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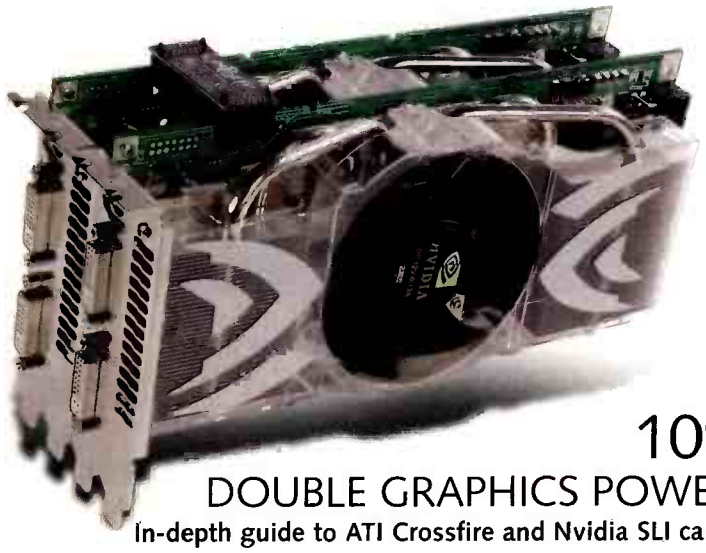

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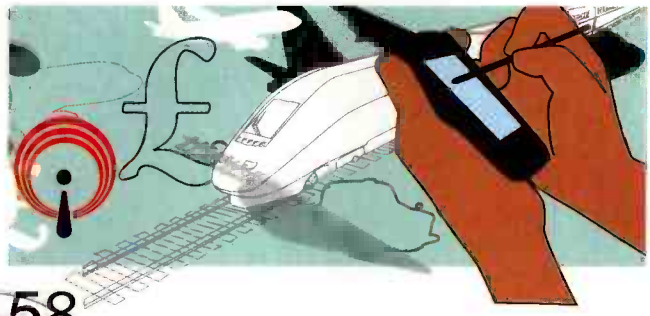

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Editorial

Remote access to the office may not be route to freedom

Mobile devices may provide flexibility, but Dylan Armbrust warns that this could mean there's no escape from work

In my daily work routine one morning this month, I came across a press release and white paper from Avanade, a technology integrator, for its study The mobile world at work. As an analysis on mobility trends for business, it's an interesting read. It predicts laptops will make up only a third of company mobile devices by 2010, yet two-thirds of companies will increase their spend on mobility tools.

For the UK, two-thirds of firms plan to increase their use of PDAs and Blackberrys, while half intend to increase investment in 3G phones and tablet PCs. Across Europe, 42 per cent of companies expect the proportion of mobile workers to increase over the next few years, with this figure rising to six out of 10 in the UK and Germany. That's going to be a lot of workers on the move.

Of the firms surveyed, two-thirds believe that a move to a 'more flexible or mobile' business and IT infrastructure will bring improved employee efficiency and productivity. Here in the UK, an astounding 79 per cent of firms held this view. Even more interesting was that half the companies associate the use of mobile devices with faster and better customer service. The same proportion of firms also believes 'mobility and remote-access technologies have already significantly increased competitive edge within (their) businesses' today.

'Is it possible to achieve a work-life balance if we're connected everywhere we go?'

As Steve Butcher, mobility community lead at Avanade, said: 'Work-life flexibility and the empowerment of mobile workers are huge business issues, and it's great to see that mobile working is firmly on the IT agenda. It means that organisations have recognised the impact mobile technology can make to the bottom line.'

There's a compelling business argument for having workers connected to the office with versatile mobility tools such as PDAs, Blackberrys and so on. It will increase staff efficiency and productivity and help provide better customer or client services. If you run a business this is a good deal, as it can boost your profits.

However, the impact this will have on workers in general is also worth bearing in mind. While mobile devices will certainly provide greater flexibility about where and when people work, I'm not convinced it will create a positive work-life balance. This may sound odd coming from an editor of a technology magazine, questioning the value of ever-advancing technology, but having seen how technology can increase work – and the pressure that goes with it – I think it's an issue worth raising.

With any new development, we tend to be told it will make our lives easier and we'll work less hard. But from my observations, the opposite is true. Anyone in an office can tell you about email fatigue. Sit on any bus or train early in the morning or after work and you can't help but hear people sorting out work problems. And if you know anyone who has a Blackberry, you know that they can't have a conversation with you for more than five minutes without checking their emails, and that's in the pub! Examples like these make me question where this 'mobility revolution' is taking us as human beings.

While I'll always be an advocate of pushing technology forward and trying new things, I think it's important we remember the impact it can have on our lives. While increased bottom-line results are good for companies, does it mean we should always be on call for our workplace? And is it possible to achieve the manna of work-life balance if we're connected everywhere we go? You know where I stand, but I'd be interested to hear what your views on the matter. Email me at dylan_armbrust@vnu.co.uk. **PCW**

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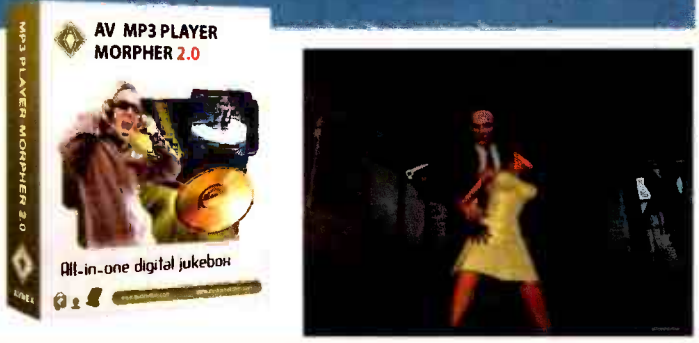

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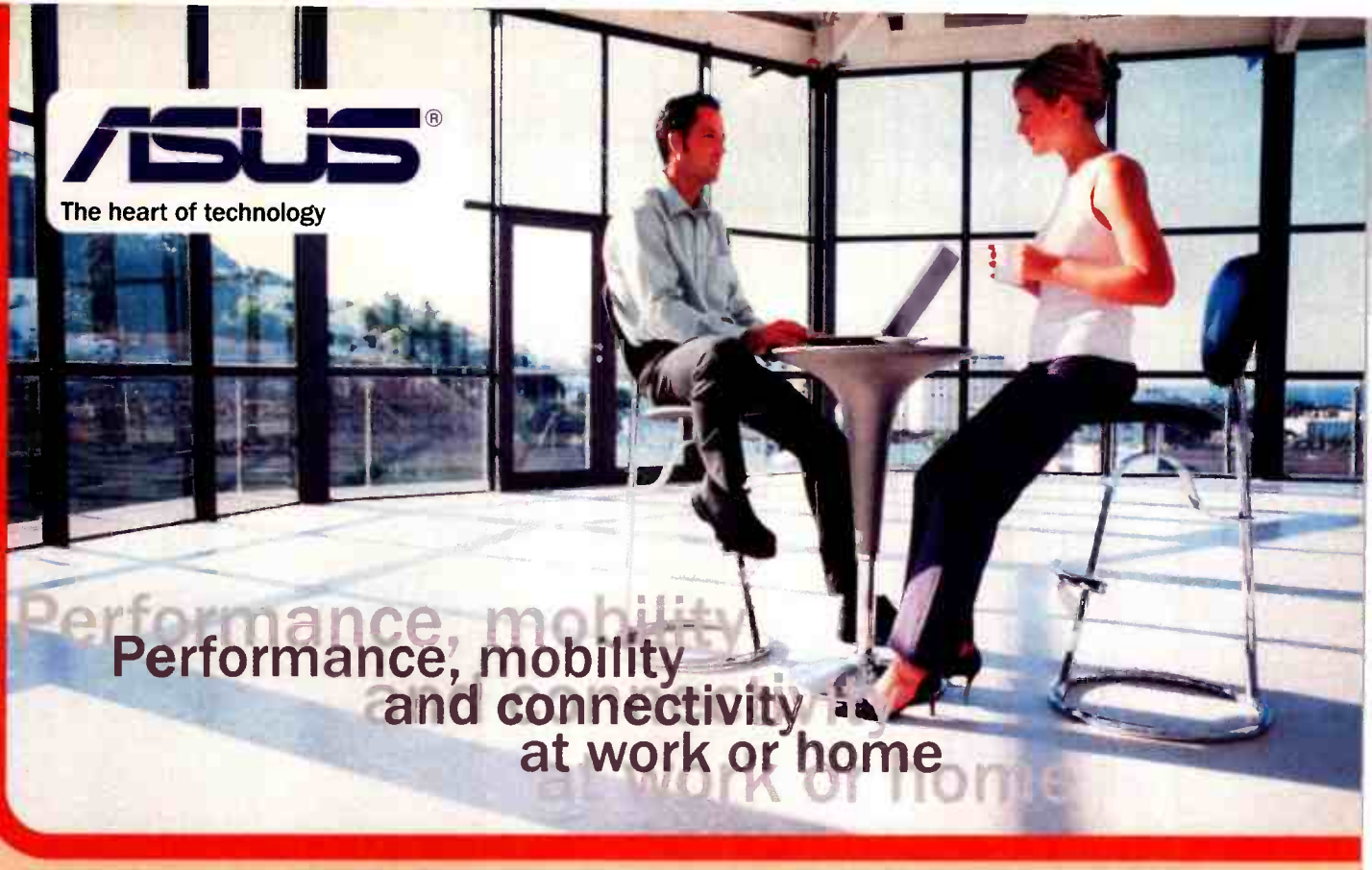

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New Windows world emerges

The news this month is dominated by Microsoft, which is preparing a complete revamp of virtually all its products in readiness for the biggest software launch for a decade.

For the first time, people outside the tight developer community can try out some of the new code. This includes you, because the Beta 2 version (one of the final bug-testing phases) of Office 2007 is on this month's cover disc.

The Beta 2 of Vista, the successor to XP, is now available for general download from the Windows Vista website. In addition, Microsoft is refreshing all its server products.

The new Office and Vista will be available to enterprises later this year and are scheduled to launch in shops in January 2007 – though there have been hints that the date might slip a little, depending on what emerges from the Beta 2 testing.

Shanen Boettcher, director of Windows client development, told a press briefing at the Windows Hardware Engineering Conference (Winhec) in Seattle that the priority was to get the products right.

The conference was remarkably low key, considering that it heralded enormous changes to software used by nine out of 10 users in the world. Boettcher said: 'We have done this before. We know what to do. We can do it.'

A January launch of Vista and Office 2007 will immediately render out of date all PCs sold at Christmas, but Boettcher said vendors will get a chance to test their machines on Vista before they go on sale and there will be deals for new buyers to get upgrades.

Boettcher added: 'These things happen with every new launch. This one is really no different.'

Microsoft is also acting to minimise confusion over new, improved Office file formats (see page 21) that older versions of the suite need new filters to read. (They are installed automatically in your existing Office software if you load the Beta 2 code on the same machine.)

The interface of three major Office products has been changed to make existing features easier to find and use (page 20). Some new collaborative features, including virtual 'workplaces' for dispersed workers, will require something of a cultural change in many businesses if they are to take off.

Winhec also gave a glimpse of where Microsoft plans to take the Origami (page 16), and of the ultra-wideband (UWB) technology that will enable the ultra-mobile to reach its potential (page 22).

Of more immediate interest is the way PCs are starting to make use of low-cost Flash memory. Vista can use USB drives as speed-up cache, and Samsung claims you can improve performance by up to 50 per cent by using a 4GB SSD costing around $100 (see page 19). *Clive Akass*

Bill Gates presents Beta 2 code of three flagship products – Vista, Longhorn Server and Office 2007 – to Alan Nunn, global technology manager

Microsoft Office 2007 prices start at £85

Four versions of Office 2007 will be available in the shops – plus a fifth that will be bundled with a PC.

The old Home and Student-and-Teachers editions have been merged into one called Home and Student with a US price tag of $149 (£85). For that you get Excel, Powerpoint, Word and the excellent One Note utility. We understand this edition will be licensed for three machines.

To get Outlook you have to buy the Standard edition at $399 (£230), or upgrade for $239 (£136). This lacks One Note but Outlook has many new features designed to appeal to businesses.

The Small Business edition – $449 (£254), upgrade $239 (£136) – adds Publisher for designing in-house documents, and Outlook with Business Contact Manager. The Professional edition – $499 (£283), upgrade $329 (£187) – adds the Access database.

Two corporate editions, Enterprise and Professional Plus, will be available only through volume licensing.

'Free' broadband faces delays

Customers signing up for the Carphone Warehouse 'free broadband' service are having to wait up to three months to be connected.

Chief executive Charles Dunstone said the 340,000 people who had applied in just eight weeks had caused a 'hiring strain' as it took time to train people to deal with customer queries.

The company has been criticised for offering its broadband service as free, when it is part of a bundle costing a one-off £29.99 and then £20.99 a month. However the package does include broadband and unlimited calls to 28 countries, and customers do not have to pay a BT line rental.

Carphone Warehouse says 100,000 customers already use the full package and a further 240,000 had their phone line set up awaiting broadband.

But it faces competition from Orange, which offers no-cost 8Mbits/sec broadband to customers who pay £30 or more on its Racoon, Canary and Panther contracts for mobile calls. Other operators, including NTL, are believed to be considering similar bundles of landline and mobile calls, broadband and even TV.

'Free' broadband bundles are not necessarily cheaper for light phone or web users. Plusnet offers an 8Mbits/sec service for just £8.99 a month, though you pay BT line rental on top of that and it is capped at 50MB – about enough for email; you pay 0.024p per MB (ie 24p per GB) for anything above the cap.

Ferraris race to first dual-core Turions

Acer is using low-drain mobile processors from AMD in its Ferrari range of high-end notebooks. The Turion 64 X2 is AMD's first dual core for laptops, and is being marketed aggressively by Intel with its Core Duo chips.

Dave Everitt, European marketing strategist at AMD, insists the company will be able to keep up with Intel on performance per watt, on which its larger rival has been promising order-of-magnitude improvements during the coming five years.

Some laptop makers prefer to use AMD chips because they provide more opportunity to make distinctive designs and provide a wider choice of components compared with Intel's tightly specified Centrino platform.

The Ferraris, with a style inspired by the racing cars, are certainly distinctive and include features such as a high-definition multimedia interface port, a 5-in-1 card reader, Bluetooth VoIP (Voice over IP) phone, Gigabit Ethernet and a 1.3megapixel camera as standard.

● Intel challenges AMD on gaming – see page 25.

Fire alarm for HP cameras

HP warned of a fire risk in 675,000 Photosmart R707 digital cameras that have been sold worldwide. The batteries can overheat when the camera is charging. At least one camera has caught fire, but no injuries have been reported.

Anyone who bought a Photosmart R707, which was introduced in August 2004, is advised to stop using it until the firmware is upgraded. You can download the upgrade from **http://tinyurl.com/g76an**.

More information on the problem can be found at the US Consumer Product Safety Commission at **http://tinyurl.com/l4vcq**.

Microsoft drops pdf in Adobe spat

Support for Adobe's pdf format has been pulled from Office 2007 and Windows Vista in a spat over the use of Microsoft's rival XML Paper Specification (XPS) in the next-generation software.

'Unfortunately, Adobe has been pushing for us to remove XPS from Windows,' said Andy Simonds, Microsoft group product manager for Windows digital documents, in a posting on his blog.

'Given the clear benefits of XPS to customers and partners, this is something we cannot do.'

Chris Harris-Jones, principal analyst at Ovum, said Adobe feared that pdf support in Office 2007 would cut sales of Acrobat, the portable-document editing package.

He said people wanting advanced pdf features such as security would still need to buy Acrobat, but that most users would be happy with the 'Save as pdf' option included in the Beta version of Office 2007.

Adobe has been considering an anti-trust action against Microsoft over the issue, according to US reports.

Simonds revealed that, 'to resolve Adobe's concern', the Office team is detaching XPS and pdf support from the software so that it can be made available as a free download. *Matt Chapman*

● XPS 'improves print quality', p20.

Computex round-up

Computex opened in Taiwan as we went to press. Rob Jones' full stories are online (see the links below). Prices are approximate.

Intel chipsets

Intel launched its 965 Express chipset family, claiming that with GMA X3000 integrated graphics, it can handle high-definition video smoothly with no need for a dedicated card.

→ **www.pcw.co.uk/2157701**

ATI's faster PhysX

ATI claims its PhysX graphics acceleration boosts a lowly RV530 card to four times the speed of Nvidia's G70. It can be used with two or three ATI cards, with or without Crossfire twinning.

→ **www.pcw.co.uk/2157675**

Benq goes Blu

Benq will launch two Blu-ray PC drives this summer, the $700 internal Sata-connected BW1000, and the $800 external EW100G, released a month later.

→ **http://tinyurl.com/ecej3**

Flybook flies

Dialogue, makers of the Flybook, showed an 'airline friendly' laptop with a hinged 12in screen it says is easier to use on cramped trains and planes.

→ **http://tinyurl.com/fyaoc**

Greenpeace demo

Greenpeace protesters demanded that high-tech companies cut down on the use of toxins that endanger third-world children who recycle scrapped products.

→ **www.pcw.co.uk/2157674**

Sparkle card

Sparkle's SP-PX79GX2 graphics card for serious gamers uses twin Nvidia Geforce 7950 GX2 GPUs, each with 512MB of memory.

→ **http://tinyurl.com/ebpxc**

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Not a Via but an Intel-based Asus Origami at Winhec; it differs in that it has a camera

Lighter and cheaper Origamis

Origamis will get thinner, cheaper and lighter over the next couple of years, according to the general manager of Microsoft's ultra-mobile PC division.

Otto Berkes told developers at Winhec that prices could start to drop late this year, and that products are likely to get up to 40 per cent lighter and 40 per cent thinner. Some will have 5in screens, possibly making them pocketable.

The priority at this stage should be to cut the Origami's size, weight and power consumption rather than increase processing power, which is likely to stay around that of a 1GHz ultra-low-voltage processor, Berkes said.

Pressed on this, he said Origami processors would and should get more powerful but their consumption should start following its own version of Moore's Law, halving every 18 months to two years. (Intel pioneer Gordon Moore predicted that transistor density, and therefore processor performance, would double at that rate.)

Berkes said the machines were not going to be successful until they hit commodity prices, but first versions of new technology were always more expensive because of the extra development costs.

Microsoft chief Bill Gates has talked of trying to get prices below $700 (£380), at which level they would compete even with PDAs, let alone standard notebooks. Prices of some models are already getting close, at least in the US (see left).

Vista will include tablet functionality as standard and there are several new features. A welcome one is the ability to delete mistakes by 'crossing out' with the pen; users will also be able to define their own pen gestures.

Handwriting recognition, which was previously fixed ability, can now learn by experience so that it reads your writing better the more you use it. It will also build up a custom dictionary based on the vocabulary you use. But Berkes said we are also likely to see Origamis with keyboards.

Atlantic puts up Via prices

Via has been promising low prices for Origamis based on its low-drain C7-M ultra-low-voltage chip, but those quoted in Britain seem to be suffering from high pressure over the Atlantic.

A model demonstrated at Winhec had a US price tag of $799 (£490), which is getting close to Microsoft's target (see right) – and it included a GPS receiver. But a similar Pace Blade Easy Book E7 is due to launch in the UK this month at £750, only £49 less than the cheapest Samsung Q1 and without the GPS.

Colin Brix, Via's chipset platform group international marketing specialist, said his company had no control over what price systems were sold at. He echoed Otto Berkes (see main story) in saying the next generation is likely to be smaller with a longer battery life. 'Some of the first models we are seeing are not at their optimum,' he said. 'The technology is there, but for early devices they are really rushed.'

Via sees Origamis as a chance to undercut Intel on price in an important market, according to one member of the C7-M design team. Charles Holthaus said at Winhec that he also believed the C7-M could compete on performance and battery drain doing the kind of tasks an Origami has to perform.

But could it continue to do so as Origami processors go dual-core? Holthaus said Via had considered going dual-core. 'We haven't disclosed it on any of our public roadmaps yet but it is certainly technically feasible for us. We already have [two] discrete processors on motherboards today.

'The next evolution will be to put those on the same die. We haven't committed to that product yet.'

The C7-M chips are also small enough to put two on an Origami motherboard, Holthaus said.

The killer application is close to home

Microsoft envisages some ultra-mobile PCs being designed for particular applications such as education, health, music players, games machines and satellite-based navigation.

They are already being tried out in Japanese schools, according to Seiva Ohta, one of Microsoft's Origami architects, at Winhec. He showed some slides of concept models intended as a guide for developers.

You can see my colleague Tom Sanders' photographs of the slides at **www.siliconvalleysleuth.com/2006/05/post_1.html**. The designs looked good, and seemed useful, but I confess that they left me underwhelmed.

Niche markets have been the mainstay of tablets since they first became available, which was long before Microsoft adopted the format. Origamis will find similar uses, but the format is exciting precisely because it puts the power of a general-purpose desktop PC into your hands.

I was also surprised that neither Ohta nor Otto Berkes (see above) mentioned home networks in their Winhec presentations. My guess is that, once the design matures, the Origami will become the principal network interface.

Home networks will never go mainstream until they get a foolproof interface, and the Origami is the best format to provide one: TV and Media Center PC screens are too big, too cumbersome and too far away for the purpose.

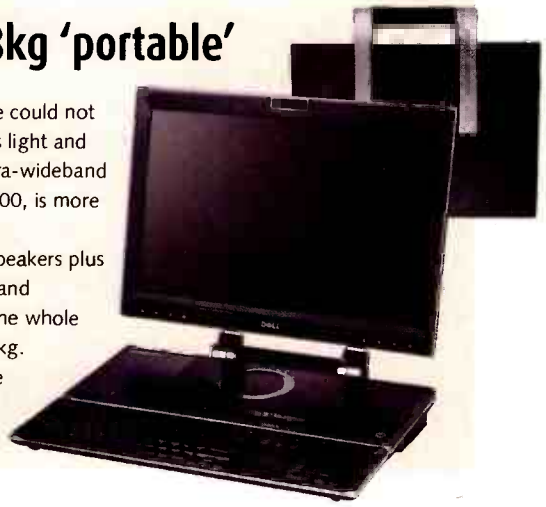
That means a killer Origami application could turn out to be electronic content guides taking in not only radio and TV programmes, but also the wealth of feeds online, plus your home collection of music, pictures and movies. *Clive Akass*

Compare and contrast... the 8kg 'portable'

Dell's new XPS-M2010 portable was not at Winhec but we could not resist including it here for the contrast. The Origami travels light and draws its resources from the network (or will do, when ultra-wideband gets sorted – see page 22). The M2010, costing from £2,000, is more like the traveller who takes along the kitchen sink.

It includes a 20.1in, high-definition widescreen, eight speakers plus a sub-woofer, a detachable, full-sized Bluetooth keyboard and gyroscope-enabled remote, a webcam and a DVD drive. The whole thing folds into a briefcase format weighing no less than 8kg.

Clearly it is aimed at a different market from that of the Origami. One, evidently, that does not plan to carry its 'portables' very far.



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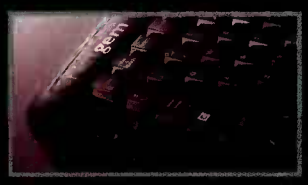
tvMaX



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Speed up your PC in a Flash

Windows needs some optimisation before it can take full advantage of solid-state portable enabled by new Flash drives, said Otto Berkes, the general manager of Microsoft's Ultra-Mobile PC division, at Winhec. This is because Flash has very different read-write characteristics from a hard disk.

Samsung was showing off two solid-state drives (SSD) – a 32GB and a 16GB, both available in 1.8in or 2.5in formats. Samsung says they can be read at 57Mbytes/sec and written at 32Mbytes/sec. Prices will be in line with those of Flash prices, currently $20-$25 (£10-£13) per GB.

That makes a complete solid-state mobile affordable at the high end of the market. But a 4GB SSD costing around $100 (£53), used in conjunction with a standard hard disk, can produce as much as a 50 per cent improvement in system performance with the aid of new features in Vista, according to Don Barneston, associate director of Flash marketing at Samsung.

The inside view of a Samsung hybrid drive

'Eventually all drives will be solid state but at the moment Flash is just too expensive [for most people],' he said. 'But if you think about it, you don't need 32GB to get most of the benefits.'

Barneston showed an Alienware notebook containing a standard hard drive and a 4GB SSD that uses a Vista feature called Super Fetch that can use any available non-volatile memory, including USB drives, to speed up performance.

You could, of course, load your most-used applications in Flash. But Barneston said Super Fetch goes one better by watching what you do. 'If it knows that you usually play a particular game on Saturday morning it will load it ready for you.'

A similar effect can be gained from hybrid drives, also being pioneered by Samsung, that have both a hard disk and up to 250MB of solid-state memory. Samsung hybrid drives come in capacities of 80GB, 120GB and 160GB.

Samsung says their average power consumption is 0.24w compared with an average 1.2w of a hard disk – an average 14 per cent improvement in battery life. The drives use a Serial ATA 1.5G interface. The performance boost is greatest with 'seek intensive' activities – including bootups.

Analysts point out that the hard drives have had solid-state cache for a long time; hybrid drives simply have more. Also, Intel plans to put Flash memory on motherboards in its Santa Rose mobile generation planned for next year, with much the same effect as the Samsung hybrid systems. Intel's technology, called Robson, will not rely on Vista.

Vista comes late to Bios replacement

Microsoft's next-generation operating systems will not support the Unified Extensible Firmware Interface (UEFI), designed to supersede the PC's antique Bios system, until the end of next year.

Intel-based Macs already use the technology, which (among other features) promises faster bootups than Bios, the kernel of code that configures a PC before the operating system starts to load.

UEFI is likely to be in Vista service packs towards the end of 2007, and will also be supported by the Longhorn server operating system, Andrew Ritz, a development manager for the core-platform architecture team, said at Winhec.

It was due to be supported by Vista at launch. However, Microsoft announced in March that the feature would be delayed because too few UEFI-enabled systems would be available to justify putting it into the operating system.

Pay-as-you-go scheme brings IT to the poor

Pay-as-you-go schemes for mobile phones in Britain were used as a model for a new project to make computers more affordable in developing countries.

People using the Flexgo scheme will need a small downpayment to get a PC, after which they buy time with a card (pictured) in the same way as a mobile phone, Microsoft chief Bill Gates said at Winhec.

Eventually, after paying for a certain number of hours, the user gets to own the machine and can use it for free. It has already been piloted successfully in Brazil.

The scheme, set up in conjunction with Intel, will be extended to China, Hungary, India, Mexico, Russia, Slovenia and Vietnam.

Jpeg rival

Microsoft has outlined a new image format supported in Vista that it claims retains more detail than the dominant jpeg formats at the same level of compression.

The Windows Media Photo (WMP) technology is being seen as a rival even to the relatively new Jpeg 2000 specification.

Heavy compression of images is usually a trade-off between quality and file size. Digital cameras typically use 6:1 compression but the new WMP format could offer the same quality at half the file size, Bob Crow, program manager for the technology, claimed at Winhec.

He said this not only allowed more pictures to be stored on the camera, but it speeded up printing and file transfers. Software is being finalised to help developers WMP-enable their devices, Crow said.

PC sideshows

The tiny LCD-screen Logitech keyboard is relaying information from a PC using Vista technology called Sideshow. Next to it, a similar laptop-lid panel is showing the same information.

Many laptops now have these tiny auxiliary screens, which are designed to give you information such as the time, or new emails, without the need to boot up the system.

Vista's Sideshow is designed to extend this facility to peripheral devices. Microsoft says this is quite simple for developers to code and it expects to see novel uses.

Start ends

The much-derided Windows Start button has gone in Vista. Despite millions of dollars worth of usability tests, it apparently never occurred to Microsoft that people would find it strange to exit by pressing Start. Vista replaces it with an anonymous icon.

TRY OUT OFFICE 2007 YOURSELF
See our cover disc and page 182

Pdf rival to 'boost quality'

Windows will, for the first time, be able to do justice to pictures captured by the latest digital cameras, thanks to new print technology in Vista, according to a British company that helped develop it.

Adrian Ford, chief technology officer at Global Graphics, said Windows XP cannot render the full dynamic range captured by even relatively cheap digital cameras (see

Ford: XP cannot render the full range produced by digital cameras

feature on page 63). Printing of richly formatted documents is also slowed down because the data passing through the Windows Graphics Device Interface (GDI) is translated into an intermediate format and then retranslated for the printer.

This technology goes back 20 years and cannot preserve the quality of modern images, Ford said. 'There is a very big difference between what you can print with Windows today and what the high-end graphics market needs.'

Vista has a new 'print path', better colour management and a new document description language called XML Paper Specification (XPS). Printers with drivers supporting XPS could render images faster and better because the data did not go through an intermediate format, Ford said.

XPS has been seen as a rival to Adobe's pdf format. Both can be used royalty-free and both are designed to be rendered identically on any platform. Microsoft said XPS is ideal for archiving and has constructed an ecosystem of content management, permissions and digital rights round it.

→ **www.globalgraphics.com**

Why Office got a new look

Experienced users may be irritated by having to learn a new Office interface, even if they accept that there are many improvements. So why did Microsoft decide to change it so radically?

It was done because the old menu structure was too cumbersome for the suite's swelling feature set, according to Jensen Harris, lead program manager of Microsoft's user experience team and one of the leaders of the redesign project.

He said the new 'results-oriented' structure of ribbon bars and galleries should make lesser-known features more accessible to users. Even the old file menu has gone, replaced by an anonymous icon (see screen above) – and you don't get the option to revert to the classic layout. But Harris insisted: 'In our experience people get used to the new interface in a few minutes and prefer it.'

He said it was myth that people only want to use five per cent of

This corner icon and tiny task bar replace the old File menu

the features. 'In the enterprise you are far more likely to meet someone saying: "There must be a way I can get this done but I don't know how to do it",' he told press in New York.

Harris pointed out that the old menu structure was designed for a program with 50 features, not 1,500 like the latest versions of Word. Word 1 in 1989 had only top-level menus; but the menu structure in 1991's Word 2 was essentially the same as that in Word 2003.

'So all the features that have gone into the product in the 20 years and more since then have had to be fitted into a structure that we designed in the late 1980s,' Jensen said.

Toolbars and task panes were introduced in an attempt to get round the problem but they provoked complaints about 'bloatware'. By 2003, Word had 31 toolbars and 19 task panes.

Harris said that at one point the design team put all the Office options on cards, with the intention of laying them out on the floor in a bid to find a more usable arrangement. 'Then we realised that there was nowhere big enough in [the Microsoft campus at] Redmond to lay them out.'

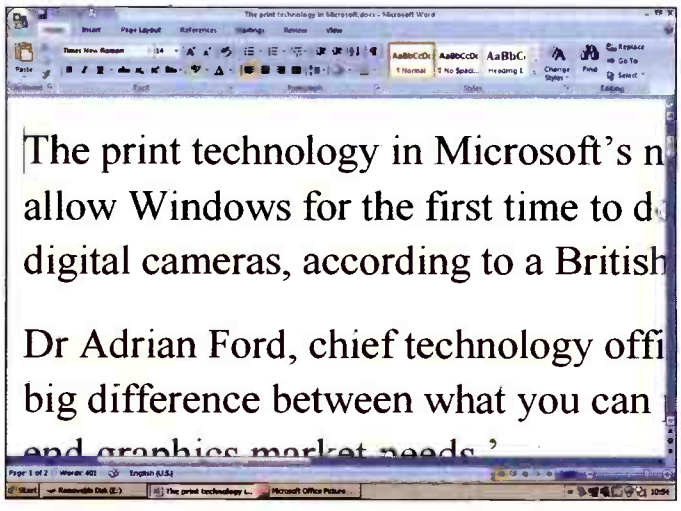
The team analysed billions of user-Office interactions looking for answers. 'We looked in particular at the kind of features that were used together and cross-referenced that with other data.'

This led to the idea of 'harnessing the power of context' – presenting people with the tools they need to do the task in hand and, just as importantly, not confusing them with options they do not need at the time.

The new icon ribbons and galleries present people with their options, with previews of the results, rather than expecting them to go searching through menus to find what they need.

All features are (or will be) accessible with hotkeys for the benefit of power users; and an online utility that maps the old interface to the new will be available for people who cannot find features they knew how to access in old versions.

Harris admitted the interface has one major drawback: the ribbon bars leave very little working room on small Origami ultra-mobile screens. 'We have been thinking about that,' he said. 'One solution might be to have the bar [vertically] down one side of the screen rather than across the top.' *CA*



A scroll bar at screen bottom right allows you to magnify or shrink the view. Note that the magnified type does not pixellate, a feature common to Vista

What do you think of the new interface?

You can read my first takes on Vista and the new Office by browsing our Test Bed blog at **http://labs.pcw.co.uk**.

There's more in our Hands on section (see page 133) and Cover disc notes (see page 181). I have loaded Office 2007 on two PCs, once on top of Vista and once over XP with Office 2003, so far with no major problems.

What you think about the new Office? Write to Letters@pcw.co.uk and join the discussion on our *PCW* Interactive blog at **http://interactive.pcw.co.uk** to let us know your views *Clive Akass*

Microsoft braced for 'X' factor backlash

Microsoft executives admit that the new file formats for Word, Excel and Powerpoint in Office 2007 will cause confusion, but they say that everything possible is being done to avoid it when the final code is released.

The new formats, distinguished by an 'x' at the end of the old three-letter suffix (ie .docx), are smaller, more versatile and more accessible thanks to the use of Extended Markup Language (XML).

XML allows files to contain new levels of information and its simple (in principle) tagging system is more readily understood than the obscurities of the old binary files. These advantages will be lost on non-technical users, however, and Microsoft is steeling itself for complaints.

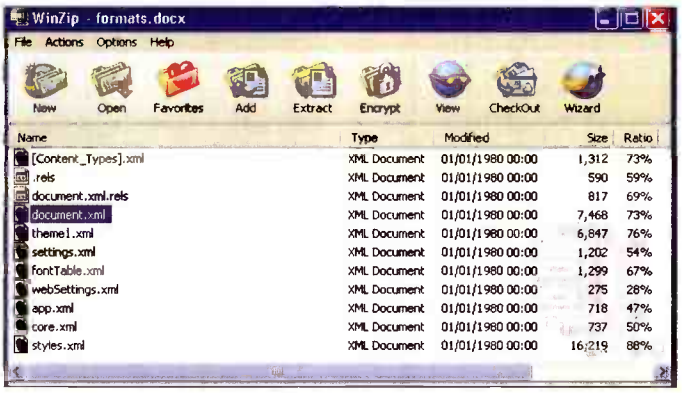
But it is determined to avoid repeating the uproar in 1997, when people discovered old versions of Word could not read new document formats. Filters for reading the new formats will be available online for versions later than Office 97.

Office 2007 modules will save in legacy formats, but businesses may have to rely on people remembering to do so. Unskilled users could find this difficult to cope with. Downloading a filter is likely to be even more daunting for them, especially if they do not have broadband. And, of course, some people may not have a connection at all.

You need look no further than *PCW* to see the kind of problems that will be experienced by companies across the world. Our PC Word .doc files have to be read by Macs for putting stories on to pages, and we use a special template with text styles set up for the Quark Xpress desktop publishing suite.

If we start using Word 2007, we will have to remember to save in the old format rather than .docx; and if we were to standardise on Word 2007 we would need new filters for the Macs and new templates for the PCs.

On the plus side, we could probably automate some tasks by making use of the XML features in Word. IT departments might appreciate that, but they can expect to hear from Moaning Minnie at the desktop.



The new Office formats are actually zip files. If you open one up in Winzip, or a similar utility, you will see it contains several XML files. This screenshot shows the .docx file for this article, the main body of which is in the file called documents.xml. The other files contain information, such as styles and fonts, referenced by document.xml. They could also contain pictures

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The new **Vigor3300V** is a high performance firewall, VPN concentrator and VoIP (Voice-over-IP) device. Stateful Firewall, load balancing, content filtering, up to 200 VPN tunnels and up to 8 VoIP ports. (Due March).

Vigor3100 SDSL

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Specification subject to change. Facilities vary with model.

In brief

Safe email delivery

A service designed to guarantee secure, fast and confirmed delivery of emails has been launched by Safe-Post. The product ensures a direct connection between the sender and receiver, so mail cannot be intercepted, said Safe-Post chairman Brian Raven.

The service is free for three months, then there's a one-off £5 charge plus £4 a month per user.

→ **www.safe-post.com**

1841 online census

The 1841 census of Britain has gone online for the first time, offering family historians a detailed snapshot of early Victorian life. The website Ancestry.co.uk has now translated all censuses from 1841 to 1901 into digital data that can be searched online by subscribers.

→ **www.ancestry.co.uk**

BT soccer win

BT Vision has won the pay-per-view rights to show 242 'near live' FA Premier League football matches for three years from 2007. They will be available via a new video-over-broadband service. BSkyB also got the rights to show matches from 10pm on the day they were played.

£1.5m phone bill

A Qatar man paid £1.5m for the mobile phone number 666 6666 following an hour-long bidding session, breaking the previous record of £270,000 paid in China for the number 8888 8888.

Exit XXX domain

Plans to create an .XXX domain for porn have been rejected by the governing Internet Corporation for Assigned Names and Numbers (ICANN), following opposition from conservative groups and pornographers.

Advocates claimed the domain would make porn both easier to find and to avoid. But opponents pointed out there was no guarantee pornographers would move lucrative sites from the mainstream web.

Bluetooth hitches faster ride

A marriage of Bluetooth and emerging ultra-wideband (UWB) technology can provide the fast wireless links needed for ultra-mobile devices to reach their full potential, according to one of the leading firms developing the technology.

True mobiles such as the Origami tablet will eventually be able to draw from the network anything they lack onboard. This goes far beyond facilities, such as a printer or storage, that are already routinely used by untethered devices.

If you want to see something on a larger screen than the Origami's, for instance, you will simply tell it to screen the images on the nearest TV.

To achieve this the mobile has to be able to discover and report what resources are available when you walk into a room. 'Bluetooth can do that already but it does not have very fast data transfer,' said Simon Finch, vice-president of the Wifi strategic business unit at Cambridge Silicon Radio (CSR).

CSR's mini-PCI card has both Bluetooth and Wifi

The maximum real throughput of Extended Data Rate Bluetooth is about 2Mbits/sec; but UWB can hit speeds in excess of 400Mbits/sec, enough for multiple high-definition video streams. Bluetooth's contribution lies in its ability to find and link securely with resources, says Finch.

'All the nasty work of developing all the profiles that are needed to connect to different devices has been done. The idea is that Bluetooth discovers devices in a room and then calls up UWB [to do any heavy data transfers],' Finch said at the Wireless Event show in London.

CSR cannot say when its UWB-Bluetooth modules, which will also go in mobile phones, will be available. This depends partly on how soon other companies offer products because they need to pass interoperability tests. But the technology is not expected to be available before 2008.

Microsoft admits UWB-Winet overlap

Microsoft is keeping tabs on Bluetooth ultra-wideband (UWB, see above), even though its features overlap with technology the company is developing itself.

The first release of Vista will not support UWB, though Microsoft does expect the technology to play a central role in passing multimedia files between fixed as well as mobile devices in the home.

UWB support will be built into Vista after its release but it can act as a 'virtual wire' with a number of protocols including USB2. Microsoft is developing a technology called Winet, which uses IP over Ethernet, with UWB transporting the data.

Winet is also designed to 'discover' what devices are in range and make them available to you – tasks already performed by mature Bluetooth technology.

Vatsal Bhardwaj, program manager of the Windows devices experience group, agreed there was some overlap and said Microsoft is watching the Bluetooth moves.

He also said CSR's approach (see above), which essentially uses Bluetooth radio as a control channel for UWB, was easy on batteries. He pointed out that it also requires two radio modules, one UWB and the other Bluetooth, in a very price-sensitive market. Using UWB for both data transfer and signalling would save unit costs. 'So there are advantages in both approaches,' Bhardwaj said.

UWB is designed to work within rooms, which means it should not have to fight for airspace like Wifi networks in cities. The first spec offers data rates of 480Mbits/sec over a range of three metres, but speeds are expected to rise to 1Gbit/sec.

USB2-over-UWB chips could be in products by the end of the year. But Stephen Wood, president of the Intel-backed Wimedia Alliance, said the task of getting regulatory approval worldwide is likely to take some time.

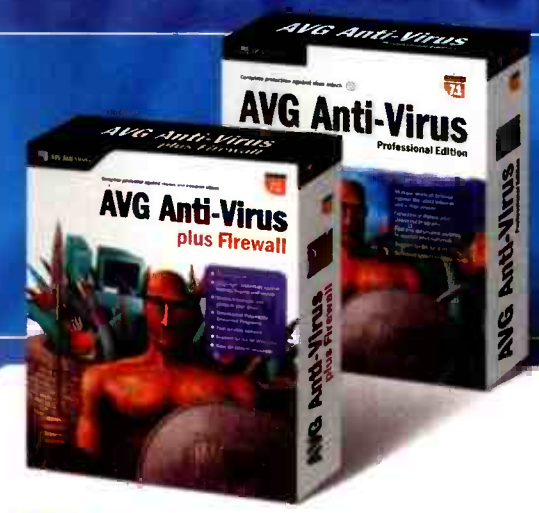
VoIP lives down its past

Voice over IP (VoIP) has got over its early reputation for poor call quality, with 65 per cent of users now satisfied with its sound quality. Faster links and clever software have made web calls more viable.

Now only 29 per cent of users say they are not satisfied with the quality, according to a survey by Continental Research.

Unsurprisingly, considering that pure VoIP calls are usually free, 86 per cent said they were satisfied with the value for money. More than eight in 10 (84 per cent) said they were satisfied with the ease of use.

Sit back and relax!



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In brief

Slimline zoom

Kodak says its new slimline Easyshare V610 is the smallest 10x optical zoom digital camera yet launched. You may quibble with the description, because you cannot zoom seamlessly through the 10x spread of focal length as it is split across the Easyshare's twin lenses.

One offers the equivalent of a 35mm camera's 38mm to 114mm zoom, and the second covers 130mm to 380mm. But most photographers can live with that 16mm gap in the zooms, and the design means that neither lens has to protrude. The V610 goes on sale this month for £350.

→ **www.kodak.com**

Acorn lives

The Acorn brand is to be revived for a new range of notebooks launching this month. They range from a 12in machine to a 17in widescreen, and will be followed by a range of PCs. The original UK company, which made the BBC Micro and Archimedes machines, rebranded itself as Element 14 in 1998 but was overshadowed by its hugely successful spin-off, chip designer ARM.

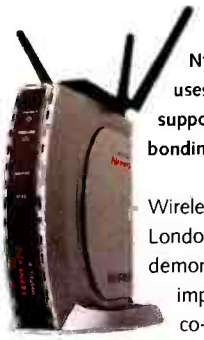
→ **www.acorncomputers.co.uk**

Get your goat

A free search utility called Trexy stores your web search trails and their results on a server to help you retrace your steps – and benefit from the search trails of others. It's run by London-based Australian Nigel Hamilton and his sister Megan, who chose the cuddly goat pictured as their logo because search trails reminded them of those left by goats.

You can download it at **http://trexy.com/trailbar.html**.

Phones to get 'polite' 11n



Buffalo 'draft 11n' Nfiniti wireless router uses a Broadcom chip supporting channel bonding

Mobile phones supporting the emerging 802.11n Wifi standard are to use a cut-down version that avoids the controversial bandwidth-hogging dual channel supported by the draft spec.

They will also use a single antenna rather than the multiple ones sprouted by routers based on the draft 11n spec, which increase data rates by using Multiple Input Multiple Output (Mimo) technology.

But mobiles will still get some benefit from Mimo by clever processing of signals from fixed multiple antennas.

The Wifi Alliance is working out the details after realising that it would not be possible to run three or four antennas on a small mobile phone, according to Simon Finch, vice-president of the Wifi strategic business unit at Cambridge Silicon Radio (CSR).

'Essentially there are going to be two versions [of the 11n standard],' Finch said at the Wireless Event show in London, where CSR was demonstrating technology improving the co-existence of Bluetooth and Wifi in the same device (see picture, page 22).

The restriction to a single channel will halve the maximum data rate on 11n. But Finch said phone makers are not so bothered about the faster speed 'because quite honestly they would not know what to do with it'.

They are more interested in the quality of service provisions, something lacking in early versions of Wifi. 'They are going to take all the goodies out of N but not the full spec.'

Finch echoed criticism of the dual channels allowed by the 11n spec, which give the user 40Mbits of bandwidth rather than the usual 20Mbits. Critics point out that, in the most-used 2.4GHz band, this will leave only one non-overlapping channel for neighbouring Wifi links.

'It's going to be nasty for the average residential user, particularly in a block of flats where people are living on top of each other.'

Buffalo and chipmaker Broadcom were demonstrating a Broadcom-based 'draft-N' kit at a hotel near the Wireless Event, which they said could push through 135Mbits/sec using a dual channel.

It can be set to reduce politely to a single channel in the vicinity of other Wifi networks using the same frequency band, but in places such as central London this would be just about everywhere.

This appears to mean that polite users in cities will get a maximum 67Mbits/sec throughput. The position is not so bad in the 5GHz bands that are, currently at least, less crowded and have more frequencies available.

→ **www.csr.com**
→ **www.buffalotech.com**
→ **www.pcw.co.uk/2157647**

Apple rivals react to Ipod lock-in

Apple's policy of trying to lock Ipod users into buying music from the company is causing ever more restrictive digital rights management (DRM), according to a US web campaigner.

Cory Doctorow, a fellow with the Electronic Frontier Foundation, said Apple tries to stop people switching to rival makes of music player by ensuring that tracks downloaded from its Itunes music store play only on the Ipod.

'Apple [turns] every Itune you buy into a 99 cent price tag on switching from Apple to a competitor's product,' he said at the Red Hat Summit in Nashville.

The lock-in was important to Apple because music players have an average life span of only 18 months, after which time there was no guarantee the Ipod would still be the best or most popular product.

Hi-fi manufacturer Denon is the latest to jump on the Ipod bandwagon. Its £79.99 Ipod docking system is designed to be used with its D-M33 mini hi-fi system, which has a street price of around £250

Apple rivals reacted by trying to tempt movie studios and record labels to sign exclusive licensing deals by pushing for more restrictive DRM, playing to industry fears of new technology and piracy, Doctorow said. They also bank on content owners' troublesome relationship with Apple, which has shown little willingness to raise download prices.

There is a similar trend in the battle between the high-definition DVD (HD-DVD) and Blu-ray HD-DVD formats, Doctorow said. Blu-ray has even brought back region coding that will prevent a US DVD playing in a European drive.

Apple has attacked proposed French legislation enforcing file compatibility between different makes of players as 'state sponsored piracy'.

● A small group of campaigners protested at Microsoft's Winhec conference in Seattle, claiming that the company's DRM was too restrictive. *Tom Sanders*

→ **www.eff.org**
→ **www.apple.com**

Intel challenges AMD on gaming front

Intel will ship the desktop version of its new Core 2 Duo processor in July, with the laptop version coming a month later.

Architectural enhancements in the dual-core Core 2 Duo include the ability to process more instructions per clock cycle, an increase in computing throughput and optimisations to enable the two cores to share Level 2 (L2) cache more effectively.

The move to a 65nanometre manufacturing process allows engineers to craft smaller and finer silicon circuits than is possible with 90nanometre technology.

Now that Intel's focus is no longer on the race with its rival, AMD for ever faster clock speeds, it is marketing the Core 2 Duo as wider, smarter and faster.

The desktop Core 2 Duo will draw only 65w thanks to its adoption of Pentium M power-saving technology. Francois

Intel claims its Core 2 Duo chipsets' performance and power consumption will appeal to end users, and will threaten AMD's reputation in the gaming arena

Piednol, senior performance analyst at Intel, urges end users to look 'not just at the Core 2 Duo's performance, but at its power consumption too'.

The Core 2 Duo desktop clock speeds range from 1.86GHz to 2.67GHz, and most versions have 4MB of L2 cache, greatly reducing the time taken to complete intensive tasks such as video transcoding.

In our tests, a Core 2 Duo running at 2.67GHz managed a PCmark05 CPU score of 6,691. Scores such as this would leave the Core 2 Duo peerless in the consumer market.

Intel's new Core 2 Extreme could shatter AMD's reputation for being best for gaming chips. It will be more powerful than the Core 2 Duo, maximising performance at the expense of drawing more power. It is widely expected to run at either 2.8GHz or 3GHz.

The architecture of the Core 2 Duo for laptops will be broadly similar to the desktop edition, but optimised for long battery life.

Piednol is confident that Intel's dual-core processors will outperform AMD's.

He says that AMD dual cores make inefficient use of L2 cache because the company wrongly believes this is best split up into 2MB chunks.

Intel forecasts that by the end of 2005, 75 per cent of its desktop and 90 per cent of its mobile sales will be dual-core products. *Marc Delehanty*

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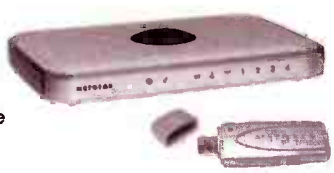

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LETTERS

→ **Send your letters to** The Editor, *PCW*, VNU Business Publications, 32-34 Broadwick Street, London. W1A 2HG.

Send your email to letters@pcw.co.uk

LETTER OF THE MONTH

Is Dreamweaver overkill for schools?

Sean Hindle wrote in July's *PCW* about the prohibitive cost of using Dreamweaver in schools. I have two points to make.

First, it's time to recognise that Adobe's purchase of Macromedia probably spells the end of Dreamweaver. I've resisted more recent upgrades because of the UK/US price differential and the lack of clarity over the future of Adobe's stable of products, with two web-authoring tools (Adobe Go Live and Macromedia Dreamweaver).

And let's not forget that Microsoft has Expression Web Designer in public beta. OK, there's still a while before it's launched, but I bet it will be priced to grab market share. Unless a credible third party arrives on the scene during the inevitable Microsoft release date slippage then, to paraphrase Edmund Burke, 'All that is necessary for the triumph of Microsoft is that its competitors stop trying.'

Second, should schools even be using Dreamweaver? It's a large and complex product and takes a lot of learning even for a dedicated adult professional. Would you propose that, to learn to fly, one should start off in a Boeing 747, or might it make more sense to use a small trainer aircraft?

My son came home asking for access to Dreamweaver because that's what he was using at school and he had an assignment to complete – and was finding it difficult. I showed him how to use Notepad and edit HTML. He found it much easier and more logical. OK, maybe that's a bit extreme, but there are good low-cost or free Wysiwyg web page editors. Lots of children now have access to a home computer – wouldn't it be better if they could use the same software at home? If you really want a tool as complex and powerful as Dreamweaver, what about the open-source NVU?

Rob Hindle

WEB 2.0 NO PANACEA

As a retired IT operations manager, I find *PCW* a very useful way of keeping in touch with technological developments.

However, I do not share your enthusiasm for Web 2.0 and thin clients, with all software, personal data and correspondence stored on some remote server(s). As a keen amateur photographer there is no way I would trust any organisation with my photographs and neither would I want my financial and personal information open to their employees and all and sundry hackers.

I can see the benefits to corporate organisations of remote access to data and corporately configured software, but for individuals there are potentially huge disadvantages to being forced to subscribe to the latest (and remote) software. I still use Windows 95 and an old version of Office on one PC, with the latest Photoshop on another.

I am sure there are many PC users who continue to use older versions of software because they still have all the required functionality. Mr Gates would, I am sure, be very pleased to force us all to subscribe to the very latest version of his software.

Finally, my PC is always available. Remote servers are not. I also know exactly where my backups are stored. Could I be confident of software and data being always available if stored remotely? I think not.

Mike Curry

Web 2.0 technologies allow users to access applications over the Internet

↘ Unless otherwise stated, letters sent to the Editor, PCW team or contributors will be considered for publication. Letters may be edited for clarity or length.

NOT SO WELCOME

Your article 'Welcome to the webtop' (*PCW*, July 2006) went into great depth on the subject of desktop applications moving to the web in the coming years. However, it did not pick up on a couple of major issues that may stop some consumers and many businesses from shifting to the webtop for years to come.

First, I assume that to be any good, all the mentioned web applications will also store their associated data (such as documents, spreadsheets etc) on the web so that they, along with the application itself, can be accessed from anywhere. However, this raises the intrusion of privacy question. Who knows how these new companies will treat your sensitive data? The case with Google automatically reading emails on Gmail to display tailored advertising illustrates this perfectly. Will we be able to trust our data with companies like this?

Second, you make the point that a whole web-based Google 'operating system', complete with a suite of applications, will mean that people will no longer have to worry about third-party incompatibilities or spyware and the like. This assumes that applications on this webtop will only be made available from Google, which sounds somewhat monopolistic and reminiscent of a certain other software manufacturer. If Google was to open up its 'operating system' to third-party applications, then the same problems that people face today would almost certainly appear with rogue applications.

I don't think that the age of the webtop is doomed at all – I would certainly like to use the new web applications and would love to be able to access them from anywhere, but is it really possible without a real shift in attitudes and policy?

Ruben Arakelyan

EBAY'S RESERVE POLICY

I am sure you will receive lots of feedback following your Ebay article (*PCW*, July 2006), but I have a strong objection to Ebay's policy on reserve prices.

Ebay's reserve policy poses risk for sales of lower-priced goods

When I first started using Ebay, it was possible to set a reserve price for any item you were selling. About 18 months or so ago, 'to improve service to all our users', Ebay changed its policy and now you cannot impose a reserve price lower than £50 for any item. The only other way to control the price of an item you list is to set a minimum starting bid.

That imposes a big risk on sellers of lower-priced goods. If I have an item that I want, say, £20 for, I have to either take the risk of being forced to sell for 99p if I follow Ebay's recommendation of setting a low starting bid, and get no higher bid, or dissuade bidders (and show my hand) by setting a starting bid close to my reserve price.

I cannot see how this policy helps Ebay, and it certainly has dissuaded me from using it to sell modestly priced items. If Ebay found the service was uneconomic on its old terms, the answer should have been to raise the fee for reserve price auctions, not eliminate them.

Needless to say, when I emailed Ebay about this issue, I was fobbed off with irrelevant automatic replies and was never able to communicate with anyone who understood or cared about my issue. Maybe you might have better luck.

Tony Cater

A QUIET LIFE

I read Gordon Laing's column on Internet cafés (Inside information, *PCW*, July 2006) with interest. He describes a situation familiar to travellers, a choice between working in a noisy public place or a hotel room with high connection charges.

There is a third way. Take your laptop, but work in the peace and comfort of your hotel. Then take your work to the Internet café on a USB Flash memory drive. Similarly, copy your emails onto the Flash drive and make your considered responses away from the noise back at your hotel.

Dan Wild

POWERING DOWN

Hardly a day goes by without another scare story in the news about climate change. In the UK, we're being told of an impending energy crisis as our oil and gas runs out.

It has been identified that most people leave their computer switched on all day even when it is not being used, and in some cases all night too. So across the world, a vast amount of energy is being wasted. Also, even if we do turn them off, we are being told that the standby state that modern domestic electrical equipment goes into also consumes a noticeable amount of precious electricity.

We're told that the only way to truly turn off your computer, TV, hi-fi or DVD player is to pull the plug from the wall. I am sure there are many conscientious people who see it as their duty to do this every night, but quite frankly, I do not think that a mass unplugging goes on as the populace retires to bed.

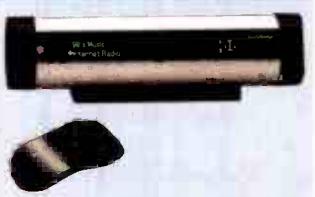
I use a standard Windows-based PC most of the time and I accept that I often leave it running all day. Why? Because of the time it takes to shut down and reboot; it is just too long. I would like to call on the hardware and software manufacturers of this world to collaborate and solve this simple problem.

Once the inconvenience of the bootup and shutdown procedure has been removed, I am sure most people will have no issue in switching off their computer as they pop out for a cappuccino, knowing they are saving power, money and that very important half-written email to the head of department.

Julian Gough

Kelvyn Taylor replies: The 'hibernation' mode of Windows XP can do pretty much what you require, by storing the PC's state on hard disk and powering off totally. However, in some cases this is prevented by incompatible hardware, badly written software that interferes with Windows' ability to enter this state, or programs that fail to resume properly when power is restored. As you say, work is still needed to make energy-saving practices simpler for users.

WIN Next month's prize for the letter of the month is a Pinnacle Soundbridge



This sleek network music player is a true plug-and-play solution for enjoying all your digital music throughout the house via your existing Wifi router. It lets you control your music library from across the room using the remote control and plays a large selection of Internet radio stations, even when your computer isn't on. It requires no software installations, and supports audio formats including wma, aac and mp3, as well as a multitude of music services such as Itunes and WMP10. For more information on the Pinnacle Soundbridge, go to **www.pinnaclesys.com.**

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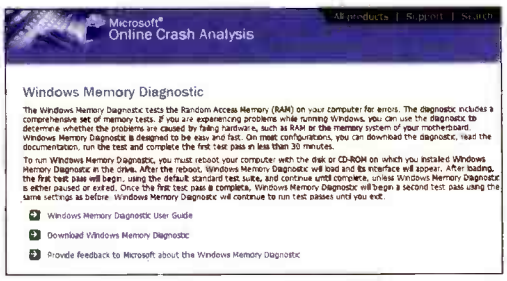
- Never cancel a direct debit or standing order as a means to resolve a dispute over payments or service. You may get a poor credit rating and face court action.

HOW TO COMPLAIN

- Keep records of who you speak to, along with any paperwork and emails.
- Stay calm – companies will respond defensively to abuse and shouting, regardless of whether you are in the right.
- If the dispute reaches an impasse, insist on escalating the complaint. Get a director's name and send correspondence by recorded delivery.

MORE INFO

- For more information on consumer law in England and Wales, visit www.oft.gov.uk/consumer. In Scotland, visit www.scotscourt.gov.uk.
- You can also get advice from Consumer Direct, a DTI-backed agency, at www.consumerdirect.gov.uk.



Keep records of reports from any diagnostic tools you may use

MEMORY BLANK

In February, I placed an order for 512MB of Ram with Savastore. The memory arrived promptly, but caused a problem when I installed it. My PC started to crash, displaying blue screens and error messages.

I took out the memory and downloaded Microsoft's Windows Memory Diagnostic, which boots from a floppy and checks the memory. It reported faults with the new 512MB module, but not with my existing memory. I contacted Savastore to ask for replacement memory because the supplied module was faulty. I had to pay the postage.

Shortly afterwards I received an email saying the item had been 'tested/repaired as requested' and was being returned by Amtrak. When the delivery arrived, it contained an AMD Athlon 64 processor, relating to a different returns number. I contacted Savastore again via the web form, but received no response. There is no phone number on the site.

Andy Scott

Savastore told us that address labels for the two returns had been mixed up due to human error. The company has now contacted Mr Scott and arranged a refund. Savastore could provide no explanation as to why Mr Scott's emails had gone unanswered. We found the telephone numbers for sales and technical support clearly listed in the Contact us section of its site.

Mr Scott is also entitled to a refund for the postage cost he incurred in returning the item because it was faulty. Companies can ask you to pay the return carriage up front (provided it is made clear in their terms and conditions) and may run their own tests. If you use a diagnostic tool to identify a fault, be sure to keep a copy of the report on the PC. You can find the Ram diagnostic tool Mr Scott used at **http://oca.microsoft.com/en/windiag.asp**.

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R Moore

Our first thought was that the bank's internal system took longer than Mr Moore thought to recognise transfers from one account to another. Transfer periods differ from bank to bank, but can take anywhere between 12 hours and five days.

The Co-operative Bank website advises customers to allow three working days for fund transfers to be recognised, and Mr Moore said he had checked the payment issue dates on the online statement from his current account; they were well within the minimum payment dates specified on the credit card bill.

When we investigated, Mr Moore noted that the bank had issued a new credit card with a new number following the loss of the original. However, the details of the credit card on his online banking bill payment facility had not been updated, so Mr Moore's payments had been made to the old account.

The Co-operative Bank apologised for the error, and accepted that it should have told Mr Moore it was his responsibility to change the details of the account to receive payments via online banking. The bank has now refunded all late payment and interest charges for the relevant periods.

When online banking accounts change, such as following the cancellation of a card due to theft or loss, we advise that you check the source and destination details of any regular payments, whether by fund transfer, standing order or direct debit. If a bank or other financial provider does not deal satisfactorily with your complaint, contact the Financial Ombudsman Service at **www.financial-ombudsman.org.uk**.

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TREND MICRO™

Gordon Laing

gordonl@pcw.co.uk

Don't let Raid crash the backup party

Raid controllers are a good way to back up your digital media, but it pays to do your homework first, warns Gordon Laing

It's amazing how quickly we're filling our hard disks with digital media these days. I knew my own situation was getting bad, but was taken aback to discover that I have taken almost 25GB worth of photos since buying a digital camera seven years ago. I'm not even going to mention my audio and video collections.

Of course, this is a big part of what owning a PC is about today. It's great fun to have these collections of photos, music and videos instantly available, and even more compelling when you consider streaming them throughout your home. Besides, affordable hard disks mean you never need to worry about running out of space.

But capacity shouldn't be your only concern in this digital nirvana. By storing your media collections on a single hard disk, you're putting a lot of faith in one mechanical device that, lest we forget, will undoubtedly fail at some point in the future. And should it do so without backup, you stand to lose a great deal.

'You're putting a lot of faith in one device, which will undoubtedly fail at some point'

Most importantly, your digital photos have long since been wiped from the memory card; and if you prefer viewing on screen, you might not even have prints. Then there's music. On the upside, if your collection consisted mostly of ripped CDs, you'll at least be able to rip them again.

Clearly, protection against disk failure is crucial. Proper backup demands that your data is copied onto media that can be physically transported to another location to additionally protect against fire, flood and theft. And unless you have a very modest media collection or enjoy lugging around a shelf-full of optical media, the best solution here is to use a portable hard disk.

While these are a great backup solution, there are also ways to protect against disk failure in your PC. One of the most popular is a Raid controller that uses two or more hard disks working together as a single 'array' to increase reliability, performance or both.

Raid sounds great and controllers are featured on most modern motherboards, but it's crucial to understand their restrictions. If you create a Raid array without first doing a little research, you could end up wasting potential capacity and performance, not to mention having a storage volume that may not work on other systems.

There are several types of Raid, the most basic being Raid 0 and Raid 1, also known as Striping and Mirroring respectively. Raid 0 takes two or more hard disks and delivers additional performance by effectively reading and writing in parallel. Unfortunately, if one disk fails, you lose everything. So more speed, but less reliability.

Raid 1 takes pairs of disks, but writes the same data on both of them. Should one disk fail, the other can take over. So you get double the reliability but lose 50 per cent of total disk capacity.

A more cunning option is Raid 5, which uses three or more disks, but spreads parity data across all of them. This effectively wastes an entire disk's worth of storage, but provides redundancy for the whole array. So if you have three disks you only lose 33 per cent of the total capacity; fit four and you'll lose just 25 per cent.

The trouble is, Raid 5 may not be featured on your motherboard and, even if it was, there's an additional concern: a Raid array requires the same controller that built it in order to access the data. So if something goes wrong with your motherboard or you want to upgrade, you'll need a new motherboard with a compatible Raid chipset in order to access your array.

This is why I believe Raid is best implemented by a third-party controller card. The array should work on another system by simply swapping the card over, and you'll also normally enjoy more compelling options, such as support for Raid 5. Of course, there's the same risk should the card fail and if you can't find a compatible replacement you'll lose your data, but if you go for a reputable manufacturer you should be fine.

Raid 5 is an ideal solution for protecting against disk failure, and that's why it's used by mission-critical systems worldwide. Now budget Raid 5 controller cards are available, they could prove equally effective for protecting large media collections at home. To see how the theory holds in practice, check out next month's Hands on Hardware column. **PCW**

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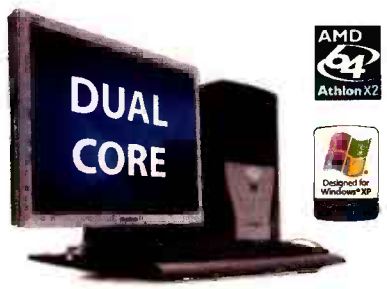

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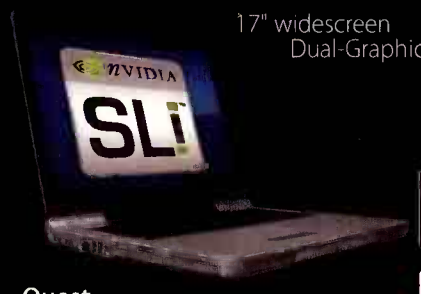

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Barry Fox

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Hell hath no fury like a footie fan conned

The BBC has announced free HD coverage of the World Cup, but many viewers won't get their receivers in time, warns Barry Fox

Eleven years ago the BBC did a very brave thing and announced the start of limited but regular digital radio broadcasts, even though there were no receivers. This gave electronics manufacturers the confidence needed to develop DAB (digital audio broadcast) receivers.

But the BBC's publicity people promoted the engineering kickstart as a 'new service launch' and turned DAB into a bad joke. The BBC is wasting licence fee money on programmes that only a few engineers can tune into, the tabloids jibed.

Now the BBC is doing something equally brave and clumsy with high-definition TV (HDTV). Hell hath no fury like a football fan conned.

For a year Sky has done a very efficient job of drip-feeding clear information on the Sky HD launch. At the last minute the BBC joined in with programme support – but a very muddled message.

'Sky is no longer able to offer installation dates before the end of the tournament'

'The BBC starts the UK's first free-to-air high-definition consumer broadcasts this week, at the start of a 12-month trial of this new sharper, clearer TV format... Starting on 9 June, the BBC's World Cup coverage will be simulcast in HD, as will major Wimbledon matches.'

Said BBC director of television Jana Bennett: 'Licence-fee payers expect high-definition broadcasts from the BBC.'

A pre-launch demo at London's Curzon cinema, with a Christie 2K DLP projector filling the 3.5m screen, showed the stunning picture quality, and reporters from national newspapers were there to tell their readers how to tune in.

Bennett assured them: 'Full information will be available on our website.' But the only clear advice on the site (**www.bbc.co.uk/hd**) is to pay Sky or NTL/Telewest cable in order to watch the free HD broadcasts.

The BBC programmes are not encrypted, and Pace and Humax both sell free-to-air satellite receivers, at about £300 each. Both should plug into a Sky dish and pull in the BBC programmes for free. Pace warns that its box may not work with analogue component video connections, and Humax says its box will. However, the BBC could use digital flags to turn off these analogue connections; for instance, when screening Hollywood movies.

According to Seetha Kumar, Head of HDTV, at the BBC: 'There is no guarantee that the boxes will continue to work after the trial.' There were sighs of scorn when she added the old chestnut: 'For more advice viewers should check with retailers.'

