 170W. In fact, the biggest concern is the size. It's double height and getting on for full-length, so you'll need to make sure there's plenty of room in the case. Even by the standards of modern cards, it's an absolute monster.

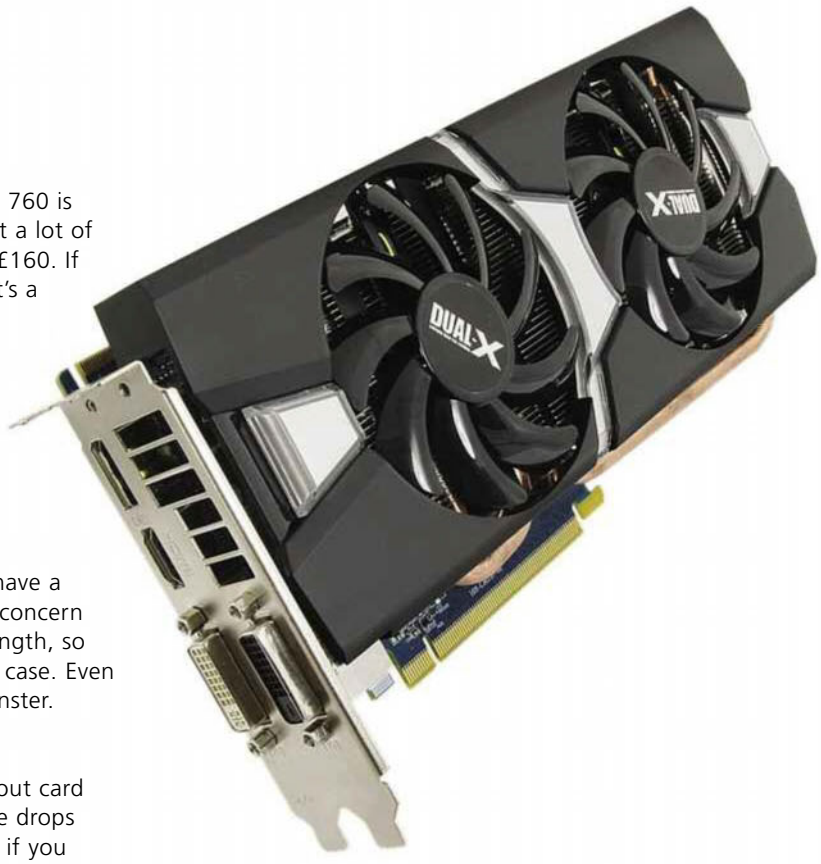
Sapphire R9 280 DUAL-X 3GB – £185
Although the GeForce GTX 760 used to be the stand-out card by some distance in this price range, some recent price drops mean that the Radeon R9 280 is just about affordable if you shop around. Most models are above £200, but there are some that fall inside the price bracket we've defined, and of those we're most impressed by the Sapphire R9 280 Dual-X.

Why? Well, 3GB of GDDR3 RAM certainly doesn't hurt its capabilities. 4K performance is particularly strong, and it supports up to four monitors through DisplayPort, HDMI and dual-link DVI. An 850MHz clocked GPU belies its power, though you just have to look at the TDP – 200 watts – to see why it's so fast. The Dual-X part of the model name refers to the dual fan setup, which isn't that unusual in a card of this type but isn't specified by the single-fan reference design either.

Assuming you can afford it, the only reason not to buy one right now is that the Radeon R9 285 is going to be out in early September, which may mean it's on shelves by the time you even read this. Based on Tonga rather than Tahiti architecture, there's a good chance the that R9 285 will be more efficient and faster than the R9 280 without costing a huge amount more. Even if it is more expensive, it'll probably knock a few quid off this card anyway. If you're thinking of buying an R9 280X, take our advice and give it a week or two just to see how things shake out.

Enthusiast Cards (£200+)

At this level, it's not just about gaming performance. It's about bragging rights. It's about quality engineering. If you care less about what your PC does and more about how it looks on paper, this is the sort of card you'll be aiming for. Just be careful. When you're chasing the fastest frame-rate, there's always something to spend your money on. Here's what's worth it.



Asus R9 290 DirectCU II 4GB – £300

GeForce might rule the top-end of the market, but AMD has something they don't, and that's the newest hardware. Priced around £300, the Radeon R9 290 (and its overpowered, even more expensive variant, the R9 290X) are some of the newest, fastest cards on the market. A high-end GeForce might be alright if you want to keep one eye on your bank account, but the R9 290 cards ensure you get the maximum performance possible. The most expensive R9 290X cards go up as high as £500.

We're not seriously suggesting you spend £500 on a single graphics card, of course, but only because the benefits of spending £200 more than a standard R9 290 are, in real-world terms, virtually impossible to notice. There are better cards on the market, but you'll struggle to find one that isn't either previous generation in some way (like the HD 7990) or priced ridiculously (like the £1,000 R9 295 X2).

Picking the right R9 290 is like choosing the right needle from a haystack made of needles, but we do like the look of the Asus R9 290 DirectCU II, which is a 4GB card costing £299. As well as the better than average pricing, it's overclocked but still runs cooler than the competition thanks to its superior DirectCU II cooling system, which achieves 20% lower temperature, dissipates over 220% of the space, and is three times more quiet than the reference design. A TDP up to 300 watts means only serious performance nuts need apply.

EVGA GTX 780 Ti 3GB – £500

The best GPU on the market right now is undeniably the GTX Titan Z. But it costs over £2,000, so you'd expect that. However, if jettison some of the more ridiculous performance-chasing features, you'll soon hit the GeForce GTX 780 Ti, which is available for a far more conservative £500. It is, in most respects, the best gaming card you'll find for home PCs and one of the fastest single-GPU cards available.

But which GTX 780 Ti should you go for? We come down on the side of EVGA's GTX 780 Ti, a 3GB card clocked at 876MHz. Unlike some incarnations, it isn't overclocked beyond its abilities, nor does it sacrifice performance for pricing like the lowest-priced versions do. As well as comfortable performance and stability, EVGA's card has some interesting extras, such as a secondary BIOS (to allow for danger-free tweaking).

At £500, it's not going to be on many people's Christmas lists, but if you're trying to build the best system you can, it's the only choice you can feasibly make unless you have a bottomless wallet. Arguably, you might be better off (speed-wise) running two slower cards in SLI, but if you want a single-card solution that uses less space, generates less heat and has lower power requirements, this is the card to go for. **mm**

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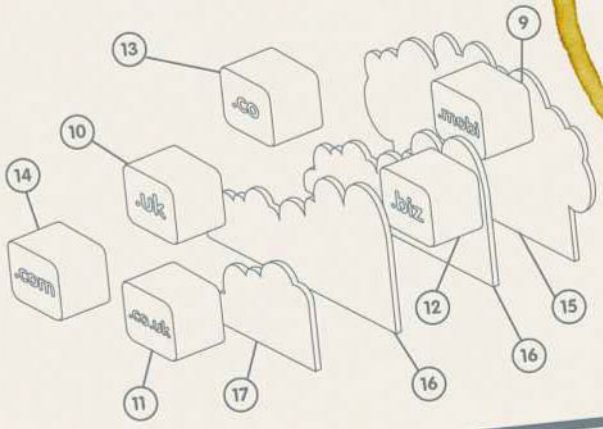

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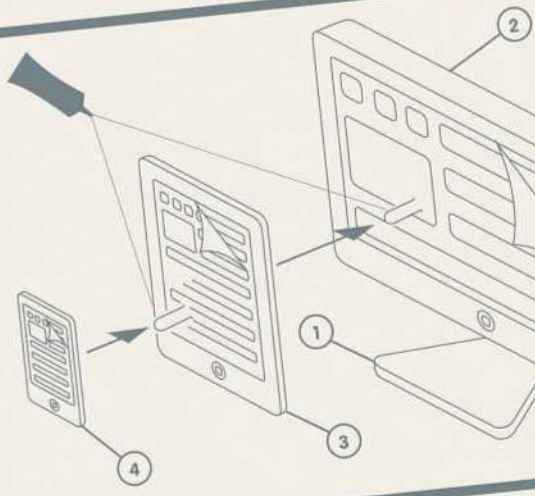

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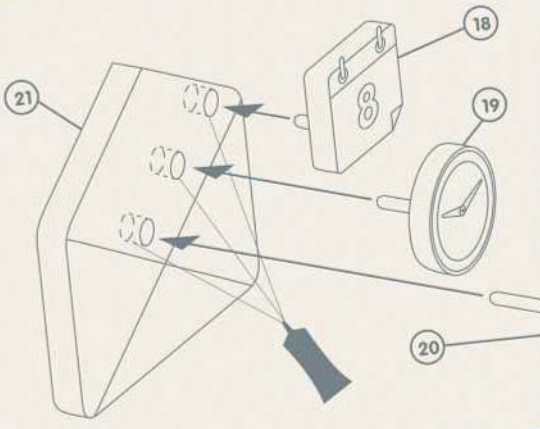

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The Best Money Can Buy:
Keyboard

A good PC isn't going to do much if you can't control it. A good keyboard is what you need...

Happy Hacking Keyboard Professional HP Japan

This week we're going to take a step outside of the PC and look as one of the most important peripherals you can buy: the keyboard. Without this basic device, using a PC wouldn't be all that easy, and a good-quality keyboard not only makes using your PC use more productive, but it can also help prevent aches, pains and the dreaded carpal tunnel syndrome.

Keyboards may have a core, base concept, and most will feature the same qwerty layout of keys, but there's now more to a keyboard than simply typing. Many boast unique features and additional controls, and there are keyboard designed for very specific uses. There are even keyboards outfitted to cater for people with disabilities, and the input device isn't limited to simple plastic, with all sorts of expensive options open to those who really want to splash out on a truly extravagant model. This is, of course, the area we're going to focus on, as we take a look at some of the most expensive and exuberant keyboards around.

2000-IS-DT

Product: Happy Hacking Keyboard Professional HP Japan
Price: around £2,700

No, it's not a painted Commodore 64; this is one of the most expensive keyboards you can find, if not the most expensive, and it's also one of the most specialised in terms of use. The Happy Hacking Keyboard Professional HP Japan is a custom, made to order keyboard that features some extravagant materials used in its build.

The keys of the unit are coasted in a special Urushi lacquer using special brushes, reportedly made from the hairs of virgins, and they're then finished off by being sprinkled with gold dust. It sounds crazy, but at this kind of money, we're not totally surprised. Well, maybe at the virgin part.

The keyboard's keys are all intentionally left blank, making this a model suited only to those with the best touch-typing skills, but it's a very mechanical and tactile model and one that's highly sought after by those with cash to burn.

Professional II Datahand

Product: 2000-IS-DT
Price: around £1,350
This very pricey offering may not initially look like much, as it's seemingly a rather generic keyboard layout, but that's quite far from the truth. The 2000-IS-DT is one of the most durable pieces of PC hardware you'll find.

It's well suited to various conditions, including moisture and dirt, as well as hard impacts. This is thanks to the non-corrosive stainless steel casing and the specially fitted internal barrier that enhances the protection and completely seals the internals.

The keyboard itself is a full model, complete with numeric keypad, and it has a built-in trackball, so you don't need a mouse to use it. It might not look all that attractive, especially compared to some of the options here, but this is all business, and it shows.

Kirameki Pure Gold Keyboard

Product: Professional II Datahand
Price: around £415
Yes, although it may not look like one, the Professional II Datahand really is a keyboard, albeit a very different kind. The two separate sections each cater for one hand and can be altered for a perfect fit. You place your thumb and fingers into the switches and can type by gently moving them a tiny amount.

It's a very different approach to typing and one that'll certainly take a lot of getting used to, but once you do, it could allow even faster input speeds, using a fraction of the desk space and movement. Thanks to the ergonomic design, it should also be very comfortable. Of course, this kind of uniqueness doesn't come cheap, so you'll have to be prepared to put in the time if you spend the cash.

Mad Catz S.T.R.I.K.E.7

Product: Kirameki Pure Gold Keyboard
Price: £220
Some keyboards are expensive because of special construction or advanced features. Others are pricey because they're designed for a very special purpose, and others are expensive because they're coated in gold. Yes, gold, and this is one.

The Kirameki Pure Gold Keyboard is an 86-key model that has keys coated in 100% pure gold leaf. It's Japanese in origin and reflects the Japanese art of utilising gold leaf. The result is a keyboard that would have any self-respecting rapper queueing up to grab one.

The keyboard itself is a traditional model, and it features two USB ports as well as an adjustable base.

Logitech Logitech UC Solution for Cisco 725-C

Product: Mad Catz S.T.R.I.K.E.7
Price: £220
We've looked at this keyboard a few times in Micro Mart for a few reasons. For one, it's certainly one of the most unique and striking keyboards you're going to find, and it also boasts a ton of features for gamers, with a great amount of configuration options.

The S.T.R.I.K.E.7 is a modular unit, and you can alter the layout to suit your own preference. This includes reordering the module configuration, tilting and adjusting the wrist rests and even swapping over the WASD and arrow keys.

The V.E.N.O.M. Interface module is a touch-screen control unit that can use one of many different applications to control both your PC and in-game functions. The unit even features two extra USB ports.

It's an impressive keyboard, especially for gamers, and the adjustability makes it useful for those who find it difficult to get comfortable with a standard model.

Hypertec Goldtouch Go! 2

Product: Logitech Logitech UC Solution for Cisco 725-C
Price: £215
Although this keyboard may be aimed at the business user who needs to conference call, it also has a surprisingly useful feature set for home users and even gamers. For one, the included webcam is excellent, providing 1080p video, and it's controlled via special inputs from the keyboard. The included mouse is designed to be comfortable for all-day use, and the keyboard can not only control the webcam but also headset functions. The keyboard also has backlit keys to display call status and a cable-tidy system to help reduce desktop clutter.

Although we're looking at keyboards here, not desktop sets, we've included this, because it ties in the features of each device very well, making the set more of a whole than three separate units.

Product: Hypertec Goldtouch Go! 2
Price: £180
This is a keyboard designed for a single purpose, and that's to be the perfect partner for any travelling computer user. It manages this thanks to a central hinge that allows users to adjust and flex the two halves of the keyboard. This is both to fold the keyboard away when not in use for easy transport and to adjust the keyboard angle for a more comfortable setup when in use.

It's a simple feature but one that really does make it a great option for people on the go who want a more ergonomic keyboard than the traditional flat keyboard setup of standard laptops.

Product: Orée Board 2
Price: from 150
If you like a little bit of a natural touch to go with your technology, there's surely no better option than this. The Orée Board 2 is a custom made model that you can tailor yourself when you order. You can pick the kind of wood used (maple, walnut or wild cherry), the country layout, system layout (Windows, Mac/iPad) and even the font used on the keys.

The keyboard design itself is simple and very elegant, and the wooden appearance makes it really stand out. When it comes to actual features, there's little to report, as it's all about the custom wooden appearance, which is very nice, indeed.

Product: Logitech G19s
Price: £145
The Logitech G19s is a gaming keyboard that's dominated by an LCD display that can be used for a number of tasks. It can relay in-game information, system information, show images and much more. You can use third-party apps to extend its functionality and can even create your own.

The keyboard itself is also very responsive, and features a special 'anti-ghosting' ability that prevents conflicts when multiple keys are pressed. So, when you're gaming and need to press a number of keys at once to execute complex moves or manoeuvres, you'll have no problems.

It may not have the sheer spectacle and feature set of the Mad Catz S.T.R.I.K.E.7, but in terms of responsiveness and ability, it's a great gaming unit.

Product: Cooler Master CM Storm Mech
Price: £135
Responsiveness is the name of the game here, and the Cooler Master CM Storm Mech is a gaming keyboard that prides itself on fast, responsive inputs. It features a 64-key rollover that prevents key clashing, and up to 75 macros and five profiles can be used.

The unique shape makes it visually striking, and the black wrist rest doubles as a carry handle, useful for travelling to LAN parties or just around to a friend's place for a gaming session. Topping this off is a very durable build, so it's a keyboard that can certainly stand the test of time.

Product: Fine Handcrafted Wood Bioshock Art Deco Steampunk Keyboard
Price: £125
We stumbled on this keyboard via the website **www.etsy.com**. Hand crafted by HannaLTD, this is just one example of a range of custom keyboards that pack an impressive style. This particular model is a *BioShock*-style steampunk unit that's made out of various materials, including wood, and it has an old-school typewriter appearance, with a tarnished and aged wear and tear aesthetic. There's even a 'Property of Ryan Industries' label.

There are few more interesting-looking keyboards around, and each Art Deco-style unit is hand made to order, so they boast a rather unique appeal. **mm**

Orée Board 2

Logitech G19s

Cooler Master CM Storm Mech

Bioshock Art Deco Steampunk Keyboard

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Your Letters

Windows Crashing!

Not sure whether you're still doing these as I haven't seen for a while... but here's one taken at the internet kiosk outside arrivals in Marseille mp2.

Guy Tomlinson

??

I expect there are a lot of people out there who would say that this sums up Windows!

Angela Thorne

Head In The Clouds

The big thing now is cloud computing. Hey, I use it to store backups and have a lot of pictures on here.

However, I dont want to work on a slow, cloud-based spreadsheet when I can use one on my local drive.

Microsoft thinks otherwise; it wants us to use Office online, but what good is that if your internet goes down?

Seems to me, it's companies wanting to be first with 'the next big thing' which, like 3D, will be a passing fad.

Andrew S Redding

Telly Troubles

I read with interest Tronby Fisher's letter 'Dongle Disaster' in issue 1324. We have a Samsung TV of similar vintage and a Talktalk 'You View' box, so his comments about the cost for the 'Essentials' package were very interesting. I think that one of Mark Pickavance's articles in the past had made me aware of the difficulties of high-cost high tech PVRs, so we use a simple scart-based PVR, which works well for basic viewing.

The TalkTalk guide to their 'You View' box shows the two ways to set it up: 1) with Homeplug and 2) without Homeplug. We use the Homeplug variant with a TV-based PC underneath. The system is very basic but works okay. The only useful extra the 'You View' box provides that I will use is a slightly newer and better implementation of the BBC iPlayer (and the other players) than the PC version.

The box was sent to me by TalkTalk as an unsolicited 'freebie', so I hope I'm not paying the £10 extra that Tronby refers to. The letter TalkTalk sent me says, "Your package now includes TV" and "calls now come with a Free YouView box", so it was presented to me as a free 'fait accompli'. As a 'freebie' I am pleased to have the box, though I would not want to pay a regular monthly premium for it.

I may be wrong, but I suspect that the PC version of the BBC iPlayer is not the latest and best: other later implementations of it appear on the various boxes like this 'You View' box sent to me. The only danger with for us with our particular lounge media setup is that we will soon (because of all these TV add-ons) run out of HDMI connectors on the Samsung TV. It is getting a bit old, and maybe newer TV sets have more of these.

I have now 'officially' 'used' the 'You View' box for watching *The Honourable Woman* last Thursday, so I won't have to return it in the plastic bag they sent out to me for non users to return it! So by 'using' it, I hope they do not mean 'renting a video'. I am such a terrible 'user' I would not possibly know how to do that!

Harry Deakin

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Component Watch

This week, James Hunt picks out some interesting RAM deals

When it comes to memory, DDR4 might be on the market, but most of us are still chugging along with DDR3. But don't despair. Intel has confirmed that it won't put DDR4 onto its standard consumer platforms for over a year, so if you want to upgrade, it could be a good time to do it. In case you want to take advantage of the faster speeds available, we've picked out the best prices for some of the fastest RAM modules around.

Deal 1: Corsair XMS3 4GB (2x2GB)
RRP: £64.99 / Deal Price: £51.33
Clocked at 2000MHz, Corsair's XMS3 PC3-16000 RAM is low price but high speed. For just over £50, you can get hold of a 4GB kit, which demonstrates outstanding performance and stability. Available with signature XMS heat spreaders, each module is built using carefully selected RAM modules for extra reliability. Ideal for mid-market systems that need a bit of a jump start in the memory department.

Where to get it: CCL Online – bit.ly/1qAcGvL

Deal 2: G.Skill RipjawsX 8GB (2x4GB)
RRP: £74.99 / Deal Price: £60.46
If you want something for budget gaming systems, the G.Skill Ripjaws X doesn't cost much more than the Corsair XMS3, but you get twice as much RAM and at faster speeds: 2133MHz (PC3 17000). Watch out for the signature heat spreaders: they're slightly wider than average, but they look great and should fit easily into any gaming system as long as you're using a standard case and PSU.

Where to get it: Ebuyer – bit.ly/1BngvrF

Deal 3: Corsair Vengeance Pro 8GB (2x4GB)
RRP: £89.99 / Deal Price: £71.98
If you're looking for some RAM modules that'll take overclocks in their stride, you can't go wrong with this Corsair Vengeance Pro kit, which is rated up to 2400MHz – well beyond the standard for the platform. With eight-layer PCBs specially selected for performance potential and aluminium heat spreaders that provide superior temperature management, their built-in XMP 1.3 profiles allow for automatic, reliable overclocking. High performance at a reasonable price.

Where to get it: Dabs – bit.ly/1BnelZ2

Deal 4: Kingston HyperX Predator 8GB (2x4GB)
RRP: £99.99 / Deal Price: £86.24
Rated at 2666MHz, you'll struggle to find better than Kingston's HyperX Predator gaming RAM. It boasts some of the fastest speeds, lowest latencies and highest capacities available on the market, with a new heat spreader for greater heat dissipation. For peace of mind, HyperX Predator modules are backed by a lifetime warranty and free technical support, as well as a guarantee of expansive compatibility testing. Perfect for gamers who want to reach the top performance around.

Where to get it: Ebuyer – bit.ly/1ojGE2x

Deal 5: G.Skill TridentX 16GB (2x8GB)
RRP: £399.99 / Deal Price: £347.84
Finding 2800MHz RAM is hard, especially if you want a good price, but G.Skill's TridentX modules have been successfully pushed as far as 4404MHz in stress testing, so 2800MHz seems almost modest by comparison. An extreme overclocker's best friend, G.Skill TridentX has superb latency and capacity, and the kit comes with its own cooling fan to ensure you get the best performance possible. Simply fantastic gaming hardware.

Where to get it: Ebuyer – bit.ly/1usHiQg

olloclip Announces Android Expansion

It's Another Full HD Monitor!

Will the world ever tire of such things?

Viewsonic is hardly bringing anything new to the table by doing thi,s but we welcome yet another Full HD display to the market, nonetheless. The HG2401mh is a 24" display featuring a 144Hz rapid refresh rate and a 'blazing-fast' 1ms response time, which means this is just perfect for any avid gamers and entertainment enthusiasts among you. Come on, we know you're there...

The Game Mode technology enhances visibility and detail by brightening dark scenes in games, while an Aimpoint hotkey function brings instant crosshairs. Connectivity on this high-performance screen includes dual-HDMI and DisplayPort inputs and dual-USB connectivity so you can use this with gaming consoles, entertainment players and PC systems alike. Throw in Blue Light Filter and Flicker-Free Technology to help reduce eye fatigue during lengthy gaming time and you have yourself a welcome addition to the wealth of HD displays out there – and all for £249, from October.

 QUICK BITS... The BBC has launched its Make It Digital education project for 2015, aimed at helping to close the UK's IT skills

Samsung Galaxy phones now supported

Olloclip, that purveyor of mobile photography tools, has moved onto the Android platform by now providing its 4-IN-1 Photo Lenses for the Samsung Galaxy S4 and S5. If you're in the dark over what we're talking about, there are quick-change lens system that allow you to add fisheye, wide-angle and a couple of macro lense options to your mobile photography arsenal, all in one wee package. They've been, we're lead to believe, very popular among iPhone snappers, and now select 'droid user are getting to try them out too.

Designed to bring DSLR-type functionality, it was just a matter of time before it made the leap from Apple, and it's no surprise to see Samsung's popular phones have been chosen take the lead. Priced at £60 from **www.olloclip.com**, anyone wanting to up their on-the-go photography chops should probably take a good look.

Safeapzz Launches Second PC Optimizer

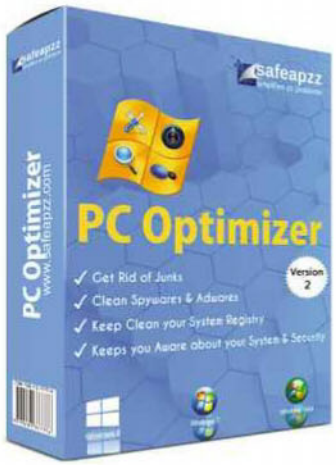
Promises to keep thing ticking over nicely

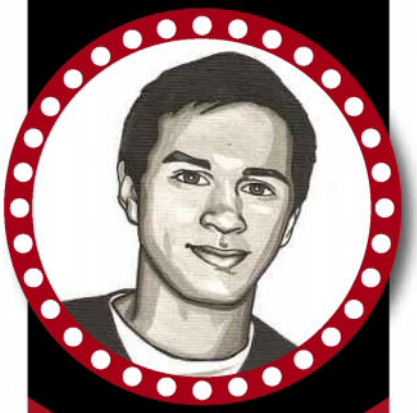
Always nice to be able to bring you news of British products, although while Scotland is very much part of the UK at the time of writing that could have all changed by the time you get round to reading this. Anyway, putting politics to one side, across the border we go to bring you news from Safeapzz, a developer of utility software that has recently launched version two of its PC Optimizer suite.

This is, as you'd expect, a collection of computer maintenance tools to assist you in repairing, cleaning and optimising Windows, stopping PC crashes and fixing those dastardly Windows errors.

Removing junk files to save you valuable disk space, this features a nice, clean user interface and will repair all those invalid references that can cause havoc to your system. Promising the most comprehensive set of utilities to keep you on a smooth path to system success, including a spyware and adware cleaner, and a Startup Manager clean-up tool, we like the sound of this very much, doubly so as it's homegrown – or not anymore, depending on today's political landscape.

Head for **www.safeapzz.co.uk**, if you would like more info or if you'd like to purchase this for £31.50.





As computer enthusiasts, we all take joy in getting new components, systems or gadgets. Taking your new item out of its box and getting it up and running is a thing of wonder for sure.

Unfortunately, for many of us, that doesn't happen half as often as we'd like, because we simply don't have the money to get everything we want or even the things we need.

The good news is you can save money by avoiding purchases that you perhaps don't really need.

Say you don't get a new smartphone, but instead just opt to keep the one you've got and then get a cheap rolling contract. You could put all the money you save away, and then when something really goes wrong with your PC or whatever, you'll have the cash to fix or replace what you need to.

Of course, that's easier said than done. After all, who can resist a bit of retail therapy every now and then?

Until next time...

Editor

Anthony

Meanwhile... On The Internet...

It's easy, we suppose, to think of celebrities as very different from ourselves, as something 'other'. The fact is, though, that one of the side effects of the internet-driven social media world we live in these days is that the anonymity it affords and the range of people we'll never have to actually see face to face it brings us into contact with seems to allow for a scary level of unaccountable meanness in some people.

While we talked a lot last week of the iCloud hack/CelebGate/Fappening, it's worth remembering that these kinds of things happen to a lot of people and not just those in the public eye. That's what makes the anonymous blog of a woman whose photos appeared on a 'revenge porn' site (courtesy of an acquaintance who stole them from her computer: **tinyurl.com/MotI1329a**) a sobering read.

Of course, some people take their clothes of and get photographed willingly, and – as the blog written for the *Huffington Post* by former model (now actress and writer) Keeley Hazell explains – have to face up to a future with a past in which they are preserved seemingly indefinitely and are only a Google search away (**tinyurl.com/MotI1329b**).

If all that has you in the mood for a little schadenfreude (one of our very favourite words, if not emotion), then maybe you should take a look at the complaints of the main Redditor behind r/TheFappening,' Johnsmcjohn' (who was all but doxed by the *Washington Post* and whose real name has appeared in several places online) and his complaints about intrusions into his privacy (**tinyurl.com/MotI1329c**) by the press in a recent AMA (**tinyurl.com/MotI1329d**). Frankly, it's hard to feel sorry for him (or Reddit, if we're honest). However, in the spirit of not being as big a double-standard straddling idiot as he's been, we're trying.

Frankly, the internet is on much safer ground when it sticks to cats and creating small-scale celebrities. If you can combine 'internet-famous' with 'feline', you're almost certainly on a winner, which is why it's not surprise to find out that the feline of 2013, Tardar Sauce (better known to all as Grumpy Cat) is due to be making his film debut this christmas in *Grumpy Cat's Worst Christmas Ever* (**tinyurl.com/MotI1329e**), in which he befriends a girl that can hear what he's thinking. Sounds terrible*****.

***** Amazing!

While we're not really fans of the sport (we're actually more into baseball, as US passtimes go), one good thing about autumn is the American football comes back. While most eyes around the world focus on the NFL – which is having its own internet-distracting cause celebre at the moment, courtesy of Ray Rice (**tinyurl.com/MotI1329n**), that has shone a spotlight on its attitude to women in general (**tinyurl.com/MotI1329o**) – Meanwhile...'s attention is always reserved for college football. Actually, not the football, more the marching bands that appear at half time.