There is a simultaneous trial of DVB-T (Freeview) HDTV in the London area from the Crystal Palace transmitter. But there are no receivers available for mpeg4 HD DVB-T.

'The Ofcom licence is for closed trials, with restricted numbers.' said Bennett. 'We are choosing 500 trialists and will be making set-top boxes available to them. We can only demonstrate in closed sites, inside our own buildings.'

Next day the BBC's *Breakfast* television programme ran a puff 'news item' that vaguely advised viewers they would 'need to buy a special HD set-top box' to get their free HD programmes. Again, the only practical advice was to buy from Sky or a cable company and pay a subscription to get free HDTV. The programme soon had to read out angry messages from viewers who had bought HD-ready screens on the strength of shop adverts for the World Cup, then found they couldn't get an HD receiver installed until after the World Cup Final on 9 July.

'There are plenty of boxes around', said the BBC's reporter, 'but there is a big queue to get them installed. Sky can't install boxes until at least the start of July.'

By mid-May Sky had 40,000 advance orders and confirmed: 'We are no longer able to offer installation dates before the end of the tournament.' The BBC promotion is just making things worse.

If viewers already have a Sky dish, why can't they just take home a Sky HD box and plug it in? Sky has ducked this question, but the answer is pretty obvious. Connecting an HD receiver to an HD screen will usually involve HDMI cables. Left to their own devices, a lot of viewers would probably end up connecting by Scart, watching standard-resolution Pal and wondering what all the HD fuss is about. **PCW**

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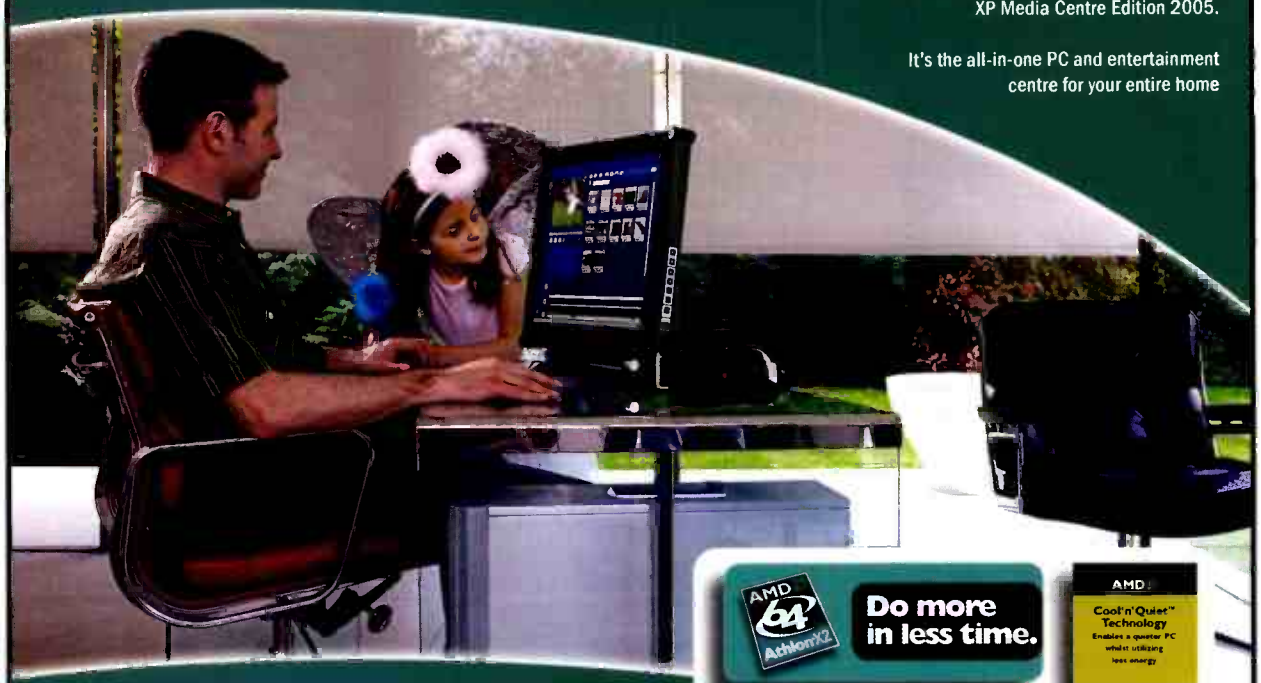

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Windows XP Media Center

The living room has always been the centre for home entertainment. From the sofa we juggle remote controls to skip tracks on CDs, control DVD players and set-top boxes. But these days, more and more of our digital entertainment is being stored on, and consumed from, personal computers: digital photography, digital music files, and DVDs on laptops are just a few of the applications that are now a part of our lives.

But sitting at a desk can never be as comfortable as sitting on the sofa – Windows XP Media Center Edition 2005 offers a new approach. With a Windows XP Media Center Edition PC you can use one device (and one remote) to do the work of your stereo, DVD player and personal video recorder (PVR) ... as well as giving you full PC functionality.

You can listen to music, watch movies, view home movies and digital photos, record TV programmes (even 'timeshift' or slightly delay live programmes), send instant messages and much more, all from the sofa, using a clear, simple interface, and all viewed on the living room TV.

Music, radio, TV, instant messaging, digital photos, video recording, DVD burning, email and more ... Windows XP Media Center is a home entertainment hub for the whole family

And of course a Windows XP Media Center Edition PC can do all the things you would expect with a traditional PC, such as surfing the web and sending emails. The key is to choose the Windows XP Media Center PC that is right for you. They range from entry-level tower PCs which use the remote and the Windows Media Center interface to easily access media files (either with or without TV tuners): the primary function of these will be as 'productivity' PCs, or workstations. At the other end of the spectrum are sleek, quiet, feature-rich units, at home in the living room: these will tend to act as a media

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Contents

Introducing Media Center
As the PC moves firmly into the living room, explore what Windows Media Center Edition can do for your home entertainment experience. Page 3

Advanced TV viewing
Timeshifting, recording, viewing ... you can even record and watch simultaneously. Read this section to learn more about the advanced TV features of Windows Media Center Edition. Page 6

Sharing shots
Edit and enhance photos, and share them via email, a slideshow or by burning to CD. Page 6

Making more of music
Windows XP Media Center Edition automatically organises your digital music collection and rips CDs to your hard drive. Page 7

PC WORLD
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A Windows Media Center PC can also be used as a conventional desktop PC.

hub, and for occasional instant messaging, web surfing or email. But both examples are fully featured Windows Media Center PCs – the choice of how to use them and what for is up to you! In this guide (and the e-book that complements it) we'll be explaining what Media Center Edition is, how it can make your home entertainment experience richer and more fun, and we'll give specific examples of how you can use this exciting operating system to get more from your PC. We believe there will be a few ideas you haven't even dreamed of yet!

The main magazine introduces the features of Windows XP Media Center Edition 2005, as well as all features included in all versions of Windows XP, including Media Center. The e-book is a collection of tips and tricks for popular Windows XP programs such as Media Player and MSN Messenger.

Prices and configurations

As we've said, there are Windows Media Center PCs for a variety of uses and budgets. If you want an inexpensive PC primarily for traditional use, you don't want TV, but would like a remote control for access to your digital media, you should find Windows XP Media Center PCs starting at a little over £400. For a sleek Windows Media Center PC for use as a media hub, with a large hard drive, multiple TV tuners and high-end graphics card, expect to spend £600 or more.

You should also look for a WiFi connection, to enable wireless internet connection and easy home networking (no more trailing cables), and you can expect a surround-sound socket (as you're going to want a good audio setup to make the most of all the movies and music). You can also expect a variety of ways to get digital information onto your computer, whether it's digital music files, digital photos or digital video footage. So expect a mix of USB2 and FireWire ports, and a memory card reader. Plus you will have a CD/DVD reader and burner too.

Windows Media Center Edition is easy to access and simple to navigate.

What will I see?

The obvious point about viewing on the family TV is that you're viewing from 10 or 12 feet away, rather than two feet away as on the desktop. Windows XP Media Center Edition is basically Windows XP with an intuitive, easy-to-read interface for accessing the digital media and PC functions. Menus are simple and easy to navigate, with the familiar Windows look-and-feel. If you've used Windows before you'll feel right at home, but even beginners should be pleased with how easy the learning curve is. Pick up your remote and you can access all the features of the Start menu, such as My TV, My Videos, Play DVD and My Music. Everything is available at the click of a button.

What can I do?

As well as being a standard Windows PC, a Windows Media Center Edition PC can take on many of the jobs of your DVD player, personal video recorder (PVR) such as TiVo, your hifi ... even your photo album! Advanced TV and recording features let you view regular TV broadcasts, while the PVR lets you record direct to your hard disk: you can then view later, burn to DVD or transfer to a laptop or portable media player.

The Electronic Programme Guide (EPG) outlines the week's upcoming shows, making it easy to record specific programmes. You can even set up the system for more advanced recording, such as taping every episode of a certain soap, or every show that stars a particular actor.

Have you ever watched a football match on TV, been interrupted and come back to find you missed a goal? You'll love time-shifting. Hit pause and it begins recording the show to your hard disk. Hit Play and it begins playing exactly where you left off.

Ever spent ages hunting a certain CD? Those days are gone. Now you can bring your entire CD and digital music collection into the living room. Playing direct from Media Center means your music is always organised, but that's just the start. Rip tracks from CD, add them to your music library, and make playlists. Find ideas and workshops in the e-book at *www.vnunet.com/ms/uk* and lots more at *www.microsoft.com/windowsxp/using*.

A new way to view TV

Record while you watch, pause live TV, even check your emails as you watch

Windows Media Center Edition brings new flexibility and control to your TV watching experience. Windows XP Media Center Edition 2005 features support for dual tuner control. This means you could be watching and recording two shows simultaneously!

The Electronic Programme Guide lets you find out what the upcoming shows are, and then select a TV programme for recording to your hard disk. And recording itself is so easy. You simply press the Record button on your remote control; press the Guide button; go to the TV show that you want to record in the Electronic Programme Guide, press the Record button again ... and that's it!

Let your PC be your guide

And while the Electronic Programme Guide offers a vast array of digital broadcasts (you'll never be stuck for something to watch) you can narrow things down, customising the guide to only show channels you're interested in. So you might limit things to just sport or music, say. For convenience, Windows Media Center PCs let you schedule recordings weeks in advance.

You have to keep an eye on how much hard disk space is being consumed by your TV recordings of course, but if you want to make room for new recordings, that's easy too. Simply burn your shows to DVD. Pop a writable DVD (or CD) in the CD/DVD drive. Navigate to My TV on your remote. Press More Info, select Copy to CD/DVD, and you're done.

As well as being able to watch and record two shows at once (depending on the exact configuration of your Windows Media Center PC), you can multitask while watching TV. This means you can surf the web, check emails or send instant messages, or perform any traditional PC functions while the TV plays in the background, or in a 'picture in picture' display.

Sharing shots

Windows Media Center PCs make it easier than ever to view and edit photos then burn, email or post them online

Windows Media Center PCs make it so easy to share your photos with family and friends. You can gather round the TV to watch a slideshow of shots from the family holiday or party, and you can choose the ones you want to keep, discard, and distribute to your friends. Furthermore, Windows Media Center gives you more power than ever when it comes to sharing digital photos. You can attach digital photos to emails and whisk them off in a message. You can even burn a CD or DVD of images (along with mood music if you desire) and pop a disc in the post (this also makes a perfect way to backup your precious memories). And because your Media Center Edition PC is a fully

Don't miss it: timeshift

Has this ever happened to you? You're just at a crucial point in a movie or soap. Maybe there's a story on the news you can't miss ... and the phone or doorbell rings! You deal with it and the moment has passed. Infuriating! But Windows Media Center allows you to pause live TV at any time. As soon as you push the pause button on the remote, Windows Media Center automatically begins spooling the programme to the computer's hard drive. Simply press the play button when you return to your seat and the show resumes just where you left off. You'll find lots more ideas, plus workshops to help you make the most of the TV capabilities of Media Center Edition 2005 in the e-book at *www.vnunet.com/ms/uk*. You can also access how-tos at *www.microsoft.com/windowsxp/using*.

Windows XP Media Center Edition can function as a personal video recorder allowing you to record, pause and rewind live TV

Making more of music

Squeezing the most from your digital music collection

featured Windows PC, you can tweak and enhance your digital photos until they are just right – basic editing tasks such as red eye reduction and cropping can be done from the comfort of your sofa if you choose. Download Microsoft Photo Story 3 free of charge and you can add special effects, soundtracks and even your own voice narration to your photo slideshows. You'll find more ideas and tips in our e-book at *www.vnunet.com/ms/uk*. Also access how-tos at *www.microsoft.com/windowsxp/using*.

Sharing your photos

Why not post your photos online? Sites such as *spaces.msn.com* or *www.myfamily.com*, have low-cost or no-cost webspace for displaying pictures. Prefer email? Windows XP Media Center Edition is "superset" of Windows XP, so you have all Windows XP's features available to you – including the ability to email directly from the My Pictures folder, with the option to reduce the size of images before you send. Buy a colour photo printer with your PC and you can produce quality prints in an instant. Your Media Center PC has many ways to enhance photos, and *www.microsoft.com/windowsxp/using/digitalphotography* has great ideas on making the most of your pictures.

Many of us have large collections of digital music stored on our PCs, and Windows XP Media Center Edition is designed to make full use of those music libraries. Integrating with Windows Media Player, the Windows XP Media Center Edition organises your music into categories and allows you to automatically sort and search through your entire collection of tracks.

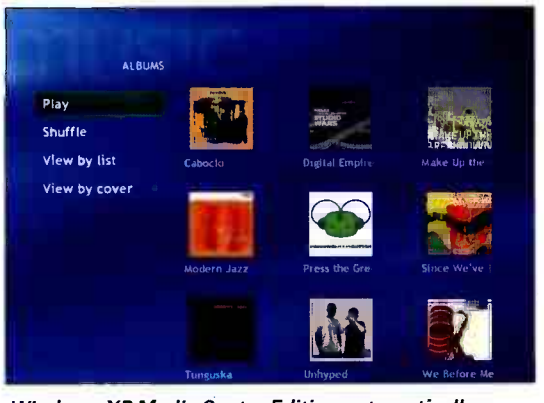
You can also rip new tracks from your CDs via Windows XP Media Center Edition: the music will then be saved and added to your audio library. Since Windows Media Player is used as the basis of Windows XP Media Center Edition's audio capabilities, auto playlists are also available and will be generated based on your listening habits.

Browsing through your music is a breeze – you can search with the remote from the comfort of your sofa. My Music automatically adds album art when you rip CDs to your hard drive, and this makes finding your desired music selection that much easier. Using this, you can also simply add albums or tracks to the queue. In moments you can cue up a perfect selection of music for the entire evening ... whether for a lively party or a dinner for two.

The My Music function of Windows XP Media Center Edition allows you to enjoy your music like never before and never have to worry about hunting through your library for a specific CD again. See also our e-book at *www.vnunet.com/ms/uk*.

Conclusion

Here's where we leave you, but for you – with your Windows XP Media Center Edition PC – it's just the beginning. An exciting new world of music, radio, TV, instant messaging, DVD burning, email and more ... when you want it, where you want it.



Windows XP Media Center Edition automatically organises your digital music collection.

Getting the message

More and more of us are using instant messaging as a 'real time' version of email. MSN Messenger takes the idea further than ever

More and more of us are succumbing to the delights of instant messaging (IM). The instant exchange of typed messages, popping up on an always-open window on your screen, is perfect for those times when email is just too slow. It's great for chatting to friends and family but also an essential work tool, especially for those working remotely or from home.

But there's much more to instant messaging than just type. With MSN Messenger you can chat online via text, voice, log in from a mobile phone (note that this is limited to certain models) or even hold video and audio conversations. You can enhance the message with photographs, or share files and searches. MSN Messenger is free (download it from *http://messenger.msn.co.uk*), and it's a great tool to have on your Windows Media Center PC.

In addition to video and audio chats, MSN Messenger allows PC-to-PC calling, games, fast transfers of large files (a great solution for those with email size limits), playing online games such as chess with friends or sending messages to mobile phones.

Ever tried to explain how to use software to a friend? Remote Assistance allows you to show them on their PC from wherever you sit. Remote Assistance lets you connect to a friend via MSN Messenger. You can view their computer desktop over the internet and show them how to fix their problem. Support professionals can also use this to help you with your PC should the need ever arise.

Equip yourself with a microphone and a webcam and you can really make the most of MSN Messenger. But even without these you can add colour, fun and nuance to messages by incorporating emoticons (smileys) within. And with a Windows Media Center PC you can do it all from the comfort of your sofa.

You'll find lots more ideas, plus workshops to make the most of the instant messaging powers of Media Center Edition 2005 in the e-book at www.confirmurl. com. There's more at *www.microsoft.com/windowsxp/using/default.mspx* and *http://join.msn.com/messenger/features.*

Instant messaging adds an immediacy to a conversation that you just don't get with email ... and it's as useful for remote working as it is for chatting to friends and family.

What about wireless

Windows XP has liberated the computer from the desktop, bringing it into the living room, but if you work from a laptop you may want to work in the garden or at the kitchen table; you'll certainly want to access WiFi hotspots for surfing the internet and sending emails on the move. Ensure the laptop you buy has wireless connectivity (typically based on Intel's Centrino processor). Alternatively, wireless adapters are now cheap. There are wireless USB adapters which can be plugged into almost anything with a free USB slot ... adding wireless connectivity to a printer say. Your home network, with perhaps a work PC in your home office and the main Media Center PC in the lounge, can all run on the network, sharing such resources as printers and internet access. For our workshop on setting up a wireless network, see the e-book at *www.vnunet.com/ms/uk.*

Guy Kewney

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Finding security in a virtual world

An impenetrable firewall may not be the best way to keep your systems secure. Guy Kewney examines the alternatives

Most of us don't want to be famous, even if it brings great wealth. We want to be admired. Being admired is not the same as having strangers hate you just because you were on TV, or because you wrote a piece of software that made some money.

Real fame is having people write computer viruses specifically targeting your company. Against this sort of customised attack, it's hard to see what anybody can do. Anti-virus and anti-spyware software is generic, to counter mass-market attacks. But suppose you work for a merchant banking group and one day you find all your systems crashing. The only clue is an anonymous email saying 'Ha ha. That will teach you to fire me!', and you realise a disgruntled ex-employee has written a virus specifically designed to use inside knowledge of your network to bring it down.

'The more secure your environment, the more careless you are likely to be'

That's fame. It isn't good. But it is what you need to be a successful giant business; which means you're making yourself into a target as surely as if you painted concentric circles on your face.

It is also a direction in which the anti-virus community fears we're headed. What the PC community can do about this isn't obvious to me. I've endured many presentations from Microsoft about how it is making the PC more secure, and I suspect we aren't talking the same language here.

From the perspective of security experts, there are choices. First, you must have an inherently safe environment. When you have that, you must support it by writing inherently safe code. Finally, you have to use the computer in a safe manner.

I had a chat with the guys from Fortify Software, who don't believe an impenetrable firewall is the answer. Rather, they believe software-development tools have to produce code that is pre-verified against common errors such as buffer over-runs as part of the testing process. I expect to hear a lot more from them over the next year or two.

But their point was a good one, generally. Put simply, the more secure your environment, the more careless you are likely to be. If there are no cars, why look before crossing the road? If the network is controlled by foolproof intrusion-prevention technology, are you likely to trust an executable piece of code you find on your hard disk? Or are you more likely to be cautious if it's a machine used on the Internet by a 10-year-old?

I think the problems require a computing environment where it isn't possible to bring down the network by running trojan code. That means, to my mind, that the environment has to allow user stupidity, but isolate the user's own private environment from the main system.

The question that then arises is the old, sad, Microsoft-bashing one. Can this honestly be done with a Windows system focused entirely on digital rights management and backwards compatibility with the IBM PC Bios from 1981?

I'm working on a story relating to what I think is a scandal in local government computing. In essence, it involves business practices by Microsoft agents (I can't yet tell if Microsoft is even aware of the practice) that amount to 'buying the business' in order to create a publicity firewall. This is a system where people write 'security analysis' white papers about their proposed new system, and base those white papers on unsupported assertions from Microsoft. They publish the white papers as 'our research' and then Microsoft quotes this 'independent assessment' as proof of its suitability for a high-security environment.

The way to achieve security isn't by publishing corporate flannel as independent research. It is (obviously) the view of my Linux friends that a proper operating environment is the only way forward. It is the view of my Windows friends that there's no way of replacing the universe of Microsoft-based software, or of making the universe of Windows users into people who understand Unix.

Perhaps the solution is to create a virtual environment, with Unix as the host, in which protected Windows environments can be set up and run with limited privileges. It must be possible, with virtualisation technology, to run something like that on any new dual-core PC, with a little extra system memory. And if it is, maybe we can move forward into a world where computers actually work without causing more problems than they solve. PCW

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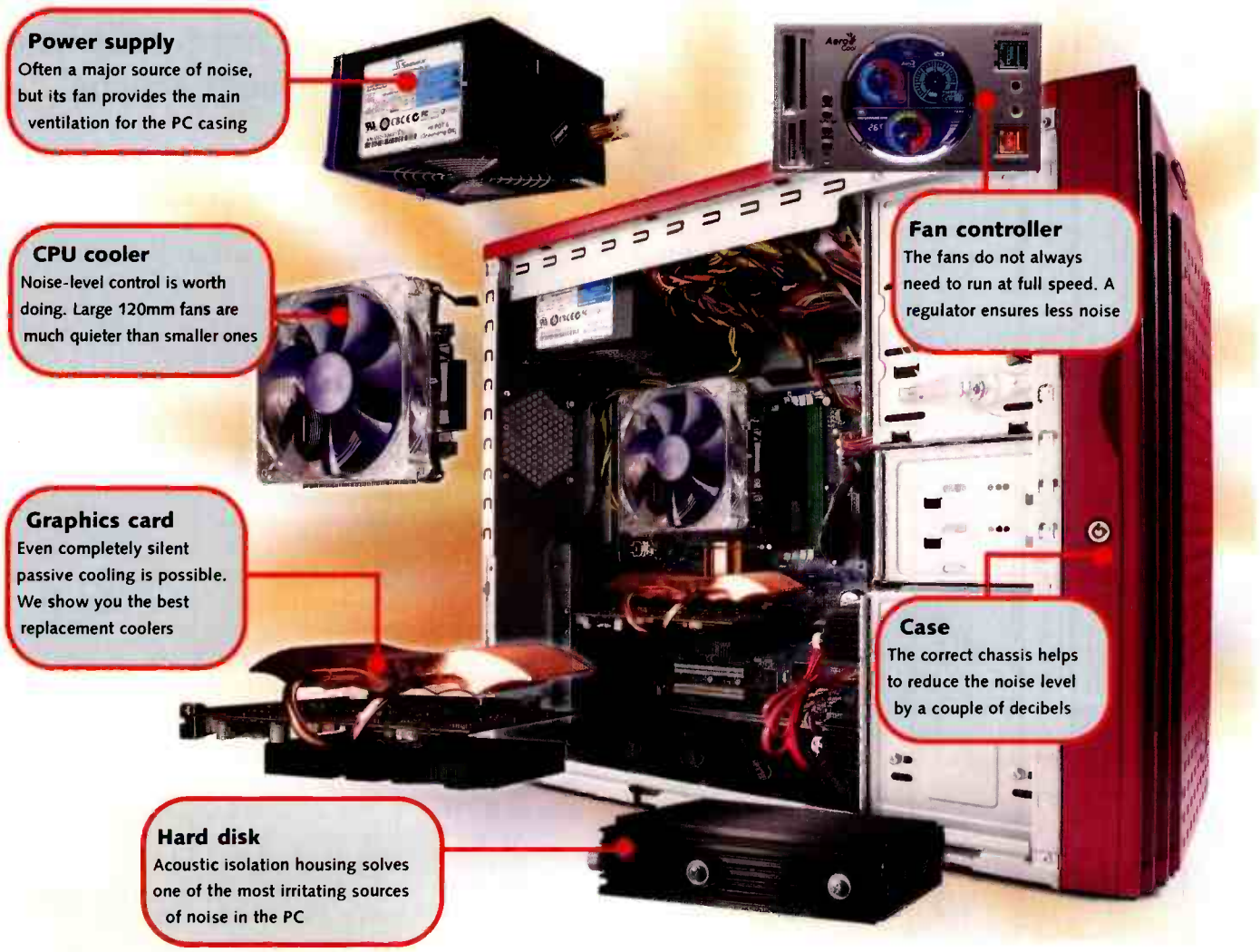
Weekend project: Silence your PC

It's quick and easy to reduce the noise from a PC without spending a fortune. Sascha Faber guides you step by step through the options, whatever your budget



You can turn your PC into a zone of tranquillity. This isn't about spending a fortune to build a totally silent PC, but rather about using simple techniques and a moderate investment to modify your existing computer and to make irritating fan noise and rattling hard disks things of the past. You really can get some astonishingly good results using standard PC components. Investing just a few hours' work will help make your PC much more pleasant to live with.

First you need to identify the noise sources in your PC, then you can make modifications, starting with the worst offender. We'll examine the most important PC components in a logical order, starting with the processor cooler, progressing to the hard disks, the power supply unit (PSU) and the graphics card, and finishing with the chassis fans and case.

The big picture

When you're carrying out noise optimisation, you need to keep in mind the overall cooling needs of the PC. For example, the PSU fan plays an important role for the thermal management of the whole system, as it ensures that there is a continuous airflow ↘

FIG 1

You can use fan adapters to fit larger fans onto old cooler units

FIG 2

Our test system uses the Thermalright SI-120 CPU cooler with a 120mm fan

FIG 3

The most important step: physically insulate the hard disks from the PC chassis using a product such as the Noiseblocker NB-X Swing

FIG 4

Special hard disk casings such as those from Silentmaxx ensure maximum noise absorption

through the PC's insides. It's possible to make a completely silent passively cooled system, but only by careful planning and using a lot of expensive components. Whatever you do, don't try and switch over to passive cooling without considering the whole PC's ventilation: for example, using passive cooling on your graphics card can easily lead to the graphics chip becoming too hot if there isn't an adequate cooling airflow.

However, fans don't have to be loud. The size of the fan is important here: large diameter models, up to 120mm, are slower and less noisy than a smaller, faster fan with the same cooling properties.

1 The CPU cooler

The processor's cooling system is usually the noisiest thing in a PC. The simplest way of dealing with an excessively loud CPU cooler is to swap the existing fan for a quieter model (see step 5 for more about fans) and continue to use the existing heatsink module. The larger the diameter of the new fan, the better the cooling characteristics will be and the lower the noise level. If you use a fan adapter, you can fit a large diameter fan onto a small cooler unit (see figure 1). These adapters cost £2 or less from suppliers such as Casetech (**www.casetech.com**).

If the installed cooler is too small or can't be fitted with a new fan, the only option is to buy a new unit. For good cooling results, a CPU cooler needs to have a heatsink with a large surface area. Expensive materials such as copper tend to make better heatsinks.

The table on page 42 lists a selection of powerful and quiet CPU coolers. Among the best are fanless heatsinks such as the Thermalright SI-120 at £32 (see figure 2). Their size means these coolers can also be used in conjunction with ultra-quiet 120mm fans.

The Vapochill Micro cooler from Asetek comes in an Ultra Low Noise version at around £33, equipped as standard with a particularly quiet 92mm fan. The Asetek cooler/fan assembly can be rotated in any direction in the CPU socket, allowing you to direct airflow from the fan to improve the heat circulation in the case.

At about £18, the Arctic Cooling Freezer Pro series offers a good compromise in terms of noise, cooling performance and price, and the fan is isolated from the cooler unit with rubber fittings.

2 Hard disk

High rotation speeds and the constant back and forth movements of the write and read heads turn hard disks into sources of irritating noises. The usual countermeasure is to physically separate the hard disks from the PC chassis, to prevent the casing rapidly becoming a source of noisy vibrations.

The cheapest way of doing this is to use something like Noiseblocker Swing decoupler modules, which cost about £7 per hard disk. They use four small rubber holders to physically isolate the hard disk from the casing in a 5.25in drive bay. The disadvantage is that it is rather fiddly to install the separate fastenings.

It's easier with the newer Noiseblocker NB-X Swing, whose side sections take one or two hard disks (see figure 3). The best possible acoustic isolation can be achieved by mounting the hard disk using rubber cords, such as the Sharkoon HDD Vibe-Fixer that Pixmania (**www.pixmania.co.uk**) can supply for about £18.

'Movements of the write and read heads make hard disks a source of noise'

The most efficient way of reducing hard disk noise is to completely encapsulate the hard disk in a noise-absorbing enclosure; but you will have to dig deep in your pocket as this will cost you around £40 per disk for something like the Silentmaxx HD Silencer (see figure 4).

One disadvantage of mounting the hard disks like this is that it isolates them thermally as well. You should use a temperature-measuring strip to check that the temperature inside the hard disk bay doesn't exceed 50°C. If the casing is adequately ventilated, however, there aren't usually any problems.

3 The PSU

Budget PSUs save money in many areas, including the fan. Over time, you might find that the fan bearings wear out and become noisy. There is always the option of swapping the fan for a quieter one. However, unless you're an expert, it's not straightforward and, to be honest, if your PSU is of such a quality you're better off replacing it with a modern, quiet, high-quality branded unit (see figure 5). As a bonus you might find that a lot of other system stability problems disappear when you do this, as poor-quality PSUs are notorious for creating intermittent, or even permanent, PC problems. QuietPC (**www.quietpc.com**) offers a range of ultra-quiet PSUs starting from about £60.

It's important to remember that the PSU fan doesn't just cool the PSU, but it also plays an important role in air circulation throughout the PC case. If the capacity of the PSU fan is reduced, extra chassis fans have to be used to ensure that enough air flows through the PC's casing. On better-quality fans the air throughput is usually marked in terms of cubic metres per hour. To prevent

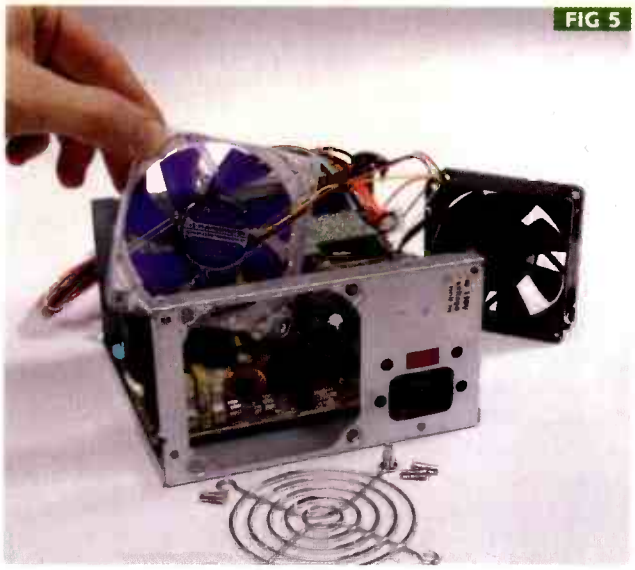


FIG 5

It's possible to upgrade a PSU fan, but it's easier and much safer to upgrade your PSU to a better model

the PSU from overheating, the PSU fan should be capable of moving 40-60 cubic metres of air per hour.

Completely passively cooled PSUs such as those from Silentmaxx or Silverstone can only be recommended to a certain extent. Their solid metal housings act as heatsinks, meaning that the PSU itself is adequately cooled, but additional fans are needed to remove the heat from inside the PC (see figure 6). The amount of noise saved is really very small.

Inexpensive, but also of limited effectiveness, are rubber isolators for the PSU mounts. These are placed between the PSU and the chassis during installation to minimise the transfer of vibrations.

4 Graphics cards

With a power demand that can easily exceed 100w, the latest graphics cards challenge the CPU in the power consumption stakes. The graphics card's cooling system is correspondingly elaborate and often just as loud. It's not necessarily the fast and expensive graphics cards designed for game playing that are the worst. Entry-level and intermediate graphics cards often use cheaper coolers which, despite their small size, make a lot of noise, and don't last long either.

'When choosing a cooler, bear in mind the type of graphics card you have'

Manufacturers such as Aerocool, Arctic Cooling, Revoltec and Zalman (see figures 7 and 8) offer quiet and powerful replacement coolers for between £5 and £30. When choosing a replacement cooler, it is important to bear in mind the exact type of graphics card. Every graphics card will have different holes to secure the cooler onto the circuit board. You really do need to consult the manufacturers' specifications (see figure 9).

On slower cards such as the ATI Radeon X600 or Nvidia Geforce 6600 models you can simply change the whole cooler unit for a passive (fanless) heatsink. The Aerocool VM-102 (about £20) is suitable for all graphics cards with two securing holes and, with its large copper heatsink, channels heat away effectively even without a fan. You must, however, check that there are no components on the motherboard that will get in the way of the large heatsink.

For faster cards, active cooling is a necessity. The Zalman VF-700-Cu (see figure 7) and NorthQ 3850 Copper (£23 and £15 respectively) are quiet, but still perform well. However, the cooling power of these fans is not enough for cards from the ATI Radeon X1900 or Nvidia Geforce 7800 series.

Arctic Cooling's Silencer and Accelero series are the right coolers for the job in this case. There are now 12 Silencer models and two Accelero models available for various graphics cards. The main advantage of these coolers is that the heat from the graphics chip is transported straight out of the computer

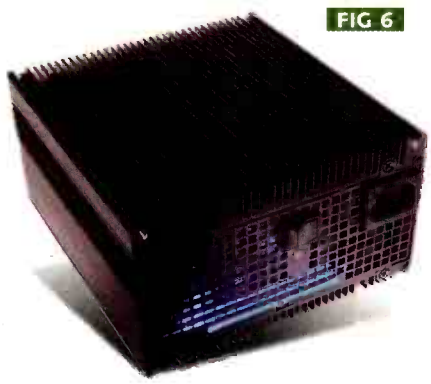


FIG 6

PSUs that are completely passively cooled, such as this Antec Phantom 350, should only be used in fan-ventilated cases

Buy yourself a tranquil life

You can buy quiet PCs preconfigured off the shelf. However, they are certainly not standard items.

It's not easy to create a perfectly quiet system with standard components. Near-silent PCs have to be designed from the ground up with silence in mind. Well-known manufacturers such as Dell and Fujitsu Siemens have seen that there is a market (especially in those countries with workplace noise regulations, such as Germany) and have offered ready-configured quiet business computers for many years.

Fujitsu Siemens, for example, offers the compact Esprimo E (pictured). Thanks to its regulated fans, under test it is scarcely audible in normal operation at 29dBA and even under full load only produces 34dBA. The best manufacturers will declare their PC's noise levels according to the ISO 9296 standard, which allows figures to be compared directly by end users.

Extra-quiet, at a price

For such specialised items, it is not the best price that counts, but the lowest possible number of decibels. Expect to pay a couple of hundred pounds more than you would pay for one of a similar speed but of conventional construction. This will get you a system bursting at the seams with noise-reducing technology. It's even possible to have systems that are fully passively cooled, from makers such as Tranquil PC (**http://tranquilpc.co.uk**) and Hush (**www.hushtechnologies.net**), for example. The hard disks are the only remaining sources of noise, but that can be minimised by noise-absorbing enclosures as described in step 2 on page 40.

Fujitsu Siemens offers the compact Esprimo E, which is extremely quiet to run

↘

TABLE 1

Components for a quiet PC

PRODUCT	GUIDE PRICE	DESCRIPTION	MANUFACTURER'S URL
CASES			
Antec P150 EC	£100	Includes quiet drive mounts and quiet 430w PSU	www.antec.com
Silentmaxx ST-11 Pro	£100	Soundproofed PC case	www.silentmaxx.com
CPU COOLERS			
Arctic Cooling Freezer 64 Pro	£18	CPU cooler with 80mm fan	www.arctic-cooling.com
Asetek Vapochill Micro Ultra Low Noise	£32	CPU cooler with 92mm fan	www.asetek.com
Thermalright SI-120	£32	CPU cooler for 120mm fan	www.thermalright.com
GRAPHICS COOLERS			
Aerocool VM-102	£20	Passive graphics card cooler for ATI and Nvidia models	www.aerocool.com.tw
Arctic Cooling ATI/NV Silencer	£16-20	Heatpipe cooler for ATI and Nvidia cards	www.arctic-cooling.com
Arctic Cooling Accelero 1/2	£20	Heatpipe coolers for X1900XT and 7900GTX series	www.arctic-cooling.com
Zalman VF-700-Cu	£23	Cooler for faster ATI and Nvidia cards	www.zalman.co.kr
NorthQ 3850 Copper	£15	Cooler for faster ATI and Nvidia cards	www.northq.com
HARD DISK ACCESSORIES			
Noiseblocker NB-X Swing	£7	Hard disk isolator	www.noiseblocker.de
Sharkoon HDD Vibe-Fixer	£18	Fastening for 3.5in hard disks	www.sharkoon.de
Mcubed Vertical Silence	£42	Isolated and sound insulated hard disk housing	www.mcubed-tech.com
Silentmaxx HD Silencer	£40	Isolated and sound insulated hard disk housing	www.silentmaxx.com
FAN CONTROLLERS			
Aerocool Powerwatch	£50	Controller and temperature monitor for up to four fans	www.aerocool.com.tw
Digital Doc 5+	£48	Controller and temperature monitor for up to eight fans	www.ichbinleise.de
Innovatek Fan-O-Matic	£140	Controller and temperature monitor for up to four fans	www.innovatek.de
Zalman ZM-MFC1	£20	Manual speed controller for six fans	www.zalman.co.kr

via an external exhaust arrangement and therefore doesn't add to the heat build-up inside the PC.

5 More about fans

The decisive factors when choosing CPU and casing fans are the voltage, the speed and the amount of air to be moved.

If you are going to fit the fan to a motherboard, a graphics card or PSU with a fan controller, you must check that, as well as the positive and negative DC power wires, there is a third wire for the fan speed monitoring signal. However, many of the newer Socket 775 and Socket 939 motherboards do not reduce the voltage to slow down the fans (a method known as linear regulation), but instead use a system called pulse width modulation (PWM), which reduces the fan speed by turning the

'Hardly any of the fans in a PC need to run at full speed all the time'

supply current on and off in a pulsed manner. PWM-capable fans are recognisable by their four wires (two for power, one for speed sensing and one for the PWM control signal) and corresponding four-pin sockets on the motherboard.

Hardly any of the fans in a PC need to run at full speed all the time. There are several options for reducing the fan speed and making your system run quieter (see figure 10).

The simplest – and lowest cost – solution is a variable potentiometer to control fan speeds. These cost a couple of pounds and often come with a mounting that allows them to be fitted into a spare expansion card slot, with a small control knob that's accessible from the back of the computer.

A more refined solution is provided by slot-in controllers that fit into a PC's front 5.25in drive bay. You can then control the fan speeds from the easily accessible front panel. Zalman, for example, offers the ZM-MFC1 with rotary controls and LED status lights for four fans at about £20.

To optimise the fan speed and get the best compromise between fan noise and cooling performance, you will have to keep an eye on the temperatures inside the PC. Higher-priced controller units (£30 and above) also monitor the temperature via sensors and adjust the fan speeds automatically. In our Labs reference system, we use an Aerocool Powerwatch unit (see figure 12), which costs

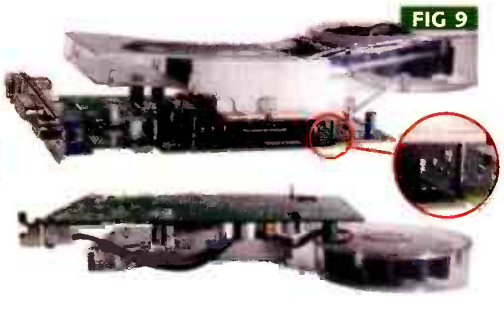
FIG 7

The Zalman VF-700 Cu provides active cooling for the graphics chip but is still quiet

FIG 8

Midrange graphics cards can be cooled without a bothersome fan using the Aerocool VM-102

FIG 9



When choosing a replacement cooler, it's important to check the exact position of the fixing holes

FIG 10

There's a huge choice of quiet fans

Cheap and simple: Rubber 'Slics' isolate fans acoustically from the mounting

FIG 11

£50 and has four fan connectors and four temperature sensors. A 'luxury' model is the £140 Innovatek Fan-O-Matic which has four fan controllers and six temperature sensors that are fully programmable via the bundled Windows software interface.

If you want to attach the CPU fan to an external controller, problems can arise: many motherboards check the CPU fan's speed monitor signal. If there's no such signal because the fan isn't connected, the motherboard concludes that there is a problem and switches off or generates an alarm. You might be able to overcome this by turning off the CPU fan control option in the Bios.

'You can reduce fan noises by physically separating fans from their mountings'

You can also reduce fan noises cheaply by physically separating the fans from their mountings, which helps prevent vibrations from spreading. The cheapest way to do this is using Slics, which are thin rubber studs with notches that fit into the fixing holes on the fan and the mounting frame (see figure 11). Simply pull the Slic, instead of the fastening screw, into the mounting and pull until the barb engages. Then let go and you're done. If you want to improve the appearance simply cut off the protruding bit. A four-pack of Slics from Noiseblocker costs about £2.

TABLE 2

Specialist suppliers

VENDOR	URL
Casetech	www.casetech.co.uk
Chillblast	www.chillblast.com
Hush Technologies	www.hush-technologies.net
Ichbinleise	www.ichbinleise.de
Komplett	www.komplett.co.uk
Kustom PCs	www.kustompcs.co.uk
Overclock	www.overclock.co.uk
Overclockers UK	www.overclockers.co.uk
QuietPC	www.quietpc.com
Scan	www.scan.co.uk
Tranquil PC	www.tranquilpc.co.uk

Whisper-quiet cases

The PC case itself is something else you have to take into account with a quiet system. For our test system we used the Silentmaxx ST11 Pro case that has a solid steel case and a noise-insulating lining. This is a quality product whose only drawback is the premium price of £100 without a PSU or a case fan – the fan kit costs an extra £30.

A somewhat cheaper alternative to this is the Antec P150 (see figure 13), which costs the same as the Silentmaxx but includes suspended drive mountings, and a quiet power supply unit, the Antec Neo HE, which is rated at 430w.

An existing case can often be quietened effectively with noise-absorbing matting. Manufacturers such as Acousti offer customised soundproofing kits with parts pre-cut for particular PC cases, or you can buy generic packs to cut and shape yourself for about £25-£35 per PC.

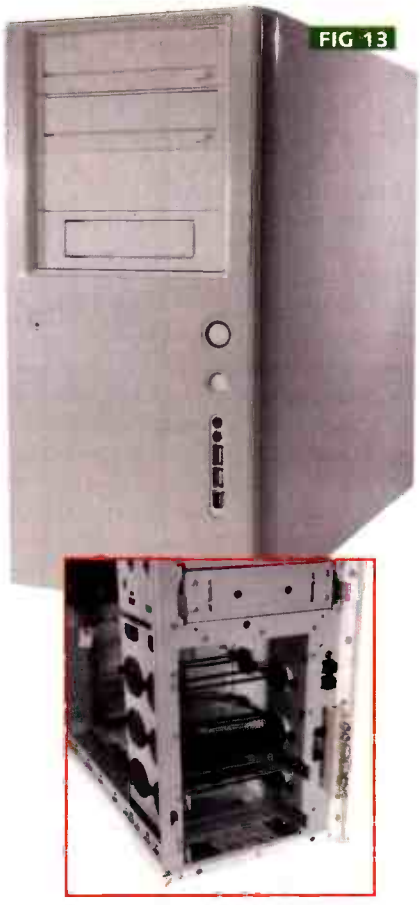
And finally... keep it clean

One very cheap, but often forgotten way to help keep your PC quiet is to keep it clean. This is especially so with CPU and graphics card coolers – when the heatsink fins become clogged they can't dissipate heat as well and this results in the fans working overtime to keep the components cool. A monthly blast with an air duster or a soft brush will work wonders, as well as reducing the risk of fire. **PCW**

FIG 12

The Aerocool Powerwatch's controller automatically keeps up to four fans running quietly

FIG 13



Good value and a great idea: the Antec P150 case includes elasticated drive mounts

Inside Boot Camp

While some were surprised to see Windows running on a Mac, others believe it is Apple's next step towards world domination. Cliff Joseph takes a tour of duty to find out more

Boot Camp adds a new control panel to Windows, allowing you to boot into either Windows or the Mac OS

We were tempted to kick off this piece by quoting Bob Dylan's *The times they are a-changin'*. But it might be more apt – not to mention more contemporary – to quote REM's *Losing my religion* instead. After all, the rivalry between Mac fans and PC users has often seemed like a religious crusade, with Apple setting itself up as the creative alternative to the dreary number-crunching world of the corporate PC.

So it really did seem like a religious conversion when Apple announced – almost exactly one year ago – that it was dropping IBM's PowerPC processors from its Mac computers and would be switching to Intel processors instead. The full implications of that move are still unclear, but the recent release of a beta version of the Boot Camp utility is at least an indication of where Apple might be going in the future.

Boot Camp is a piece of software that allows the new Intel-based Macs – the Imac, Mac Mini and Macbook Pro – to run Microsoft Windows. We've covered the technical aspects of this process before (see the review in our July 2006 issue and online at **www.pcw.co.uk/2153753**), but Boot Camp is essentially a utility that allows you to partition the Mac's hard disk so you can install Windows alongside Apple's home-grown OSX operating system. You can then choose which operating system to use when you start up – a process known as 'dual-booting'.

Giving them the boot

Apple says that Boot Camp is just a beta version of a feature that will be included in the next version of OSX due early in 2007 – codenamed 'Leopard' – but it works pretty well right now. The partition process takes less than five minutes and you'll need a blank CD so Boot Camp can put the Windows drivers for the graphics card onto a disc for you. Once that's done, you just install Windows the same way you would on a PC.

There are some limitations – such as the fact that Boot Camp will only allow you to install the full version of Windows XP complete with Service Pack 2 (SP2) – you can't install an older version of XP first and then update it with SP2 later, nor can you install any previous versions of Windows, such as Windows 2000 or ME (see the box opposite for tips on how to create an XP CD that includes SP2). But, to all intents and purposes, an Intel-based Mac running Windows works just like an ordinary PC running Windows.

The arrival of this dual-boot capability raises all sorts of questions about the future of the Mac and of Apple itself.

Some people argue that Apple has finally thrown in the towel and can no longer be bothered to compete with the mighty Microsoft. It has even been suggested that Apple is preparing to get out of the computer business altogether, dumping the Mac so that it can concentrate on selling squillions of Ipods. Others take a quite different view, arguing that Boot Camp is a very clever ploy by Apple designed to lure PC users into switching over to the Mac for the very first time.

We won't claim any special insight into Apple's plans, but there's one thing we do know. Apple is on a roll at the moment. It's making money hand over fist, despite the fact that several Mac models are still waiting for their Intel makeover and are still using PowerPC processors.

It's hard to believe that Apple will just roll over and play dead at a time when it's doing so well – especially as it recently got a public commitment from Microsoft that it would update the Mac version of Microsoft Office for the new Intel Macs and would continue to develop the Office suite for several years to come.

Fight from the inside

It does seem more likely that Boot Camp is a kind of Trojan horse designed to lure PC users over to the Mac camp. Many PC users admire the elegant design of Mac hardware and the eye-catching graphical user interface of OSX, but still hold back from buying a Mac because they are committed to Windows or to specific Windows programs that may not be available on the Mac.

The 'Macs can't run Windows' argument is a particular problem for Apple in the corporate market. The Mac version of Microsoft Office is completely compatible with the Windows version of Office, so there's no real reason business users can't do their Excel number-crunching on a Mac (apart from the fact that Office for the Mac doesn't include a version of the Access database). However, most large organisations simply won't consider buying Macs because they don't run Windows.

Well, now they do, and removing that all-important obstacle might just allow Apple to get its foot in the door of the 90 per cent of the market that is currently Microsoft's private stomping ground.

Don't get us wrong – we're not suggesting that Apple is planning to topple Microsoft or even start courting large corporate clients. Its focus at the moment is very much on the consumer market, where the success of the Ipod is making Apple look very trendy right now. But don't forget that Apple currently holds less than five per cent of the personal computer market. If it can tempt just one million home users worldwide to swap their old PC for a new Mac – and maybe buy an Ipod at the same time – Apple could double its market share and profits without even having to think about the corporate market.

Using Boot Camp is very simple – just partition your Mac's hard disk and then install Windows as you would normally

When the Leopard pounces

Of course, all this is speculation. Apple is famously secretive when it comes to revealing information about future products. However, by releasing this beta version of Boot Camp it has clearly admitted that Windows does play some part in the future of the Mac.

One bit of speculation making the rounds at the moment is that Apple could go further than just allowing Macs to dual-boot. The favoured option here is 'virtualisation' – a technique that would allow you to run Windows and the Mac OS alongside each other at the same time, so you can switch from one to the other as easily as switching from one application to another.

There's already a virtualisation program for the Mac called Parallels Workstation, which is attracting a lot of attention right now (there's a trial version available from **www.parallels.com**).

Apple is swimming in cash at the moment, so it could buy Parallels out of petty cash; and then – hey presto – buy a Mac and you get two computers for the price of one.

The key to all this speculation is Leopard – the next version of the Mac OS. Leopard won't be released until early next year, but Apple is holding its annual developers' conference during the summer. It traditionally uses these conferences to brief software developers on new features that are being planned for the Mac OS.

Hopefully we'll get a few clues about Apple's approach to Windows over the next few months. So who knows – maybe your next PC really will be a Mac after all. **PCW**

How to create a Windows XP CD that includes SP2

If you want to try out Boot Camp, apart from the obvious requirement of an Intel-based Mac, you'll also need a copy of Windows XP Professional that includes SP2. New retail versions of XP should include this, but if you have an older licensed version of XP Pro you can save money by creating what's known as a slipstream CD. This CD is simply a copy of your original XP CD that includes all the updated files from SP2.

It's not illegal to create such a CD as long as you have a genuine licensed copy of the original XP CD – but you can't run the same copy of XP on two systems at once.

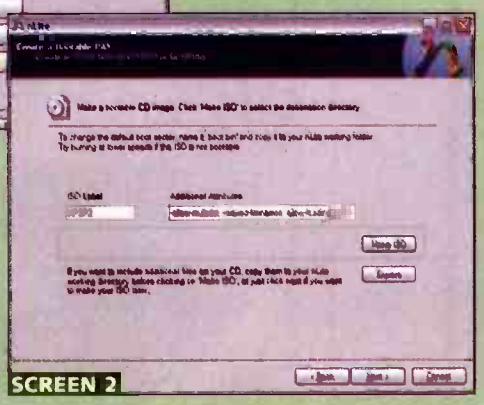
One of the easiest ways to make a slipstreamed CD is by using the freeware program Nlite (**www.nliteos.com**). After installing the program, first copy your entire XP Pro CD to a directory (say, C:\XPSource). Then download the SP2 network installation package from Microsoft (**http://tinyurl.com/5bobl**) – this has a filename of WindowsXP-KB835935-SP2-ENU.exe.

Run Nlite and follow the simple wizard to point it at your source file directory. After Nlite has verified these, the next step (see screen 1) offers various options, including 'Integrate a Service Pack' and 'Create a Bootable ISO', which are the two we're interested in here. Click these two buttons, hit 'Next' and point Nlite to the location of the SP2 exe file you downloaded. It will then automatically extract and integrate the updated files into the source directory.

When Nlite has finished the slipstreaming, the 'Burn ISO' screen appears (see screen 2). Hit the 'Make ISO' button to choose where to save this and start the creation. You can then use your CD-burning software to burn the updated, bootable XP installation CD. If you don't have such software, the freeware CDBurnerXP Pro (**http://www.cdburnerxp.se**) is a good choice.

Kelvyn Taylor

SCREEN 1



SCREEN 2

Far left: Nlite lets you integrate a service pack into the XP source files with ease

Left: The final step is to create a bootable ISO CD image file

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Home 1000	upto 1Mbps	50 : 1	£17.95 inc VAT	£29.95 inc VAT
Home 2000	upto 2Mbps	50 : 1	£19.95 inc VAT	£34.95 inc VAT
Home Max	upto 8Mbps	50 : 1	£24.95 inc VAT	£39.95 inc VAT
Office 500	upto 512Kbps	20 : 1	£22.95 ex VAT	£31.99 ex VAT
Office 1000	upto 1Mbps	20 : 1	£26.95 ex VAT	£49.99 ex VAT
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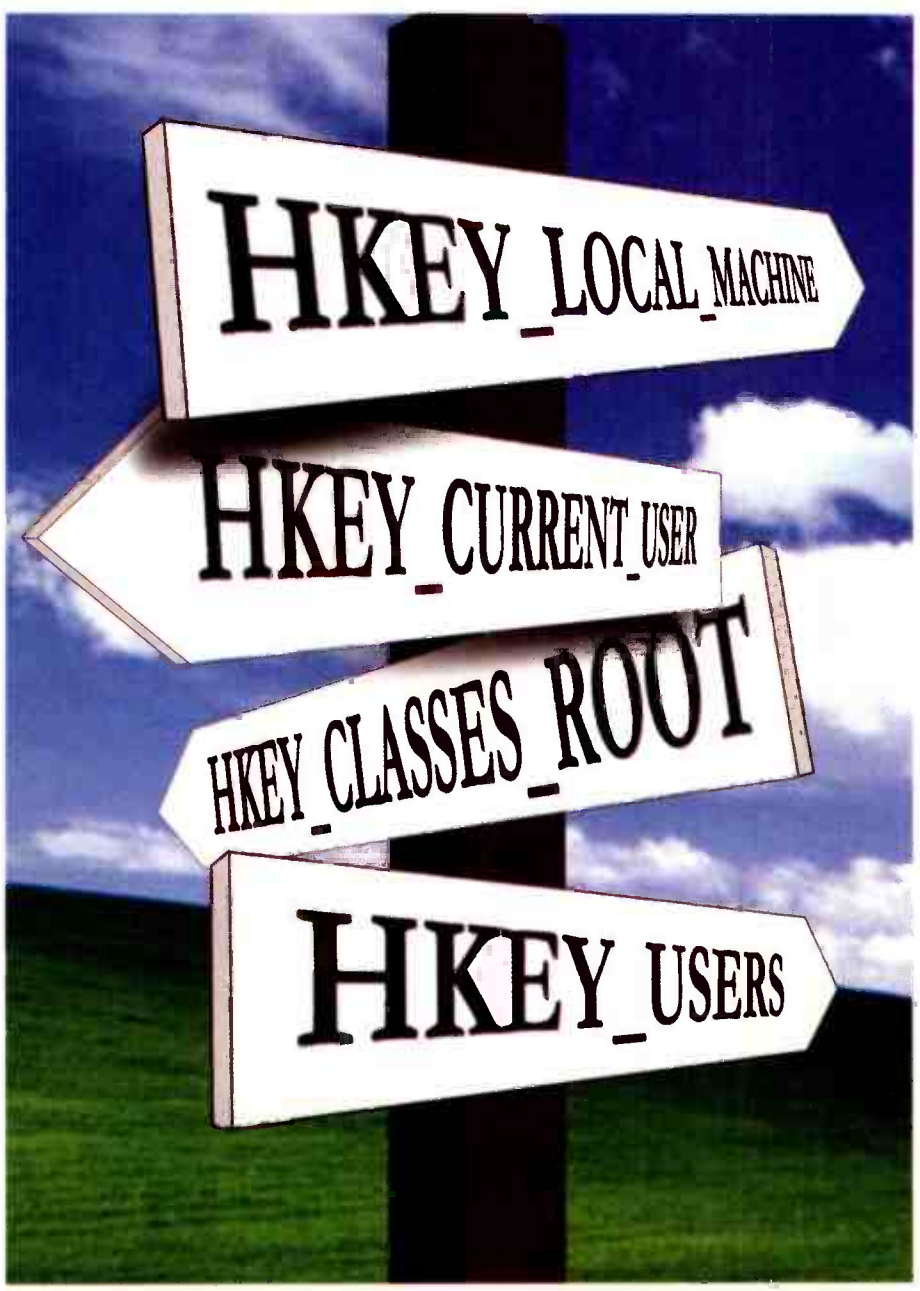
A roadmap for the Registry

The Registry is the ultimate tuning utility that the expert user can use to improve XP's security, speed and ease of use – for free. Hans Klumbies and Jörg Geiger explain

Windows can do quite a lot more than Microsoft lets on, as only a fraction of Windows' functions are accessible via the graphical user interface (GUI). You can only get at the majority of functions and settings via the Registry. Microsoft's advice is that only very experienced users should edit the Registry, and this article will help you to become such an expert.

The Registry tools that come with Windows are a bit limited, but Microsoft provides for free some very functional utilities that are easy to build on. We'll introduce you to Microsoft's offerings on page 48. Third-party manufacturers produce Registry tools, too, and we've listed some of them on page 55. The best Registry tips can be found starting on page 51, split into three categories: Security, Performance and Usability.



The heart of Windows

Since Windows 95, the Registry has been the central Windows database for all system settings. The Registry is part of all current Microsoft operating systems – XP, XP x64 and even Vista. Be careful, though: bugs or incorrect Registry entries can instantly make Windows completely unusable.

Before you start experimenting in the Registry, make a system backup using an imaging program such as Acronis True Image. If you don't want to make a disk image, you can use XP's own System Restore facility, although it is not as comprehensive and it won't restore any lost data files or programs.

You can find the System Restoration feature under Start/Programs/Accessories/System Tools/System Restore. If your computer won't run properly because of incorrect Registry entries, you can press the

Registry settings and keys

TABLE 1

REGISTRY KEY NAME	SETTINGS	LOCATION
HKCR (Hkey_Classes_Root)	Contains file allocations and class registrations	%Systemroot%\system32\config\
HKCU (Hkey_Current_User)	Manages user-related settings	%Systemroot%\system32\config\
HKLM (Hkey_Local_Machine)	System-wide configurations are controlled from this Registry branch	%Systemroot%\system32\config\
HKU (Hkey_Users)	Contains Desktop settings and security recognition	In the individual users' profile folders
HKCC (Hkey_Current_Config)	Link to the current hardware profile	%Systemroot%\system32\config\

F8 key during bootup to revert to a previous configuration – choose the 'Last known good configuration' option on the screen. Alternatively, you could try starting in Safe Mode and accessing System Restore as described above. Remember that you must have Administrator rights to reset the system using either of these methods.

Chaos in the Registry

The most dangerous things that can affect system stability and the condition of the Registry are program installations that write or change a large number of keys and values. You can't accidentally wreck the Registry while using Windows normally – the only way to alter it is by using the built-in editing utility, Regedit (use Start/Run and Regedit). In Windows XP there is also the command regedt32, a legacy from Windows NT and 2000, where Regedit was only partially implemented. However, under XP the command regedt32 also starts Regedit (see screen 1). An alternative is the command-line tool reg (see box on page 52).

While your PC is running, the Registry is being constantly accessed and changed – you can see what's happening using the utility Regmon from Sysinternals (**www.sysinternals.com**). This shows exactly which programs are accessing which Registry keys (see screen 2). For example, if you launch Firefox, then Regmon will record over 1,000 accesses to the Registry. We explain how to use Regmon later in this feature (see page 50).

The five main keys

If you open the Registry editor, the cursor will normally land at the same place you last edited. However, the first time you edit the Registry you will be at the top of the Explorer-like hierarchy under which you can see the five main Registry keys: Hkey_Classes_Root (HKCR), Hkey_Current_User (HKCU), Hkey_Local_Machine (HKLM), Hkey_Users (HKU), and Hkey_Current_Config (HKCC).

Table 1 shows which settings can be found in which key. The folder icons in the tree view are somewhat confusing at first glance: they are not directories in the standard sense, but keys containing subkeys and values. Microsoft is just making use of the familiarity of the Explorer visual metaphor. Regedit's menus offer only basic functions: key import and export, an inflexible search function and the option to set access permissions.

The most important keys for tuning measures are HKLM (system-wide settings) and HKCU (user-specific settings). HKLM has five subkeys: Hardware, Sam (Security Accounts Manager), Security, Software and System. The Hardware subkey is rebuilt every time you restart the system, and stores device data that Windows recognises as it boots up. Running the command msinfo32 will show you the information stored in this part of the Registry.

In the Sam subkey, Windows stores security settings such as passwords. A very high security level applies to this key – anyone browsing this Registry branch will be unable to see anything. By default, Windows will not even display the content for Administrators (see screen 3).

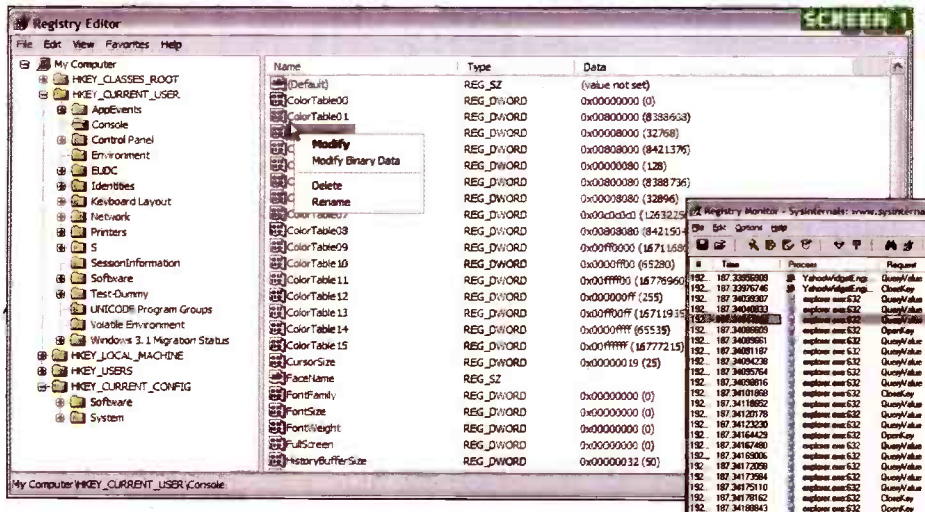
However, there is a trick with which you can view the entries: select the key Hklm\Sam\Sam and choose Permissions from the right-click context menu. Activate the Allow/Read checkbox for the Administrators group. There's nothing here you can safely alter, though.

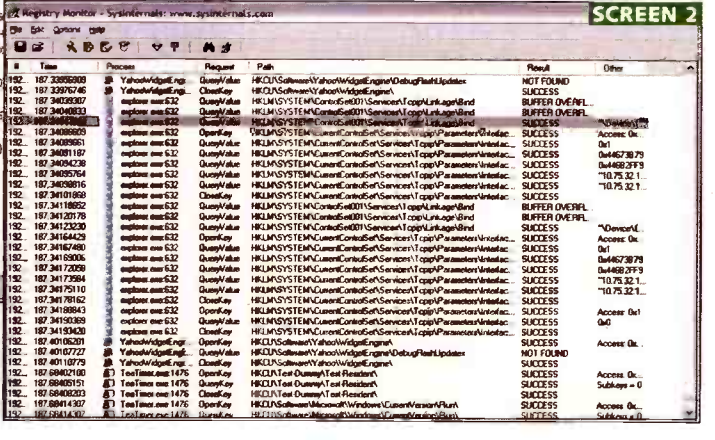
The Software subkey is much more useful, with numerous Windows basic settings that you can use for tuning, as shown in the example in the box on page 49.

Improve Windows' built-in tools

Out of the box, Windows only comes with a few, rather limited tools for working with the Registry. But with the right add-ons and a few shortcuts, you can make working on the Registry a lot easier.

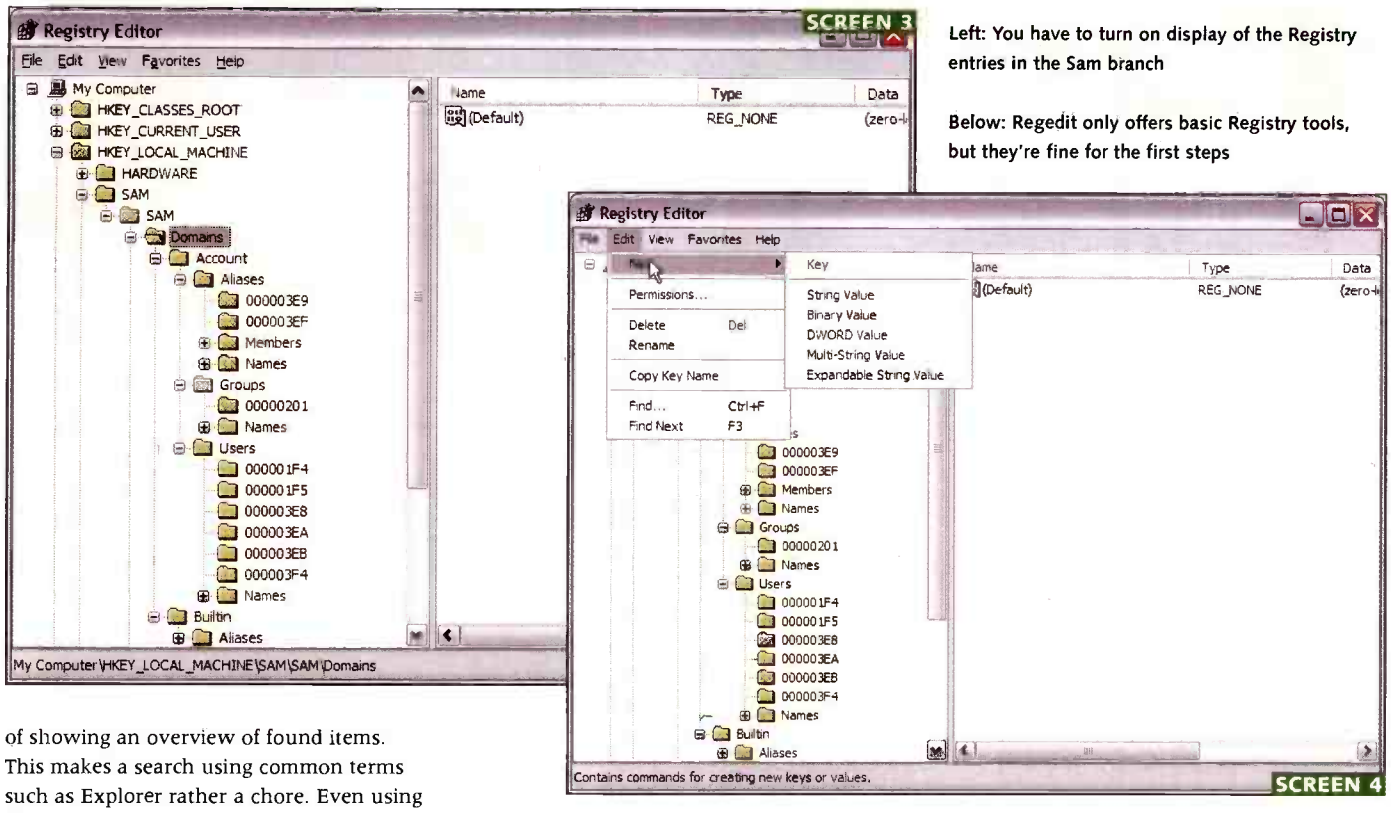
Windows' built-in Registry-editing tool, Regedit (see screen 4), is not particularly flexible, but it is quite adequate for home users and, with a few tips, you can use it for rudimentary tuning. You can use Ctrl & F to search for keys, values and data but, if you do, be aware that Regedit always jumps to the next occurrence of the search text instead





Above: Regedit is your starting point for Registry manipulation

Right: Regmon is a powerful tool for keeping an eye on Registry accesses



Left: You have to turn on display of the Registry entries in the Sam branch

Below: Regedit only offers basic Registry tools, but they're fine for the first steps

of showing an overview of found items. This makes a search using common terms such as Explorer rather a chore. Even using F3 to jump to the next matching result is not much help. To get more advanced search capabilities, you will need to use an add-on tool such as Reg Scanner (**www.nirsoft.net/utils/regscanner.html**).