Best among these appears to be Ohio State, which has featured in these pages before, and it pulled out all the stops last week to produce a quite brilliant ten-minute show covering some classics of television. It's hypnotic viewing (**tinyurl.com/MotI1329p**), though we can't help but think we've seen *The Lone Ranger*'s horse, Silver, somewhere before (**tinyurl.com/MotI1329q**)

Apparently, readers of *The Guardian*'s website are new to all this internet malarky, so the kind journos there have seen fit to put together a glossary of handy terms. It's all a bit tongue in cheek, so it suits us down to the ground (**tinyurl.com/MotI1329f**) and is well worth a bit of a gander with a cup of coffee.

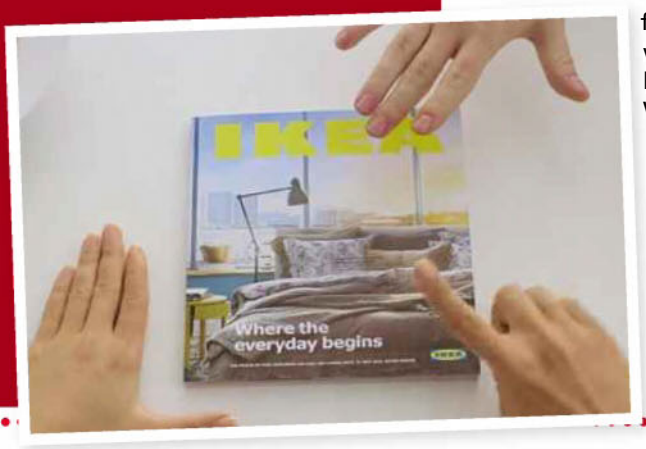
Aaaaaaaaand Finally...

We've made no bones about our *Star Wars* fandom over the past few months, and of course right now is a good/bad time to be such a thing and in control of a column dedicated to the world of the internet. Aaaaanyway, it does go some way to explaining why we've once again gone to a galaxy far, far away for a few links this week. Firstly, there's the drone footage of the bunkers at Greenham Commons' GAMA site (which stands for - deep breath - **G**round Launched Cruise Missile **A**lert and **M**aintenance **A**rea, about which you can read more here: **tinyurl.com/MotI1329g)**, now used as a data centre by a firm appropriately called The Bunker **(tinyurl.com/MotI1329h)**, which shows their apparent use as sets for Episode VII **(tinyurl.com/MotI1329i)** – perhaps a Rebel Alliance Base? Yavin IV, anyone? To the far right of the video, it's possible to make out an X-Wing and half of the Millenium Falcon, sightings that have been corroborated by pictures taken by an aerial photograpy company, allegedly by accident **(tinyurl.com/MotI1329j)**.

Also on the *Star Wars* front, we have a video, which comically illustrates how important John Williams' music is to the impact of the original movies **(tinyurl.com/MotI1329l)**. That's a well-worn point that has been seriously explored before **(tinyurl.com/MotI1329m)** by people a lot cleverer than us. Not quite as hilariously, though.

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

While the whole world and its iDog was freaking out over the iPhone and the Apple Watch **(tinyurl.com/MotI1329r)**, others were predictably parodying the cult surrounding the company. However, the best of these came in advance of the U2-powered product launches last week, from IKEA of all places. Ladies and gentlemen, prepare to experience the power of a Bookbook... **(tinyurl.com/MotI1329s)**



Caption Competition

Once again, it's time for the caption competition, where we provide the pictures and you provide the laughs. Let's see what you made of this:

- **JayCeeDee**: "Justin Bieber giving video evidence from a safe house, in his latest trial."
- **JayCeeDee:** "I could never get the hang of the Vulcan salute. 'Live long and prosper'."
- **wyliecoyoteuk:** "Windows 9 introduces gesture recognition to operate the new start menu."
- **wyliecoyoteuk:**"The new economy internet voting system in action."
- **Planeman:** "Virtual 'high fives' suck."
- **Doctoryorkie:** "I (your name) do solemnly swear to only shop at GAP."
- **Thomas Turnbull:** "Swearing in online for jury duty - it had to come one day."
- **Kris Graves:** "Well, the Windows 8 installation was saying hello. It'd be rude not to say it back."

Thanks to everyone who sent in an entry. Our winner this week is Planeman, for "Virtual 'high fives' suck."

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**.

Alibaba IPO Will Be Huge

One of the biggest tech IPOs ever

You may have heard about this one, but just in case... Chinese e-commerce firm Alibaba is something of a big deal, so much so that its initial public offering on the New York Stock Exchange is planning to raise a gargantuan $24.3 billion.

The IPO was mooted to happen in August, but when that didn't happen, September became the expected date – and now details have emerged of the numbers involved. If the company can indeed raise these funds, it would stand as one of the mightiest tech IPOs in history.

To give this a bit of context, the Associated Press reported that Alibaba would debut with a market value of $163 billion. Twitter was expected to raise $18 billion. Make no mistake, this is massive. Absolutely massive. Expect to be reading much more about this over the coming weeks.

Twitpic To Shut Down

Dispute sees Twitter win the day

Farewell to picture sharing site Twitpic, which has now ceased to be. Bereft of life. It is a dead website (as of 25th September, anyway).

The decision for it to be shut down follows a dispute with Twitter, the social networking site having apparently given Twitpic a decision to either drop a trademark on the "Twitpic" term or lose its access to the Twitter API, without which tweeting of pictures to Twitpic would be tricky, to say the least.

Twitpic decided to stop all business activities rather than give up its name. Twitter has reacted to the news, oddly, by stating that it's "sad" to see Twitpic shut down. It was probably as surprised as we are.

Snippets!

iPhones Most Stolen

The Home Office has released an interesting set of figures that suggest Apple's latest models of its iPhone – from the 4S to the 5C and 5S – were the smartphones most likely to the stolen in England and Wales. Covering the period August 2012 and January 2014, and based on analysis of crime data in London, the figures note that the BlackBerry 9790 was the next most-likely victim with Samsung and HTC models also featuring on the list. The good news is that the actual theft of iPhones has decreased, with the more robust security of iOS 7 said to be the reason behind that.

Mail Merge Mishap

Sending out a welcome email to your students should be simple enough. Type out a generic letter, mail merge the names and Bob's Your Uncle. Unfortunately, the London School of Economics has made a bit of horlicks of this, by addressing around 200 students as 'Kung Fu Panda' in recent correspondence – due to, one would presume, some wag adding the name to the database a placeholder or test name. Some students have claimed racial stereotyping caused the incident, according to the BBC, with others quoted as stating that the apology from the university showed a lack of a sense of humour.

Ransomware Not Dead

Cryptolocker may have been bought to its knees, but it's still causing trouble – and despite the efforts to stop the ransomware, it would be premature to assume that such threats are gone. According to Dell Secureworks, within a week of the takedown of the botnet powering Cryptolocker there was actually a hike in ransomware infections due to spam linking to a copycat nasty. According to the same report, the group behind this 'new' ransomware made over $1m by infecting more than 600,000 systems.

Sony's SmartWear Experience Takes Shape

SmartBand Talk and SmartWatch 3 to land in autumn.

Sony is making another play in the smartwear arena with the development of its SmartWatch 3 and SmartBand Talk devices. Pictured here is the watch, the first of the company's Andorid Wear models, in fact. Working alongside the accompanying Lifelog app, which is designed to give you a better understanding of how you live your life so that you can make the requisite changes, both are really about taking fuller control of your life and your health.

SmartBand Talk is a lifelogger, with call handling and voice control via its always-on curved 1.4" e-paper display. We're more interested in the SmartWatch 3, truth be told; partly because it looks really rather nice, and partly because you'd assume a market entry from a big player like Sony will provide strong competition for other players in the market.

As for its functionality, using Google's wearable software will help to bring an audience as this device organises information, suggests what you need, receives messages, weather updates, flight information – pretty much anything you'd expect it to do. With a built-in microphone, compass, Gyro and GPS sensor, everything is included to bring more accurate, more powerful lifelogging and it's a significant step-up from the SmartWatch 2 with its 1.6" 320x320 TFT LDC Transflective display, built-in 4GB local memory and Bluetooth connectivity.

Available in the autumn, it will be interesting to see how both of this devices fare.

WD Celebrates Anniversary With New Design

Ten years and counting

Happy Birthday To You; Happy Birthday To You; Happy Birthday Dear My Passport; Happy Birthday To You...

Doesn't have a great ring to it, does it? With that out of the way, the real news here is that WD is commemorating the 10th anniversary of its My Passport line of portable external hard drives with the introduction of a sleek new design in the My Passport Ultra Anniversary Edition, pictured here.

Launched alongside the My Passport Ultra - Metal Edition, the drive features a metal exterior, up to 2TB capacity, content protection with backup and cloud integration, plus the aluminium enclosure means nice styling as well as extra protection.

Throw in SmartWare Pro with DropBox integration for backups and recovery, and you're golden. The Metal Edition 1TB drive is priced at £70 (£106 for 2TB) and the Anniversary drive is available in limited quantities so if you like the look of that, get in early over at **www.wd.com**.

QUICK BITS... Twitter has started trialling a Buy button, allowing users to buy an item directly from within

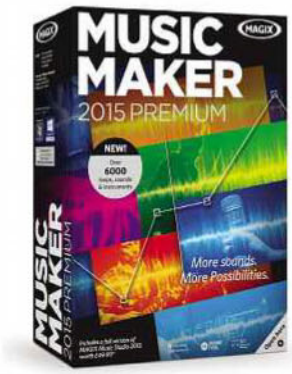
Magix Is The Music Maker

Redesigned software promises the works

Magix has released Music Maker 2015, the latest version of its music-making software (obviously), from which t's promising big things this time round.

Biggest change of the lot is a total redesign of the interface, with a bunch of new innovations such as a uodated virtual synthesiser, drum machine and Vita Sampler to help create your own unique sounds. As is typical with Magix products, user friendliness is the order of the day too, while the Premium version also promises to provide the flexibility to suit more experienced hands.

Six new sets of loops and samples, a pitch correction tool, and Mastering Suite are among the wealth of features in the £80 Deluxe version (£60 for the lesser-featured Standard one), so please head over to **www.magix.com** if you would like to buy it.



Amazon Fire Smartphone Now For Pre-Order

Will it do better business over here?

Available exclusively on the O2 network, you can now pre-order Amazon's Fire smartphone if that's your thing. Kitted out with a 2.2GHz quad-core Snapdragon 800 processor, 2GB RAM, a 13MP camera, Full HD video, free cloud storage for your photos and a year of Amazon Prime membership (that offer's only available until 31st December 2014, though).

The phone hasn't done great business since its launch in the States, with reviews noting sluggish performance and poor design among the problems. However, this hasn't stopped Amazon from bringing it to our shores so will we see similarly poor sales figures over here? The timing coincides nicely with Apple's own phone launch – something called the iPhone 6? We bet we know which will sell more...

Intel Launches Core M Chip

Smallest. Transistors. Ever

So, Intel's been busy. We now know what the first in its next-generation Broadwell processors looks like with the launch of the Core M chip, shown at the IFA trade show.

Powering new 2-in-1 devices from the likes of Dell, ASUS, Acer, Toshiba and more, the Core M processor has been purpose-built for outstanding performance in ultra-thin, fanless laptops and tablets, delivering double the battery life compared with a four-year-old system. In other numbers, the chip enables up to 50% faster computer performance and 40% faster graphics performance versus comparable, previous-generation Intel Core processors and Intel is promising that consumers with older PCs will notice the difference.

Capable of handling over eight hours video play (which is said to be as much as 20% more than the last-gen chip could manage), this is also 50% smaller and has 60% lower thermal power than anything similar that's gone before. Available in a few versions at launch – the up to 2.0GHz Intel Core M-5Y10/5Y10a processors and the up to 2.6 GHz Intel Core M-5Y70 processor – you can read all about it over at **www.intel.com**.

Ricoh SG-2100N A4 GelJet Printer

Mark discovers that what inkjet printers really need is more gelatine

DETAILS
- **Price: £68.99 (Ebuyer)**
- **Manufacturer: Ricoh**
- **Website: ricoh-europe.com**
- **Required spec: Microsoft Windows XP or later, Apple MacOS X 10.5 or later, Microsoft Windows Server 2008**

It's been a very long time since I've reviewed any truly new print technology, almost certainly in the last century.

However, the GelJet tech used in the Ricoh SG-2100N isn't entirely new; it's an interesting new derivative of inkjet printing, and therefore has many of the same caveats associated with those solutions. But it circumvents some issues and in a rather clever way.

The first departure for an ink-spraying printer is the raw speed on offer, because delivering 29 pages a minute in Eco mode is simply quite amazing. It achieves this by having a humungous print head, featuring a ridiculous number of nozzles, allowing it to paint a very wide strip of colour in a single pass. Probably the reason this hasn't been attempted before is that the ink needs to be fully absorbed and dry a little before the next application.

The SG-2100N can get around that inkjet limitation by using special viscous gelatine inks that dry more rapidly, avoiding bleeds and the associated paper distortion. The four inks are also pigment based, avoiding the chemical changes that alter the hues of dye based inks when exposed to sunlight.

The design of the SG-2100n aims to leverage this technology by providing a flat paper path for the wide head to work that offers the added benefit of accepting high-quality 163g/m2 stock in the single A4 250 sheet feeder. Other models in Ricoh's GelJet range have duplex and a single-sheet feeder, but this, being the entry level design, doesn't.

Connection to the PC can be either USB or a wired network

Technical specification

Warm-up time: 35 seconds.
First output speed: Full colour – 6.5 seconds / B/W – 5.5 seconds.
Continuous output speed: Full colour and B/W – 29 pages per minute .
ISO Speed: Full colour and B/W – 12 pages per minute.
Memory: 32MB.
Dimensions (W x D x H): 399 x 360 x 212.5.
Weight: 9.5kg.
Power source: 220-240V, 50/50Hz.
Duty cycle: 10,000 prints per month.

> **“The print resolution is to die for, the colours are bright and dynamic”**

connection, which this reviewer prefers over often inconsistent wireless networking. Using either method, installation takes only a few minutes with the provided driver/manual disk.

The specifications on printer resolution are just amazing with images being rendered at 3600 x 1200dpi, or about ten times the quality of magazine print. To get the very best detail, it reduces output to a page minute, but that’s hardly slow by colour output standards.

And it only uses 22.8 watts in operation – a fraction of what a laser printer needs to fuse toner to paper.

The print resolution is to die for, the colours are bright and dynamic, it's very inexpensive considering how well constructed it is – what could possibly go wrong?

One aspect that might put photographers and designers off is that it won’t print to the edge of the paper, leaving a 3mm border in all directions.

But that’s a minor wrinkle when you start calculating the cost of running this platform on a regular basis.

Ricoh pitches the idea that printing on the SG-2100n in colour is almost as cheap as mono laser – an assertion that I can pokes holes in rather easily, given then replacing the four-ink cartridges will cost you £20 more than the price of the printer. Typically, four carts cost you about £90, print an average of 600 pages with 5% coverage, giving a cost of roughly 3.2 pence a page. That’s nowhere near what average mono laser printing costs per page, however you calculate it.

There's also a need to buy a fifth item, the 405783 waste ink collection unit every 27,000 pages for another £28, like it’s impossible to just empty the ink out.

The printer is rated for an office duty cycle of 10,000 pages a month. That works out at in excess of £1,500 a month in consumables, with Ricoh’s dream customer. If you’re printing that much, you need thermal wax or colour lasers to reduce costs, because these output overheads will bankrupt you.

Those thinking ‘Isn’t it cheaper to just buy a new printer?’ didn’t attend my seasonal presentation entitled ‘Why printers turn up with half empty ink cartridges’.

I know that the printer price is subsidised and that Ricoh needs to cover the cost of developing new technologies, but the SG-2100n eliminates some of the drawbacks of inkjet printing, only to ignore the one that really annoys people: the disturbing price of using one extensively.

That’s a huge shame, because the concept works well and progresses the technology of inkjet printing an appreciable notch.

The cost of printing rather relegates this printer to those who don’t print often, and not the massive monthly duty cycle the machine was designed to service. **mm Mark Pickavance**

Fast and colourful printing undermined by high ink costs

Kingston MobileLite Wireless G2

Michael goes cross-eyed as he watches four HD movies at once

DETAILS
- Price: £35.54
- Manufacturer: Kingston
- Website: www.kingston.com
- Required spec: n.a.

Following the launch of the original product last year, Kingston has now developed the second-generation version of its MobileLite Wireless offering. Appropriately entitled MobileLite Wireless G2, this device has been designed to let users stream content stored on SD memory cards and USB flash sticks to a range of mobile devices.

Dimensions of 129.14 x 79.09 x 19.28mm and a weight of 171g mean it can be slipped into a pocket for easy transportation between locations.

Powering the unit is a built-in rechargeable li-ion 4640 mAh battery that should be good enough to deliver up to 13 hours of data streaming. The battery is charged via a micro-USB port situated on the left side of the unit, where it's accompanied by the power button and three LED lights providing charging, boot-up and operation feedback. On the right side of the G2 is an Ethernet port for when you need to link to a wired network. Positioned on top of the unit are the standard USB port and SD memory card slot into which you can insert the media holding the content to be streamed to other devices.

The MobileLite Wireless G2 works by setting up its own wi-fi network to which Apple, Android and Kindle devices can connect using a free downloadable app from the appropriate store. This allows you to target local content and any stored on the attached memory card and/or USB flash stick. You can drill down through levels and select the content to be streamed to a chosen device. When searching through the content available from the G2, the app has filters allowing you to target connected devices, photos, movies and music specifically. The app can also be used for posting to Facebook and Twitter plus sending items via email.

> **“New to this version of the product is support for bridge mode”**

According to Kingston, you should be able to connect up to eight devices for general traffic such as photos and data. When HD movies are involved, then the number of connected devices is reduced to five. While I was unable to match these claims due to a lack of appropriate devices, I was able to set up a situation where I had four devices, each receiving a different HD movie, being streamed simultaneously from the G2 without any dropped frames or break-up in the audio and video.

EDITOR'S CHOICE micro mart

On its own, the Kingston wi-fi network does not have any internet ability. Fortunately, new to this version of the product is support for bridge mode, which allows you to get round this problem. Bridge mode allows for bi-directional traffic so that devices can receive data from the Kingston wi-fi while still linked to the internet via a home wi-fi network.

As well as offering multi-streamed data to various devices, this product can act as a battery backup facility to a smartphone or tablet using the supplied USB lead. Unlike the first MobileLite Wireless product, this new version does not come with a user guide. There is one, but you'll need to download it and find out how to set up bridge mode. Included in the box is a micro-to-standard USB lead and SD memory card adaptor.

mm Michael Fereday

It does what it says and at a reasonable price

micro mart
9 Quality
10 Value
9 Overall

SanDisk Extreme Pro SSD 240GB

SanDisk pulls the pin on its Extreme Pro grenade and tosses it into the SSD market

DETAILS
- **Price: £127.68 (Amazon)**
- **Manufacturer: SanDisk**
- **Website: www.sandisk.co.uk**
- **Required spec: SATA 6Gbps port and SATA power**
- **Part No: SDSSDXPS-240G**

When I think of SanDisk, my mind usually brings up flash cards and USB keys, because it's that type of storage that it's normally associated with.

That might change soon, because its latest SSD technology isn't remotely me-too, and its competitors should take a long hard look at the new Extreme Pro range.

As with most SSD designs from the outside, there isn't much to see, and the Extreme Pro is no exception. It's plastic and metal, coloured black, and sized like a 7mm 2.5" SATA hard drive. Along with the drive, the box contains a plastic spacer for those with laptops, designed to take thicker drives – nothing exceptional about that.

Under the hood is a Marvell 88SS9187 controller, in this model 240GB of SanDisk second-generation 64Gbit 19nm MLC NAND and 512MB of DRAM cache memory.

That's the same controller that it used in the previous Extreme II, but the firmware has been tweaked, and the flash organisation is all new.

What's striking here is results of this seemingly innocuous mix are really, really impressive from a performance perspective.

Usually I tell people to avoid the smallest SSD in a range, but in this case the 240GB model is actually the best of the bunch. SanDisk states 550MB/s reads and 520MB/s writes, but then many drives claim these speeds.

Under CrystalDiskMark, I got 520MB/s reads and 500MB/s writes, but using ATTO I got the quoted speeds or marginally faster! These levels are at the edge of where SATA 6Gbps is effectively capped by bandwidth. With IOPS levels knocking on 100K for a 4K random read, this isn't just being configured to look fast on paper either.

> **"What SanDisk has done here is produce a product that hits precisely the right note"**

When you take the stunning performance, that SanDisk is offering this unit with a ten-year warranty and at just 53p a gigabyte, there must be something wrong here?

Certainly when you compare it with the recently launched Samsung 850 Pro series, the Extreme Pro looks very cheap indeed.

However, there are some important differences between these products that it's worth any potential customer noting. The first of these is that the Extreme Pro doesn't include drive encryption – a point that might put off business customers.

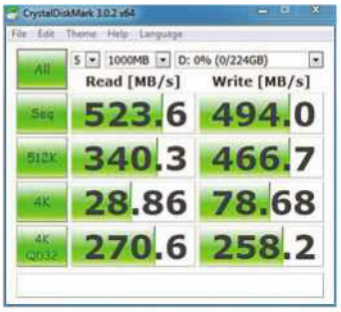
And while both these devices offer ten-year warranties, SanDisk is only rated to 80TB TBW or 22GB per day for a decade, whereas the Samsung 850 Pro is rated to almost double that usage level. Most users won't get near this limit, but if you edit video or large data sets daily, then this probably isn't the SSD for you.

Conversely, if all you want is decent SSD, the Extreme Pro is beaten on price per gigabyte by the Crucial MX100. But the Extreme Pro offers a much better performance envelope than the MX100, especially when you consider IOPS but also reliability.

What SanDisk has done here is produce a product that hits precisely the right note, combining exceptional performance and a killer price.

The Extreme Pro is so impressive that I can't wait to test the upcoming PCIe products, because SanDisk has been shown as a major player in this space.

mm Mark Pickavance



A bindingly fast and yet competitively priced SATA SSD

Dragon Naturally Speaking 13

Michael uses his voice while giving his keyboard a rest

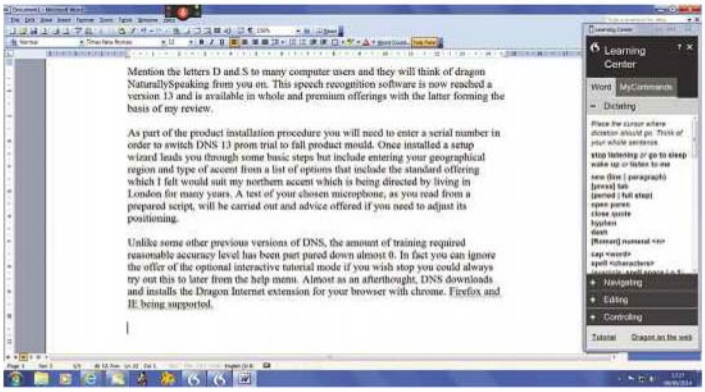
DETAILS

- **Price: As reviewed £139.99**
- **Manufacturer: Nuance**
- **Website: www.nuance.co.uk**
- **Required spec: 2.2GHz processor, 4MB RAM, 1.2GB hard disk space running Windows 7 or later**

Mention the letters DNS to many computer users and they will think of Dragon Naturally Speaking from Nuance. This speech recognition software has now reached version 13 and is available in Home and Premium offerings, with the latter forming the basis for this review.

Once installed, a setup wizard leads you through some basic steps that include entering your geographic region and type of accent from a list of options that include the Standard offering, which I felt would suit my northern accent, which has been diluted by living in London for many years. A test of your chosen microphone, as you read from a prepared script, will be carried out and advice offered if you need to adjust its positioning.

Unlike some of the previous versions of DNS, the amount of training required for a reasonable accuracy level has been pared down to almost zero. In fact, you could even ignore the offer of an interactive tutorial mode if you wish. You can always try out this option later from the help menu. Almost as an afterthought, DNS downloads and installs the Dragon internet extension for your browser, with Chrome, Firefox and Internet Explorer being supported.



Dictation

Help at hand

The Dragonbar

The DNS interface has had a make-over. Sitting in the default position at the top of the screen is the appropriately named DragonBar. You can move this bar to another location or change its appearance. The DragonBar, in its active state, provides access to various drop-down options that include Profile, Tools, Vocabulary, Audio and Help. There's also a button for turning the speech input feature on and off. When not being used, this bar will shrink down to a single icon, so taking up less space.

Along with the main help feature, DNS can come to your assistance in other ways. There's the interactive tutorial mentioned earlier and the Dragon Learning Centre. Previously known as the Dragon Sidebar, this feature takes up a position on the right of the screen and dynamically changes its content to reflect the current features being used.

As the internet continues to be a main source of content and information, Nuance has enhanced the product's web support with DNS13. The software now allows for full text control when dictating straight to Gmail, Outlook and Yahoo Mail. There's also support for various popular web applications hosted by various browsers.

EDITOR'S CHOICE micro mart

As usual with DNS, it's best not to look at the screen while dictating, as there's a slight delay before the printed text appears, which can be distracting. This is the approach I used when dictating a 470-word document into Microsoft Word using the software. Checking the results revealed that ten words were incorrectly recognised. This gave an accuracy level of 97%, which was the same level I achieved with version 11 (I missed out on version 12) of the product.

I should point out that this level of accuracy was achieved with its initial use. The more you use the product, the better it can perform as it learns from its mistakes. However, for this to happen, you do need to carry out any editing from within DNS13 using voice commands. Personally, I find adjusting to the editing feature to be the hardest aspect of the program.

mm **Michael Fereday**

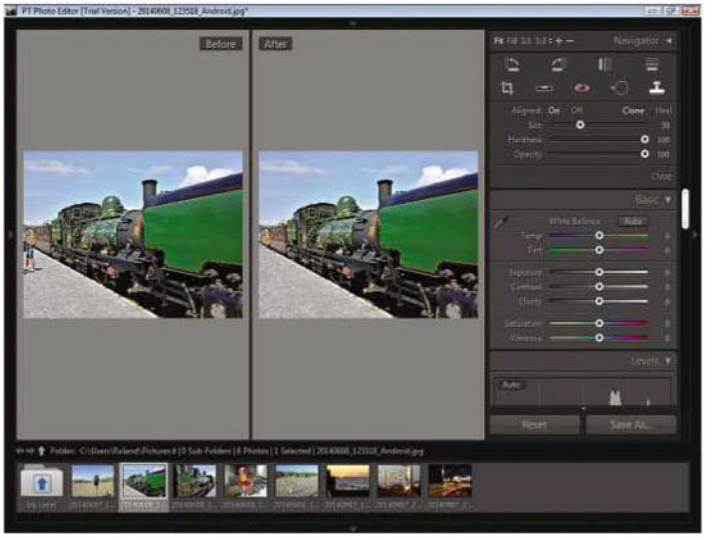
This continues to be the market-leading, feature-rich speech-to-text software

micro mart
9 Quality
9 Value
9 Overall

Fix photo flaws with PT Photo Editor

Roland Waddilove tries an inexpensive photo editor that can repair common faults in digital camera and phone photos

DETAILS
- **Price: £23.94**
- **Manufacturer: Photo-Toolbox**
- **Website: photo-toolbox.com**
- **Required spec: Windows XP or later, 1GB RAM, 1GHz processor, 15MB disk space**



The before and after views when using the tools shows the changes made

The small collection of tools is all you need to repair most photo problems

There are numerous photo editors for Windows PCs, ranging from the free GIMP to the uber-expensive Photoshop. PT Photo Editor is down at the cheap end of the market, and it's easily affordable at £23.94, but is it any good? It's far from perfect, and in some ways it's quite limited, but some of its tools are excellent, and it offers a few features not found in similar editing tools.

PT Photo Editor does not offer multiple layers, text or drawing tools, and it's mainly designed for fixing any flaws in the photos you take with your digital camera or mobile phone. The screen is divided into panels, and at the bottom is a tray of thumbnail images showing the photos in the current folder. You can browse photos and open them for editing from this tray. On the left is the history, which shows the actions you've performed on a photo, and you can step backward or forward undoing or redoing them.

On the right is the tools panel, which the most important. The others can be hidden when they aren't being used. There's a small palette of tools, which include crop, rotate left or right, flip horizontally or vertically, remove red-eye, remove blemishes and clone. The clone tool, which copies from one part of the image to another to erase flaws, has heal and clone options, with the former matching the texture, lighting and shading during the copying. It also has brush size, hardness and opacity options. The heal tool is a variation of clone and works in a similar way.

The straighten tool is brilliantly simple: you draw a line, which is then made horizontal or vertical. It's so easy to draw along the horizon or find a vertical post or building and just draw a line, you'll never have sloping photos again. Red-eye removal is easy to use too.

The controls for adjusting the brightness, contrast, colour, saturation and so on are extensive, and there are more ways to adjust the image than in most other photo editors. Is it possible to have too many photo adjustment tools? The number in PT Photo Editor is a bit overwhelming, and there must be around 50 sliders, but at least they're easy to use: you just click and drag them. Some of the controls are excellent, and you can use an eye dropper to pick a colour in a photo, for example, and apply effects to just that colour, increasing its saturation, adjusting the exposure or temperature and so on. Another really nice feature is the before and after views, which shows two images side by side as you use a tool on the image. It makes it easy to see the differences.