You can use the File entry in the Regedit menu to import and export Registry values or the entire Registry. This is useful for saving and restoring the settings manually: you should always keep a backup of your Registry in a safe place if you're going to try experimenting with settings. You can also save settings made on one machine and copy them to other Windows installations. You can choose between two formats: Registry files (file extension .reg) and Registry hive files (no file extension).

The difference between these two formats is small, but can be very important. When a .reg file is read, it only overwrites those values in the Registry that are present in the .reg file. Values that are present in the Registry, but not in the .reg file remain unchanged. With a Registry hive file however, the entire Registry – and all the values therein – will be overwritten with the values from the imported file. Hive files are normally only used for maintenance; for example, to troubleshoot the Registry from a different PC.

Control access to Registry keys

If you have full administrative or owner access to a registration key then you can edit the access rights for users and groups included in XP's access control list (ACL). To start, click on the key whose rights you wish to change and then select Edit/Permissions from the menu. Next, select the user or group whose permissions you want to change from the list of users and groups. Check the required boxes in the Allow or Deny column. You can choose from Full Control, Read or Special Permissions. Greyed-out checkboxes indicate that the permission is controlled by a key further up in the Registry hierarchy (see screen 5).

Monitoring program installations

Programs that use a Microsoft installer routine are monitored by the command-line utility Msiexec. You can start it from the Windows shell with the command msiexec/I [Program name].msi/L C:\protocol.log. This installs the program (/I) and records all the system changes (/L) in a log file called protocol.log.

Here's an example that installs the free Microsoft support tools on the XP CD. Insert your Windows XP CD, open a command window with Start/Run/cmd and change to the CD's Support/Tools directory. Type the command msiexec /I suptools.msi /L c:\protocol.log. The installer will start and record its progress in the specified file. You will see the newly created Registry values and the changed directories listed in the log file, which you can view with Notepad. The alternative /L*v switch means that all the alterations made to the system will be recorded. This can result in extremely comprehensive – and large – log files.

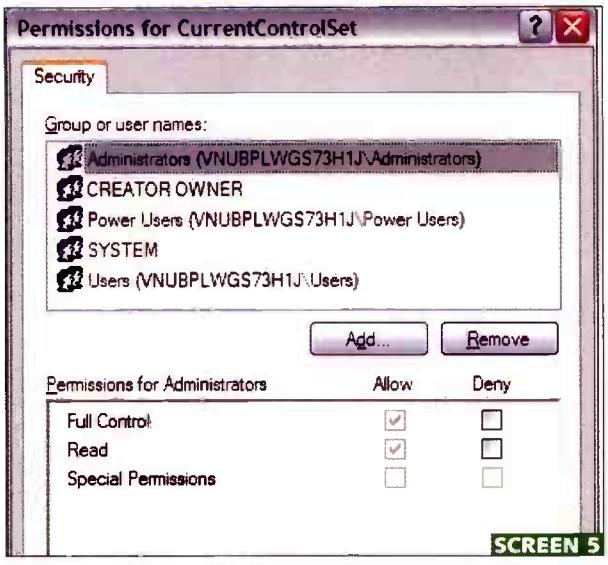
Using the command-line uninstaller, Msicuu, you can remove this type of

Install non-WHQL drivers without a fuss

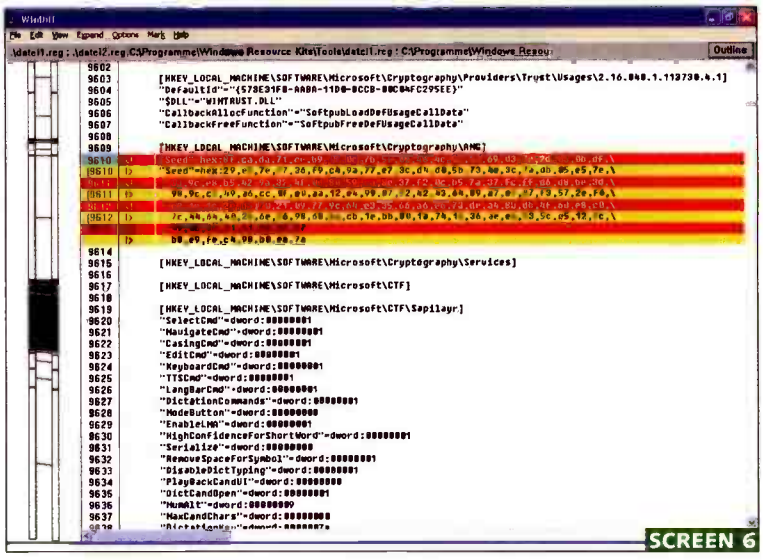
Windows XP usually issues a warning before installing drivers that are not WHQL (Windows Hardware Quality Labs) certified. This is annoying if you are installing a device driver that has been extensively tested but doesn't have the Microsoft logo. By making an alteration to Hklm\Software\Microsoft\DriverSigning, you can suppress this message.

Click on the entry labelled Policy in the right-hand pane, then use the Modify item in the right-click context menu to open up the Edit Binary Data dialogue box. Now delete the existing binary data (normally this will be 01) and type in the value 00. Click OK to finish the editing.

The System subkey contains information on the current hardware configuration, which is stored in an assortment of 'Control Sets'. As standard you'll see the keys ControlSet001, ControlSet002 and CurrentControlSet. This last one is a copy of another Control Set – in fact, it's an exact copy of the Control Set that is currently in use (the ID number of the current Control Set is stored in the 'Current' value in Hklm\System\Select). The other Control Set saves the last working configuration, which is used when you choose Last Known Good configuration at startup with F8, as described above.



There is a separate access right for each Registry key



Windiff compares the contents of two Reg files and highlights the differences

installation without leaving any remnants. Use Start/Run/msicuu.exe to start the utility and select those components in the dialogue box that you wish to remove. They will be removed along with all the corresponding Registry entries.

Keep tabs on Registry changes

You can monitor the Registry in a targeted manner using Windiff (see screen 6), a free utility from Microsoft, which is also included in the support tools that we referred to above. If, for example, you want to check the alterations Microsoft makes to the Registry during a Microsoft program installation, first export the key HKLM\Software\Microsoft using Regedit. Next, install the program and export the same key to a second file. The command windiff file1.reg file2.reg compares the two files, highlighting the differences in colour.

The Registry in real time

The free utility Regmon (**www.sysinternals.com/Utilities/Regmon.html**) makes a record every time the Registry is accessed. It displays, in real time, which Registry keys are currently being used by Windows, which programs are tapping in to the Registry and which data is being read from or written to the Registry (see screen 7). Every time Windows or an application accesses the Registry, Regmon adds a line to its display window. The first pair of columns contains the line number and the time. The next column shows the name of the process that is accessing the Registry, usually the program's file name. One column further on, you find the type of access, followed by the Registry location and the result. The last column contains additional information, for example the actual content of a value.

However, Regmon's most important function is its filter, which allows you to display only those entries relevant to a particular program. You can access the filter via the menu entry Options/Filter/Highlight or by clicking on the funnel icon. Enter those accesses you wish to monitor in the Include field. The first time you run the program, there is an asterisk (*) in this field that means all Registry accesses will be logged. For example, if you enter the filter expression 'ACC-DENIED' then you will only see access attempts denied by the system because of inadequate permissions. If you enter firefox.exe, then you will only see that browser's attempts to access the Registry.

By making entries in the Exclude field, you can also make sure that specific registration paths, processes or other

Keep the Registry clean

In Windows XP, Microsoft has removed the limit on the Registry size – you have to make sure the Registry does not get too big and remove unnecessary or defunct entries.

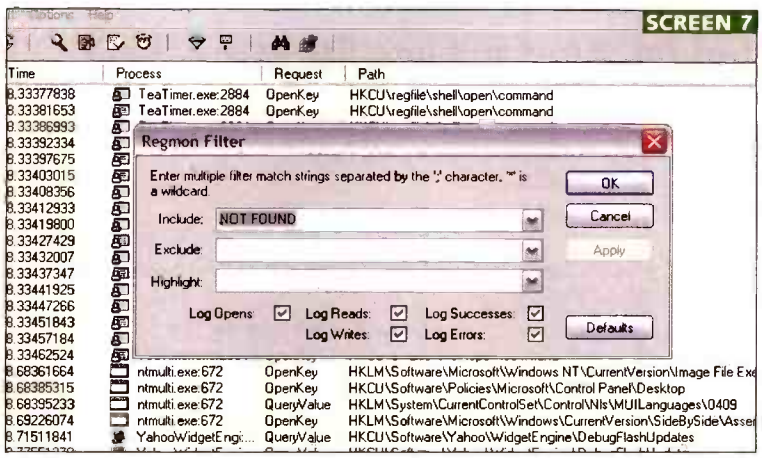
There are loads of freely available but professional utilities that track down and remove broken or superfluous Registry entries. One good program is Microsoft's Regclean, which you can find distributed on the Internet as freeware, although Microsoft has officially discontinued it. You should take care, though – it can cause problems with Office programs that have been installed but not yet run. For more details see the Knowledgebase article ID 299958 at **http://support.microsoft.com**. It can fix quite a few common Registry problems.

Start the software to check the Registry for entries with errors. Once the check is complete, Regclean will offer to remove the incorrect entries. Click on the Fix Errors button to clean up the Registry. Reg Clean automatically creates an 'undo' Registry file in the Regclean program folder, labelled in the format 'Undo computeryyyymmdd hhmmss.reg'.

If necessary you can restore the original entries by running Regedit and choosing the Import function from the File menu, then selecting the appropriate undo file. There are dozens of free Registry cleaning programs out there, but be sure to make a full Registry backup, preferably to external storage, before using any of them, as they do vary widely in quality. We'd recommend you think about paying the $12.95 (£7 approx) for Macecraft Software's Registry Supreme (**www.jv16.org**), and take comfort in the free support forums and 30-day money-back guarantee.

results that continually access the Registry are not included in the logging. Candidates for this treatment include svchost.exe, which is a general host process name for services that are carried out with the help of system files. As all kinds of services run in parallel under Windows, multiple instances of svchost.exe can show up in the list of running processes at the same time.

Using the Log Opens, Log Reads, Log Successes and Log Errors checkboxes in the Filter/highlight dialogue box, you can specify which types of access should be recorded. Important events such as a Set Value (the alteration of a Registry value) can be highlighted in colour in Regmon by using the Highlight field. If you want to examine a logged entry more closely, select it in the log, then double-click or press the key combination Ctrl & J. This will open the Registry Editor at exactly this place. Unlike Windows XP's own event log, which only records the most important system events and errors, Regmon shows all changes to the Registry.



Regmon shows all Registry activity in real time

TOP REGISTRY TIPS

If you use the Registry for tuning, you don't want to have to wade through thousands of entries until you finally get to the right one. And you don't have to – we've done the hard work and found some of the best Registry tips for you. There are three categories: Security, Performance and Usability.

SECURITY

Deactivate password storage

If you enable this feature, Internet Explorer will store passwords for websites so you only have to enter them once. The password caching function does save some retyping, but it also makes the protection offered by a password ineffective.

To deactivate password caching, open the key HKCU\Software\Microsoft\Windows\CurrentVersion\Internet Settings and use Edit/New/Dword Value to create a new entry called DisablePasswordCaching. Double-click on the new entry and enter the value 1. If Internet Explorer is restarted, password caching will now be disabled.

Disarm Windows Script Host

Windows 2000 and above include the Windows Script Host (WSH). This is a collection of assorted program libraries that provide an environment for script files. If you do not use the Script Host, you should deactivate it for security reasons (see screen 8). To do so, open HKLM\Software\Microsoft\Windows Script Host\Settings. Use Edit/New/String Value to create an entry called Enabled and set its value to 0.

Turn off Admin shares

If you run Windows XP Pro on a network, you should check your shared folders. Running the command 'net share' at a command prompt displays all current shares. Those ending with a $ are default shares, set up automatically by Windows. You can delete them using the command net share [sharename]/DELETE but they will be recreated the next time Windows starts up. Permanently turning off the default shares is only possible by using the Registry: HKLM\System\CurrentControlSet\Services\LanmanServer\Parameters is the relevant key, to which you have to add the Dword value AutoShareWks. Finally, set the new value to 0.

Restrict USB access

USB sticks are developing into a risk for corporate networks. Employees bring in their own programs or make unauthorised copies of files to USB sticks. However, if you turn USB off at Bios level, you will then have to connect mice and keyboards serially.

Preventing write access to USB sticks can be done with a Registry entry. Under HKLM\System\CurrentControlSet\Control\StorageDevicePolicies the DWORD value WriteProtect must be set to 1.

Hide the last user's name

The classic Windows login screen usually contains the name of the last user. This does save time, but weakens security. To prevent the name appearing, set the DWORD entry DontDisplayLastUserName under the key HKLM\ SOFTWARE\Microsoft\Windows\CurrentVersion\Policies\System to 1.

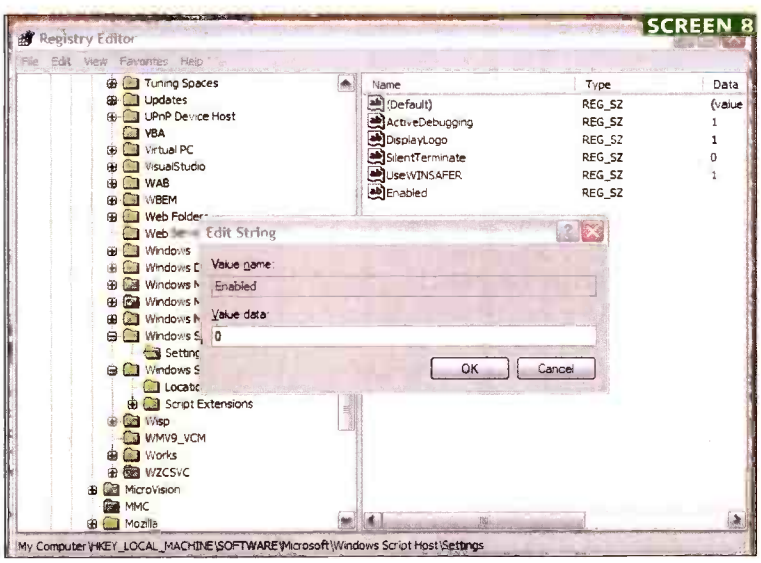
PERFORMANCE

Optimise memory management

Open the Key HKLM\System\CurrentControlSet\Control\SessionManager\Memory Management\PrefetchParameters. This is where Windows' memory management can be customised.

The subkey PrefetchParameters is responsible for the built-in prefetcher, which preloads memory pages to Ram both during bootup and in normal operation. The value EnablePrefetch should be set to 3. If you have 512MB or more Ram, you can prevent the Windows Kernel being swapped out to disk.

Go to the HKLM\System\CurrentControlSet\Control\SessionManager\Memory



If the Windows Script Host in the Registry is deactivated, potential security holes are closed

Quick tips for command-line Registry editing

Reg is the command-line tool included with Windows XP and is often faster than its graphical counterpart, Regedit. Here's a list of five useful commands.

Compare Registry branches

Some settings can be made at different places in the Registry and can affect each other. Reg has a comparison option so you can spot the differences between branches at a glance: **reg compare "Branch 7" " Branch 2 "/s /od**

Quickly create values

If you are certain of the name of the key to be created, then it is much quicker to use a Reg command: **reg add [keyname]**

Display values

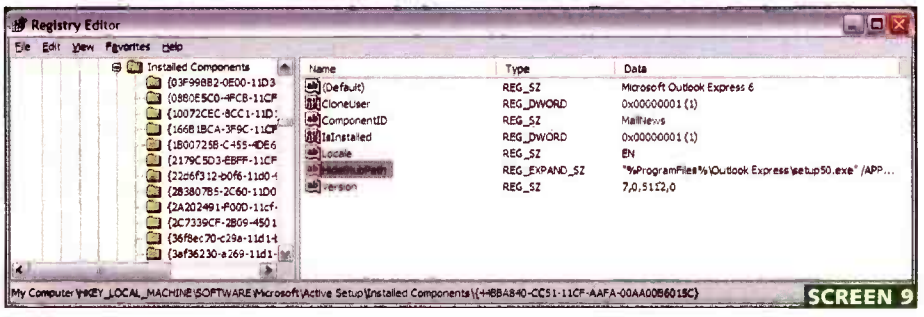
You can use a query option to retrieve values easily: **reg query [keyname] /v [valuename]**

Create a structure file

To save a key in a hive structure file, simply use this command: **reg save [keyname] save.hiv**

Load a structure file

A hive structure file, like the one created above, can be restored easily: **reg load [keyname] save.hiv**



To get rid of the desktop icons for Outlook Express, you have to hide the StubPath value

Management key. Double-click the entry in the right-hand pane labelled DisablePaging Executive and change the value from 0 to 1. After the next restart, Windows will no longer be able to swap itself out to disk, which can help improve system performance.

Turn off the access stamp

When accessing directories with hundreds or even thousands of files, LastAccessStamp slows things down because it causes unnecessary read and write cycles. The following steps will prevent this stamp (which marks all files with details of when they were last accessed) from being created.

Open the key HKLM\System\CurrentControlSet\Control and right-click on the subkey FileSystem. Select New and Dword from the context menu and add a new entry called NtfsDisableLastAccessUpdate. After double-clicking on the entry, allocate it a value of 1. You must restart Windows before the changes take effect.

Turn off event logging

XP constantly logs changes to the configuration or other events to a file on the hard disk. The main disadvantage of this function is that it makes large demands on processing power. It is only really necessary if you like reading error messages.

If your system is running without problems, then you can simply turn the logging off. First, open the key HKLM\Software\Microsoft\WBEM\CIMOM. In the right-hand window, double-click on the EnableEvents entry and change the value from its default of 1 to 0. Next, in the same window, double-click on the Logging entry to open it and, again, change the 1 to a 0.

Turn off Windows Messenger

Microsoft has equipped Windows XP with a range of add-on services that automatically run in the background. One of them is the Windows Messenger. If you don't need it then you can simply turn it off by a simple entry in the Registry. Open the Registry path HKLM\Software\Policies\Microsoft and, if there is not already a subkey named Messenger, create it by choosing Add Key from the Edit menu and entering Messenger. Using the same procedure, add a key called Client. If there is no entry called PreventAutoRun, choose the option 'Dword value' from the Edit / New context menu. Name this value PreventAutoRun and set its value to 1 in order to stop Windows Messenger starting automatically.

USABILITY

Change the registered owner

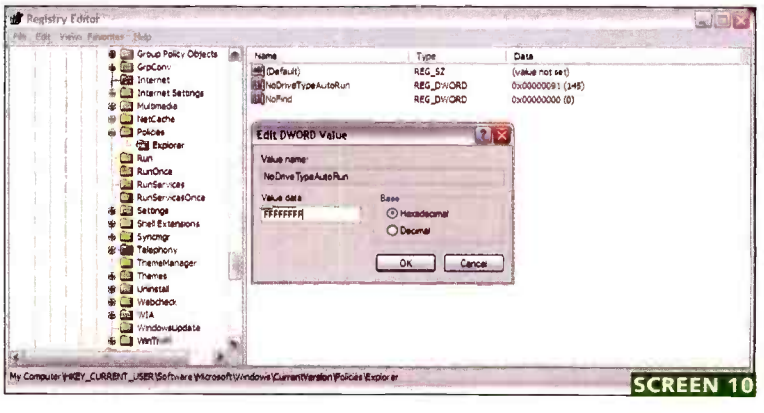
Sometimes you might find it necessary to change the name of the registered XP licence holder, for example if you buy a used computer. You can find the relevant entries – RegisteredOwner and RegisteredOrganisation – by opening the key HKLM\Software\Microsoft\Windows NT\CurrentVersion.

Hide Outlook Express

It annoys many users that icons for Outlook Express appear in the Start menu and the Quick Start bar even if they are using a different mail client. This is easily rectified. Find the Registry path HKLM\Software\Microsoft\Active Setup\Installed Components\{44BBA840-CC51-11CF-AAFA-00AA00B6015C}. All you have to do now is alter the name StubPath to HideStubPath and the Outlook Express icons should no longer appear in the Start menu and the Quick Start bar (see screen 9).

Define a new starting point

Regedit has the habit of remembering the last-opened key, so the next time you run it, the cursor jumps immediately to this key. To prevent this happening and make the cursor jump to a place of your choosing, find the following Registry path: HKCU\Software\Microsoft\Windows\CurrentVersion\Applets\Regedit. Either delete the value of the entry LastKey or enter your preferred key there. Next,



Autoplay aide: Using the NoDriveType AutoRun entry you can finally put a stop to all types of drive autostarting

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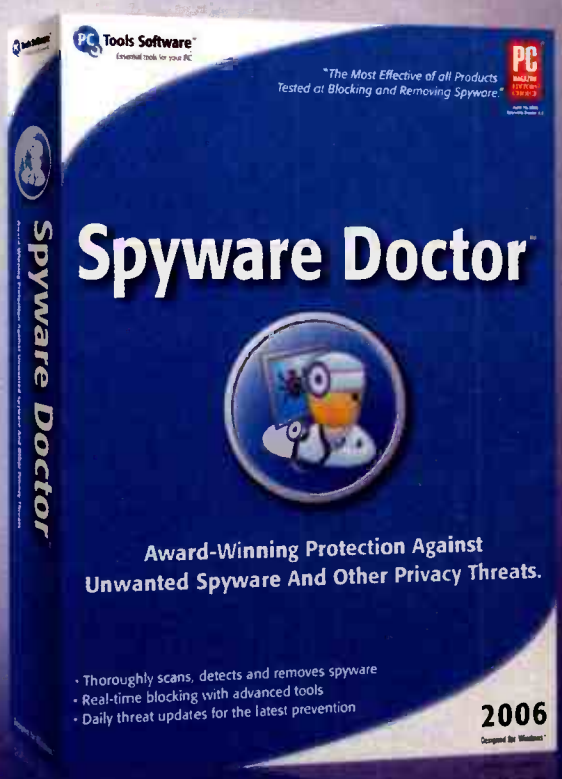

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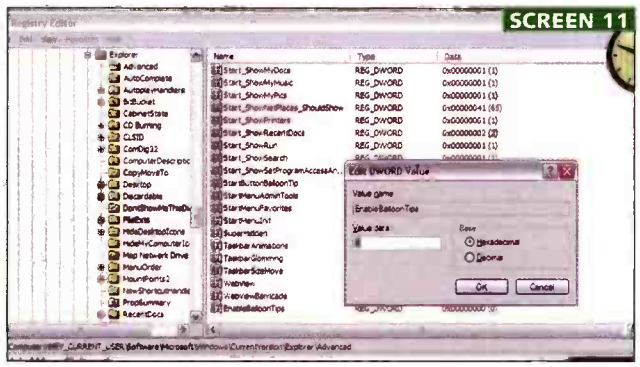
Spyware Doctor 3.5
Issue 157, April 2006

Recommended Registry utilities

NAME	URL	COST	DESCRIPTION
NTREGOPT	www.larshederer.homepage.t-online.de/erunt	Freeware	Compacts fragmented Registry entries to optimise space usage
Regmon	www.sysinternals.com	Freeware	Realtime monitoring of Registry activity
Registry Crawler	www.4developers.com	$39.95 (£21 approx)	Power tool for Registry editing and maintenance
Reg Cool	http://home.tiscali.de/zdata/regcool_e.htm	Freeware	Regedit replacement with advanced search facilities
Reg Seeker	www.hoverdesk.net/freeware.htm	Freeware	Registry editor and system tune-up tool
Erunt	www.larshederer.homepage.t-online.de/erunt	Freeware	Registry backup and restore utility
Registry Mechanic	www.pctools.com	£19.95	Automatic Registry repair and maintenance
JV16 Power Tools 2006	www.jv16.org	$29.95 (£16 approx)	A collection of over 23 system tools and utilities including seven Registry tools
Reg Scanner	www.nirsoft.net/utils/regscanner.html	Freeware	Tool for searching the Registry



You can get rid of superfluous balloon tips via the Registry

right-click on the Regedit key. Click on the Permissions entry and select the currently logged-in user and then on Advanced. After double-clicking on the current user, place a check mark in the Deny column next to Set Value.

Turn off autoplay

If you want to turn off the Autoplay function not just for CD and DVD drives, but also for USB sticks, removable drives and memory cards, you will have to add a new key to the Registry. First, locate the following path: HKCU\Software\Microsoft\Windows\CurrentVersion\Policies\Explorer. Choose New from the Edit menu. Create a Dword value named NoDriveTypeAutoRun and give it the hexadecimal value FFFFFFFF (see screen 10).

Turn off balloon tips

Windows often displays hints in irritating balloon tips. They can be turned off in some programs, such as the Security Center, but not for all applications. However, you can use the Registry to turn off speech bubbles altogether.

Navigate to the Registry path HKCU\Software\Microsoft\Windows\CurrentVersion\Explorer\Advanced. Then choose New from the Edit menu and create a new Dword value called EnableBalloonTips with the value 0 (see screen 11).

If you want to undo this, then change the value from 0 to 1. Unfortunately, balloon tips can't be turned off system-wide – they have to be turned off for each individual user.

Process idle tasks

If your computer is not used for a few minutes, Windows carries out housekeeping tasks (IdleTasks) such as defragmentation and optimisation of Windows startup files. Depending on your system configuration and the number of applications, this procedure can take a few minutes. This can have the side effect that your computer runs very slowly when you wish to resume work.

To stop this happening, you can run these tasks manually, so your work is not interrupted later. Open the Run dialogue from the Start menu and enter the phrase:

```
Rundll32.exe advapi32.dll,↙
ProcessIdleTasks
```

(Key: ↙ code string continues)

Click on OK to confirm. Windows will process the background tasks immediately, which could take a few minutes.

Sort the Start menu

After installing a few programs, the Start menu begins to look untidy as the software only sorts itself alphabetically within groups.

You can make the Start menu entries sort themselves alphabetically by opening the Registry branch HKCU\Software\Microsoft\Windows\CurrentVersion\Explorer\MenuOrder\StartMenu2, then selecting Delete from the context menu and confirming your choice with Yes.

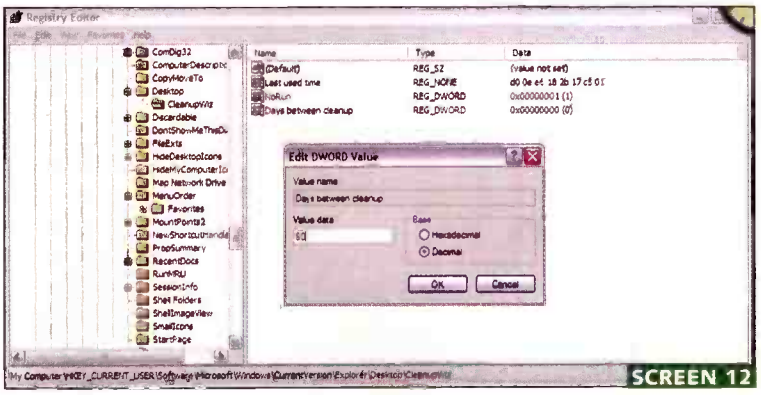
Customise the clean-up interval

If it has been activated, the Windows XP automatic desktop icon clean-up routine usually runs every 60 days.

However, you can customise the interval to match your own requirements so it is longer or shorter.

Select the Registry path HKCU\Software\Microsoft\Windows\CurrentVersion\Explorer\Desktop\CleanupWiz. Double-click on the Dword entry Days between clean up to open it. If it does not exist, you will have to create it.

Next, right-click on the value and choose Change. Enter the number of days after which the wizard should run. If you want to turn it off altogether, you can do so with the Dword value NoRun. Create it and give it a value of 1 (see screen 12). **PCW**



The desktop cleanup interval is specified in days (the default is 60)

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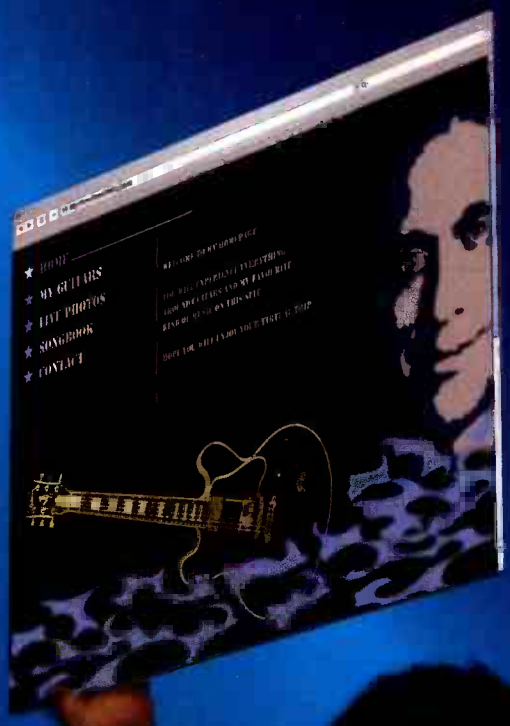

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The true cost of wireless data

Wireless access to the web is convenient but can cost a small fortune. Nigel Whitfield looks at the various ways of getting online data, how much you will pay, and offers some money-saving tips

Accessing the Internet on the move started off as a bit of a damp squib, with the first Wap-capable phones providing slow access to a small section of the web, using dial-up connections at speeds that had long since been exceeded by conventional modems.

Since then, however, using the net away from a fixed connection has become more practical, with GPRS, Wifi and now Edge (Enhanced Data Rates for GSM Evolution) and 3G technologies giving faster and more usable connections, allowing you to browse web pages, check email and connect to the office network when you're out and about.

When the honeymoon ends

Many of us now take it for granted that we can check web pages on our mobile phone, or connect to the Internet using a laptop. We routinely look at media clips or buy music from Itunes when we're online, and think nothing of downloading a new application to try out. Thanks to the higher speeds of Wifi and 3G we don't have the same frustrating slowness to remind us how much time we're spending online.

Mobile networks are encouraging us to use data, with better phones, combined Wifi/3G cards and data allowances as part of your subscription. When you upgrade to a 3G phone, data use is encouraged, with some networks offering three months of 'unlimited' access as part of the deal.

Decisions, decisions

But what happens next? All too often, after the deal ends, or when you use up an allowance of time or data transferred, the big bills start to come in. Make no bones about it – phone calls and broadband Internet access may be cheap now, but for data on the move, most of us are still paying way over the odds.

Take your phone or laptop abroad and things get worse; we are used to roaming charges, but don't forget the data bill. With some networks charging an outrageous £10 per megabyte, it could be very costly just downloading a few emails with attachments.

With combined Wifi and data cards, plus mobile phones that incorporate 3G data and Bluetooth, you'll often have a range of options for connecting to the Internet when you're away from home or the office. But which is the best – should you find a Wifi hotspot, or hook up to your phone via Bluetooth and use its GPRS or 3G connection? Are you better off with a subscription to a service, or just paying as you go? Is it wisest to stick with what you have, or might it be worth buying a Wifi card and a subscription to a hotspot network – or getting a second mobile phone subscription just for data?

This feature explains the different ways you can get online for mobile data, and how much you can expect to pay. We'll also look at some of the tips, tricks and solutions you can use to make sure you don't end up with a massive bill.

Downloading data and surfing the web from a mobile phone has become more common

Keeping tabs on your data usage

How much data do you use? Chances are, like most people, you don't have much idea about the amount you download each day or week – unless you're a heavy user and keep coming up against bandwidth constraints imposed by your ISP. For most people, it isn't an issue; you download data, and then you don't think about it again.

Step away from your usual Internet connection, however, and things change – you're reliant on a Wifi service or a connection via your mobile phone, both of which have to be paid for.

You need an idea of how much data you're using. One way to find out is with your mobile phone, but do it before you go abroad. Most mobile phones that have GPRS include a data counter; look for it in the Call Log area and reset it. Then, using a cable or Bluetooth connection to your computer, link to the Internet and start browsing.

In a quick test we fired up our email program, grabbing a couple of emails – none with attachments – and letting it sync with our Imap email folders. We then went to the *Guardian* homepage and opened the UK Latest page, plus six other news stories that looked interesting; fairly typical, we think, for a quick morning fix to keep you in touch when you're away.

After disconnecting, our phone reported 881KB of data sent – mostly due to the email sync – and 1.94MB received. Do that with a typical roaming data tariff in Europe, and you'll spend over £25 in just a few minutes!

Costly options

It's vital to consider your choices when using data on the go; those boil down to two ways of getting online – mobile data (3G or GPRS via your phone or a data card in your laptop) or Wifi. For each of those, you can pay-as-you-go, or take out a subscription.

Not surprisingly, Wifi is often far cheaper than using a mobile network, with services such as The Cloud (**www.thecloud.net**) launching unlimited UK Wifi access for £11.99 a month this summer, which easily beats anything on offer from the UK mobile phone networks. If you don't use it often enough, you can pay-as-you-go for the same price each week; go abroad, however, and you'll have to pay access charges at Wifi hotspots, which are around £6 per hour. It's worth checking carefully, though; for example, Vodafone's Wifi roaming charge is fixed at £3.50 for 30 minutes, or £6 for an hour, while T-Mobile's varies depending on the country you're in and charges in 10-minute blocks.

Many hotspots work on a pay-as-you-go basis, but check what you're paying for. For example, any time remaining on a voucher for access in one country may not be usable in another.

Even though pricing seems expensive and a busy Wifi hotspot may not be as fast as you'd hope, they're still likely to be better value for downloading information than using a mobile phone or GPRS/3G data card.

But if you can't find a hotspot or you don't have a Wifi card in your computer, you'll have to rely on mobile data. And that's where you'll spend more than you expected.

The cheapest price for using data internationally, whether browsing the web on your mobile or using it as a modem with your laptop, but without a special data tariff, is on O_2, where it will cost you either £7.05 or £5.29 per megabyte, depending on the country you're in. T-Mobile charges £7.50, while Orange's cheapest charge is £8, and Vodafone comes in at £10.28 (see table 1).

'A Wifi hotspot is likely to be better value for money than a mobile phone'

3 is a little different in that its data bundles include a certain amount of roaming in the monthly charge, but when you've used that up, that's your limit. Roaming includes the partner networks in the UK when you can't get 3's signal, so you could have used up your allowance before you even leave home, if the 3G signal is bad. If you haven't used up your limit, however, its

UK users should consider T-Mobile's Web N Walk tariff; £19.99 for 18 months will get you 2GB of data downloads, and a free card for your laptop

£20 per month plan includes 30MB of roaming data, which is much better value than using the other networks. It may look attractive, but with no data-roaming agreements in many countries – including, for example, France and the Netherlands – it's not a good choice for many international data users.

Dedicated data tariffs are worth looking at, and often include a PC Card for a laptop – though in many cases the charges are the same once you're roaming (or when you've used up any included data allowance) as they are for connections via your mobile phone.

One exception to that is Vodafone, where data card usage costs £4.11 per megabyte if you select one of its 'preferred' networks, though it's a whopping £10.28 otherwise for access via your phone.

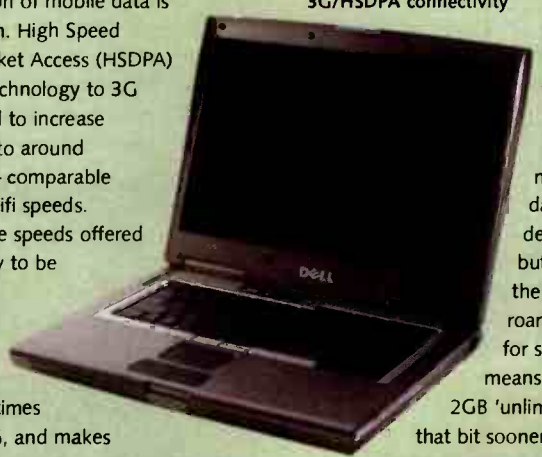
The best deal at the moment for UK travellers is T-Mobile's Web 'n' Walk Professional unlimited, at £19.99 for an

3G add-on set to increase download speeds

While many of us are only just starting to move to 3G mobiles, the next stage in the evolution of mobile data is on the horizon. High Speed Downlink Packet Access (HSDPA) is a bolt-on technology to 3G that is claimed to increase the speed up to around 10Mbits/sec – comparable to 802.11b Wifi speeds. In practice, the speeds offered are more likely to be around the 1.5Mbits/sec mark, but that's still three to four times faster than 3G, and makes services such as mobile TV easier to deliver.

As an add-on to the 3G networks, it won't take as long to roll out as 3G, and most of the UK networks expect to have services running this year, starting in major urban areas. T-Mobile's latest 3G datacard already supports HSDPA at a reasonable £58.75 (plus contract), with the service due to go live in the summer. The first phones supporting the technology should be available in July.

Some notebooks such as Dell's Latitude D820 are now available with integrated 3G/HSDPA connectivity



At £19.99 a month for unlimited data the T-Mobile deal is good in the UK, but you'll still pay over the odds when you roam. Don't forget that, for some, the high speed means you'll just hit the 2GB 'unlimited' fair use barrier that bit sooner.

Notebook manufacturers are also getting in on the high-speed mobile data act, with Dell recently announcing Latitude models with embedded mini-PCI 3G/HSDPA controllers and a slot for the Sim card in the battery compartment. In Europe the services will be provided by Vodafone. Acer has announced similar plans for some models in its Travelmate and Aspire notebook ranges.

Data downloads via your mobile phone TABLE 1

TYPICAL COST PER MEGABYTE FOR DATA DOWNLOADS OUTSIDE BUNDLED ALLOWANCES, EUROPE	
NETWORK	COST PER MB
O_2	£7.05
Orange	£8
T-Mobile	£7.50
Vodafone	£10.28

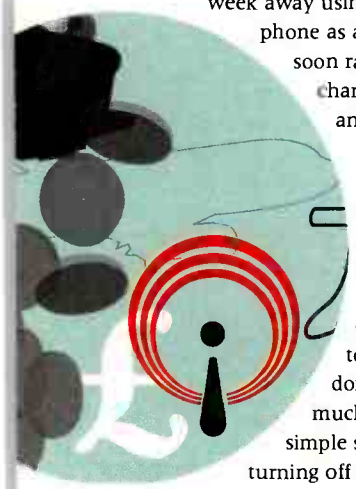
Heavy use mobile data card tariffs TABLE 2

NETWORK	COST PER MONTH	ALLOWANCE
3*	£45	512MB
O_2	£88.12	1GB
Orange	£88.12	1GB
T-Mobile	£19.99	2GB
Vodafone	£52.88	1GB

* All tariffs billed as 'unlimited' with a fair use allowance, except 3

'unlimited' service (subject to a 2GB 'fair use' limit and a ban on Voice over IP (VoIP) and instant messaging); with the data card free for those who take an 18-month contract, or £58.75 if you choose the 12-month contract.

If you use data abroad often, look at the Vodafone Travel tariff. For a hefty £95 ex VAT per month this provides 'unlimited' 1GB usage in the UK and 100MB per month of roaming data; outside that, the charge on preferred networks is only £2 per megabyte. While that monthly fee may look steep, bear in mind that with our morning email and web example coming in at around 3MB, a week away using your mobile phone as a modem would soon rack up even higher charges if you were on any other network.



Saving money

When you're charged by the amount of data you download, the obvious solution is to make sure you don't download so much; you can take simple steps, such as turning off images in your web browser, or downloading the compressed versions of files, and disabling any synchronisation option on your email program. There are also dedicated software solutions that can help you to save time and money.

One of the best known is Onspeed, which is marketed as an 'Internet accelerator'; on a Windows computer, it works as a web proxy, applying compression to data as your web browser requests it, and recompressing images on the fly, to varying degrees, letting you choose between the crispness of the pictures and the saving in time and data transferred (see screen 1).

Anyone using a laptop with a mobile phone as a modem would be well advised to consider Onspeed; it can make a dramatic reduction in your data bills. In our Labs tests, it managed a 15-fold speed increase, at the cost of loss of detail in pictures. The compression – as long as you're not downloading already compressed material, such as mp3s or zip files – will very likely save you more than the £24.99 subscription.

But what about mobile browsing? Onspeed's latest offering (Onspeed Mobile) costs £19.99 per year, and it's a Java-based web browser. The firm boasts a five-times speed boost and in our tests we found that – depending on the website – it varied between that and just doubling. The same holds true for the amount of data transferred, which means if you're paying by the megabyte for web browsing, you could easily halve the cost. Browse a few megabytes of web pages while you're abroad, and you'll easily recoup the costs, though you'll have to use Onspeed's browser and you won't see a boost to other Internet-ready applications

'Prices are slowly falling, but we think downloading data is far too expensive'

on your phone, such as email. For a full review, see the June issue of *PCW* or online at **www.pcw.co.uk/2152101**.

If you don't want to pay up front, there are other solutions. Websites you visit often are likely to have a lot of logos, buttons and so on. So if you think you'll be using the *Guardian* or BBC News sites to keep abreast of what's happening at home, have a thorough browse before you leave – and don't empty your cache – to ensure all the key graphics are already on your computer. Also consider bookmarking the 'low graphics' or 'text only' versions of any such websites.

Compression software such as Onspeed can cut the size of downloads, saving a fortune when you're paying roaming data charges

Recordable discs are very cheap – as are the drives. If there's a library of files you might need on the server at work – and if company policy allows it – make a copy onto a DVD and take it with you. Even if you have to buy a DVD burner, at under £40 it'll still be cheaper than downloading a substantial amount of data on an overseas connection.

If you do need to download while you're away, a cybercafé with a disc burner or a USB slot for a USB stick is still likely to be a more cost-effective way of getting what you want than going online from your laptop.

Change on the horizon

It's not all doom and gloom; the EU has been making threatening noises about the costs of roaming with mobile phones and, while the headlines have focused on the price of voice calls, the investigation will cover all roaming charges, including data.

That should be good news for consumers, and proposals for any legislation are due to be published in July. In advance of that, networks have been rushing to cut costs in a bid to show they really can be trusted to look after consumers – a move that has persuaded at least some of the national regulators to agree that regulation may not be necessary.

In our view, however, it still is – certainly when it comes to data. There's never been any justification for a charge of £10 per megabyte when you're roaming and, while the prices are slowly falling, we think it's still far too expensive.

Data bundles will inevitably increase in size and value for money, such as T-Mobile's HSDPA offering (see box on page 59), but there will be restrictions too. Reliable high-speed data makes it simpler to plug a VoIP phone or Skype headset into a 3G-equipped laptop and bypass mobile roaming charges, or even have your office telephone extension in your hotel room with you. Or that's the theory – in practice, T-Mobile has announced a ban on VoIP and instant messaging, and other networks may follow, although 3 bundles Skype with its data card. Perhaps, with patchy international data coverage, they won't be losing out anyway.

While the networks will grab some headlines with talk of price cuts for roaming, most of those are going to be for voice calls. When it comes to data on the go, we fear it will be a long time before everyone can use it without worrying about the bills. **PCW**

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Colour perfect

Managing colour on a PC is complex, even for pros. In the first of a two-part series Terry Relph-Knight guides you through the maze, beginning with a tour of the basic concepts

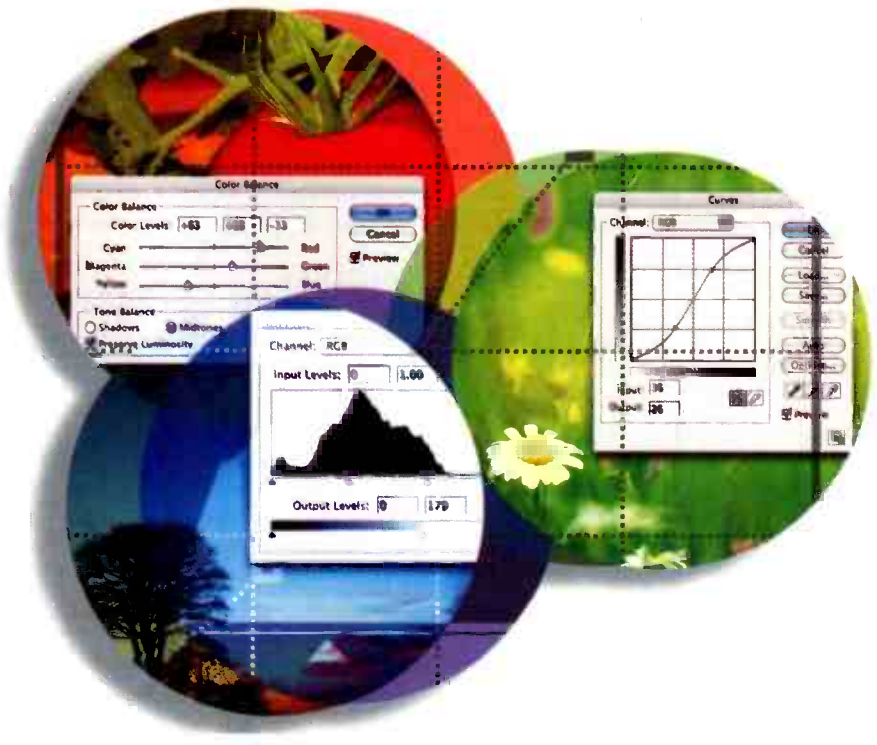
Most of you will have captured, manipulated and reproduced colour images via a range of devices and software. During this process you may have noticed colour changes and inconsistencies in your images. For example, your digital camera pictures may have a yellow or red colour cast or there may be a red tinge on colour prints.

If you compare colour prints with the same image displayed on your monitor they will almost certainly look very different. This is because assumptions are made by the operating system in an attempt to handle colour correctly as it passes an image from one device or piece of software to another. This automatic colour handling assumes each device conforms to colour standards and that they all behave in a uniform way. But in practice each camera, scanner, display or printer captures or reproduces colour differently, which is the source of most colour problems.

Early operating systems that could handle colour had no built-in colour management. Apple pioneered the control of colour in operating systems and was a prime mover in establishing the Colorsync Consortium, known as the International Colour Consortium (ICC). ICC profiles associated with each colour device are a shorthand summary of colour characteristics using a number of data points from which the full characteristics can be reconstructed. This has varying degrees of accuracy depending on the number of points used for the original profile.

Colour support

Microsoft's operating system didn't have any colour management features until Windows 98 and, until now, colour control has been decentralised, with individual colour profiles for each device accessed and controlled via their associated software drivers. Current versions of Windows support the use of ICC profiles, although Vista will introduce a new colour management platform. The Windows Colour System (WCS) will offer centralised control of colour and a new colour infrastructure and translation engine (CITE).



Although WCS will not be available as an upgrade for Windows XP, colour tools are being made available for XP that are presumably spin-offs from the design work on Vista. For example, the Color Control Panel Applet (a free download from **http://tinyurl.com/ajg7t**) centralises many colour settings in one place, lets you install and uninstall ICC profiles and check and assign different profiles to devices, and even includes a simple 3D gamut viewer so you can compare two profiles.

In general, Windows assumes that all colour outputs and inputs use the sRGB (Standard Red, Green and Blue) 'colour space' (see 'Describing colour' on the next page) and relies on third-party manufacturers' compliance to this standard to correct for individual device characteristics. sRGB-compliant devices do not have to provide a profile or other support for colour management to work.

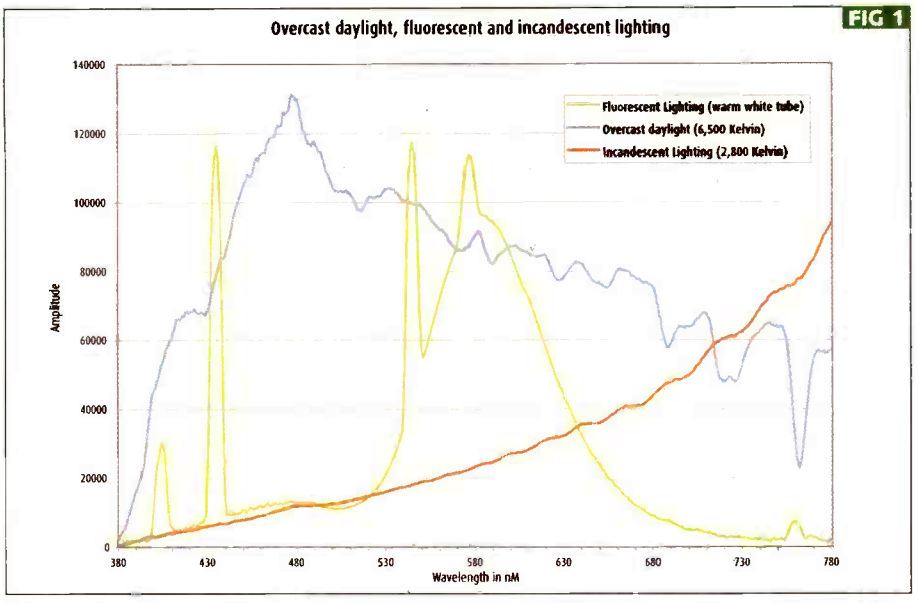
You can establish far better control of colour on your PC by understanding colour processes, allowing you to make informed decisions about what actions to take at various points in the process of capturing and reproducing colour. By calibrating and profiling each colour device in your system to produce customised individual profiles, you can ensure that each one behaves in a known and optimal fashion.

In the first of this two-part series, we provide an overview of the concepts behind colour management and a general explanation of how colour management is achieved. In next month's issue we'll look at some colour management calibration and profiling tools and how they are used in practice.

Colour and the PC

There are two scenarios for working with colour on a PC: you either leave it all up to the system and hope for the best, or you take control of the process by following a colour-management workflow.

Colour management is being used in both these cases and, if colour devices were perfect and consistent, we could let the system ↘



The spectral distribution for three common sources of illumination that we habitually regard as 'white' light. Colours can radically change their appearance when illuminated by these different sources

control colour management and get perfect results every time. Unfortunately the colour response of every camera, scanner, display system and printer is different and the deviations from any standards are great enough that, when you string a random selection of devices together, the results are often unpredictable.

Colour management is a complex issue because the response of every colour device in a chain must be known and the values that represent colour must be translated as they move from each device or piece of software to the next. This problem is complicated even further because the range of colours (the colour 'gamut') that can be reproduced by a printer is always smaller than can be sensed by a camera or scanner, so something has to be done with the colours that can't be printed.

Describing colour

Colour is the name we give to the sensations we experience when different levels of electromagnetic radiation at frequencies within a fairly narrow range (visible light) enter our eyes and are interpreted by our nervous system.

Describing and measuring the properties of colour is therefore quite difficult. Colour spaces are conceptual 3D spaces that have been developed so we can describe, measure and control colour more accurately. Partly for historical and partly for practical reasons, there is more than one colour space in general use.

Commonly used colour spaces include Yxy, L*a*b* and Luv. All these colour spaces use a 'vertical' axis to represent luminance (perceived brightness, which varies from black to white) and two other perpendicular axes to represent colour hue.

'The colour response of every camera, scanner and printer is different'

Additive and subtractive colour

Like the human visual system, computers, input devices and displays use the red, green and blue primary colours to capture and reproduce colour. However, all printers use some variation of the CMYK system, using cyan, magenta, yellow and black inks to print colour images. Which of these two methods is used is determined by whether a device uses additive or subtractive colour.

Cameras, scanners and monitors default to black, and colours must be added to create an image. Printed images start with a 'white' sheet of paper, so colours must be subtracted to create an image. For example, on a monitor, red and green pixels must be illuminated to create yellow, while for printing yellow ink absorbs, or subtracts, blue from the light falling on it and reflects yellow (red and green) wavelengths. The transformation between RGB colour models and CMYK is the last step in a colour-reproduction chain and where things often go wrong.

Rendering intents

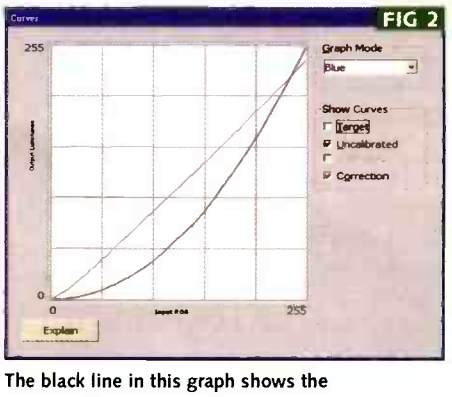
The 'rendering intent' is perhaps the biggest stumbling block to totally automatic control of colour. The 'intent' of a translation from one colour space to another describes how out-of-gamut colours are dealt with when translating from a large gamut to a smaller one. There are four methods, or intents, specified for ICC profiles; perceptual, saturation, relative colorimetric and absolute colorimetric. Perceptual and saturation renderings compress the gamut and desaturate all the colours in the source space to fit them into the destination gamut. Relative and absolute colorimetric rendering both clip the source gamut so all out-of-gamut colours get limited to the closest hue in the destination.

Perceptual rendering attempts to preserve the overall colour appearance of an image by translating all the colours from the source into the destination, while preserving the relationship between them. The perceptual rendering intent is good choice when a lot of colours would otherwise fall out of gamut in the destination space.

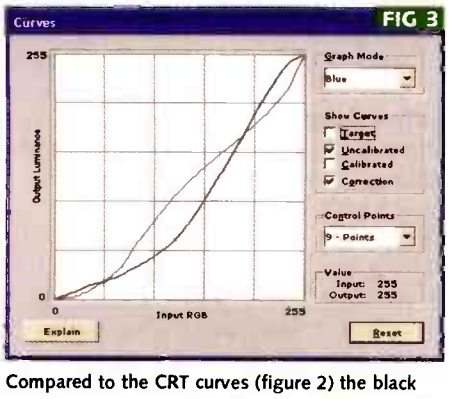
Saturation rendering is good choice for simple images, where vivid colours are required without too much concern for image accuracy. Saturated colours in the source are converted to the nearest, most saturated colour in the destination.

Relative colorimetric rendering adjusts for changes between the 'white' of the source and the 'white' of the destination, for example between a camera's 'white' and the 'white' of a paper print. All in-gamut colours are then reproduced exactly, while any out-of-gamut colours are clipped to the closest hue in the destination. This can be a better choice than perceptual rendering, as in-gamut colours are reproduced accurately.

Absolute colorimetric rendering doesn't adjust for changes in white. It is used mainly



The black line in this graph shows the uncorrected transfer characteristic for the blue gun on a CRT. The blue line is the required calibration correction



Compared to the CRT curves (figure 2) the black uncorrected curve and the blue correction curve for the blue channel on an LCD show how much the LCD transfer characteristics deviate from the ideal

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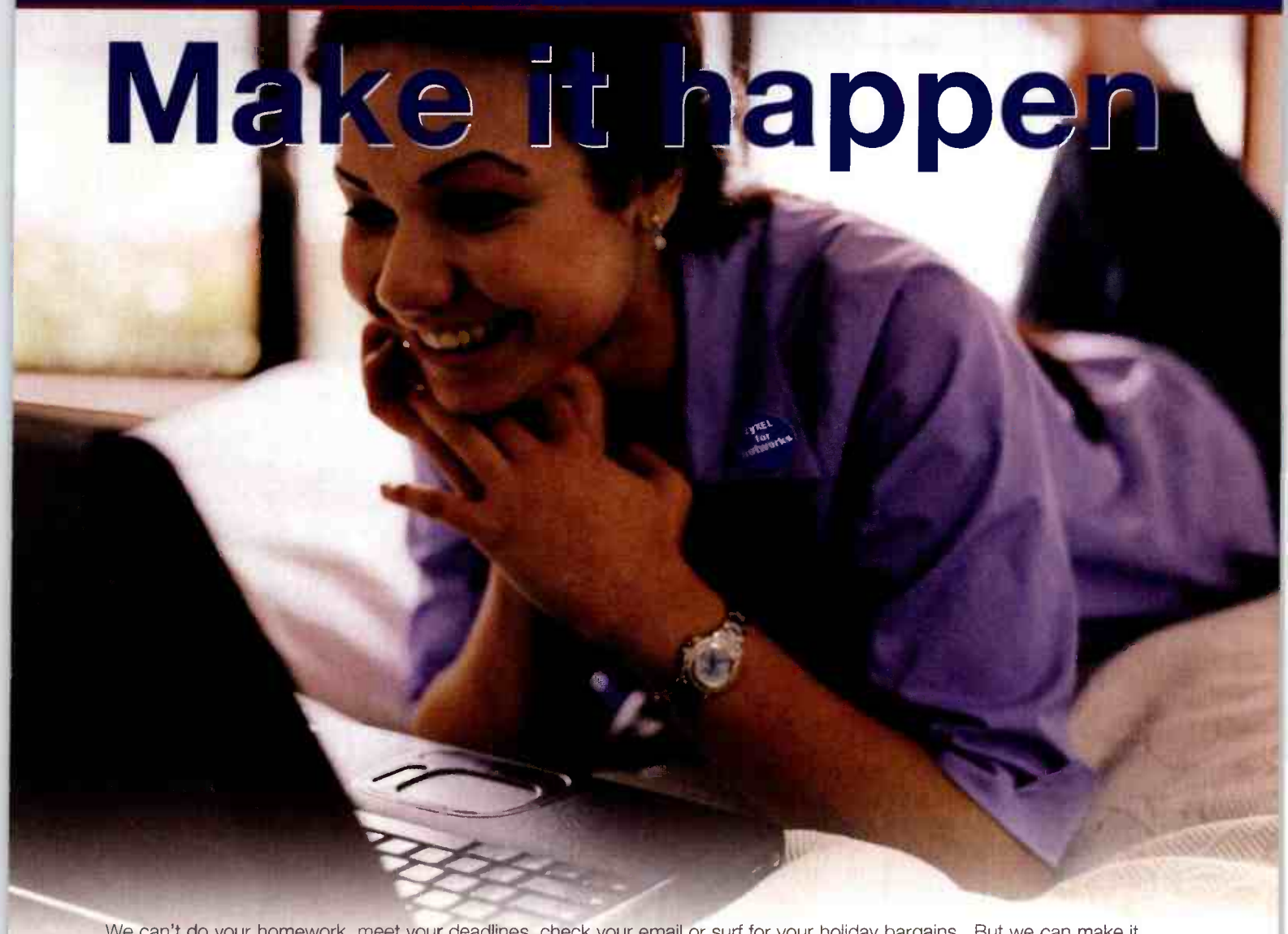

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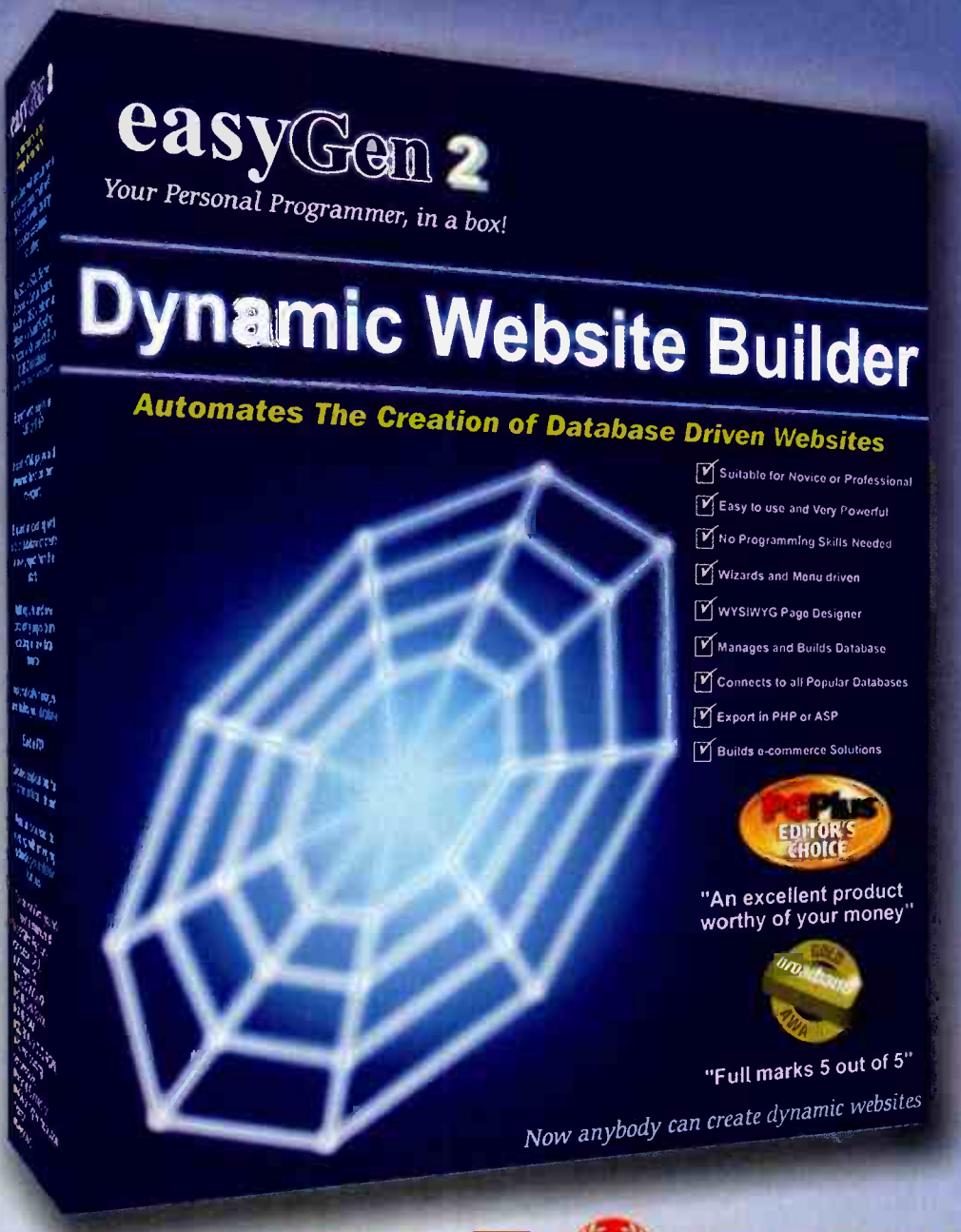

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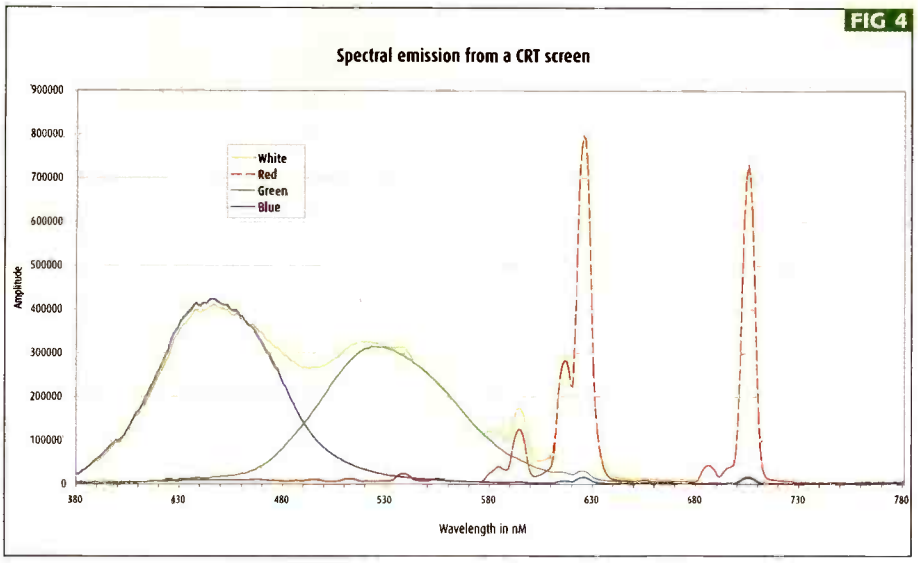


The red, green, blue and combined white plots for a typical CRT colour display. Apart from the spikes from the red phosphor the output is relatively smooth and at least approximates the curve for daylight

for proof simulations where the goal is to mimic the behaviour of one printer (eg, a printing press) while using another (a desktop inkjet). With absolute colorimetric rendering, if you render from a source with a bluish white to a destination with a yellowish white, cyan will be added to correct the white.

Image-editing programs, such as Adobe Photoshop, let you select the rendering intent appropriate to the task.

Light and colour

Most things in nature do not naturally emit light. Most of the colour we see is through the reflection of either daylight or artificial light from the surfaces of objects. This is significant because the colour of objects or images, including computer displays and colour prints, is affected by the spectral content of the light we view them by.

The human visual system compensates for the quality and intensity of light, so we don't notice huge changes in the appearance of surroundings when the illumination changes. Only extreme cases make this obvious. For example, if a blue and white object is illuminated with only red light, it appears to be red and black. The type of illumination used has an effect on perceived colour.

Colour temperature

Colour temperature is a term often used to describe the spectral content of light. In physics it describes the behaviour of an ideal 'black body' as it is heated and emits radiation. At high enough temperatures the radiation can be seen as visible light. An incandescent lightbulb running off a dimmer switch behaves rather like an ideal black body, going from dull red, through yellow, to white yellow, as the current and therefore the temperature of the filament is raised.

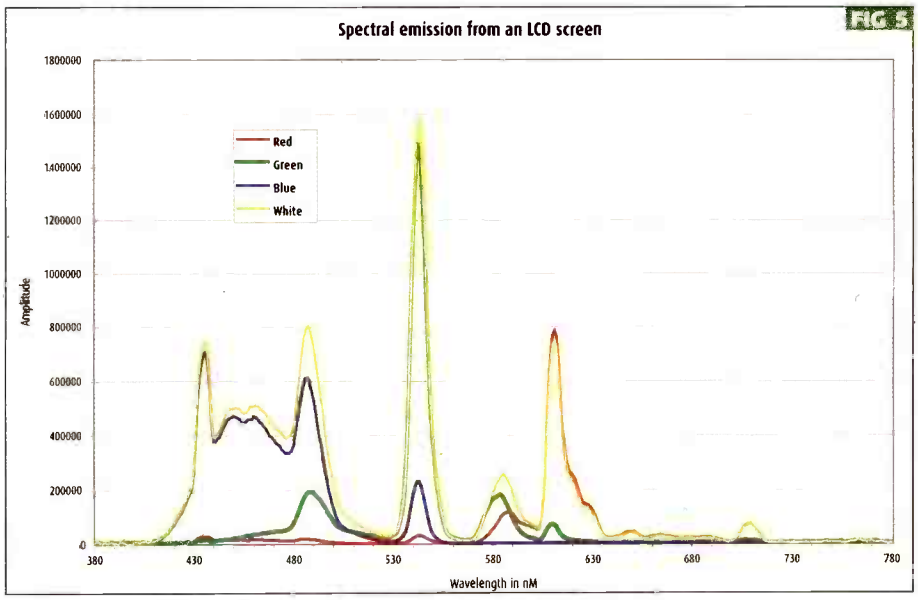
Halogen lamps run at even higher temperatures and tend to produce a blue-white light (see figure 1). Colour temperatures of 5,000Kelvin (K) correspond to a yellow white illumination, 6,500K to a slightly bluer white and 9,300K to a very blue white. Although points on the colour temperature curve don't correspond exactly to the changes in natural daylight or to the different types of artificial illumination, it is a useful way to describe the quality of illumination.

Colour temperature figures describe the standard colour balances used on monitors. CRT monitors are normally shipped set to a colour temperature of 9,300K which is a very blueish-white. This makes them look brighter and produces very punchy colours suitable for business uses. However, when setting up a system for accurate control of realistic colours it is more sensible to set the display's colour temperature to match the illumination under normal viewing conditions, so for accurate colour work, reset your monitor (there are normally at least four presets from the monitor control menu) to 6,500K or even 5,000K.

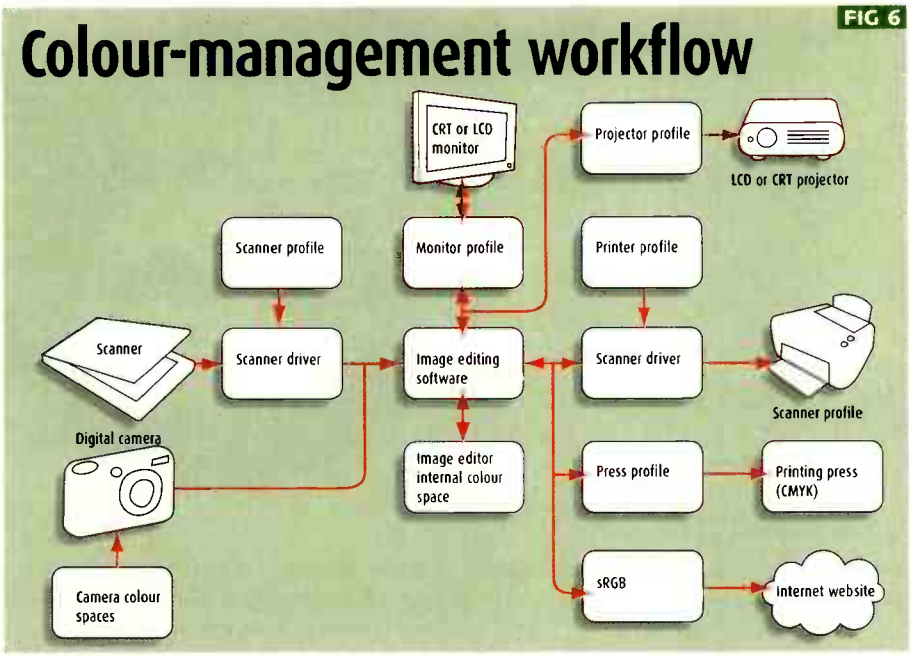
Although most image editors include a software utility, such as Adobe's Gamma, to calibrate monitors by eye, these aren't very accurate. The best way to set colour temperature and calibrate a monitor is to use a hardware monitor calibrator, such as the Colorvision Spyder (**www.colorvision.com**). This corrects your monitor's transfer characteristics to the ideal curve and ensures that the transfer curves for the three colour channels, R,G and B, track together to produce consistent colours at any level of brightness (see figures 2 and 3).

CRT versus LCD monitors

Despite the technology being over 100 years old, CRT monitors offer definite advantages



Compared to the CRT plots (figure 4) the LCD light output is much more spikey. The white curve representing the almost unfiltered cold-cathode fluorescent backlight is very similar to the fluorescent lighting curve shown in figure 4



The devices, profiles and software involved in a typical colour-management workflow

for precise colour work over flat-panel LCD and plasma displays. A CRT monitor is an analogue device with no real limit on the number of colours it can display. In contrast, LCD monitors are essentially digital devices. Although most graphics cards output 8bits per colour channel for a total of 16,777,216 discrete colours, the vast majority of LCD monitors still only drive each pixel with 6bits per channel to produce 262,144 discrete colours. Various dithering methods are used to extend the colour range and produce the illusion that these monitors are displaying 16,194,277 colours (usually described in the specification as 16.2m colours).

For accurate colour display, all types of monitor require correction. The construction of a CRT means that it has an input-to-output brightness response (or transfer characteristic) that complements that of the human eye. LCD monitors have a different transfer characteristic that requires greater correction than a CRT. The transfer characteristics of PC colour display systems are corrected by adjusting the raw values in a colour look-up table in the graphics card's memory and large corrections can result in visible digital artefacts on the monitor.

Most LCD monitors use cold-cathode fluorescent tubes as a light source, mounted behind the liquid-crystal panel. Although the light from these tubes contains a wide range of light frequencies and looks 'white', the spectral response contains a number of pronounced spikes and doesn't much resemble natural daylight (see figures 4 and 5).

The colour-management workflow

A colour-management workflow follows the natural way of working with colour; an image is captured by a camera or scanner, imported to a PC, viewed on a monitor, edited with image-editing software, perhaps saved as a different version and then printed (see figure 6). Each device in the chain should be profiled and calibrated, so the appropriate colour translation can be applied, as the image moves from one device to the next. Colour management won't, for example, magically expand the gamut of your printer, but it will make it possible to control and predict colour reproduction and get the best from your printer and other colour devices.

Image-editing software

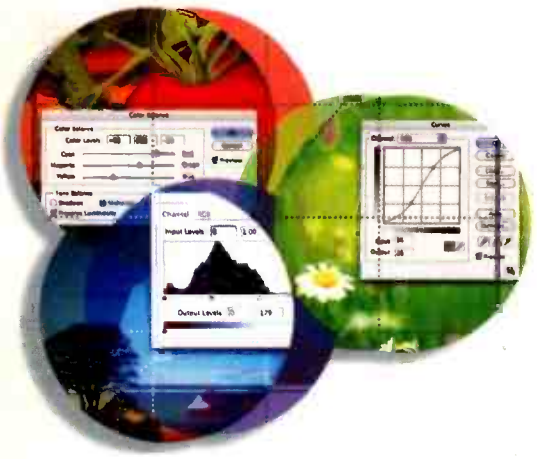
Good image-editing software allows you to specify the input and output colour space translations and manages these via its own internal colour space. For example Photoshop uses the L*a*b* space (Lab) and translates all inputs from their source space to Lab and all outputs from Lab to the destination colour space. To handle these conversions correctly, Photoshop needs to know the source and destination spaces. It reads the source colour space when it opens image files or colour device drivers.

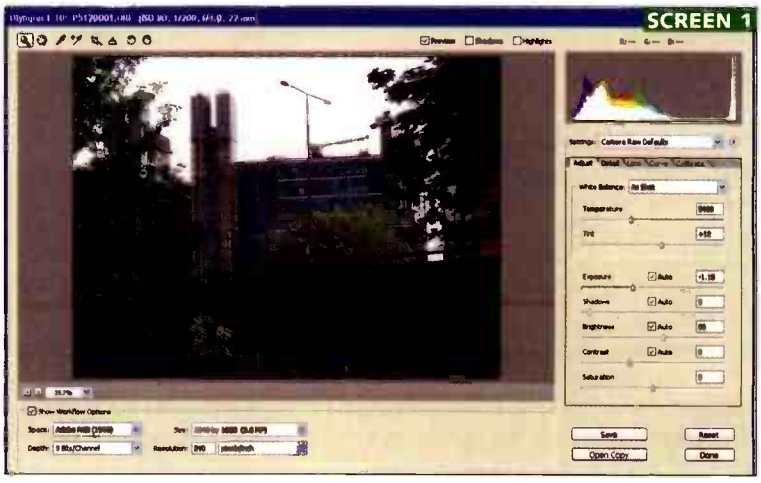
Unfortunately, with cameras that use the Exif (Exchangeable Image File) standard, the colour space may be misidentified because the Exif specification only allows it to indicate whether an image uses the sRGB space. There is no provision to indicate use of the Adobe RGB space. If you do set your camera to Adobe RGB, you will have to select this manually in Photoshop when importing images for editing, otherwise Photoshop will misidentify them as sRGB.

Cameras and scanners

Digital cameras and scanners are the most common colour image input devices. A colour scanner can be regarded as a special type of camera, except that its lighting conditions are controlled. Although it's not impossible to calibrate a digital camera, any calibration will only be accurate for one set of lighting conditions. There is little point in attempting to calibrate or profile a digital camera unless the calibration is for a tightly controlled permanent studio setup.

But it's still important to know how your camera handles colour so the correct colour





This Raw mode image from an Olympus E-10 opened in Adobe Photoshop shows the large number of image controls available

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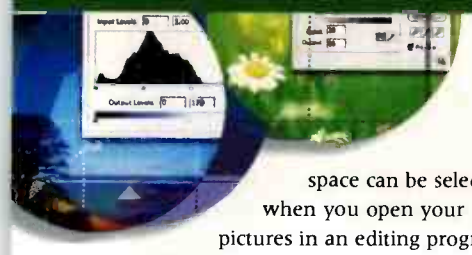


space can be selected when you open your pictures in an editing program.

Digital cameras internally process the image, both compressing it, to maximise the number of pictures that can be stored on the internal memory, and translating it into a standard colour space. The common default mode is for picture files to be in the jpeg format and use the sRGB colour space. Many cameras also allow selection of the tiff format and use of either sRGB, Adobe RGB or Raw colour spaces.

Using the sRGB colour space for your pictures means you will almost always lose some colours from the original scene, but because sRGB is the default colour space for Windows and applications, your pictures will look reasonable when displayed or printed, without you having to get directly involved in colour management. For example, you can open digital camera pictures directly from the camera, or via a card reader, and use the various Windows XP wizards to view and print them. If the sRGB colour space is used consistently throughout this process, the colours in your images will be handled more or less correctly.

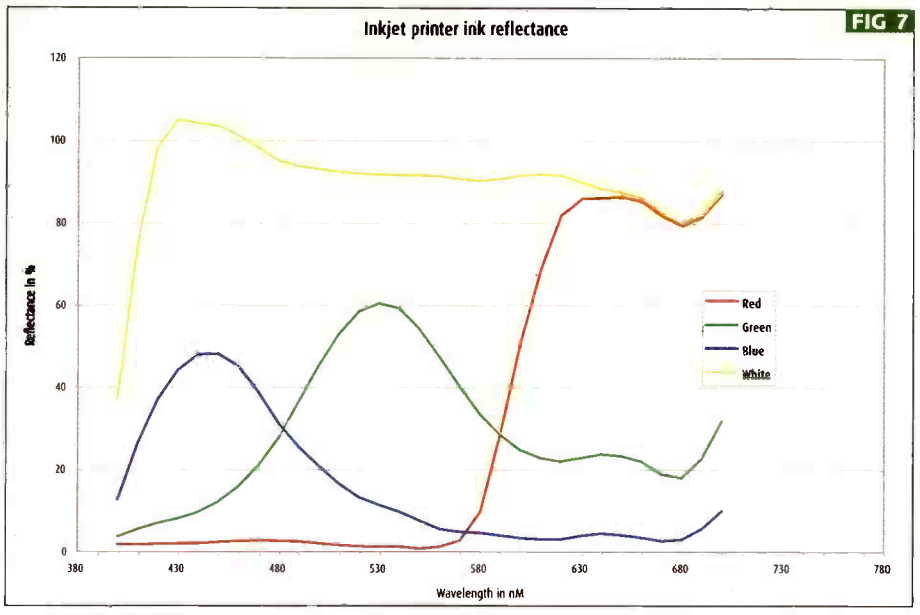
Selecting Adobe RGB in your camera preserves a wider range of colour information in the picture file and is a good choice for general work when you know you will always be editing your pictures in an image editor before their final use.

At the extreme, setting your camera for Raw mode allows you to capture images with the minimum of internal processing done in the camera. With Raw mode you gain access to the maximum range of colours your camera can capture and the opportunity to exert the maximum amount of control over the image data.

For example, you can choose the colour space, adjust for colour temperature, alter sharpening and adjust for lens aberration (see screen 1). The disadvantage of Raw mode is that the uncompressed images occupy maximum space (for example a 3.8megapixel image requires 7.26MB) and you may need to install suitable plug-ins for your editing software.

Scanner drivers also often allow a choice of how colours are managed. Typically you can select either sRGB or Adobe RGB (and sometimes Apple RGB) colour spaces. Usually there's an option to turn driver colour management off and this is a little like a camera's Raw mode.

Normally you can see the effect of your colour-management selection in the scan preview window. Turning the driver colour management off allows you to apply your own colour profile, created using a profiling tool for the scanner you are using. Profiling a scanner involves scanning a standard colour target and then using profiling software to process the resulting image to produce the profile.



The red, green and blue curves in this graph of ink reflectance for an inkjet printer are for red, green and blue created by printing magenta plus yellow, cyan plus yellow and cyan plus magenta. The white curve is for the un-inked paper and shows a typical extreme blue peak of over 100 per cent reflectance where the paper has been dyed with a fluorescent 'whitener'

'Accurate display calibration is the most useful step you can take'

Colour display calibration

Accurate display calibration is possibly the most useful step you can take towards image colour control on a PC. If you are used to the default settings on your monitor, a correctly calibrated display will take some getting used to, because the image will seem far too 'warm' but any photographic scenes will rapidly appear more natural. Calibration is performed by attaching an emissive colorimeter to the screen. This senses and measures a sequence of calibration images under software control.

Output calibration

Profiling and calibrating a printer is more difficult and expensive than profiling and calibrating a monitor, because you're dealing with a complete printing system, including the driver, hardware, inks and paper. Paper types are frequently changed and sometimes different inks are used. Each change requires its own colour profile. This is why printer manufacturers provide so many options for paper types in their printer drivers, but of course these selections are optimised for their own papers and inks (see figure 7).

Print-system calibration involves printing a colour target file of known colour values onto a chosen paper and measuring each block of colour using a reflection colorimeter.

Is your head hurting yet?

Implementing a colour-management system may seem complicated and buying a set of profiling tools is undoubtedly expensive. But don't be put off – the most effective thing you can do is to learn to understand colour, and how your PC and its peripherals deal with it. Although it's worth profiling and calibrating your monitor, using the manufacturer's generic profiles for scanners and printers and using the branded inks and papers for your printer should at least give you a basic level of consistency.

Next month we'll take a closer look at some profiling products and examine how they are used. **PCW**

Books and resources

Desktop Scanners by Robert G Gann PhD (1999) Prentice Hall PTR, ISBN 0-130809-04-7

Real World Color Management 2nd Edition by Fraser, Murphy & Bunting (2004) Peachpit Press ISBN 0-321267-22-2

Norman Koren's website
www.normankoren.com

Related Microsoft websites
www.microsoft.com/windowsxp/using/digitalphotography
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- High-End ASUS® Motherboard Dual DDR, S-ATA, x16 slot, 3 PCI, 3 PCI-EX
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REVIEWS

WHAT'S NEW THIS MONTH

AMD has been particularly busy this month. Not only has it released the AM2 socket for its new range of processors, but also a dual-core version of its Turion notebook platform.

Mesh shipped us a PC based on the AM2 socket. Along with the FX-62 processor, it also includes a motherboard with Nvidia's brand-new Nforce5 chipset. Read our review on page 80.

With Intel's Centrino platform dominating the notebook market, AMD will also be hoping that its new Turion X2 64 will allow it to claw back some market share. A review sample of Evesham's Quest A230, which has the new Turion badge, made it to us just in time for this issue and you can read the review on page 81.

Finally, don't forget to read our group tests starting on page 97. We have a selection of dual-core PCs for £899, while Nvidia and ATI slog it out in our comparison of SLI and Crossfire dual-graphics cards.

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OUR SCORING

Excellent ★★★★★ Very good ★★★★☆ Good ★★★☆☆ Below average ★★☆☆☆ Poor ★☆☆☆☆

OUR AWARDS

Editor's Choice: The best product in a comparative group test. Anything that wins this award is of better quality than its competitors.
Recommended: A product that combines great features, usability and value for money.
Great Value: Not the best in class, but a product that has superior features and performance for the price.

Editor's Choice | Recommended | Great Value

'For a camera with so many built-in features, Canon's DC40 is very easy to use'

Read the review on page 85

AMD AM2 PC

Mesh Matrix X-treme FX AM2

Personal Computer World RECOMMENDED

A supercharged FX-62 PC that will delight most gamers

Mesh's latest high-end desktop offering is the Matrix X-treme FX AM2. It has an enviable spec sheet and, at just under £2,000, is aimed squarely at the gaming enthusiast.

The PC is powered by AMD's latest dual-core Athlon64 FX-62 processor. This sits on an Asus motherboard using the new AM2 socket. You can read more about AM2 and the Nvidia Nforce5 chipset this motherboard uses in our review of the Asus KM2 N32 SLI Deluxe (see **www.pcw.co.uk/2156925**).

The 2.8GHz FX-62 processor has a 200MHz clock speed advantage over the FX-60 socket 939 model – AMD's previous fastest. The FX-62 is the first AMD processor to use DDR2 memory, which finally brings AMD in line with Intel when it comes to DDR2 support.

Mesh has sensibly decided to give the processor plenty of memory in the form of 2GB of DDR2 Ram running at 533MHz.

The FX-62 claims second spot in our all-time fastest processor table (see **www.reportlabs.com**) and clocks up just under 400 more points than the FX-60 in PCmark05. As the driving force behind this Mesh PC, the FX-62 helped it achieve some impressive scores in our PC benchmark tests. PCmark05 returned a score of 6,428, while the PC notched up 288 in the Sysmark 2004 SE. This compares favourably with other systems we've benchmarked, surpassed only by the more expensive Chillblast Atlantis Fusion, which runs on an overclocked FX-60.

Gamers will be pleased to see it achieved a 3Dmark05 score of 12,094 and managed 86fps (frames per second) in Far Cry. This is due in no small part to the two Nvidia Geforce 7900 GT cards connected in SLI (Scalable Link Interface) mode. With such serious graphics power, we're glad Mesh has enabled gamers to get the best of it by supplying an impressive monitor. The 20.1in Viewsonic VX2025WM is a widescreen display optimised for a resolution of 1,680 x 1,050.

Mesh has loaded the system with two dual-layer DVD writers, leaving a single 5.25in bay free should you require it. There's no shortage of storage with a 500GB Sata (Serial ATA) hard drive.

Connectivity isn't a worry either, with six USB2 ports, a Firewire port and two Ethernet ports. Two of the USB ports are at the front of the case but, disappointingly, the only headphone jack is at the back.

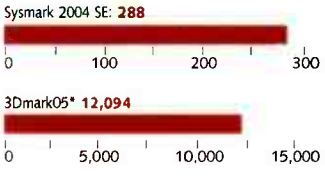
A Logitech keyboard and mouse ship with the Matrix X-treme, and both are cordless. The keyboard has the usual array of shortcut buttons, which you'll probably never use, while the mouse is well-sized and supports the entire palm comfortably.

When buying a machine for £1,999 you're making a significant investment that you want to be as future-proof as possible. Although we're suitably impressed with the benchmark results, as this is the first AM2 system we've reviewed, we currently don't have another PC to compare it with like-for-like.

Furthermore, considering Intel's desktop version of the Core 2 Duo is imminent, any potential purchasers of this Mesh system would be wise to hold on to their cash until we find out what the Intel systems are capable of doing.

Having said that, if you don't want to wait a minute longer for a supercharged PC and aren't particularly bothered about Intel processors, this AM2 monster from Mesh will serve you well and the benchmark scores speak for themselves. *Marc Delehanty*

Performance



*Tested at 1,024 x 768 in 32bit colour

Details

Price £1,999
Best price www.pcw.co.uk/bestprices
Contact Mesh
www.meshcomputers.com
Specifications AMD Athlon64 FX-62 (Socket AM2) • 2GB DDR2 Ram • Asus KM2 N32 SLI Deluxe • 20in Viewsonic VX2025WM monitor • 2 Nvidia Geforce 7900 GT 256MB graphics cards • 500GB hard drive • 2 Sony DW-G120A DVD writers • Soundblaster X-Fi Xtreme • Three-year on-site warranty

Verdict

Pros Fast processor and graphics; good monitor
Cons Worth waiting to see what Core 2 Duo brings

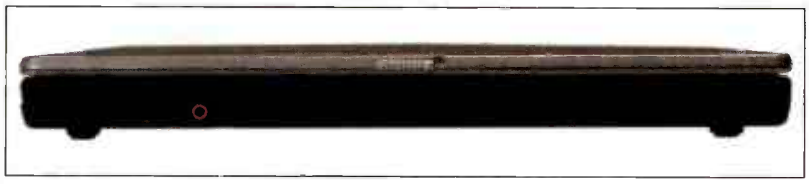
Features	★★★★½
Performance	★★★★★
Value for money	★★★★½

Overall A fast PC with the latest AMD and Nvidia technology
★★★★½

AMD TURION X2 64 NOTEBOOK

Evesham Quest A230

It may be a 64bit dual-core notebook, but there's no great leap in performance



The lower-end processor and fairly low-spec graphics card in the Quest A230 impact on performance, so it's most suitable for the less demanding user

AMD's Turion notebook platform has been living in the shadows of Intel's Centrino alternative for some time now. Things weren't helped when Intel released a dual-core Centrino platform with the Core Duo processor. Now AMD is fighting back with a notebook platform that's both 64bit and dual-core in the form of the new Turion X2 64.

As it stands, if you want a 64bit dual-core notebook, AMD is your only option. That said, if you're running the standard 32bit version of Windows XP, you won't be able to make use of the Turion's 64bit architecture. However, it will put you in a good position for the 64bit Windows Vista when it's released early next year.

As you'd expect, Intel is readying its reply to AMD's 64bit notebook processor in the form of the Core 2 Duo, although this isn't expected to be widely available until August. Evesham was first to get one of the new Turion notebooks to us.

We expected Evesham to pull out all the stops and show us what the new processor is really capable of; however, it opted instead for a budget model.

Weighing just 2.1kg, it will instantly appeal to those who need a notebook they can carry around with them regularly, and it feels reasonably robust.

The new Turion processors are available up to 2GHz, but the TL-52 version installed in the Evesham Quest A230 runs at 1.6GHz. The processor is provided with a suitable 1GB of Ram in the form of two Corsair DDR2 667MHz 512MB modules.

In Sysmark 2004 SE, the Quest A230 clocked up a score of 163. It's an improvement on the old single-core Turion systems, but when you compare it with the 192 notched up by the 1.6GHz T2300 Core Duo processor, it doesn't look quite so impressive. However, as with all Intel's Core Duo processors, it should be noted that the Intel T2300 has 2MB of Level 2 (L2) cache compared with the AMD TL-52's 1MB L2.

Evesham has gone for ATI's low-end Radeon X300 graphics with the Quest A230. As suspected, it struggled through our graphics benchmarks with a score of just 656 in 3Dmark05 while it refused to run our Far Cry test. This is certainly no gaming notebook. The 12.1in widescreen display features a glossy X-Bright coating and looks good when viewed square on, especially when watching DVDs. However, viewing angles aren't great, so you'll run into problems if a group of people are trying to look at the screen.

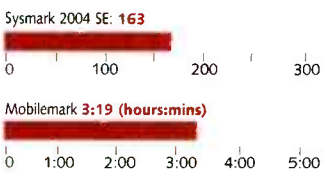
Along with improved performance, Turion X2 64 also promises extended battery life. However, in our Mobilemark test it only managed to scrape up three hours and 19 minutes. It's not a bad score by any means, but neither is it the groundbreaking battery life we'd been hoping for. We're in the process of running further battery tests on the Quest A230 and you can keep up to date with them at **www.reportlabs.com**.

Evesham has elected to go for a very low price point with its first Turion X2 64 notebook, with the whole package priced at just £799. Clearly, this has impacted performance a fair bit with one of the lower-end Turion X2 64 processors being used and a fairly low-spec graphics card. However, if you're not a demanding user, the small chassis, lightweight design and long battery life will certainly appeal.

Just as with the Mesh AM2 PC (see page 80), unless you're looking to buy a notebook in the very near future, we'd recommend holding off until Intel releases its Core 2 Duo.

Will Stapley

Performance



Details

Price £799
Best price www.pcw.co.uk/bestprices
Contact Evesham
www.evesham.com
System requirements AMD Turion 64 X2 • AMD TL-52 1.6GHz processor • 1GB Ram • 12.1in monitor (1,280 x 800) • 80GB hard drive • ATI Radeon X300 graphics • Windows XP Media Center Edition • 3 USB2 • 1 Firewire • VGA-out • Multiformat card reader • 2.1kg

Verdict

Pros Small chassis; lightweight; 64bit dual-core processor
Cons Low-spec graphics; one of the slower Turion processors; XP won't make use of 64bit

Features ★★★★★
Ease of use ★★★★★
Value for money ★★★★★

Overall A competitively priced Turion X2 64, but performance suffers as a result

★★★★★

DUAL-CORE NOTEBOOK

Apple Macbook

Personal Computer World RECOMMENDED

This should be a hit with Mac fans, but gamers may not be so keen

Mac fans have been waiting a long time for this, as the new Macbook is the long-overdue replacement for Apple's ageing Ibook laptops.

These were saddled for several years with the IBM G4 processor, so there's been no shortage of demand among Mac users for a more powerful replacement. The recently released Macbook Pro was the first Apple laptop to make the switch to Intel's Core Duo processor, but with prices starting at £1,400, the Macbook Pro is very much a top-of-the-range option.

This non-Pro version of the Macbook is the mainstream model aimed at the Ipod-owning, mass-market audience. There are three models, all equipped with a 13.3in widescreen display and measuring just 32.5 x 22.7 x 2.75cm (w x d x h).

One detail that has attracted a lot of attention is the glossy coating on the screen – a number of PC laptops have similar screens. While they're great for watching DVD films, the reflective surface can become quite annoying when performing more mundane tasks such as word processing. The glossy surface acts like a mirror and seeing your own reflection in the screen can be distracting. To combat this, Apple has added an anti-reflective coating to the Macbook's screen, and this does reduce the mirror effect quite significantly. The screen is the one common factor across the new Macbook range, but the three models vary in a number of other respects.

The cheapest version costs £749 and is equipped with a 1.83GHz Core Duo processor, 512MB of Ram, a 60GB hard disk and a CD-RW/DVD-Rom drive. Our review unit was the more expensive £899 version, which increases the processor speed to 2GHz and adds a dual-layer DVD burner. Both these models are housed in a glossy white case, similar to that of the old Ibooks, but they've been updated to include a built-in webcam, wireless networking and Bluetooth as standard. There's also a third model designed in matte black, and with a slightly larger 80GB hard disk. It looks more businesslike than the white models, but charging £1,029 for the honour of having a black finish is taking liberties.

Even so, the Core Duo processor represents a real step forward for Apple. It claims this processor is four to five times faster than the Ibook's old G4 processor. Of course, overall system performance relies on other factors as well, such as the graphics card and hard disk, but the Macbooks still clock in at 50-100 per cent faster than the Ibook when running applications such as Apple's Imovie video-editing software.

The one weakness is Apple's choice of a low-cost, integrated Intel GMA950 graphics chip. This is fine for video work or 2D graphics, but it's really not up to much when running 3D games. You'll be lucky to get more than 15-20 frames per second from most recent games. However, Mac users are typically more interested in music, digital photography and video work, and for that sort of software the Macbook is ideal – especially with the Ilife '06 suite that Apple includes with all Macs.

There's nothing revolutionary about the Macbook, but it does give Apple's laptop range a much-needed shot in the arm. And, of course, it has the gorgeous design that is associated with Apple products. The £899 model will probably sell like hotcakes – but it will be interesting to see if even diehard Apple fans are prepared to swallow the overpriced black model. *Cliff Joseph*

Details

Price £749 (1.83GHz), £899 (2GHz, white), £1,029 (2GHz, black)
Best price www.pcw.co.uk/bestprices
Contact Apple www.apple.com/uk
Specifications 1.83-2GHz Intel Core Duo • 512MB memory • 13.3in widescreen display • 1,280 x 800 resolution • 80GB 5,400rpm hard drive (60GB 1.83GHz version)
• DVD-Combo (1.83GHz version)
• DVD-RW (2GHz versions)

Verdict

Pros Improved performance; comprehensive set of features
Cons Poor 3D performance; glossy screen may deter some

Features	★★★★★
Performance	★★★★★
Value for money	★★★★★

Overall Mac fans will lap it up, but PC users might think twice about the 3D performance

★★★★★

BUSINESS NOTEBOOK

Lenovo Thinkpad X60

Personal Computer World RECOMMENDED

Not one for the catwalk, but a good laptop with excellent battery life

There's a full keyboard and, although you don't get a touchpad, the Trackpoint on Lenovo's Thinkpad X60 isn't hard to use

If buying a notebook was all about style, the Lenovo Thinkpad X60 wouldn't even reach the qualifying stages of the beauty contest, but for those who want power and performance over looks, it is top of its class.

The black, somewhat bland chassis may have Plain Jane looks, but it hides a reliable, solid workhorse PC.

Lenovo's Thinkpad X60 is a Core Duo Centrino notebook, and our review unit came with an eight-cell long-life battery to complement the standard four-cell version. When this bigger battery is used, it juts out from the back of the notebook, but the total weight is just 1.6kg, making it extremely easy to carry around.

In Mobilemark's standard productivity test the Thinkpad X60 managed a remarkable seven hours and 36 minutes. It achieved 10 hours in the reader test, which simulates light reading, and just over five and a half hours when playing a DVD. These are by far the best battery life results we've ever seen.

The Intel 945GM chipset with the dual-core T2400 1.83GHz CPU gives the notebook a decent amount of power. It's by no means a gamer's machine, but scored 190 in our Sysmark 2004 SE tests, which is plenty for the target business user. That power is let down slightly by its meagre 512MB of Ram, especially as the X60 steals up to 128MB of this for graphics.

We also found the branding a little confusing. Better known under the IBM name, but now owned by Lenovo, it's still labelled an IBM Thinkpad on the lid and inner chassis, yet branded Lenovo on the AC power block and software.

But that plays no part in the usability of this notebook. While the chassis is smaller than standard Thinkpads, Lenovo has still managed to include a full keyboard that is extremely easy to type on.

The 12.1in display may be small, but it is clear and bright, so you'll have no problems reading the screen.

While some Thinkpads include both a touchpad and the Trackpoint in between the keys, the X60 has sacrificed the pad to accommodate the smaller size.

Using the Trackpoint is down to personal taste – some people like it, others loathe it, but it wasn't hard to move the mouse around the screen.

Security includes a biometric fingerprint scanner, plus the Thinkpad comes with the usual range of Lenovo software, accessed via the Thinkvantage key.

Software comprises backup, wireless and PC support utilities along with automatic updates, security and hard-disk protection.

Optional extras include a desktop docking station (costing £129) and a slimline DVD drive/CD writer (at £121), which slots into the dock, not the notebook.

There's an SD card slot in the chassis and you can attach three USB devices – there are also ports for mini Firewire, Ethernet and VGA, and a PC Card slot.

Disappointingly, Lenovo has changed the AC power connector, so if you have an old, spare Thinkpad mains block, it won't fit in this X60.

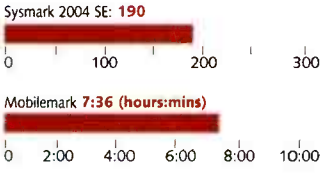
If you wanted to level a criticism at the Thinkpad, it would be the lack of internal optical media, but how often is this really needed on the road?

This is a great notebook that would particularly suit business people who need extra-long battery life.

With the dock and optical drive the Thinkpad X60 costs £1,610, but without these two extras the price drops to just £1,360, which includes the eight-cell battery.

Rob Jones

Performance



Details

Price £1,360
Best price www.pcw.co.uk/bestprices
Contact Lenovo www.lenovo.co.uk
Specifications Intel 1.83GHz T2400 Core Duo CPU • 512MB Ram • 12.1in display (1,024 x 768) • 60GB hard drive • 802.11a/b/g • Bluetooth • Infra-red • Intel GMA950 integrated graphics • Windows XP Professional • 268 x 211 x 20mm (w x d x h) • 1.32kg (without battery)

Verdict

Pros Fantastic battery life; light; small; ease of use
Cons Needs more memory; no inbuilt optical drive

Features ★★★★★
Performance ★★★★★
Value for money ★★★★★

Overall A solid, reliable notebook with superb battery life and light enough to carry all day

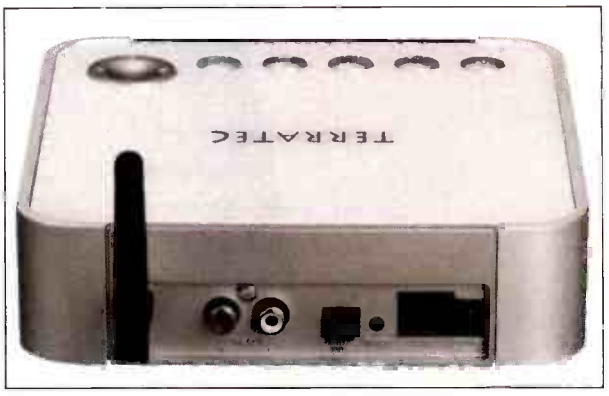
★★★★★

AUDIO-STREAMING DEVICE

Terratec Noxon 2

Personal Computer World RECOMMENDED

Wirelessly stream Internet radio and your digital music collection to your hifi



The rear of the Noxon 2 is home to optical and analogue audio outputs as well as an Ethernet port and wireless antenna

The Noxon 2 from Terratec aims to handle all your audio needs by streaming both your private digital music collection and the thousands of free Internet radio stations currently available directly to your hifi.

The rather odd design combines a Mac Mini-style case with a large LCD that hangs in a rather ungainly way over the front. Terratec tells us it will soon be releasing a speaker attachment for the Noxon 2 that will sit directly under the main unit – this will also give it a more conventional appearance. Pricing and a release date for this aren't available yet.

An antenna pokes out from the rear and, should you prefer a wired connection, an Ethernet port is also available. Both analogue and digital (optical) audio outputs are provided, along with a headphone socket and USB port for hooking up a portable audio player or USB key full of music. As far as ease of use goes, the Noxon 2 excels. Thanks to the intuitive menu system and installation wizard, we had it hooked up to our WPA-encrypted wireless network in a matter of seconds.

With the supplied Twonkyvision software installed on your PC, the Noxon 2 will be able to access any mp3 and wma files on your hard drive – this includes wma files with DRM (digital rights management).

The Noxon 2 is a UPnP (Universal Plug and Play) device and will therefore talk to any UPnP Nas (network-attached storage) drives on your network. The advantage of using a Nas drive is that you don't have to have your PC constantly switched on to provide the Noxon 2 with content.

Along with locally stored music files, the Noxon 2 is also able to access the plethora of Internet radio stations available. A huge collection of stations is pre-loaded, but you can add any others. With so many to choose from, it's a good thing the Noxon 2 lets you search through the mass of stations by genre and country.

Audio quality obviously depends on the bit rate of the station. It's also worth remembering that if you're listening to Internet radio all day it could start eating up your broadband package's usage cap.

The included remote is reasonably easy to use. Fun buttons include the smiley face, which adds the current playing track to your favourites, and the sad face for those songs you've grown out of. If you temporarily lose the controller, track and menu navigation buttons are located on the top of the device.

We tried out the Noxon 2 with Iomega's Storcenter and, although it worked, we did find it a fair bit slower than when using it with the Twonkyvision software running on a PC. There was no problem in terms of playing audio, but browsing through the music library often involved some frustrating 10-second pauses.

The Internet radio feature worked well – being able to listen to stations from all over the world is quite an experience. However, you're at the mercy of the chosen bit rate of the station you're listening to and, of course, the reliability of their servers.

One point worth making is that Terratec has gone to great lengths with the user manual. It goes much further than just describing the basic features. You'll find a guide to wireless networking and how to resolve any problems you might have.

If you want an easy way to listen to Internet radio and the ability to stream your own music collection to your lounge stereo, the Noxon 2 is definitely worth considering. *Will Stapley*

Details

Price £149
Best price www.pcw.co.uk/bestprices
Contact Terratec
www.my-noxon.com
Specifications 802.11b/g • UPnP • Wep/WPA encryption • Ethernet port • External antenna (included) • Mp3, wma (including DRM support), m3u • Internet radio • Line-out (RCA), digital optical out • Headphone socket • USB2 • Remote control • Twonkyvision software

Verdict

Pros Easy to use; works well; good documentation
Cons Use with a Nas drive can be slow; Internet radio quality varies wildly

Features	★★★★½
Performance	★★★★½
Value for money	★★★★½

Overall A great way to listen to Internet radio and your music collection through your hifi

★★★★½

SATELLITE NAVIGATION

Acer d150

A compact GPS device with good basic features, but a little overpriced

The d150 is Acer's first foray into the standalone sat nav market and, with established brands such as Tom Tom, it has its work cut out.

Below the 9cm touchscreen display sit six backlit control buttons and a navigation joystick. These are well-spaced and large enough to operate. Volume controls sit to the left, map controls in the centre and home and navigation menu keys are on the right.

Unlike some skinny PDA-shaped GPS devices, the d150 has a large rear end that could make dashboard placement somewhat tricky. However, its solid form keeps the voice announcements from sounding tinny, although they occasionally distort at high volume.

Should you have space, installation is simple, using a suction cup and flexible mounting arm with a locking cradle. An extra degree of freedom would have been useful and what appeared to be an extra arm section was included, although it has no obvious use.

Built-in mp3 and photo-viewer programs are also included but we doubt many people would put them to good use. If you do want to give them a go, media can be stored on the supplied 256MB SD card and played back using the on-screen controls. Microsoft Activesync 3.8 allows you to synch contacts from your PC onto the d150 and navigate to their addresses by name.

Destinator DS navigation software powers the d150 and it comes with pre-installed Navteq maps of the UK and Ireland as well as major roads of western Europe. During testing, the d150 managed to get us from A to B without any problems and the speaker could be heard on busy roads. Full postcode support lets you tap in a precise address, but the lack of TMC (traffic message channel) support means it can't adjust routes from traffic reports.

At £299.99, the d150 sits in the budget section of the GPS market, but we still prefer the overall usability and price of the Tom Tom One. *Paul Monckton*

Details

Price £299.99 inc VAT
Best price www.pcw.co.uk/bestprices
Contact Acer www.acer.co.uk
Specifications 9cm touch-sensitive screen • 96MB system Ram • Navteq map data • Destinator DS navigation software • SD memory slot (256MB supplied) • Pre-installed maps of UK/Ireland, partial western Europe coverage • 10-hour battery life • Mp3 and photo playback • Car mount and charger • AC adapter • USB cable • 113 x 50 x 97.6mm (w x d x h) • 300g

Verdict

Pros Large buttons; easy installation
Cons No TMC support; better models available at a similar price
Features ★★★★☆
Performance ★★★☆☆
Value for money ★★☆☆☆
Overall Good basic features and map coverage, but priced too high for the functions available
★★★☆☆

DVD CAMCORDER

Canon DC40

Improved image quality, plenty of features and simple to use

Back in January 2006 we reviewed Canon's DC20 DVD camcorder. A little bigger and quite a lot better, the new DC40 is essentially a more highly specified version of the same product.

It's an impressive device, supporting in-camera video editing and immediate playback of recorded video in domestic DVD players. If you wish, Canon's new camcorder can cut the PC out of the equation entirely. Basic titling, video effects and chromakeying can all be achieved simply by using the camera's built-in menus.

For more advanced editing, simply load the recorded disc into your PC and run the supplied Roxio MyDVD software. There's no need for video capture or slow Firewire data transfers.

While we were a little disappointed with the video quality of Canon's DC20, the DC40 attracts no such criticism. It has a bigger CCD with twice the number of pixels that helps it create both video and still images with greater clarity and less noise than the cheaper model.

The leap from 2 to 4megapixels is significant – it may be slightly thicker and 70g heavier than the DC20, but if you're taking snaps you can now consider leaving your stills camera at home.

In stills mode, the DC40 captures images at up to 2,304 x 1,736pixels – far from cutting edge but certainly adequate for holiday snaps. You also benefit from the camera's 10x optical zoom lens. Also new on the DC40 is a larger, 2.7in widescreen LCD screen, which is a definite improvement.

For a camera with so many built-in features, it's very easy to use despite being festooned with 19 buttons and sliders. If image quality is important to you, the DC40 is definitely worth the extra £150 over the DC20. *Paul Monckton*

Personal Computer World RECOMMENDED

Details

Price £749.99
Best price www.pcw.co.uk/bestprices
Contact Canon www.canon.co.uk
Specifications 1/2.8in CCD • 4.29megapixels (3.99 effective) • Max still image size 2,304 x 1,736 • 2.7in LCD • 10x optical zoom • 200x/40x digital zoom • 1cm macro • Mini-SD compatible • Remote control • DVD-R/-RW recording • USB2 • 60 x 87 x 126mm (w x d x h) • 480g

Verdict

Pros Easy to use; built-in editing/special effects; image quality
Cons DVD discs slow to start up
Features ★★★★★
Performance ★★★★☆
Value for money ★★★★☆
Overall A marked improvement over the DC20. Slightly larger, but better image quality, a huge amount of features and good ease of use
★★★★☆

STEREO BLUETOOTH HEADSET

Jabra BT620s

Listen to stereo music from your mobile phone or PC wirelessly

While most Bluetooth headsets are small devices that sit in one ear, the Jabra BT620s looks more like a pair of earmuff-style headphones. This is because the BT620s can be used to listen to stereo sound signals. Phone conversations aren't currently conducted in stereo, of course; but this Jabra headset has been designed with music lovers in mind as well.

In order to listen to stereo music wirelessly, however, the BT620s needs to be paired with a compatible A2DP-compliant Bluetooth device. A2DP allows for advanced audio playback, but not all Bluetooth devices support it. None of the devices we initially tested, including a Microsoft Bluetooth 2 dongle, a new Bluetooth-enabled Mac and a Nokia 6680, supported A2DP. Jabra does, however, provide its own A2DP-compliant Bluetooth USB dongle at £29.99.

Once up and running, sound quality is excellent, both on mono phone calls and stereo music playback. Range is also pretty good, although not up to the claimed 10m. We certainly got a good 7m and several walls away before sound started breaking up. The only gripe we'd have is that there's quite a bit of sound leakage at mid-to-high volumes. Buttons to remotely control media playback are built into the earpieces. Once again, the paired Bluetooth device needs to be compliant with a specific protocol for these controls to work.

Theoretically, the BT620s can connect to two devices simultaneously, pausing music playback from one device, say, when a phone call is received from another. In our tests, however, receiving a call from a mobile seemed to break our link to our PC-based music player.

Wireless headphones will always appeal, but this offering has its issues. The bulky design won't impress those used to Ipod headphones and, more importantly, if you want to listen to stereo music through your mobile, you'll need an A2DP-compliant phone. *Jonathan Parkyn*

Details

Price £69.99
Best price www.pcw.co.uk/bestprices
Contact Jabra www.jabra.com
Specifications Bluetooth 1.2 compliant headset • Supports A2DP for stereo music playback • Supports AVRCP for remote control • Omnidirectional microphone • Range up to 10m • Rechargeable power supply • Up to 16 hours' talk time, 14 hours' music playback • Up to 240 hours' standby time • 100g

Verdict

Pros Great stereo sound quality; good range; remote control functions
Cons Requires compatible Bluetooth transceivers to work; some sound leakage; slightly uncomfortable
Features ★★★½☆
Performance ★★★★½
Value for money ★★★½☆
Overall Sound quality is great, but compatibility issues might put people off
★★★½☆

21IN TFT MONITOR

Viewsonic VP2130b

Excellent build quality and ergonomics make this ideal for demanding and prolonged use

Personal Computer World RECOMMENDED

Using a 21.3in PVA panel, the VP2130b from Viewsonic achieves some impressive feats. You get a 1,000:1 contrast ratio without the high-gloss finish of contrast-enhancing techniques such as Sony's X-Black technology, while viewing angles sit at 178° both horizontally and vertically.

Its 300cd/m² maximum brightness is more than adequate for desktop work, or even small presentations and, while the rated grey-to-grey response time of 8ms is far from cutting edge in absolute terms, it's acceptably fast for a modern PVA panel of this quality. Uncalibrated, the VP2130b does a good job of maintaining smooth, accurate colour, but this improves if you use the supplied Perfectsuite software to calibrate the display.

Despite being a relatively simple software application, Perfectsuite lets you perform every adjustment you can think of. You can then save and reload your own custom settings. It also provides auto-pivot functionality and the option to lock the display with a Pin code.

If you prefer the traditional on-screen menu approach, basic control functions are accessible by four tiny black buttons. The menu itself is basic and easy to navigate, but it doesn't offer the advanced functions of the Perfectsuite software. As well as pivoting, the stand has a tilt feature, 270° swivelling and a 135mm height adjustment. The tasteful black chassis has a very narrow bezel and both analogue and digital inputs, together with a four-port USB2 hub.

Viewsonic's new pixel-error policy improves on the usual ISO 13406-2 Class II specification by guaranteeing zero permanently bright sub pixels for up to 15 days after purchase. This applies to all 17-21in models in the Viewsonic Professional series. Overall, the VP2130b is capable of producing stunning image quality and has some interesting features. *Paul Monckton*

Details

Price £699
Best price www.pcw.co.uk/bestprices
Contact Viewsonic www.viewsonic.co.uk
Specifications 21.3in PVA panel • 1,600 x 1,200 resolution • 1,000:1 contrast ratio • 8ms grey-to-grey response time • 300cd/m² brightness • Analogue and digital inputs • Enhanced ISO 13406-2 class II pixel-failure policy • 468 x 315 x 404mm (w x d x h) • 9kg

Verdict

Pros Excellent ergonomics; good features; image quality
Cons USB ports hard to reach; invisible control buttons
Features ★★★★★
Performance ★★★★½
Value for money ★★★★½
Overall The VP2130b has a well-selected range of features and excellent performance
★★★★½

TV STREAMING

Sling Media Slingbox

Watch your home TV from anywhere in the world

Personal Computer World RECOMMENDED

Looking a little like a silver-coloured gold bullion bar, the Slingbox lets you watch and fully control your home TV from anywhere in the world, provided you have Internet access with an upstream of at least 256Kbits/sec.

It is aimed at anyone who wants to watch their home TV when on the move, such as business people who travel often, but it will also attract those who want to watch their TV from, say, a home or office computer.

On removing it from the box, the first thing you'll notice is that is feels cheap, taking you by surprise because the casing looks metallic, but is in fact plastic.

Setting aside our initial disappointment, we used the quick-start guide to marry our Slingbox to a Sky+ set-top box. It comes with all the connections you could need, including S-video, composite and coaxial leads, a Scart adapter and an infra-red control cable. The Slingbox itself isn't wireless, so you need to hook it up to your router via the included Ethernet cable.

The TV stream is about seven seconds behind real time. Picture quality is fairly good, although it will vary depending on network traffic. In the home, we've had it running wirelessly to both a laptop and desktop PC.

The Slingplayer software will regulate the TV stream to ensure it runs smoothly without freezing. Over the home network, we had the Sling Media screen maximised to 17in with no issues over picture quality. Sound does suffer a little, though.

It's a one-to-one technology, so you can only have it open on one machine at a time. But setting up the software on additional computers was very easy, taking only a minute or two.

What really impressed us was the absolute control we had over our home TV, even when accessing it from afar over the Internet. We were equally pleased with the software media player and its ability to smoothly stream TV to a PC. Read a longer review at **www.pcw.co.uk/2157099**. *Rob Jones*

Details

Price £179.99
Best price www.pcw.co.uk/bestprices
Contact Sling Media
www.slingmedia.com
Specifications S-video, composite, Scart adapter • Ethernet cable • Internal DVB-T tuner • Requires minimum 256Kbits/sec upstream

Verdict

Pros Good streaming quality; fully controls home TV
Cons Sound quality a little poor; plasticky design
Features ★★★★½
Performance ★★★★½
Value for money ★★★★½

Overall If you want the ability to watch your home TV from anywhere, the Slingbox is well worth considering

★★★★☆

BLUETOOTH SKYPE PHONE

Trendnet Clearsky

A Bluetooth handset that lets you make and receive Skype calls wirelessly

The free Voice over IP (VoIP) service from Skype has generated a huge collection of third-party accessories. Trendnet's Clearsky handset hooks up to your PC wirelessly via Bluetooth and then connects directly to Skype. A USB Bluetooth dongle is included for PCs that aren't Bluetooth-enabled.

Initially, we struggled to get the Clearsky to connect with Skype. The Bluetooth installation went well and the phone was paired with the PC without a problem but, despite repeated attempts on numerous PCs, we couldn't get Skype to recognise the handset.

After the eighth attempt failed, we ditched the installation CD, downloaded the drivers from Trendnet's website and tried reinstalling the phone. This time the Clearsky instantly connected to Skype, but it was more than a little annoying that so much time was wasted using the drivers supplied on the CD.

Few options are available on the Clearsky. You can adjust the volume, change your Skype status, check your credit and choose from four ringtones.

Call quality was nothing special. We also frequently experienced short bursts of interference, especially when moving around the house while making a call.

When switched on, the Clearsky takes over as your PC's default audio device. This means if you watch a video or listen to music, the audio will be output directly to the phone. To redirect audio to your soundcard you need to switch off the phone or adjust the sound properties in Control Panel. The Clearsky hooks up directly to your PC, so you'll also need to have the PC switched on whenever you want to use the phone.

If you're a big Skype user and want to wander around while making calls (typical Bluetooth reception stretches around 15-20m), the Clearsky may be of interest. But at £89 it's expensive, especially considering you need to keep your PC on. *Will Stapley*

Details

Price £89
Best price www.pcw.co.uk/bestprices
Contact Trendnet
www.trendnet.com
Specifications Bluetooth v2.0 with EDR • Earphone jack (2.5mm) • Built-in speakerphone • USB socket for charging (mains adapter included) • Supports Skype, Skype In, Skype Out • Li-ion battery • 60hrs standby time • 6hrs talk time • 45 x 22 x 143.5mm (w x d x h) • 100g

Verdict

Pros Simple to use; comes with Bluetooth adapter
Cons PC must be on; we had to download new drivers from the web
Features ★★★½☆
Performance ★★★½☆
Value for money ★★★½☆

Overall Bluetooth link can affect sound quality and it's a bit pricey, but heavy Skype users may like it

★★★½☆

SILENCE YOUR PC Turn to page 39 to find out how you can reduce PC noise

Gigabyte GA-8N-SLI Quad Royal

Price £150 **Contact** www.komplett.co.uk **Overall** ★★★★★

Before you buy this motherboard and the four graphics cards to go with it, it's important to realise that the lack of quad-SLI support with Nvidia's current driver means you won't be able to run a four-card SLI system.

However, if you disable the SLI function, this board allows you to run up to eight DVI monitors – just the job for your flight sim. The rest of the board's features are what you expect to see on a top-flight board these days; an Nvidia SLI Intel Edition chipset, supporting up to 1,066MHz FSB (front-side bus) CPUs, dual Gigabit Lan, integrated 7.1 audio and four Sata (Serial ATA) 3Gbits/sec ports. But due to the lack of space, you get just one standard PCI slot. *Simon Crisp*

Overall If you want a desk full of monitors, this is the board for you

Sapphire Toxic X1900XTX 512MB

Price £421.83 **Contact** www.tekheads.co.uk **Overall** ★★★★★

A major problem with running high-end graphics cards is how to keep things quiet. To help out, Sapphire's Toxic X1900XTX has lost the huge heatsink and fan of the standard X1900 XTX reference design, and gained a water block and separate water-cooled device with a smaller and quieter fan. Impressively, it's also factory overclocked with a 675MHz core and 801MHz memory (1,602MHz effective) clocks as opposed to the standard 650/750MHz clock speeds.

The card itself is still a two-slot job, but Sapphire has thoughtfully made the water pipes long enough to use any available PCI slot. *Simon Crisp*

Overall If you have the slots free and can afford it, this quieter version of a blazingly fast graphics card is well worth the money

Seagate Barracuda ST3750640AS

Price £352.44 **Contact** www.overclockers.co.uk **Overall** ★★★★★

This hard drive has an incredible 750GB storage capacity. By using its perpendicular recording technology, Seagate has managed to cram 188GB on each platter, so the drive uses just four platters to achieve its enormous capacity. Perpendicular recording stands data bits in a vertical position instead of the usual horizontal plane, allowing more bits to be packed on a disk.

The drive has a spin speed of 7,200rpm and a 16MB cache and comes with a five-year warranty. It's also one of the quieter drives on the market. We put Seagate's new drive through our standard performance tests and you can see the results online at **www.reportlabs.com**. *Simon Crisp*

Overall If you can afford it and you want the size, this is for you

Zalman Fatal1ty case

Price £TBC **Contact** www.quietpc.com **Overall** ★★★★★

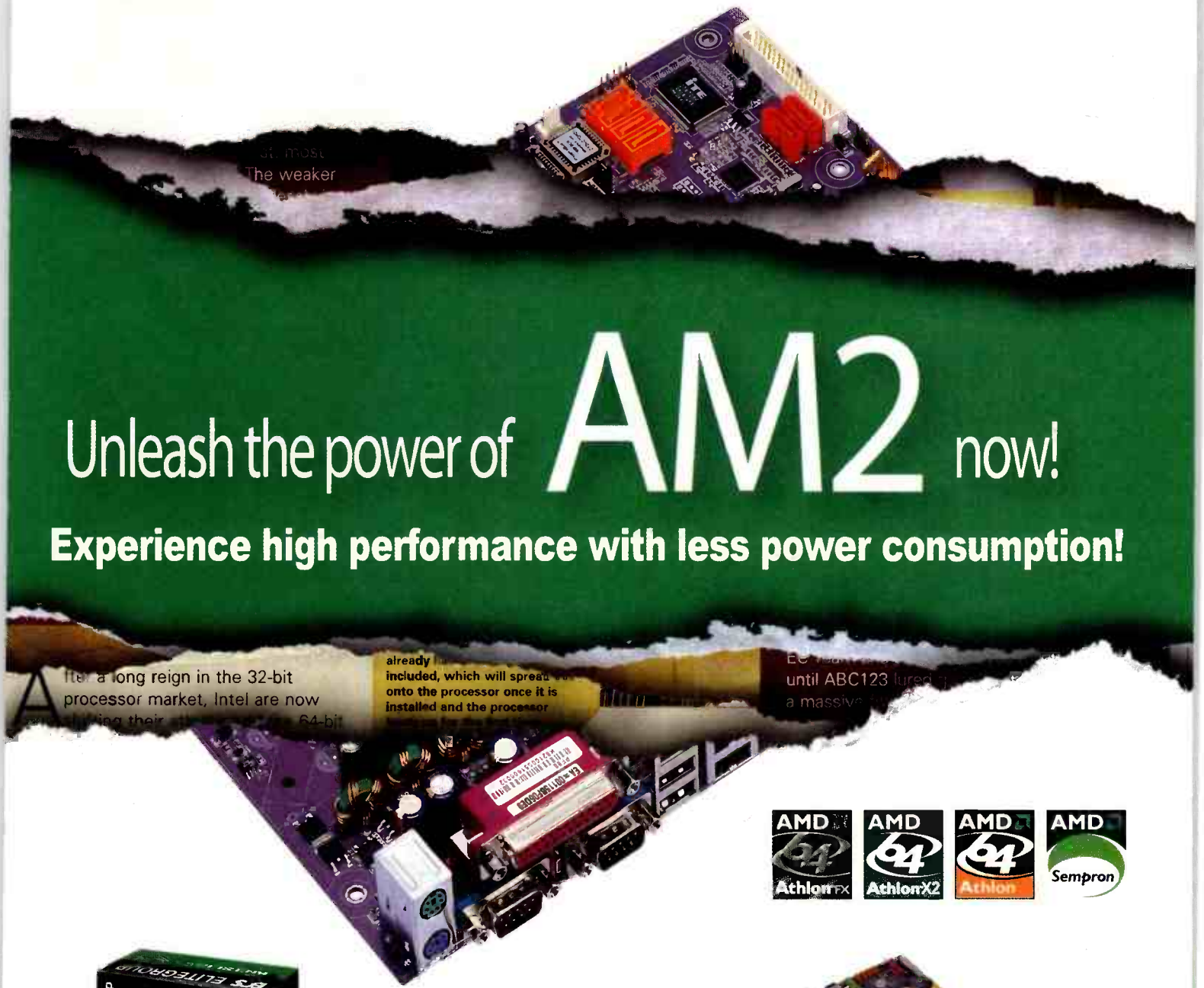
Beautifully constructed from 5mm black anodised aluminium, the Fatal1ty looks like a normal high-end case. It is only when you open the side panel that you see the design touches Zalman is famous for.

The 3.5in drive bays are rotated 90°, which allows easy access and they have rubber rollers to make it easier to push in the drives. A novel idea is the use of Velcro straps to hold the drives in place, which allows for quick and easy removal. The case comes complete with a card reader and three fans – a 120mm on the rear panel and a pair of 92mm ones at the front – all with red LEDs. *Simon Crisp*

Overall The case we looked at is an early sample and the pricing is yet to be confirmed, but the build quality is superb

ECS ELITEGROUP

Simply Smart



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[illegible] until ABC123 lured [illegible] a massive

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- Dual Gigabit LAN
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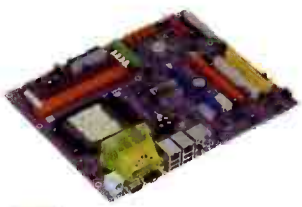
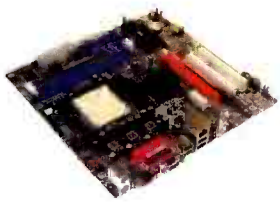


KA3 MVP

ATI CrossFire™ Xpress 3200



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ATI Radeon Xpress 1100

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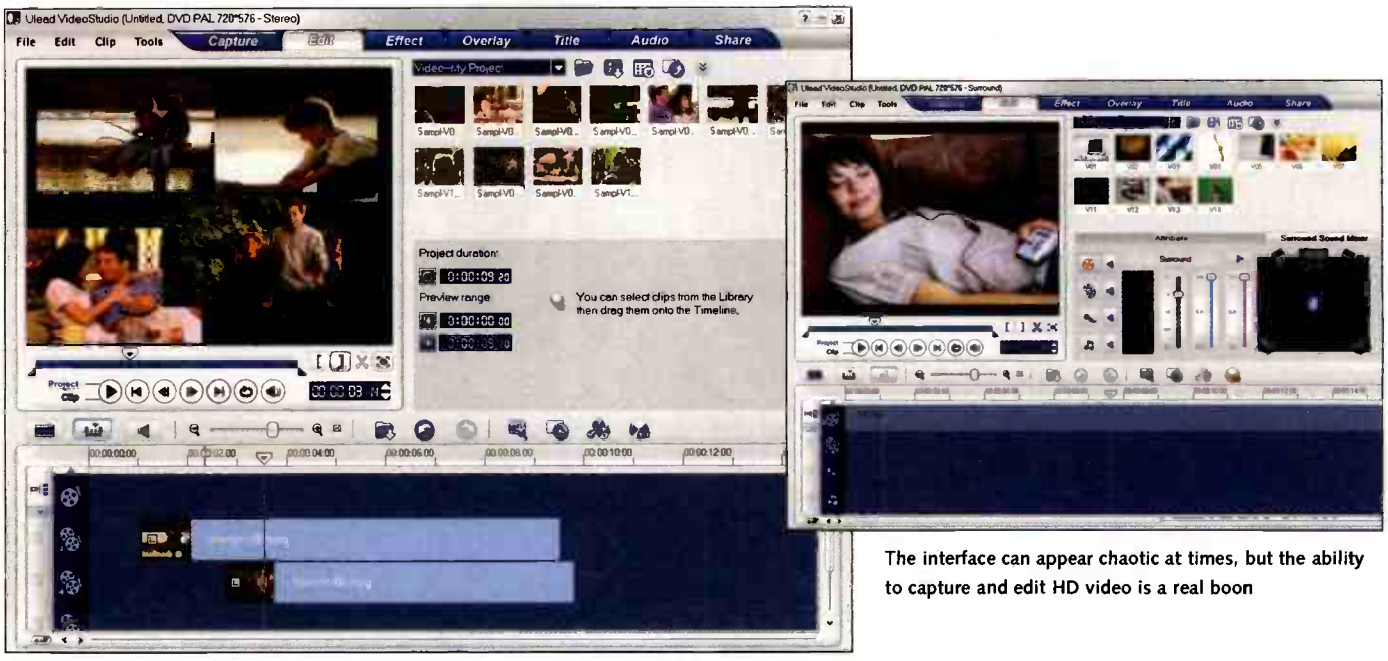
Ulead Videostudio 10 Plus

A low-cost video-editing package with powerful features



The interface can appear chaotic at times, but the ability to capture and edit HD video is a real boon

The entry-level Moviefactory video-editing package was recently updated, and now its big brother, Videostudio, gets an even more extensive upgrade.

No video-editing program is complete these days without support for HD (high-definition) video, so the ability to import and edit HD video is top of the list of new features for Videostudio 10.

If you read our review of Moviefactory 5, or caught our Test Bed blog, you'll know Ulead had to remove all mention of support for Blu-ray. The rival to HD-DVD complained that since the Blu-ray specification hadn't officially been released, Moviefactory 5 couldn't claim to be compatible. As such, Videostudio 10 only touts support for HD-DVD, but a software update for Blu-ray should be available once the specification is finalised.

You can also choose whether to edit in standard 4:3 aspect ratio or the widescreen 16:9 format. These are quite common features now, but Videostudio does come up with one interesting trick when editing HD video that we haven't seen outside more expensive professional editing systems.

The fact is, HD video files can be enormous, and many older PCs will struggle when trying to edit them (Ulead recommends a 3GHz processor for HD work). To make life easier for owners of older PCs, Ulead has added a feature called Smart Proxies. When you turn this option on, Videostudio automatically creates lower-resolution versions of your HD video files, allowing you to edit the low-resolution files without slowing down your PC too much.

When you're finished, the program automatically applies your changes to the original HD files while you go off and do something more interesting.

At the other end of the video spectrum, Videostudio can import video clips from devices such as mobile phones. A click of a button allows you to select any video clip and convert it into a format that is suitable for putting onto a web page or sending as part of an email.

We like the batch-conversion feature that allows you to convert multiple video clips from one format to another – perhaps converting your home movies into the mpeg4 format used by both the Apple's Ipod Video and Sony's Playstation Portable.

On the audio side of things, Videostudio now supports Dolby Digital 5.1 surround sound and Ulead has come up with a couple of useful features here as well. The first is the ability to up-sample ordinary stereo recordings to simulate 5.1 audio. Second, it's possible to then use the new surround-sound mixer to control the placement of sound effects simply by using the mouse to move the audio indicator around on the mixer display to create your surround-sound effects.

There are lots of new editing tools as well; the most important being the ability to add five extra video tracks to the program's editing Timeline, giving a total of seven video tracks in all. This makes it possible to create complex montages and picture-in-picture effects.

The program's interface has been tidied up, but it's still a little chaotic at times, with an assortment of tabs, buttons, pulldown menus and dialogue boxes that sometimes seem to just pop up out of nowhere.

Even so, the variety of new features in Videostudio 10 make it excellent value for money and it does a good job of simplifying complex tasks so that even beginners can get good results quickly. *Cliff Joseph*

Details

Price £59.99
Best price www.pcw.co.uk/bestprices
Contact Ulead www.ulead.co.uk
System requirements Intel Pentium 4 or Athlon 64 processor • 512MB of Ram • 1GB hard disk space • Windows XP (SP2)/2000 (SP4)

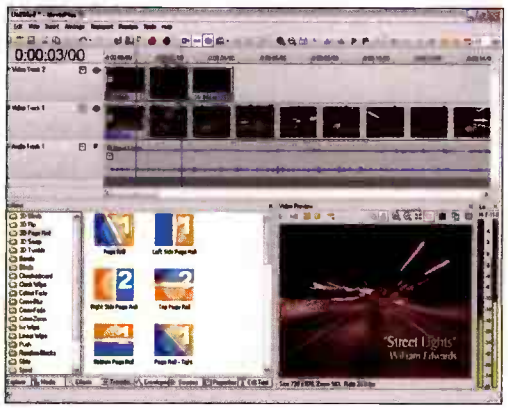
Verdict

Pros Powerful video-editing features; competitive price
Cons Slightly awkward interface; poor online help
Features ★★★★☆
Ease of use ★★★☆☆
Value for money ★★★★★
Overall A strong upgrade with many powerful features, but the interface could be improved
★★★★☆

VIDEO EDITING

Serif Movieplus 5

Loaded with features, but Serif's budget video-editing suite might not appeal to beginners



A video-editing program from an established graphics software developer at a reasonable price sounds appealing, and Serif Movieplus 5 certainly comes with most of the features we'd expect from a program of this type.

Recent enhancements for version 5 include a built-in DVD authoring element, which allows menus, text, backgrounds and chapter points to be created from any Movieplus project. There's also support for HDV (high-definition video), although a much more powerful computer than that suggested by the program's minimum requirements is necessary for importing, working with and exporting HDV material. Several other improvements have been added, including new 3D transitions and filters, enhanced tools for titles and credits, and support for Apple's Quicktime video format.

The sub-£60 price tag might tempt home users, but anyone unfamiliar with video-editing products might be in for a shock. Unlike similar programs, such as Ulead Videostudio or Pinnacle Studio, Movieplus does little to soften the blow for beginners.

The program's layout is based on a multi-track timeline, media/effects library and preview window combination. This works well and will feel familiar to seasoned editors, but hand-holding is in short supply. Many of the most common functions are hidden in menus or toolbar buttons without much in the way of explanation. It would have been better to present movie editing as logical a step-by-step process and guide users through the experience as many other programs of this type do.

Movieplus 5 falls into something of a crack between heavyweight professional editing applications and budget-end software. *Jonathan Parkyn*

Details

Price £59.99
Best price www.pcw.co.uk/bestprices
Contact Serif www.serif.com
System requirements Pentium II or Athlon XP processor • 128MB of Ram • 149MB hard disk space • Windows 2000 or XP

Verdict

Pros Reasonable price; HDV support; built-in DVD authoring
Cons Complicated to use; nothing new or innovative
Features ★★★★☆
Ease of use ★★☆☆☆
Value for money ★★★☆☆
Overall There's nothing here that we haven't seen elsewhere. Sadly for Serif, other video-editing applications tend to do it better
★★★☆☆

DVD PLAYBACK

Cyberlink PowerDVD 7 Deluxe

Special features for notebook users and and a wide range of audio support

PowerDVD 7 is the latest release of Cyberlink's software for playing DVDs on Windows PCs. One of the major benefits of this latest release is the improved functionality for notebook users. PowerDVD 7 monitors battery power, increasing the playback speed, so you catch the entire movie before it drains. Watching a film at anywhere from 1.05 to 1.25 times normal speed is tolerable, although it is a nuisance when trying to read subtitles.