I like PT Photo Editor, and the tools for repairing photo faults are good. I couldn't live with it as my only photo editor because there are some things it simply can't do, but combine it with GIMP, for instance, and it makes for a powerful photo editing combo.

mm Roland Waddilove

A great tool for adjusting and repairing common flaws in photos

Vodafone Smart 4 Power

Vodafone looks to snag those who want LTE performance on a PAYG deal

DETAILS
- **Price: £120 PAYG**
- **Manufacturer: Vodafone**
- **Website: www.vodafone.com**
- **Required spec: Vodafone phone SIM**

Most people want phone brands that they're familiar with, though not all. Others just want the critical features and couldn't care less what logo adorns their handset.

That's precisely the customers that Vodafone addresses with its Smart 4 Power: those who want a phone that looks a bit like the latest HTC or Samsung but doesn't come with the same pocket emptying price.

It's got a whole range of them under the 'Smart 4' moniker, and the Power model is the stout one that ate all the 4G pies.

And initially picking the Smart 4 Power up, I can see how it would be hard to differentiate it from the premium products it's meant to ape.

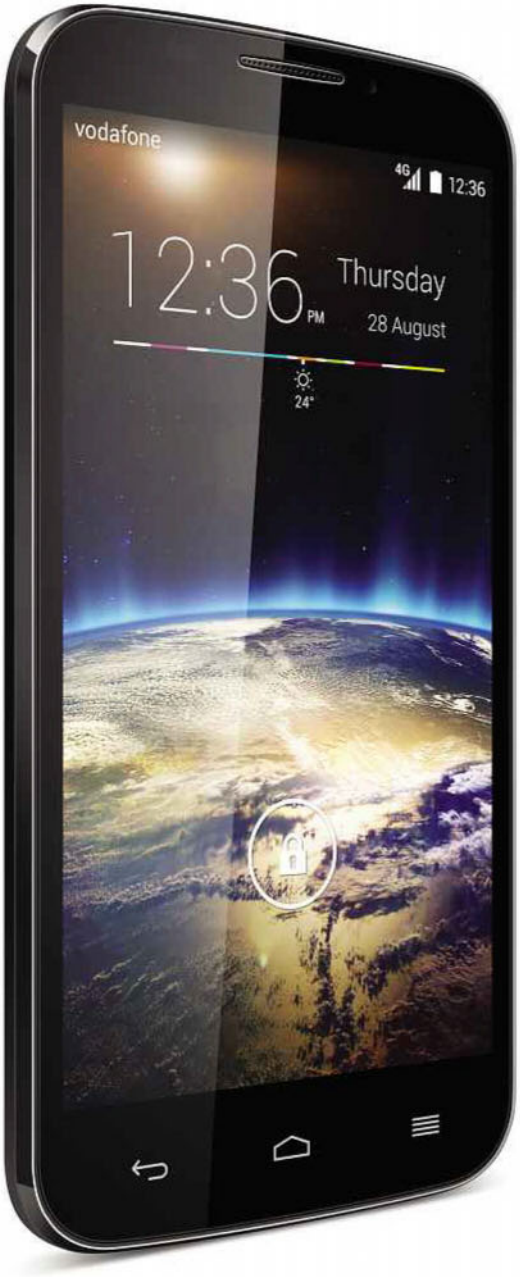
The large 5" screen, while not the highest resolution, is bright and colourful, even if the viewing angles aren't that good. The 1.3GHz quad-core Mediatek CPU makes Android 4.4 KitKat very responsive, and this design even supports high-end features like NFC and LTE. The era when the cheapest phones don't have Bluetooth and tethering is a distant memory, thankfully.

Yet these devices are built to a budget, even if they're potentially subsidised by the network to which the phone is locked. In this respect the cost-cutting exercise decided that the camera isn't wonderful quality, and there's no support for 802.11ac wi-fi, but that's true of 80% of the smartphones sold.

At 162g, it's a little on the heavy side, and the white back panel looks like a scuff opportunity if ever I saw one. But no phone is perfect, not even those made by Apple, and there's plenty to like here for someone who wants a large Android phone to avoid finding their reading glasses to read a text.

However, there are some choices that Vodafone made with this device when it had Alcatel construct it that just make no sense whatsoever. The one that really threw me was that it only comes with 2GB of flash storage, of which only 1.2GB is available to the user. Most phones that cost less than £100 come with 8GB, of which usually 5GB is usable, so the lowly amount in here isn't acceptable.

Vodafone's excuse, I'm sure, is that the Smart 4



Specifications	
Dimensions	**141 x 71.4 x 9.5mm**
Weight	162g
Colours	Black, white
Screen	5.0" qHD multi-touch screen
Camera	5MP + front camera
Platform (OS)	Android 4.4 KitKat
Chipset	1.3GHz quad-core, MTK 6582M, MTK 6290 (LTE modem)
Memory	4GB ROM + 1GB RAM, micro-SD slot (up to 32GB)
Battery Capacity	3000mAh
Networks	GSM/EDGE/3G/HSPA+/LTE-CAT4
Features	Wi-fi 802.11b/g/n (EAP-SIM), A-GPS, BT4.0 A2DP, NFC, HD Voice, FM radio w/ RDS
Box content	Charger, USB cable, headset, quick start guide (QSG), NFC QSG with two NFC tags

Power does come with a micro-SD slot, so you could expand available storage by inserting a card. That's true, but that's additional cost passed on to the purchaser, and some apps won't move to external storage space, for whatever reason. To the senior person in Vodafone who made that decision, sir, you mucked up royally.

While that wasn't a good choice, I'd suggest that the pricing Vodafone went with is significantly better judgement. For the reasonable build quality and the fact that Vodafone resisted the temptation of messing up Android, the £120 price seems very competitive for what technology is in the Smart 4 Power.

But just looking at the base price rather makes assumptions about how you use your phone, especially in respect of the LTE functionality, if you're lucky enough to be in the right geographic location to get that.

> **"The era of the truly nasty network-branded phones is well behind us"**

For those who want PAYG, the cheapest LTE-capable SIM from Vodafone will cost you £20 a month, for which you'll get 500 minutes, unlimited texts and 2GB of data. A better deal is at the next tier where you get unlimited call time and 4GB of data for £30. But that's contract level costs and you've paid for this phone. To get this service level on pay monthly costs £31.50 for two years, and the phone is free, which seems a better deal if you accept the 24-month lock-in.

With LTE, the cost of the phone isn't the major factor; it's more about how rapidly your data package will exhaust if you decide to watch TV using it, for example.

As nice as the Smart 4 Power is (and for £120 it's great really), I can't help thinking that anyone who wanted 4G on a budget might be better off with the new Motorola G LTE or even Vodafone's own Smart 4 turbo (£79).

What the Vodafone Smart 4 Power does underline, however, is that the era of the truly nasty network-branded phones is well behind us, and it's not necessary to spend £500 or more for something serviceable.

mm Mark Pickavance

A big KitKat LTE phone locked to the Vodafone network

GROUP TEST

Multi-bay NAS Units

A simple, single-bay NAS drive will serve most people perfectly fine. It'll serve and stream HD content, store backups and music, and even allow you to download content while everyone is asleep. But it's a lonely job being a single-bay NAS.

Therefore, to further improve reliability and performance, a NAS unit with two or more bays is needed. David Hayward takes a selection of multi-bay NAS units for a spin around the Micro Mart test track, to see which come out the best.

Multi-bay NAS Units

ZyXEL NSA325v2

DETAILS
- **Price: £99.99**
- **Manufacturer: ZyXEL**
- **Website: goo.gl/01rfVf**
- **Required spec: Two 3.5"/2.5" drives up to 4TB, Ethernet connection**

ZyXEL's NAS 3 series are designed to be simple yet effective. The NSA325 was a simple unit, but it did the job well enough, and thanks to the use of hih-quality components, you could pretty much guarantee that it would keep going for many years. Now, though, it's updated its range, and the NSA325 was the first to get a facelift.

The NSA325v2 is a two-bay NAS unit, which can take up to 4TB 3.5" or 2.5" SATA-2 or SATA-3 drives in either RAID 0 or 1 or JBOD configurations. There's a single gigabit Ethernet port around the back, alongside two USB 2.0 ports, pinhole reset and the power. The front of the unit houses a single USB 3.0 port, power button and the copy/sync button that's commonly found on the ZyXEL range of NAS units.

Inside, the 1.6GHz Marvell CPU and 512MB of memory keep the data flowing nicely and process the many features of the NSA325v2 without any hint of a drop in performance.

As for the design, there are some alterations from the previous NSA325. For starters, the look of the unit has changed slightly, with ZyXEL forsaking the grooved lines of the drive access front door to a polished, mirrored black effect and incorporating a nice aluminium-effect strip down the side for the various LEDs and control buttons. In addition, the swing and release door of the NSA325, which was a particular bugbear of ours, as it always felt very flimsy, has been updated to a push and slide removable cover, which we're pleased to say feels much better and a lot more solid than the previous model.

The drive bays are also updated, this time with a proper hot-swap-like tray and handle system, combined with a release button on the bottom. This makes removal, replacement and just general access to the interior of the unit much better, cleaner and probably improves the airflow around the installed drives. It's a little bigger than the previous model too, but rounded corners, sleek lines and a matt-black finish make it look like a more compact unit.

Once the drives are fitted and the NSA325v2 is hooked up to your network, it's simple enough to get everything up and running through the included software and the ZyXEL NAS Starter Utility. Also, the web configuration and admin side of things appears to have seen a facelift and is now a lot easier to get to grips with. But it's nowhere near as polished as the built-in Linux-based operating systems we've reviewed with the Synology or QNAP later in the group.

As with the previous version and most of ZyXEL's range, the list of things this unit is capable of is more than good enough for most users. The usual DLNA, FTP and web server offerings all are present, as well as smart device application support and phpMyAdmin/MySQL support. There's also a Hybrid Cloud feature present which, like most modern devices, allows you to create your own cloud system with access locally or remotely in a flexible and secure environment.

ZyXEL, then, has done a good enough job with the second version of this reasonably popular NAS unit. There could be further improvements to the OS layer and perhaps some more design tweaks here and there, but on the whole it's more than enough for the home user or even small office.

The v2 is a marked improvement over the previous version

Netgear ReadyNAS Ultra 4

DETAILS
- **Price: £214.58**
- **Manufacturer: Netgear**
- **Website: goo.gl/OJ3ieZ**
- **Required spec: Up to four 3.5" 2TB hard drives, free Ethernet connection**

The Netgear ReadyNAS Ultra 4 won't be the first choice of NAS for the home

However, if you want business quality kit in the living room, it's certainly more than capable

Netgear's ReadyNAS Ultra 4 is a bit of a beast of a NAS unit, with four internal, hot-swappable, 3.5" drive bays, each capable of holding a 2TB hard drive, which results in a total of a very impressive 8TB of storage, a pair of Ethernet ports and three USB 2.0 ports.

Powering this monster is a 1.66GHz single-core Atom CPU with 1GB of DDR2 SODIMM, which thankfully does an admirable job of shifting the data to and from the unit, as well as managing the expanse of storage available. It primarily comes as a diskless unit, but there are options available where you can purchase a couple of drives pre-installed, although you'll have to search around for these deals.

The build quality of the drive is reasonably sturdy, with the front door swinging open to reveal the drive bays within. The drive bay door, like some of the NAS units we've used before in the past, feels a little flimsy, and when fully loaded with four hard drives, the weight of the unit behind the door makes it feel even more fragile. However, as long as you don't try to move the unit by the door, there's little to complain about. There's a large aluminium carrying handle that sticks out of the back of the unit, much in the same way as a rack-mounted server. Although this tells of the unit's more professional target market, it makes it quite difficult for the home user to push it flush with the back of a wall, for example.

The large 90mm fan, which vents out of the rear, does a grand job of keeping the internals cool but is rather noisy – probably a little too noisy for the living room setting, if we're being honest here. And in relation to it sitting flush to the wall, the fan will obviously be blocked in this case.

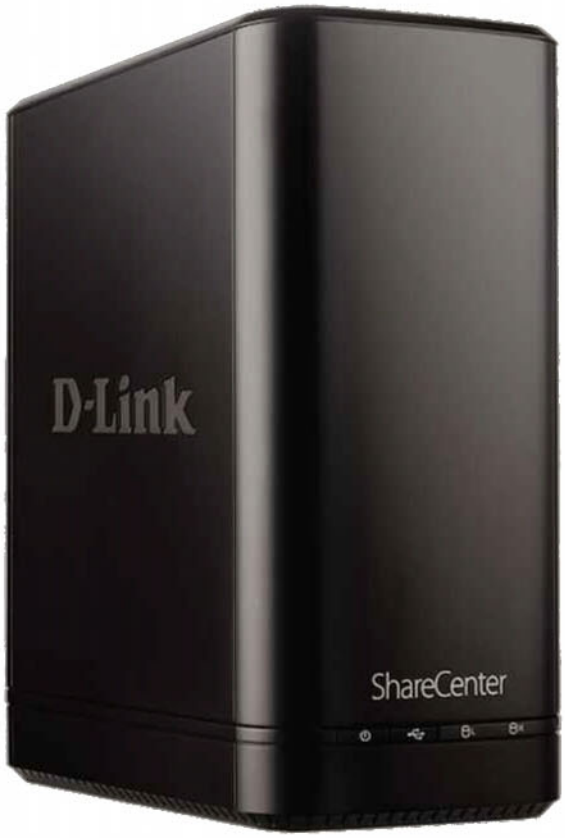
Two of the three USB ports are located around the rear of the unit and can be used to hook up external disks, printers and so on, all of which can be accessed and configured through the Netgear NAS software. The USB on the front of the unit can be used as a one-touch feature for backing up from the NAS to an external source or vice versa. Additionally, on the front is a handy LCD panel that indicates the IP address of the unit, as well as the status of the installed hard drives.

The ReadyNAS Ultra has an abundance of features that regularly appear in NAS units these days: DNLA, UPnP, iTunes server, BitTorrent client, SqueezeBox and Skifta are supported, and there's the ability to access the unit remotely via the ReadyNAS Remote software. Also, you have a choice of RAID configurations to set up, using RAID 0, 1 or 5, as well as the proprietary Netgear XRAID2, which uses the last disk in the array for redundancy in case of failure.

Although the ReadyNAS Ultra 4 is a fine NAS unit, it's not really the one you'd opt for in the living room. Despite its ability to serve media and provide thousands of hours of video and millions of images across the potential 8TB, its workplace origins become more apparent the more you use it. It's great for the workplace or home office perhaps, but it's just too large, expensive and noisy for general use.

D-Link ShareCenter DNS-320

DETAILS
- Price: £50.64
- Manufacturer: D-Link
- Website: goo.gl/3uLkex
- Required spec: Up to two 3.5" 4TB hard drives, spare Ethernet connection



▲ *The D-Link ShareCentre is a decent enough NAS unit, although a little slow*

▲ *It should suffice for most home network applications, though*

This D-link ShareCenter is a two-bay storage NAS unit that offers a straightforward solution at a very reasonable price.

You can purchase it as a diskless unit, but there are options for a preinstalled single 1TB hard drives or 2TB and two 2TB hard drives, which obviously increases the cost. The unit is equipped with a single gigabit Ethernet port and a single USB 2.0 port, along with several flashing LEDs in a strip along the front of the black, mirror-polished case. The CPU powering the unit is a Marvell 88F6281 at 800MHz, with 128MB of flash memory and 128MB SDRAM.

The installation was easy enough thanks to a step-by-step wizard that takes you through the process of getting your hard drive active and ready for copying media content to. An interesting element of the setup procedure is the configuring of an email address, which is used by the unit to message you, should anything start to go wrong, such as higher than normal temperatures or a failure in one of the components. You'll need to have your SMTP server information handy before you enter the information, which for some may be a little confusing, especially since the ShareCenter prides itself on making the setting up of a NAS very easy. However, it's not impossible, and with a little effort you get access to a nifty feature.

The build quality of the ShareCenter is rather good, although it's a bit of a nuisance for attracting dust, but aesthetics to one side, it feels reasonably sturdy. The rear exhaust fan can become a little noisy, and we had a problem to begin with where it seemed to be making everything vibrate, but a gentle prod soon fixed that, and although you could still hear it if you concentrated on it, it wasn't as loud as the Netgear ReadyNAS.

Naturally, there are plenty of features that come with this NAS and its web admin side. The usual arrangement of print server, scheduled backup, FTP server, iTunes server and UPnP/DLNA servers are available, as well as support for Apple Time Machine and an EasySearch utility for Windows machines. You can RAID the hard drives in JBOD, RAID 0 and 1, and SMART disk monitoring is enabled by default.

Although the ShareCenter looks very nice and won't be out of place among the other black, mirrored, polished units that litter our homes these days, it does have some setbacks that mar an otherwise good setup. For starters, it's not particularly quick; the tests we ran placed it at the bottom of the group, and navigating the web admin GUI seemed a little too clunky and slow for our liking. Writing a 4GB file came in at just 12MB/s, which is enough for watching most content, but if you're using this as a backup device, then you're going to be stuck watching the progress bar for a long time.

All in all, although the ShareCenter is a decent looking NAS unit, and it's simple to use and has a few welcome features, it's probably a little too slow for most users' tastes. And along with the rather slow interface, the more advanced user will probably grow somewhat impatient. For most, though, it's well priced and good as a starter home NAS unit.

QNAP TS-251

DETAILS
- **Price: £414**
- **Manufacturer: QNAP**
- **Website: goo.gl/OF1wNj**
- **Required spec: Two 2.5"/3.5" hard drives up to 4TB, free Ethernet connection, internet connection for apps and OS updates**

On its own, the QNAP TS-251 is incredible, but the price is simply too much for the average user

The operating system, however, is superb

We recently looked at the QNAP TS-251, which stood out on its own as a superb NAS unit suitable for the home and small office. However, we thought it would be a good test of the unit to pit it against its competitors, to see if it can still keep its razor sharp edge when faced with similar products.

Inside this two-bay NAS you'll find a dual-core Intel Celeron CPU at 2.41GHz and 1GB of DDR3L RAM (expandable up to 8GB), along with 512MB of flash memory. You can fit two 3.5" or 2.5" inch SATA drives in the hot-swap cradles, which slide into the unit and lock into position without any hint of snagging or the feeling of 'only just going to fit'.

The rear of the TS-251 features a HDMI port, a pair of gigabit Ethernet ports, two USB 2.0 ports and a single USB 3.0 port, along with the power and a pinhole reset. The front contains a further single USB 3.0 port, the power button, one-touch copy button, a strip of LED indicators and, of course, the two drive bays.

Driving all this is a customised embedded Linux operating system called QTS 4.1, which you can use to configure the TS-251 and set up the RAID levels for the inserted drives. The UI is large, colourful and extremely easy to use, and it offers you the ability to tweak the NAS unit to your particular specification or to delve deeper into its inner workings for a more advanced level of configuration.

The services the TS-251 offer via the NAS Management facility include the usual DLNA server, but with the added ability to hardware transcode video in real time up to five different devices simultaneously. There's also a myQNAPcloud wizard, which can publish the TS-251 NAS services to the internet. And in addition, there's an advanced file synchronisation tool called Qsync. Other standout features include a backup station, advanced music management and serving, a torrent download station and a built-in anti-virus layer to protect your files.

In addition to all that, there's also a VPN service, MySQL server, network-based surveillance station and server, and many more services via the QNAP App Centre, such as virtualisation, Dropbox support, Google Drive Sync, Drupal and even an app version of *Super Mario Bros*.

The installation of the TS-251, with two drives fitted, is very quick indeed. Within a matter of five minutes, we had a pair of 1TB drives wiped, RAIDed and were back on the login screen ready for a system update and the installation of some selected apps. Obviously, the Celeron CPU and 1GB RAM helps push the TS-251 along at a rate of knots and keeps it up to speed even when the device is pushed to the limit through serving media, transcoding, and when being used as a web and backup server.

The added benefit of being able to plug it directly into a TV with the HDMI port is a feature that other manufacturers should really start to look at. In fact, this NAS unit is only one small step away from becoming a fully functional media centre PC.

The conclusion is therefore pretty sound. Pitting the TS-251 against the other products on test proves that QNAP has an eye for the future of the NAS, and its only likely to get better over time. But the price is simply too much for most users to consider compared to the competition.

Multi-bay NAS Units

Synology DiskStation DS413j

DETAILS
- **Price: £254.90**
- **Manufacturer: Synology**
- **Website: goo.gl/FGsKuL**
- **Required spec: Four 3.5" 4TB hard drives for full spec, free Ethernet connection, internet connection for OS packages and updates**

It's certainly an odd-looking unit but one that works extremely well

There's more than enough here to expand and improve on, and the OS is fantastic

Synology has made a name for itself in the industry side of the computing sector with a selection of very good products that keep businesses around the world up and running 24/7. In recent years, though, it's started to leak the knowledge gained and the technology to home users – something we're rather glad of.

If we're being totally honest, the DS413j is a bit of an odd looking unit. There's something not exactly ugly about it but instead more retro in its appearance. It's almost like a really old HP printer or one of the first hard drives that used to sit external to the PC back in the 8086 days.

The DS413j is a four-bay NAS unit with a potential capacity of up to 16TB (if you fill it with 4TB hard drives). Around the back of the unit, you'll find a single gigabit Ethernet port, along with a pair of USB 2.0 ports and the power. The entire unit is driven via a Marvell Kirkwood, single-core 1.6GHz CPU, with 512MB DDR, which helps the data flow to and from unit with apparent ease.

There's no access to the drive bays through the front of the unit; in the case of the DS413j you have to unscrew the four thumbscrews at the rear and lower the backplate to reveal the horizontal drive bays. The backplate itself is where the two 80mm fans are located, and loading up the NAS unit with a full set of hard drives can get a little tight, especially the bottom drive bay, thanks to the frame the fans are placed in. It's not impossible, though, and with a little wiggling, we managed to get everything in place.

Overall, aside from looking like a 70s throwback, the build quality is very good. The unit is sturdy enough, the hinged backplate doesn't feel like it's about to break in your hands, and aside from a slight amount of flex in the casing, it's a good unit to work with.

Getting it up and running is surprisingly easy, since we initially thought the business-like origins of Synology would offer a less than simple, home user approach. As it turns out, we were proved wrong, and the accompanying software identified the NAS unit with ease, and through the Synology Assistant we soon had the installed drives prepared in a RAID array that was deemed the most effective for our setup. Furthermore, the GUI offers a nice windowed interface to the NAS unit, which can sit in the corner of your screen while you monitor its functions.

It, like the QNAP example previously, runs off a Linux-based GUI called DSM (DiskStation Manager). It's bright, easy to read and easy to use, and it can manage the DS413j without any hint of slowing down. There are also a number of packages available to download to further the usefulness of the NAS unit, which also makes it a great development platform for third-party developers to get their apps onto.

This is another NAS unit where a small push can easily turn it into a fully fledged media centre PC. Who knows – with the kinds of CPU and resources available in these newer NAS units, we could be seeing the next generation of media and game stations begin to surface. If the OS platforms continue to grow and improve, then there's plenty of scope for more elaborate setups.

Buffalo LinkStation 220DE

DETAILS
- **Price: £63.94**
- **Manufacturer: Buffalo**
- **Website: goo.gl/nQ7MxM**
- **Required spec: Two 2.5"/3.5" 4TB hard drives, spare Ethernet port**

Buffalo has in the past proved itself to be a formidable force when it comes to designing reasonably priced, technically balanced products. Whereas the bigger names go all out to present something that would look tasteful in the living room, Buffalo instead opt for a more subtle appearance and somewhat better performance.

This is certainly apparent with the LinkStation 220DE. This two-bay unit is capable of housing 2.5" or 3.5" drives up to a maximum of 4TB with supported RAID levels 0 or 1 or JBOD.

Inside, there's a Marvell Armada 370 800MHz dual-core CPU with 256MB of DDR3 RAM, helping to drive the DLNA, iTunes and Buffalo Private Cloud services that the 220DE offers out of the box.

The design is remarkably simple. The front bay door is removed, revealing the two hot-swap-like drive caddies, which slot in easily enough – although there's not a lot of space left for improved air flow. There's a single gigabit Ethernet port around the back of the unit, together with a single USB 2.0 port and power plug. The large 80mm fan vent dominates the remainder of the rear of the 220DE, and the side matt-black finished panels are well constructed and certainly feel solid enough.

In terms of design, that's all that can be said for the 220DE. It's not that it's awful to look at or anthing; it's just not designed to be a tabletop centrepiece to get your friends around to gaze at on a Saturday night. Obviously, then, it's how the unit performs that matters.

Our tests were run reasonably well. HD content was streamed without any problems, and thanks to the combination of the internal CPU and decent operating system of the 220DE, you can successfully stream up to four different HD videos to different devices without the dreaded circle of buffering appearing.

As a backup solution, the 220DE works well enough. The transfers were reasonably speedy, and provided you're not trying to back up the entire contents of half a dozen computers, you should be suitably satisfied with the unit.

The built-in GUI is simple enough to understand and works well when you get into creating RAID-level drives and setting up the various shares and so on. However, it's not quite as intuitive or as flash as the Linux-based GUIs we've now become accustomed to. In fact, where there's now a simple nested menu to one side and little information expanded into, we begin to wonder how on earth you can get anything done effectively. The desktop-type GUI may be more of a resource hog than a simple menu, but it's brought with it a vastly improved interface to help manage the unit and any connected users and devices. In the case of the 220DE, while the user interface may be easy to use, it lacks depth and as a result can be quite frustrating, especially if you've used a better UI.

The Buffalo LinkStation 220De isn't the best-looking unit to ever grace our desk, but it's functional and it works without well without the fancy bits other manufacturers have gone for. Saying that, it's very limited, in both hardware (with the single USB port around the back) and software.

The Buffalo LinkStation 220DE is a very simple NAS unit that works reasonably well but is limited

It's more than capable, though, for small home applications

Synology DiskStation DS413j

The Synology DiskStation DS413j may look a little odd, and it's a bit long in the technology tooth these days, but as long as it's still available and the DSM OS is still being upgraded, then it's more than enough for most users.

It has the right combination of technology, price and features, plus there's tons of potential for the future.

QNAP TS-251

Fair enough, the QNAP TS-251 costs just over £400, so it's bound to be something of a higher-end design. However, like the Synology, the thing that makes it stand out from the crowd is the built-in operating system.

If you can afford it and you want something that will no doubt last you a lifetime, then QNAP has you covered. The OS alone is worth it, and as with its co-winner, the potential is huge for the future of the NAS unit.

How We Tested

Each NAS unit was tested on a home gigabit network with up to four 2TB Toshiba 3.5" hard drives where possible. A single 4GB HD video file was copied across the network, to and from the NAS unit, and media was streamed to a PC, tablet, Xbox 360 and PS3 simultaneously.

	ZyXEL NSA325v2	Netgear ReadyNAS Ultra 4	D-Link ShareCenter DNS-320	QNAP TS-251	Synology DiskStation DS413j	Buffalo LinkStation Live
Price	£99.99	£214.58	£50.64	£414	£254.90	£63.94
Total HD Capacities	Up to 8TB	Up to 8TB	Up to 8TB	Up to 4TB	Up to 16TB	Up to 8TB
Number Of Drive Bays	2	4	2	2	4	2
Size	108 x 205 x 147mm	134 x 205 x 223mm	113 x 146 x 182mm	168.5 x 102 x 225mm	184 X 168 X 230mm	87 x 126 x 205mm
Number Of USB Ports	3	3	1	4	2	1
Avg 4GB Write Speed	50MB/s	64MB/s	12MB/s	70MB/s	55MB/s	35MB/s

Tech Origins
PDA

David Briddock highlights the key moments that defined the development of the Personal Digital Assistant

The path to a pocketable electronic personal organiser that could replace our diaries, address books and scraps of paper has been a chequered, multi-decade journey.

Psion

Cambridge-based Psion was one of the first off the mark. In 1984 it released the Pocket Organiser as a new kind of digital notepad. Healthy sales encouraged Psion to develop the idea further, and also prompted other to become interested in this marketplace.

In these early days Psion devices competed against MS-DOS handheld products, such as the Hewlett Packard 'Jaguar' HP95LX. Yet, despite a more familiar operating system, larger memory and better screens none managed to overshadow Psion's specialised software and rapid design evolution.

The later Psion 3 and Psion 5 models, with their QWERTY keyboards were especially popular. These models used an proprietary EPOC operating system, which later served as the basis for the Symbian operating system used by Nokia mobile phones. During this period the UK was considered to be at the leading edge of PDA research and development.

Newton Message Pad

Records suggest the term Personal Digital Assistant (PDA) was first used in January 1992 by then-Apple CEO John Sculley, when talking about Apple's forthcoming Newton Message Pad at the Las Vegas Consumer Electronics Show. The Newton featured a touchscreen and a stylus, that offered system navigation, handwriting recognition and various gesture controls – such as command shortcuts.