Image quality is visibly enhanced when using Cyberlink's proprietary CLEV-2 technology. Version 7 allows you to tinker with the CLEV settings, and a split-screen playback mode (one-half CLEV off) helps in altering the image to your taste. The processor-intensive CLEV component is automatically disabled when running on a slower PC.

Other enhancements include See-it-clearly and Say-it-again. The former makes sure subtitles don't get in the way of the action by placing them in the black bands at the bottom of the screen. Although not always foolproof, it's a welcome addition.

Say-it-again is a useful feature, accessed via a keyboard shortcut, which loops the last few seconds of playback, saving you the hassle of rewinding, playing and possibly replaying. Audio-wise, PowerDVD can now handle AAC encoding along with its broad range of support for surround-sound systems. Speaker control is especially useful for Dolby Digital speaker systems.

If you're a movie aficionado with a great speaker setup, this software will certainly make the most of it. Power-conscious notebook users will appreciate the battery-saving aspects, but for the average user who plays the occasional movie on their PC, £39.99 may just be too high a price. *Marc Delehanty*

Details

Price £39.99
Best price www.pcw.co.uk/bestprices
Contact www.cyberlink.com
System requirements 1.1GHz processor or higher • 60MB hard disk space • Windows ME/2000/XP

Verdict

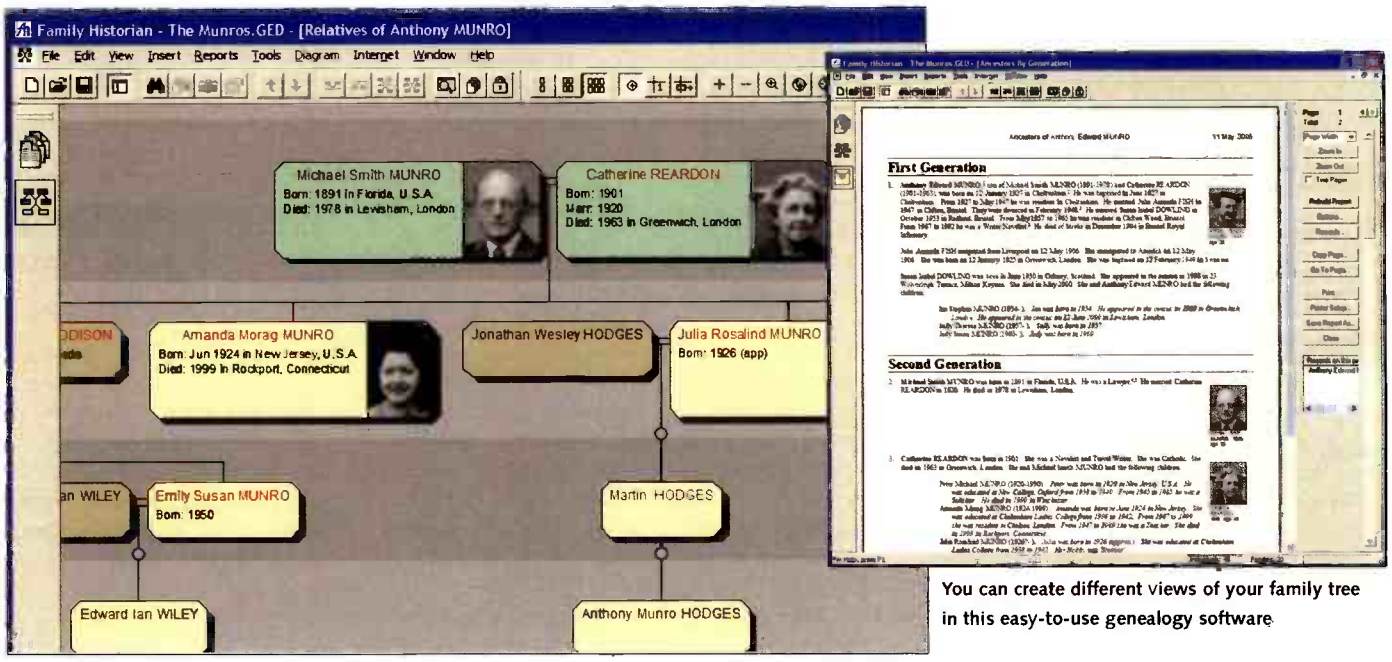
Pros Good audio/video format support; plenty of extras
Cons Regular desktop PC users may never use all the extras
Features ★★★★☆
Ease of use ★★★★★
Value for money ★★★☆☆
Overall Great power features for notebook users and wide range of audio support, but overkill for standard PC use
★★★★☆

GENEALOGY

Family Historian 3

A powerful genealogy tool to help you build your family tree

Personal Computer World RECOMMENDED



You can create different views of your family tree in this easy-to-use genealogy software

Creating and updating a family tree is possibly the most complicated database work anyone will do outside work. This new version of Family Historian makes the job as simple as possible without compromising on features.

The Gedcom format is an open standard for genealogy data and most programs claim compatibility. However, since Family Historian uses it as the default file format rather than an import/export function (a process that's rarely 100 per cent accurate), it is far easier to share information and doesn't tie you to a proprietary format.

The appearance of Family Historian is fairly utilitarian but this does help keep it focused on the task of entering family data. It is very well designed and easy to find the correct menu item or shortcut without having to constantly refer to help files.

Entering family information is straightforward. The Individual entry window can be used to add information about new family members without having to return to the main interface. Assuming all the information is to hand, it's a fast and efficient method of adding data.

You can create views of a specific individual, a limited number of their ancestors or descendants, or the entire family. For ease of use some individuals can appear twice in the views, rather than trying to arrange the tree with a single box for each person – this helps keep the tree legible.

Photos, audio and video files can be added to family records. Each can be linked to one or more individual related to the material. Impressively, not only can a whole photograph be linked to an individual but also just a section of it. This works best when picking faces out of large family photographs to link to individual records.

Multimedia can be embedded in the database, but by default it is linked to an external source. Should any of the linked files be moved, a tool is on hand to point the database in the right direction. Furthermore, if pictures are stored in the same folder or subfolders of the database, links are automatically updated if the whole folder is moved.

A powerful wizard is available for importing other Gedcom files into Family Historian. Records are compared and possible duplications displayed for review and deletion as required. If necessary, you can export a specific section of your family tree as opposed to the whole database. This section, or indeed the entire tree, can be sent directly to CD or, if you have some web space, an HTML document can be generated.

Certain records can be marked private and left out of these options; with identity theft so common it's not such a good idea to make your mother's maiden name public on the Internet.

Another impressive feature of Family Historian is the high degree of customisation you can apply to the family tree. Entire sets of events can be created and shared with others and almost every aspect of the reports and queries can be tailored to your requirements. Query requests can be saved in the csv format for use in other applications, such as Microsoft Excel.

It's also worth mentioning that there's a very strong and active community behind the software (see **www.fhug.org.uk**).

The interface might not win any style awards, but the features and ease of use make Family Historian an excellent tool for any genealogist. *Tim Smith*

Details

Price £38
Best price www.pcw.co.uk/bestprices
Contact Family Historian
www.family-historian.co.uk
System requirements
Windows 98 or higher

Verdict

Pros Extremely powerful; customisable; good value
Cons Multimedia would be safer embedded by default as opposed to linked

Features	★★★★★
Ease of use	★★★★½
Value for money	★★★★★

Overall One of the strongest tools for recording and maintaining family records

★★★★★

3D ACTION

Tomb Raider Legend

Personal Computer World RECOMMENDED

Lara's back on top form in this remarkable resurrection of a fading franchise

Lara has a graceful set of moves that are enjoyable to control in this return to form for the Tomb Raider series

It doesn't seem possible that Lara Croft has been on our PC screens for nearly 10 years now. A decade is an eternity in standard showbiz terms. But, unlike many real-life starlets, the voluptuous virtual videogame icon has the unique ability to get better looking with age.

And that's the first thing you'll notice when you start up Tomb Raider Legend (or Lara Croft Tomb Raider Legend to give the game its slightly un-catchy full title). Both the game and its – ahem – titular heroine look absolutely stunning when played on a PC running a decent graphics card. But, while Lara herself is clearly none the worse for wear, just how kind has time been in terms of gameplay?

Well, given that the Tomb Raider series has been getting progressively worse over the years, it's hard to get too excited about a new instalment, especially since the last game in the series – The Angel of Darkness – is widely understood to be an unmitigated disaster.

In fact, a lot has happened in the world of third-person action gaming since then, and it seems as if developer Eidos has learned not only from its own mistakes, but also from the success of other excellent adventure titles such as Ubisoft's The Prince of Persia: The Sands of Time and, more recently, The Two Thrones. This is particularly evident in the way the player controls Lara's movements. Where once she had all the manoeuvrability of a 10-tonne truck, old hotpants now has a graceful, fluid set of moves that are genuinely enjoyable to wield.

Betraying its console roots, the game is distinctly better when you switch your keyboard and mouse for a gamepad. But, unlike in the previous outings, you'll rarely be moved to throw things at the screen in frustration. There are a couple of slightly misjudged motorbike chase sequences and the occasional annoying 'interactive cutscene' to cope with. But, during all the climbing, jumping, swinging and shimmying that makes up the majority of the game, Lara's behaviour is impeccable.

The high point of the game may well be its puzzle-solving sections. These aren't particularly difficult, but usually require quite a bit of lateral thinking and take advantage of the game's realistic physics.

Story-wise, there's the usual hokum about some missing artefact or another. It's not exactly original or even particularly coherent, but it certainly serves as an adequate backdrop for Lara's archaeological adventures. Most of the action takes place in or around the now familiar gloomy tombs and temples, but a few notable exceptions, such as a Tokyo skyscraper and an abandoned Russian research lab, prove to be interesting variations on the theme.

Also of note are both the script and the voice acting. Casting Keely Hawes (last seen in BBC One's *Spooks*) as the voice of Lara is a stroke of genius for which someone surely deserves a medal. The actress' clipped feminine tones bring a whole new warmth to Croft's personality, as well as adding a hitherto unexploited layer of sex appeal to the character.

All in all, Legend is a tremendous success and goes a long way towards restoring the Tomb Raider series' slightly tarnished reputation. Our only reservation is that the game is a fairly short experience (about nine hours in total) with relatively little in the way of replay value. There's no multiplayer option and, apart from collecting hidden treasures and unlocking new outfits for Lara to wear, there's not a lot to keep you coming back. Having said that, the brief Croft Mansion standalone sidegame is another of Legend's highlights. *Jonathan Parkyn*

Details

Price £34.99
Best price www.pcw.co.uk/bestprices
Contact Eidos www.tombraider.com
System requirements
Pentium III 1GHz • 256MB of Ram • 10GB free hard disk space • DVD-Rom drive • Windows 2000/XP

Verdict

Overall **A little on the short side, but a cracking start to what's sure to be a new series of adventures for the rejuvenated Lara Croft**

★★★★★

FLIGHT COMBAT

Blazing Angels: Squadrons of WWII

Does this flying simulation go down in a blaze of glory or crash and burn?

If you've had enough of all those identikit World War II-based first-person shooters that are crowding your local game store, then why not take a break from it all by playing something from the soon-to-be-overpopulated selection of World War II-themed flight combat sims instead.

Blazing Angels has a crude storyline that acts as a flimsy excuse for a series of squadron-based airborne combat missions. The basic premise is that you and your wingmen must take to the skies in a variety of vintage aircraft, participating in many of the events of World War II. This involves attacking targets from above, defending friendly units and shooting the bad guys.

If you can put up with the dreadfully stereotypical voice acting, the game starts off in a reasonably fun manner when you're conscripted to do your bit over Dunkirk. As things progress, however, it becomes clear that, while the locations may change, the gameplay itself rarely does.

It's not the best-looking game in the world, either. Lighting, cloud effects and famous landmarks can be quite impressive but, from up above, buildings and countryside tend to look a bit bland.

Perhaps the most exciting aspect is the selection of online options. Throw real, live opponents into the mix and the dogfights liven up considerably. A co-operative mode is a welcome extra, where you and your chums can join forces to battle the enemy together. However, we wouldn't suggest it's worth shelling out for Blazing Angels on the strength of its online play alone.

Not really a flight simulation, and yet not quite an arcade shoot-'em-up either, perhaps the problem is that Blazing Angels is trying to be all things to all people. Sadly, in doing so, it could end up appealing to nobody at all. *Jonathan Parkyn*

Details

Price £19.99
Best price www.pcw.co.uk/bestprices
Contact Ubisoft
www.blazing-angels.com
System requirements
1GHz processor • 256MB of Ram • 6GB hard disk space • DVD-Rom drive • Windows XP

Verdict

Overall **Like WWII shooters, WWII flight combat sims are getting a bit samey and, apart from a few interesting online options, Blazing Angels is unlikely to set hearts aflame**

★★★☆☆

FIRST-PERSON SHOOTER

Condemned

Sega's brutal take on survival horror is sure to hit you where it hurts

It's clear from the *Se7en*-style opening title sequence that Condemned is trying very hard to be a movie. It certainly has a gripping plot that puts you on the trail of a deranged serial killer and takes you on a series of unexpected twists and turns along the way. Moody lighting and blink-or-you-miss-it flashes of spookiness in the periphery of your vision also help to ramp up the cinematic feel of the game.

If Condemned really was a film, it would probably get billed as a psychological horror rather than a slasher movie. Either way, you'd be quick to criticise it for two reasons: sloppy pacing and repetitive action.

The game's somewhat frustrating pace isn't helped by its strangely sluggish central character. While Condemned takes place from a first- rather than a third-person perspective, anyone who has played a first-person shooter before will undoubtedly find the slow, lumbering momentum of FBI agent Ethan Thomas a permanent annoyance throughout.

As you attempt to investigate a particularly nasty murder, you'll be forced to deal with regular brutal attacks from the city's population of down-and-outs, often armed with little more than a plank of wood.

The extremely violent nature of the game's savage hand-to-hand combat system is likely to come as a shock at first. But, once the initial impact has worn off, frequent encounters with faceless enemies soon become very predictable.

Condemned is an undeniably terrifying game with a promising premise. It seems to want to prove that you don't necessarily need hordes of hungry zombies to put the willies up videogame players. But simply replacing the ubiquitous undead with an army of fast-moving goons bent on beating your brains out doesn't count as innovation. *Will Stapley*

Details

Price £29.99
Best price www.pcw.co.uk/bestprices
Contact Sega www.sega-europe.com
System requirements
2GHz processor • 512MB of Ram • 8GB hard disk space • DVD-Rom drive • Windows 2000/XP

Verdict

Overall **Early thrills soon wear off and, intriguing though it is, Condemned never really lives up to its promise**

★★★☆☆

Personal Computer World

vnu labs

How we test

Performance testing is an important part of PCW's reviewing process and to obtain our authoritative results we use the UK's best PC testing resource – VNU Labs. Here we explain why you can trust our results and give you a tour of our most frequently used benchmark programs.

One of the main reasons people upgrade their PCs is because their old model seems 'too slow'. But how do you tell whether the one you're going to replace it with is any faster? At *PCW* we take PC testing very seriously and we have the UK's best PC testing labs – VNU Labs – on tap to help us give you reliable, authoritative performance figures, to help you with your purchasing decisions.

It's true that speed isn't everything, but it's an important part of the buying equation, especially when there are so many components out there. As many of our PC group tests are based on price bands, checking the performance is even more important – if the core system is underperforming, you need to know before you part with your hard-earned cash.

In VNU's UK Labs, which is part of the European VNU Labs network, our staff have over 20 years of combined testing experience. We know all the perils and pitfalls of practical benchmarking and we contribute to the development of industry-standard benchmarks through our full membership of Bapco (www.bapco.com), the non-profit benchmark consortium. We are also a media member of the Futuremark Benchmark Development Program (www.futuremark.com). Listed below are the main benchmarks we use for testing PC systems and components.

- Bapco Sysmark 2004 SE – an application-based benchmark that tests real-world system performance.
- Futuremark 3Dmark03 – a 3D graphics benchmark designed to test the performance of DirectX 8 graphics cards.
- Futuremark 3Dmark05 – the latest version of 3Dmark that tests DirectX 9 3D graphics performance.
- Ubisoft Far Cry – we use the Fort level timedemo to see how graphics cards perform in a real DirectX 9 game.
- Futuremark PCmark05 – a synthetic benchmark used to test the performance of a PC's major subsystems.
- Bapco Mobilemark 2005 – used to assess the battery life of notebooks using real-world applications and usage scenarios.
- Test beds – we use standardised AMD and Intel-based test rigs to test components and peripherals.

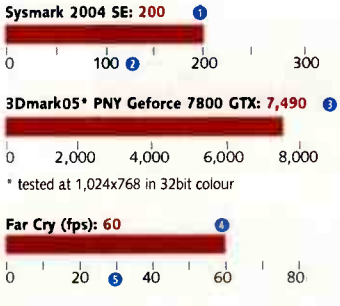
There's more information about our testing procedures and benchmarks on our Labs site at www.reportlabs.com/testbed/bguides/benchmarks.php.

Far Cry is a real-world DirectX 9 test

PCmark05 measures memory, processor, graphics and hard drive performance

3Dmark05 pushes modern graphics cards to their limits

Performance



1. A score of 200 indicates that the system is twice as fast as the reference PC
2. The reference PC (2GHz P4 512MB of Ram) scores 100
3. A Geforce 7800 GTX would score in the region of 7,490
4. A score of 60fps (frames per second) or higher is most desirable
5. A result of 30fps or above means the machine can produce playable frame rates at the tested resolution

Create. Store. Backup. Go.

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- USB 2.0 interface - all cables included
- AC adapter-free, powered by USB
- Sleek, robust encloser - designed by F.A. Porsche
- 2 years manufacturer's warranty as standard

Available Models :
40GB, 80GB, 120GB

NEW! LaCie Triple Interface FireWire 800/400 & USB2.0 d2 Hard Drives
- Sleek, aluminium heat dissipating robust case
- 7200rpm ideal for DV Video - silent operation
- Fast FireWire 800 'Extreme' up to 88MB/s sustained
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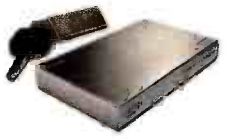
- Compatible with Windows® backup utility
- 2 years manufacturer's warranty as standard

Available Models :
160GB, 250GB, 300GB, 500GB, 600GB, 1000GB, 1200GB, 1600GB, 2000GB



LaCie USB/FireWire 2.5" MobileDrives
- Ultra-portable - anly 7.6 x12.9 x1.7cm & 200g
- USB 2.0 and/or FireWire interface - cables included
- AC adapter-free, powered by USB or FireWire
- Ideal for notebook/laptop users as mobile storage
- Sleek, robust enclosure - design by F.A. Porsche
- Compatible with Windows® backup utility
- 2 years manufacturer's warranty as standard

Available Models :
USB2.0 - 40GB, 60GB, 80GB, 100GB
FireWire & USB2.0 - 40GB, 60GB, 80GB, 100GB

LaCie 'Biggest Disk' FireWire 800 & USB2.0 RAID
- Up to 2000GB, RAID 0, 0+1, 5, 5+ hot spare
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- Sturdy aluminium enclosure & ultra quiet operation
- Compact size - only 15.3 x29.8 x17.6cm
- Hot swappable hard disks; superiour RAID security
- Automatic online rebuilding with RAID 5
- 2 years manufacturer's warranty as standard

Available Models :
1000GB, 1600GB, 2000GB

LaCie d2 'Lightscribe' Firewire or USB2.0 16x DVD+/-RW's & CD-RW
- Lightscribe direct disk labelling technology
- For professional looking created media
- Double Layer DVD up to 8.5GB capacity
- Dual format DVD+/-RW (and CD-RW)
- Super fast write and re-write speeds
- Bundles Include DVD authoring software
- 2 years manufacturer's warranty as standard

Available Models :
DVD+/-RW 16x4x16x Double layer & CD-RW
CD-RW 52x32x52x

LaCie d2 'Ethernet Disk Mini' Network Hard Drives and USB2.0
- Share data across a netwark by unlimited users
- Easily administered via any web browser
- Quick and simple installation - no drives needed
- No server required, NAS hard drive
- Fast ethernet connection or USB direct attach
- For Windows®, Mac OS® and Linux
- 2 years monufacturer's warranty as standard

Available Models :
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Ethernet Disk XP embedded - 800GB, 1000GB

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- Extremely high contrast ratio of up to 1000:1 (119 model)
- Wide viewing angles of 170° horizontally/vertically
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- 3 years advance replacement warranty

Available Models :
119 TFT/LCD Monitor - 19"
120 TFT/LCD Monitor - 20"

LaCie 300 Series Monitors
- DVI and VGA connectors
- Highest specification Superfine TFT Panel
- 321 - maximum resolution 1600x1200
- 321 - response time 20ms
- 321 - dot pitch 0.27
- 321 - 176 degree viewing angle (S-IPS)
- 3 years advance replacement warranty

Available Models :
321 - 21"
319 - 19"

LaCie Blue Eye Pro Colour Calibrator
- Automatic hardware calibration
- Creates and activates advanced ICC profiling
- Time saver colour test modukle
- Switchable colourimetic environments
- Designed to complement the LaCie 300 series
- USB interface - all cables and software included
- 2 years manufacturer's warranty as standard

Available Models :
Blue Eye Pro
Blue Eye 2

Please visit www.lacie.com/uk

LaCie products are available from leading resellers - E-mail: info.uk@lacie.com

£899 dual-core PCs

Two heads are better than one, and that's certainly the case with the new generation of dual-core processors, discovers Cliff Joseph. Find out how these seven PCs perform

For years, the processor industry, dominated by Intel's Pentiums, relied primarily on processor speed to improve performance. Intel led the way, pushing the Pentium through the 1GHz barrier, then on to 2GHz and 3GHz. Rival manufacturers, such as AMD and IBM, took a different approach, arguing that efficient processor design could improve performance without increasing processor speed, but Intel's vast marketing power kept the emphasis on the 'megahertz myth' for many years.

Unfortunately, these ever-increasing processor speeds were matched by ever-increasing power consumption and heat output. Eventually, even Intel had to face the fact that more efficient design was the way forward.

That efficient design is represented by the new generation of dual-core desktop processors used in the PCs we tested here. Intel's Core Duo and AMD's Athlon 64 X2 processors are, effectively, two processors in one, cramming two processor cores onto a single silicon chip. Sharing the processor load between two cores has many benefits. It provides better performance when running multiple applications, as you can let each processor take care of a different program. It can also provide better performance within individual applications, such as multimedia software or games, where your PC needs to juggle complex audio and graphics data at the same time.

Dual-core processors represent state-of-the-art design. But you don't need to spend a fortune to get the benefits of these processors. We've rounded up seven dual-core PC systems that come in at just £899, providing you with leading-edge performance at mainstream prices.

ON TEST

98 Cube 24/7 Epsilon ST6
Dell Dimension 9150

99 Evesham Axis GR76
Intellect Prodesk X2 3800+S

100 Mesh Matrix Vector 7600GT
Panrix Nitro 840D

103 PC Nextday Zoostorm 2-5401
Versatile PC

103 Dual-core tweaks

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107 What's in store for Intel and AMD processors

Editor's Choice

'You don't need to spend a fortune to get the benefits of state-of-the-art dual-core processors'

Cube 24/7 Epsilon ST6

Price £899 **Contact** www.cube247.co.uk

Like several of its rivals in this group test, Cube has based its £899 dual-core PC on the Athlon 64 X2 3800+ processor. That's a good choice, and it gives the Epsilon ST6 a very solid level of basic performance, as indicated by the Cinebench test suite (see page 106), which focuses primarily on processor and OpenGL graphics performance.

Most of the Epsilon's other features are pretty good too. It has 1GB of Ram, a 300GB hard disk and twin optical drives, with both DVD-Rom and separate dual-layer DVD burner. Cube also includes a full set of Creative 5.1 surround-sound speakers and 11 USB2 ports into which you can plug various peripherals and accessories.

However, there are one or two minor weaknesses that let the Epsilon down a little. The relatively low-cost ATI Radeon X1300 graphics card holds the PC back in terms of its 3D graphics performance. The Epsilon was noticeably slower than its rivals in the Far Cry tests and when running the 3Dmark05 test suite. To be fair, though, games and 3D performance is still quite respectable, even if its 56fps (frames per second) in Far Cry can't match the top performers such as PC Nextday's Zoostorm. The other sign of a little cost-cutting is the inclusion of a 17in flat-screen monitor, compared to the 19in models provided with most of the other PCs in the group.

The Epsilon is clearly no slouch, and it's more than adequate for a wide variety of demanding tasks, including video editing and games. However, a number of its rivals manage to squeeze out a little extra 3D performance while also including larger monitors. So while the Epsilon's performance is solid enough, it doesn't quite match the all-round value for money that you get from some of the other PCs reviewed here.

Verdict

Pros Good connectivity options
Cons Below average 3D performance

Features	★★★★☆
Performance	★★★★☆
Value for money	★★★★☆

Overall Good for the price, but the low-cost graphics card lets it down

★★★☆☆

Dell Dimension 9150

Price £899 **Contact** www.dell.co.uk **E-value code** D06915r

Intel's Pentium isn't terribly well represented in this group of dual-core PCs. The Windows Media Center Edition (MCE) Dimension 9150 and the Nitro 840D from Panrix are the only two here. Dell's PC is attractive with an easy-to-maintain BTX-based internal design and tool-free access to most components.

Dell has used a 3GHz Pentium D dual-core processor, whereas Panrix installed the slightly faster 3.2GHz model. The Geforce 7800GTX graphics card is also slightly slower than the 7900GT in the Panrix, but still top-notch. As a result, the Dimension 9150 lags slightly behind Panrix in tests, and comes in a little behind some of the faster AMD-based machines.

The difference in performance really isn't that great, however, and with 2GB of DDR2 Ram the 9150 is more than powerful enough to handle demanding tasks such as video editing and games. Hardcore gamers might prefer a machine with a second PCI Express x16 slot that would allow them to upgrade with a second graphics card, but this won't bother most mainstream users.

Besides, Dell's focus is clearly more on its multimedia capabilities. It is one of the few PCs in this group that uses Windows XP MCE. To help cope with its multimedia capabilities, there are two 160GB hard disks, providing 320GB of storage space, and an analogue Hauppauge TV tuner card that allows video input and output. This makes it good for multimedia work such as video editing or audio recording, which require lots of memory and disk space.

While the Dimension 9150 may not be the winner in terms of raw horsepower, its specification and multimedia features make it a great choice for a wide range of users, whether you're looking for a solid workhorse or simply to use it as part of your home-entertainment system.

Personal Computer World EDITOR'S CHOICE

Verdict

Pros Versatile multimedia features, plenty of Ram and hard disk storage
Cons Solid performance, but not the best choice for hardcore games fans

Features	★★★★★
Performance	★★★★☆
Value for money	★★★★★

Overall The emphasis on multimedia features makes this a great entertainment PC for home users

★★★★★

Evesham Axis GR76

Price £899 **Contact** www.evesham.co.uk

Housed in a rather monolithic black tower chassis, Evesham's Axis GR76 may not be the most eye-catching PC you'll ever come across, but it provides good performance and plenty of upgrade potential.

The Axis GR76 is based on an Athlon 64 X2 3800+, running at 2GHz, with 1GB of Ram, a 250GB hard disk, and the almost-obligatory twin optical drives. The bulky tower chassis isn't much to look at, but it has lots of room inside for hardware upgrades. In addition, it's always good to see tidy cabling inside a PC as it's a sign that the manufacturer has paid attention to detail.

There are three spare drive bays and three spare PCI slots available for future expansion, and an extra PCI Express x16 slot that gives dedicated gamers the option of upgrading to twin Nvidia SLI graphics cards for maximum games performance. Not that there's anything wrong with the Axis' performance right now; it was one of the few PCs to top the 70fps mark in our Far Cry test, and achieved good scores in most of our other tests as well.

Evesham has included a set of Creative I-Trigue 2.1 stereo speakers, rather than the 5.1 speaker sets offered by a number of the other PCs in this group, but that's a relatively minor detail. However, the 17in flat-panel Viewsonic monitor might sway a few potential customers who would prefer one of the 19in screens included with PCs such as the Panrix Nitro. Equally, though, other users might be tempted by the two-year on-site warranty that Evesham offers.

It won't win any prizes for innovation, but the Axis GR76 is a solidly designed and constructed PC that will cope with any task you throw at it – including playing the latest 3D games.

Verdict

Pros Good performance and lots of scope for expansion
Cons 17in monitor; stereo speakers; no TV tuner
Features ★★★★★
Performance ★★★★★
Value for money ★★★★★

Overall A solid and quick Media Center PC that offers a good base for future upgrades, but as it stands its features don't quite make the grade

★★★★★

Intellect Prodesk X2 3800+S

Price £899 **Contact** www.intellect.uk.com

Housed in a silver and black mini-tower chassis, Intellect's Prodesk X2 3800+S is one of the more compact and neatly designed systems in this group, and is a good choice if you're a little cramped for room at home or in the office.

The PC includes a media card reader on its front panel, along with a complete set of USB, Firewire and audio ports, so you can easily connect peripherals, such as your digital camera or DV camcorder.

The Prodesk is based on a 2GHz Athlon 64 X2 3800+, which is the most commonly used processor among these price-conscious systems. We weren't surprised, then, that its test results sat in a cluster along with most of its 3800+ counterparts.

The same is true of graphics performance, with the ATI Radeon X1600 Pro graphics card achieving a very respectable speed of 65.63fps in our Far Cry test – a score that sits smack in the middle of the range.

The huge 400GB hard disk should provide you with enough room to store plenty of digital music, photos and video. There's also a spare drive bay and two PCI slots available for further expansion, although the motherboard in the compact case isn't Crossfire- or SLI-capable, so gamers can't upgrade to twin graphics cards.

However, Intellect does include a decent set of Creative 5.1 surround-sound speakers and a rather good 19in flat-panel monitor from Xerox (now there's a name you don't hear very much any more).

The Prodesk provides very good all-round performance, and its compact design should appeal to home users who don't want to clutter their office or bedroom with one of its more cumbersome rivals.

Verdict

Pros Compact design; good all-round performance
Cons No dual-graphics capability
Features ★★★★★
Performance ★★★★★
Value for money ★★★★★

Overall A lot of PC power wrapped up in a pleasantly compact design

★★★★★

Mesh Matrix Vector 7600GT

Price £899 **Contact** www.meshcomputers.com

It may not have any particularly outstanding features, but Mesh's Matrix Vector 7600GT nonetheless provides very solid performance and a good set of hardware features.

Inside the Matrix Vector is an Athlon 64 X2 3800+, running at 2GHz, backed up by 1GB of Ram and a 250GB hard disk. There are faster processors in rival PCs, such as the 2.2GHz model from PC Nextday and the 3.2GHz Pentium D used by Panrix, which helps them nudge ahead in terms of overall performance. However, the difference isn't that great and the Matrix Vector produces good results in all areas, ranging from business applications to games and multimedia.

A good set of additional hardware includes two DVD drives – a standard DVD-Rom and a dual-layer DVD burner. The monitor is a high-quality 19in Viewsonic widescreen flat-panel display, and you also get a set of 5.1 surround-sound speakers from Creative. The result is a very good PC that will work well as a games machine or part of your home-entertainment system. We also like the three-year warranty offered by Mesh (one year on site, followed by a further two years return-to-base).

Our only minor criticism is that the internal arrangement is a bit untidy. There are three spare PCI slots and one spare PCI Express x16 slot for an optional Nvidia dual-graphics SLI upgrade, so you should have plenty of scope for expansion. However, the arrangement of some of the cables inside the chassis means you may struggle to install expansion cards into some of these slots.

The Matrix Vector certainly provides all the features and performance most home users are likely to need. However, more experienced users who like to open up their PC and explore its upgrade potential might prefer something a little tidier on the inside.

Verdict

Pros Good performance and multimedia features
Cons Untidy internal cabling limits access to expansion slots
Features ★★★★½
Performance ★★★★½
Value for money ★★★★½
Overall A solid, if unremarkable performer whose only real weakness is the obstruction of its internal PCI slots
★★★★½

Panrix Nitro 840D

Price £899 **Contact** www.panrix.co.uk

The Panrix Nitro 840D stands out in more ways than one. The most noticeable difference is the glistening perforated metallic chassis, which makes a change from the unimpressive plastic design of most PCs here. It's also one of the few machines we've seen recently to include a good old-fashioned floppy disk drive – although we suspect that the media card reader, USB, Firewire and audio ports also mounted on the front panel will be rather more useful.

The bold design is also matched by some very strong performance results. There was no single machine that emerged as the outright performance leader in this group, but the Nitro was one of the most consistent performers in our suite of Labs tests. It stands out here by virtue of being one of just two Intel-based systems in this review.

Its 3.2GHz Pentium D processor provides a high level of raw processor power, complemented by an Nvidia Geforce GR76 graphics card – although it's worth noting that both PC Nextday's Zoostorm and the Evesham Axis GR76 both edged just slightly ahead of the Nitro in our Far Cry test. However, the Nitro's spare PCI Express x16 expansion slot and Nforce4 SLI-based motherboard give gamers the option of upgrading to twin Nvidia SLI graphics cards in the future.

Two additional PCI slots and two free drive bays provide plenty of room for further hardware upgrades, and we were pleased to see that the tidy cabling inside the chassis didn't block access to any of these slots or bays. The Creative SBS560 surround-sound speakers supplied with the Nitro are perhaps best described as 'cheap and cheerful', but that's one of the few weaknesses.

With its eye-catching design and strong performance results the Panrix Nitro 840D is an attractive system that will appeal to any home user.

Personal Computer World RECOMMENDED

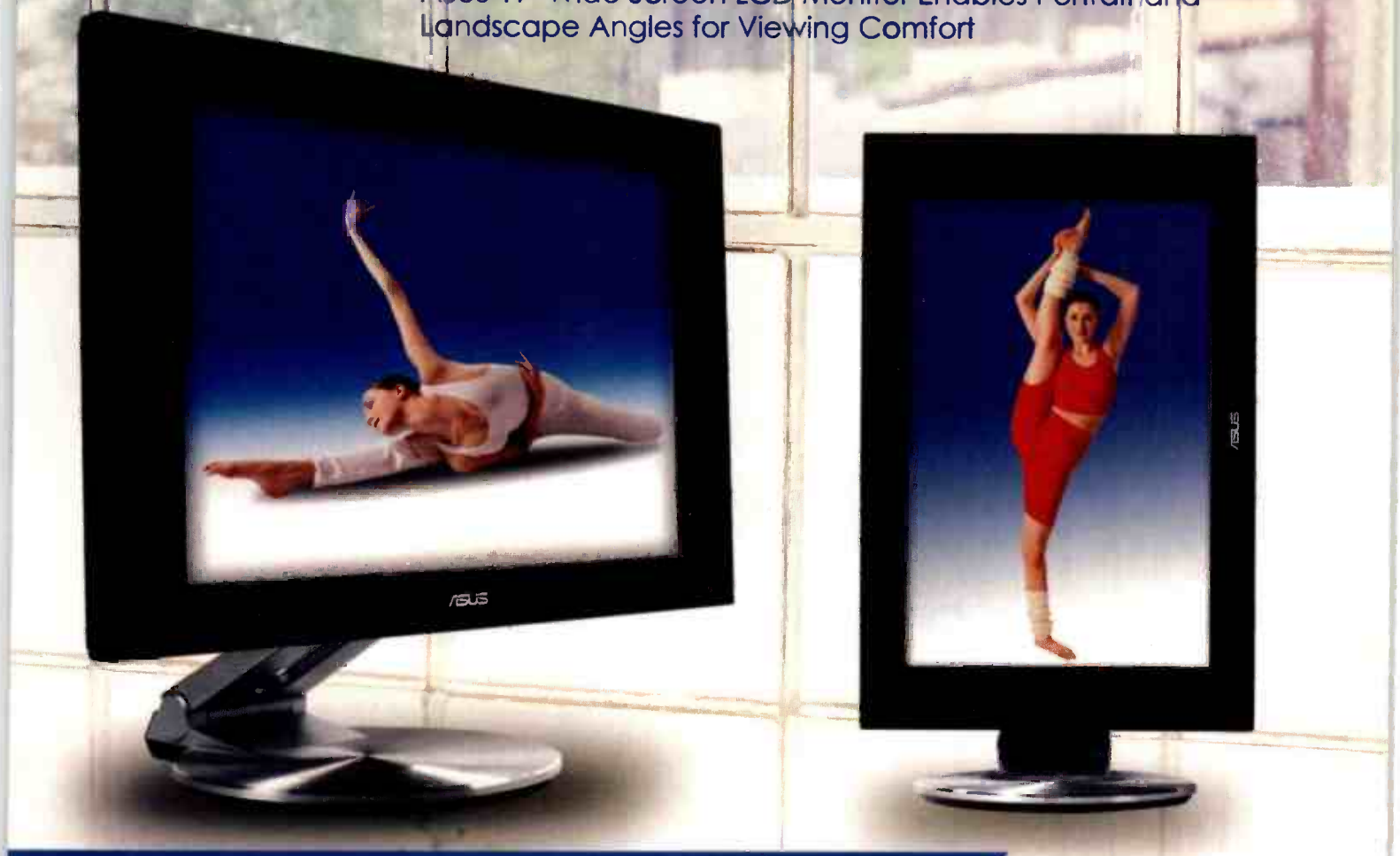
Verdict

Pros Attractive design; consistently strong performance in all areas
Cons Budget speaker system; limited software bundle
Features ★★★★½
Performance ★★★★½
Value for money ★★★★½
Overall A well-constructed PC that provides good performance
★★★★½

Advertisement

Different Angle, Different Point of View

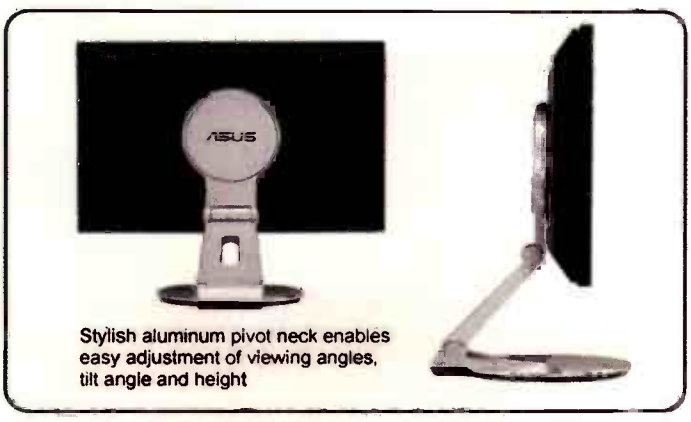
ASUS 19" Wide Screen LCD Monitor Enables Portrait and Landscape Angles for Viewing Comfort



Sick of scrolling down excel tables and getting vertical photos cut off? And are you tired of the blurry images when using a monitor to watch TV and movies? If so, then please read on.

Optimized viewing angle

With so many video applications, it's difficult for one viewing angle to satisfy all. The ASUS PW191 is a 19" widescreen (16:10) LCD monitor, which enables 90-degree rotation to deliver both landscape and portrait angles. When viewing tall images (excel tables, websites or architectures) that require a broader range of visual field vertically, rotate the monitor to the desired position.



Stylish aluminum pivot neck enables easy adjustment of viewing angles, tilt angle and height

Ergonomics that's a pleasure to look at

The PW191 was created with viewing comfort in mind, and that includes the overall product appearance as well. The pivot aluminum pivot neck stylishly contrast the monitor's black frame, but most importantly, it enables easy adjustment of viewing angles, tilt angle and height most suitable for different sitting positions

SPLENDID™ Video Intelligence Technology

SPLENDID™ evaluates each pixel in every frame and adjusts them in smaller regions without affecting the whole picture. Colors, brightness, contrast and sharpness in each region are dynamically optimized according to conditions most favorable to the human eye. It offers five modes (Standard, Scenery, Gaming, Night View and Theater) and three skin tones (Natural, Reddish and Yellowish) to satisfy the specific needs in various graphics functions. Watching videos with computers and display are now as good as on the best TVs.

OnScreen Display and Touch Sensor Hot Keys

OnScreen Display and Touch Sensor Buttons are two features aimed to enable quick application activation. Tune image color, brightness and contrast, adjust speaker volume, and select the special SPLENDID™ modes by using the Touch Sensor Hot Keys and user-friendly OnScreen Display. No need to interrupt current functions to adjust video quality.

Takes Care of Audio as Well

Two built-in 2W stereo speakers that enable exceptional sound deliverance provide an awesome sound system. No need to waste money on standalone speakers and also gets rid of the messy audio cables.

Real Viewing Comfort

Vertical and horizontal viewing, height adjustment, tilt and swivel angles, stylish appearance and intelligent image enhancement all add up to a complete display solution. Your LCD monitor to accommodate your viewing habit, not the other way around.

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CISCO SYSTEMS

PC Nextday Zoostorm 2-5401 Versatile PC

Price £899 **Contact** www.pcnextday.co.uk

It's not the most stylish PC we've ever seen, but the Zoostorm Versatile PC from PC Nextday certainly delivers the goods in terms of performance.

The silver and black faceplate doesn't make a great first impression, giving the Zoostorm a rather cheap, plasticky appearance. Fortunately, PC Nextday has done a better job inside.

The combination of a 2.2GHz Athlon 64 X2 4200+ and Nvidia Geforce 7600GT graphics card produced strong performance in most of our benchmark tests. Most notably, the PC emerged as the clear winner in our Far Cry test, so it will appeal to people looking for a strong games machine at an affordable price.

Like a number of its rivals, the Zoostorm boasts twin optical drives, with a standard DVD-Rom drive and a dual-layer DVD burner. A media card reader is also mounted on the front panel so you can quickly transfer files from a digital camera or other types of storage device.

The PC comes with a 19in AOC TFT monitor and a 2.1 speaker system with stereo speakers and sub-woofer. A full set of surround-sound speakers would have been great, but this isn't a major omission.

One weakness of this PC is its lack of upgrade potential. The Zoostorm doesn't have dual graphics capability, with only a single PCI Express x16 slot and a non-SLI capable Nforce4-based motherboard. This might deter some games fans who want the option of upgrading. Furthermore, the one available PCI slot bumps right up against the fan on the graphics card, so you might struggle to fit any other expansion cards into the space available.

The lack of expansion slots is disappointing, but the Zoostorm's strong performance should still satisfy even the most demanding home users.

Verdict

Pros Good performance, especially for games
Cons Looks a bit cheap; lack of expansion slots

Features	★★★½☆
Performance	★★★★½
Value for money	★★★★☆

Overall A strong performer, although the limited expansion potential may deter some users ★★★★☆

Dual-core tweaks

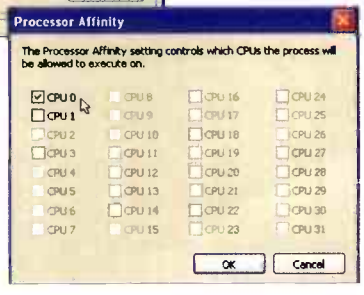
A dual-core processor that effectively gives you two processors in one sounds like a great idea. However, software often needs to be rewritten in order to take full advantage of a dual-core system (or of a multiprocessor system that has two or more separate processors installed on the motherboard). Once the program has been updated, it becomes 'multiprocessor aware'. This means it is able to split its workload into separate 'threads' (chunks of program code) so it can direct each thread to a different processor. So a video-editing program might split a project into separate threads containing audio or video data.

If a program isn't multiprocessor aware it may only be able to run on one of the available processors, which means you lose the benefits of having the second processor. Some older programs may not be able to run on a dual-core or multiprocessor system at all.

There is a way around this, though. If a particular program won't run on your dual-core system you can download a shareware program called Runfirst (free from **www.activeplus.com/us/freeware/runfirst**). As the name implies, you can run this program immediately before running the software that is crashing, and it will be assigned to just one of the available processors so that it runs properly.

There may also be occasions when you want to tell a particularly demanding program, such as Photoshop, to stick with one processor, so that it doesn't grab both processors and hog too many system resources.

Left: Select the 'Processes' tab in the Task Manager and right-click on the program that you want to adjust



Below: The Processor Affinity dialogue allows you to assign the program so that it runs on just one of the available processors

Open the Windows Task Manager using the standard Ctrl & Alt & Delete keyboard shortcut. Select the 'Processes' tab to view a list of all the programs running. Select the process you need by using the mouse to right-click on it. The pop-up menu that appears will include an option called 'Set Affinity', which lets you tell Windows to allow Photoshop to run on only one of the processor cores.

This allows you to limit demanding programs to just one core, leaving the second processor free to run other programs. Photoshop or any other program can complete its tasks in the background while you carry on working with another program that uses the second processor. If the program is multiprocessor aware, it may slow it down a bit, but it won't hog all your system resources.

£899 dual-core PCs

	CUBE 24/7	DELL	EVESHAM
MANUFACTURER			
Model name	Epsilon ST6	Dimension 9150 (D06915r)	Evesham Axis GR76
Price inc VAT	£899	£899	£899
Sales telephone	0870 242 1179	0870 152 4699	0870 160 9500
URL	www.cube247.co.uk	www.dell.co.uk	www.evesham.com
HARDWARE			
Processor	AMD Athlon 64 X2 3800+ (2GHz)	Intel Pentium D 930 (3GHz)	AMD Athlon 64 X2 3800+ (2GHz)
Motherboard	EQS/PC Partner	Dell DXP051	MSI K8N SLI
Chipset	ATI	Intel 945G	Nvidia Nforce4 SLI
Available memory/type	1GB PC3200 DDR400	2GB PC-2 4200 DDR2	1GB
Occupied/spare memory slots	2/2	2/2	2/2
Max memory supported by motherboard	4GB	4GB	4GB
Hard disk manufacturer and model	Seagate ST330062AS	Seagate ST3160812AS	Western Digital WD2500JS
Secondary hard drive	None	Seagate ST3160812AS	None
Total storage space	300GB	320GB	250GB
EXPANSION AND I/O			
No of 3.5/5.25in bays	6/4	2/3	4/4
No of free 3.5/5.25in bays	4/2	0/2	3/2
No of PCI/PCI x16/PCI x4/PCI x1 ports	5/1/0/1	3/1/1/0	3/2/0/2
No of free PCI/PCI x16/PCI x4/ PCI x1 ports	4/0/0/1	2/0/1/0	3/1/0/2
No of USB2/Firewire ports	11/1	7/0	6/2
No of serial/parallel/PS/2 ports	1/1/2	0/0/0	1/1/2
MULTIMEDIA			
Primary optical drive	NEC ND-4570A	Philips DVD8801	Sony DW-G120A
Optical drive formats and DVD write speed (max)	16x DVD, 16x DVD-/+R, 8x DVD-/+RW, 6x DVD-RW, 8x DVD-R DL	16x DVD, 16x DVD-/+R, 8x DVD+RW, 6x DVD-RW, 8x DVD +R DL	16x DVD, 16x DVD-/+R, 8x DVD+RW, 6x DVD-RW, 8x DVD-/+RW DL
Secondary optical drive	LG GDR8164B	None	Sony DDU1615
Optical drive formats and DVD write speed (max)	16x DVD	N/A	16x DVD
Soundcard	Integrated Realtek	Integrated Sigmatel	Integrated
Speakers	Creative MF4050	A525 speakers	Creative I-Trigue 3220
Graphics type/memory	ATI Radeon X1300/512MB	Nvidia Geforce 7800GTX/256MB	Nvidia Geforce 7600GS/256MB
Screen type, size and (maximum resolution)	GNR TS700, 17in TFT, 1,280 x 1,024	Dell E196FP, 19in TFT	Viewsonic VX724, 17in TFT, 1,280 x 1,024
OTHER INFORMATION			
Modem/other hardware	None	Hauppauge WinTV PVR TV card	None
Network	10/100BaseT	10/100/1,000BaseT	10/100/1,000BaseT
Operating system	Windows XP Home SP2	Windows Media Center SP2	Windows Media Center SP2
Bundled software	Nero 6, Power DVD 6	None	Microsoft Works 8.5, Bullguard Antivirus 5, Cyberlink PowerDVD 6
Standard warranty (RTB= return to base C&R = collect and return)	1 year RTB	1 year RTB	2 years on site, 1 year RTB
SCORES			
Features	★★★☆☆	★★★★★	★★★☆☆
Performance	★★★☆☆	★★★★½	★★★★½
Value for money	★★★☆☆	★★★★★	★★★★½
OVERALL	★★★½☆	★★★★★	★★★★☆

INTELLECT	**MESH**	**PANRIX**	**PC NEXTDAY**
Prodesk X2 3800+S	Matrix Vector 7600GT	Nitro 840D	Zoostorm 2-5401 Versatile PC
£899	£899	£899	£899
0161 429 9911	0844 736 0440	0870 027 1981	Online only
www.intellect.uk.com	www.meshcomputers.com	www.panrix.co.uk	www.pcnextday.co.uk
AMD Athlon 64 X2 3800+ (2GHz)	AMD Athlon 64 X2 3800+ (2GHz)	Intel Pentium D 840 (3.2GHz)	AMD Athlon 64 X2 4200+ (2.2GHz)
Gigabyte GA-K8N51GME	Asus A8N-SLI Deluxe	Asus P5ND2 SLI	ECS Nforce4 A939
Nvidia Nforce4	Nvidia Nforce4 SLI	Nvidia Nforce4 SLI Intel Edition	Nvidia Nforce4
1GB PC3200 DDR400	1GB PC3200 DDR400	1GB PC-2 5400 DDR2	1GB PC3200 DDR400
2/2	2/2	2/2	2/2
4GB	4GB	4GB	4GB
Maxtor 6H400F0	Maxtor 7Y250M0	Samsung Spinpoint 2504C	Western Digital WD3200JS
None	None	None	None
400GB	250GB	250GB	320GB
3/2	4/3	5/4	3/3
1/1	2/1	2/2	2/1
2/1/0/0	3/2/0/2	3/2/0/2	3/1/0/2
2/0/0/0	3/1/0/2	2/1/0/2	1/0/0/2
7/2	8/2	6/4	8/3
0/1/2	0/1/2	0/1/2	1/1/2
Pioneer DVR-110D	Sony DW-G120A	Samsung SH-W163A	Philips SPD2400L1
16x DVD, 16x DVD-/+R, 8x DVD+RW, 6x DVD-RW, 8x DVD -/+R DL	16x DVD, 16x DVD-/+R, 8x DVD+RW, 6x DVD-RW, 8x DVD-/+RW DL	16x DVD, 16x DVD-/+R, 8x DVD+RW, 6x DVD-RW, 4x DVD -R DL, 8x DVD +R DL	16x DVD, 16x DVD +/-R, 8x DVD+RW, 6x DVD-RW, 8x DVD+R DL, 4x DVD-R DL
None	Sony DDU1615	None	Philips PCDV5016L2
N/A	16x DVD	N/A	16x DVD
Integrated Realtek ALC850/7.1	Integrated Realtek ALC850/7.1	Integrated Realtek ALC850/7.1	Integrated Realtek ALC655/5.1
Creative MF4050	Creative Inspire T6060	Creative SBS560	Zoostorm S2176
ATI Radeon X1600 Pro/256MB	Nvidia Geforce 7600GT/256MB	Nvidia Geforce 7900GT/256MB	Nvidia Geforce 7600GT/256MB
Xerox XAP 192i, 19in TFT, 1,280 x 1,024	Viewsonic VA1912w, 19in TFT, 1,440 x 900	Samtron 94V, 19in TFT, 1,280 x 1,024	AOC LM965, 19in, (1,280 x 1,024)
None	None	None	Wireless Lan card
10/100BaseT	Dual 10/100/1,000BaseT	10/100/1,000BaseT	10/100/1,000BaseT
Windows XP Home SP2	Windows XP Home SP2	Windows XP Home SP2	Windows XP Home SP2
Nero, Power DVD, Open Office	Microsoft Works 8.5, Cyberlink DVD Suite	Ability Office Pro OEM	Nero 6, Power DVD
1 year RTB	1 year on site (UK mainland only), 2 years RTB	1 year on site, 1 year C&R	1 year on site
★★★½	★★★★½	★★★★½	★★★½
★★★★½	★★★★½	★★★★½	★★★★½
★★★½	★★★★½	★★★★½	★★★★½
★★★★½	★★★★½	★★★★½	★★★★½

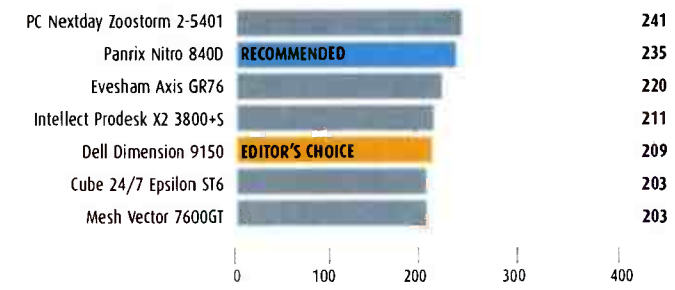
Vendors of group test products are only obliged to sell them at the prices quoted here (which include delivery and credit card surcharges) for the life of this PCW issue. They may also change components under certain circumstances. ↘

Lab results

All the PCs on test are very evenly matched in terms of overall performance, but 3D graphics results vary due to the many different graphics cards on offer

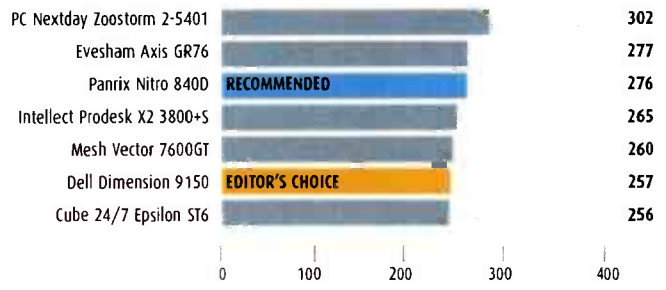
Sysmark 2004 SE (overall)

Bigger is better



Sysmark 2004 SE (Internet content creation)

Bigger is better



Sysmark 2004 SE (office productivity)

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PCmark05 (overall)

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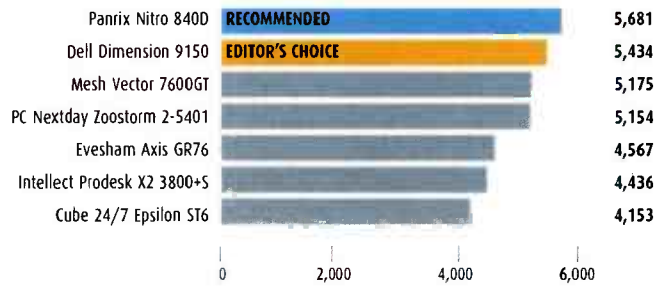

3Dmark05 (1,024 x 768 in 32bit colour)

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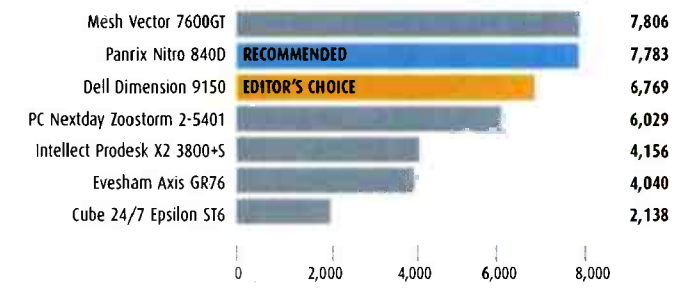

Far Cry (1,024 x 768 in 32bit colour)

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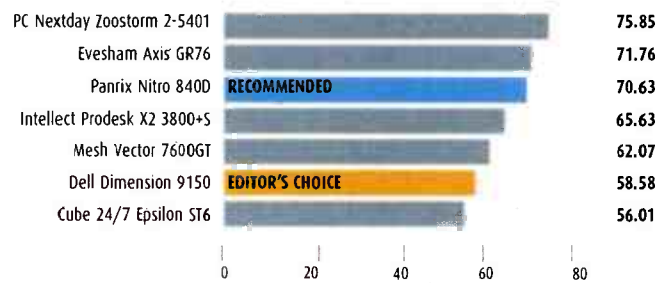
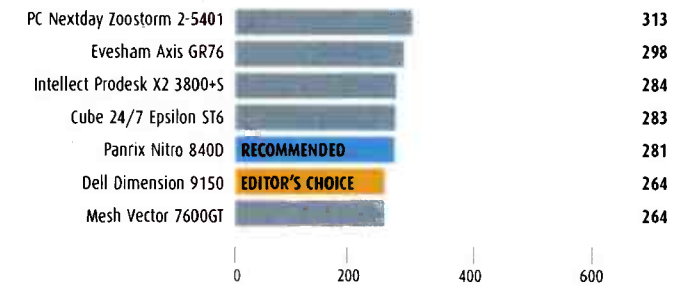


Cinebench 1 CPU

Bigger is better



Cinebench 2 CPUs

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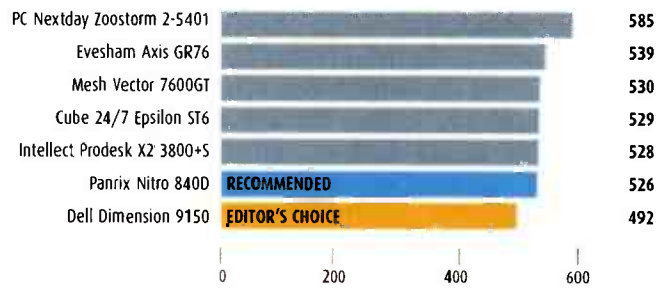


Please see page 95 for an explanation of how we tested the PCs

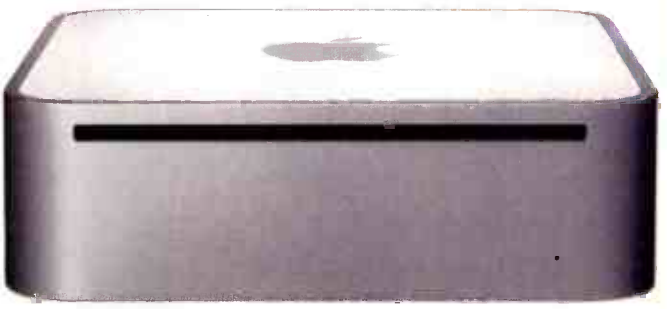
What's in store for Intel and AMD processors

Dual-core processors aren't simply the flavour of the month. They represent the future of processor design for both Intel and arch-rival AMD. Intel recently stated that by the end of this year more than 70 per cent of its desktop processors would be dual-core designs, with that figure rising to 90 per cent for mobile processors. And, as always, you can rely on the competition between Intel and AMD to ensure rapid development of this new generation of dual-core processors.

One interesting feature of the PCs submitted for this review was the dominance of AMD's Athlon 64 X2 processors. Intel was only represented by two Pentium D processors, while its recently launched Core Duo processor was nowhere to be seen. That's because the Core Duo's low power consumption means it is best suited to notebook PCs. There are already several notebooks available that use the Core Duo processor, giving Intel something of an edge over AMD in the laptop arena.

However, AMD recently announced its Turion 64 X2 dual-core processors, which are also designed for notebooks. Running at speeds of up to 2GHz, the Turion should go head to head with the Core Duo in the coming months. Intel's response was the announcement of a 2.33GHz version of the Core Duo, and the release of information about the next generation of 'Core 2 Duo' processors.

The Core 2 Duo range will include processors designed for both desktop and mobile systems, with the mobile processors expected to appear in July, followed by the desktop versions in August. It's also believed that there will be a special 'gaming' version of the chip that goes by the name 'Core 2 Duo Extreme', although no confirmed details are currently available. AMD also has some new desktop chips up its sleeve, and is working on new versions of the Athlon 64 X2, which will move up to the new 4800+ model running at 2.4GHz.



New low-power desktop processors from AMD and Intel will make innovative PC designs possible – similar to Apple's elegant Mac Mini

One interesting aspect of all these new processors is that they will be very energy efficient, and will hopefully lead to new small form factor designs for desktop PCs. Maybe then we'll see PC manufacturers coming up with something like Apple's Mac Mini, which uses the Core Duo processor, rather than the dreary tower designs used by most of the PCs submitted for this review.

Further down the line, AMD is aiming to develop four-core processors for some time in 2007, while Intel has stated that it will be developing an entirely new range of multi-core processors in about two years' time.

Editor's Choice

Editor's Choice Dell Dimension 9150
Recommended Panrix Nitro 840D

Dell Dimension 9150

Panrix Nitro 840D

Perhaps the most impressive thing about this group of PCs is the sheer consistency of the performance results, and the great value for money they all offer. All the PCs here will meet the needs of most home users – and probably many business and professional users too.

The PCs from Cube, Evesham, Intellect and Mesh are based on a 2GHz AMD Athlon 64 X2 3800+, and there really wasn't that much difference between them, even taking into account the choice of graphics card and so on. Not surprisingly then, the two PCs that had a slight edge in performance were the ones with faster processors – the 3.2GHz Pentium D in the Panrix Nitro 840D, and the 2.2GHz Athlon in PC Nextday's Zoostorm 2-5401.

With these two going head to head in performance terms, we had to look closely at the additional features. The Zoostorm has a significantly larger hard disk, but only 2.1 speakers, compared to the Nitro's 5.1 surround sound. These are relatively minor details though, and the superior upgrade potential of the Panrix Nitro was the deciding factor. The dual-graphics Nvidia SLI capability (only one card is provided as standard) and additional PCI slots in the Panrix Nitro give it more room for adding power and features in the future. So by a very slim margin indeed, the Panrix Nitro 840D gets our Recommended award.

For our Editor's Choice award, it's not simply a case of out-and-out performance. Dell's Dimension 9150 wasn't one of the top performers, but its dual-core Pentium D processor, 2GB of Ram and beefy 256MB Nvidia 7800GTX graphics card still provide plenty of power, wrapped up in an attractive case and with a 19in TFT display.

Hardcore gamers might prefer our Recommended choice for performance, but Dell's emphasis is clearly on entertainment and multimedia features, rather than just games. The Dimension's TV tuner card and Windows XP MCE give it the most versatile audio and video features, and make it the best overall choice for people who want to use their PC as a solid home workhorse. **PCW**

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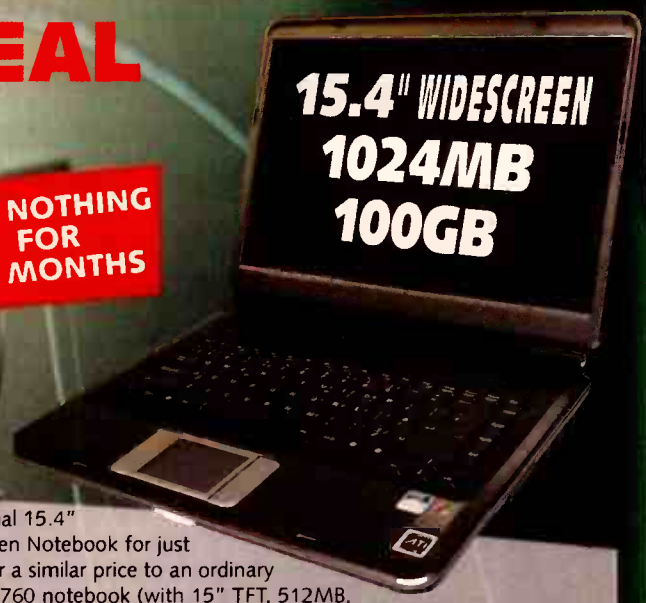

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Dual graphics power

ON TEST

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Dual graphics platforms

'Either a Crossfire or an SLI system will deliver an impressive boost in performance when compared to a single-card solution'

Representing the ultimate in graphics power, ATI and Nvidia's dual-graphics systems can help double the frame rate in 3D games, as Klaus Langer and Matthias Ott discover

PC systems with two graphics cards are currently the ultimate for high-tech enthusiasts. Graphics cards from ATI (Crossfire) or Nvidia (Scalable Link Interface or SLI) bring 3D games to your screen with the highest possible graphics quality. The games run smoothly at the highest quality settings and resolution. Not only does this make 3D shoot-'em-up, driving or flying games look much better, but it also brings a new level of realism to business simulators.

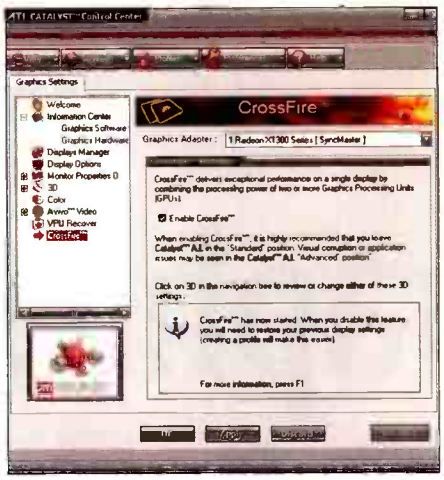
In this group test we've compared the performance of rival architectures from ATI and Nvidia and outlined the best combination of motherboard and graphics card, as well as explaining what to watch out for during installation of the systems.

We'll give you the most important results straight away: ATI systems are a bit faster, but those from Nvidia are a little easier to install. Either a Crossfire or an SLI system will deliver an impressive boost in performance when compared to a single-card solution; according to the application, performance can be up to 90 per cent better.

In the early days of dual-graphics system programming, the developers concentrated exclusively on increasing the frame rate for 3D games. Today, the focus is also on improvements in overall picture quality. The continuing fascination with 3D is not being ignored, and the range of possible settings for edge smoothing and anisotropic filtering is being expanded by developers.

↘

'Dual-graphics systems offer an advantage for multitasking'



When you've installed your dual-graphics system, new options will appear in the driver's control panel. On the left you can see the ATI Catalyst version and on the right Nvidia's Forceware equivalent. Nvidia has a useful option that shows you how the load is being shared between the GPUs when running 3D applications. It's intended as a visual check to show you that SLI is working correctly

Very similar 3D performance

When it comes to 3D performance, the ATI and Nvidia graphics platforms in comparable price/performance classes are almost identical. In the high-end class, however, the ATI Crossfire combination using two Radeon X1900 XTs is just ahead of the Nvidia SLI setup with two Geforce 7800 GTXs.

The fastest ATI combination achieves an impressive 76.4 frames per second (fps) with the resource-hungry 3D game benchmark Far Cry at 1,280 x 1,024 resolution, while the equivalent Nvidia setup rates a 'mere' 63fps. In practice, however, you can't really tell the difference.