The Newton brought handwriting recognition technology to the public's attention, analysing and interpreting stylus strokes and marks with sophisticated learning software. However, this analysis demanded considerable processing power, which the handheld device didn't really have. This meant a slow, frustrating experience, and consequently Apple retired the Newton product line in 1998.

Despite its demise, the Newton remained a significant design influence. For example, the much celebrated Palm Pilot range, which arrived shortly after the 1995 acquisition of Psion by US Robotics, also sported a stylus and handwriting capabilities. However, Palm Pilots employed the novel Graffiti handwriting alphabet to improve recognition accuracy and speed.

Cellular Integration

In 1996 Nokia released its Nokia Communicator 9000, which successfully blended PDA and mobile phone technology via its hinged design and useable QWERTY keyboard. Later, in December 1999, a Company called Research in Motion (RIM) launched another keyboard-drive organiser-style phone it called the Blackberry. Both were immediate hits with the business community, which now had a single device for communications, contacts, documents and diary management.

Apps

Yet, just like the typewriter and single-purpose word processing machine, technology eventually caught up and overtook the PDA concept. This process really became obvious with the arrival of Apple's iPhone in 2007; its elegant design, tactile interface and large app collection effectively marked the end of the dedicated PDA era and began the age of the smartphone. Now, anyone with such a device can select the organisational and productivity apps that best suit their personal needs and lifestyle from a wide range. Apps developed by free-thinking companies and individual developers. **mm**

Psion Organiser

Newton Message Pad

Nokia Communicator 9000

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STEP 3 Choose whether to create an optional Zinio account

STEP 4 Enter your Apple ID password to confirm

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How-to Basics
Sharing An External Hard Drive

More basic networking this week, involving hard drives

Last week, we had a look at sharing a standard USB printer across the computers on a home network (i.e. the computers in your house that are attached to your router). This week, we'll have a quick look at sharing an external hard drive.

There are many reasons why you'd want to share an external drive – access to backed-up data, perhaps? Whatever the reason, the setting up is, in many ways, much the same as last week's printer setup. Let's take the first PC again, and share an attached external hard drive so that the second PC can access the data stored on it.

External HDD Sharing For Windows XP

Plug the external drive into the PC, and make sure that it's recognised and operating correctly. On our test machines it performed as it should and is using drive E in this instance. Right-click the drive and select 'Sharing and Security' from the menu, then click on the all too familiar 'If you understand the risks…' link.

You should now be looking at a window similar to the one where you shared the printer. All that's needed of you now is to tick the box next to 'Share this folder on the network', name the share as it will appear on the network (in our case we called it 'Ext'), tick the box to allow the other PCs on the network to have the permissions to change any of the files on the drive should you wish, then click OK.

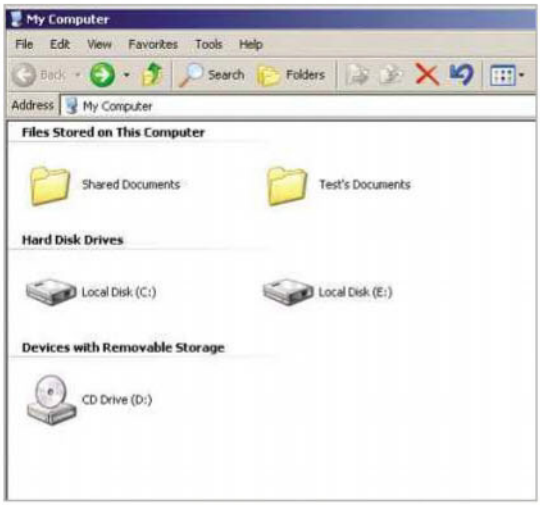
Windows will then stamp the files and folders on the drive with the relevant permissions. This may take some time, depending on the size of the hard drive and how much data you have stored on it, but once it's done, the drive will be displayed in much the same way as the printer was last week – with a hand symbol under the drive icon representing that the drive is now shared.

Accessing the newly created shared drive from the second PC is also done in much the same way as the aforementioned printer setup. You can click on Start > Run or press the Windows key, then type in the network name of the first PC as '\\networkcomputername\sharename'. Again, you'll have to substitute the networkcomputername part with the name of your first PC and the sharename part with the networked name of the shared hard drive, so in our case the end result would be \\windowsxp-test\Ext.

Note that what you enter isn't case-sensitive; we've only done this to emphasise the shared name we created. As before, depending on your setup, you may be required to enter

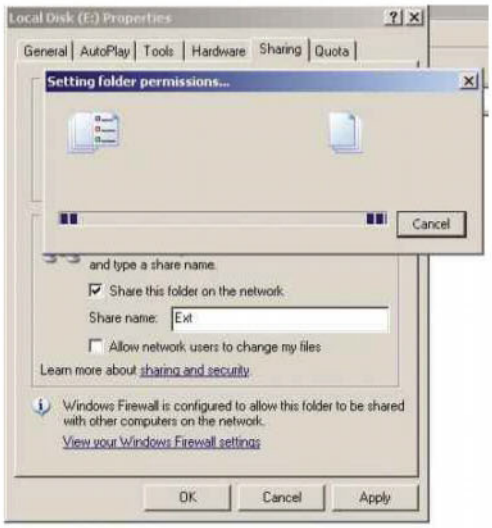
Windows 7 sharing is much nicer to look at…

… and makes sharing a lot easier



XP's sharing is a little bleak, but equally as powerful as Windows 7's

XP does offer more wordy explanations that its siblings



Stamping permissions may take some time

Windows 8.1 Sharing

While the main body of this covers Windows XP to 7, Windows 8.1 feels a bit left out. With Windows 8, the whole Microsoft HomeGroup element comes into force more than the previous versions of Windows, and it'll take longer than we have here to explain it all.

That being the case, we'll let Microsoft take it from here and explain, via its own website:

windows.microsoft.com/en-us/windows-8/share-files-folders

Remember, though, to keep it simple at first, then move on when the need arises.

authentication in the form of the username and password you set the share up with.

External HDD Sharing For Vista/Windows 7

To share an external drive on a Windows 7 test machine, we can follow the same route as the XP version, but with this being a more modern OS, the aesthetics are slightly different.

As before, plug the drive into your Vista/7 machine, and make sure that it's operating correctly. Right-click the drive icon in the Vista/7 version of Explorer and select 'Share With > Advanced Sharing'. This will bring up a slightly different window from the XP version, but it will essentially lead to the same result. What you need to do here is click on the 'Advanced Sharing' button, then tick the 'Share this folder' box and enter the appropriate network share name, 'Ext' in our case.

When you're ready, click on OK, which will return you to the previous window and display the network path to your newly created shared external hard drive. To access the new share, simply do the same as before on the second PC, whether that's XP or Vista/7, by entering Start > Run > \\networkcomputername\sharename again. As per the remark about permissions earlier, be prepared to enter the correct username and password.

A Quick Note

Now that we've got the hang of creating a share and accessing it, it's worth just making a couple of notes at this point.

What we've done here is offer the basic solution, while showing you what can be achieved. If you find yourself constantly entering usernames and passwords, then re-enter the share setup window from the steps above and check out the permissions tab/button. In here you can set a username with permanent access to the shared resource, so there's no need to enter any details when accessing it.

We won't go into permissions on this occasion, as there are already plenty of tutorials built into Windows and on the internet that detail this well beyond the limited space we have here. And we also thought that since you've got this far, and no doubt you're feeling quite smug, to use the resources attached to the first PC, then obviously that first PC must be powered up in order for the share and the resources to work – which goes without saying. But if you're looking at creating a shared device that's independent of a host PC, then you'll have to purchase a device that has that particular ability built in, such as a NAS unit or one of the many networking extensions that can be attached to the likes of a USB printer or hard drive, for example.

On another quick note, we're sharing full drives and devices here; if you want, you can also share a folder within a drive without necessarily sharing the entire dive. To do this, follow the same procedure as the sharing of the drive, but instead, right-click the folder of your choice and give that a relevant network shared name. This will make that folder and all subfolders (again this can be changed) accessible on the network – good for sharing games, media, images or work without the extra baggage of the entire contents of the hard drive.

"There are many reasons why you'd want to share an external drive"

Sharing A Second Hard Drive

By now you're probably an okay when it comes to sharing resources from the first PC, but let's say you install a second hard drive on the first PC. All you need to do is follow the same steps as before for the external hard drive, and make sure that you've given the share a unique network name, and more importantly one that you can remember.

The advantage of sharing a second hard drive (we're assuming this is an internal drive) is the speed of access when compared to the external hard drive, which will have to access the files via USB and usually comes with very poor access times when compared to an internal hard drive.

It's also considerably cheaper when alongside an external drive of the same size, and it won't suffer any loss of data should someone inadvertently unplug it during its operation. Whichever you choose to share over the network, remember that keeping the process as simple as possible will, in the end, cause you a lot less headaches and make the task of sharing somewhat more enjoyable. mm

If It Ain't Broke... Don't Upgrade It

We look at how to avoid unnecessary purchases and save yourself some much-needed cash

By its very nature, technology goes forward. It advances relentlessly, through innovation, research and production. Things improve and then improvements are made on those improvements.

This constant progression works in tandem with our consumerist, capitalist culture, where the need for seemingly endless growth means companies are constantly looking for new ways to make us spend our money. That, of course, means new products.

What I haven't mentioned, however, is invention. Why? Simply because as far as I can tell, this is exceedingly rare. For the most part, new products build on something that already exists. Every year, we have new smartphones, for example, with faster processors, sharper screens and better cameras. And every year, it seems the manufacturers of these devices struggle to come up with additional features to excite the public and, crucially, encourage them to spend.

Admittedly, I'm no student of economics or sociology, so I'm sure anyone more learned in these fields could easily pick holes in my limited analysis of this phenomenon. All the same, it seems to me that a lot of what's being pushed at us is unnecessary and simply doesn't justify getting your wallet out – not yet, at least.

> **"Companies are constantly looking for new ways to make us spend our money. That, of course, means new products"**

With that in mind, let's take a look at what could well be the most pointless upgrades right now. (Bear in mind that with all of these products, if you don't already own one, it's not an upgrade; it's a new purchase.)

Smartphones

Assuming your current handset isn't a budget model but rather a last-generation flagship design, then you probably don't need anything that's on the market now. The advantages you gain with a new phone are so minimal, you're basically just throwing money away.

Higher screen resolutions are frequently posited as a reason to upgrade, but surely we've reached a point where pixel density is going beyond what the human eye can perceive. Do the 720p smartphone displays of yesterday look vastly different to the 1080p ones of today? And as for 4k, would you even know you had it if it wasn't written on the side of the box?

The matter of resolution also applies to the camera. Unless you're a professional photographer or an amateur enthusiast of this art (in which case you'd probably want to use a DSLR anyway), the pictures you capture are likely to be in an informal setting. You don't need professional features to snap your mates in the pub or your cat wearing a slice of bread on its face. And it seems unlikely you're ever going to want to print these images as billboards or posters on the sides of buses, so smaller resolutions will be probably be sufficient. And, of course, the number of megapixels is not the be all and end all. What's more important is good light, and in the absence of that, the cameras of the current flagships don't fare much better than their predecessors.

Other factors, such as increased RAM and faster processors, are virtually irrelevant unless you're running certain games. Even then, the most graphically demanding titles should still run quite happily on a last-gen phone.

What does that leave us with? Storage instantly comes to mind. It's no surprise that many mobile devices don't have an SD card slot, because additional capacity is something you might genuinely want and need, and allowing you to upgrade that alone, without the requirement that you buy a brand new, shiny gadget doesn't make good business sense. Thankfully, some manufacturers (notably, Samsung) are more generous in this respect and offer SD card slots in their phones.

Beyond these things, it's all about gimmicks. Fingerprint scanners, heartbeat monitors and voice control are just a few of the things that are meant to convince you to spend, but my advice would be to keep your money and get yourself a SIM-

Top Upgrade: Solid-state Drives

Without a doubt, an SSD is the upgrade that will make the most difference to a PC's performance. Your OS will boot faster and programs will open in a snap. And now we're regularly seeing 256GB models for less than £80, so you can still have enough space for a decent selection of applications and games.

Top Upgrade: Hard Drive

Even though SSDs are much faster and lighter, the traditional hard drive still represents a useful upgrade path. Media file hoarders and anyone else working with a lot of large files will benefit from increased, not to mention good value, storage. And at the moment, SDDs cannot compete on this front.

only contract – one you can easily cancel whenever you really do need to upgrade.

Monitors

Let's make another assumption: that your current PC monitor was made in the last five years and isn't a CRT. Let's also take it as given that it supports 1080p resolutions.

Needless to say, if it doesn't meet these criteria, you should seriously think about upgrading as soon as you can afford it. In fact, even if it is a 1080p flat panel, there's still good cause to get a new one. Because you tend to sit relatively close to your monitor when you use your PC, you'll be able to appreciate higher resolutions such as 4k in games and movies.

There's also the possibility that you might want a larger display or additional ones for multi monitor setups. These, as well as things like picture quality and response times, are certainly good reasons to buy a new screen, if you old one is deficient in any way.

What's less convincing are 3D and touch-screens.

Five years on from James Cameron's movie *Avatar*, 3D is at best a novelty and at worst an annoyance. In the same way that people are increasingly opting for the 2D option at the cinema, we've seen gamers turn away from the glasses-free 3D of the Nintendo 3D. Indeed, it was this feature's problems that led to the release of the 2DS (a wise move, perhaps, apart from the fact it did away with one of the console's key attractions: the folding form factor).

> **“You don't need professional features to snap your mates in the pub”**

None of this is surprising when you think about it. 3D's biggest problem is surely that it's just not very good. Things on 3D screens and monitors rarely look like they're three-dimensional objects. Instead, they look like staggered two-dimensional layers, so there is an illusion of depth, but in no way is it realistic. Such imagery can be interesting to look at, but when you do get a 'wow' moment in a 3D movie or game, surely that's pulling you out of the experience, rather than immersing you in it. It's only when you forget about the 3D that you're usually able to enjoy the media you're consuming.

Touch-screens, meanwhile, while immensely useful on mobile devices and things like self-checkout tills at supermarkets, are a pointless luxury for a home PC monitor – a fact that no doubt contributed heavily to the failure of Windows 8. Using one requires you to stretch out your arm and lean over two perfectly functional and in many ways superior peripherals: your keyboard and mouse. Not only is this physically uncomfortable, you then find yourself potentially having to deal with fingerprints on your display.

Neither of these technologies is worth upgrading for, and if you are due a new screen anyway, then you'd be better off avoiding them to save some cash.

RAM

As with many things, whether or not you need to upgrade your RAM largely depends on what you use your computer for. For the typical home PC user, though, 4GB is usually enough, as our sister mag PC Pro showed in an article entitled 'How much RAM do you really need?' (April 2014). Through various tests it was shown that for most common computing tasks, this amount of memory is perfectly sufficient. The results of these tests also indicated that as you increase the RAM beyond that point, you see diminishing returns, meaning the improvement in performance soon becomes negligible or even non-existent.

Of course, there are situations when having 8GB or even 16GB of memory is actually useful. Chief among them is image and video editing. Programs like Adobe Photoshop and Premiere can use vast amounts of memory if it's available, and you'll see real-world improvements here. The same goes for 3D rendering software and other design applications.

But most people don't do these things. Even games generally don't benefit from more than 4GB of RAM. Probably the only reason to upgrade, other than photo and video processing, is if you're particularly keen on having 20 tabs open in your web browser, while you listen to Spotify, read PDFs, write a letter in Word and edit a spreadsheet in Excel – all the while running a game on a second monitor and perhaps watching iPlayer on a third. Basically, if you're asking your computer to multitask a lot and on a regular basis, then getting some more RAM might be a good idea. Even then, though, 8GB is probably more than enough.

Of course, if you're buying a laptop, then you might want to get as much memory as you can afford, because they can be difficult, if not impossible, to upgrade later.

Top Upgrade: Mechanical Keyboards

You don't have to be a professional typist or a gamer to benefit from a decent keyboard. Mechanical keys are not only more responsive, more comfortable and better for your fingers, but they also offer an undeniably satisfying click when you press them. Perhaps that's doesn't sound like the greatest reason to spend your cash, but once you've tried one, you'll understand the appeal.

Windows

Again, whether you need to upgrade here depends on what you currently have and what you use your PC for. If you're running Windows 95 and you only ever use Microsoft Paint, with no connection to the internet or any other networks and, most

Top Upgrade: Routers

For everyday internet browsing, email and even HD movie streaming from sites like Netflix, an N-class router should suffice. Indeed, if your internet usage isn't being slowed down by your wireless connection, then you don't really need to upgrade (even if you're using a pre-N router). If it is, however, or if you have high-speed broadband and do a lot of file transfers over your home network, then the time for a new router has come. Find one with gigabit Ethernet ports and AC-class wi-fi, and you won't be disappointed by the performance.

importantly, you're perfectly happy with the performance you're getting, then you don't have any need to upgrade.

More likely, though, you could be one of the millions of people still running Windows XP. Similarly, if you're happy with what it does and you don't need any new features from your OS, then it should be fine – as long as it doesn't have an internet connection.

> **"3D's biggest problem is surely that it's just not very good"**

Because Microsoft has now ended support for XP, any new vulnerabilities found in this operating system won't be patched. To be on the safe side, you'll want to install a new operating system, but does it really have to be Windows? Linux distributions are becoming increasingly easy to install and run, and for the majority of tasks, they do everything they need to.

Of course, you might want to stay with Windows, in which case an upgrade to Windows 7 would certainly be advisable. If you're already on that OS, though, the step up to Windows 8 is undoubtedly one you can skip past. It does offer some performance improvements, but the radical UI makes it an unappealing prospect and, ultimately, a waste of money.

Whether or not Windows 9, when it arrives, will justify upgrading depends largely on its price. At the time of writing, there are rumours that it could be offered to existing Windows users for free or at least extremely cheaply (which Mark Pickavance addressed in issue 1328). If that does turn out to be the case, then you have no reason not to upgrade. Otherwise, you can probably just stick with Windows 7 for a while longer.

Office Software

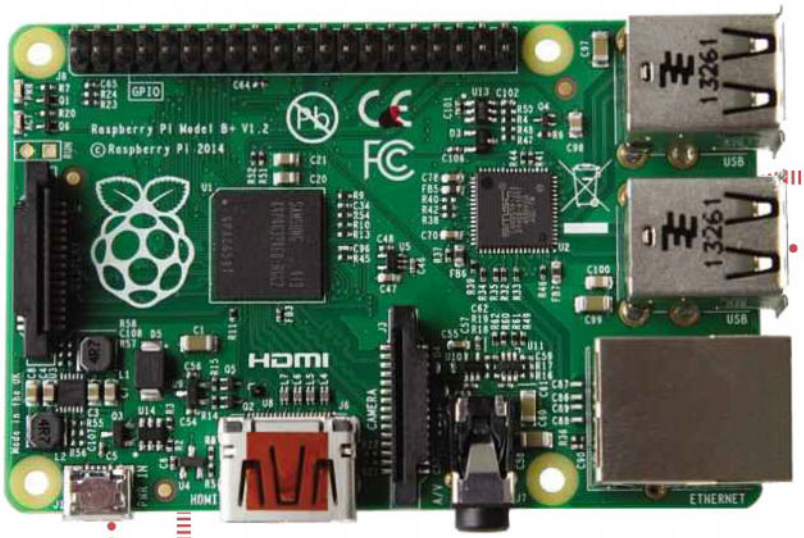
There have been many different versions of Microsoft Office over the years, but have any of them offered anything much better than their predecessors? It would seem not. The most dramatic change to this software since its inception is probably the introduction of the divisive Ribbon interface.

Even if you do like the Ribbon, it's not really worth upgrading from an earlier version of Office to get it. Assuming that your current office suite (whether it's a Microsoft product or not) does everything you need, then there seems little reason to change it.

Of course, Microsoft Office is a well-crafted and advanced application, so there will be features that you can't get elsewhere. However, I'd be willing to bet money that the majority of people don't use them and likely aren't even aware they exist. For them, a free application like OpenOffice or LibreOffice will provide everything they require. Plus there are cloud-based options like Google Docs and Zoho to consider. With these you get the convenience of being able to access your files from anywhere you have an internet connection, including phones and tablets. And if you wanted to add cloud storage to OpenOffice or LibreOffice, you could simply save your files to a service like Dropbox or Google Drive. **mm**

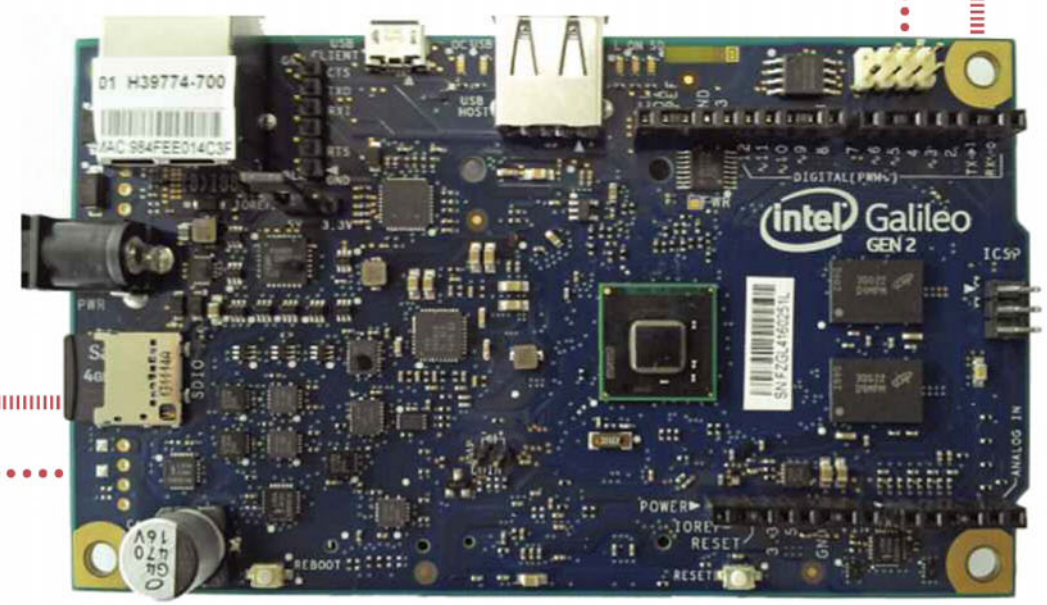
Top Upgrade: USB 3.0

If you have a laptop with USB 2.0 only, then you're probably out of luck. Desktop users, however, are more fortunate. Stick a USB 3.0 add-on card into a PCI Express slot, and you'll have access to a number of benefits. Firstly, of course, USB 3.0 external hard drives and flash drives can achieve much greater transfer speeds than USB 2.0. Secondly, because of the increased electrical power of these ports, things like mobile devices will charge much faster from them (if they support fast charging). Thirdly, USB 2.0 AC wi-fi dongles are bottlenecked by the limitations of this port, so you'll need USB 3.0 if you want to truly benefit from the speeds that this wireless standard can offer.



Raspberry Pi Model B+ **Vs** Intel Galileo Gen 2

David Briddock compares the new Raspberry Pi Model B+ against Intel's Galileo Gen 2



Over recent months there's been a flurry of activity in the area of low-cost development boards aimed at kids, educators and makers.

For a number of years, the Raspberry Pi has epitomised this domain, and now the Model B has had a refresh.

But others want to steal some of the limelight, including Intel, which has just to rolled out a modified version of its x86-compatible Galileo board.

What do these updated boards offer and how do they compare? Let's find out.

Intel Galileo Gen1

The first generation Galileo appeared in October 2013. It featured the new Quark X1000 system on a chip (SoC) processor, a departure from Intel's MinnowBoards, which are based around the faster but more expensive and power-hungry Atom processor.

The Quark SoC is a single Pentium ISA-compatible 32-bit CPU with one core, one thread and clock rates of up to 400MHz.

Galileo boards include a mini-PCI Express slot, 10/100 Ethernet, micro-SD slots, plus serial and USB 2.0 ports. As for software, the board runs Linux, currently the Yocto 1.4 release (**yoctoproject.org**), and device programming can take place on a Windows, Mac OS X or Linux PC.

Nothing too spectacular you might be thinking, but Intel is keen to emphasise another key feature of the Galileo board.

Arduino Focus

At the launch, Intel remarked that the Galileo is, "Just the first in a line of Arduino-compatible development boards based on Intel architecture" – a family of boards, it said, aimed at artists, designers and DIY enthusiasts who don't necessarily have a technology background.

By ensuring Galileo is out-of-the-box compatible with both Arduino-designed expansion boards and the Arduino development environment, Intel hopes to attract the attention of makers and educators while maintaining a close relationship with the Arduino community.

Intel backed up this vision with an 18-month programme to donate 50,000 Galileo boards to 1,000 universities. And it wants to help introduce maker-style lessons into the curriculum.

Intel is also a founder and platinum sponsor of the Maker Education Initiative (**makered.org**), whose mission is to, "create more opportunities for all young people to develop confidence, creativity and interest in science, technology, engineering, math, art and learning as a whole through making."

> **"The four USB ports on the B+ are a welcome update"**

Intel Galileo Gen2

The second generation offers a number of subtle enhancements specifically targeted at the maker community.

Twelve of the 20 GPIO pins are now fully native for greater speed and improved signal handling. There are two types of USB connector, while the Universal Asynchronous Receiver/Transmitter (UART) serial connectivity now adheres to Arduino hardware and software specifications.

There are quite a few power options too. In addition to the 7-15V main power connector, a Galileo can run using the Power over Ethernet (PoE) standard, plus it has a 3V button battery option.

The PoE capability (**goo.gl/uTgM7s**) is an important feature if you're pushing for acceptance in the Internet of Things (IoT) arena (see boxout). And Intel is certainly trying to do that. PoE means a single cable can provide both power and data connectivity. Of course, USB can do this as well, but PoE allows for much longer cable lengths.

Raspberry Pi Model B+

Just like the Galileo Gen2, the Model B+ is all about incremental changes rather than a radical overhaul. After all, with over 2.5 million Raspberry Pi sales, it doesn't make sense to rock the boat too much.

It's still centred around the Broadcom BCM2835 700MHz processor and its much admired graphics capability. The dual-core VideoCore IV® Multimedia co-processor, Open GL ES 2.0, hardware-accelerated OpenVG and 1080p H.264 high-profile decode can deliver very impressive graphical performance figures.

The 512MB SDRAM memory is the same as the Model B, which is a little disappointing to those hoping for a 1GB option to run memory intensive apps and games.

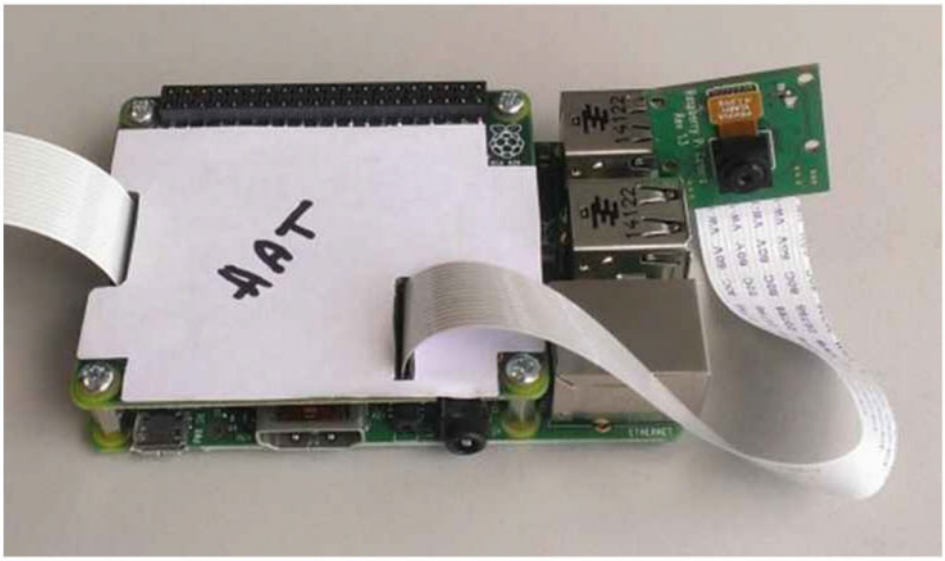
So the Model B+ is evolutionary not revolutionary. Nevertheless, despite the subtlety of the changes, there are some important differences. Here's what's changed, starting with the most visual differences.

Model B+ Changes

The underlying circuit board is still credit-card sized, but it now has rounded corners. There are also four mounting holes

Intel Galileo Gen2 Specs

- Intel QuarkTM SoC X1000 at 400MHz.
- 32-bit Intel Pentium compatibility.
- 256MB DDR3.
- 8MB NOR Flash.
- 8KB (programmed via the EEPROM library).
- USB 2.0 Host (standard Type A).
- USB 2.0 Client (micro-USB Type B).
- Mini-PCI Express slot.
- RJ45 Ethernet.
- 20 digital GPIO (12 fully native speed).
- 6 analogue inputs.
- 6 PWMs with 12-bit resolution.
- 1 SPI master.
- 2 UARTs.
- Power jack (7V to 15 V).
- Power-over-Ethernet (PoE) support.
- Optional 3V coin cell battery operation.
- Four 4mm mounts for Arduino boards .
- Dimensions: 124mm × 72mm.