The benchmark results on page 115 give an overview of how the 3D performances of different models of Crossfire and SLI graphics cards compare in both single and dual modes.

Control four screens

For users who do a lot of multitasking, dual-graphics systems offer a particular advantage. There are four VGA outputs, so you can attach up to four monitors, and a separate application can run on each monitor. If you activate the dual-monitor option in the relevant driver, four independent video outputs are available for use, and Windows XP will support up to 10 monitors. In respect of multitasking, Nvidia has included a special Finance screen profile in its drivers for use in the financial and stock trading environments.

Another possibility is to display the same application simultaneously on several monitors. Only a few games, such as Microsoft's Flight Simulator 2004, currently support multi-desktop output. For example, when running Flight Simulator you can show a different view on each screen. In the case of a photo editor, you can drag the tool palettes onto a separate monitor to keep the image unobstructed. A word of caution, however: with multi-display applications, you do not get the doubled graphics performance of a Crossfire or SLI system. The only advantage here is in the four monitor connections.

Platforms for SLI and Crossfire

For dual-graphics systems, you need a special motherboard with two PCI Express x16 or x8 interfaces and, unsurprisingly, two suitable graphics cards.

If you are on a limited budget, you could configure a system with, for example, two low-cost Geforce 6600 SLI cards at about £80 each and a motherboard for about £60. The upper end is currently represented by Crossfire systems, with Radeon X1900XT cards costing about £400 each.

Plenty of manufacturers make motherboards using the Nforce4 SLI chipset needed for Nvidia SLI cards. For ATI's Crossfire the choice isn't so great; you can choose between boards using ATI's Crossfire Edition of the Radeon Xpress chipset or Intel's 975X chipset.

A fast CPU is important

Can you increase performance further with a dual-core processor on the motherboard? The answer is no, because the CPU speed is more important than two processor cores with 3D games.

At the moment, the fastest single-core chips available from Intel or AMD run at higher clock speeds than the fastest dual-core processors. The processor should have a speed of at least 3GHz or the CPU can become a bottleneck for graphics performance.

Whether you are using ATI or Nvidia products, you need a power supply unit (PSU) rated at a minimum of 500w, as a single high-end card can draw well over 100w. Any less and there can be crashes in 3D operation.

In spite of this, dual-graphics systems are not always power wasters, especially the higher-end cards, which incorporate power-saving tricks from notebook technology.

If you're using only an office suite, for example, the graphics driver switches to 2D mode in which the core speeds are reduced and some processing modules are turned off.

Ultimate power – Nvidia's Quad SLI

For performance enthusiasts, the X16 variants of the Nforce4 SLI chipsets offer something special: you can run four graphics chips at once. Quad SLI technology does this using two dual graphics cards, each with two 512MB 7800GTX chips, giving a total of 2GB of video memory and a massive amount of graphics processing power.

Each dual card fits into one x16 PCI Express slot and the configuration requires a special Quad SLI-capable motherboard, not to mention a hefty PSU and an efficient cooling system. A few months ago Dell produced a limited edition Quad SLI PC – the Dimension XPS 600 Renegade (pictured) – for the US market, but this is now sold out. In the UK you can buy a Quad SLI system, such as Scan's 3XS range or Alienware's Aurora ALX, but be prepared to fork out well over £4,000 – and that's before you've added a monitor or two.

Dell's XPS 600 Renegade uses Nvidia's Quad SLI technology

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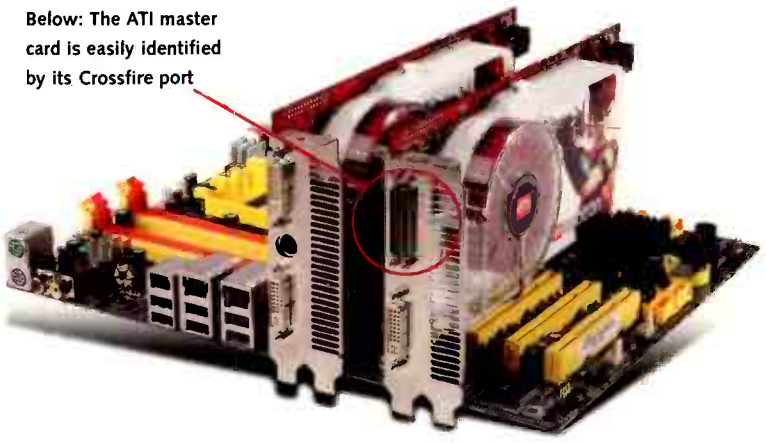
The rivals: blow by blow

The strengths and weaknesses of Crossfire and SLI, and how the installation procedures differ

Above: This is a Crossfire cable with DVI-out (to the monitor) and DVI-in (for connecting to the slave card) connectors



Below: The ATI master card is easily identified by its Crossfire port

CROSSFIRE

ATI's dual-graphics solution has been an inordinately long time in the making, but now ATI's fastest Crossfire combination seems to be gradually climbing to the top of the performance mountain.

The dual-graphics solution from Canadian graphics chip specialists ATI requires a motherboard with a Crossfire chipset such as the Crossfire Edition Radeon Xpress 200 or Intel's 975X chipset.

Installation of the Crossfire cards follows the master-slave principle. The master card is responsible for communication with the slave card. It is fitted with a special chip and a connecting Crossfire cable for this (see picture above).

ATI master cards are still something of a rarity – at the moment master models with the Radeon X850, X1800 or the more up-to-date X1900 graphics chips are available. Any ATI card can be used as a slave, provided its chip is from the same series as the chip on the master. It doesn't matter whether the card is an XT, XL, Pro or a basic model.

It's not all straightforward, though: cards from the midrange (X1600) and budget (X1300) series don't require an external cable connection. On these cards, the PCI Express bus and the chipset jointly take care of communication between cards. You do not, in this case, need to buy a master card. Nvidia's system does not use a master/slave arrangement and has no such problems.

Three graphics modes

ATI's Crossfire cards can be used in three different modes that make different use of the two cards' processing work: Alternative Frame Rendering (AFR), Super Tiling and Scissor Mode.

AFR mode alternately calculates consecutive frames, whereas with Super Tiling the picture is calculated using a chequerboard pattern.

The 32 x 32pixel squares are calculated in turn by one of the two graphics cards; in Scissor mode one half of the picture is calculated by each card. Dual-graphics systems are not needed for smooth playback of high-definition videos. Single graphics cards that support H.264/mpeg4 AVC encoding are fast enough for HDTV or HD videos.

Crossfire installation

To install the graphics cards, you insert them in the pair of PCI Express slots. To activate Crossfire mode, you have to check a box in the driver settings.

For Crossfire mode to work smoothly you must use the driver's artificial intelligence (AI) function. This allocates a profile to a 3D application and the driver then decides for itself about the optimal load distribution among the graphic cards. The driver will point out any installation errors and let you know whether Crossfire is working successfully.

Chipsets for ATI dual-graphics systems

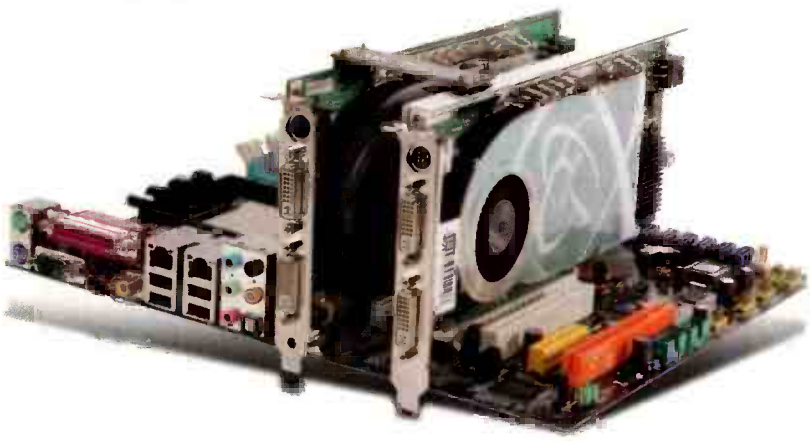
If you want to combine the ATI dual-graphics solution with an AMD CPU, you are, at the moment, limited to ATI's Radeon Xpress 200 Crossfire Edition chipset. Its Northbridge RD480 is paired by the motherboard manufacturers with an ATI SB450 chip or a ULI Southbridge, using either the ULI 1573 or the newer 1575 with a Sata (Serial ATA) II controller. If you intend to transfer hundreds of megabytes of data, say for backup purposes, via USB, you ought to opt for a board with a ULI Southbridge chip, as the USB transfer rate on an ATI SB450 is only half that of other chips.

Intel shoots straight

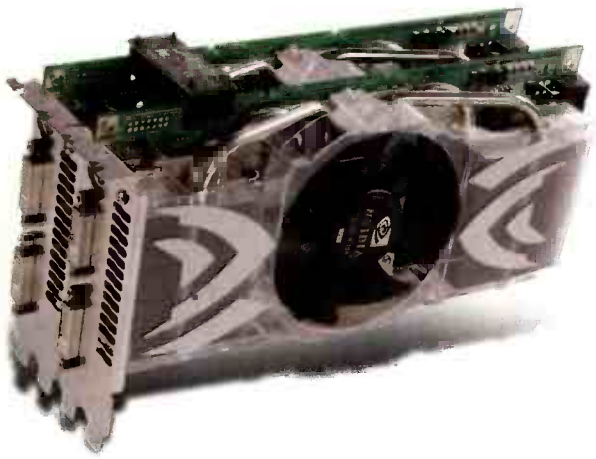
For Crossfire PCs based on Intel chips, the only choice at the moment is Intel's 975X chipset. Motherboards with an ATI Northbridge for Socket 775 CPUs are not yet on the market.

With 975X boards, an ICH7R chip with Raid support and HD audio for high-quality surround sound (7.1 and Dolby Digital) usually serves as the Southbridge. A notable feature with Intel is Matrix Raid: this allows you to create both a fast Stripe Set (Raid 0) and a secure Mirror Set (Raid 1) using just two hard disks. The new Aopen 975Xa-YDG motherboard should be interesting (see review at **www.pcw.co.uk/2155376**), as it will allow Crossfire graphics cards to be used with the new Intel Core Duo mobile processors.

With SLI there are no master and slave cards



No external cable needed: the SLI plug connects the SLI cards



NVIDIA SLI

Implementing an SLI system is easier than installing a Crossfire system. Insert the cards into the PCI Express slots and link them with the SLI connector.

The disadvantage is that, for an application to use SLI mode, an SLI profile has to be stored in the Forceware graphics driver or SLI won't be activated. Currently, there are over 150 games with profiles in the driver and new programs are added with every driver update. If there is no profile available for a current game, you can create your own SLI profile without too much effort. In order to ratchet up the graphics quality, Nvidia permits the use of advanced-edge smoothing techniques when anti-aliasing (AA) is in use. This is possible as the graphics processors share the processing workload for AA: the final output is the result of blending two images that have been processed with 4x or 8x AA. Nvidia calls these special SLI-only AA modes SLI8X and SLI16X.

Combining cards

Nvidia has created a dedicated SLI website with loads of information and instructions for building an SLI system at **www.slizone.com**.

A particularly helpful new feature of SLI is the ability to use graphics cards from different manufacturers, although this is only possible with the Forceware driver version 81.87 and later. In our tests, for example, the Geforce 6600 cards from Gigabyte and MSI worked together with no problems in an SLI setup. This version of the Forceware drivers also lets you use the TV output in an SLI setup.

Heat problems

A further sensible feature of the Nvidia graphics card driver is the ability to monitor and display both graphics processors' temperatures via the driver control panel. This is important as, in a system with dual cards and a lot of other add-on cards or peripherals, heat problems can occur if the case ventilation is impeded.

In order to avoid heat build-up, you should take the layout of the motherboard into consideration when making your purchasing decision. An important factor is the spacing between the two PCI Express slots, which is very tight on many older SLI motherboards.

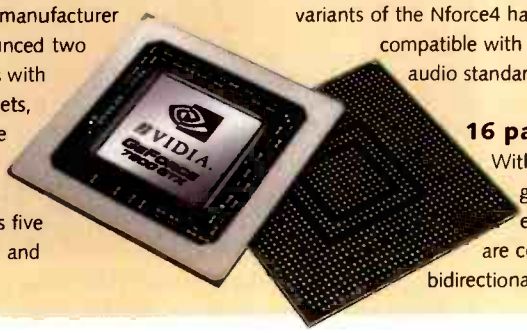
With graphics cards that have large coolers, such as the 512MB version of the Geforce 7800GTX, you can end up with only 1cm or so of free space between the cards. If one of the two cards gets too hot, it slows down the GPU's clock speed automatically. This leads to a noticeable deterioration in performance, which eats up most of the available SLI processing power.

In contrast, on the 256MB 7800GTX cards, the fan has a much lower profile and the air circulation problem is much less likely to occur. On motherboards that have two PCI slots located between the PC Express slots, the necessary spacing to allow adequate cooling is ensured, as long as both slots are kept empty.

Chipsets for Nvidia dual-graphics systems

If you've opted for an Nvidia SLI setup, you won't have to think very hard about the chipset, as SLI only works with Nvidia's Nforce4 chipsets at present.

Motherboard manufacturer Asrock has announced two SLI motherboards with ULI-M1697 chipsets, but Nvidia to date has not certified these for SLI use. Nvidia itself offers five chipsets for AMD and Intel CPUs.



The latest is the Nforce4-SLI-XE for the Intel platform. The Southbridge of this chipset for lower-priced motherboards is, however, missing the hardware firewall, which other variants of the Nforce4 have, but it is compatible with Intel's HD audio standard.

16 parallel lanes

With PCI Express, graphics and expansion cards are connected by serial bidirectional point-to-point connections (called 'lanes'), each with a maximum data rate of 250Mbytes/sec in each direction. The latest PCI Express graphics cards can use 16 of these lanes in parallel – hence the 'x16' designation.

On the majority of motherboards with Nvidia's SLI chipsets, a small circuit board or a Bios option determine whether all the PCI Express lanes are routed to the first slot or whether they are distributed equally to each slot. Lane allocation is not required for the high-end variants of the Nvidia4 SLI chipset, as in this case both graphics card slots are usually connected using 16 lanes each.

Comparative picture quality

With Crossfire and SLI systems, even the most performance-hungry 3D games can be played at the highest frame rates, with full details visible in top quality

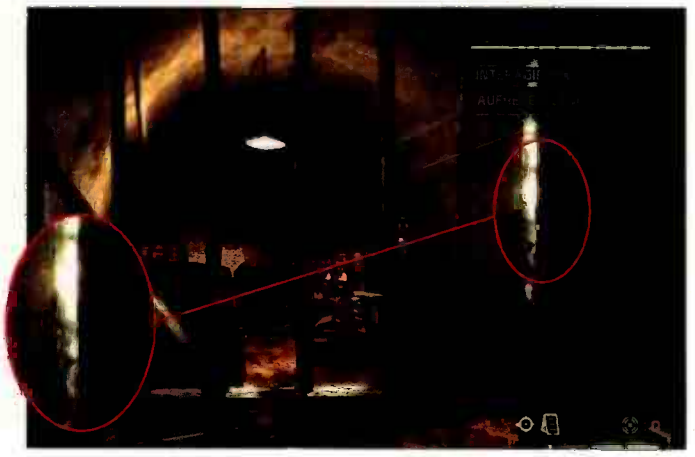
Low graphics power
(For example: Nvidia Geforce 6600; ATI Radeon X1300)

With weak graphics performance, details go missing: there are fewer objects and shadows or reflections

High graphics power
(For example: SLI 7800GTX or Crossfire X1900XT)

With an SLI or Crossfire system, full details are visible in top quality – notice the reflections in the water

The High Dynamic Range (HDR) lighting effect offers better calculation of lighting effects: the scene here is without HDR

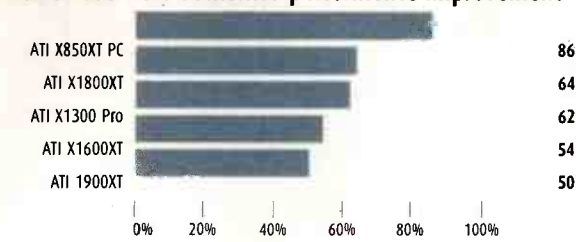


The HDR effect adds more realistic reflections to metallic surfaces and better representation of light sources – note the lighting on the metal grille

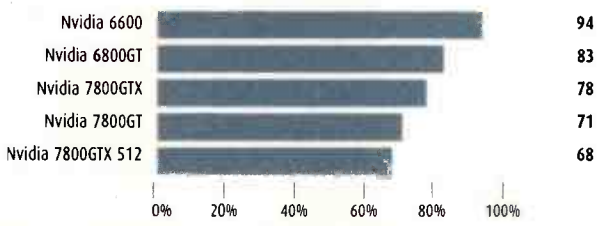
In this scene, there's insufficient graphics performance to show all the combined effects

The same scene with all details and at highest quality – note the water reflections and more natural-looking lighting

ATI single versus dual card 3Dmark05 performance improvement



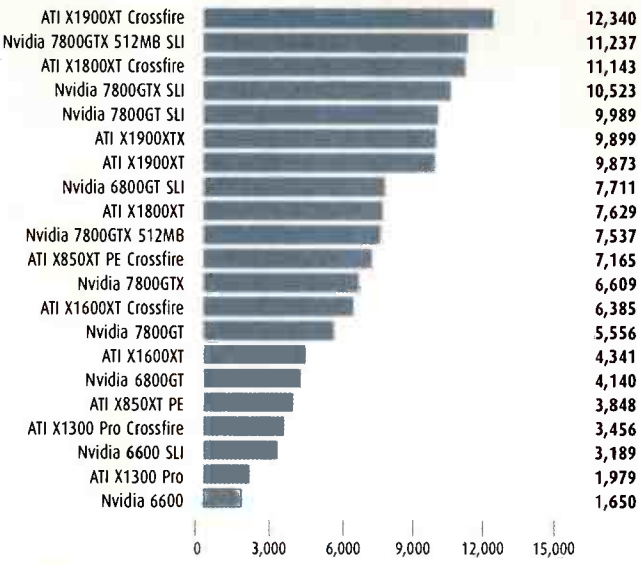
Nvidia single versus dual card 3Dmark05 performance improvement



As these two graphs show, you can almost double the performance of some graphics cards by using them in a dual configuration

3Dmark05 (1,280 x 1,024, 2x FSAA, 8x AF*)

Bigger is better



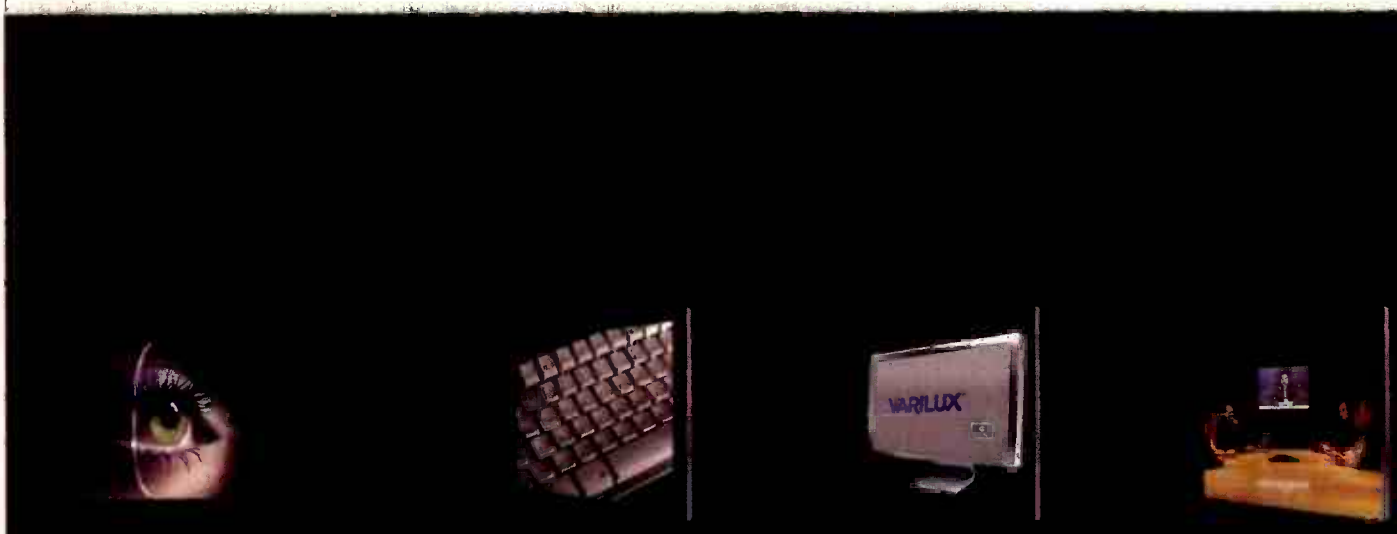
ATI pips Nvidia at the top end of the scale with its X1900XT in Crossfire mode (*FSAA = Full Scene Anti-Aliasing; AF = Anisotropic Filtering)

DUAL GRAPHICS CHIPS SPECIFICATIONS

MANUFACTURER	CHIP NAME	CHIP CODENAME	MANUFACTURING PROCESS (NANOMETRES)	NUMBER OF TRANSISTORS (MILLION)	CORE FREQUENCY (MHZ)	PIXEL PIPELINES	VERTEX SHADERS	MEMORY CLOCK (MHZ)	MEMORY TYPE	MEMORY SIZE (MB)	MEMORY BUS WIDTH (BITS)	APPROX STARTING PRICE FOR RETAIL CARDS
CROSSFIRE GRAPHICS CHIPS												
ATI	Radeon X1900XTX	R580	90	380	650	16	8	1,550	GDDR3	512	256	£400
ATI	Radeon X1900XT	R580	90	380	625	16	8	1,450	GDDR3	512	256	£370
ATI	Radeon X1800XT	R520	90	320	625	16	8	1,500	GDDR3	256/512	256	£300
ATI	Radeon X850XT PE	R480	130	160	540	16		1,180	GDDR3	256	256	£200
ATI	Radeon X1600XT	RV530	90	157	590	4	5	1,380	GDDR3	128/256/512	128	£120
ATI	Radeon X1600 Pro	RV530	90	157	500	4	5	780	GDDR3	128/256/512	128	£100
ATI	Radeon X1300 Pro	RV515	90	105	600	4	2	800	GDDR3	256/512	128	£85
ATI	Radeon X1300	RV515	90	105	450	4	2	500	GDDR3	128/256/512	128	£75
SLI GRAPHICS CHIPS												
Nvidia	Geforce 7800GTX 512	G70	110	302	500	24	8	1,700	GDDR3	512	256	£400
Nvidia	Geforce 7800GTX	G70	110	302	430	24	8	1,200	GDDR3	256	256	£300
Nvidia	Geforce 7800GT	G70	110	302	400	20	7	1,000	GDDR3	256	256	£200
Nvidia	Geforce 6800 Ultra	NV45 + HSI	130	220	400	16	6	1,100	GDDR3	256/512	256	£170
Nvidia	Geforce 6800GT	NV45 + HSI	130	220	350	16	6	1,000	GDDR3	256/512	256	£170
Nvidia	Geforce 6800GS	NV42	110	200	425	12	5	1,000	GDDR3	256/512	256	£130
Nvidia	Geforce 6600 GT	NV43	110	146	500	8	3	1,000	DDR2	128/256	128	£85
Nvidia	Geforce 6600	NV43	110	146	300-350	8	3	500-550	DDR2	128/256	128	£60

DUAL GRAPHICS PLATFORMS

PROCESSOR TYPE	CHIPSET	TOTAL PCI EXPRESS LANES	SLI CONFIGURATION (NO & TYPE OF PCI EXPRESS SLOTS)	MEMORY CONTROLLER	MAXIMUM RAM (GB)	SATA/PATA CHANNELS	SATA II	HARDWARE FIREWALL	GIGABIT ETHERNET	HD AUDIO	NUMBER OF USB PORTS
AMD	Nforce 4 SLI X16	38	2 x16	N/A	4	4/4	✔	✔	✔	✘	10
AMD	Nforce 4 SLI	40	1 x16/2 x8	N/A	4	4/4	✔	✔	✔	✘	10
AMD	ATI Radeon Xpress 200 Crossfire Edition	20	1 x16/2 x8	N/A	4	4/4	✘	✘	✔	✔	8
Intel	Nforce 4 SLI X16 Intel Edition	40	2 x16	DDR2	16	4/4	✔	✔	✔	✘	10
Intel	Nforce 4 SLI Intel Edition	20	1 x16/2 x8	DDR2	16	4/4	✔	✔	✔	✘	10
Intel	Nforce 4 SLI XE	20	1 x16/2 x8	DDR2	16	4/4	✔	✘	✔	✔	10
Intel	Intel 975X	22	1 x16/2 x8	DDR2	8	4/2	✔	✘	✘	✔	8



Visionary lenses for the computer generation

Computers have changed all our lives; in many ways for the better. But they do put strain on our eyes.

Maintaining focus on the screen can cause eyes to become dry and irritated. And we can make as many as 3600 eye movements an hour in repeated shifts from screen to keyboard and back again.

No wonder tired eyes can be a computer generated problem.

In Europe over 60% of 40 to 60 year olds now use computers at home and at work, and around 75% of them report eyestrain.

Now there is a completely new lens from Varilux® that will come as a great relief to many computer users.

This lens is called Varilux Computer™. It comes from the people who invented Varilux® lenses which are prescribed to over 300 million people worldwide.

For further details on Varilux Computer™ lenses and for your nearest Varilux® Specialist Optician please call or visit our website today. It really is a site for sore eyes.

Varilux keeps progressing. You will too.

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Visit www.variluxcomputer.co.uk/world
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COMPILED BY ALAN STEVENS

BUSINESS

TAKE CONTROL OF PRINTING

Whatever happened to the paperless office? Electronic mail, ebusiness and other 'e' technologies may be on the rise, but we're churning out more bits of paper than ever and it's costing a fortune.

The truth is that people like paper and printing is still an important business tool, so in this month's Business section we outline some practical steps you can take to keep your printing budget in check.

There's also a distinct printing theme to the reviews with a new business laser printer and a print server, both with wireless networking capabilities. Plus we have software that can tell you who's printing what on your network, how much it's costing, and will even let you charge for it.

But that doesn't mean we've neglected the other technologies. There's a review of the latest MDaemon mailserver software along with a clutch of other hardware and software products of interest to the small-business user.

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OUR SCORING

Excellent ★★★★★ Very good ★★★★★ Good ★★★★★ Below average ★★★★★ Poor ★★★★★

OUR AWARDS

Editor's Choice: The best product in a comparative group test. Anything that wins this award is of better quality than its competitors.
Recommended: A product that combines great features, usability and value for money.
Great Value: Not the best in class, but a product that has superior features and performance for the price.

Editor's Choice Business

Recommended Business

Great Value Business

The business awards are used for products that are more suited to home offices or small businesses.

'It doesn't matter what kind of business you're in, printing costs you money, and lots of it'

Read the feature on page 118

Slash printing costs

Keep tabs on your printing and reduce the overall bill with these tips from Alan Stevens

It doesn't matter what kind of business you're in or how big your company is, printing costs you money, and lots of it. As well as buying the printer, you're paying for inkjet refills, toner cartridges, maintenance kits, paper and power, not to mention all the setup, management and maintenance required.

However, there are ways to drive down those costs without affecting your business.

Look for inkjets designed to handle high volumes

Know what you've got

In even a tiny company, it can be surprising how many printers get 'acquired' over the years. The first thing you need to do is find out just what printers you have already, how much they're used and for what.

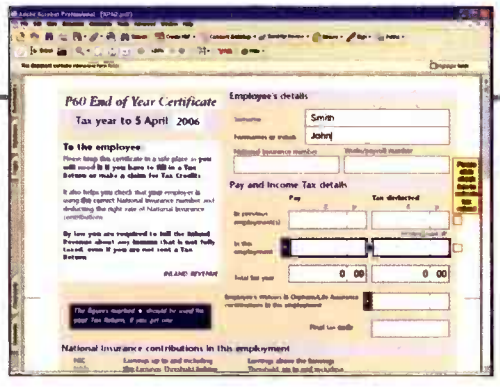
You can also get a rough idea of how much printing goes on by looking at the printer page counters, where available, and by finding out how much you spend on paper and other supplies each month.

In larger companies, it is less easy to get this information, but you can get more accurate, independent data by using specialist printer-auditing software. Print Audit 5, for example (reviewed on page 125), not only lets you build up a full picture of your printer resources and who's printing what, but you can also control the print process more effectively and charge for what's produced.

Once you have this information, you can decide whether the printers are providing value for money, or whether you need to rethink both the number and type involved.

Inkjets or lasers

In terms of technology the main choice continues to be between inkjets and



HM Revenue & Customs includes pdf forms on its employer CD-Rom, and if it's good enough for HMRC...

The portable document format may have been invented by Adobe, but it's actually an open standard.

Although the Adobe Acrobat product line remains the yardstick by which others are judged, it's relatively expensive and there are plenty of affordable alternatives – and we regularly include such tools on our cover discs.

Note too that HM Revenue and Customs uses pdf files for many of its forms, and most accounting packages let you create pdf invoices and other documents rather than print them out.

Create your own pdfs

You've probably had a pdf (Portable Document Format) file or two drop into your inbox and, no doubt, used Adobe's free Acrobat Reader to open them. But did you know that you can easily and cheaply create pdfs of your own and take advantage of all this electronic document format has to offer?

That means being able to print to a pdf file from any Windows application, control who will be allowed to open and print the document and optionally encrypt the content. Tools to update and manage pdf files are also available along with utilities to convert to and from other formats, build interactive forms, embed pdf tools into other applications and a whole lot more.

Six of the best pdf creation and management tools

Adobe Acrobat	www.adobe.com	The standard by which other pdf applications are judged. Full set of tools available for the creation, editing and management of electronic documents
PDF995	www.pdf995.com	Full suite of pdf creation, conversion and management utilities. Free if you're willing to accept a bit of advertising
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Nitro PDF Professional	www.nitropdf.com	Full suite of pdf creation and conversion tools including form-filling options
Pdf Factory	www.pdffactory.com	Pdf creation, merging of multiple documents, encryption and password security, send pdf by email. Conversion and pdf-editing utilities, server and 64bit Windows versions also available
Scansoft PDF Create	www.nuance.com	Pdf creation, merging multiple documents, encryption and password security. Conversion/pdf-editing utilities available

lasers, with inkjets often seen as a more affordable small-business solution. However, it's important to look at all the running costs rather than just the purchase price.

Starting at around £25 ex VAT, inkjets are hard to resist, but cartridges quickly run dry, leading to sky-high cost of ownership and constant, often fiddly maintenance. Really cheap inkjets are designed primarily for home users printing high-resolution colour photos. Quality matters to business users, but most are more interested in being able to print large numbers of mostly black and white documents cheaply and reliably.

Business users should look for inkjets designed to print large volumes at high speed, although don't expect them to be much cheaper than a laser to buy or any cheaper to run. The only exception is where you need to print in colour, where an inkjet is likely to be more cost effective than a colour laser, especially for small volumes.

For general business printing, it's hard to beat a laser. They tend to have much higher duty cycles (the number of pages that can be printed per month) and superior paper-handling facilities with multiple input trays, duplexing (see box above) and document finishing options, often as standard.

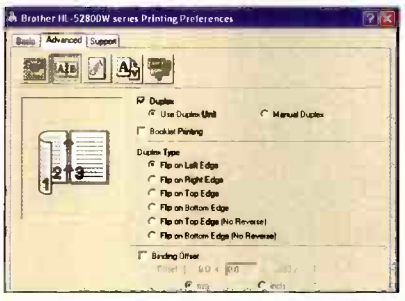
There are differences, and to save on running costs look for lasers with separate toner and developer cartridges. The developer cartridge in the Brother HL-5280 (see page 120) only has to be changed every 25,000 pages compared to 5,000-7,000 for the toner. That means cartridges are a lot cheaper to buy – and it's more environmentally friendly not to throw away perfectly good components whenever the toner runs out.

When looking for a robust business printing workhorse a laser is hard to beat

Print, print, duplex, duplex

Here's a very simple tip that can, literally, cut your printing bill in half: print on both sides of the paper!

OK, strictly speaking, it won't cut your printing bill in half, but it can make significant inroads into the amount of paper you have to buy. The documents will also be a lot more professional looking and, if you're producing long reports, easier to bind.



Double-sided printing is easy to configure, looks professional and can really save money

Manual duplexing isn't easy, and you don't really want to print double-sided on an inkjet, but it's now a common option on even quite cheap lasers. It's also very easy to use with, in most cases, duplexing implemented as a tickbox choice in the Windows printer driver. Turn it on and the printer does all the hard work, grabbing back every other page as it comes out, turning it over and printing the next one on the back.

Why stop there? A lot of printer drivers let you print multiple pages on each sheet (known as 'n-up' printing), cleverly arranged to fold and make into a booklet. Or check out Fineprint (**www.fineprint.co.uk**) which sells software to enable this and other cost-saving options no matter what printer you're using.

Don't forget to include photocopiers or faxes in your plans; both produce printed output and cost money to run. Multifunction devices (MFDs), incorporating a scanner and, optionally, a fax modem, can be used to replace both without compromising on functionality or convenience, with the added benefit of only having to buy, manage and maintain one piece of hardware.

Share and share alike

One of the most effective ways of reducing printing costs is to do away with personal desktop devices and share printers on your network. You can do this in several ways, starting with software sharing in Windows.

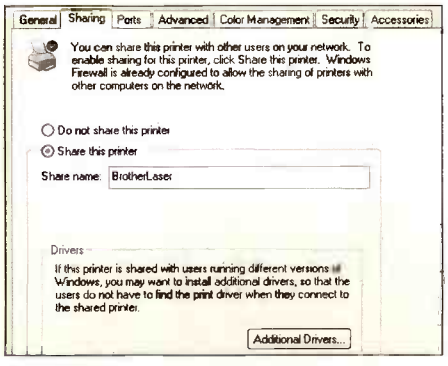
Any printer attached to a Windows PC can be shared, no matter how it is connected. Open the printer properties, click on the Sharing tab and tick the option marked 'Share this printer'. Other PCs will then be able to browse to the shared printer, although it will only be available when the host PC is switched on. The local user may also notice some slowing down when large or complex documents are being printed. On a larger network look at other ways of sharing printers.

You could, for example, attach the printers to a network file server that, by definition, should always be available. But that's probably locked away, so consider setting up a dedicated print server PC or, even better, a custom print server appliance.

Dedicated print servers only cost a few pounds and have several advantages. They're robust with no moving parts to go wrong and small enough to enable printers to be located for maximum convenience – some even support wireless networking, allowing printers to go almost anywhere.

Two types of print server are available: external devices such as the Netgear WGPS606 (reviewed on page 129), to which you can attach one or more printers using parallel, serial or USB cables; and internal adapters built into the printer itself. They're all very easy to set up – typically from a browser – and in many cases will accept print jobs from a variety of clients, enabling Windows PCs, Apple Macs and Unix or Linux users to all share the same printers.

There are lots of other things you can do to drive down print costs, such as using pdf documents rather than paper wherever possible (see box on opposite page) and by outsourcing high-volume work to a professional print shop. Whatever you do, it's hard not to save money, with surprising savings to be made if you really try. **PCW**



Any printer attached to a Windows PC can be shared with others on the network

LASER PRINTER

Brother HL-5280DW

Personal Computer World BUSINESS RECOMMENDED

Fast speeds, high quality and wireless support at a good price

The product name may be a bit of a mouthful, but the Brother HL-5280DW is a very compact business-class laser with a range of advanced features, including support for both wired and wireless networking.

The HL-5280DW sits at the top of the recently released HL-5200 series and is well suited to life as a small-business or workgroup printer. It has a 250-sheet A4 paper tray located in the bottom of the unit to which two more trays can be added, bringing capacity up to 750 sheets. Plus there's the usual foldout feeder for card, transparencies and envelopes and a built-in duplexer for double-sided printing.

Running costs, of course, are just as big an issue as the purchase price, so a new 7,000-page toner has been introduced on this model which, together with a separate drum unit, brings print costs down to a claimed 1.2p (inc VAT) per copy. It's no slouch, with a 28ppm laser engine, a fast (266MHz) Risc processor and 32MB of onboard memory, expandable up to 544MB using standard Dimms.

For most small-business applications, however, the standard configuration will be more than adequate, with PCL and Postscript 3 (BR-Script) emulations both provided as standard. Drivers for use with Windows, Apple Mac and Linux PCs are also available with support for a range of advanced features, including N-up booklets, poster stitching and watermark printing.

On the connectivity front, you're almost spoilt for choice. As well as USB and parallel ports, for example, there's a 10/100Mbits/sec wired Ethernet interface and a 54Mbits/sec wireless controller also built in as standard. The wireless interface can be used with both 802.11b and 802.11g networks to either connect the printer to an existing Lan or, in ad-hoc mode, to allow wireless clients to print directly to the Brother laser on a peer-to-peer basis.

The necessary print server emulators are all built in. There's also support for just about any network, printing or management protocol you care to name; everything from standard Windows SMB printing through to Cups (the Common Unix Printing System) and IPP (Internet Printing Protocol), with a comprehensive setup wizard plus an integrated web-management interface to further help tweak the settings.

Using these, it took less than five minutes to hook the Brother laser onto our test network and use it both over the wired Lan and on a secure WPA-encrypted 802.11g link. Support for SNMP management is also provided and a copy of Brother's own Windows print-management console (BR Admin) is thrown in for good measure.

Another big benefit with this printer is a general lack of noise, added to which there's none of that annoying ozone smell you seem to get from some lasers, making the HL-5280DW a very easy printer to live with. It's also very quick, warming up from standby in just under 10 seconds to deliver top-quality output at an impressive rate. Indeed, the only niggle we had was with the duplexer which, like others we've tested, tends to grab back each page and print the other side regardless of whether there's anything on it.

Speed will depend on what you're printing and its resolution, with a slightly slower 1,200dpi on offer if the default 600dpi fails to impress. Either way, quality is excellent on this fast, fully featured, yet affordable small-business laser. *Alan Stevens*

Details

Price £410 (£349 ex VAT)
Best price www.pcw.co.uk/bestprices
Contact Brother 0845 606 0626 www.brother.co.uk
Specifications 28ppm, 1,200dpi laser printer • 250-sheet A4 paper tray expandable to 750 sheets over three trays • 7,000-page toner cartridge, separate 25,000-page drum unit • Integrated duplexer • USB and parallel interfaces • Wired 10/100Mbits/sec Ethernet interface • Wireless 802.11g interface • Integrated print server • Web-based and SNMP management (BR Admin software included)

Verdict

Pros Fast warm-up; print speeds; integrated wireless interface and support for a host of networking protocols; high-yield toner; built-in duplexer
Cons Duplexer 'prints' blank second sides

Features	★★★★★
Performance	★★★★★
Value for money	★★★★★

Overall A good-quality, small-business laser that does it all without costing the earth
★★★★★

MSI recommends Microsoft® Windows® XP Home

AMD Turion64 X2 MOBILE TECHNOLOGY

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- All-in-1 designed with Combo/DVD Dual
- 1.9kg

Light and elegant
MSI unique Dual Corecell function

Lightweight and Slim

It weights only 1.9Kg and is equivalent to the height of only two thin magazines.

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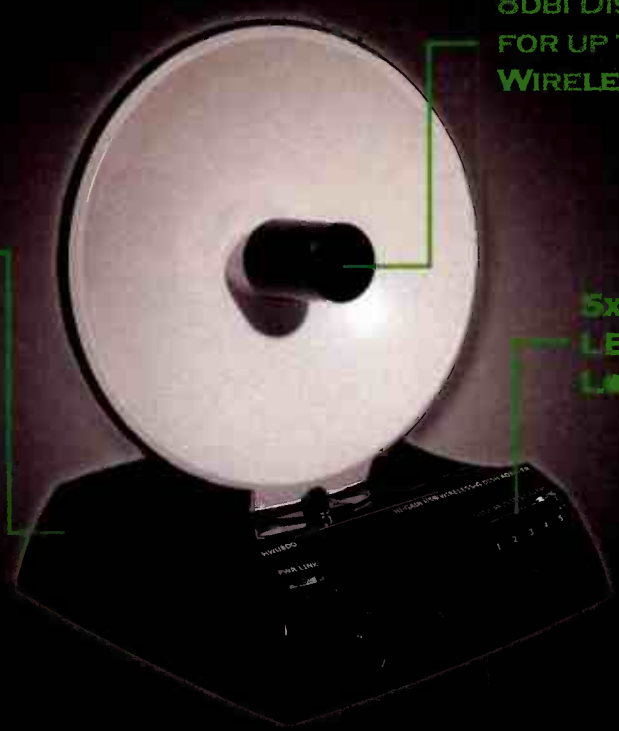

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LED PROJECTOR

Toshiba TDP-FF1A

Tiny, lightweight, economical to run and good for presentations when you're on the move

If you spend your life presenting to small groups, the Toshiba TDP-FF1A projector, or FF1 for short, could be of interest. To start with it's tiny. Small enough, in fact, to fit into a large pocket, and it's lightweight too, weighing just over half a kilo. It also comes with a portable screen and uses a light-emitting diode (LED) rather than a conventional mercury bulb, making it both very robust and economical to run. However, it's not particularly cheap and compromises have been made to achieve the small format.

The FF1 comes as a complete kit in a deceptively large carry case to accommodate not just the projector itself, but the neat folding screen designed for ad-hoc presentations. Other than that, the bag is almost empty with the projector itself measuring just 135 x 100 x 55mm (w x d x h).

A standard 15pin D-Sub video port is used to hook the projector's SVGA (800 x 600) output to a PC using the cable provided, with a composite video RCA socket underneath and audio connectors alongside. There's also a USB socket into which it's possible to plug a Flash memory stick containing jpeg images for a totally PC-less presentation. You don't even have to plug it into the mains, thanks to a clip-on lithium-ion battery, enabling the projector to be used for up to two hours between charges.

Focusing is done by manually turning the lens and there's a screw foot underneath to adjust the display angle. However, this isn't very effective and we ended up balancing it on a pile of books. The four buttons needed to control the projector are all on the top, with a credit card-sized remote control also included in the kit.

The small size is all down to the use of a DLP (Digital Light Processor) chip and the LED light source, with a 10,000-hour life another big advantage compared to mercury bulbs, which always seem to need replacing just before a big presentation. It also means that you can power up and start using the FF1 straight away.

Likewise, when you've finished, there's no need to wait for the bulb to cool down. Just switch off, throw it in the bag and you can be off to your next appointment.

Unlike a conventional projector, however, it's not particularly bright, plus you're limited to a maximum resolution of just 800 x 600pixels. Good enough, perhaps, for a small group, and the accompanying screen has a reflective surface which helps. But with a maximum projection distance of around 2.5m the resultant picture isn't very big.

The bundled screen measures 570mm diagonally, roughly the same as a 22in TV, enabling a group of people to sit around a table and view a presentation in daylight.

However, when we enlarged the image and projected it onto a larger screen or wall, it became necessary to draw the blinds and at the maximum size (1.75m) there was a high degree of fuzziness, further added to by the relatively low resolution.

Portability is clearly the major selling point of this Toshiba projector and that could be important if you spend your time giving demonstrations, running courses or pitching for business to small groups. However, to present to larger numbers or for permanent installation, a conventional projector is still the technology of choice. *Alan Stevens*

Details

Price £899.99 (£765.95 ex VAT)
Best price www.pcw.co.uk/bestprices
Contact Toshiba 01234 121 3456 www.toshiba.co.uk
System requirements DLP projector • 10,000-hour LED lamp • 400-lux brightness • 800 x 600pixels resolution • Projection distance 0.65-2.5m • Max image size 1.75m (diagonal) • Connectors – D-Sub video-in, composite video-in, audio-in, audio-out, USB • Removable lithium-ion battery • 135 x 100 x 55mm (w x d x h) • 736g • Remote control • Fold-up screen • Carry case

Verdict

Pros Very portable; no cooling down of bulb; two-hour battery life; USB slot for Flash memory sticks
Cons Limited brightness; low resolution; maximum image size of 1.75m

Features ★★★★★
Ease of use ★★★★★
Value for money ★★★★★

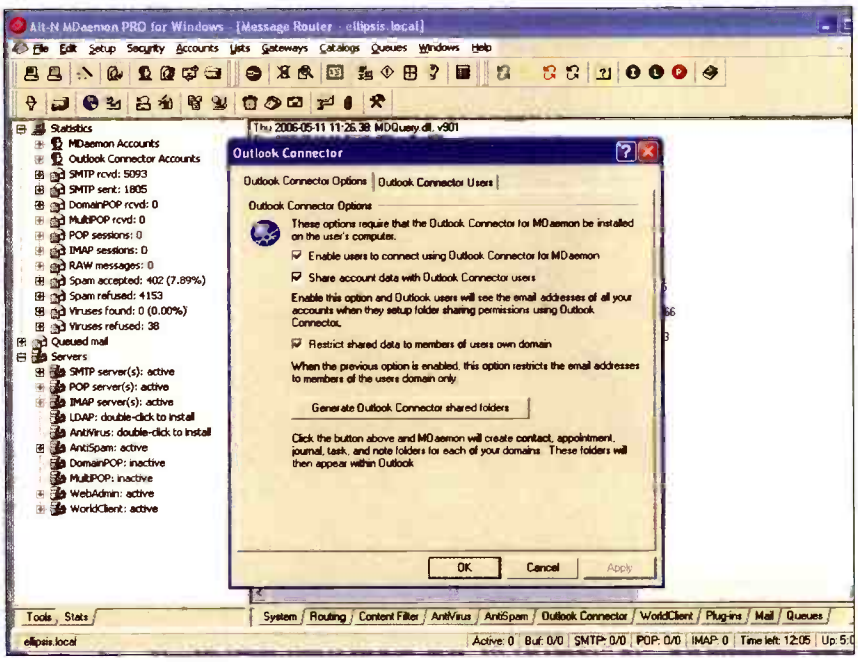
Overall Great for presentations on the run, but outclassed by conventional projectors that can be almost as portable

★★★★★

SMTP EMAIL SERVER

Zen Software MDaemon Pro v9.0

Bigger, better, closer to Microsoft Exchange – and cheaper, too



Outlook Connector helps provide seamless integration with Microsoft's Outlook client

Popular with small businesses as a simpler, more affordable alternative to Microsoft's Exchange email server, the latest version of MDaemon Pro majors on performance and security improvements along with enhancements to the already comprehensive groupware capabilities.

The performance benefits will be felt most by companies needing to handle large volumes of mail, but those using Imap mail and the web-based World Client software will also benefit. Most of the message-handling processes are now multithreaded, along with those supporting the anti-virus, spam and content-filtering options, with significant throughput gains to be had, especially on multiprocessor and multicore platforms. However, even on a modest, single-processor server, the extra speed is evident and worth having.

Also evident are changes to the MDaemon Outlook Connector, an optional add-on (from £70.59 ex VAT for six users) which enhances the built-in groupware functionality to provide seamless integration with Microsoft's Outlook client. This also gets a performance makeover along with functionality enhancements to make the end result a lot more Exchange-like.

As with Exchange, the Outlook Connector stores data on the mail server itself rather than a local PST file. This data can also be shared by the web-based client, with the Outlook Connector also providing native support for the various collaboration features otherwise only available when using Outlook with a Microsoft server. That means the ability to share contacts, calendars, notes and other folders and now, with MDaemon v9.0, an integrated 'free/busy' service to enable users to check on other people's availability when scheduling meetings.

An out-of-office button allows users to set up automated responses. A couple of omissions need to be addressed to fully emulate an Exchange setup, such as support for contact categories, which will be added in another update later this year.

On the security front, MDaemon has always been a leader, with an integrated, Kaspersky-based, anti-virus scanner (updates from £67.65 ex VAT per year), support for SSL message encryption and a range of anti-spam and content-filtering options. There is also enhanced support for emerging anti-spoofing and anti-phishing technologies. Most notable is the Sender ID initiative, whereby sender IP addresses are checked to make sure they match those of the purported domain.

An integrated SyncML interface enables smartphone and PDA users to synchronise handheld data directly without third-party tools. Web Admin, the browser-based management console (previously a free download), is now integrated into the main package. You can also configure MDaemon to synchronise user accounts against Active Directory.

Management remains the Achilles' heel of this package which, if you take advantage of everything, can be complicated to set up and administer. Troubleshooting isn't easy, although MDaemon is a very stable platform that, by sticking to open email standards, rarely runs into trouble. You get a huge amount of functionality for a lot less than the cost of deploying Exchange and, most of the time, MDaemon is easier to manage.

Existing customers who have paid for support will get the MDaemon v9.0 upgrade free, while small businesses looking to buy for the first time will find that it compares well with Exchange and other Windows SMTP solutions. *Alan Stevens*

Details

Price From £262.65 (£223.53 ex VAT) for six users
Best price www.pcw.co.uk/bestprices
Contact Zen Software 0845 058 058 www.zensoftware.co.uk
System requirements 500MHz Pentium III host (Pentium 4 2.4GHz or higher recommended) • 512MB of memory (1GB recommended) • 100MB disk space plus additional space for mail storage • Windows XP/2000/2003 • Internet Explorer 5.5 or later

Verdict

Pros Significant performance enhancements; integrated free/busy service; Active Directory synchronisation; integrated web-based management
Cons Can be complicated to manage and to troubleshoot problems; Outlook groupware functionality still not quite as seamless as with Exchange

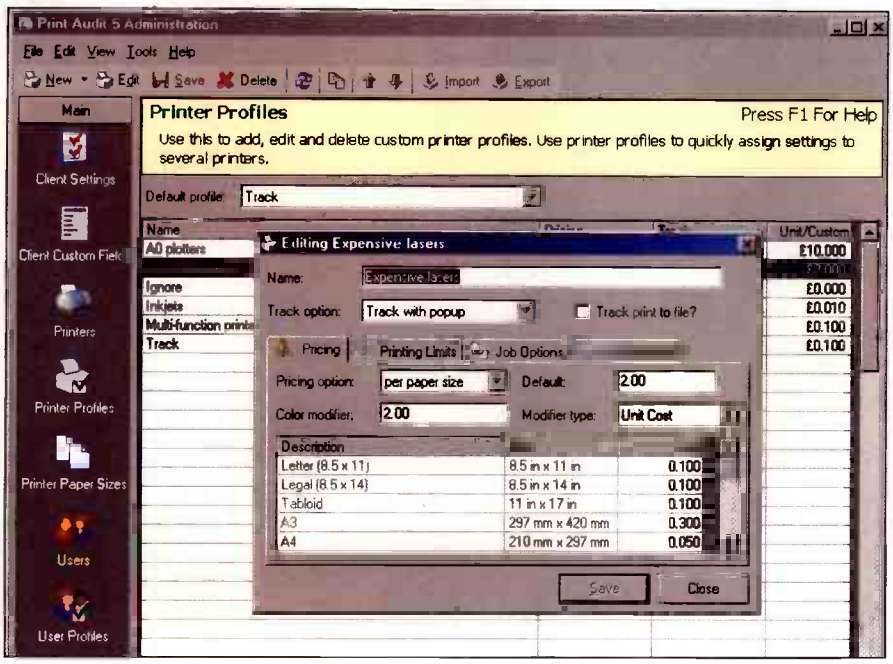
Features ★★★★½
Ease of use ★★★★★
Value for money ★★★★★

Overall Cheaper and easier than Exchange and now with almost as much functionality
★★★★½

PRINT-MANAGEMENT SOFTWARE

Print Audit 5

Keep tabs on who's printing what, and manage your costs



Using PA5 you can track and charge for document printing

There are lots of good reasons for using Print Audit 5 (PA5): It can, for example, tell you who's printing what and whether they're really using that expensive multifunction laser you've just installed or a desktop inkjet that costs the earth to keep in cartridges. More than that, however, it lets you monitor and manage your print costs.

Unlike most print-management tools, PA5 is client- rather than server-based which makes for a somewhat lengthy setup. It does, however, confer the advantage of being able to monitor all types of prints, whether to locally attached printers and plotters or via a network print server. No changes to the Windows drivers are needed, and plug-ins for Autocad and Microstation will be installed automatically where these applications are detected.

Deployment starts with the creation of the database used to hold the collected data, along with installation of a special client communicator program and management/reporting tools.

On a small network (up to 50 users) a flat-file (Access) database is provided, but for anything bigger you'll need Microsoft's SQL Server – either the full package or the free MSDE or SQL Express editions.

Fortunately no database knowledge is required, and there is no need for client PCs to have database access, with all the transactions handled through the client communicator using a user-selectable TCP port. The client communicator needs to be installed on an always-on Windows host; typically, the database server. However, if it's switched off or becomes unavailable for any reason, clients will continue to cache print data locally until communication is re-established.

Next you need to create a network-distribution folder from which the PA5 client will be loaded onto every PC to be monitored. That can either be done manually or, more usually, automated using login scripts, Group Policy or the custom client status and deployment tool included in the package.

Once installed the client software starts logging print activity straight away, no matter what the source. Job query and reporting tools are also provided to make sense of the information collected, with a choice of standard reports and a custom report generator. Data can also be exported for further analysis and imported into accounting packages if required.

By default, everything is priced using a base rate of 10p per page, which you can alter using custom profiles applied to the lists of printers and network users collated by the software. Cost modifiers can be applied to reflect paper size, colour and duplex printing, plus there are facilities to ignore printing to a file, pdf generation and printing from specific applications.

Finally the software can be set to ask users to input customer or job information via a pop-up whenever a print job is processed. Up to four custom codes and associated values can be defined. Users can also be asked for Pin codes before they're allowed to print. You can manage printer access by redirecting large documents to the most appropriate devices and by setting document quotas.

A great tool for small engineering or architectural practices wanting to charge for printing, PA5 is equally useful for anyone looking to understand their print spending and manage it more effectively. The data collected can be a real eye-opener and, configured correctly, it should pay for itself quickly. *Alan Stevens*

Details

Price From £24.20 (£20.60 ex VAT) per user
Best price www.pcw.co.uk/bestprices
Contact Print Audit 01483 726 206 www.printauditeurope.com
System requirements Client requires Windows 98SE or later • Mac OSX client also available • Client communicator requires Windows 2000 or above • Flat-file Access included • Support for SQL Server 6.5 or later • Windows or Novell Netware network

Verdict

Pros Monitors local as well as network printers; Apple Mac client; Autocad and Microstation plug-ins; local caching when client disconnected; bundled reporting tools
Cons Client deployment can take some time
Features ★★★★½
Ease of use ★★★★½
Value for money ★★★★★
Overall A flexible print-monitoring tool; small companies will be most interested in the cost-recovery features
★★★★½

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TAPE BACKUP

Sony Storstation AIT-3Ex

A good choice of upgrade for existing AIT owners

The Storstation AIT-3Ex is the latest generation of Sony's tiny AIT (Advanced Intelligent Tape) drive, offering a native capacity of 150GB per cartridge and a sustained throughput rate of 18Mbytes/sec – figures which represent a 50 per cent capacity and performance hike compared with existing AIT-3 drives, for the same money.

Whether you need this extra space and speed will, of course, depend on what you want to back up. However, the AIT-3Ex is a good match for the disk capacities on offer in the small-business server market, especially when the built-in hardware compression is applied, although Sony claims a somewhat optimistic 390GB per cartridge in such cases. That's a lot more than most of the competition predicts and we certainly didn't manage to get anywhere near that figure in our tests, conducted using the Symantec Backup Exec for Windows Servers (Quickstart Edition) included in the box. However, compression did have an appreciable effect, boosting capacity by around 40 per cent on average using our sample datasets.

Overall throughput was good, the Sony drive taking a full backup of the 160GB Sata data disk in our Pentium 4-based test server in just over two hours.

We used an internal model with an Ultra160 SCSI interface for those tests, the AIT drive slotting easily into a standard half-height expansion slot using the adapter provided. Rails for mounting in an HP Proliant are also included and there's even a 3.5in bezel, if needed. A self-powered external version is also available (£1,163 ex VAT) with all models able to read and write AIT-3 format tapes, although you only get the full capacity and performance with AIT-3Ex media.

A good fit with the typical small-business server, the Sony AIT-3Ex offers over four times the capacity of the DAT format. However, it faces competition from other half-height products (such as the Tandberg 420LTO reviewed in the June issue of *PCW*, and online at **www.pcw.co.uk/2152334**), which offer yet more capacity and performance at much the same price. *Alan Stevens*

Details

Price £1,125.65 (£958 ex VAT)
Best price www.pcw.co.uk/bestprices
Contact Sony 01932 816 000 www.sonyisstorage.com
Specifications 150GB per cartridge native capacity (390GB with compression) • 18Mbytes/sec native sustained transfer rate • Ultra160 SCSI LVD/SE interface • Adaptive Lossless Data Compression (ADLC) • Bundled Symantec Backup Exec for Windows Servers Quickstart Edition

Verdict

Pros More capacity and throughput than AIT-3; bundled backup software; compatibility with other AIT formats
Cons Half-height LTO drives provide more for the same price

Features ★★★★★
Performance ★★★★★
Value for money ★★★★★

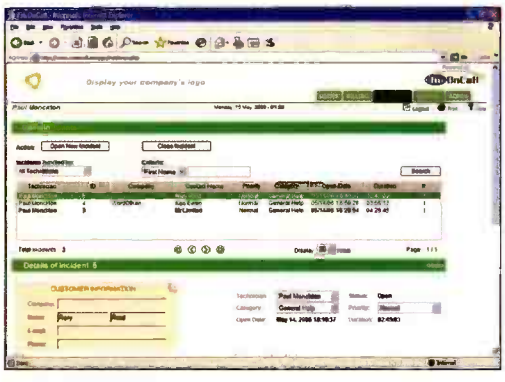
Overall A sensible upgrade for existing AIT users but new users might want to look at LTO

★★★★★

REMOTE HELPDESK

01 Communique I'm Oncall

Remote, hands-on technical support made simple thanks to an easy, web-based interface



Wherever you are, as long as you're connected to the Internet, you can initiate remote technical support sessions using only a web browser. No software needs to be pre-installed at the remote end, so you can connect to new clients and take control of their PCs in moments.

To prepare a remote session, you can either create a pre-configured email containing an HTTP link or ask the user to input a code on your support web page, which can be customised with your own company logo.

Once you've connected, you get remote control and file transfer – and that's it. Many features you might expect are absent. The most noticeable omission is the lack of any integrated chat facility. If you don't want to fight for control over a Notepad window, you'll have to use the telephone or instant messaging to speak to your client. Furthermore, it doesn't come with any support tools, for example remote viewing of critical system information, such as running processes or system event logs. Instead, everything must be conducted via the remote-control session.

On the administration side there are plenty of configuration and customisation options. You can edit the content of the automated user invitation email, create categories of support incidents and build up a database of clients to which you can attach notes and comments. You can add multiple support technicians to your online team and search all current and previous incidents.

It's all very quick and easy, but I'm Oncall is not without competition and is lacking in some areas. At $99 (approx £53) per month, per seat, I'm Oncall works out about the same price as competitors such as Log Me In Rescue (**www.logmein.com**). A free trial is available from **www.imoncall.com**. *Paul Monckton*

Details

Price Single user $99.95 (£53) per month; $999.95 (£531) per year
Best price www.pcw.co.uk/bestprices
Contact 01 Communique www.imoncall.com
System requirements
Local system: Windows 98/ME/2000/XP/Server 2003 • Internet Explorer 5.5 or later/Mozilla Firefox 1.5
Remote system: Windows 98/ME/2000/XP/Server 2003

Verdict

Pros Very easy to set up; no troublesome installation for remote users; technicians can share licences
Cons No chat facility; lack of online features

Features ★★★★★
Ease of use ★★★★★
Value for money ★★★★★

Overall Easy to configure, use and manage, but light on remote-support tools

★★★★★

WIRELESS ACCESS POINT

US Robotics Professional Access Point

Business-class Wifi device to improve your security

The Professional Access Point addresses many small-business security and management concerns typically ignored by cheaper, consumer-focused, wireless devices.

It doesn't look special, with a pair of rather large antennas the only giveaway as to what's inside. Nor is it remarkable in pure wireless terms, supporting standard 54Mbits/sec 802.11g networking with none of the go-faster add-ons common in the consumer market.

It has a whole raft of features not normally found on low-cost wireless devices. As well as the usual WPA and Wep encryption facilities, there's full support for WPA-2/802.11i using Advanced Encryption Standard encryption plus a built-in 100-user mini Radius server and support for external Radius authentication. There's rogue access point detection too, and the ability to define a separate guest VLan to keep occasional users away from more sensitive network resources.

Web-based management comes as standard with SNMP support if required – Management Information Bases (MIBs) are included. There's also a neat clustering facility for companies looking to support wireless roaming with multiple access points. Up to eight Professional Access Points can be clustered with only the first requiring direct setup. The others inherit the same basic settings, with dynamic channel planning, load balancing and Quality of Service also supported across the cluster.

The interface is a little cluttered, but with the basics all handled by a wizard, configuration is not too onerous, with the clustered management facility a real time saver on larger deployments.

Support for Power over Ethernet (PoE) would have been useful, but what you do get is more than enough for most small businesses. *Alan Stevens*

Details

Price £149.99 (£127.65 ex VAT)
Best price www.pcw.co.uk/bestprices
Contact US Robotics 01628 640 140 www.usr.com
Specifications 802.11b/g wireless access point • Multi SSID/BSSID support • Single 10/100Mbits/sec Ethernet interface • VLan tagging; integrated 100-user mini Radius server • AP clustering

Verdict

Pros Automatic setup and load balancing of AP clusters; guest VLan facility; SNMP support
Cons No PoE support; standard 802.11g performance
Features ★★★★★
Performance ★★★★☆
Value for money ★★★★★
Overall Not cheap, but addresses many wireless security and management concerns faced by a small business
★★★★★

WIRELESS PRINT SERVER

Netgear WGPS606

Printing without (some) wires is reasonably easy with this print server

Don't expect to plug printers into the Netgear WGPS606 wireless print server and print documents directly from a wireless PC. It can be done but not peer-to-peer, the WGPS606 acting as a bridge to wirelessly link any attached printers to an existing network access point or router.

A neat solution for companies looking to share a couple of printers on their Lan, the WGPS606 looks much like an ordinary Netgear switch. Which isn't surprising because, as well as an 802.11b/g wireless interface, it has a built-in four-port 10/100Mbits/sec switch which can be used both to share attached printers and for more general network duties.

The printers need USB ports and, after connection, setup is a three-step, wizard-driven process. The first step requires the printers to be connected and configured on a local PC. That done, they're re-plugged into the print server along with the already configured PC which, at this point, is connected using an Ethernet cable. The wizard then locates the print server and takes you through the setup of the wireless interface, searching for available Wifi networks and prompting for any encryption keys required.

Finally you can unplug the Ethernet cable and send documents to print from any network PC – whether connected wirelessly or not – with a separate client wizard to help with the port setup involved.

You will need suitable drivers on each of the clients unless an intermediate Windows print server is configured to download the drivers on demand. A Windows server could also help overcome the platform restrictions, otherwise the clients need to be running Windows 98 or above.

Performance will depend on the speed of the printer and whether you're printing over the wired or wireless infrastructure. Most of the time there's little difference but long and complex documents can take a lot longer if sent over a Wifi link. *Alan Stevens*

Details

Price £65.80 (£56 ex VAT)
Best price www.pcw.co.uk/bestprices
Contact Netgear 01344 458 200 www.netgear.com
Specifications 54Mbits/sec wireless print server • 802.11b/g Wifi interface • Four-port 10/100Mbits/sec wired Ethernet switch • Two USB 1.1 printer ports (cables included) • 64/128bit Wep and WPA encryption (shared keys) • Existing wireless router or access point required

Verdict

Pros Share two USB printers over a wired/wireless Lan; supports common Wifi encryption technologies
Cons No support for ad-hoc wireless printing; USB printers only; bulky external power supply
Features ★★★★☆
Performance ★★★★☆
Value for money ★★★★☆
Overall Not an essential, but adds useful wireless capabilities
★★★★☆

TIME MANAGEMENT/BILLING

Acksen Timesheet Xpress 8

Personal Computer World BUSINESS RECOMMENDED

An essential tool to monitor, record and bill your company's time

Timesheet Xpress fills the gap between paper timesheets and full-blown CRM tools

Time is the stock-in-trade of a surprising number of small businesses, but keeping track of it, and billing for it, is far from easy. Manual timesheets can be cumbersome, contact-management tools complex and expensive. Which is where Timesheet Xpress comes in, neatly filling the gap between the two.

Timesheet Xpress does nothing more, or less, than record time. It identifies customers, clients or projects involved, the tasks and associated costs, with tools to later analyse, report and bill for that time. It can be installed onto any PC running Windows 95 or later and uses an on-screen timesheet as its primary interface. Looking much like an Outlook calendar, each timesheet covers a fixed period of a week with user-definable timeslots that can be anything from five minutes to an hour long, in five-minute increments.

Time can be allocated to a list of clients or projects, defined manually or by importing existing details from a csv file, with integration into the Act CRM application also possible. A separate user-defined task list is used to categorise time allocations, with facilities to colour-code time allocations and distinguish between chargeable and non-chargeable items; for example, to record time spent on office admin or when users are at lunch, on leave or off sick. Free-format notes can be added to the time records, with personal expense recording another built-in option.

Data can be entered into any time slot, although the program keeps track of and highlights the current time, automatically entering whatever client/project and task you have open into the active timeslot. When installed on a Windows 2000/XP PC, Timesheet Xpress will be configured to run from the taskbar with the option of maximising the program on a regular basis as a further, very useful, reminder.

It's all delightfully simple and straightforward, very much like filling in a paper timesheet and, as a consequence, very easy to use, even when it comes to analysing the data and running reports.

Options let you select time periods, clients, tasks and other parameters with analyses showing the data in a spreadsheet-like display that can be saved in Excel, HTML and other formats. Reports can, of course, be printed or saved in a variety of formats including pdf and, although there's no report generator, the reports provided should cover most requirements.

A useful invoice-generation tool is also included, although this is limited when it comes to customisation, plus you'll need to enter the data into your accounts package separately.

Each timesheet is stored as a discrete file which can be viewed, printed or emailed – this last option enabling timesheets from multiple users to be collated and managed by a central co-ordinator. A multi-user version of the software is also available (from £57 ex VAT for three users) to allow multiple users to record their time in companies where PCs are shared. Client/project and task lists, billing rates and timesheets can also be stored in a network share, with users only allowed to update their own timesheets, not others.

Admittedly the client/customer management facilities are pretty basic, but then Timesheet Xpress isn't designed to be a CRM application. It just records and bills for time, does it simply and effectively and is an affordable tool that will appeal to any small business in the service sector. *Alan Stevens*

Details

Price From £38.78 (£33 ex VAT) per user
Best price www.pcw.co.uk/bestprices
Contact Acksen 0870 225 1790 www.timesheetxpress.com
System requirements 1GHz Pentium III processor or faster, minimum 64MB of Ram • 30MB free hard disk space • 24bit colour with 1,024 x 768 resolution recommended • Windows 95/98/ME/NT4/2000/XP • Internet Explorer 4 or later

Verdict

Pros Very easy to use; intuitive colour-coded display; taskbar resident with auto pop-up option; good range of reports; invoice generator; built-in stopwatch timer
Cons Management of discrete timesheet files could be an issue in larger companies; can't easily change user and company details

Features ★★★★½
Ease of use ★★★★★
Value for money ★★★★★

Overall An essential tool for any business that needs to record and bill for time

★★★★★

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Device compatibility

Blackberry, Nokia N series and 6600 models,Fujitsu Siemens LOOX 420, LOOX 720, T- Mobile MDA compact, MDA II, MDA III, Vodafone VPA II, VPA III, VPA compact, O2 Xda II, Xda III, Qtek 2020, HP iPAQ hx2110, iPAQ hx2410, iPAQ rx3715, iPAQ hx2750, iPAQ hx4700, iPAQ hx5150, iPAQ hx6340, Acer n30, Acer n50, Dell Axim X50, X30, Palm Zire 72 - silver, Tungsten T2, Tungsten T3, Tungsten T5, Treo 650, LifeDrive.
Please contact us direct if your model isn't shown new devices added regularly.

Operating System

Palm OS 5.2.1, 5.2.8, 5.4.5, Windows Mobile 2003 4.20.1081 (Build 13100), 4.20.0 (Build 14053), 4.21.1088 (Build 14235.2.0.0), Windows Mobile 2003 SE 4.21.1088 (Build 14132), Windows 2000/XP, Symbian and RIM

Bluetooth™

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Microsoft

Practical advice from the industry's experts

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HANDS ON

SPOTLIGHT ON STREAMING

Welcome to another advice-packed Hands on section, where you can get some of the best practical hints and tips in the industry from our resident team of gurus.

This month there's a bit of a theme centred around multimedia streaming, with both Gordon Laing (page 138) and Niall Magennis (page 152) looking at this increasingly popular area from two slightly different angles.

Gordon's Hardware column focuses on the hardware choices, whereas Niall looks at the software implications for audio streaming.

By the way, don't forget that there's a great audio-streaming device, the Pinnacle Soundbridge, up for grabs as our Letter of the month prize – see page 29 for details.

The final piece of good news is that we've put the last four years' worth of Hands on articles (over 1,000 pages) on this month's 8GB cover DVD. You can also find recent articles at **www.pcw.co.uk/handson**.

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Far left: Raw secrets revealed on page 146

Left: Using your TV to view photos and more requires the right setup (see page 140)

Advice from our experts

Solutions to your problems and tips to help you improve your skills

HARDWARE

Case customising

Q I'm interested in customising the case on my PC, but am not entirely sure where to start. I'd really like to avoid power tools if possible.
Colin Emerson

A Most customised PCs involve lights inside the case, so clearly you'll need some kind of window through which to view them. Many modders take hacksaws to their case side panels, but depending on your model it may be possible to swap a side panel for one with a pre-cut window.

As for the contents of your PC, there's all manner of illuminated fans, grills and designer cabling available – check out the case-modding sections of Kustom PCs at **www.kustompcs.co.uk** and Case-Tech at **www.casetech.co.uk**.

Transparent case panels and illuminated fans are a great way to customise the look of a PC

Remote options

Q I'm running Windows XP Media Center Edition on a PC, but find its reliance on the Microsoft remote control for navigating the media interface quite infuriating at times. I know you can use the mouse, but there's no way it can emulate the Skip buttons on the remote, or fire up the Guide in one press. Are there any alternatives to the Microsoft remote?
Steve Watkins

A It's not widely publicised, but the Windows XP Media Center Edition (MCE) interface can be completely controlled by keyboard shortcuts, and there's a full list of what you need to know on Microsoft's website at **www.microsoft.com/enable/products/keyboard/keyboardresults.asp?Product=42**. Ctrl & G fires up the Guide, for example. You could therefore use a standard keyboard to fully control MCE, or if you have a remote control that can be programmed to store keyboard shortcuts, program it instead of having to use the Microsoft model.

Power to the M

Q I'd like to build my own media PC and have been following the articles in the Hardware columns about using the Pentium M processor. Having checked the prices of this processor and motherboards that support it, it seems like a very expensive option. Is it really worth having over a Pentium 4 or Athlon 64?
Matt Spencer

A As you've discovered, there is a significant price premium for building a system using a Pentium M, both for the processor itself and the motherboard. There are, however, several key benefits over traditional desktop processors.

First, it consumes less power than traditional desktop processors, which could result in savings for a system that will be powered up for long periods; this lower consumption will please the environmentally conscious.

Most important of all though, the Pentium M generates less heat than its desktop counterparts, which allows you to cool it more easily. Quiet running is important for an entertainment PC and, while it's possible to cool a hot Pentium 4 or Athlon 64 quietly, it requires a large heatsink and fan, which demands a larger case. In contrast, a Pentium M can be quietly, or even silently cooled by a much smaller heatsink, allowing smaller, slimmer cases to be used.

If you're not bothered about having a large case for an entertainment PC or concerned about power consumption, a system based on a Pentium 4 or Athlon 64 will be fine. Those who demand a compact system that runs silently and economically may justify the extra cost of a Pentium M. The newly announced Core 2 desktop processors from Intel will use many technologies from mobile processors, allowing them to run cooler and hopefully on less power.

WINDOWS

German Windows

Q While I was abroad I bought a laptop PC with Windows XP Pro installed, but it's all in German. Is there any way I can change the interface to English?
Rick Hawkins

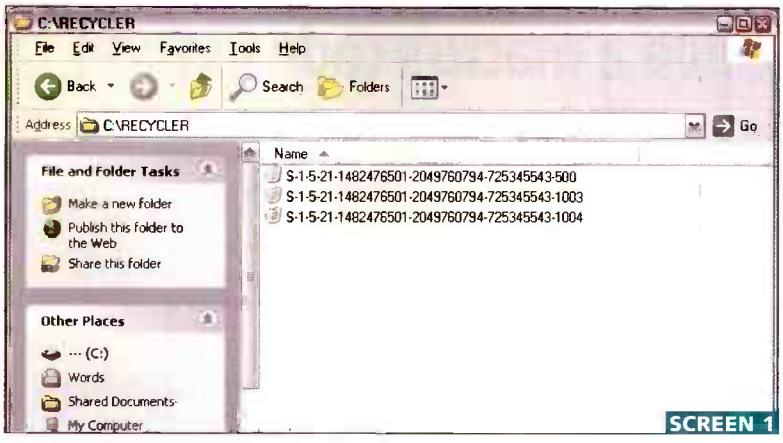
A Sadly not. You'll have to either buy an English version of XP, or work on your German language skills. Having said that, the Microsoft Multilingual User Interface Pack allows users to log on to any of the 33 language versions of Windows. However, this is an add-on and requires an English version of Windows 2000, XP Pro or Server 2003, and is not available through retail channels. You can only obtain it, according to Microsoft, through 'Volume Licensing programs such as the Microsoft Open License Program... or with a new computer as an OEM version at customer request'.

Recycling issue

Q I am running XP Pro. When I empty the Recycle bin there are still three folders in the C:\RECYCLER folder, with names such as S-1-5-21-1482... etc. Although these folders show no contents, according to the properties, one is 22MB. What's going on?
Frank Varney

A Basically, Windows is lying. Each user has his or her own subdirectory in the Recycler folder on each partition, including the 'uber-administrator'. But in Explorer only the current user's recycled files are visible – you can, however, see the true state of affairs from a command prompt using the command DIR /AS.

When you empty the Recycle bin, you only do so for the current user. There's a useful command-line utility to translate those strings of numbers (known as Security Identifiers or SIDs) into user names (see screen 1). Go to **www.joeware.net** and look for SidToName.



Different Recycler folders for each user can cause confusion

WORD PROCESSING

Stop spellchecker

Q How can I stop Word 2003 checking spelling and grammar for certain passages of text? 'No language' doesn't seem to be an option in the list of proofing languages.
Denys Hall

A You are nearly there – select the text you don't want checked, go to Tools, Language, Set Language... Below the language list you'll see an option – 'Do not check spelling or grammar'. Although the wording gives the impression that this is a global option, it refers to the selection. If there are consistent types of text you don't want proofed, you could create a macro. Create a new style from the button in the Styles and Formatting task pane. Click the Format button in the New Style dialogue, choose Language, and tick the 'Do not check...' button as before.

DIGITAL IMAGING & VIDEO

Holiday blues

Q While on holiday my 256MB Compact Flash showed a 'Card Error' after I had taken approximately 182 photos and some video clips. I cannot retrieve any of the images on the card, and my computer will not recognise that a card has been inserted. I sent the card to Fuji Image Recovery but they were unable to retrieve any images either. My camera is a Fuji S7000.
Steve Banbury

A If Fuji was unable to recover anything from the card, it doesn't look good. However, there are a number of utilities for recovering images from corrupt cards including Photorescue Pro (**www.objectrescue.com/products/photorescuepro**) and Photorescue (**www.datarescue.com/photorescue**).

Powerpoint pickle

Q I have a video on a CD-Rom in vob format, and would like to be able to play it as part of a Powerpoint presentation. I would be grateful if you would let

Full-screen split in Word XP

WORD PROCESSING

Q Any thoughts about the impossibility of turning off the Word menu bar, and getting a proper 'Full Screen' split into two equal panes? I am using Word XP.
Storm Dunlop

A This is possible, though the solution is hardly obvious. Go to Tools, Options, View, and in the 'Show' section, clear the checkbox next to 'Windows in Taskbar'.

This prevents Word showing a separate button (or a single grouped button) for each open document. However it also has another effect – all open document windows are contained in a single parent window, sharing a common set of menus and toolbars, in the manner of Word 97 or earlier.

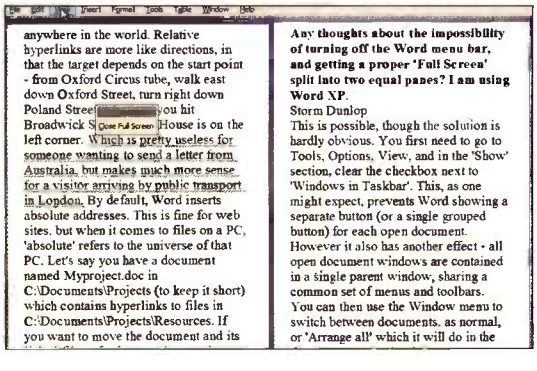
You can then use the Window menu to switch between documents, as normal, or 'Arrange all' which it will do in the time-honoured and rather useless manner of putting them in a vertical stack.

If you then go to View, Full screen, you should end up with no menus, toolbars or other screen furniture – just your documents. You can then drag and resize these to the arrangement you desire.

Word 2003 users have an added bonus – a 'compare side-by-side' command on the Window menu. Word 2000 users don't have the 'Windows in Taskbar' option, so this is a non-starter for them.

If you move the mouse pointer to the top of the screen, the menus will appear, and you will also find you can turn on individual toolbars from the View menu without getting any additional clutter.

You may also find that the Windows Taskbar disappears, but you can still switch between tasks, using Alt & Tab, or press the Windows key (or Alt & Esc) to open the Start menu. Finally you can return to the normal, fully furnished Word view by pressing the Escape key.



It can be done – two documents full-screen in Word XP

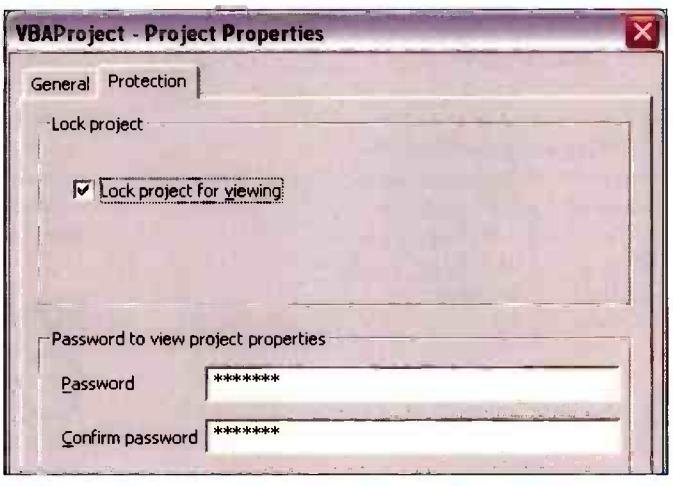
How to hide a macro's code in Excel

SPREADSHEETS

Q I can prevent an Excel macro being listed in the dialogue box displayed via Macro, Macros on the Tools menu by calling it Private Sub() instead of just Sub() or Public Sub(). However, anyone can choose ThisWorkbook in the Project Explorer panel of VBA, and then View Code, and the listing shows up. How can I hide the macro's code?
Neil Rothwell

A Right-click on VBAProject in the Project Explorer panel of VBA. Choose VBA Project properties. Click the Protection tab. Tick the 'Lock project for viewing' box and enter a password. Save and close the VBA Editor. Save and close the Excel workbook. Re-open the workbook. Press Alt & F11 to go to the VBA Editor.

To display ThisWorkbook you will now have to enter the password. If that is entered correctly you can view the code, change the password, or unlock the protection again if you wish.



It is easy to hide macros behind a password using the VBAProject function

me know what I need to do to convert it to a suitable format, preferably with minimal loss in quality. By the way, it's all in aid of a local charity, and there are no copyright issues with the video.
Barrie Potter

A You can edit vob files in Ulead Videostudio 9 (or the new version 10). Select 'Insert media file to Timeline' from the File menu then choose 'Insert DVD/DVD-VR' from the submenu. When you've successfully imported and edited the video, click the Share tab and choose Create Video file from the options panel.

Powerpoint supports a variety of video formats including avi, mpeg2 and wmv. To maintain quality and provide the best playback performance on a PC, wmv is probably the best option. Choose a profile that either matches, or is close to the resolution of the original file; for example, UK Pal video is a resolution of 720 x 576.

SPREADSHEETS

Runaway rows

Q When an Excel spreadsheet 'runs away' to row 440 when you wanted to stop at 40, how do you delete unwanted rows to return the file to its smaller size?
Paul Richards

A First of all, to stop it running away when you want to highlight a range, don't run down with the mouse. Hold down Shift and click on the first and last cell to highlight the desired range.

It's always a good idea to get rid of unneeded rows because they add to the file size. Click on the row number below your last used row to select it. Press Ctrl & Shift & down arrow. On the Edit menu choose Clear, All. Take the equivalent steps to clear the columns to the right of your used ones using Ctrl & Shift & right arrow. Press Ctrl & Home to go to the first cell you are using – probably A1. It's important at this point to save the file. Now press Ctrl & End and the focus will shift to the last cell you are using.

Cell height macro

Q Is it possible to use a variable for setting the cell height? For example, the height is determined by the numerical value of its contents.
Graham Taylor

A Not without writing a macro. Cell height is determined by row height, which by default is based on the point size of the largest font it contains. Row height can also be changed by right-clicking on a row number and entering the desired height. Alternatively it can be reset with a macro. VBA for Excel has a RowHeight property. The following short macro will double the height of a specified row:

```
With Worksheets("Sheet1").↙
Rows(1)
  .RowHeight = .RowHeight * 2
End With
```

(Key: ↙ code string continues)

Date difference

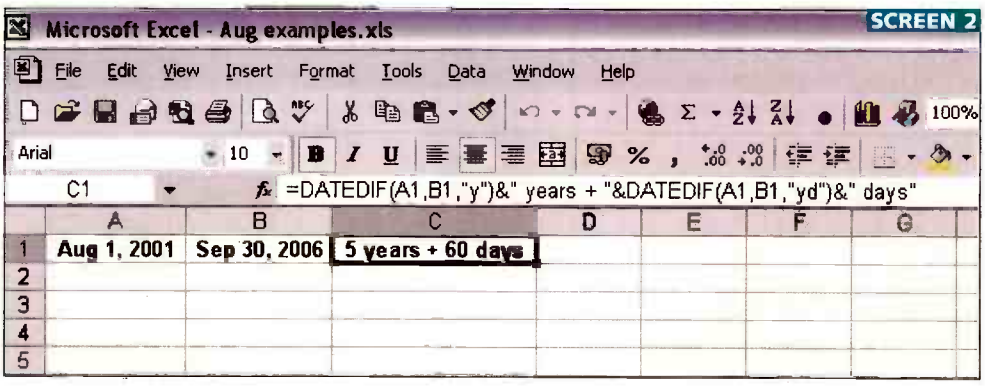
Q How do you calculate the period between two dates, with the answer shown as years and days, for example, 5 years + 60 days? I've looked at Excel's DATEDIF function but it doesn't seem to offer the solution I need.
Peter Tucker

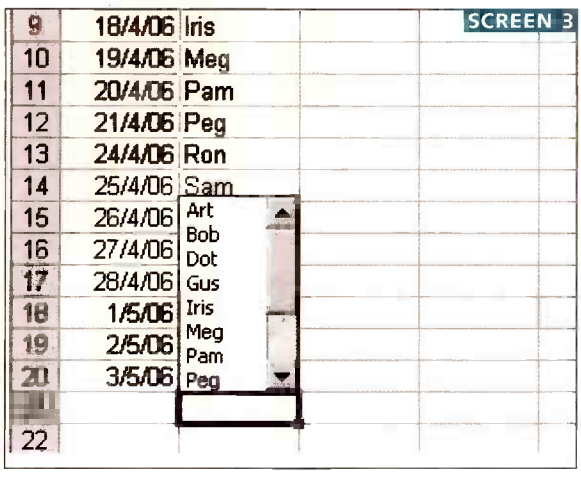
A It will if you use the DATEDIF (date difference) function in a formula like this:

```
=DATEDIF(A1,B1,"y")&" years + ↙
"&DATEDIF(A1,B1,"yd")&" days"
```

Enter your earlier date in cell A1 and the later date in B1 (see screen 2).

Calculate the period between two dates and display them in years and days using the DATEDIF function





Recent versions of Excel offer a pick list feature

Pick list tip

Q Is it possible in Excel to make a pick list of the items already entered in a column?
Gavin Fuller

A If you have a recent version, there is no need. Excel offers the feature for you. Just right-click in any of the cells with an entered item, or the next blank cell beneath them, choose Pick From List, and a pick list appears (see screen 3).

Scrolling solution

Q I would like to click on a button on an Excel spreadsheet to send the cursor to the next empty cell at the bottom of Column B. I keep adding information there so the column steadily extends down. I hate the wasted time scrolling when I'm sure it can be automated. Is there a macro I could assign to the button to achieve this?
Vince Emmerson

A This macro will take you to the last used cell in Column B of the active worksheet:

```
Sub LastCell()
Range("B1").Select
ActiveCell.SpecialCells↙
(xlLastCell).Select
End Sub
```

But it would be as quick to just click on cell B1 and press Ctrl & End.

DATABASES

Spaced out

Q I'm using Access 2003 and am working with a table of records that originally came from an Excel worksheet. The records have been entered with lots of extra spaces at the beginning of the text entries, at the end, or both. Is there a way I can deal with them?
Kiara Burns

A Access has a function called Trim that removes leading and trailing spaces from fields. If, for instance, you included the troublesome field in a query, you can write an expression that uses Trim to remove the spaces. Assuming the text with spaces is in a field called UntidyText, the syntax would be:

```
NeatText:Trim([UntidyText])
```

This would give you a column headed 'NeatText' which contained the text without leading or trailing spaces.

There are two other flavours of Trim, LTrim() is short for 'left trim' and removes just the leading spaces, and RTrim () is 'right trim' and removes trailing spaces only.

If you want to see the neatened text on a form, you would base the form upon a query that used Trim on the offending field. Then any text box would display the information without extraneous spaces. Or, of course, you can use the Trim function in an Update query (see last month's issue) to permanently remove the spaces. If you've bought the DVD edition of *PCW*, you'll find a simple example in the Access file on the cover disc. You can also download it from **www.pcw.co.uk/2151344**). The SQL is:

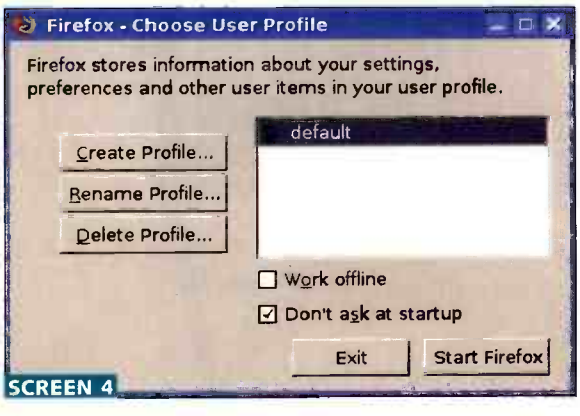
```
UPDATE ImportFromExcel SET ↙
ImportFromExcel.Fname = ↙
Trim([Fname]);
```

LINUX

Firefox hunting

Q I have been having random problems with Firefox 1.5 – pages not opening properly, some unusual crashes. I want to wipe all my settings and start again, but I can't find any option to do this.
Ian Mansfield

Firefox uses profiles to store user settings



A Firefox stores all your settings (including passwords, history and cache) in a profile (see screen 4). You can run Firefox with multiple profiles, but few people use this feature.

Profiles are held in .mozilla/firefox inside your home directory. If you look in here you will find at least one directory, randomly named. To delete all Firefox profiles for your user, delete the entire structure by running 'rm -r .mozilla/firefox' after closing all browser windows.

However, if you want to keep saved passwords and forms it may be worth testing with a second profile before deleting everything; start Firefox at the command line with the option '-profilemanager' to create or delete individual profiles. Another possible source of problems is from extensions, especially if they were installed before an upgrade to Firefox 1.5. Try uninstalling all extensions and see if the problems disappear.

Find the share

Q On my Linux system I have a few folders shared for Windows networking. I can access these, but the shares show up in 'mshome' instead of 'workgroup'. How can I change this?
Olivia Reynolds

A Distributions usually have configuration tools for setting the domain or workgroup on the Samba server. You can edit the configuration file directly. It's usually at /etc/samba/smb.conf. Edit the file and look for the line 'workgroup = mshome' and make the change there. **PCW**

LET US HELP YOU

All our experts welcome your queries. Please respond to the appropriate address below

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Spreadsheets spreadsheets@pcw.co.uk
Visual programming visual@pcw.co.uk
Web development webdev@pcw.co.uk
Windows win@pcw.co.uk
Word processing wp@pcw.co.uk

Gordon Laing has been a hardware enthusiast since his first Sinclair ZX80 and as a former editor of PCW and contributor for over 10 years, what he doesn't know about technology isn't worth knowing.

→ Comments welcome on the Hardware column.
Email hardware@pcw.co.uk
Please do not send unsolicited file attachments.

Share your media with ease

Discover which is the best device for enjoying your media files around the home

Reaching for a box of printed photos or a shelf of CDs and DVDs is fast becoming an outdated way to access your media collection. Today almost every PC owner stores some degree of their media collection, be it photos, music or video on their hard disk, while some have gone the whole hog and manage their entire collection this way. It's certainly the way forward, with sales of downloaded music soaring and many predicting Blu-ray and high-definition DVD (HD-DVD) will be the last physical disc-based formats to be sold.

Having a PC packed with media is all very well, but what's the best way to enjoy it? Most PCs remain located in an office or spare room, neither of which are where you'd normally want to watch a movie, play an album or view a slideshow. Ideally you want to share the files with your friends and family in the comfort of your living room and to do this, the technology industry has developed two main approaches.

The first is simply to put a PC in your living room and connect it to your main home-entertainment system. Quiet cooling solutions, good-looking cases and remote-control systems have allowed such entertainment PCs to fit discretely into our front rooms, but is it really necessary to buy a complete new PC system just to view your existing digital media content?

The alternative solution is to keep your existing PC where it is, and access the media files over a wired or wireless network using a streaming appliance in the living room. These are normally cheaper, smaller and quieter than a fully fledged PC, while a network can normally support multiple units, allowing you to easily access your content in different rooms.

Both entertainment PCs and streaming appliances have been around for some time, but the question remains: which is the best solution for you? It's a common question posed in the Hands on Hardware mailbox, so this month we'll discuss the pros and cons of both solutions, and reveal lesser known but key issues to be aware of.

Entertainment PCs are designed to be connected directly to a TV or home-entertainment system. Quiet cooling and consumer styling allows them to operate discretely in a living room

Compatibility issues

Compatibility is probably the biggest issue of all when it comes to playing media files – after all, if the device in question isn't compatible with the file format you're using, you clearly won't be able to play it. This is rarely an issue for a PC, where easily accessible software and downloadable codecs exist to play back essentially any kind of media file format you can think of.

Compatibility is, however, an area where you can become unstuck with a streaming appliance. Remember, most are sealed boxes that cannot usually be upgraded with downloads, so it's crucial to buy one that is compatible with your files. Sure, software can convert an existing media collection, but native compatibility is preferred for quality, minimal processing overheads and storage requirements.

Some appliances can stream music, photos and video, while others, such as the Squeezebox, are designed to stream audio alone

Most streaming appliances will happily play mp3s, but considerably fewer will work with the native wma format of Windows Media Player, especially if you use the lossless option; Slim Devices' Squeezebox 3 (see our review at **www.pcw.co.uk/2150590**) is one of the few that will. And while DivX and Xvid are probably the most widespread formats for video stored on PCs, some devices, including the Xbox 360, refuse to stream them. The moral is always to check.

If you want to stream TV recordings made by a Windows XP Media Center PC, you're currently restricted to specifically branded 'Media Center Extender' appliances, such as the Xbox 360.

Flexibility and connectivity

In this column we may be focusing on playback of PC-based media files, but many of the devices are capable of much more – and this degree of flexibility could greatly influence your choice. For example, the Xbox 360 may be able to stream content (albeit only handling video from Windows Media Center PCs), but it is of course primarily a games console that also plays DVDs.

Some devices bolt on media streaming as an extra: for example, Kiss Technology produces DVD players and PVRs (personal video recorders) that can also stream PC content (see **www.kiss-technology.com**). The Squeezebox 3 may only handle audio, but it can stream Internet radio stations (see **www.slimdevices.com**).

The most flexible device of all, though, is the entertainment PC. Behind the various media software interfaces lies a normal PC that is capable of running games, email and web programs, along with standard office applications.

Entertainment PCs and streaming appliances offer a number of ways to connect to your display, but it's crucial to select the right one for the best results; entertainment PCs may also require tweaking. This is an entire subject in itself, so we've dedicated this month's Performance column to making the right connections with the latest high-definition TVs (HDTVs) (see page 140).

Looks and noise

Some people are undoubtedly fussier than others, but most wouldn't want a large, ugly, noisy box delivering their media collection in their living room. In the past this has ruled out the use of traditional PCs, but thankfully in the past couple of years there have been great advances in terms of quiet cooling and better-looking cases.

Today, thanks to products sold by specialist stores such as Quiet PC (**www.quietpc.com**), it's possible to silence a modern PC so the loudest component will be the whirr of a hard disk alone; this in turn puts them in line with consumer hard disk-based appliances such as the Sky+ box, which most people would describe as acceptably quiet.

Smaller form factors and carefully designed cases are also allowing PCs to blend in more with traditional consumer appliances. In this respect, a modern entertainment PC with the right components can be as quiet and attractive as you like.

Looks and noise levels are, however, an area in which dedicated streaming appliances have the opportunity to take the lead. Most can run with no moving parts at all, allowing them to operate in complete silence, while simple electronic designs can result in highly compact devices that are considerably smaller than any PC and that could start up much faster. Take the Squeezebox, for example. It may only be designed to stream audio files, but does so using a simple, compact and silent form factor which starts very quickly.

You don't necessarily need a dedicated appliance to stream media content from your PC. A handful of DVD players also feature streaming capabilities for certain types of content

Don't assume all streaming devices are quiet: Microsoft's Xbox 360 uses numerous cooling fans and, even with these running at reduced speed in Media Extender mode, it remains audible in quiet environments. If operating noise levels are important to you, it's best to audition a streaming appliance or entertainment PC in a quiet room first.

The Xbox 360 has built-in software for streaming video, photos and music, but to enjoy all the facilities, you'll need to connect it to a Windows XP Media Center PC

Making a decision

Entertainment PCs and streaming appliances clearly have their pros and cons, and it's important to think carefully about how you'd like to access your media collection before making a purchase. As discussed above, media PCs definitely have the upper hand in terms of flexibility and compatibility, being able to work with any format while offering additional capabilities beyond simple playback.

It's hard to buy or even build a decent entertainment PC for much less than £1,000, which is a considerable sum for a single device when you compare it with a typical DVD player or PVR. And even if you do go for one, it may not be as small or quiet as you'd hoped.

In contrast, there are a number of streaming appliances available that start at less than £200. You could easily build a multi-room system with several of these for the same price as an entertainment PC. If you're only interested in audio, for example, you could deploy a number of Squeezeboxes throughout your home from £180 each. Then there are products such as the Xbox 360, which offers media streaming, DVD playback and a games console for around £280 including the accessory pack; it's easy to imagine having two or three of these in one household.

The disadvantages, as discussed, are compatibility and flexibility. A streaming appliance may do just that and nothing more, and they are generally compatible with a limited number of formats. And while standard software services are emerging, many may not easily co-exist with others.

So before buying a streaming appliance, check that it's compatible with the formats of your media files, and how well it can co-exist with alternative appliances should you ever want more than one type sharing the same collection.

As always, there's no single solution that is perfect for everyone, but once you understand the issues involved it's easier to make the right decision. If you're running an entertainment PC, a network of streaming appliances or both, we'd love to hear your experiences.

Protecting your collection

Before closing this month's column, a word of warning. It's all very well having a large media collection stored on a PC, but as the saying goes, don't put all your eggs in one basket. Should your hard disk fail or your PC become the victim of fire, flood or theft, you could lose your entire collection.

It's annoying enough having to face countless hours of re-inserting discs to rip a new collection, but some files may be irreplaceable. Most digital camera owners transfer their images onto only one system before reformatting the memory card and starting again; these files on a single hard disk subsequently become the only copies of the images they'll have. Clearly, should anything happen to the disk, these precious photos could be lost forever.

The solution is to use some kind of backup. Installing a second hard disk or a mirrored Raid array will provide your PC with a level of redundancy should anything physically go wrong with the primary disk, but again don't forget the possibility of losing the entire system.

To be totally secure, keep a backup of your crucial files in a different location. These could be on a laptop, a portable hard disk or network-attached storage (Nas) device, a number of optical discs or another PC. You may never be 100 per cent protected, but as your media collection grows, it makes sense to look after it. We'll look at Raid and backup for media collections in a future column. **PCW**

Gordon Laing has been a hardware enthusiast since his first Sinclair ZX80 and as a former editor of PCW and contributor for over 10 years, what he doesn't know about technology isn't worth knowing.

→ Comments welcome on the Performance column.
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Get your TV connected

Choose the right setup in order to enjoy your PC's photos and video at their best

Today an increasing number of PCs are connected to TV sets for media playback purposes. However, as discussed in this month's Hardware column (see page 138), there's normally a wide variety of connections available on a modern TV set, and to enjoy the best picture it's crucial to choose the right one.

PCs have long offered TV connectivity options, normally with the choice of either Composite or S-video plugs on graphics cards. If your TV features an S-video input, this would be preferable to a composite video connection for the best picture.

Composite and S-video connections are only designed for transporting standard-definition video, which for the UK Pal TV standard means an interlaced resolution of 720 x 576pixels. It's possible to run higher resolutions through these connections, but the result is often unclear. PCs are capable of generating much higher resolutions and, with the advent of high-definition-ready TV sets, we can enjoy their benefits in the living room.

Anyone who has connected a PC to a TV using an S-video or composite connection knows video files may look fine, but the Windows desktop and any applications are unusable. With a high-definition (HD) set, though, you can get closer to the resolution of a PC monitor, allowing you to go beyond video playback and run applications.

Photo slideshows made from Windows benefit from higher resolutions. Standard-definition video can be scaled by the PC to match the display's higher resolution, delivering superior results to a traditional DVD player, and there's also the option to play native HD content.

There are two main HD video resolutions in use today: 1,280 x 720 and 1,920 x 1,080pixels. The former is normally delivered in non-interlaced, progressive scan format only and is known as 720p. The higher resolution mode is delivered in interlaced format and is known as 1,080i, although a non-interlaced, progressive scan version called 1,080p is used by professionals and supported by the best consumer equipment.

Most HDTVs, such as this 50in Panasonic Plasma set, feature a variety of means by which to connect an entertainment PC

An HD-ready TV will be able to display both 720p and 1,080i video signals, although the native resolution could be 1,280 x 720, 1,920 x 1,080 or something in between. A display with a native resolution of 1,920 x 1,080pixels is preferred, but these are expensive. Models with a resolution of 1,280 x 720 or 1,366 x 768 are more common and will scale 1,080i video to fit.

Connecting HD signals

As mentioned earlier, S-video and composite video connections are not appropriate for transporting HD signals. You'll need a different type of connection and there are normally several options on a modern HDTV.

The most obvious connections to look for when connecting a PC are standard monitor ports. Most HDTVs feature an analogue PC input using either a 15pin D-Sub or five separate plugs for the RGBHV signals. Most should also feature digital connectivity, either using a DVI or HDMI port, the latter capable of taking a DVI signal through a simple adapter.

As with PC monitors, the digital option is preferable, but both analogue and digital connections should deliver a great-looking picture from your PC.

An alternative connection that can handle HD signals is a progressive-capable component video input, which uses three plugs labelled Y, Pr and Pb (these will only handle standard-definition signals). Many PC graphics cards, along with DVD players, offer component outputs and if your set supports both these and VGA/DVI ports, you should experiment to see which offers the best picture.

Native resolutions

In theory, you should be able to connect your PC to an HD-ready TV using one of the connections above, set the PC's resolution to either 1,280 x 720 or 1,920 x 1,080 and be ready to go. Annoyingly, many HDTVs are unable to be driven directly by a PC at these resolutions. Some will only allow their PC inputs to be driven at resolutions of, say, 1,024 x 768.

Other TVs may also reveal undesirable scaling artefacts unless driven at their native resolution, which could be something odd such as 1,366 x 768. Some graphics cards may offer alternative modes that will do the trick, while others will need tweaking with utilities such as Powerstrip (**www.entechtaiwan.com/util/ps.shtm**).

Generally speaking though, these problems most commonly occur when you're using a VGA or DVI input. If you're experiencing problems with these inputs, consider using a component video connection instead and setting your PC graphics card to output one of the standard HD signals of 720p or 1,080i. All HD-ready sets should know straight away how to correctly display these signals.

If you're still experiencing problems, it's worth browsing forums (such as **www.avforums.co.uk**) or even doing a search on the name of your TV and PC connectivity. Many owners have tried what you're attempting and can reveal the particular solution. **PCW**

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Tim Nott is a full-time freelance journalist. When he's not writing about Windows and word processing, he tackles many other diverse subjects. He currently lives in France with his wife and family.

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Driving ambition

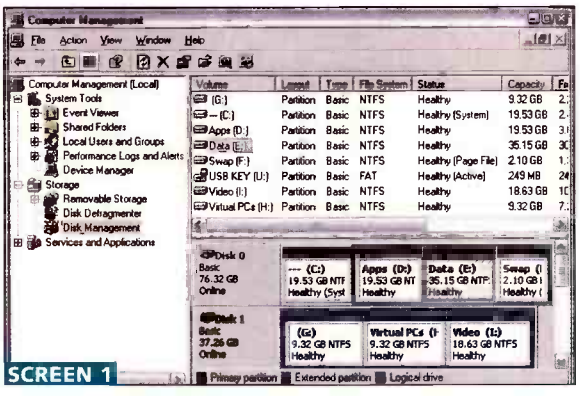
Permanently assign letters to optical drives, Flash cards and more

Last month we looked at the vagaries of the XP Autoplay feature for removable media. This month we pursue a related topic – taking control of the drive letters used. Under Windows 95, 98 and ME, assigning a drive letter to a CD-Rom drive could be done by going to System properties, Device manager and opening the properties of the CD-Rom drive. In the Settings tab, you then changed both boxes in the 'Reserved drive letters' section to the same letter.

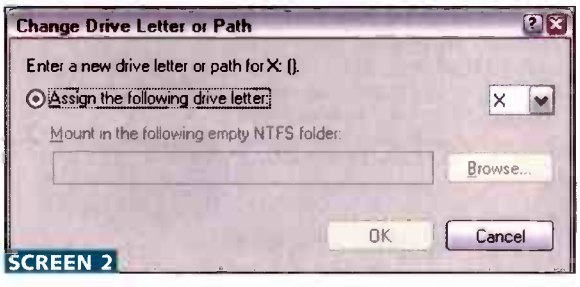
With two CD drives, I labelled these X and Y so they wouldn't be bumped down by changes to hard disk partitions. Installation, reference and games CDs also stayed at their expected letters, so I didn't have to browse for the CD.

Since then, things have moved on. We use far fewer games and reference CDs. We also have far more removable storage devices in the form of external drives, USB keys, cameras, card readers, music players and so on. And depending on what you have plugged in, the assignment of drive letters is a bit of a free-for-all, with no permanent ties between device and letter.

Although this may be only a cosmetic nuisance in some cases, it could play havoc with any kind of automated backup routine.



SCREEN 1



SCREEN 2

Top: The disk management console

Bottom: You will need to assign a new drive letter

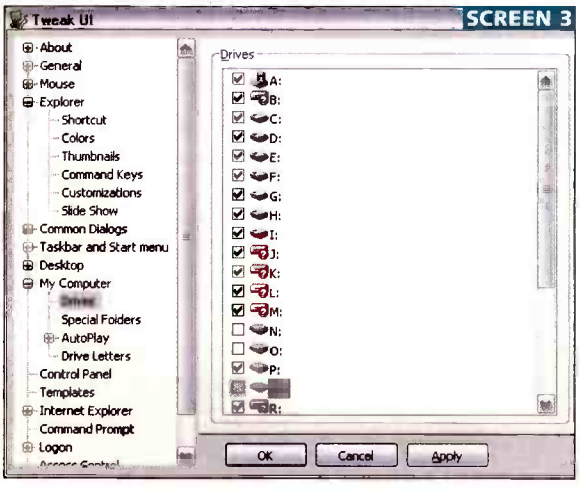
A man of letters

So here's how I cleaned up my drive-letter act. Device manager is not the point of entry in Windows XP or 2000. Instead, go (with administrator status) to Control Panel, Administrative Tools, Computer Management. Expand the Storage branch in the left pane and select Disk Management. To the right you will see a split window; the top section contains a list of fixed and removable partitions. Below that is a graphic representation of partitions or 'logical drives' grouped into physical devices, so if your hard disk (or disks) has been partitioned into separate drive letters, these will appear as light blue tiles (see screen 1). If you get something different, go to the View menu and select 'Volume list' for the top pane and 'Graphical view' for the bottom.

An empty CD or DVD drive won't appear in the top list, but will be shown in the bottom list. So, the first task was to change the drive letter of the DVD drive, by right-clicking on its tile in the bottom pane, then choosing 'Change drive letter and paths'.

In the next dialogue, I clicked the Change button, which produced another dialogue in which I could 'Assign the following drive letter' (see screen 2). For old time's sake I chose X:, then repeated the process to assign Y: to the CD drive. This now left some breathing space between my last hard disk partition (I:) and the optical drives.

The next step was to reassign the USB key. I plugged this in and the contents of the Computer Management windows updated themselves, showing this as J:. Going through a similar procedure, I reassigned this, in a vaguely mnemonic way, to U:, and renamed it (you can do this with a lot of drilling down in the Computer Management properties, but it's quicker to right-click and rename from 'My computer'). Again, the change should update automatically in Computer Management.



SCREEN 3

Hide unwanted drives in TweakUI

Save battery life

If your camera (or other battery-powered device) doesn't have a power feed from the charger, you may find that transferring pictures straight from the camera devours battery life.

You can buy a USB card reader that will support all major formats for very little money. It takes its power from the USB port, so you can transfer pictures from a variety of cameras or other sources without recharging batteries.

This left a four-in-one Flash card reader. When connected, this appears as four drives in Explorer. If a slot is empty, it will appear as 'Removable disk' in Explorer, but with a card inserted you can give it a name. I named it after the make of the camera – Pentax.

Reassigning the drive letter of this to P: was a little more complicated as that letter was already taken by another slot on the card reader, so the current incumbent had to be shifted to another position first.

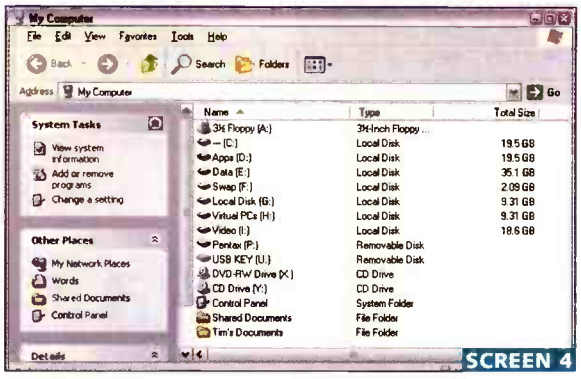
The final step in tidying up was to go to TweakUI and hide the drive letters (N:, O; and Q:) for the unused slots in the card reader (see screen 3). So far, so good – everything has stayed put with its assigned letter (see screen 4).

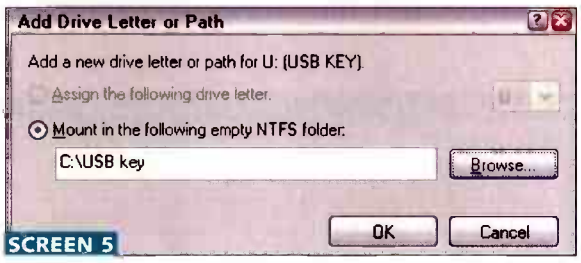
There's still a loose Canon to tie down, which awaits my daughter returning home with her camera, but I don't foresee any difficulties. As far as I can tell, the drive letter (and name) stays with the physical device, irrespective of the USB port, so you can swap media between the same port.

A lack of letters

Although Bill Gates denies he ever said '640KB should be enough for anyone', one could paraphrase that as '26 drive letters should be enough...' Patently, that's starting to look woefully inadequate. Discounting B:, but counting in the three hidden letters, I now have just 10 slots left with which to accommodate the next onslaught of removable technology. Short of changing the interface language to Sanskrit, which at 53 letters would alleviate the problem temporarily, what can be done?

The answer in NT4, 2000 and XP is to 'mount volumes', which sounds like the sort of thing only consenting adults or Linux users should do. But it's not difficult – or unseemly – in XP.





Top: Checking My Computer after reassignment shows everything has stayed put

Bottom: Pressing Add gives the option to mount a drive in an empty NTFS folder

First you need a partition on your hard drive formatted as NTFS. If you have a PC with XP pre-installed or have installed from scratch this should be the case. If you've upgraded from 98 or ME it may not be, but that obstacle can be overcome – see the box below.

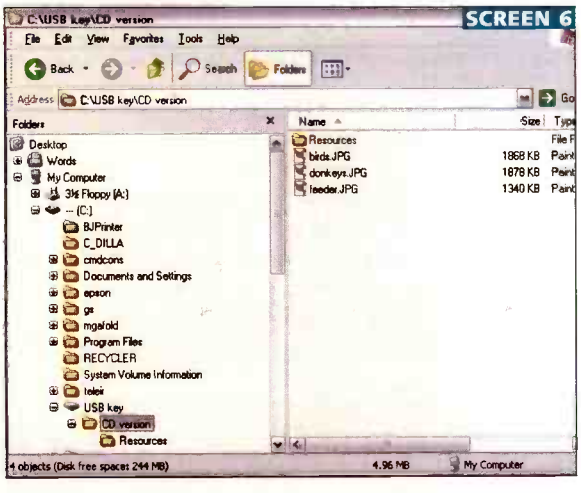
The first action is to create an empty folder on an NTFS partition in which to mount the device. Next, with the device connected, go to Disk management, as detailed above, right-click the device and, as before, choose 'Change drive letter and paths'. In the next dialogue, instead of pressing the Change button, press Add. This will give the option to 'Mount in the following empty NTFS folder' (see screen 5).

Browse to your new folder, then OK out. Back at Disk management, right-click, 'Change...' once again, select the original drive letter, which you'll see listed with the mounted location, and click Remove. You'll need to reboot for the changes to complete. We've noticed a slight gotcha here in that mounted drives don't seem to Autoplay, but that shouldn't be too much of a sacrifice (see screen 6).

Double desktop

Further to May's observations on duplicate desktop icons, another possibility has come to light, and in this case you'll find that one set doesn't function at all and can't be deleted or moved. This is almost always the result of a prank (or a bizarre accident).

What has happened here is that someone has taken a screenshot of the desktop, then used it as the wallpaper. Although it may seem obvious in retrospect, this has had several online Windows discussion boards baffled for some time, with suggestions including deleting the icon cache file, checking for spyware and – horror of horrors – reinstalling Windows. **PCW**



A USB device mounted in a folder

XP reinstall tip

If you're planning to do a complete reinstall of Windows XP on a freshly partitioned drive, make sure that all removable devices are disconnected first. Otherwise you may get drive letter conflicts: Windows setup may assign the device to C: and your primary hard disk partition – where you'd normally install Windows – will be bumped to a different letter.

You might also find, as did reader Stephen Brereton, that a USB drive full of backups shows all its storage as 'unallocated'.

For the full story see **http://support.microsoft.com/?kbid=896536**.

How to convert a partition to NTFS

To convert a partition from Fat32 to NTFS, first back up your data. Close down all other applications and open a command prompt. Type 'convert x: /fs:ntfs' replacing 'x' with the letter of the partition you want to convert.

You may get error messages saying that the drive needs to be 'unmounted' or that 'Convert cannot gain exclusive access...' to the drive. In this case, the drive will be converted at the next restart, so follow the prompts. If you are dual-booting between Windows 98 or ME and XP, then you won't be able to access the NTFS partition from the former operating systems without third-party software.

There's a utility to read NTFS volumes at **www.sysinternals.com**, but this is read-only. Don't convert an ME or 98 boot partition to NTFS – you will not be able to boot that OS.

Barry Shilliday has worked with computers for almost two decades. By day, he is a Linux and Unix consultant, but in his free time he prefers to travel the world – and snap it with his camera.

→ Comments welcome on the Linux/Unix column.
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Don't risk your data

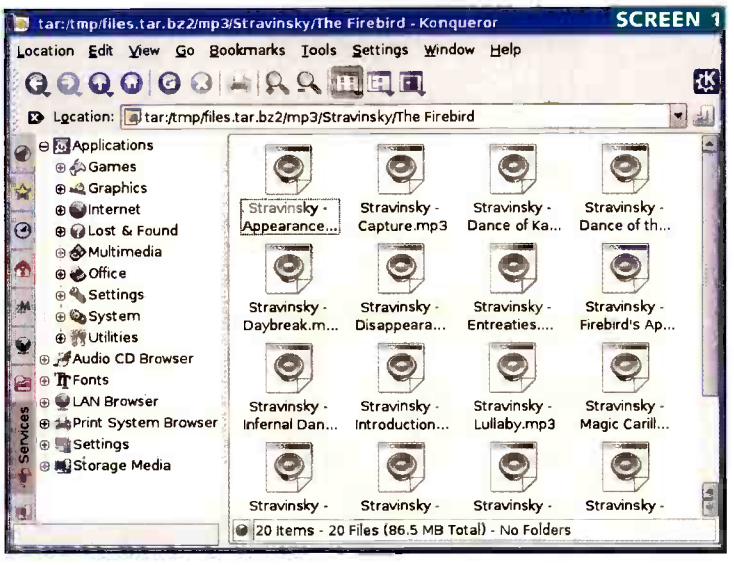
Stay safe and back up your important files using the tar command and rsync

When was the last time you backed up all your files? For most people the answer is probably a long time ago, if at all. Backing up isn't the most exciting thing in the world to do but it's something we should all do a lot more often. When a hard drive fails and you realise you have lost the last year's worth of email, personal accounts and all your downloaded music files, it's too late to think about starting a backup. We're going to look at some ways to back up your data using standard utilities.

Like other Unix systems, Linux stores all your personal data in your home directory. As a normal user, you have little access to the system beyond your home files and the /tmp directory. Many Linux distributions routinely wipe clean the /tmp directory at start-up, so it's never a good idea to store any files in there. That means if you just want to back up your personal files and application settings, you should only need to back up your home directory and nothing more. If you were to lose your entire system and had to do a reinstallation, it would be possible to restore your backed-up home directory to the new system and start again where you left off; alternatively if you wanted to 'roll back' to an earlier set of files, you could delete your home directory and restore it from the backup.

Using the tar command

There are various methods to store or archive data on Linux. The 'tar' command is the best to go for, since it is found on every Unix system and is very well supported with graphical utilities. The GNU version of tar (as found on Linux) can also compress the files. Other versions may be more limited, or might even require a separate step to compress the archive.



The reason for this discrepancy is that tar was originally developed for backing up data to tape (it is named after 'tape archive'). A tar archive itself is little more than a series of files, one after the other, presented as one large file. GNU tar lets you compress this data with gzip or bzip2 automatically, and creates the extensions .tar.gz and .tar.bz2 respectively.

To create a full archive of your home directory, run tar as follows:

```
$ cd /home
$ tar cfvj /tmp/backup.tar.↙
bz2 $USER
```

(Key: ↙ code string continues)

The first command changes the directory to /home, where all users' home directories are located. Next, tar takes four options: 'c' to create a new archive; 'f' to act on a file; 'v' to produce detailed (verbose) output; and 'j' to produce a bzip2-compressed archive. The options are followed by the name of the archive, which in this example is created in /tmp, and finally the directory to archive. The shell will substitute $USER with your login id; you can enter it directly in the command if you wish. Since your home directory sits in /home, you can archive from here. So in this example, if your login id is 'barry', tar will back up the contents of /home/barry into /tmp/backup.tar.bz2.

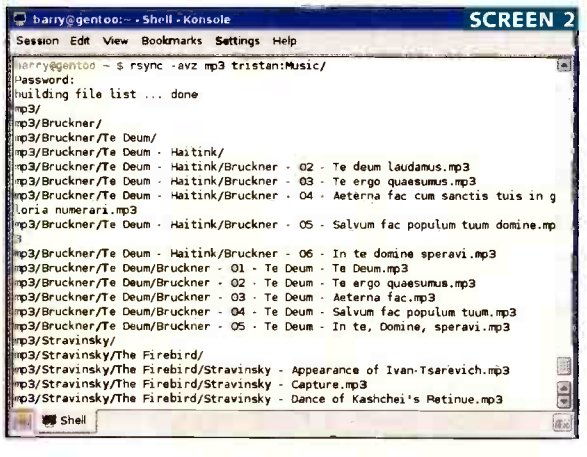
You can restore from an archive in almost exactly the same way. By default, tar preserves all the original information on the files, such as permissions, date stamps and symbolic links. Replace the 'c' option with 'x' to extract files and, since an extraction takes place in the current working directory, simply list the archive to extract:

```
$ cd /home
$ tar xfvj /tmp/backup.tar.bz2
```

To view the contents of the archive, replace the 'x' option with 't'. You may need to pipe the output into 'less' (append `| less` to the command) to prevent the results streaming by. Quite often you may want to extract certain files or directories rather than

Copy and back up files securely to another machine with rsync

Keep a local backup of a directory with rsync



everything. Just list these after the name of the archive. For example, if you want to extract the '/home/barry/mp3' directory only:

```
$ tar xfvj /tmp/backup.tar.bz2 barry/mp3
```

If you list files or directories after the archive's name, tar will extract these only. If you list only the archive (as in the first example), tar will extract the entire contents. Conversely, when creating an archive, you can list multiple directories and files after the archive name, and tar will include all these in the archive.

As ubiquitous as it is, tar offers a lot more, including incremental backups (backing up only changed files). To learn more about it take a look at its man and info pages. There are many graphical utilities for accessing tar archives. Under Gnome we have File Roller and under KDE Ark. These can be used to create, extract or modify tar archives, if you prefer not to use the command line. Alternatively, in KDE you can access archives directly by clicking on the icon (see screen 1). This uses KDE's kioslaves, as we saw last month. Using this method you can treat the archive like a standard directory, copy files from the archive, or open files directly.

Backing up with rsync

Rsync is designed to copy files between remote systems reliably. As the name suggests, it can synchronise files and directories between systems, copying all changes from one to the other (see screen 2). As such it's also very useful for backing up data, both remotely and locally (see screen 3). Unlike tar, which creates a single compressed archive file, rsync will simply copy the files, duplicating the structure elsewhere. When rsync is used locally, it behaves like a more sophisticated copy command. With the '-a' option, rsync preserves all file information and includes directories (and contents), so to back up the 'mp3' directory to /tmp, run:

```
$ rsync -av mp3 /tmp
```

The 'v' option tells rsync to produce some output as it copies, otherwise the process is silent. In this instance, rsync copies the mp3 directory itself, together with all its contents, and creates the structure under /tmp. If you then re-run the command, you will notice that nothing gets copied the second time: rsync finds the two directories are synchronised and takes no further action. Add a new file to the directory and this alone will be copied on a subsequent run.

Rsync is quite sensitive about trailing slashes in directory names. For example, if the previous command had been written 'mp3/', rsync would not copy the mp3 directory itself, thus the contents would be written directly into /tmp. So to back up an entire home directory into /tmp, run:

```
$ rsync -av /home/barry /tmp
```

This creates /tmp/barry with a duplicate set of files. To back up the contents of the directory into /tmp/backup/ directly, run:

```
$ rsync -av /home/barry/ /tmp/backup
```

'Rsync can synchronise files and directories between systems'

The difference between the two may seem a little confusing at first, but after a while you should get the hang of it. Use the '-n' option when experimenting, as this prevents rsync from making any changes.

As above, rsync was designed primarily for remote copying. It behaves transparently and is surprisingly easy to use. If you have an OpenSSH server running you need do nothing more. Just about all Linux distributions come with OpenSSH, as does Apple's OSX. Transferring a file remotely just involves placing the name of the machine before the directory, separated by a colon. To copy our mp3 directory to a Mac with the name 'tristan', run:

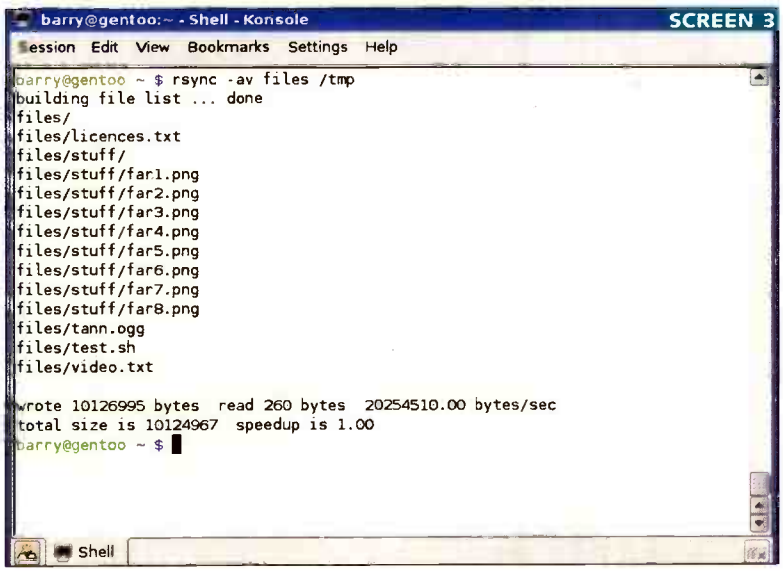
```
$ rsync -avz mp3 tristan:Music/
```

The '-z' option here compresses the data, which may speed up the transfer significantly over a slow connection depending on the data, but is unlikely to help on a fast local network. In this example, the mp3 directory is securely copied to the Mac and placed into the Music directory, thus creating Music/mp3/ on the remote machine. The command assumes that the user id on both systems is the same; to use a different name, use the login@host syntax (for example, myid@tristan:Music/). Without a directory listed after the colon, rsync copies to the home directory. Restore the files in exactly the same way, reversing the source and destination:

```
$ rsync -avz tristan:Music/mp3 .
$ rsync -avz tristan:Music/mp3/ /tmp/music
```

The first command copies the mp3 directory to the current directory (represented by a dot). The second copies the contents of the mp3 directory to the /tmp/music directory, creating it if necessary.

A great benefit of rsync is that it only copies whatever is necessary. You can run the command at any time and it updates the copy, probably taking just a couple of seconds. It's possible to add further options to create a complete mirror; that is, to delete files on the destination (or back up) if deleted on the source, thus keeping an exact duplicate. Whether acting locally or remotely, rsync behaves the same, and using an encrypted reliable remote method, it makes it an easy way to back up important files on a remote machine over the Internet. However, if storing a backup on the same hard drive, remember to copy it off to a writeable DVD or another hard disk. **PCW**



You can access a compressed tar file like a normal directory with KDE

Ken McMahon is a freelance journalist and graphic designer. His involvement with digital cameras began with a Commodore 64. He graduated to Macs and now works mostly with PCs.

→ Comments welcome on the Digital imaging & video column.
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Please do not send unsolicited file attachments.

The Raw facts revealed

Discover the secrets of shooting and processing images to get the best possible shots

Back in December 2004 I discussed the merits of shooting and processing camera Raw images. Since then, I've left my camera's format setting permanently on Raw, only shooting jpegs with my Canon Ixus.

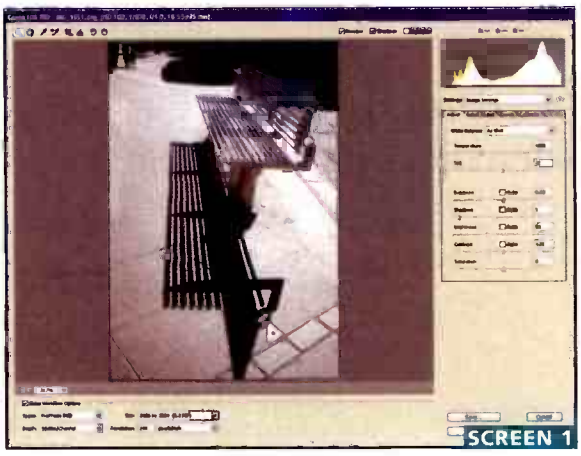
The falling cost of digital SLRs and the trend for including Raw as an option on compact cameras such as the Canon Powershot S60 and Fujifilm Finepix F710 means most people with a good-quality digital camera can now shoot Raw. But many people aren't aware of the benefits Raw files provide, and are put off by the need for additional post-processing using software provided by the camera manufacturer or a third-party application such as Adobe Camera Raw.

While in many situations you might be hard pressed to tell the difference between a high-quality camera-processed jpeg and a post-processed Raw file, shooting Raw can enable you to squeeze every drop of potential from your shots and, in some circumstances, can make the difference between a useable shot and a write-off.

I'm not going to provide an in-depth technical explanation of Raw formats here; instead, I'll concentrate on the practical side of shooting and processing Raw files to obtain the best possible results.

Drawbacks of shooting Raw

Possibly the biggest problem with Raw files is that, because they are proprietary, no two formats are the same. Not only is Canon's format different from that of Nikon, Konika Minolta, Olympus and everyone else, but Raw formats also vary from model to model so there's no guarantee the Raw images from, say, Canon's new EOS 30D are the same as those from the 20D. You need to make sure that any Raw conversion software or image-editing application you buy supports Raw images from your camera model.



Overexposure can cause highlight clipping

One way around this is to convert all your images to Adobe's open dng raw format. For more info on dng, see Digital imaging & video in the February 2005 issue of *PCW*, or go to **www.adobe.com/products/dng/main.html**.

As Raw files are uncompressed they tend to be quite large – around 8MB compared with 2.5MB for a high-quality jpeg from an 8megapixel camera. So they take longer to write to the media card and you get fewer images on a card compared with jpegs.

Time to write to the card will only be an issue if you're shooting continuous frames. For example, the Canon EOS 20D can shoot high-quality jpegs at five frames per second (fps) for a maximum burst of 20 frames before its buffer is filled, but shooting Raw limits the maximum burst rate to six images.

It also takes longer to transfer your Raw files from the media card to your hard drive. Once this is done you'll need to convert them to a conventional file format such as jpeg, tif or psd using the software supplied with your camera, or a third-party application such as Adobe Camera Raw, Pixmantec Rawshooter or Corel Paint Shop Pro. This is both a drawback – as it adds another stage to your workflow – and a huge advantage, because you, rather than your camera, are in control of the process.

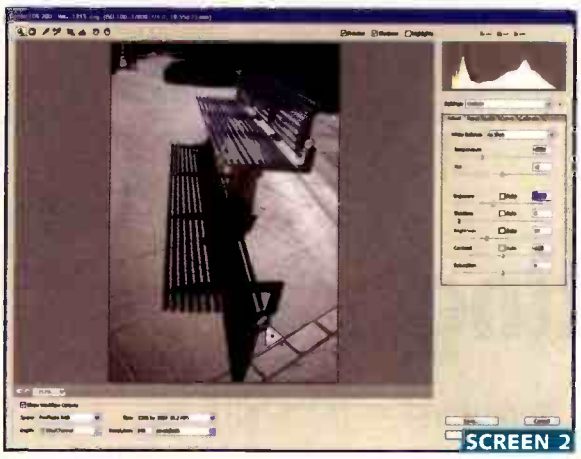
Choosing the best conversion tools

In my view, the Adobe Camera Raw plug-in (designed by Photoshop 'inventor' Thomas Knoll) is the best Raw converter out there, and the obvious choice if you're using Creative Suite as it is very well integrated with Photoshop and Adobe Bridge. Download it for free from **www.adobe.com/products/photoshop/cameraraw.html**.

I'd also recommend you read Bruce Fraser's white paper 'Linear Gamma', which gives a detailed explanation of the process of gamma conversion and tonal mapping and its implications for exposure when shooting Raw.

If you're not a Photoshop user, there are plenty of other options. Bibble 4.7 and the less expensive Bibble Lite are available for Windows XP, Mac OSX and Linux from **www.bibblelabs.com**. Corel Rawshooter essentials, based on the Pixmantec product of the same name, provides, among other things, white balance, sharpening, exposure compensation and batch processing and is available free from **www.corel.com/servlet/Satellite?pagename=Corel3/Trials/DownloadContainer**.

Raw support is increasingly becoming a feature of budget image-editing applications. So if you use Corel Paint Shop Pro X, Ulead Photo Impact 11, Serif Photo Plus 10, Microsoft Digital Image Suite 2006 or Adobe Photoshop Elements 4 you can start shooting and processing Raw files. With most of these applications, Raw support is a new feature and, if you decide to move to an exclusively Raw workflow, a third-party Raw processor will provide a wider range of features. Before you buy any Raw software, check the vendor website to ensure your camera's Raw format is supported.



The easy way to view Raw files

Unlike jpeg, tiff, bmp and some other image file formats, Windows doesn't support the display of Raw files. The best way to do this is using organiser or album software.

If your image-editing application supports Raw files and has an album module, you can use this to view the images. Alternatively, download a copy of Microsoft Raw Image Thumbnailer and Viewer for Windows XP from **www.microsoft.com/windowsxp/using/digitalphotography/prophoto/raw.mspx**.

This allows you to view Raw files in Windows Explorer. Currently, support is limited to Nikon and Canon Raw formats, but hopefully this will be extended to other manufacturers soon.

In a nutshell, what the camera does when it produces a jpeg from your camera's sensor data is convert the greyscale data into RGB pixel values – a process known as demosaicing – and apply white balance, saturation, sharpening and any other processes as defined by the camera settings. By taking control of these processes and treating each image individually rather than applying a catch-all set of functions, you can produce a marked increase in image quality.

Raw image processing is about more than just tweaking saturation and sharpening though. Most digital cameras capture 12bits of information per pixel which is downsampled to 8bits in the camera when you use a jpeg setting. By shooting Raw you can retain all that data or decide on the best method for conversion. In either case, the result will be a robust file, with more tonal information that can undergo adjustment in your image-editing application without noticeable degradation such as posterisation.

Tackling poor exposure

Raw processing provides greater scope for correcting poor exposure, and particularly for recovering 'blown' highlight detail. Unlike the human eye, the camera sensor responds to light in a linear fashion. One of the functions of raw conversion is to map the camera's linear response to a gamma more closely resembling the visual response of the human eye (and film). One consequence of this is that a relatively larger proportion of the available bits are allocated to the highlights than the shadows. The implications for correcting exposure problems may not be immediately obvious, but it amounts to the fact that, when shooting raw, it's better to overexpose than underexpose.

There's not much you can do with an overexposed jpeg; if there's no detail in the highlights, no amount of messing with levels or curves will help. But with Raw files it's different, and Adobe Camera Raw (ACR) and some other Raw converters can help you recover highlight detail in images that have been overexposed by as much as a stop.

Reducing the Exposure value in ACR can restore highlight detail

Screen 1 shows an image that, if it were a jpeg, would be a cause for concern. The Histogram display in ACR 3.3 clearly shows the highlight clipping that has occurred as a result of slight overexposure. In ACR the Exposure slider controls the white point, and by dragging it to the left and reducing the Exposure value you can see the highlight detail magically reappear (see screen 2). With this shot, an adjustment of three-quarters of a stop is required to restore detail to the highlight areas on the pavement and the steel bench; beyond that, there are no more pixels in the histogram.

If you're unsure where to start with the exposure and other controls in ACR, try selecting Use Auto Adjustments from the Settings menu (Ctrl & U). Most of the time this does a pretty good job. You can also check the Auto boxes to auto adjust each of the tone controls individually.

Screen 3 shows what happens when you underexpose. Due to the linear nature of camera sensors, six of the 12bits of image data per pixel are used to record the brightest stop of tonal detail in your image. That means that if you underexpose by one stop, you're effectively only using half the available bits to record your image.

To compound the problem you also have to drag the Exposure slider to the right, effectively stretching the histogram across the full tonal range. There's unlikely to be enough information in the shadow end of the histogram to enable you to do this without introducing a very visible noise element (see screen 4).

This is going to be the case whether you're working with a 12bit Raw file or an 8bit jpeg. However, with the Raw file, depending on the ISO setting and the degree of underexposure, you might just get away with it, though the resulting file won't stand up to further tonal adjustments. With an 8bit jpeg the noise problem will be compounded by posterisation which you'll see as gaps in the histogram. **PCW**

Above: An underexposed Raw image is more problematic than one that is overexposed

Right: Attempting to correct underexposure can create visible image noise

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The A to Z of indexing

How to create an index; plus absolute and relative hyperlinks explained

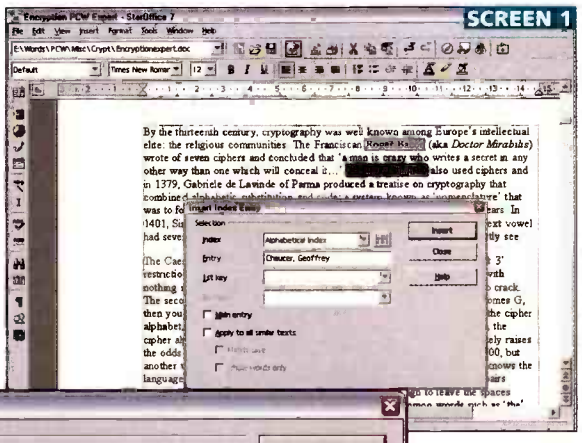
You can't always get what you want... but, as the song continues, 'if you try sometimes, well you just might find you get what you need'. So it was with a reader's query this month. He and some friends had been researching old parish records and one of the researchers wanted to find a way of sorting an entire document into an alphabetical word list.