Model B+ HAT

positioned in a square arrangement, which ensures the Model B+ will be securely attached to its host device or enclosure.

The four USB ports on the B+ are a welcome update. With only two ports on the Model B, adding a keyboard and mouse meant no free USB sockets for a wi-fi dongle or external drive.

One of the most important changes is the extended GPIO socket, which now has 40 pins. Fortunately, the first 26 pins are identical to those on the Raspberry Pi Model A/B, so existing add-ons can still be attached. The 14 extra pins enable a smarter setup (as we'll see later).

The analogue and composite video connector has been ditched in favour of a single four-pole connector. And the power socket has been repositioned to be the same side as the HDMI port.

Another significant change is the move to a micro-SD card slot, which will host the Pi's operating system. The latched mechanism ensures the card cannot fall out. However, it does mean existing full-sized Model A or B SD cards can't be used.

Under the covers, the Pi's power management has been redesigned. This allows the B+ to power four USB peripherals (including an external 2.5" hard drive) without requiring a mains-powered external hub. And the lower overall power consumption, from 750mA to 600mA, will mean extended battery life for mobile Raspberry Pi projects.

Something that hasn't changed is the price. The Model B+ is available from various suppliers at around £25.

Model B+ HATs

A few weeks after the Model B+ announcement, the Raspberry Pi Foundation blogged about another new initiative.

This time the focus was on the extended GPIO pins. To improve on the free-for-all, anything-goes scenario for add-ons the foundation decided to release a set of guidelines. These describe how the extra pins can enhance the user experience by delivering a 'plug-and-play' capability.

Now there's something called Raspberry Pi Model B+ HATs, an optional set of hardware and software rules for add-on boards. HAT stands for Hardware Attached on Top.

The idea is that a HAT-compatible expansion board will be recognised by the host Raspberry Pi operating system. This in turn means it can be automatically configured, for instance by transparently installing the necessary drivers – a great help for users with limited Linux experience.

In overview, a HAT is a rectangular (65mm x 56mm) board that has four corner-positioned holes, which align with the Model B+ mounting holes. The 40W GPIO header supports the specified auto-configuration system that allows hands-free GPIO and driver setup.

Two GPIO pins, namely ID_SD and ID_SC, are reserved for an I2C compliant Electrically Erasable Programmable Read-Only Memory (EEPROM). This EEPROM store holds the board manufacturer's information, GPIO setup, plus a 'device-free' fragment, which describes the attached hardware and thus allows Linux to automatically load the required drivers.

As you'd expect, the HAT specification is open source and available on GitHub (**github.com/raspberrypi/hats**), so anyone can design HATs for the Model B+. And although it's entirely optional, the Raspberry Pi Foundation is encouraging everyone to use this approach and make life easier for Pi owners.

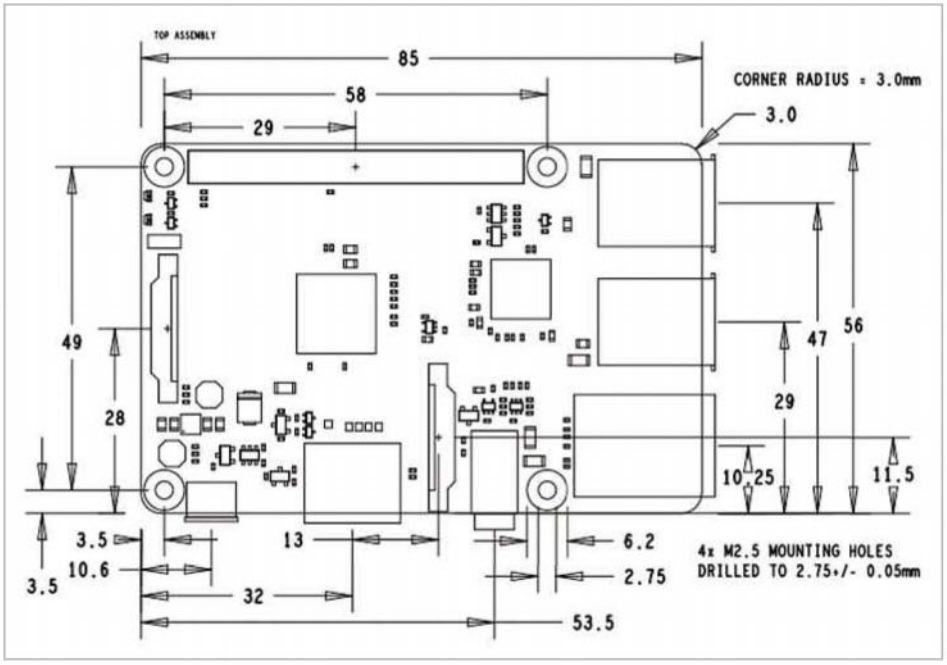
As it's only just been launched, it's too early to know how successful the HAT initiative will be, yet we'd be surprised if it wasn't embraced by the majority of the bigger players in the Raspberry Pi add-ons and accessories marketplace.

A number of companies, like Pimoroni (**goo.gl/9aeDpe**), have created new-style cases for the Model B+. Some already take into account that it may be wearing a HAT.

> **"Intel is banking on support from the large and active Arduino community"**

Raspberry Pi Mobel B+ Specs

- Broadcom BCM2835 700MHz processor.
- 512MB SDRAM.
- HD 1080p video output.
- Composite video output (PAL / NTSC).
- Stereo audio output.
- Ethernet port 10/100 .
- RJ45 socket.
- Video/Audio HDMI 1.3 and 1.4.
- 4-pin audio/composite Video Out jack (3.5mm).
- 4 USB 2.0 ports.
- 15-pin MPI CSI-2 connector for Raspberry Pi HD Video Camera.
- 15-pin serial display interface connector.
- 40-pin connector for GPIO and serial buses.
- Micro-SD card slot.
- 5V power supply via micro-USB jack.
- Dimensions: 85 x 56 x 17 mm.



Raspberry Pi Model B+ layout and dimensions

Making A Comparison

How do these two boards fare against each other? More specifically, what sort of things should you take into account before deciding to buy one or the other?

Now we've covered the hardware side of things, let's consider their respective target markets and community support.

Internet Of Things

These days, everyone has their eye on the IoT marketplace, where billions of small, low-cost. internet-connected devices perform dedicated functions.

Intel is no exception, and this second generation of the Galileo board is its latest attempt to capture a share of this space.

In terms of IoT flexibility, the Galileo seems well placed. The x86 chip runs virtually any operating system, and there's an enormous range of development languages, libraries and tools. Also, the PoE capability is a key IoT feature, and the built-in Arduino hardware and software compatibility only adds to its appeal.

Yet Intel has been slow off the mark; low-cost AMD-based architecture boards, with their low-power capabilities, have largely dominated the IoT scene so far. And because the Galileo Gen 2 is over 25% larger than the Gen1 board, it's unlikely to find favour with the quickly growing wearable maker community.

The Model B+ certainly has price in its favour, yet there's nothing to suggest it will attract droves of IoT makers or turn the heads of Arduino enthusiasts – at least not until someone develops an Arduino-compatible HAT.

In reality, this isn't a great concern to the Raspberry Pi Foundation, since the Pi Compute Module, announced in April 2014, seems to be a far more flexible alternative for IoT projects.

Community

In reality it's unlikely Intel has any chance of achieving the media interest and worldwide community support enjoyed by the Raspberry Pi. We can only congratulate the non-profit Raspberry Pi Foundation for generating this global following in such a relatively short time.

The latest Model B+ has a logical and well thought out design. It's an update aimed at cementing the love affair with the Raspberry Pi family, and within days of the launch, the response from both the press and Pi community was overwhelmingly positive.

Meanwhile, Intel is banking on support from the large and active Arduino community. It hopes they'll appreciate the default pin compatibility with the Arduino Uno R3 shields and features like the tweaked serial input/output.

It seems like a good plan. But unfortunately for Intel it's not that simple. There's already a multitude of Arduino boards out there: highly capable boards that already have a solid following within the maker community. So the question is: how does Intel raise the community profile of its Galileo boards?

One option would be to compete on price. At the time of writing, the retail price of the Gen2 isn't fixed. However, the single-board price is expected to be around $60 – a figure many potential buyers may consider to be a little high.

There's no doubt a $30-35 Galileo Gen2 board would shake up the marketplace much more effectively and put the Gen2 in the same price bracket as the Raspberry Pi.

The Winner Is?

Is there a clear winner here? Well, it depends on who the prospective customer might be.

The Raspberry Pi is a tried and tested product. Its ability to introduce youngsters (and adults) to the world of digital computing, electronics and maker projects has been nothing short of remarkable, and the educational establishment take-up is equally impressive.

Yet in some ways the Model B+ changes may be rather too subtle. For instance, an increase in the Raspberry Pi's memory to 1GB would widen the software app and development language possibilities.

On the other hand, the x86-based architecture and Arduino compatibility of the Galileo is of more interest to those who've already gained a degree of hardware construction and software programming experience. And it could yet prove to be a great open-source community platform.

What is the Internet Of Things?

The Internet of Things (IoT) can be seen as the marriage of computing, sensors and networking. It forms a large umbrella that encompasses many associated technologies like Machine-to-Machine (M2M) communication.

IoT applications are wide and varied. These include monitoring weather and traffic flows, metering domestic and industrial power demands, capturing sport and fitness activity data or keeping a vigilant eye on patients with health problems and the elderly.

Futurist predictions suggest we'll see live in smart cities, travel in intelligent cars and own self-aware houses. Nevertheless, there are many hurdles to overcome such as recognised standards, scalability problems and data security.

However, with a marketplace worth trillions of dollars, the challenges are definitely worth tackling.

HEDT Powerhouse

X99 And Haswell-E

Mark Pickavance looks at the new high-end platform from Intel and marvels at the unleashing of all that power

Most of Intel's current products are focused on delivering exceptional power management or quiet but powerful desktop solutions. But every couple of years, it allows itself to indulge in technology that's unashamedly fast and loud.

With a new chipset and processors to match, Intel looks set to make the enthusiast system builder swoon once more with a new HEDT (high-end desktop) CPU.

Welcome to X99 and the Haswell-E generation, where power and performance take centre stage once more.

Two Hearts One Mind

Whereas the desktop LGA 1150 platform chipset gets a refresh each year, the performance end of Intel's range hasn't see an update since X79 in 2011, and X58 was three years prior to that.

X99, codenamed Wellsburg, offers a modified version of the LGA 2011 socket (v3), but in many other respects it's not hugely different from its X79 predecessor.

It still uses the DMI 2.0 bus interface, has a bus speed of 4Gbps and eight PCI Express 2.0 lanes (up to 40 lanes total).

Intel has also at last ditched mixing SATA 3Gbps and 6Gbps, going exclusively for the faster operation on all six integrated ports. X99 also supports 14 USB ports as before, but at least six of them are now USB 3.0, negating the need for third-party chips to supplement this feature.

Along with the usual suspects, it's still pushing Thunderbolt in its launch presentation, with a Thunderbolt Ready sticker, seemingly unwilling to accept that only Apple is interested in using this technology.

On the basis of these modest changes, you might reasonably expect to drop an older LGA 2011 processor into a new X99 motherboard and enjoy the more concurrent feature set. But sadly, you can't.

One of the most infuriating aspects of Intel's hardware history is its insistence on retaining a socket's physical design while changing the underlying technology. It did this with LGA 775 outrageously, causing many moments of confusion when users assembled a CPU and motherboard gloriously unaware that they'd never work together.

Back to its old tricks, on X99 the LGA 2011 socket returns for another outing but is entirely incompatible with the previous version of this interface for numerous reasons.

Probably the biggest one of these is that in current Intel CPU designs the memory manager is located inside the chip, and it's done by the motherboard chipset. Because of this, any older LGA 2011 processors don't have the DDR4 memory manager they'd need to make an X99 board work. And conversely, for precisely the same reason, a new Haswell-E generation LGA 2011 CPU won't function on an X79 motherboard, because it doesn't have a DDR3 memory controller.

Intel has been marginally smarter than before in this context, having changed the keystone elements around the socket so that you can't insert the wrong type of LGA 2011 chip into a motherboard that won't support it electronically.

Technically, this is the third incarnation of LGA 2011 (also called Socket R), as it was revised previously for Ivy Bridge-EX (Xeon E7 v2) after initially being designed to support Sandy Bridge-E/EP and Ivy Bridge-E/EP CPUs.

Therefore in many respects the value of X99 isn't what it brings to the table, but that it allows the new Haswell-E class processors to run, and they're a definite speed-step from the CPUs that came before it.

Hello Haswell-E

On the desktop platform Intel would normally be expected to provide low, middle and high-end possibilities from the outset,

New Intel Haswell-E Processors			
Model	**Intel Core i7-5960X**	**Intel Core i7-5930K**	**Intel Core i7-5820K**
Platform	Haswell-E	Haswell-E	Haswell-E
Process	22nm	22nm	22nm
Cores/Threads	8/16	6/12	6/12
Cache	20 MB L3	15 MB L3	15 MB L3
Core Clock	3.0/3.3 GHz	3.5/3.9-4.0 GHz	3.3/3.6-3.8 GHz
Socket	LGA 2011-3	LGA 2011-3	LGA 2011-3
TDP	140W	140W	140W
Memory	DDR4-2133 MHz	DDR4-2133 MHz	DDR4-2133 MHz
Chipset	X99	X99	X99
Cost	£740	£425	£300

but on the HEDT range it's just offering variations on the common theme of 'fast'.

The initial Haswell-E series has three variants, all Core-i7 level: one 'X' extreme chip and two 'K' class devices. I've detailed the i7-5960X, Core i7-5930K and Core i7-5820K in a separate table, but they're all very impressive chips, judging by their specifications. All these initial designs are unlocked, so expect some extreme tweaking once these get out into the wild.

"On the basis of these modest changes, you might reasonably expect to drop an older LGA 2011 processor into a new X99 motherboard... But sadly, you can't"

One twist that's worth noticing is that the X99 chipset supports "up to 40 PCIe lanes", but actually it's the CPU in this layout that does the real handling of lanes.

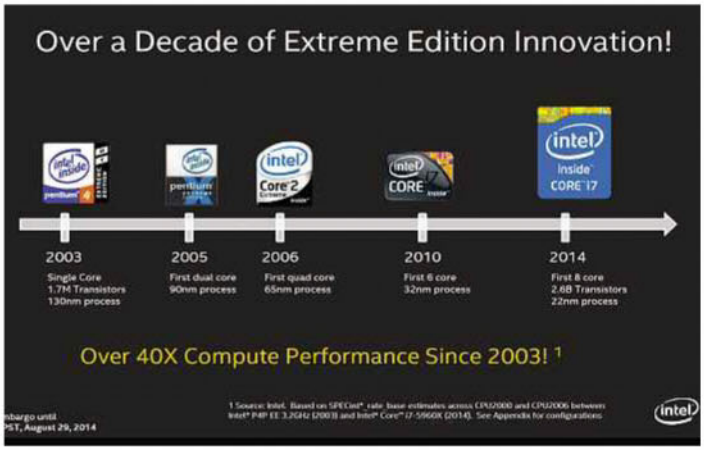
Because of this, only the top-end processors actually have 40 lanes, and the i7-5830K. for example, comes with only 28 lanes. That's not likely to be a problem unless you wish to go all-out on a multi-GPU configuration. Those wishing to drive four discrete GPUs with 8x PCIe connections or a dual 16x setup will need a 40 lane capable chip.

Undoubtedly the i7-5960X is the star of this show, offering octal cores and threading for no less than 16 simultaneous executions. But with that much simultaneous processing in action, Intel wisely reduced the clock to a 3GHz base and 3.3GHz boost to stay within the 140 watt envelope it defined for this platform.

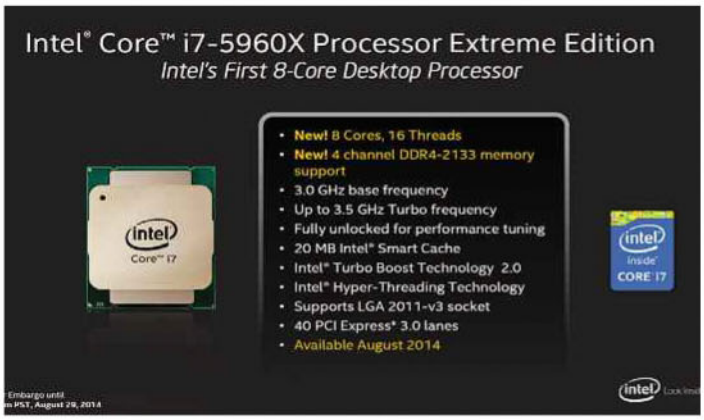
That's just an extra 10 watts more than the previous generation, though performing most tasks, the chips are probably going to consume much less than that.

Lubricating all these cores and threads, a large section of the Haswell-E silicon is allocated to 20MB of L3 cache, and unlike the desktop Haswell part, there's no room allowed for an integrated GPU of any variety.

The space for the extra cores and cache is mostly due to the die shrink from the 32nm of the Sandy Bridge-E era processors to the 22nm that Haswell-E is manufactured at. However, it should be noted that in late 2013, Intel released three Ivy Bridge-E designs for the X79 platform, spearheaded by the i7-4960X, which were fabricated at the same track thickness of 22nm. These chipsets contained some 1.86 billion transistors and had a die size of 256.5mm², whereas the new Haswell-E has a staggering 2.6 billion parts covering 356mm² or roughly 40% more silicon.



In the past 11 years Intel has gone from the Pentium 4 with 1.7 million transistors to the latest Core i7 will more than 2.6 billion on a single chip.



In terms of base clock speed and boost, the new Intel Core i7-5960X doesn't break any records, but it does have 20MB of L3 cache and can process 16 threads simultaneously.

The ASRock X99 WS is typical of the full-sized EATX motherboards that are being released to support the X99 chipset. It has no less than five 16x PCIe slots, and with the right processor can offer four-way AMD CrossFireX or Nvidia SLI. Some boards have seven PCIe 16x slots on them

This new platform also requires new memory, DDR4. The DIMMs are a very similar size to DDR3, though they have more pins and won't fit or work in a DDR3 slot

Until Intel switches to using even thinner tracks, Haswell-E is probably the most complicated CPU being built for a mass market, and significantly more elaborate than anything Intel has produced previously. It has made larger chips but not at this fabrication scale.

However, having more transistors is only part of the story, because X99 and the Haswell-E is also the first PC combination to offer DDR4, and that's a radically different memory model than we've seen previously.

Bandwidth Bandwagon

Under X79, DDR3 RAM was initially allowed in speeds up to 1600MHz and four-stick, quad-channel kits. Because memory management is internal to the CPU on these chips, this was then boosted to 1866MHz memory under Ivy Bridge-E. Some motherboards supported eight DIMM slots, and with 16GB modules, systems with 128GB of memory were possible.

The move to DDR4 isn't just about new, and therefore incompatible, 288-pin modules. Also, the way that this memory is coupled to the CPU is very different, because while DDR3 allows more than one DIMM to create an extra wide channel, DDR4 insists that it's a strict DIMM-channel arrangement. Or that's what I and many other technical people have been telling people up till now.

The advantages of DDR4 are that it uses lower voltages (less than DDR3L), allows for higher clock speeds, and the change in architecture also allows for higher density (therefore bigger) modules.

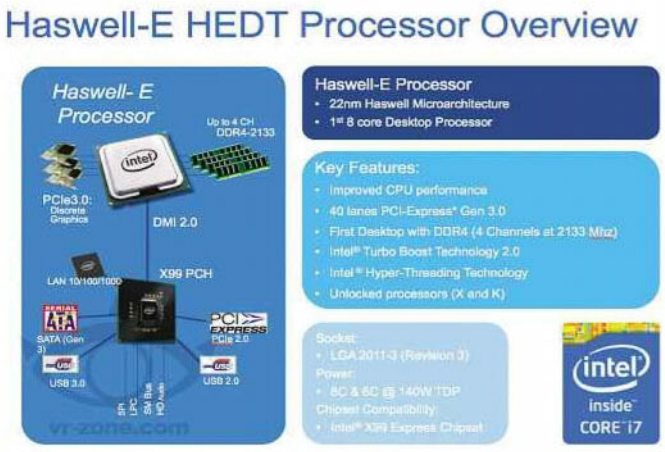
The standard speeds on offer are 1600, 1866 and 2133 MT/s, though many memory makers are offering faster modules that, like DDR3, can be accessed through overclocking. These can be 3200, 3000, 2800, 2666 and 2400 MT/s, with potentially higher clocks coming down the line.

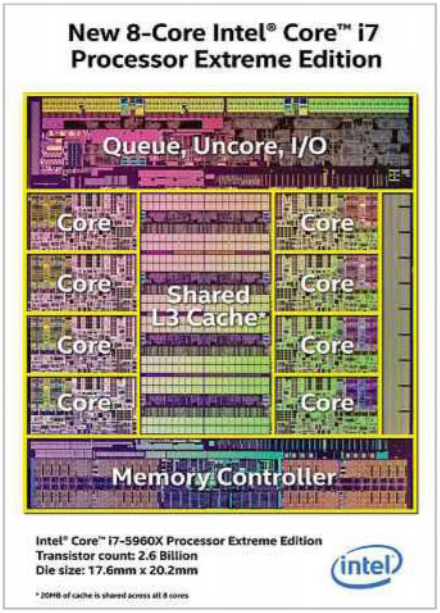
While DDR4 promises increased bandwidth and lower power consumption, there are some caveats too.

> **"Emotionally, I'm suffering something of a quandary about X99 and the Haswell-E series processors"**

According to the JEDEC information, theoretically a four-channel system can only have four DIMMs, and a two-channel system (as is likely with the LGA 1150 replacement) can only have two modules. But now X99 is here, this turns out to not be the case, and a channel can be allocated over at least two DIMMs, allowing for eight memory socket systems.

Quite clearly even with a 2011-pin CPU, there aren't enough pins to support eight 288-pin DDR4 DIMMs, so evidently there's the ability to multiplex pairs of DIMMs to be accessible as a single channel. This is entirely contradictory to all the DRR4 information that's been disseminated by JEDEC and the memory makers up to this point. It appears that DDR4 isn't strictly point-to-point, though there is likely to be an impact on latency and performance when you allocate more than one module to the same channel.





	X79	X99
CPU Support	Sandy Bridge-E, Ivy Bridge-E	Haswell-E
Memory Standard And Maximum Slots	Quad-channel DDR3, eight slots	Quad-channel DDR4, eight slots
Overclocking	Yes	Yes
Embedded GPU	No	No
RAID 0/1/5/10	Yes	Yes
Maximum USB Ports (USB 3.0)	14 (0)	14 (6)
Maximum SATA Ports (SATA 3.0, 6 Gbps)	6 (2)	10 (10)
Main PCIe Configuration	40 PCIe lanes	40 PCIe lanes; 2 ×16 + 1 ×8 or 5 ×8
Secondary PCIe	8 × PCIe 2.0 (5 GT/s)	8 × PCIe 2.0 (5 GT/s)
Intel Rapid Storage Technology	Yes	v13.1
Smart Response Technology	No	Yes

The new octo-cored Haswell-E is something of a monster at 356 mm², though Intel did make an even bigger six core Sandy Bridge-E CPU that was 435mm²

Without this modification, systems would have arrived being only able to access half the memory of the previous designs, which for those that use workstations would probably be unacceptable. And these chips will also arrive next as Xeon server processors, where the amount of accessible memory is critical for maintaining high levels of performance.

In terms of sales, the Xeon market is much larger than the one for enthusiast workstations, and therefore Intel is more likely to bend to those needs rather than keeping gamers happy.

DDR4 will undoubtedly deliver more bandwidth than DDR3 over time, though initially the differences between stock modules of DDR4 and massively overclocked DDR3 might be subtle, and DDR3 might actually be preferable, especially in regard to latency.

Final Thoughts

Emotionally, I'm suffering something of a quandary about X99 and the Haswell-E series processors. While the technology behind it is interesting, the justification for this type of hardware seems paper thin at best.

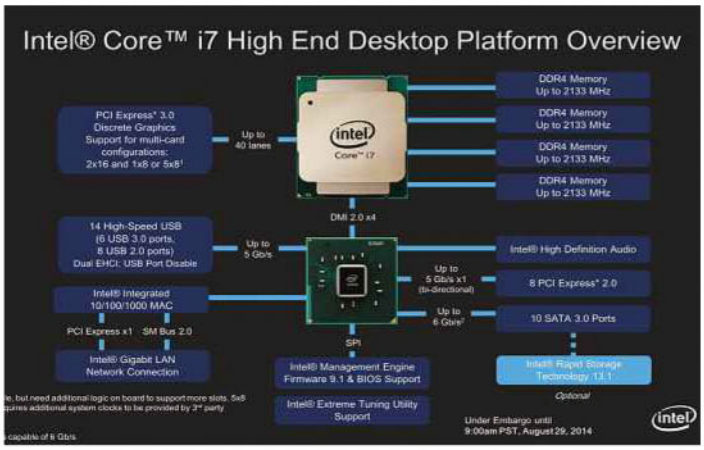
Having lived with a prior six-core LGA 2011 system for a couple of years, I'm still trying to work out why anyone would need something so powerful. The bumping of this up to eight-core (16 threads) levels, the power efficiencies of Haswell-E and the introduction of bandwidth-to-die-for DDR4 seems to go well beyond what might be considered excessive.

However, not everyone uses their PC for lightweight tasks, and those wanting workstation performance levels are probably going to be pleased. What's changed since the last refresh of this strata is that gaming performance is mostly tied to GPU power. The advent of more efficient API thinking, like Mantle and potentially DirectX 12, drives a move away from the CPU having such a central role in overall performance. And AMD's own work with its APU product range underlines this point.

These days, most PC games can be run at 1080p resolutions using a decent detail level with a £100 or less video card and almost any multi-core CPU.

When you crunch the hard numbers, only the most dedicated gaming fan with multi-GPU, multi-display 4K output is likely to be considering X99 technology. Or it's for those for whom overflowing back accounts are an issue.

What's also marginally frustrating is that these chips are the first to use DDR4, though they don't have integrated GPUs, which might really benefit from the extra bandwidth that technology offers. Because of this choice, the most positive thing I can say about this technology is that the enhancements that it delivers now will filter into the next generation of desktop solutions, probably within a year.



The X99 chipset isn't very different from the X79 that it replaces, though you'll need one to accept the new Haswell-E processor and the DDR4 memory that it requires to work

How welcome DDR4 turns out to be and how the extra bandwidth will bolster on-board GPU performance is a long way from being decided, but the PC is morphing once more, as it must do to ultimately survive.

For those wishing to ride the X99 pony, the cheapest processor is about £300. An X99 motherboard starts at about £200 and 16GB (4x4GB) of 2133MHz DDR4 is about £170. That's £670, assuming you have all the other bits handy, though you can easily blow double this if you want the top spec processor and a fancy motherboard/memory combination.

Hopefully at some point here at Micro Mart, we'll be able to dissect what this sort of investment buys you in terms of pixels pushed and benchmarks abused. But one can say without much predictive ability that these board and processor combinations will undoubtedly dwarf any other benchmark scores we've previously seen.

It just strikes me as increasingly niche, in a time when Intel needs to be more encompassing. **mm**

Magazine Apps For Android

Reading's good for you, as Keir Thomas explains in his examination of six apps made to make content look beautiful

This week's apps group test looks at magazine apps, which is a nascent category in the Google Play store. The goal of magazine apps is to take online content, such as that provided by the very best websites, and present it to the user in a readable and attractive form. In other words, clutter like adverts and menu bars are stripped away, and photos are given prominence. Most magazine apps also let you subscribe to interest areas in order to discover interesting content without the need to subscribe to actual sites. The apps determine what you'll see, which can make for an experience where you discover new sites and are often taken outside of your usual comfort zones.

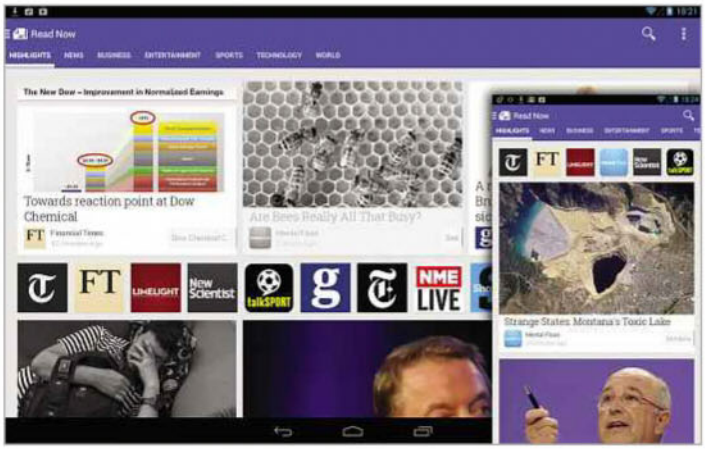
As usual, all the apps below were tested on Android Jellybean 4.3, and all are available for free in the Google Play store, although some come with optional in-app purchases.

Google Play Newsstand

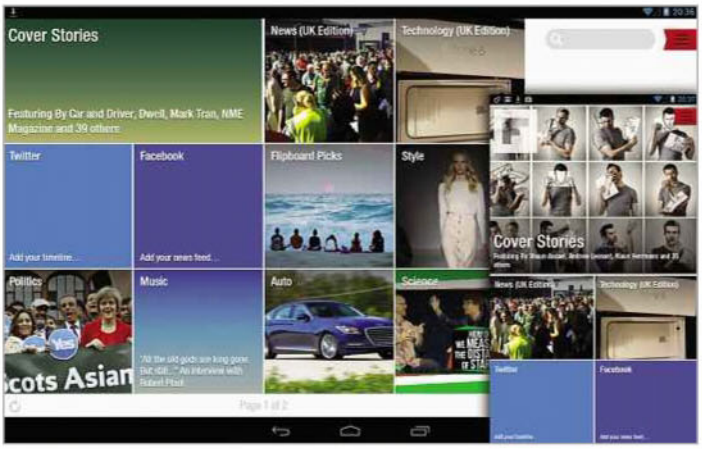
Once upon a time, Google released Currents, which even it might admit was a blatant rip-off of Flipboard. As is the way with most Google products, Currents generated a solid base of users but didn't set the world alight. Google Play Newsstand is its second attempt at a magazine app and, to be fair, it attempts to innovate away from purely Flipboard-like operation by presenting electronic subscriptions for real-life publications alongside Flipboard's trick of turning free online content into magazine-like pages.

Newsstand has three basic modes – Read Now, My Library and Explore – which you can switch between by tapping the menu button. Read Now is the default mode and presents headlines and popular articles with the goal of letting you explore new online sources, as well as find interesting things to read. You can switch between Read Now's interest areas by tapping the sub-headings at the top of the screen: News, Business, Entertainment, Sports, Technology and World. There's also a Highlights heading that presents the best of all these.

Stories are drawn from a wide variety of sources within each of Read Now's headings, and this doesn't always make sense.



▲ *Google Play Newsstand attempts to merge the world of paid-for subscriptions with free online content, and it might just be genius*



▲ *The original magazine app, Flipboard still leads the pack by keeping things simple yet stylish and ultimately useful*

On the day of our review, the royal baby was announced, but Newsstand's chosen source for this was CBC Sports. We noticed quite a North American bias to the Read Now's choice of sources, in fact, and avidly read a Motley Fool article about marital social security before realising that it was US in origin. Surely Google knows from our IP address what country we're in?

Newsstand's My Library mode is like the older Currents app in that you can choose to view stories from specific sites or publications, and the Explore options lets you choose new sites or publications to subscribe to. These sites are arranged hierarchically under interest headings (Crafts & Hobbies, Food & Drink, Entertainment etc.). The big difference compared to Currents is that electronic editions of real-life newspapers and magazines are offered (for a fee) in addition to an impressive but also seemingly endless list of websites.

Regardless of which mode you choose, Newsstand displays stories as tiles, illustrated by large photos and headlines. Well, actually, Google calls these Cards, but you get the idea. Tapping on a tile/card typically displays the article with a large picture at the top and the body copy beneath. Gone is Current's formatting of text into columns. Instead, Newsstand simply boosts the margin so that on a tablet in landscape orientation the text is in a centred column that's equally easy to read. Also gone is the page scroll mode within Currents that meant each page of text jarringly slid in and out of view. Instead, Newsstand scrolls smoothly, just like a browser.

Newsstand is a worthy successor to Currents and, perhaps more importantly, offers a new paradigm for online content creators. Several publications exist within its walls with a limited amount of free content and also as paid-for subscriptions. The era of free content might be coming to an end. On the other hand, publications might finally be able to make money from online content.

Flipboard

An original idea executed to perfection, Flipboard all but invented the magazine app genre. The goal was to take the best content from websites, which ordinarily can appear a bit cluttered, and make it look terrific by aping magazine layouts – putting big pictures at the top of the page, using a nice font for the body of the article and making the user believe they're turning actual pages as they read.

The content is taken from a huge range of websites, but it can also include social media sites like Facebook, and that's Flipboard's second trick: all the information you want is at your fingertips and on a device that lets you lounge around while you access it. It's a stroke of genius.

Key to operating Flipboard is the flip gesture, which turns the virtual pages. On a phone, this is achieved by swiping from the bottom to the top of the screen, while on a tablet swiping from right to left achieves the same thing.

When the app starts, you're invited to choose interest areas, ranging from Photography to Gaming, and at this point, the final neat feature of Flipboard becomes evident – unlike some other apps here, you don't have to choose actual sites or publications to subscribe to (although this is possible – see below). Instead, Flipboard does the choosing of articles for you. This leads to a nice feeling of exploration in which left-wing Guardian fans end up reading The Telegraph or Daily Mail and vice versa.

> **“An original idea executed to perfection, Flipboard all but invented the magazine app genre”**

Once the app starts, you're shown a tiled interface with each of the interest headings you chose. Tapping any opens it as a virtual magazine, with headlines and extracts from articles set against big thumbnail photographs. Tapping any then opens it for reading.

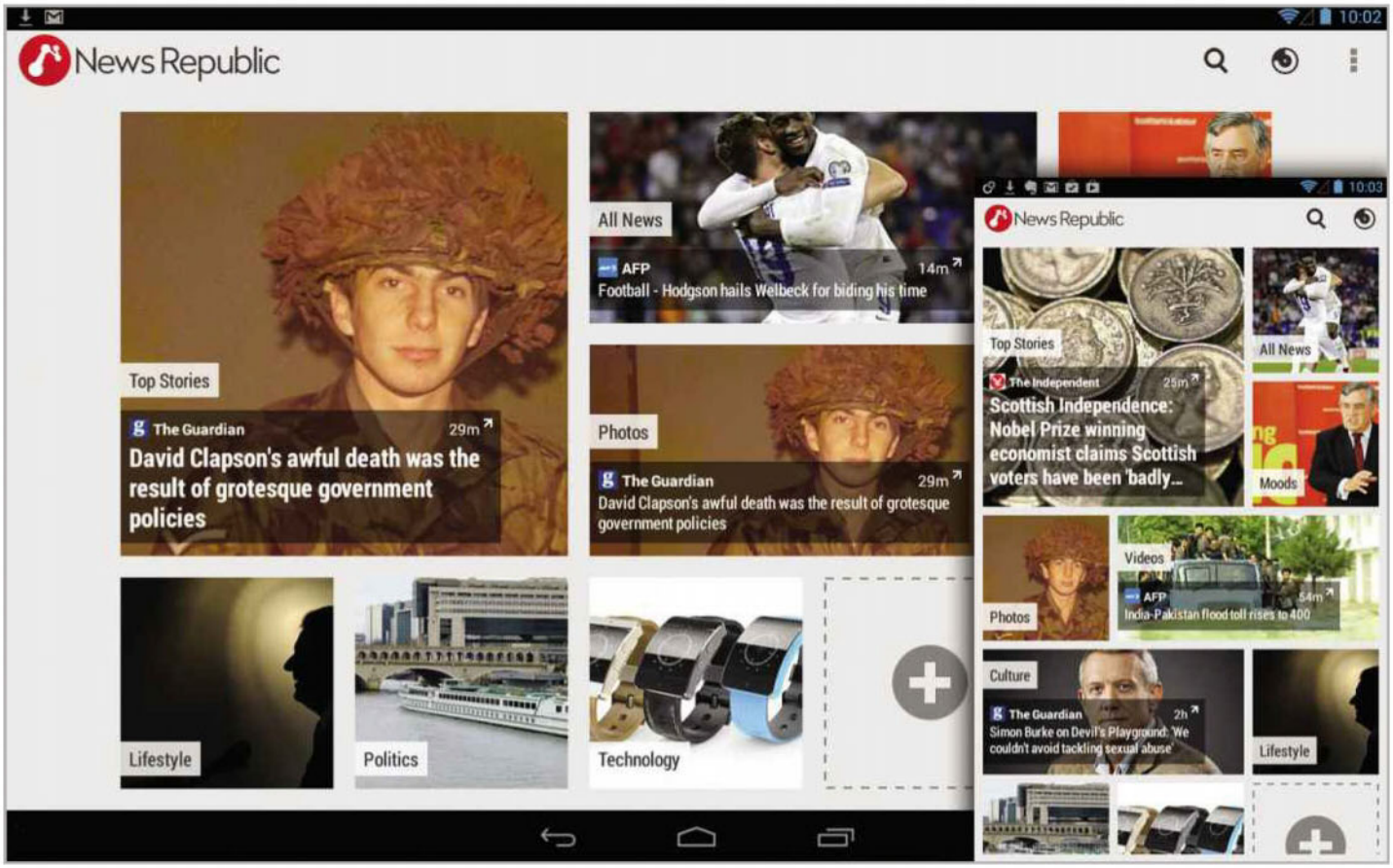
Articles can be shared, although this is handled by Flipboard's own sharing system, so you'll need to link in accounts on first use. In each case, a brief excerpt is shared, along with a link.

Stories you find interesting can be added to your very own magazine or simply favourited, which lets you find them again in future. By tapping the menu icon you can also choose to subscribe to specific websites or journals, and again these are arranged under obvious interest categories.

It's difficult if not impossible to fault Flipboard. It's simple and elegant and does what it sets out to do with style and aplomb.

News Republic

Despite the app's title, News Republic is a straight-up magazine app, albeit one with a handful of interesting features. News is



News Republic is smooth and simply packed with interesting stories, making it a true Flipboard challenger

included as one of the interest areas shown to users, of course, but you can also choose from the usual lifestyle, entertainment, sports and other interest areas.

Using the app for the first time involves choosing from these, and the list is brief, although this is something of an illusion. Later on you're able to add to your list by selecting from perhaps the biggest and most specific range of interest areas provided by a magazine app. Put it this way: none of the other apps here offer 'Manchester' as an interest area!

As with all magazine apps, stories are pulled from a variety of sources, and there doesn't appear to be a way to subscribe to specific websites or publications.

Once up and running, the app has two ways of working. The default is to simply show your chosen interest areas as a series of tiles. Tapping each shows the headlines for that topic. However, swiping in from the left on a phone or from the bottom of the screen on a tablet switches to One Feed – a fancy way of saying that the most important headlines from each interest area are combined into a single scrolling display, rather like a personalised magazine.

Tapping on any headline opens it for viewing, with a nice, large photo at the top and text beneath in a single column that scrolls like a web page when you drag. It's clear a lot of thought has gone into the presentation of articles, and it pays off. News Republic feels very smooth, and we didn't encounter any glitches found in some other apps, such as empty articles in which there was simply no text or incorrect photographs.

Within each article you'll see certain words highlighted against a grey background. These are tags, and that brings us to the first of News Republic's unique features: TagNav Explorer. Tapping the word switches to other stories that also contain that tag, and while the tag might be the name of a celebrity, it can be something as trivial as the word 'stores' – and tapping that tag will bring up a series of business articles where the word features prominently. TagNav Explorer might sound pretentious, but it works very well.

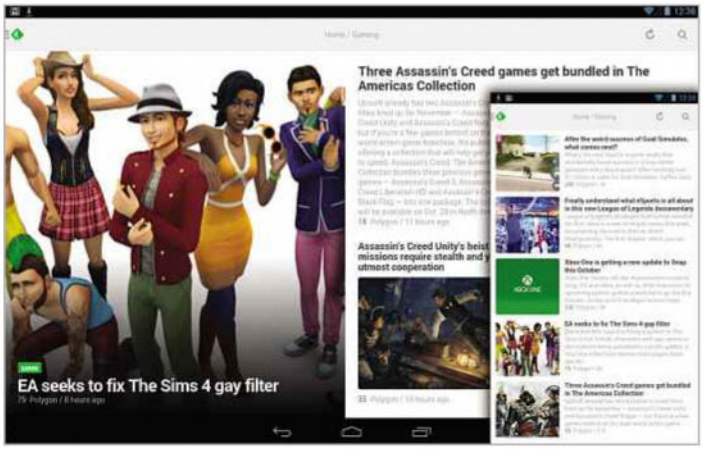
Another of News Republic's headline features is the fact that it learns what you like, with the goal of tailoring the story feed to match. It does this by simply taking note of which headlines you tap, but you can also rate stories according to how they make you feel: Astonished, Pleased, Indifferent, Worried or Sorry. We're not quite sure how that works, frankly, and although a story might make us feel 'sorry', that's no indication we don't want to read that type of story again.

News Republic is perhaps the only app here that we'd consider a genuine challenger to Flipboard. There's a real feeling of discovery, although perhaps wisely it takes a different path to Flipboard, which means the two can be installed alongside each other without duplication.

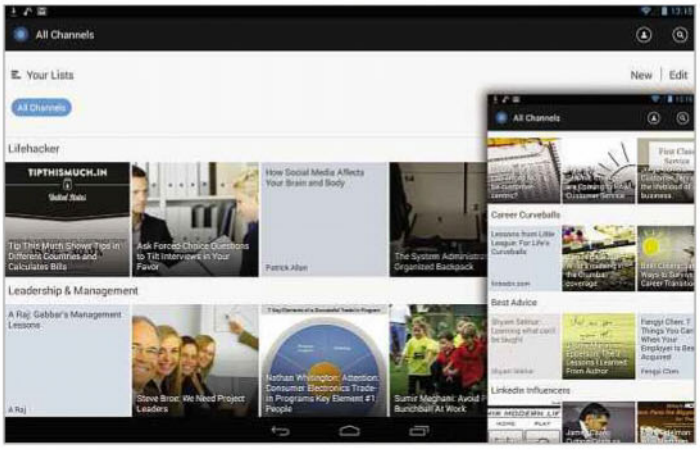
Feedly

As its name suggests, Feedly is all about hooking into a website's RSS or Atom's feed. These are the hidden lists provided by most sites to allow people to keep up to date with their content. However, perhaps Feedly is best described as having crossover appeal, because it offers the fine-grained control over reading provided by subscribing but also a user-interface typically found in a magazine app complete with tiled headline interface. There are a handful of limitations with an RSS/Atom feed approach, though.

When the app starts, you're invited to choose from the traditional interest areas via a column at the right-hand side on



Subscribing to RSS/Atom feeds lies at the heart of Feedly's approach, but it borrows its look from magazine apps



LinkedIn Pulse is like a business-person's version of Flipbook, focusing on business-oriented news and interest sites

a tablet or virtually full-screen on a phone. Each subject tile then expands into a list of sites, and tapping the plus icon alongside each subscribes you. Unfortunately, you then need to decide what group to add the feed to, with a list sliding in from the left. A group will automatically be created for that interest area, which makes us wonder why this additional step is necessary. It certainly makes adding sites time-consuming and fiddly.

Once up and running, the default Home view of Feedly presents the headlines from each group in order. If you have a Gaming and also a Tech group, for example, then you'll see the Gaming headlines first, and scrolling-up a few times will reveal the Tech headlines. By opening the menu you can also tap to view only a specific site's headlines.

> **"The purchase of Pulse by LinkedIn raised a few alarm bells"**

Feedly takes an interesting approach when it comes to headlines within each group. The first page shows the main headlines, along with large thumbnail photographs and excerpts. Scrolling up to the second, third, fourth etc. set of headlines shows them arranged into rows, allowing more content to fit on the page. This is a sound way of working.

Tapping any headline shows the key limitation of a RSS/Atom feed-based approach. One of three things might happen. You might see the whole story, depending on whether the site in question publishes their whole stories via RSS/Atom. Few do. More likely you'll see just an excerpt, with a link at the bottom inviting you to visit the website. Tapping this then opens the story at the website, although still within Feedly. A third option is that tapping the headline within Feedly will take you straight to the website, again within the Feedly app window.

It's a bit haphazard, to be blunt, especially considering Feedly doesn't preload the content, meaning that you often have to wait a few seconds while the page loads after tapping the headline. Apps like this really need to be virtually instantaneous.

It's with the Settings menu that Feedly really shines, however, and just about every aspect of the app's user interface is tweakable.

Ultimately, Feedly is perhaps a little too DIY for our tastes. An approach forcing you to subscribe to specific sites lacks the unique feeling of exploration that comes with a true magazine app.

LinkedIn Pulse

The purchase of Pulse by LinkedIn raised a few alarm bells among keen users of the app. The headline boast of providing "the news and insights you need to know" indicates a shift in focus towards (again quoting) "professional content". But, who knows, this might not be a terrible thing. Business professionals like to read too, and the organic discovery process provided by magazine apps could work just as well.

Unsurprisingly, you'll need a LinkedIn account to use the app, which is odd considering the iOS version of app – reviewed in these pages last week – has no such requirement.

The first order of business is selecting your interest areas so Pulse knows what articles to send your way, and these are typically business-oriented: you get Ted talks, for example, but only the Business channel therein. There are a handful of general interest sites, like Gizmodo, but perhaps the most important inclusions for fans of LinkedIn are the likes of LinkedIn Influencer, Best Advice and Career Curveballs, which present unique content from LinkedIn, such as interviews with notable celebrities or business figures.

Even the app's user interface is business-like and orderly, with each interest area or website shown as a heading, and each headline presented beneath in tile format along with the headline. Tapping any then opens it for reading, with a large photo shown at the top and the body copy appearing beneath. A unique feature is the ability to switch to 'Web mode' while reading, which simply opens the page in a browser window (although still within the Pulse app, with the option to switch out to a regular browser).

While reading articles, you can vote, comment on or share each icon via icons at the top of the article. You can share to your LinkdedIn account or Facebook, Twitter, Google+, email, messaging, Dropbox, Google Drive and more.

A neat feature of Pulse is that articles are automatically downloaded in case the app should be used when the phone or tablet isn't in range of a data connection, and you can also bookmark articles for reading later.

There's a lot to like within Pulse, and LinkedIn has done a good job of not only creating a useful app but also adding value to its service. Facebook may well be looking on with envious eyes. **mm**

PC Tip Of The Week

Windows Services

We look at programs Windows loads without your knowledge... Until now...

You've probably encountered talk of 'Services' in Windows, but if its ever left you wanting more information, step right up... A Windows Service is an executable program that performs a function without requiring the user to intervene or run the program manually. A service can start automatically when Windows boots up, after a short delay, or even manually when required. Each will take up a portion of RAM so, given that you could have up to sixty services loaded at once, a significant amount of your computer's performance could be absorbed by operations that you never realised were running.

Some of these services are vital; networking, the sound system, security, or Windows' ability to control and launch programmes. However, some can be disabled, in order to free up RAM and bring some life back to an otherwise very slow system.

Application Experience: checks the compatibility of older programs and searches for updates for known problems

Computer browser: monitors the computers, devices and files on a network and maintains a list

Desktop Window Manager Session Manager: where Aero and all of its machinations live

Diagnostic Policy-service and Diagnostic System Host: detects problems and looks for possible solutions

Distributed Link Tracking Client: makes sure that linked files on multiple computers in a network stay linked

Function Discovery Provider Host: enables file sharing over a network

Function Discovery Resource Publication: Publishes the shared files and printers so they can be discovered by other computers in the network

Human Interface Device Access: Support for multimedia devices, like a remote control and hot keys on keyboards

Internet Connection Sharing (ICS): For sharing the internet connection with other computers in the network

IP Helper: Support for an IPv6 connection over an IPv4 network

Offline Files: Makes network shares also available when the share is offline

Portable Device Enumerator Service: Enforces group policy for removable mass-storage devices

Print Spooler: a service that's necessary for loading a print job into memory for later printing. If you don't have a printer, then disable

Remote Access Connection Manager: Necessary for managing dial-up and virtual private network (VPN) connections

Remote Registry: Allows external users are able to make changes to the registry keys over the network connection

Routing and Remote Access: Allows dial in access to the local network

Shell Hardware Detection: This service starts the auto play of devices like DVD drives and USB sticks

Tablet PC Input-service: Are you using a tablet PC?

TCP/IP NetBIOS Helper: Do you use NetBIOS over TCP/IP? If you don't know then the chances are you don't

Terminal Services: As long as Remote Desktop is not used, it is safe to disable this service

Themes: Controls Aero and other fancy decorations; huge resource hog

Windows Defender: By installing MSE, or any other good antivirus, this service is disabled by the installer

Windows Error Reporting-service: Generates an error message when a program no longer responds

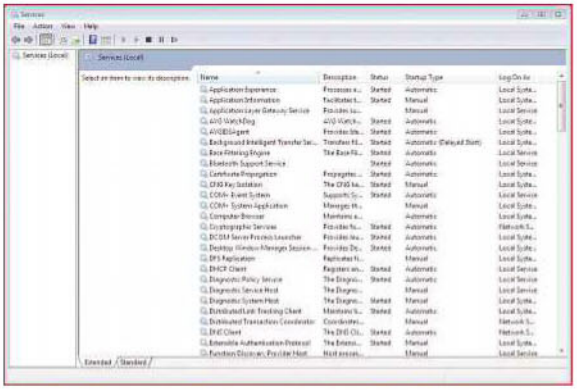
Windows Image Acquisition (WIA): For transferring images from a scanner or camera to the computer

Windows Media Center Service Launcher: Starts Media Centre-services at boot, if the TV option is enabled within Windows Media Centre

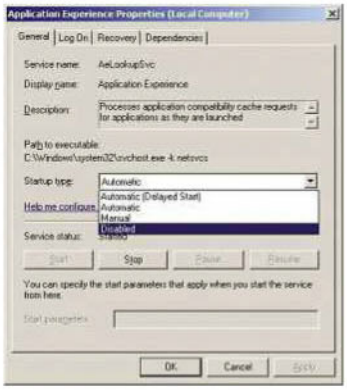
Windows Media Player Network Sharing-service: If you don't want to share Windows Media Player libraries, disable this service

Windows Search: Provides content indexing to speed up searches, disabling it can prolong search times for minor performance gains

Windows Time: For automatically synchronizing the time and date over the network. Buy a clock



Windows Services, a minefield of potential disaster and at the same time the key to a faster system



Disabling or setting to Manual those Services you don't necessarily need

The Things That Frustrate Us About... Google

You probably use at least one of its services daily, but we'd wager that Google gets on your nerves sometimes...

It's almost hard to remember a world before Google. How did we ever get anything done? There must have been a time when businesses could afford not to think about what Google would make of their websites, when algorithms and search engine optimisation were foreign concepts, but over the last few years, Google has changed a lot of the ways we do things. For the most part, it's kind of insanely brilliant, from a user's perspective – but we can always find something to get annoyed about…

Argh! We Know Best

When you type something into Google's search bar, it tries to be helpful by predicting what you're going to type. So if you type 'chee' in, you'll see 'cheesecake recipe', 'cheese sauce', 'cheese scones', and 'cheese' as possible suggestions for what you're searching for, in case you can't make it to the end of the word yourself. Also, if you make a typo in your search term, Google will ask 'did you mean: ***x***' and find results for what it thinks you meant.

This is all well and good as long as Google gets it right, but sometimes it doesn't. If you're looking for something that's spelled similarly to something else – a relatively unknown band, for example – you might find Google takes the liberty of returning search results for the thing you didn't mean.

Fix it: Okay, it's just another click to tell Google you know what you meant and it didn't, but it's still irritating. You used to be able to turn off this autocomplete option, but Google decided it really did know best and removed the option. Thanks for that.

No! Stop Pushing Google+

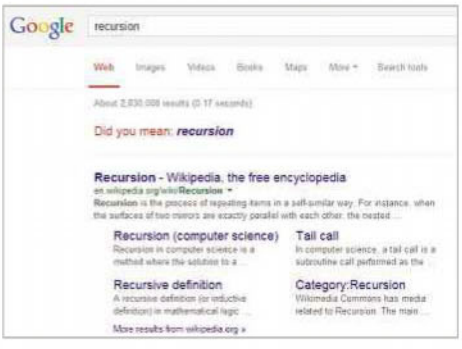
As much as Facebook and Twitter can be annoying, they're still the most convenient way for most of us to network with our friends online – because everyone uses them, pretty much, and we're all already familiar with how they work. Google+, Google's take on the social network, hasn't really caught on so successfully. That doesn't stop it from trying to prompt you to sign up for it any chance it gets, though. Want to comment on YouTube? You'll be prompted to use a Google+ ID. You can't leave a review in the Play Store without one, either. There are half a dozen other ways Google will try to shove it under your nose, to the point where it's almost exhausting to keep saying no.

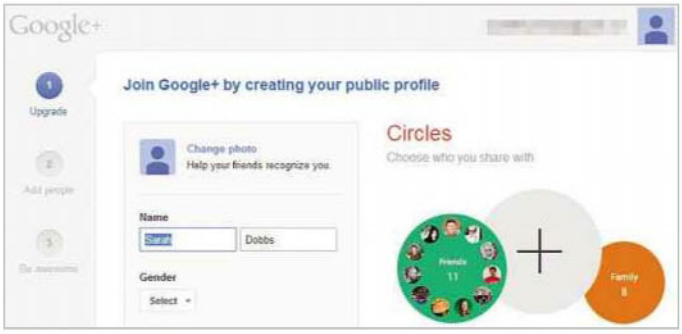
Fix it: Well, you could just sign up for Google+, but personally I'm gonna keep declining its advances.

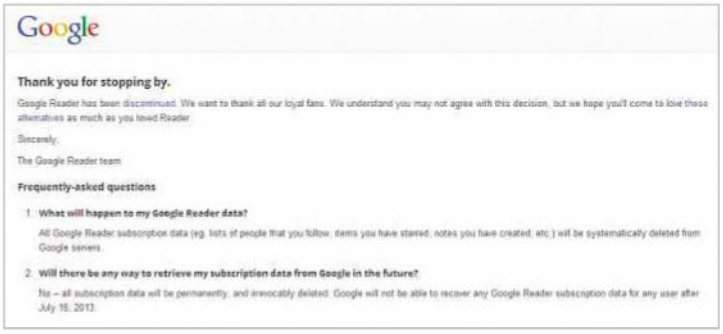
Grrr! Killing Off Things We Like

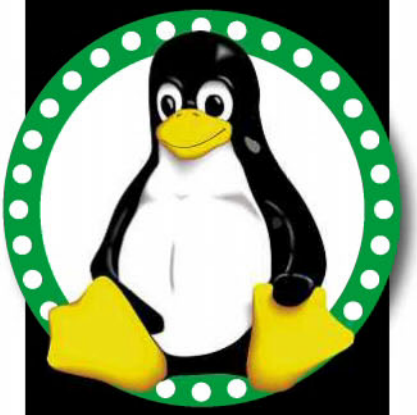
While we're waiting for Google+ to quietly go away, let's all take a moment of silence to remember the Google products we liked and had ripped away from us just as we'd become accustomed to having them. Remember iGoogle, Google Video and (most heartbreakingly missed) Google Reader? The latter was, quite simply, the most perfect RSS reader there's ever been, and nothing Google (or any other company) has come up with has convincingly replaced it as yet. Sob.

Fix it: Not to sound defeatist, but there really isn't anything you can do if Google shuts down a service you like. Unfortunately, that really is its decision to make. Not that we have to like it. **mm**









KaOS 2014.06: A Review

An interesting independently built distro, that focuses on quality over extreme content

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

KaOS Linux is a new newly designed distro that focuses its attention on elegance, functionality and a sleek, impressive 'feel'.

KaOS, the newest 2014.06 release, is a lean KDE and Qt toolkit distribution that has been lovingly crafted from scratch, along with a rolling release schedule and a repository that's filled with content built solely by and for KaOS.

It's quality that's catered for here over quantity, but that doesn't mean it's a bleak and barren wasteland of a distro. Indeed, there's plenty to get you up and running, with an internal focus on near to cutting edge version releases. KDE 4.13.2, Linux kernel 3.14.6, glibc 2.19, system 212 and kmod 17 are all present, with an additional xorg-server 1.15.1, Qt 4.8.6 and the QtWebkit 2.3.3.

You'll also find the latest versions of the Qt-based web browser qupzilla, the simple and powerful octopi as the Pacman 4.1.2 GUI frontend; there's also kde-telepathy and kdenlive, with Calligra 2.8.3 leading the way in terms of office applications. It's enough to make for an interesting, if alternative, desktop over the more popular and widely used distros at least.

Naturally, some GTK programs are also available, so the likes of Firefox 29, Chromium, the Flashplugin and Gimp 2.8.10 make an appearance but are limited due to the slim approach adopted for the KaOS repositories.

Media abilities have been improved with ffmpeg2 integration, and the inclusion of Amarok over Clementine and the phasing out of Gstreamer 0.10 to a full move to Gstreamer 1.0 are just a few of the changes you'll no doubt to appreciate in this updated version.

The installer, as with just about everything else in KaOS, has been built from scratch and is fluid enough to understand. There's a generally good set of introduction and installation documentation, which will walk the newer user through the setup process.

Once installed, though, the documentation appears to abruptly stop. The absence of what to do next can be quite daunting for a new user, especially one who may have only had a fleeting experience with Mint or Ubuntu, for example. A simple, 'how to update the system', 'how to install new programs' and the like would be a nice addition to the desktop.

KaOS: from scratch we have something rather splendid

A Sense Of Style

KaOS is certainly a stylish distro. There's a nice, soft grey backdrop with abstract uses of colour splashed throughout that gives the desktop a clear, clean cut feel to it. The system fonts are large and easy on the eyes. It's a fresh, fairly nippy and responsive system that's uncluttered and light, although it's not the fastest at booting up or in operation, and it does require more available system resources than the bog standard distro. It does look good while it's doing it, though.

However, there's an underlying feeling that out of the box it's not going to be the best desktop for day-to-day use. Granted, not many from-scratch distros are, but due to some of the limitations inherent to the distro itself and the repositories, there's the worry that KaOS may well become a little too niche as opposed to being a more stylish approach to a functioning and working alternative.

Overall, KaOS 2014.06 is a thoroughly good example of how the Linux connoisseur would enjoy their desktop and OS experience. It's a clever build and one that requires savouring rather than gulping down and formatting at the drop of a hat. It has its peculiarities, yes, but these are also moments of pleasure.

Getting Into Classic Amigas

Sven Harvey outlines your route into real classic Amiga computing

Emulation is all well and good, and Amiga Forever particularly does a good job of making a PC pretend it's a classic Amiga, but it can never be quite as good as the real thing.

If you do want to get into retro computing (or gaming for that matter) using a retro Amiga, there are quite a lot of models and variations to confuse the issue when you're first trying to find your way in.

But why would you want to? Well, original Amiga machines do offer a way into learning the basics of computing in a similar way to 8-bit computers, yet offer, at the very least, a taste of the productivity abilities that much newer machines offer. Add to that the fact that the electronics are easier to deal with in many ways and there's very little in the way of software getting in your way, and you have a potentially very rewarding hobby.

Which Model?

Your first step is to choose which model of Commodore Amiga to go for. I would always suggest that the 'big box' machines aren't the place to start – very expensive as they are relatively rare, and neither, ironically, are the CDTV and CD32 as they essentially fall into being 'just' games consoles without some expensive add-ons. That leaves the 'home' Amigas – the Amiga 500, Amiga 500+, Amiga 600 and the Amiga 1200.

If you're only interested in playing old Amiga games, then the A500 may well suffice, and trumps the A500+ in that it's far more compatible. The A500+'s main advantages over the A500 were a jump in its productivity abilities... but this was trumped immensely by the A1200. The A600 is essentially, on a technology level, an A500+ in a smaller case with a more reliable motherboard and also can have a 2.5' IDE hard drive added. However, its expansion options are sorely limited and its advantages are also shared with the A1200.

So generally I would recommend the Commodore Amiga 1200 as your starting model. Thanks to the ability to make the custom co-processors act like their predecessors in the A500 and the use of Kickstart emulation disks such as 'Relokick', the Commodore version of the A1200 is more compatible with older software than the A600 or A500+. Not only that but, unlike the A600, it can accept trapdoor processor accelerator cards (essentially new processors and faster RAM on a daughterboard that plugs directly onto a connector on the A1200's motherboard.) It is possible to upgrade the A600's processor, but it's limited at best and the A500 way of doing it is external on an already bulky all in one form factor.

Being as t0he A1200 has the AGA chipset, it also means that AGA games will function on the machines, and thanks to its expansion options you can add an internal 2.5" IDE hard disk, as well as the faster processor and more memory as mentioned above, plus you can plug in a CD-ROM drive, which opens up CD32 and Amiga CD-ROM titles, be they games or otherwise.

Fortunately, due to the A1200 selling very well and it having the second largest manufacturing run of all the Amiga machines after the A500, it's not rare enough to command a high price unless it's absolutely mint. Add to that not only the trapdoor but also other, not so deliberate, expansion ports on the motherboard, and it boasts the largest array of specific upgrades out of all of the Amiga models, making it the perfect starting base from which to build, with enough capability from the off to make it usable beyond just being a gaming machine (though a hard disk or similar functioning device really is a near necessity).

I'll come back and help you select an A1200 in a forthcoming issue!

Sven Harvey has been our Amiga specialist for over 14 years, drawing on his 23 years of retailing computer and video games and even longer writing about them.

Amiga

Occulus Thrift

Blue Peter meets virtual reality, as Ian McGurren builds Google's Cardboard project

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

If you're of a certain age, you may well remember the View-Master toy from your youth. It was a device, alongside the red and cyan glasses, that introduced many of us to the concept of 3D, and unlike the 3D that came from the red and cyan paper eyewear, the View-Master's images were in full, vivid colour. Looking like a pair of stunted red binoculars, the View-Master's trick was simple: two images, the left in the left eyepiece, the right one in the right. Simple, and effective.

Fast forward to the present day and we see similar devices popping up again, such as the Oculus Rift and Sony's Project Morpheus accessory. While they are many times more technically advanced than the fully mechanical View-Master, they share the same common idea of stereoscopy using two separate images. Problem is, they're either quite complex and in some sort of test phase at present, or they're not even on the market yet. Even when they will be, you can be sure they won't be cheap. It's quite an outlay if all you want to do is try it and see if it suits you or if it just gives you motion sickness.

Fortunately, there's a cheaper option (make that a much cheaper option, if you have a decent mobile) called Google Cardboard. First unveiled at this year's Google I/O, Google Cardboard is a stereoscopic viewer that is made of cardboard, two lenses and an NFC chip. It uses your mobile phone as the screen(s) and, most impressively of all, it can also use the phone's gyroscope for head tracking immersion.

Now, you can make the device yourself from cardboard using the printable template over at **cardboard.withgoogle.com**, but you'll still need lenses, velcro and the NFC chip. Therefore the best option is to purchase a full kit from one of the many kit sellers on eBay, though spend no more that £10 really. It may seem steep, but the lenses are a pain to get on their own, and making the device from pre-cut card is much easier in the long run.

How it is putting it together depends on your skills with a craft knife and glue (you'll still need these), though it's mostly a case of folding, with a bit of cutting and a some slightly awkward gluing – watch you don't get glue on the lenses. Once complete, though, it's a pretty sturdy piece of kit and holds a device from four inches to just over five inches snugly. You won't be afraid to move around with your expensive handset in it.

In use, the Google Cardboard is an awful lot of fun. The Cardboard app itself offers some interesting content, such as tour of the palace at Versailles, a virtual YouTube theatre and a film that, for some reason, just came out sideways. However, the real fun is to be found with the apps meant for the Durovis Dive, a device much like the Cardboard but built from plastic for commercial sale. Top of the list are Refugio3D Space Station, Dive City Coaster, and Shadowgun VR, all excellent, immersive applications that use the Unity mobile game engine and require no real input from the viewer – just to sit back and look around. Also fun is Stereotunnel (iOS) and VR cinema on Android, an app that links to the many side-by-side 3D videos that can be found on YouTube.

Tips – you can get motion sickness using this, especially if you're prone to travel sickness. You'll also find that your sense of location becomes quite altered, so be prepared for a little confusion after use. The best results are achieved standing, as you tend to look around naturally then, and this aids the immersive feeling. Some games also respond to external controllers for movement, giving yet another dimension of freedom. Also, though you can use it without the NFC chip, frankly using the Google apps this way are a pain, so if you can, pay the little extra. Finally, make sure your phone has a gyroscope, because without it, many applications will not work.

Google Cardboard is on both Android devices and iOS handsets and should set you back around £10 on eBay. No formal release has been announced and Google is otherwise tight lipped on any entry into the 'real' VR market.

Going Viral

Shaun has been lost in a world of Pandemics and mythical adventures this week.

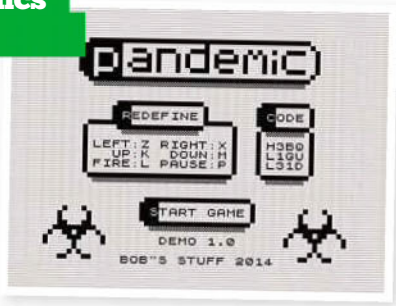
Sinclair enthusiast and games developer Bob Smith has released a four-level playable demo of his soon-to-be-released 16K Sinclair ZX81 epic *Pandemic*, yet another splendid production for the quirky British home computer.

Pandemic feels like a natural follow-up to Bob's hit game *Virus* and is influenced by Atari's classic arcade machine *Gauntlet*, which saw many home conversions (though oddly enough, not to the ZX81).

The aim is to patrol each level and eradicate all of the mutated spores, which will head right for you when you're within a visible range. It's played from a bird's eye view, and each area is built up of several screens horizontally and vertically. Movements are handled by eighht-way scrolling. Before Bob sent me a playable demonstration of *Pandemic*, I'd never seen such a feat achieved on such primitive hardware, and if it wasn't for the obvious visual limitations of a monochrome screen and a pre-defined character set, I'd need convincing that it was a ZX81 chugging away.

Pandemic is more than just a technical demonstration of Bob's programming prowess; it's a really good game as well. The seasoned *Gauntlet* player will feel right at home, less the lack of a team mate.

Details will be available soon at **bobs-stuff.co.uk**, with the aforementioned four-level download found at **tinyurl.com/Pandemic-ZX81-Demo**. If you're looking for a Windows ZX81 emulator, then I recommend EightyOne by Michael D Wynne, which is found at **chuntey.com**.



Bob Smith's newest ZX81 game is shaping up really well

Venture into the Temple of Terror for the expanded Commodore 16 or +4

Temple of Terror

In 1987, Adventure Soft UK released *Temple of Terror* for the Commodore 64, which was a graphical text adventure based on the Fighting Fantasy book of the same name (FF19 for those who used to collect and read these books, like I did).

This version has been ported over to the Commodore 16 and compatible machines with 64K of RAM. It tells a typical mythical story about a child born on a full moon who was destined to be evil. As he enters adulthood and after being brought up by Darkside Elves, he, the malevolent Malbordus, seeks five sacred and powerful dragon artefacts hidden in a lost city; once found, Malbordus's power will be unstoppable. Only one person stands in his way is you.

The game includes seven screens' worth of back story followed by some essential information on how to play, with the adventure beginning on the banks of the Catfish River.

All of the typical elements of interactive fiction games are present, and it includes an excellent splash screen based on one of the book cover versions to whet your appetite.

For further information about this release, see **commodore16.com/temple-of-terror**.

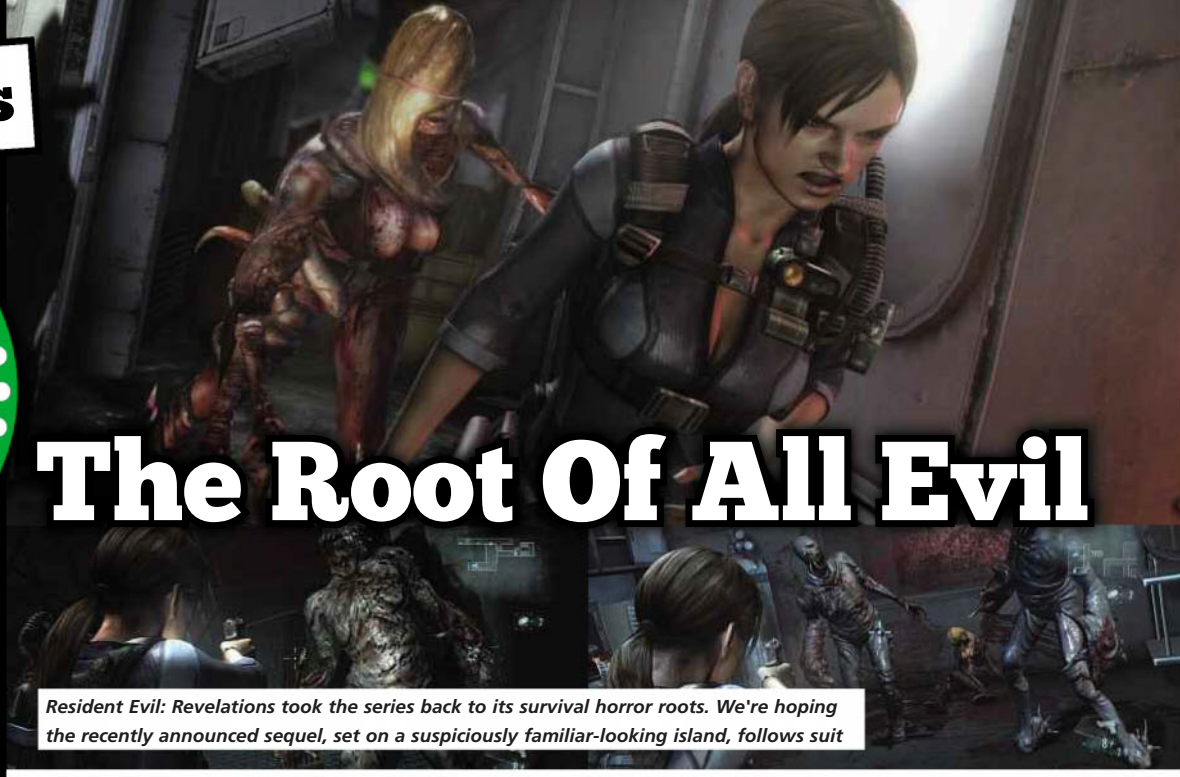
Back To Basics

If you head over to the Retro Computer Mart sub-forums of the Micro Mart forum, you'll notice that I've added some more BASIC programming listings and examples for your perusal. At the moment, the examples are Commodore and Atari based (with the latter being thanks to another forum member), but I will be adding examples for other computers over the coming weeks, so if you have any questions or have some of your own listings that you want to put out there, then that's the place to be. And for those of you who have a Twitter account, you may follow my musings via @ShaunBebbers.

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*



Resident Evil: Revelations took the series back to its survival horror roots. We're hoping the recently announced sequel, set on a suspiciously familiar-looking island, follows suit

The Root Of All Evil

This week, Ryan checks out Capcom's plans for the Resident Evil franchise, and what State Of Decay's developer is up to next...

Plug & Play

Divided critical notices aside, *Resident Evil 6* raised several vital questions for Capcom's long-running series. Where was the creeping suspense of old? What happened to the scarcity of bullets? However, perhaps most vital amongst the question marks was where the franchise could go in the future...

If we're interpreting recent announcements correctly, it seems that Capcom is in the process of responding to those questions with a back-to-basics approach. In August, the company announced that a remastered version of *Resident Evil* is in the offing – not the very first version, released in 1996, but the 2002 remake for the Nintendo Gamecube, which featured smoother graphics and additional play areas. While releasing a remaster of a remake might sound like a strange move, the Gamecube *Resident Evil* is widely considered to be the best version of the game yet seen, and producer Yoshiaki Hirabayashi has said that his team have been "very careful to preserve the original atmosphere of the game."

Capcom's intention, perhaps, is to bring the franchise back to its survival horror roots, where the tempo was slow and staccato, bullets were scarce and the undead opposition was all the more fierce. It's a theory backed up by the company's most recent announcement: *Resident Evil: Revelations 2*.

You may recall that *Resident Evil: Revelations* began life as a series entry for the Nintendo 3DS, before a HD version made its way to PC in May 2013. Released shortly after the middling *Resident Evil 6*, *Revelations* was far closer in tone and spirit to the 1996 original. Indeed, *Revelations* felt in many ways like a pleasing hybrid of *Resident Evil 4*'s technical advancements, with its over-the-shoulder perspective and intuitive controls, and the first few games' more cerebral play elements. It was certainly a contrast to *Resident Evil 6*'s hectic bout of blasting and long shadows.

It seems logical to assume that *Revelations 2* will follow the same exploration and puzzle solving template, and judging from the glimpses so far, it'll also take place in a familiar locale. Preview imagery shows a benighted island surrounded by choppy seas, which Capcom tells us is the *Revelations 2*'s setting. It looks uncannily like the sinister island from Resi spin-off *Code: Veronica*, and a second *Revelations 2* image – showing what looks like part of a prison – seems to lend weight to that possibility.

There's also a 'concept teaser' (**youtu.be/FCxYGF8R3EM**), which appears to offer little more than a touch of atmosphere at first glance: a little girl, teddy bear in hand, runs in slow-motion through a party where the guests are slowly succumbing to the T-virus. Take a second look, however, and you might begin to spot plenty of references to both earlier games and forthcoming events in *Revelations 2*.

Here's hoping that the remastered *Resident Evil* and *Revelations 2* marks a fresh new chapter in the franchise. One that sees the series move with the times, while also retaining the elements that made the earlier games so special in the first place.

Resident Evil: Revelations 2 is due out in early 2015.

Online

Every so often, we take note of just how many games – including the *Resident Evil* series, of course – feature zombies, and wonder aloud just how many more undead-themed shooters, RPGs and survival MMOs the planet can take. Well, the developer behind *State Of Decay* (the appropriately named Undead Labs) has decided to diversify a bit, and has recently announced a new MMO called *Moonrise*.

▲ ***Undead Labs has announced a Pokémon-style RPG, Moonrise, but also has another project in the works; signs point to it being a State Of Decay MMO***

In it, players roam the countryside, capture animals, train them up, and pit them against each other in real-time battles. If it all sounds uncannily like an online version of Pokémon, then that's because Undead Labs have taken inspiration from Nintendo's behemoth franchise – though designer Richard Foge denies that it's a straight clone of the big N's RPG series.

"One of the things that led to [*Moonrise*] existing," Foge explained to Polygon, was that "our founder has a thing that we go through when we're pitching new game ideas," Foge said. "He calls it the obviousness test: 'Is this a thing that people want?' And everybody wants a Pokémon MMO. It certainly was a source of the inspiration, but this is not a Pokémon clone."

Moonrise certainly looks different to the Pokémon games, with a more western fantasy-themed style closer to something like *Magic: The Gathering* (another influence on Undead Labs) than a Japanese RPG. Disappointingly, *Moonrise* is currently in development for mobile devices rather than PC, but a Windows version could be rolled out if it's a success.

Undead Labs has pledged its ongoing commitment to *State Of Decay*, meanwhile, and the studio has another top-secret, zombie-themed project in the works, too. Founder Jeff Strain revealed via Undead Labs' blog that his firm had recently hired author JL Bourne (writer of the *Day By Day Armageddon* books) to work on this forthcoming release. Also in September, former Blizzard veteran Patrick Wyatt – whose biggest claim to fame is his work on *World Of Warcraft* – had reportedly joined the company.

We've known for some time that Undead Labs is working on a *State Of Decay* MMO called *Class4*, and these recent appointments suggest the game isn't too far off. Wyatt himself, although stopping short of admitting he's working on the MMO, seemed to confirm that he'd been hired for just such a project. "I can't talk [...] about what I'm working on at Undead Labs yet. But [...] I specialise in developing really big multiplayer games. So I guess I'll be working on something like that..."

Given the surprisingly huge success of *State Of Decay* as a single-player experience, it seems inevitable that we'll be seeing a multiplayer version very soon.

Incoming

Experience suggests that we shouldn't get our hopes up over a game connected to the *Alien* franchise, but the early word on Creative Assembly's *Alien: Isolation* suggests that it could be worth looking forward to. Here, at last, trying to get to the heart of Ridley Scott's 1979 film: it's a haunted house experience in space, where you, as the lone human on an interstellar vessel with a severe lighting problem, try to avoid the sharp talons of a powerful Xenomorph. The attention to 70s detail is wonderful, but the real reason to be excited about *Isolation* is the alien: a hunter that tracks your movement and scent, meaning that finding ways to avoid its keen senses will provide the game's greatest (and scariest) challenge. We'll know if the hype's worth it on 7th October.

▲ ***Could Alien: Isolation be the game that fans of the movies have been waiting for? Reports from those who've played it suggest a terrifying sci-fi horror experience***

AD INDEX

2-3 – CCL

6-7 Morgan

11- Heart Internet

13- Chester Group Exhibitions

21- TP Link

25-123 REG

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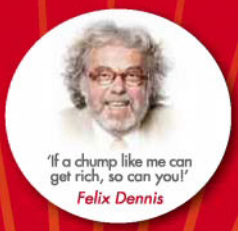

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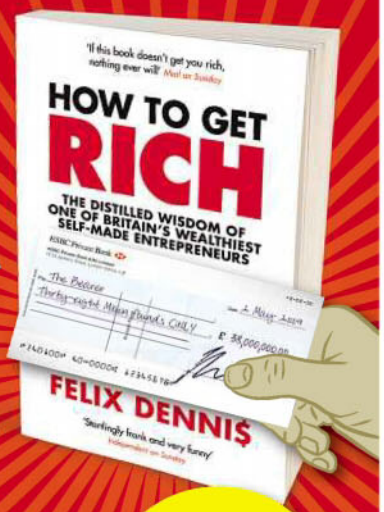

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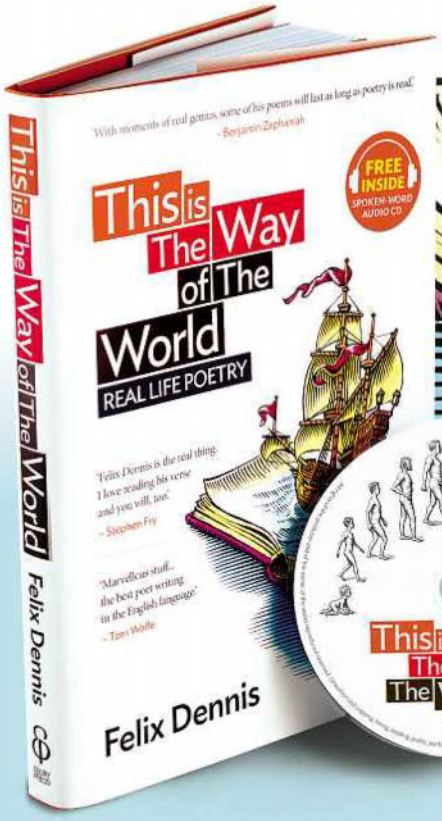

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Lian Li PC-X2000 Computer Case. Supports mATX, ATX, eATX; hot swap SATA drive compartment. Includes six 3.5" & two 2.5" hot swap disc holders. Three 140mm intake plus two 80mm and one 140mm exhaust fans.
Tel: Ian (01932) 856971 Email: a2345@btinternet.com

Matricom G Box Midnight MX2 Android HTPC. New boxed. £85 ono. Postage £3.
Tel: Mick Young (02072) 321695 Email: mick.young@o2.co.uk
Funai D50M-100Y VCR recorder, 6 head A2 stereo. New boxed. £90 ono. Postage £4.
Tel: Mick Young (02072) 321695 Email: mick.young@o2.co.uk

Cartridges for a Xerox 8500/8550 Phaser Colour Laser Printer. 6 Black, 5 Cyan, 4 Magenta, 2 Yellow solid block cartridges going very cheap! Check out cost new from Choice Stationary and make me an offer. My Xerox has given up the ghost after several years.
Tel: Ken Driver (01890) 820295 Email: ken@stonehaven2.plus.com

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Tel: Alex Thomas (01842)813630 Email: chackpobly12@hushmail.com

Novatech Bundle Gigabyte GA-M61PME-S2P M/board. AMD2 Quad Core 630 processor 2.8ghz. 2x2gb ddr2 800mhz memory. Black atx case. 400w psu. Good working condition. £120 ono.
Tel: (01964) 622867 Email ian.mackin@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.
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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.
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Gateway MT622OG 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.
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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 bargaintastic £75.
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Mini-USB finger optical laser mouse. Attaches to your finger and has two side buttons - great replacement for standard mouse. £10 p&p included.
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HP PO2015dn extra lower 250 page feed tray. £20.
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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.
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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.
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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.
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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.
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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.
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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.
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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.
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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.
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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.
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Enermax Galaxy 1000 watt Gaming PSU. Modular, 80+ Gold with all accessories, boxed. Perfect for bitcoin mining, not new but unused. VGC. £80.00.
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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 F505000. £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: omendata@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.
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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.
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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 HDT722525-DLA380. 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.
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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.
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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

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Windows 2000 Professional. NEW software and license (certificate of authenticity) 100% genuine and unopened software .ONLY £15 including P & P
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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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- **Never - NEVER -** pay by bank transfer or post out cash, unless you know the trader already, or are sure it is okay to do so. Pay by cheque, Paypal, Nochex etc wherever possible.

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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.

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Send your questions to:
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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

Silent Storage

I am going to try to repartition my hard drive to give more room in C. If this does not work I will need to replace my hard drive.

Is there a quiet and fast hard drive that you could recommend that's also good value, you know, a sweet spot model at this time? Is Samsung still the best in respect of quietness, speed, reliability and VFM?

Here is my PC's current spec:

Motherboard: ASUSTeK A7N8X-E
CPU: AMD Athlon XP 2600+, 1913MHz
Power supply: Model No ATX-1125B 250Watt power supply. Total output 130W
Memory (RAM): Corsair ValueSelect DDR1 400MHz 1GB (x 2)
Hard Drive: SAMSUNG SP1614N ATA Device
Operating System: Microsoft Windows 7 Home Premium 32 Bit

Thanks very much.

Mike

When it comes to hard drives, it's very difficult to say which is the 'best', as that kind of assessment is a very subjective thing, and can be affected greatly by overall system setup. However, your two goals of both speed and low noise would point me to recommend a move to a solid state model. SSD drives are by far the best option in terms of both speed and noise levels. For a start, they have no moving parts (such as spinning platters), so they make no noise – and the large boost in speed the tech grants, makes it a winner in the performance stakes too.

SSD units are, of course, going to be more expensive than HDD options, but you can get decent models for a more affordable price. For example, and as you're a fan of the brand, you can get a Samsung 840 EVO 500GB SSD unit for around £200 if you shop around, and larger, 1TB, Samsung 850 PRO for around £500. The latter is pushing the price up, naturally, but it's quiet and very fast.

Normal HDD units will never be as quiet as SSD, due to the moving parts, but there are models around that claim to be quiter than he standard. This is usually achieved by running them with a reduced spin speed of around 5400rpm, instead of 7200rpm. Some of the best examples of this are from the Caviar Green range from Western Digital, green-focused drives that use less power and are relatively quiet, but operate at a slower speed than normal – so it's a bit of a trade-off. They can be very good value, though. A Western Digital 3TB 3.5" WD30EZRX, for example, should only cost around £80.

Perhaps a good option would be to settle for the middle ground and go for a hybrid drive. These mix in both HDD and SSD technology to create a unique drive that's fast, and usually quieter than most alternatives (although this varies between brands and models, of course).

Just one example of this would be the Seagate ST2000DX001. This is a 3.5" 2TB hybrid unit that uses both NAND Flash and HDD storage (called SSHD). The SSD is is used to hold and access cached, required data for the task at hand, whilst the HDD storages everything else. The two work in tandem to make for a great combination, and they're affordable. This particular model should only set you back around £90. Not bad for both SSD and HDD, with 2TB of space.

Hybrid SSD/HDD units, or SSHD's, offer a good balance of price, performance and noise level

Virtual Scan

With regard to Mel's problem (Scansoft, issue 1326), I also have an old HP scanner which was only issued with XP drivers. I have Windows 7 on my laptop and Linux Mint on my desktop after having removed XP.

My Canon MFP printers are okay for copying text, but for photographs the HP is far superior. My solution was to install the free VMware virtual desktop. I then slipstreamed XP into it, including the HP scanner driver.

Next, I installed Vuescan (**www.Hamrick.com**), which I think is the best scanning software to use. I now have a working scanner, rather than an unuasable one that was too good to through away.

Obviously not easy for a first time user, but easy enough for someone more experienced. Just make sure that the internet is disconnected when using the scanner in virtual mode.

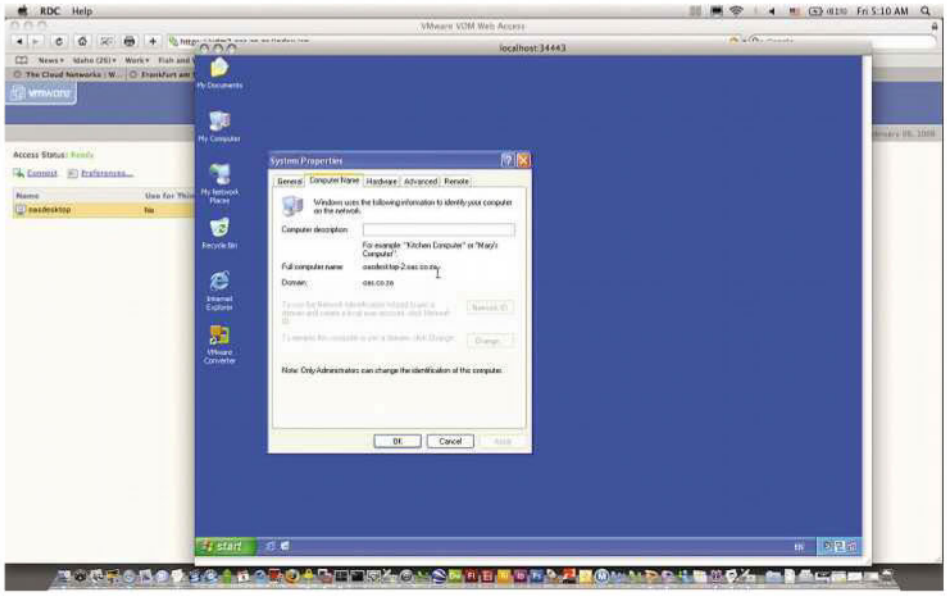
John

I'm often an advocate for using virtual machines to solve various issues, especially legacy comparability problems, so I thoroughly agree with your solution, John. It's a great way to utilise free virtualisation software, and if you've got older hardware and/or software, this can be the best way to work around any roadblocks you may run into.

However, as you said, it's also not something I'd often recommend to a new PC user, and as this was Mel's first PC, with no prior experience, this may have been a step too far. Just finding the right virtual software for free can be tricky sometimes, and then there's he need to have a copy of the version of Windows you're going to virtualise. Mel only had Windows 8, so this would require the purchase of XP.

That said, any users who have more knowledge of PCs and software, as well as an old copy of XP sitting around, should always consider this solution. It's more often than not a winner.

Whether you're using Windows, Linux or Mac OS, virtual machines can solve all sorts of issues



Budget Mobile Gaming

I have just returned an Asus laptop because my granddaughter could not download and install custom content when playing *The Sims*, which may be due to Windows 8.

I read an article in *Micro Mart* issue 1213 that covered gaming laptops, and it came out in favour of AMD. Could you say what you think would fit the bill with out breaking the bank?

J Gamble

Without an actual budget bracket to work from, it's hard to say, but assuming you want a laptop capable of gaming at a decent performance, you'll be looking for a laptop that has dedicated graphics processor, not just on-board video. This feature can push up the price of laptops considerably, but it's certainly worth noting, especially if your granddaughter intends to play newer games, including The Sims 4.

There are plenty of AMD-based gaming laptops around, and a very good model to consider is the MSI GX70 3BE-041UK. Priced at around £1,100, this is a 17.3" gaming laptop that features a quad core 2.5GHz AMD CPU, 8GB RAM, and AMD Radeon HD 8970M graphics. It even has both a 750GB HDD and a 128GB SSD. It's a solid performer for gaming.

There are variations of the unit for cheaper prices, such as the MSI GX60 3CC-296UK, which is a 15.6" unit that includes a 2.5GHz quad core CPU and AMD Neptune XT R9-M290X graphics, along with a 1TB HDD, and this costs around £780, substantially less than the GX70 as you can see.

If you're looking for a laptop below the £500 mark, your options are more limited, especially when it comes to a gaming level. One option could be a HP Pavilion 15-p047na. This is a budget laptop that includes an AMD A10 2.1GHz quad core CPU, and Radeon HD 8610G graphics, along with 8GB or RAM. This costs around £430 (found on Amazon), and should do nicely for The Sims.

You didn't specify which version of The Sims *is being run, but even* The Sims 4*'s minimum spec is a 1.7GHz CPU, and the Radeon HD 8610G, although not optimal, should run it, and have no problems running older versions. You may need to scale down the detail land resolution, though.*

Gaming laptops can be pricey, but budget

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

Sermon On The Mount

My son sometimes needs to make PowerPoint presentations for school homework. In the past, we've tried Impress in the free LibreOffice, but it doesn't have the same features, and we've found that presentations don't look quite right when played back at school in PowerPoint.

Anyway, I've downloaded Microsoft's trial of Office 2013 Professional Plus, which comes as an .img file. My lad's laptop runs Windows 8.1, and Microsoft says I can mount the .img file in that and then launch the Office setup from there. However, I get the following message: 'Sorry, there was a problem mounting the file.'

Thinking the file might be corrupt, I've just downloaded it again. But I still get the error message. What am I doing wrong? Can I burn the file to a CD or DVD and launch the setup that way?

Paul, TalkTalk

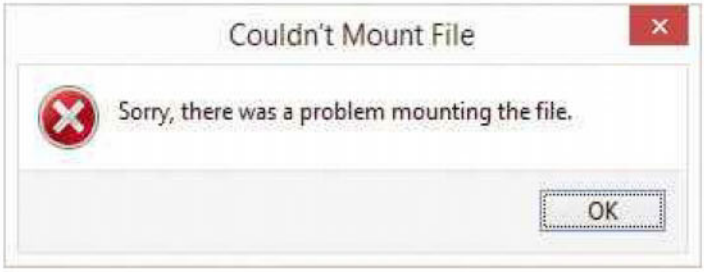
The file isn't corrupt, and you're doing nothing wrong. You've fallen foul of a foible in Akamai's NetSession Client, the peer-to-peer download manager Microsoft forces users to endure. This often gives disc images (.iso files, .img files, and so on) the file attributes A and P. Nearly all files carry the A attribute, for 'archive', but the P attribute, for 'sparse', is a bit specialist. Head to ***bit.do/PsZF*** *if you'd like to know more. Or don't. I made that mistake, and I've not read anything less entertaining since I picked up the last novel by Dan Brown.*

As you've found, sparse files can't be mounted, at least not by the functionality built directly into Windows 8.x. But don't worry, Paul – there's an easy solution. Right-click your download, click Copy, open a different folder, then click Paste. The copied .img will carry just the A attribute, so Windows will mount it just fine, allowing you to launch the Office setup file. You can delete the original .img file.

Why is this even necessary? Well, I suspect Akamai's atrocity has a bug, one that's been alive for months (probably longer). Why Microsoft hasn't demanded its removal is a mystery – as is why Microsoft doesn't alert users to the problem and highlight a workaround. Presumably the company offers the Office trial in the hope of securing future sales, yet only geeks have a prayer of even getting it installed. In my view, this is just one more sign of how weakened the Redmond giant has become.

P.S: *Yes, you can burn the .img file to disc. That's another viable workaround, as the P attribute won't matter. If you need a burning tool, try ImgBurn:* ***bit.do/Pt5z****. Also, I assume you've downloaded the 32-bit Office, which is fine, even for a 64-bit PC. In another example of Microsoft's incompetence, the download link for the 64-bit Office doesn't work. Try it:* ***bit.do/Pt9f****. For users wanting to travel the 64-bit route, head instead to this AskVG page:* ***bit.do/Pt4D****.*

Yes, but why? Why?!



Lost Your Keys?

I think my laptop's RAM could be faulty, as once or twice a day I get 'stop' and 'page fault' errors. It's a Toshiba Satellite C50-A-1DV, packing a Core i3 and running Windows 8.1 (64-bit). I want to run Memtest86+, but I can't get the CD to boot. Even though the DVD drive's set as the first boot device, the laptop just launches straight into Windows. I've also tried Memtest86+ on a bootable USB stick, with the same result. Help!

Connie, Derbyshire

This is all to do with Secure Boot, Microsoft's attempt to make PCs less vulnerable to rogue software. It's a feature of all PCs that ship with Windows 8.x pre-installed, and it's closely tied to the UEFI, the new style of BIOS. With Secure Boot enabled, a PC will only boot from a source that contains a security key the UEFI recognises. All other sources will be ignored.

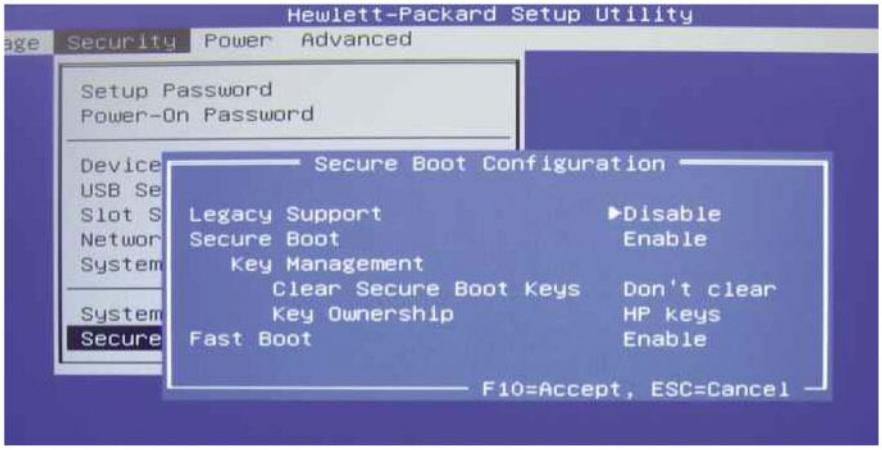
There was a fear that Secure Boot would scupper Linux users, barring them from installing any Penguin-flavoured OS on any modern machine. The reality is much kinder, thankfully. Although PCs carrying Windows 8.x stickers are obliged to ship with Secure Boot enabled, almost all allow it to be switched off, with Microsoft's blessing. Only devices running Windows RT have to have Secure Boot hard-wired (RT is the ARM-based version of Windows).

What you need to do, Connie, is get into the Toshiba's BIOS (and it really does look like a good old-fashioned BIOS, not a UEFI). Press F2 as soon

as you fire the machine up. Depending on how the function keys are configured, you may also have to hold down the Fn key at the same time.

In the Main screen, you should see the Secure Boot setting front and centre. Change this from Enabled to Disabled. Next, head to the Advanced screen, where you'll find a menu headed System Configuration. Enter this and change the Boot Mode setting from UEFI Boot to CSM Boot ('compatibility support module'). Save the settings and restart.

You'll now discover that all 'legacy' bootable media will work, including USB sticks. Once you're done with Memtest86+, re-enter the BIOS and put the settings back. Windows will likely fail to start until you do. Change the Boot Mode setting first, as I believe the Secure Boot setting doesn't even show up until UEFI Boot is enabled.



Secure Boot can lull the uninitiated into thinking the only thing they can boot from is Windows 8.x or a Windows 8.x setup disc, which some might say was Microsoft's chief reason for introducing it...

A Trio Of Trouble

Recently I upgraded my PC. I used my previous Core 2 Quad system as the base, replacing the CPU, cooler, motherboard, RAM, and PSU. The current specs are as follows.

- **CPU:** Core i5-4670K (3.4GHz, quad-core)
- **Motherboard:** Asus Z87-A
- **Memory:** 2× 8GB Corsair Vengeance DDR3-1600
- **SSD:** 256GB Samsung 840 Pro
- **HDDs:** 1TB Western Digital; 500GB Samsung
- **Graphics:** Gigabyte GeForce GTX 560 Ti
- **Monitor:** Dell 24" UltraSharp U2412M (1,920 × 1,200)
- **PSU:** Antec 650W TruePower
- **OS:** Windows 7 (64-bit)

Now, I've updated the Z87-A's BIOS, but since then Windows won't load from a restart. I have to press the reset button on the case or else fully shut the PC down and press the power button. Additionally, my 400GB Freecom USB drive's no longer recognised (there's a stack of data on it!).

There's something else, too. The latest Nvidia drivers are installed, but sporadically my display will freeze. At other times, it'll turn a blotchy yellow colour and become covered in small white squares – it's like an old BBC test card. I've attached a photo. What's going on, d'you think? My PC's falling apart!

Rick, Gmail

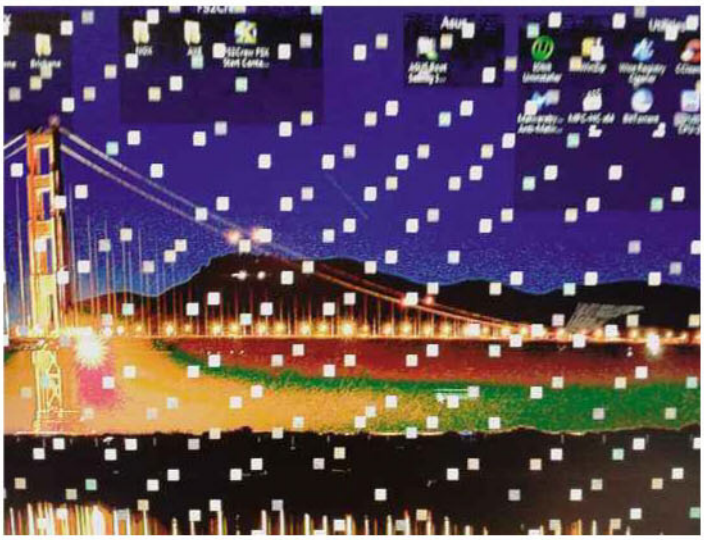
I'm not convinced the new BIOS is the problem – it could well be coincidence that your troubles began after you updated it. But can't you revert to the old one? As a general rule, a BIOS should only be updated if the new one cures known issues or adds needed features. Otherwise it should be left alone.

If the boot issues persist, they're almost certainly the result of a faulty PSU or motherboard. As ever, my money would be on the latter. In my experience, when the cause of a problem isn't starkly obvious, nine times out of ten it turns out to be the motherboard. Can you borrow another PSU? If restarts then work, swap the Antec under warranty. If restarts still fail, swap the Asus under warranty.

As for your external hard drive, Rick, hook it up to a different PC. If it works, the finger of suspicion is once more pointed at your own PC's PSU or motherboard. If it's still dead, are you sure it's even receiving juice? Has the enclosure's power brick failed? It's also entirely possible that the enclosure's circuitry has failed. As a last resort, you could remove the drive from the enclosure and connect it to your PC directly. The drive's probably just a standard SATA unit. Many, many Micro Mart readers have salvaged 'lost' data this way!

*The graphical issues are artefacts – and that's bad news. There's an outside chance the PSU or motherboard could once again be at fault, but most likely you're dealing with an overheating or damaged GPU. Are the card's fans spinning freely? Are they choked with dust? Download something like HWMonitor (**bit.do/PuB3**) to keep tabs on the GPU's temperature. For the GTX 560 Ti, anything above 99°C – as an absolute maximum – spells trouble. If the card's *not* overheating, it's probably shafted.*

I know the nights are drawing in, but surely it's a bit early for snow?



Crowdfunding Corner

Kickstarter's a great place for games you can't get anywhere else. Here are two we liked the look of!

Parkitect

Built in the tradition of *Theme Park* and *Rollercoaster Tycoon*, *Parkitect* is an old-style sim game where you put together your own theme park attraction. From designing rollercoasters to installing shops and placing scenery, you can control every aspect of your park's building and development as you aim to keep your customers and employees happy.

The developers aims to release its game in a year's time (September 2015), and until then, all Kickstarter backers will be able to keep up with the development as it goes. The game will hit all major desktop platforms (Windows, Linux and Mac OS X) and will be available through Steam Early Access and DRM free, so getting hold of a copy in your preferred manner shouldn't be difficult.

If you want to back the project, you can get a copy of the game for $15 Canadian (about £8.50!), while higher tiers include wallpapers and soundtrack, royalty-free access to the sound library, access to betas and prototypes and even the ability to get your name into the game as a guest. By the time you read this, the project should have hit its goal of $50,000, so there should be even more added in the form of stretch goals. If you were a fan of god sims, this might just be a return to the good old days!

URL: www.kickstarter.com/projects/1548960623/parkitect
Funding Ends: Sunday, 21st September 2014

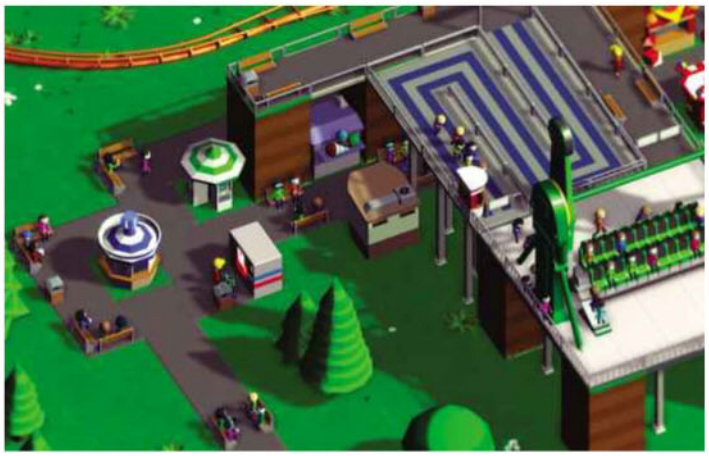
Jelly God - An Indie Game

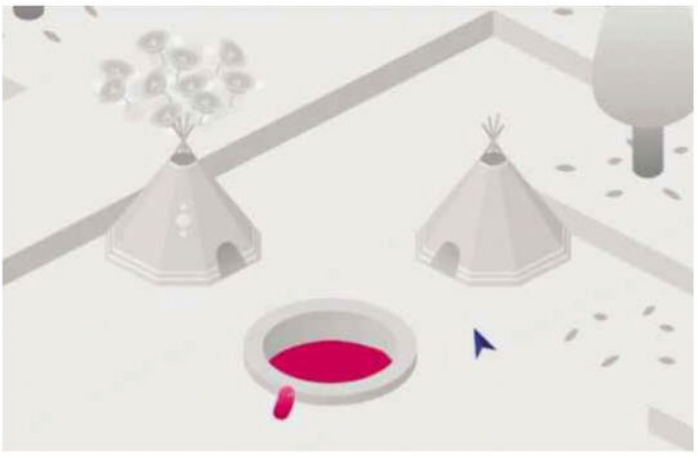
Some games on Kickstarter are inspired by old ones. Others try to do something completely new. *Jelly God* falls into the latter category. It's a game about bringing colour to a grey and lifeless land by growing and nurturing a jelly village. You expand your village by collecting resources, building homes, unlocking new colours and discovering new ways to combine items.

Aimed at players of all ages, the gameplay focuses on discovery, creation and customisation rather than destruction. Everything in the game can be upgraded, modified and/or coloured so that you can make your world exactly the way you want to. It's being built for both Windows and iOS platforms, with more planned in the future if the game is successful.

There are tons of rewards too! For NZ$10 (about £5) early backers can get a digital copy of the game, or it'll cost $15 if you miss out on the discounted tier. You can still get two copies for $25, and for $40 you get beta access. There are also Kickstarter-exclusive extras, like ambient creature pets, modified versions of in-game content and physical extras like posters, postcards, mugs and mousepads all available for those paying a little bit more. It's not due until December 2015, but it looks like it'll be worth the wait, and it's only a few more backers away from its $3,000 goal as we write this.

URL: www.kickstarter.com/projects/bexcellentgames/jelly-god-an-indie-game
Funding Ends: Sunday, 21st September 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

Studious

Back to school but with a modern twist

My children have returned to school, and peace has once more descended upon our house, where it's just me and the cat looking out of the window for inspiration (although the cat is eyeing up the birdies).

Actually, I quite miss the kids when they're back at school, but they're now among others their own age and no doubt trying to get back into the swing of things, brandishing timetables, homework diaries and crumpled letters from the headmaster in the depths of their blazer pockets – among the fluff, bits of string and random paperclips. It all seems rather archaic, in some respects.

My children's school takes a dim view at its pupils using phones during class, so they have to hand their devices in at the start of the day. But some schools are embracing the fact that nearly every child has access to a smart device of some description. To that end, then, it makes sense to see what educational titles are available.

Get Studious

The one we came across, which seemed quite handy, is called Studious. This Android app is designed to allow students to get to grips with their current school timetable and calendar, map of the building, note taking and homework planner.

Within its layout you can input your current and new school timetable, along with the teacher's name, the classroom name/number the lesson is in and colour code it according to the lesson group it belongs to. Also, if you alternate lessons from one week to the next, you can link and pair lesson groups together, such as Maths lesson 3 on Friday in week one linked to Maths lesson 1 on Monday in week 2, so you can see where you'll be continuing your lesson from the last.

The map function is certainly interesting, but it's not as well implemented as we would have liked to see. In this instance, you can specify a URL or attached PDF of a map of your school. However, we think it would have been better to integrate the timetable with the map function, so if you were to tap the lesson and the room location, it would bring up the map and point you in the right direction – perhaps even with directions?

The homework feature is certainly handy. You can input the lesson that the homework was set in, which teacher it's for, what the subject of the work is about and, most importantly, when it's got to be in for. Additionally, you can include any extra notes taken from the class and display everything you need when you finally get around to completing it. And should it slip the mercurial mind of the teen, then there's a handy alarm to warn them of the impending deadline.

And finally, Studious also has the ability to auto-silence your phone during lesson times – although in all fairness, it should be on silent anyway.

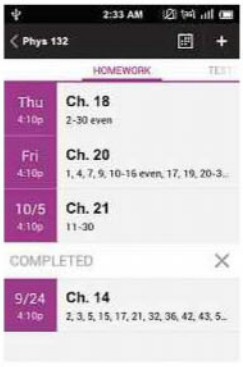
Features At A Glance

- Silence your phone in class.
- Remind you when homework and tests are due.
- Save notes.
- Free.

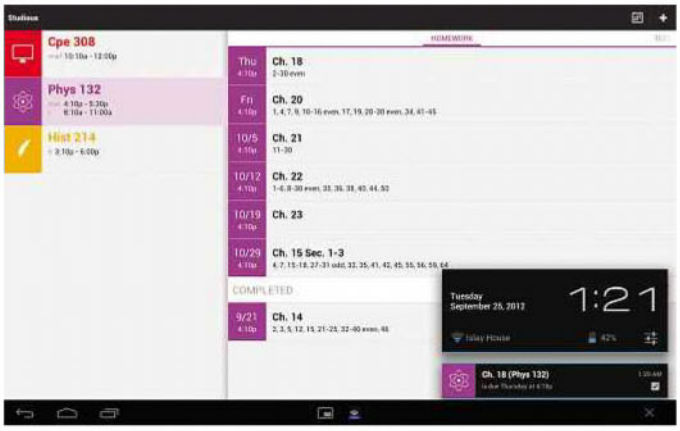
Conclusion

There are some gaps in Studious that could do with filling, such as the map function, but for the sake of a handy, modern-day homework planner and school diary, it's not all that bad.

While we're thinking of features for Studious, maybe the developer could include a function to allow for e-letters home or vice versa. That way, both sides could be sure of the other actually receiving and reading it?



Keep up with lessons, homework and other school stuff with Studious



Set reminders keep you on target for pesky deadlines

Logging Off

By now you may have noticed that, yet again, I'm not in the line-up for this season's *Strictly Come Dancing*. Tragic, I know.

There are a few reasons that this island won't be graced with my unforgettable salsa, the first being however fuzzy the BBC makes the term 'celebrity', it doesn't encompass me. Passing over that the BBC didn't ask me, I have to also admit that I have all the inane grace of the newly discovered Dreadnoughtus schrani dinosaur stumbling through a field littered with giant Lego bricks.

While some might call my dancing 'entertaining' they're probably confusing that word with another, or they're being ironic, possibly in a post-feminist fashion.

As they say, 'know your limitations'.

That might be very good advice for the technology analyst of CNN to take, because Brett Larson's various responses to the recent distribution of nude images purloined from celebrity phones demonstrated that he's exceeded his by some considerable margin.

According to Brett's own website he "has an understanding of the digital divide between traditional and online media and social networking." Really?

Then how does that explain how he tried to advise people that if they'd used the password 'password', they'd be better protected if they changed that to 'pa$$word'.

That is probably one of the worst pieces of technical advice I've heard since I overheard someone in a popular retail outlet telling a customer that only Intel processors offer 'true' PC compatibility.

But Brett wasn't done yet taking his rather thin technology guru reputation and attacking it with a lump hammer. In an interview he did with another CNN talking head, Brooke Baldwin, he got entirely confused about what, or even who, 4chan was.

According to the man who "brought the world of tech into the homes of millions of American's while working at TechTV in San Francisco," 4Chan isn't an image-based bulletin board. No, it's a person, who "may have been a system administrator who knew his way around and how to hack things". Eh?

And there was me assuming that it was this site that gets about half a billion page impressions and 20 million unique visitors a month. Stupid me!

If you enjoy watching someone left alone in mid-ocean after failing their 25 yards breaststroke certificate, I wholly recommend searching

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out a classic clip of NBC's *Today* show presenters trying to get their heads around the 'internet' in 1994. One of the team asks "What, you write to it like mail?"

Before we all get overly superior on this side of the pond, by the time you read this, the new iPhone will be released, and we'll of being subjected to some less than unbiased reporting from our home grown technology reporters.

I'm especially interested to hear from the BBC, given that it's spent approximately £2.5m of licence payer's money on Apple equipment in the past two years, netting 4,000 iPhones, 400 iPads and 800 MacBooks.

But back to my original point. I'd be the first to admit that people need to challenge themselves, because doing something they're entirely confident you can accomplish doesn't progress people. That said, in the world of tech reporting, we seem curiously blessed with people that can make very little knowledge stretch an extraordinary distance. Given what I've achieved with what I know, I can only salute them.

Mark Pickavance

LAST WEEK'S CROSSWORD

Across: 7 Macroscopic, **8** Goblin, **9** Fillip, **10** Pattern, **12** Dolby, **14** Start, **16** Quintet, **19** Quasar, **20** Bounce, **22** Silicon Chip.

Down: 1 HMSO, **2** Sculpt, **3** Foundry, **4** Scoff, **5** Apollo, **6** Scribble, **11** Altruism, **13** Gubbins, **15** Result, **17** Nought, **18** Frack, **21** Capo.

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We'd like take a moment this week to salute all the coders of the world. We recently thought we'd have crack at this software developing lark to see what all the fuss what about. How hard could it be, right? Pretty soon we'd be making top-quality mobile apps and generating huge revenues. The only problem is we soon discovered it's not that easy. After spending a few hours typing out 'if' statements and trying to work out why something wouldn't run (normally because a missing semi-colon), we started to rethink the whole notion of coding for a living. But we're not giving up completely. It might be hard, but it's also interesting, so we're going to crack on, and hopefully by the time we're in our 70s, we might have produced a half decent text adventure. That said, we'll have to also find time to write that first novel, travel the world, see the Northern Lights and finally get round to defrosting the freezer.

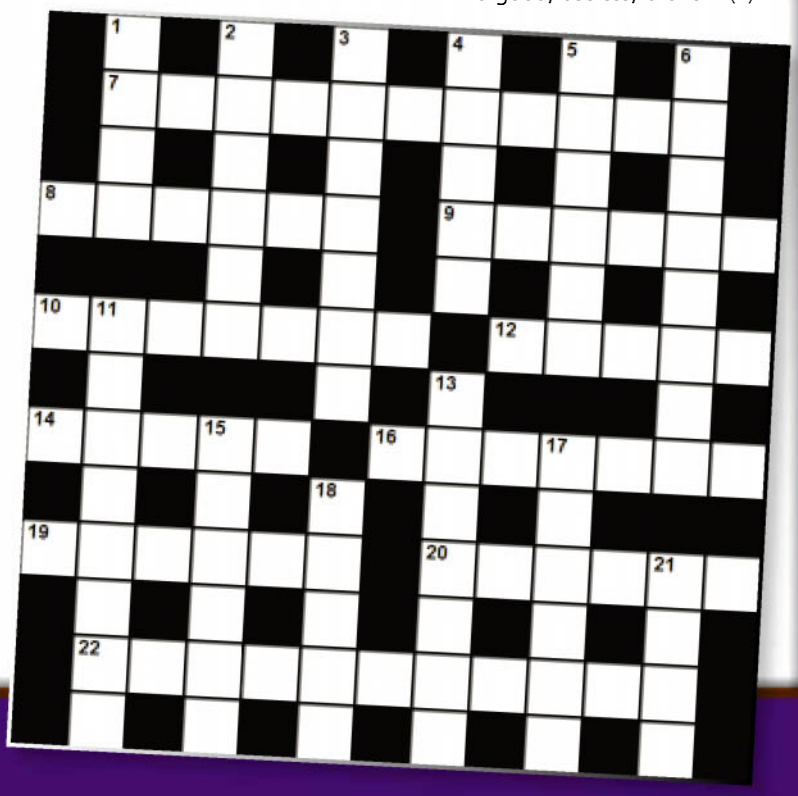
THIS WEEK'S CROSSWORD

Across

7 A system of weights based on the 16-ounce pound. (11)
8 Any one of Mark Labbett, Shaun Wallace or Anne Hegerty? (6)
9 Diverging in lines from a common centre. (6)
10 Compare and analyse two or more sources of information. (7)
12 Break suddenly into pieces. (5)
14 A small digital computer based on a microprocessor and designed to be used by one person at a time. (5)
16 .nl TLD (7)
19 A short-term cash loan aimed at people who need some money quickly. (6)
20 A web design cloud platform that allows designers to create advanced HTML websites with built-in CMS, without writing code. (6)
22 The practice of quickly scanning through different television channels or radio frequencies to find something interesting to watch or listen to. (7-4)

Down

1 The command interpreter (shell) for UNIX-like operating systems. (Acronym) (4)
2 The remains or impression of a plant or animal that existed in a past geological age and that has been excavated from the ground. (6)
3 Proportionally. (3,4)
4 A question-and-answer website where questions are created, answered, edited and organised by its community of users. (5)
5 A person who lives in a country but is not legally domiciled in it, sometimes obtaining tax advantages in the country of residence. (Abbr) (3-3)
6 A person who murders an important person for political or financial reasons. (8)
11 A very rich businessman with a great deal of political influence. (8)
13 A town in New Mexico, the scene of a mysterious crash in July 1947. (7)
15 The first 4K cinema player to bring ultra high-definition content to your home, business or local theatre using internet file based distribution. (6)
17 A political party formed in Great Britain in 1900; characterised by the promotion of worker's interests and formerly the socialisation of key industries. (6)
18 Deliberately not telling the truth. (5)
21 No good, useless, broken. (4)



In Next Week's Micro Mart

- Upgrade special! Top components and peripherals for less than £50
- How to upgrade a laptop
- Improve your network performance
- How to upgrade for free
- Plus the usual mix of news, reviews and advice

* May be subject to change

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