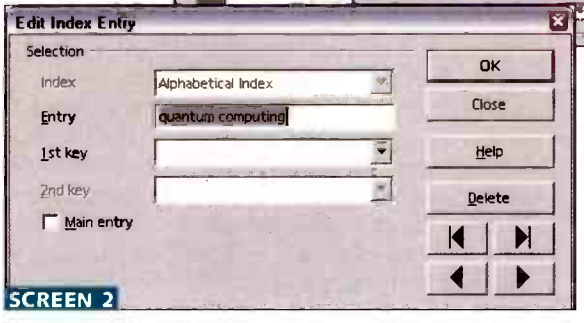
My correspondent had managed to do this in Word, by replacing all spaces with a comma, pasting into a single-column table, and then sorting. However, his co-researcher wanted to do this in Open Office. Having tried this, without a great deal of success, on a short text in Star Office (essentially the same suite), I was prompted to ask why the co-researcher wanted to do this. The answer came back that 'he wants a complete word breakdown for indexing purposes. To be absolutely honest, I'm not completely sure why he wants it, and I don't think is either'.

This sounded to me as if the gentleman in question was trying to cut his grass with nail scissors, having failed to notice that there was a lawnmower in the shed.

Even if he succeeded in creating the sorted list, the majority of the result would be 'noise' – words such as a, about, an, and... that nobody would want to index. After creating such a list and weeding out the noise, there would still remain the considerable problem of correlating each item in the list with the page(s) where it appeared.

There is a better way. In line with the original request, we're going to show how to fire up that lawnmower in Star Office, though the Word version is sufficiently similar that Microsoft users should have no difficulty.





Above: Create and edit an index entry so that names are indexed by surname

Left: When you get this dialogue you can navigate to the previous or next indexed text or item

The ABC of indexing

Start at the beginning of the document, and select the first word or phrase you want to index – for single words you can also place the cursor to the left of the word.

Now go to Insert, Indexes and Tables, Entry. This will summon the 'Insert Index Entry' dialogue. Choose the type of index you want from the top box – in this case Alphabetical index – and you will find the Entry text has already been filled in; this is what will appear in the index.

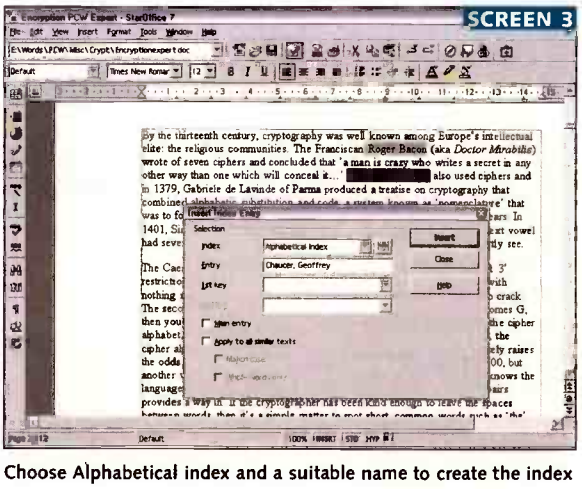
Click Insert to file the entry. The dialogue box is non-modal, so you can keep it open as you work. Select the next word or phrase you want to index, click in the Entry box in the dialogue, and the entry text will be updated to the current selection.

You can edit the text in the Entry box – and you will obviously want to do so with names, for example, so that these are indexed by surname rather than first name (see screen 1). If you don't need to edit the entry you can just click Insert – the entry text updates automatically.

One obvious item on your wish list is that you don't want to have to index every instance of the same word or phrase. Tick the 'Apply to all similar texts' box to have this done for you.

Another option is to make the current instance a main entry: if your document has several passing references to 'cryptography', for example, and one that explains the concept in detail, then if you make the detailed one a main entry its page number will appear in bold in the final index.

As you insert index entries, the items indexed in the text will appear grey – if this doesn't happen, tick View, Field shadings. If you want to edit or delete an entry, place the cursor to the left of the shaded word or words, right-click and choose 'Index entry'. You'll get a slightly different dialogue here, with navigation buttons to take you to the previous or next instance of the indexed text (the top buttons with



Choose Alphabetical index and a suitable name to create the index

a bar) or the previous or next indexed item (bottom buttons without a bar) (see screen 2).

Create the index

When you've finished marking index entries, or lost the will to continue, you can create the index itself. Having placed the cursor at a suitable place, such as the end of the document, go to Insert, Reference, Indexes and Tables... Here you'll have a choice, so choose 'Alphabetical index' from the Type box, and enter a suitable name in the Title box (see screen 3).

Here again there are a number of useful options – if you mention the same indexed word several times on the same page, you don't really want these appearing as separate entries, so tick the 'Combine identical entries' box. There's a sub-option to suffix 'p' or 'pp' to the entry to show that several instances appear on the same page if you want to be really fussy.

Another must-have is the Autocapitalise option – this forces the first letter of the index entry to upper case, irrespective of the case of the word you indexed.

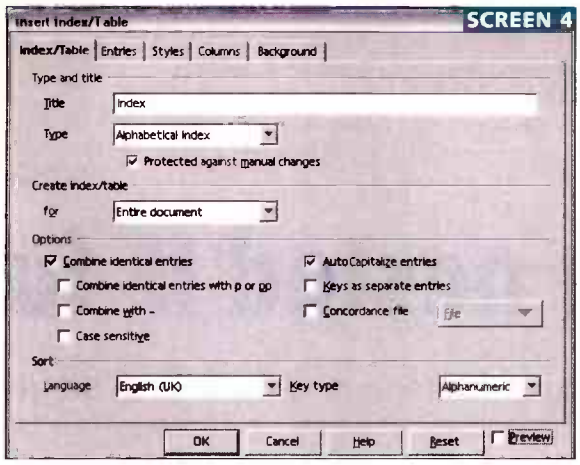
When you have your options sorted, click OK to create the index (see screen 4). Don't worry if you haven't finished indexing the document as you can update an index – or delete it and create a new one – from a right-click.

Hyperactive

Reader Bill Alexander sent me a double challenge. He had a Word document containing many hyperlinks to other files. All the files had been moved, so the hyperlinks no longer worked. Is it possible, he asked, to produce a list of all the hyperlinks in a Word document, together with their targets? Furthermore, can you produce 'move-proof' hyperlinks that will still work if the whole file structure of the main document and hyperlinked files are copied elsewhere, for example onto a CD?

Taking the first question, there is no built-in method to create such a list. Although the Edit, Links... command looks promising, this refers to DDE links rather than hyperlinks.

The best we can do is to show a way of cycling through all the hyperlinks in a document. Doubtless this could be wrapped up in some VBA to produce such a list, but we're going to leave that as an exercise for those sufficiently motivated.



Once you have chosen all your options, click OK to create the index

With the insertion point at the start of the document, select Go to... from the Edit menu. In the 'Go to what:' list choose Field, and in the 'Enter field name:' list choose Hyperlink. Use the Previous and Next buttons to trawl through all hyperlinks.

Absolutely relative

Absolute hyperlinks are those that are the same wherever you start from, rather like VNU House, 32-34 Broadwick St, London W1A 2HG, UK – *PCW*'s postal address. A URL of a web page, such as **www.pcw.co.uk**, is an absolute hyperlink – it should work in any browser, via any ISP, from a PC anywhere in the world.

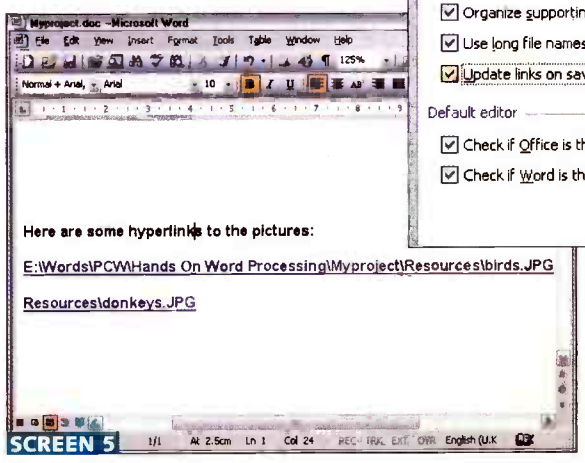
Relative hyperlinks are more like directions, in that the target depends on the start point – from Oxford Circus tube, walk east down Oxford Street, turn right down Poland Street and when you hit Broadwick Street, VNU House is on the corner. Which is pretty useless for someone wanting to send a letter from Australia, but makes sense for a visitor arriving by public transport.

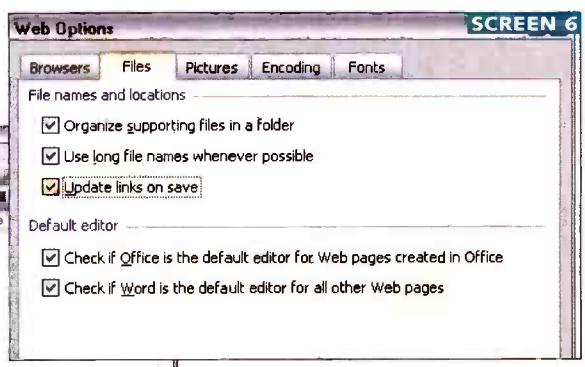
When Word inserts absolute addresses, this is fine for websites, but for files on a PC, 'absolute' refers to the universe of that PC.

Let's say you have a document named Myproject.doc in C:\Documents\Projects, which contains hyperlinks to files in C:\Documents\Projects\Resources. If you want to move the document and its linked files – for instance, by copying Myproject.doc and the Resources folder to a CD, you need relative hyperlinks, and you should find this is the default action when you insert one. If you insert a link to, say, Donkeys.jpg in the Resources folder, it should appear just as Resources\Donkeys.jpg (see screen 5).

If you have trouble inserting relative hyperlinks (ie Word insists on giving the full path) check first that you've saved the document, as a 'homeless' document doesn't yet have a path to refer to. Make sure you have the 'Update links on save' option ticked. Go to Tools, Options, General: click the Web options button then turn to the Files tab (see screen 6). Should you have a recalcitrant absolute hyperlink, you can edit this to force a relative path, but it's easier to delete it and start again. One harmless gotcha is that unless you have created a custom Screentip for the hyperlink, when you move the mouse pointer over the link you will see the full current path of the linked file.

If you need to use absolute hyperlinks, turn off the 'Update...' option. You can also set a hyperlink base – a starting path for all the hyperlinks in the document. Go to File, Properties, Summary and type in the path in the box provided. To override the base type a full path in the hyperlink dialogue. **PCW**





Left: An absolute hyperlink above, a relative below

Above: Make sure you have the 'Update links on save' option ticked

Stephen Wells is a freelance journalist and a regular contributor to computer magazines. He's been writing PCW's Spreadsheets column for over 10 years.

→ Comments welcome on the Spreadsheets column.
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Please do not send unsolicited file attachments.

Using the nested IF function

Three examples of how Excel's IF feature can produce the results you need

Nigel Halliday has an Excel spreadsheet listing members of a junior cricket club including a column for date of birth. Another column shows the age group they play in: under 13; 13 and 14; 15 and 16; and 17 and over. Calculating the age group based on date of birth is easy; however, the applicable age group needs to be based on the age as of 1 September 2005. So how can you calculate each player's appropriate age group?

One way is to use nested IF functions. Lay out your table as in screen 1 with each player's name in column A, date of birth in column B and the parameters of the groupings in the range: F4 to F7. Column E is left blank so Excel will recognise columns A: D as a table. Enter the significant date, in this case 1/9/2005, in cell B1.

On the Tools menu, choose Add-ins and check the Analysis Toolpak option. This makes extra functions available including YEARFRAC. In cell C4 enter:

```
=YEARFRAC(B4,$B$1,1)
```

and drag this formula down column C. Displaying the age of each player to three decimal places in this way offers a check so you can confirm that each player is in the right group.

	A	B	C	D	E	F
1	As of:	1/9/2005				
2						
3	Cricketer	DOB	Age	Group		Groups
4	Amy	2/9/1992				Under 13
5	Arthur	4/5/1990				13 and 14
6	Bernard	4/6/1987				15 and 16
7	Bernice	4/12/1990				17 and over
8	Clarence	30/6/1992				
9	Denise	1/7/1990				
10	Derek	2/6/1992				
11	Harry	5/1/1991				
12	Henrietta	4/5/1994				
13	Henry	4/10/1990				
14	Hilda	6/1/1993				
15	Jack	4/11/1987				
16	Jane	4/1/1992				
17	Jo	4/2/1991				
18	John	1/7/1994				
19	Paul	4/3/1989				
20	Penelope	4/4/1993				
21	Sean	4/5/1989				
22	Stephanie	11/3/1988				
23	Susan	1/2/1992				
24	Tina	4/6/1990				

SCREEN 1

A list of cricketers and their birth dates are entered on a spreadsheet

In cell D4 enter:

```
=IF(C4>=17,$F$7,IF(C4>=15,↙
$F$6,IF(C4>=13,$F$5,IF↙
(C4<13,$F$4)))
```

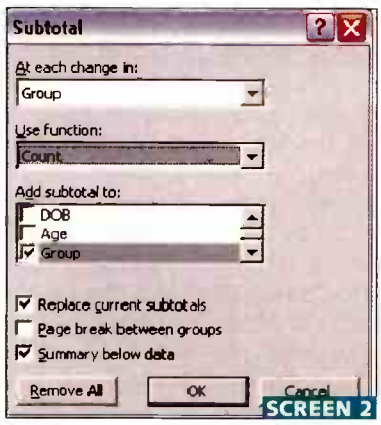
(Key: ↙ code string continues)

This formula means that if the age in cell C4 equals or is more than 17, display the contents of F7, '17 and over'. If it equals or is more than 15, display the contents of F6, '15 and 16'. If it equals or is more than 13, display what is in F5, '13 and 14'. Finally, if the age is less than 13, display the contents of F4, 'Under 13'.

The IF function formula chugs down through the groups, filtering out the oldest cricketers at each step, and classifying the remainder. The names of the players have been entered alphabetically here. Excel can rearrange the players into age groups and count how many are in each group.

Click anywhere in the table and, on the Data menu, choose Sort. In the dialogue box, choose DOB Descending. Having sorted the players into chronological order, choose Subtotals on the Data menu and make entries in the dialogue box so it reads: At each change in Group, Use function Count, Add subtotal to Group, Replace current subtotals, and Summary below data (see screen 2). Format to taste. Now you can produce summaries. Click in the table again and choose Group and Outline, Auto Outline on the Data menu and you'll have a presentable and printable result. At the top left you'll have a choice of views: 1, 2 and 3. View 1 just shows the grand total. View 2 shows the subtotals of each group. View 3 displays the whole table, as in screen 3.

Make relevant entries in the subtotalling dialogue box



SCREEN 2

Letter file

Tony Huby has an Excel spreadsheet that records the dates and numbers of letters he sends out. In column A are the dates, and the column is formatted as a simple date, 1/1/2006. The dates are incremental but not consecutive. For example he could have the 1st, 12th, 22nd and 23rd of, say, January but the next month he may only have the 3rd and 17th of February.

In column B against some of these dates are the number of Letter 1s that he has sent. In columns C and D are the number of Letter 2s and Letter 3s.

Tony wants to make a small table that shows the total number of each

Model Comment

In the table of fashion models (see Model performances on the opposite page), you can show a model's name in a Comment. Right-click on a cell and choose Insert Comment. Delete your name if it appears. Right-click on the edge of the Comment box and choose Format Comment. For Line, Colour, choose No Line. Under Fill Colour choose Fill Effects, Picture. Then choose the appropriate graphic. Drag the Size arrows out so it's not distorted.

SCREEN 3

	A	B	C	D
1	As of:	1/9/2005		
2				
3	Cricketer	DOB	Age	Group
4	John	1/7/1994	11.170	Under 13
5	Henrietta	4/5/1994	11.329	Under 13
6	Penelope	4/4/1993	12.411	Under 13
7	Hilda	6/1/1993	12.652	Under 13
8	Amy	2/9/1992	12.995	Under 13
9			Under 13 Count	5
10	Clarence	30/6/1992	13.171	13 and 14
11	Derek	2/6/1992	13.247	13 and 14
12	Susan	1/2/1992	13.581	13 and 14
13	Jane	4/1/1992	13.658	13 and 14
14	Jo	4/2/1991	14.573	13 and 14
15	Harry	5/1/1991	14.655	13 and 14
16	Bernice	4/12/1990	14.743	13 and 14
17	Henry	4/10/1990	14.910	13 and 14
18			13 and 14 Count	8
19	Denise	1/7/1990	15.170	15 and 16
20	Tina	4/6/1990	15.244	15 and 16
21	Arthur	4/5/1990	15.329	15 and 16
22	Sean	4/5/1989	16.329	15 and 16
23	Paul	4/3/1989	16.496	15 and 16
24			15 and 16 Count	5
25	Stephanie	11/3/1988	17.474	17 and over
26	Jack	4/11/1987	17.826	17 and over
27	Bernard	4/6/1987	18.244	17 and over
28			17 and over Count	3
29			Grand Count	21
30				

Left: The result – players are grouped, subtotalled and outlined

Below: One way to achieve a record of letter types mailed out

SCREEN 4

=SUMIF(Mth,1,Letter_1)

	Dates	Letter 1	Letter 2	Letter 3		Letter 1	Letter 2	Letter 3
2	4/1/06	1	143					
3	5/1/06	1		89	100	Jan	520	112	160
4	13/1/06	1		23					
5	28/1/06	1	420		60	Feb	377	229	0
6	3/2/06	2	97						
7	7/2/06	2		186		Mar	235	88	808
8	9/2/06	2		43					
9	21/2/06	2	280						
10	1/3/06	3			401				
11	9/3/06	3			407				
12	10/3/06	3	235						
13	14/3/06	3		88					
14									
15									

type of letter sent each month. He has tried using the SUMIF function to check the date column for, say, January and then sum the adjacent cell but this always returns a value of 0.

Excel offers a number of ways to do this, but here's one that will suit. Lay out the project as shown in screen 4. On Jan 4th, 143 Letter 1s were sent; on Jan 5th, 89 Letter 2s, and 100 Letter 3s, and so on. In cell B2 enter:

```
=MONTH(A2)
```

and drag this down the column. You can right-click on the column letter, B, if you like and choose Hide.

'There are many ways to access summaries of data in Excel'

In G3, G5 and G7 enter the month labels Jan, Feb and March. Hold down Shift and click on B2 and the cell opposite the last date. On the Insert menu choose Name, Define and Name this range, Mth. In columns C, D and E similarly name those comparable ranges, Letter_1, Letter_2 and Letter_3.

In cell H3 enter:

```
=SUMIF(Mth,1,Letter_1)
```

This means for each date that is in January (month 1), sum the Letter 1s. Drag this cell's contents across to J3 and edit I3 to read:

```
=SUMIF(Mth,1,Letter_2)
```

and J3 to read:

```
=SUMIF(Mth,1,Letter_3)
```

Move on to February. In H5 enter:

```
=SUMIF(Mth,2,Letter_1)
```

Cell I5 is:

```
=SUMIF(Mth,2,Letter_2)
```

Cell J5 is:

```
=SUMIF(Mth,2,Letter_3)
```

For March, H7 has

```
=SUMIF(Mth,3,Letter_1)
```

and so on.

You could also take advantage of Excel's Subtotal, and Group and Outline features.

Model performances

It's extraordinary how many ways there are to access summaries of data in Excel. I've received quite an original one from photographer, Kris Thykier. He summarises records of the dependability of his fashion models in a table controlled by a dropdown list (see screen 5). The method relies heavily on the use of Names. When cell ranges are referred to in this way they can be on any sheet in a workbook. He only has to pick a model's name from a dropdown list and the record of their bookings is displayed in the adjacent table.

Details are kept of whether each model worked as scheduled, was late, sick, whether the session overran, or was cancelled by the model. The range of cells holding these results for Candy in 2004 are Named 'Candy4', and for Charlie in 2005 are Named 'Charlie5', and so on. The range of cells that contains the names of the models is named, logically, Models.

The next step is to click on cell B3, choose Validation on the Data menu and in the dialogue box under the Settings tab, choose List for 'Validation criteria allow'.

In the Source box enter:

```
=Models
```

A dropdown arrow will appear and you can initially display the name of the first model in the cell.

In cell A14 enter:

```
=MATCH(B3,Models,0)
```

The MATCH function has three arguments. The first is the value to look up. The second is the array in which the value will be found. The third, in this case, specifies that an exact match is required and that the look-up array can be in any order. So if Candy is selected, a 1 will appear; if Charlie, a 2 will be displayed.

The adjacent table uses array formulas. Highlight the cells D6 to D10. Type in the Formula Bar:

```
=IF(A14=1,Candy6,IF(A14=2,Charlie6,IF(A14=3,Demmi6)))
```

and press Ctrl & Shift & Enter. Excel will add curly brackets, {}. Only Candy, Charlie and Demmi are covered in that formula. With four models it would be:

```
=IF(A14=1,Candy6,IF(A14=2,Charlie6,IF(A14=3,Demmi6,IF(A14=4,Emma6))))
```

and so on. Although a maximum of seven IF functions may be nested together, any of them can refer to other cells with IF functions in them.

Next highlight the range E6:E10 and enter the array formula:

```
=IF(A14=1,Candy5,IF(A14=2,Charlie5,IF(A14=3,Demmi5,IF(A14=4,Emma5))))
```

and in F6:F10 enter:

```
=IF(A14=1,Candy4,IF(A14=2,Charlie4,IF(A14=3,Demmi4,IF(A14=4,Emma4))))
```

Row 11 has SUM functions to total the number of sessions in each year for which the model was booked. PCW

SCREEN 5

Performance record

Model: Candy

Charlie
Demmi
Emma
Zara

	2006	2005	2004
As scheduled	7	5	4
Late	1	0	0
Sick	0	0	1
Over-ran	1	2	0
Cancelled	1	1	1
Total appointments	10	8	6

A pick list can be used to keep a record of a model's dependability

Niall Magennis has been dabbling in Midi and digital audio since the days of the Atari ST. He writes for a number of music magazines and lives in London in a flat overrun with music equipment.

→ Comments welcome on the Sound column. It returns in the October issue. Email sound@pcw.co.uk *Please do not send unsolicited file attachments.*

Set your music free

Get to grips with audio streaming so you can beam tunes straight to your hifi

The CD has pretty much been reduced to the status of a carrier bag for music. After you've bought it, you rip the tracks to your hard disk then forget about it. Digital music is taking over as it's easier to store, catalogue and carry around on your mp3 player.

However, it's not so convenient when you want to listen to it at home. Our stereo systems and speaker setups generally aren't capable of interfacing directly with our PCs to play the library of tracks stored on the hard drive. But that's starting to change, so this month we're going to look at some of the devices you can use to wirelessly beam your music from your PC to your hifi.

Audio-streaming devices

One of the first devices designed to let you link your home stereo to your PC was the Slimp3 from a company called Slim Devices. It connected to your stereo via the aux phono connectors on the rear, and allowed you to navigate through the library of tracks stored on your PC using the remote control and the bright display on the front of the box. However, the design of the unit was rather ugly. Over the years Slim Devices has tweaked the styling and changed the name to Squeezebox. The current product, the Squeezebox 3, is one of the best audio streamers around and has a great-looking design (we've a full review online at **www.pcw.co.uk/2150590**). However, it is pretty expensive at £230 for the wireless version.

A cheaper alternative is the Roku M1000. This works in a similar way to the Squeezebox, but has an interesting tubular design that looks very stylish. It features a similar, slightly smaller display and can be connected to your stereo via a pair of phono connectors or the twin digital audio socket. Evesham is reselling a rebadged version of the product for £150 under the name M-Bridge Wifi Music Player and we have a Pinnacle-badged Soundbridge version up for grabs as our Letter of the month prize (see page 29).

The Squeezebox 3 has a large bright screen that makes it easy to navigate through your collection of tunes

These are probably the best audio streamers on the market at the moment, but there are cheaper options. The Philips SLA5520i costs £80, is easy to set up and has decent sound quality, but the screen isn't as bright or easy to read as the Roku or Slim Devices products. Netgear used to offer the budget MP101, although it has been discontinued. It was available for under £100 and you may still be able to find old stock from some online retailers. It has a better screen than the Philips model, but the display still isn't in the same league as the ones you'll find on the Squeezebox 3 or M1000.

The software connection

Most media streamers come with their own software. Generally this software will run in the background on your PC and feed the music from its hard drive out to the device over your Ethernet or wireless network. It may include features that let you organise your

The importance of tagging

One thing we've found when using music streamers is that it's a big help if you spend a bit of time sorting out the tags on your mp3 files. Say, for example, you have a number of Chemical Brothers albums in your collection, it's best to get the naming convention correct so they all show up under the same Artist entry. For example, you don't want some albums showing up under 'Chemical Brothers' while others show up under 'The Chemical Brothers'. Why? Because most media streamers have small screens that make it a bit tricky to whizz through large libraries of songs, so anything you can do to make the library navigation easier will be appreciated in the long run.

It's also important to make sure all your tracks are properly tagged as songs. Tags such as 'Track 01' are bound to get lost in the system. We've found the Super Tagging feature in the registered version of Musicmatch especially effective for sorting out missing tags. It can check unnamed tracks against its database and suggest the proper titles, saving you the time of inputting lots of tags manually.

The Super Tagging feature in the registered version of Musicmatch can help you clean up tags in your music library

What happens when I turn off my PC?

The big problem with media streamers is that, once your PC is turned off, the music goes dead. That's because they rely on your PC to feed the contents of your hard drive to the device. Obviously, when your PC is off, there's no data being sent.

One option is to use an old PC as a music server. You just load it up with the server software for your device, fill the hard drive with mp3s and leave it running all the time. Serving music tracks across a network isn't a processor-intensive task, so even very old Pentium machines would work. For most people, however, this isn't a very practical solution. A better option may be to invest in a network-attached storage (Nas) device. This is basically a hard drive that connects into your Ethernet or wireless network and shares its files to other devices connected to the network.

Unfortunately, most media streamers won't work with a basic network share. Instead they need to be fed the file via server software. However, some Nas devices have enough memory and processing power to run the necessary server software in the background. For example, the Freecom FSG-3 comes with media server software pre-installed, so it can feed most audio streamers with content.

However, if you own older devices such as the Buffalo Linkstation or the Linksys NSUL2, you can install the Twonkymedia server software on them yourself. Check out **www.twonkyvision.de** for details.

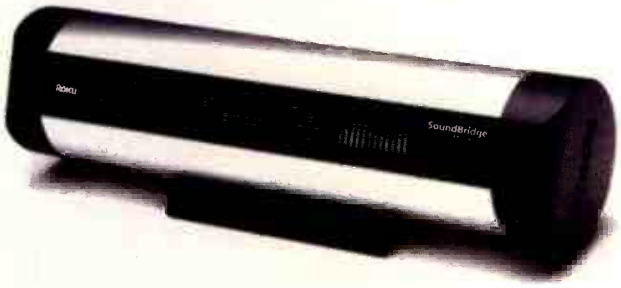
The Freecom FSG-3 is a Nas device with a built-in media server

music library to add extra tracks to be shared or remove tracks you don't want to access any more.

The quality of the software shipped with audio streamers can vary greatly. The good news is that most audio streamers conform to a standard called UPnP AV (Universal Plug and Play for audiovisual content). This sets out exactly how the streamer should interact with the server software running on the PC. In practical terms it means if you don't like the server software that comes with your audio streamer, you may be able to use different UPnP AV-compatible software or, if you have audio streamers from different manufacturers running on the same network, you can use a single piece of server software to feed both.

Depending on the make and model of your device, there may be side effects. For example, some devices allow you to search for tracks by typing in the first letter of a song title or artist name using the device's remote-control keypad. If you use a different piece of software you may lose this functionality. Nevertheless, there can be benefits. The new software may provide extras such as better support for Internet radio, or it may speed up navigation of your music library.

Windows Media Connect is a free download and allows you to stream protected wma tunes to supported devices



The M1000 from Roku has a stylish design and a very bright display that's easily readable from across a room

For example, if you own a Netgear MP101 or a Macsense Homepod audio streamer we'd seriously recommend you try out the free music server offered by Twonkyvision. You can download it from **www.twonkyvision.de**.

Netgear has put a restriction on the Internet radio feature of the MP101 so you have to pay a fee to access a decent list of stations, but we still found the Internet radio feature could be unreliable with certain wireless routers. However, by switching to the Twonky Music server software you'll be able to access any Shoutcast Internet radio station and get the benefit of the faster library navigation offered by the Twonky software.

In the case of the Macsense Homepod, the supplied software is unreliable, prone to crashes and a bit sluggish for track navigation. It hasn't been updated for a significant period of time. By switching to the Twonky Music server you'll suffer fewer lock-ups and enjoy faster track navigation.

Windows Media Connect

Microsoft has developed its own UPnP AV media server software. The software is called Windows Media Connect (see screen 1) and is available as a free download from **www.microsoft.com/windows/windowsmedia/devices/wmconnect/default.aspx**.

The main reason Microsoft has developed Windows Media Connect is that it offers support for streaming wma (Windows Media Audio) files that are protected using the Microsoft DRM (digital rights management) system. As it's a proprietary format, no other music streaming software offers support for protected wma files, so if you buy tracks from online stores such as Napster, Yahoo or HMV you have to use Windows Media Connect to feed them to your music streamer.

However, the music streamer must be compatible with Microsoft's DRM technology for it to work. The range of devices that are compatible is limited, but growing. The Squeezebox 3 and Netgear MP101 don't support protected wma files, but the Roku M1000 and the Philips SLA5520i do play these files when you use Windows Media Connect. Terratec's Noxon 2 audio streamer (see review on page 84 and online at **www.pcw.co.uk/2155979**) also supports protected wma files.

If all this sounds like it needs someone to come in and simplify the whole process, you'd be right. In fact Intel is looking to do just that with the next version of Viiv. It plans to automate the way you connect media streamers to protected wireless networks so you don't have to mess around with Wep keys, and it wants to make it easier to share DRM content across different devices such as media streamers in the home. We'll have to wait and see whether it succeeds. **PCW**

Alan Stevens has implemented and supported networks for over 25 years, working for IT vendors, system integrators and customers. He now mostly researches and writes about networking matters.

→ Comments welcome on the Networks column.
Email networks@pcw.co.uk
Please do not send unsolicited file attachments.

An invitation to help

With Remote Assistance, an expert can access your desktop in order to troubleshoot

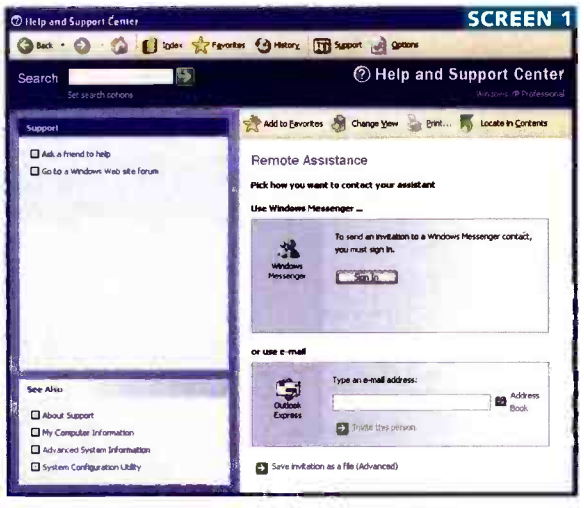
This month's column is all about Windows XP's Remote Assistance which, like the Remote Desktop option I looked at last month, uses Microsoft's Remote Desktop Protocol (RDP) to remotely control another PC. However, whereas you can use Remote Desktop to run applications on another, unattended, computer, Remote Assistance requires the presence of a local user and is designed to support one-off troubleshooting sessions.

Another difference is the use of an invitation system to put you, the local user, in touch with a remote 'expert' (paradoxically also referred to as the remote 'assistant') who can be given control of your desktop. That assistant can be anyone running Windows XP, such as a friend, a support person in a small company or a third-party specialist. All they need is a PC running Windows XP and a TCP/IP connection to your PC, over a Lan or the Internet.

Asking for assistance

Unlike Remote Desktop, Remote Assistance is available in both the Home and Professional versions of Windows XP and is normally enabled when the OS is installed. To access it, go to the Help and Support Centre on the Start menu and click on Invite a friend to connect to your computer with Remote Assistance. Select Invite someone to help you on the next screen, and you'll see the display shown in screen 1, which lets you contact your chosen remote assistant in one of three ways.

If you and the remote user both have .Net Passports (or sign up to get one) you can use Windows Messenger to set up and broker the session. This is by far the quickest way of getting help as it lets you communicate and set up a remote control connection almost instantly. However, if you don't have a .Net account or are barred from using instant messaging you can use email instead. That takes a little longer, but will work with whatever you have configured as your default email client.



You can send a Remote Assistance invitation via Windows Messenger or using email

The third method is for more advanced users and saves the invitation as an XML file, which can be transmitted by a variety of means. On a company network, for example, it could be dropped into a shared server folder to be picked up later by helpdesk staff or incorporated into an in-house automated support system.

And so to business

What happens next depends on the method chosen to send the invitation. Use Windows Messenger and, if you're not online, you'll be prompted to sign in and select a contact from the list displayed. At this point you can choose from a list of known contacts, online and off, but you won't be allowed to add to or modify the list; you have to use Windows Messenger to do that.

Assuming the person you want to invite is online, select their entry then click on Invite this person. A status message will be displayed telling you that the invitation is being sent, which will remain on the screen until a response is received.

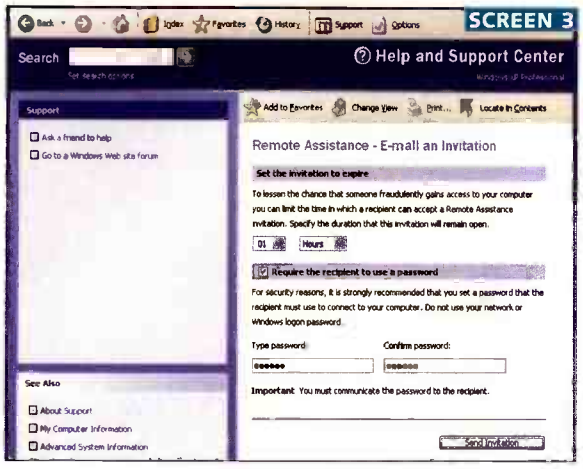
At the other end, the assistant (if online) will see the invitation appear in a Windows Messenger conversation window (see screen 2). They can then accept or decline the invitation.

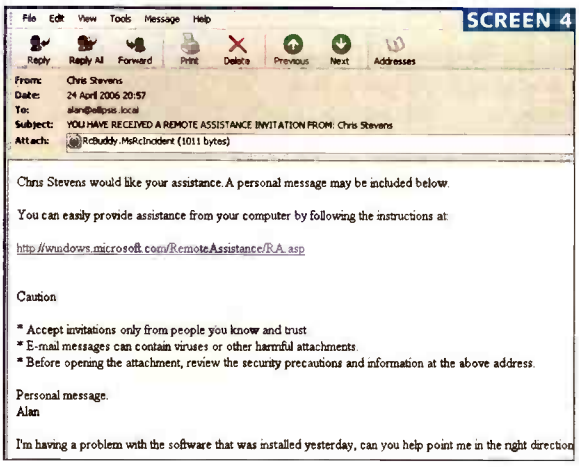
If they decline you're told the invitation has been cancelled. But if they accept you'll see another message asking you to allow the assistant to connect to your system, after which the Remote Assistance session can start.

Assistance by email

With email, you're prompted to address the Remote Assistance invitation to your chosen assistant, with the option of adding your real name and a message; for example, describing the problem you're experiencing and asking for help. To lessen the chance of the wrong person getting access to your system you can also specify a password

With Windows Messenger, the Remote Assistance invitation will be received by the assistant in their conversation window





The email sent to the remote assistant has an attachment which, when opened, will establish an RDP connection to the sender

(you'll need to tell the assistant what this is separately) and set a time limit after which the invitation will expire (see screen 3).

Press Send Invitation and the assistant will eventually receive an email with its subject field set to 'YOU HAVE RECEIVED A REMOTE ASSISTANCE INVITATION FROM:' followed by your name (see screen 4).

The personal message will be included in the content, with a link to the Windows support website explaining what Remote Assistance is all about and how the recipient should respond. Warnings about responding if unsure of the sender's identity will be included, plus an XML file attachment with a .MsRcIncident extension. The recipient has to open this attachment, which will cause a dialogue box to be displayed showing the name of the sender, expiration date and time of invite. The password, if requested, will be asked for, then a direct connection will be established to the local PC using the Remote Desktop Protocol on port 3389, as with Windows Messenger.

Send a Remote Assistance invitation by email and you can set an expiration limit; and for extra security, ask for a password to connect to your PC

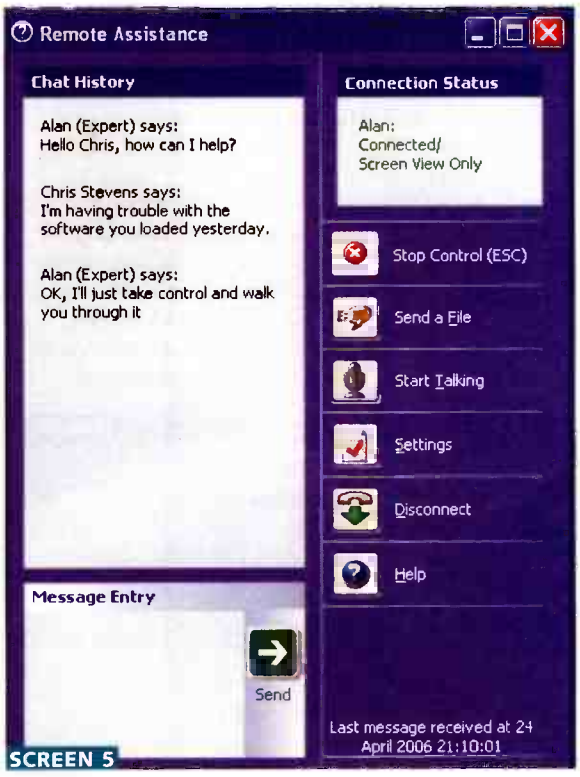
Giving assistance

Windows Messenger users will find the interface familiar, with a control panel at both ends to allow the local and remote operators to exchange messages (see screen 5). A message history is also displayed with, alongside, buttons to allow files to be exchanged and, if suitable hardware is installed, voice messages to be relayed across the connection.

At the assistant end, the display is a lot larger, to allow the contents of the local user's desktop to be displayed. The remote operator can then see what the local user is doing and, if there's a mismatch in resolution, scale the display to fit or scroll to different areas.

For security the remote desktop starts out as a read-only display, but you can allow full remote control, in response to the assistant clicking the 'Take Control' button at the top of their screen. You can then watch the remote assistant work knowing that you can terminate the session at any time, by pressing the Esc key.

The local PC user gets a control panel through which they can communicate with their chosen remote assistant



Remote considerations

The performance of Remote Assistance will depend on the type of connection, available bandwidth and amount of other network activity. The best results are over a fast Ethernet network, but a broadband link gives pretty good results, and there can be issues with firewalls and Nat (Network Address Translation).

Firewalls are easy enough to deal with – just make sure the right ports are open and, if you're using the XP desktop firewall, this will normally be done for you. However, the initial XML invitation contains an explicit IP address and port number, which can lead to problems if Nat is used.

The method of connection also has a bearing. For example, where the Remote Assistance invitation is sent by email or a file, the assistant will establish the necessary connection to the local PC directly. Most firewalls allow outbound traffic on the port used (3389) so nothing needs to be done at the assistant end. However, changes may be needed to the local setup to allow incoming traffic on this port if a firewall, other than the standard Windows XP firewall, is used.

As for Nat, Remote Assistance should work correctly as long as only the network on which the assistant resides is protected. The local PC doesn't need to know the IP address of the PC controlling it. However, if the PC to be controlled is behind a Nat gateway, the assistant may be unable to establish a connection using the address supplied in the XML invite.

Getting around this may not be possible, although if Microsoft's Internet Connection Sharing (ICS) software is used it shouldn't be an issue as facilities to deal with Nat and Remote Assistance requests are built in. Similarly Microsoft has provided support for Universal Plug and Play (UPnP) in the remote assistance software to help overcome the Nat issues when compatible routers and firewalls are deployed. So if you have trouble, check to see if you can turn UPnP on at the firewall and try again.

Alternatively, switch to Windows Messenger, as in this situation local user and remote assistant both make outbound connections so there shouldn't be any firewall problems. A remote assistant should be able to connect and control the other PC regardless of whether they're on Nat-protected networks. **PCW**

Mark Whitehorn is one of those lost souls who actually likes databases. He splits his time between consultancy, writing, working for two universities and tinkering with old cars.

→ Comments welcome on the Databases column.
Email database@pcw.co.uk
Please do not send unsolicited file attachments.

Save time and effort

Delete and Append queries explained; plus why the relational model isn't slow

People : Table

	PersonID	FirstName	LastName	M/F	NoOfAardvarks	NoOfPangolins
▶	1	Jane	Collins	F	0	1
	2	Alan	Jenkins	M	0	1
	3	Sian	Williams	F	1	1
	4	Ivor	Jones	M	1	1
	5	David	Lloyd	M	2	0
*	(AutoNumber)				0	0

Record: 1 of 5

SCREEN 1

A small sample table of creature ownership

Last month we looked at Update queries, with which you can make alterations to data stored in your database tables. Here I'll take a brief look at two further 'action' queries: Delete and Append. They delete data from, and append data to your table.

The Delete query

A Delete query is perhaps the most terrifying (which is code for 'practice on a copy of your database first', as with any action query). With a single mouse click, you can delete all records from a table.

Given a table like that shown in screen 1, we can open a query grid, add the People table and select Delete Query from the popdown list of Query Types. The query grid gains a row labelled Delete: with the entry Where in each column. Now we compose a straightforward query that identifies all the aardvark-owning males (see screen 2), the SQL for which is:

```
SELECT People.FirstName, ↙
People.LastName, People.[M/F],↙
 People.NoOfAardvarks
FROM People
WHERE (((People.[M/F])="M") ↙
AND ((People.NoOf↙
Aardvarks)>0));
```

(Key: ↙ code string continues)

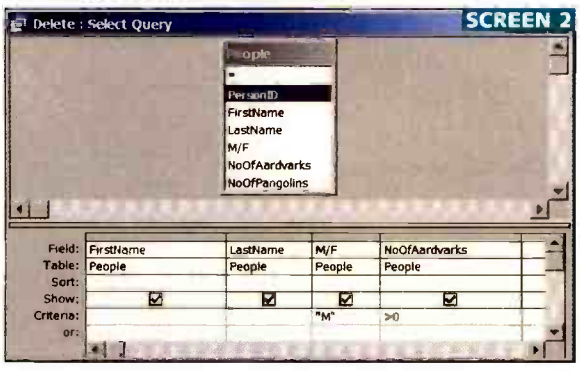
Clicking the View button shows the two records that will be deleted when the query is run. If you want to go ahead, click the Run button (the one with the red exclamation mark): Access will check first as it is impossible to reinstate records using Undo.

The Append query

An Append query will add data from one table into another; it can save the huge effort of re-entering data. Our database contains a second table called People2, and we want to add the rows from this table (see screen 3) to our original People table: note that there are extra fields in People2 and that several fields have different names.

Open the query grid and add the table containing the rows to be added, click the Query Type button and select Append Query. In the dialogue box, select the name of the table into which the new rows are to be inserted (People), leave the location as 'current database' and click OK. Add the columns that contain data we can accommodate in our original table: those for name, gender and creature ownership. Where field names differ, select the name in the destination table on the Append To: row (see screen 4).

The Delete query ready for testing: the title bar indicates it's a potentially data-destroying Delete query



The primary key column in both tables is an autonumber field, and both tables contain rows with the IDs 1, 2 and 3. Just copying these IDs from People2 to People would be impossible because the People table would contain duplicate primary key values – and primary keys must be unique. Access is clever enough to deal with this automatically: leave the ID field out of the query grid and the rows will be allocated unique autonumbers as they're appended to the People table. This is the SQL:

```
INSERT INTO People ( FirstName,↙
 LastName, [M/F], NoOf↙
Aardvarks, NoOfPangolins )
SELECT People2.FirstName, ↙
People2.LastName, People2.↙
[M/F], People2.Aardvarks, ↙
People2.Pangolins
FROM People2;
```

Clicking View shows the rows that will be appended and clicking Run makes it happen. (If you've bought the DVD edition of *PCW*, the database DBCAUG06.MDB is available on the cover disc, or you can find it at **www.pcw.co.uk/2151344**; it contains these queries in un-run form.)

Slow, slow, quick, quick, slow

Last month I suggested that, while everybody knows the relational model is painfully slow, everybody just happens to be wrong.

In relational databases the data is split into separate tables. The data in the tables is logically joined by the foreign and primary key values. Many people will tell you this is the fundamental reason relational

People2 : Table

	ID	FirstName	LastName	Address 1	Address 2	M/F	Aardvarks	Pangolins
▶	1	Alan	Green	1 Church Lane	Hirpleton	M	1	2
	2	Lucy	Bowen	Rose Cottage	Acton Green	F	0	1
	3	Fred	Flanders	17 The High	Sorworth	M	0	1
*	(AutoNumber)						0	0

Record: 1 of 3

SCREEN 3

databases are slow – because every time you run a query, the database has to follow several, possibly dozens, of these joins, in order to answer your question. So when you run a query, the head thrashes across the disk putting the data back together again. However, that's where the fallacy lies, because the assumption made here is that the tables we see on screen are stored as tables on the disk.

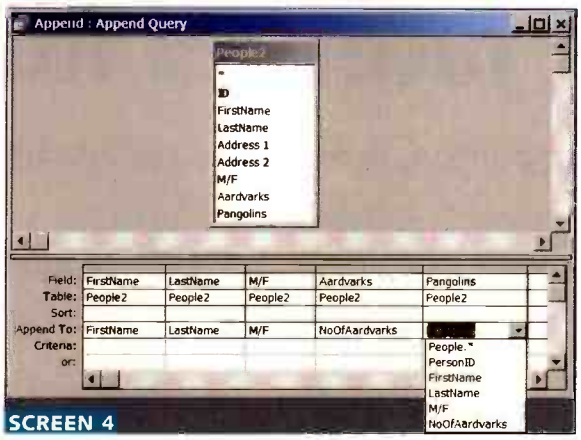
Think about computer storage. Suppose you type the word 'Penguin' into a word processor. When you press Save, how is that word stored on disk? We can answer this in several ways, all of which are accurate; it just depends on the level at which we are thinking. We could say the computer stores the seven letters P, e, n, g, u, i and n. And it does, just not as little characters. Assuming it's a Windows-based computer, it will be storing the letters as Ascii codes; so it doesn't store the letters, it stores a set of numbers, such as '80 101 110 103 117 105 110', which are then interpreted as the characters. But the numbers shown here are decimal and computers work in binary, so these decimal numbers would be stored as:

1010000
1100101
1101110
1100111
1110101
1101001
1101110

It may not be as simple as that, however. For example, in order to save storage space, the word processor may tokenise common words, so the word 'Penguin' may be stored as two bytes, for example 10010101 01110101. (Tokenising means replacing a commonly used set of characters by a smaller token that stands for the item replaced. 16 binary digits (2bytes) are enough to tokenise over 64,000 words).

Of course, whether the word is tokenised or not, the disk heads don't write ones and zeros onto the disk with a pen. Instead they alter the magnetic characteristics of the disk substrate.

The bottom line is that storing computer information is technically quite complex. Human beings work



SCREEN 4

Top: A table of data to be appended

Bottom: An Append query ready to test

better at a much higher level of abstraction than binary (let alone magnetic impressions on a disk), and that is exactly what the relational model does. It allows us to think in terms of tables with primary keys and foreign keys (see screen 5).

The mistake people make is to assume that these tables also exist on the disk. Indeed, the idea that the tables appearing on our screen have to be written as tiny little tables on the disk, complete with columns, rows, primary keys and foreign keys, is ridiculous. They can be written to the disk in any way the database engine sees fit.

By the same token, the idea that when a join between two tables is performed, the database has to look up values in one column, swap to another table and then look up values in a column there is clearly ludicrous. Indeed, Ted Codd and Chris Date (who developed the relational model) have always been at pains to point out that

A pair of tables containing normalised data; the customer who placed each order is indicated by the value found in the 'Customer ID' field in the ORDERS table. This is termed a foreign key and it points to the primary key in the CUSTOMERS table

CUSTOMERS : Table

Customer ID	Title	First Name	Last Name
1	Ms	Mary	Shaw
2	Ms	Agnes	Dick
3	Mrs	Wilhemina	Christie
0			

Record: 4 of 4

ORDERS : Table

Order No	Customer ID	Order Date	Dispatch Date
473	3	08-Aug-06	14-Aug-06
523	2	11-Aug-06	12-Aug-06
754	3	21-Aug-06	08-Sep-06
2474	1	10-Nov-06	15-Nov-06
3064	1	05-Dec-06	15-Dec-06
3141	1	09-Dec-06	10-Dec-06
0	0		

SCREEN 5

the relational model doesn't say anything at all about the way data is stored on disk.

As Date writes in *An Introduction to Database Systems*: 'First, note that the "relational system" definition requires only that the database be perceived by the user as tables. Tables are the logical structure in a relational system, not the physical structure. At the physical level, in fact, the system is free to use any or all of the usual storage structures – sequential files, indexing, hashing, pointer chains, compression and so on – provided only that it can map those structures into tables at the logical level' (Book published by Addison Wesley, ISBN 0-201543-29-X).

The really important point here is that the relational model doesn't give a fig about how the data is stored – it leaves that decision entirely up to the designers of the database engine. So there is nothing to stop a database engine (Access, Oracle and so on) from storing the customer data completely separately from the order data, or from embedding, say, the name and address of the customers within the orders so no lookup is necessary. The relational model is demonstrably not fast, slow or in between: it depends upon the implementation of the database engine. Indeed, asking: 'Is the relational model fast or slow?' is like asking: 'Is a banana happy or sad?' You are asking about a property the object doesn't display.

Now at this point you may well be thinking: 'OK, Whitehorn, you've made a very pedantic point. You've convinced me that it isn't the relational model that's slow but, in practice, it doesn't matter because relational database engines are slow – which amounts to the same thing.'

Well, no. The difference is crucial. First, if I have managed to convince you, you can now take great pleasure in correcting anyone who tells you the relational model is slow. That has to be a big plus. Second, if we look to the future I suspect we will see a huge change.

We currently store transactional data in relational databases and then restructure it for analytical purposes. I think it is inevitable that this will change. We will still use the relational model to design transactional databases. That will be stored on disk as a data structure of some kind that is efficient at storing transactional data and at answering analytical queries. The idea that we can use a single data structure for everything will simplify the entire world of business intelligence. **PCW**

Tim Anderson is an IT journalist and software developer, and began writing for PCW in 1993. Since his first Commodore Pet, he has acquired expertise in Rad programming, Windows and the Internet.

→ Comments welcome on the Visual programming column.
Email visual@pcw.co.uk
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The many facets of Ruby

Following last month's introduction, here's an insight into blocks and closures

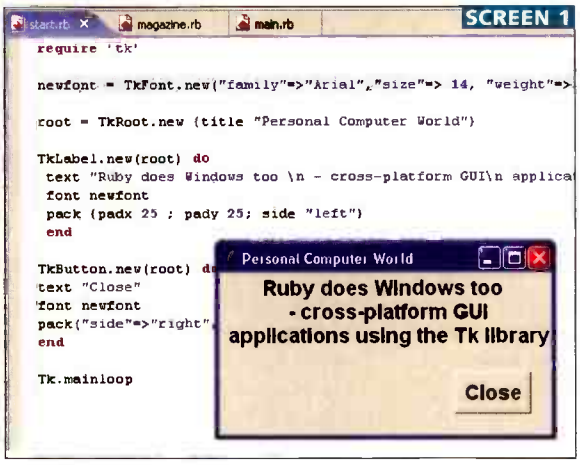
Ruby is a dynamic language that is exciting a lot of interest thanks to its excellent productivity. Last month we showed you how to put together a data-driven website using the Ruby framework called Rails. Now it's time to take a closer look at the language itself, to give those already familiar with alternatives such as Visual Basic or Java an idea of what Ruby offers, including blocks and closures.

Setting up Ruby

To recap, you can easily set up Ruby on Windows using the One-Click Ruby installer at **http://rubyforge.org**. If you want to create Windows applications, go to **www.activestate.com/Products/** and download the free ActiveTcl. This lets you use the Tk cross-platform GUI toolkit (see screen 1). There are several options for a Ruby IDE – we used Eclipse 3.1 from **www.eclipse.org** with the Ruby Development Tools (both free) at **www.rubypeople.org**.

Ruby conventions

Ruby is case sensitive. The way you name a variable or keyword makes a difference to its meaning. Here are some key conventions:
Instance variables start with @.
Class variables (static or shared variables in other languages) start with @@.
Global variables start with $.
Class names, module names and constants start with an upper-case letter.
Strings can use single or double quotes. Single-quoted strings by and large stay as you type them, but double-quoted strings support all sorts of escape sequences.



Using Tk, GUI applications are no sweat for Ruby

You can easily test your Ruby setup. From the Eclipse Window menu, choose Open Perspective and select Ruby. Next, go to File – New – Project and start a new Ruby project (see screen 2). With the project open, add a new file and call it main.rb. Type:

```
puts "It works"
```

Open the Eclipse Run dialogue. Create a new Run configuration, specifying main.rb for the file and ruby.exe for the Interpreter (under the Environment tab). If Ruby is not yet listed, click the Add button to add the ruby.exe executable. In the Arguments tab, type '-w'. This switches on warnings. Then click Run. Your Ruby program runs, and the output displays in the console. The 'puts' method writes to standard output. "Hello world" cannot get much shorter.

Five-minute Ruby

The starting point for most apps is a set of classes. This example will manage a magazine library, so start by declaring a couple of classes:

```
class Article
attr_accessor :subject
attr_accessor :rating
end
class Magazine
attr_accessor :title
attr_accessor :coverdate
attr_accessor :articles
end
```

You can put either these at the top of main.rb, or in a new file called, say, magazine.rb. If you do the latter, you can use the classes from main.rb provided you specify:

```
require 'magazine'
```

before you start trying to use the classes declared there. Now write:

```
pcw = Magazine.new
pcw.title = "Personal ↙
Computer World"
#test the class – note the ↙
use of # for comments
puts pcw.title
```

(Key: ↙ code string continues)

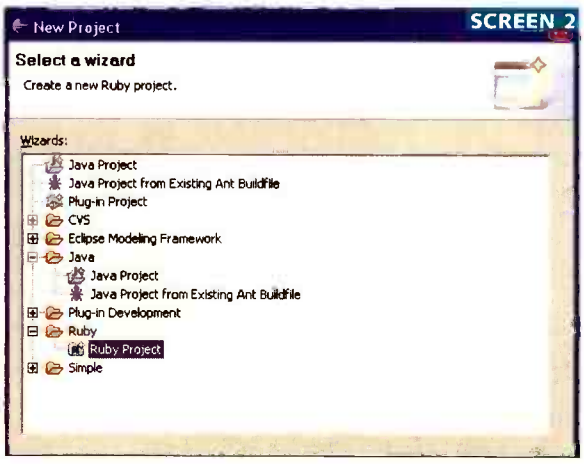
You get the idea: doing objects in Ruby takes very little code. Note the use of the new method to get a new instance of a class.

Properties and methods

In the above example, a single statement, attr_accessor, creates a property. This is really a shortcut. The full version looks like this:

```
def title
@title
end
def title=(titleval)
```

The starting point for a new Ruby application



```
@title = titleval
end
```

In Ruby, methods live in def... end blocks. The return value of a method is either specified with the return statement, or it is the value of the last statement executed. The first method above returns the value of @title, while the second sets the value of @title. In other words, these are property getters and setters, just as in Visual Basic or C#. If you do not need any further code, you can use attr_accessor instead.

The @ prefix has a special meaning in Ruby, indicating an instance variable (see Ruby conventions box).

Ruby classes support a method called initialize. Here is how to add a constructor to Magazine:

```
def initialize(title,coverdate)
@articles = Array.new
@title = title
@coverdate = coverdate
end
```

Now you can write:

```
pcw = Magazine.new("PCW","↙
June 2006")
```

Can you have two constructors, one with and one without arguments? Not directly, because Ruby does not support method overloading. This is one thing you might miss from other languages, but there are workarounds.

Blocks in Ruby

The five-minute introduction above is sufficient for a look at 'blocks'. A block is code between curly brackets or do ... end (see screen 3). The key thing about blocks is that you can pass them as arguments. A great place to start is Ruby's 'each' method. Classes like Array and Hash have an each method that lets you iterate through all the items in the collection. To list all the articles in a Magazine, in VB enter:

```
'VB code
For Each a As Article In ↙
pcw.Articles
Debug.Print(a.Title)
Next
```

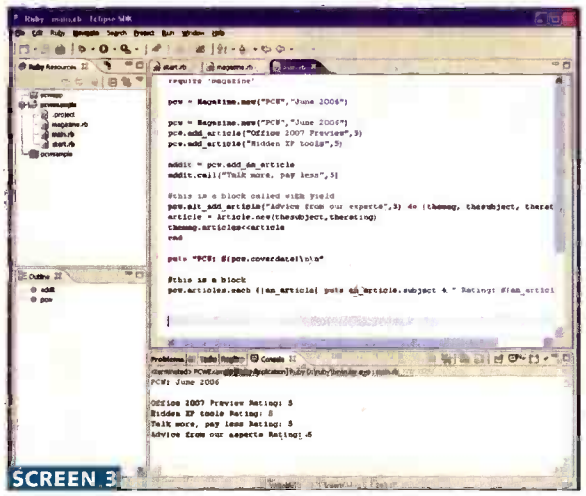
In Ruby you can write:

```
#this is a block with do ..↵ ↙
end notation
pcw.articles.each do
|an_article|
puts an_article.subject
end
```

The short version is more distinctive:

```
#this is a block
pcw.articles.each {|an_article↙
| puts an_article.subject}
```

A block of code is being passed as an argument to the each method. The variable between vertical bars indicates a parameter. Internally, the each method calls the block of code once for each item in the collection, passing the value of the item as an argument to the block.



Try out Ruby blocks using Eclipse

Fun with blocks and closures

The above code lists the Articles in a Magazine, but how are the articles added? The obvious way is to add a method to the Magazine class. First, add a constructor to Article:

```
def initialize(subject,rating)
@subject = subject
@rating = rating
end
```

Add the following to Magazine. Note the use of the << operator which appends an item to the Array:

```
def add_article(subject,rating)
article = Article.new↙
(subject,rating)
# add the article
self.articles<<article
end
```

You could implement this with a block. In this admittedly contrived case, the code is passed to the method and executed with the yield statement:

```
def alt_add_article↙
(subject,rating)
yield self, subject, rating
end
```

You could call the method like this:

```
#this is a block called ↙
with yield
pcw.alt_add_article("Advice ↙
from our experts",5) do ↙
|themag, thesubject, therating|
article = Article.new↙
(thesubject,therating)
themag.articles<<article
end
```

In the Ruby calling code, the block follows immediately after any arguments to be passed to the method. In the receiving code, the yield statement is followed by any arguments to be passed to the block.

There is a close relationship between blocks and Ruby Proc objects. A Proc object is a variable that holds a function. You can rework the alt_add_article method like this:

```
def alt_add_article↙
(subject,rating,&addit)
addit.call(self,subject,rating)
end
```

The &addit parameter converts the block to a Proc object. This leads to another possibility, where we return a Proc object from a method. Add the following method to Magazine:

```
def add_an_article
return lambda do
|subject,rating|
self.articles<<Article.new↙
(subject,rating)
end
end
```

The lambda method converts a block to a Proc. So now you have this:

```
addit = pcw.add_an_article
addit.call("Talk more, pay ↙
less",5)
```

The block within add_an_article contains a reference to self, yet when the Proc is called it is no longer in the context of a class. This ability to maintain context is why Ruby blocks are also called closures.

What's it all for?

There are several ways to look at blocks and closures. One is to note that they make functions first-class citizens. You can treat a Proc more or less like any other variable. You also gain total flexibility over where code is situated and when it is executed. For example, if you write GUI applications there is sometimes a conflict between putting code in the classes that define the GUI widgets, for easy access to the UI, or in the non-visual classes where it perhaps belongs. Blocks make it possible to get the best of both worlds.

Blocks in other languages

Once you get used to the power of blocks in Ruby, you may ask if you can use them in other languages such as VB, C#, Delphi or Java. The answer is mostly 'yes'. Microsoft's .Net 2.0 has support for closures, and so does Delphi. Java's anonymous classes come close. The Ruby advantage is that blocks are easy to use and require little code. In many cases they make code more concise. This perhaps is why blocks are used more frequently in Ruby than in other languages. **PCW**

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How to buy the best products tested by our Labs

This Buyer's Guide is a comprehensive listing of the best products PCW has tested across a range of areas, helping you to make the best decision when you're planning a purchase. Over the following pages you'll find products, their verdicts and ratings, plus information on where you can read the full review.

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BUYER'S GUIDE

78 PRODUCTS REVIEWED TO MAKE YOUR BUYING DECISION EASIER

HOW TO BUY: PCs

Many of the choices you are faced with when buying a PC are covered in the following pages. You need to think about the graphics card, memory, onboard sound or separate soundcard, size and type of hard disk, CD burner or DVD burner and so on.

Once your budget is set, the starting point is the CPU (central processing unit), because it is the brains of your PC.

Intel and AMD offer a bewildering number of processors. The differences between the CPUs are in technical details that don't necessarily mean much to end users. Pricing is also competitive, with AMD PCs generally cheaper than comparable Intel models.

Budget PCs come with Intel's Celeron or AMD's Sempron CPUs. These are aimed at undemanding users. If your needs are for word processing tasks and surfing the Internet with some low-end gaming or image editing, a PC running either of these processors is fine. You won't need a huge hard disk – 80GB will be plenty – coupled with between 256MB and 512MB of Ram and a low-end graphics card, or even onboard graphics for the truly undemanding. You'll be fine with onboard sound, and can expect to pay up to about £500, depending on your monitor.

In the mainstream desktop market it's Pentium 4 and Pentium D versus AMD's Athlon XP and Athlon 64. The chief difference is that older Pentium 4 and Athlon XP models are 32bit CPUs, while some newer Pentium 4s, the Pentium D and Athlon 64 are 64bit models. To take full advantage of this, you need a 64bit operating system and applications.

More memory can be supported by 64bit systems – 32bit Windows or Linux systems are limited to 4GB of Ram, whereas a 64bit Windows or Linux system can support 128GB. Data is also moved in larger chunks, allowing a theoretical speed advantage.

AMD and Intel offer high-end processors with the Pentium Extreme Edition and Athlon FX ranges, both aimed at the hardcore gaming market. They also have dual-core CPUs. These processors effectively act as two CPUs in one and offer superior performance.

If you're choosing a PC running the above CPUs, other considerations come down to your needs. If you store lots of music, video or photos, go for a big hard disk – 200GB or above. Memory will help speed up applications, so aim for 1GB or above and don't drop below 512MB. The latest games demand the latest graphics cards, but for most people, cards that were new six to 12 months ago will be powerful enough. And look at the CPU's cache memory, which helps eliminate data bottlenecks.

Most PCs are Windows XP, and the Home Edition is fine. If it's for a small business or you need features such as remote access, buy XP Professional. Few PCs are sold running Linux, and we'd recommend only the technically confident buy a Linux-only system. Linux can always be installed later. Finally, don't overlook the monitor, especially if you're using the PC for gaming or imaging; buy the best you can afford.

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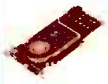

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Reviewed July 06
www.overclockers.co.uk
A terrific graphics card for those who like to dabble with overclocking.

EVGA Geforce 7800GS CO Superclocked
£160 ★★★★★
Reviewed May 06
www.evga.com
An excellent choice for AGP owners who demand fast graphics but don't want to spend a fortune.

Sapphire Radeon X800
£114.99 ★★★★★
Reviewed February 06
www.sapphiretech.com
A decent PCI Express card based on ATI's X800 series with 256MB of Ram.

£200-£349

Gecube Radeon X850XT Uniwise
£269.97 ★★★★★
Reviewed May 05
www.gecube.com
A single-slot design using Gecube's own cooling system, and it offers good performance.

Gainward Bliss 7800GT GLH
£244.89 ★★★★½
Reviewed July 06
www.overclockers.co.uk
A little expensive, but this card has plenty of overclocking potential.

Powercolor Radeon X850XT Platinum Edition
£320 ★★★★★
Reviewed July 05
www.powercolor.com
Based on ATI's fastest Radeon processor, this card will run the latest games with ease.

Gecube X850XT Platinum Edition Uniwise
£307 ★★★★½
Reviewed January 06
www.gecube.com
High-end performance and quiet cooling for AGP motherboards.

£350+

ATI Radeon X1900 XTX
£363 ★★★★★
Reviewed April 06
www.ati.com
Using the new R580 core, this is one of the fastest single-core graphics cards currently available.

HIS Radeon X850XT Platinum Edition IceQII
£370 ★★★★★
Reviewed June 05
www.hisdigital.com
Making use of the IceQII efficient cooling system, this is a quiet and super-fast card.

Sapphire Toxic X1900XTX 512MB
£421.83 ★★★★½
Reviewed August 06
www.sapphiretech.com
This is a water-cooled, overclocked and blazingly fast graphics card.

HOW TO BUY

Most graphics cards are based on either the Nvidia Geforce or ATI Radeon family of chips. Each has their strengths and both offer state-of-the-art image acceleration and comparable features.

Performance improves as you move up a range. Top chips offer more features and draw more pixels or textures in a single pass than cut-down, lower-cost options. All current graphics processors are fine for office work, but hardcore gamers favour Nvidia's Geforce 6800 or new 7800 series and ATI's latest X1900 XTX card.

Ensure the card you buy can display favoured resolutions with at least a 75Hz monitor refresh rate to avoid eye strain from flicker (if using a CRT monitor).

There are usually three clock speeds quoted (in megahertz). Core clock is the internal speed of the graphics processor. Memory speed (or memory clock) is the speed of data transfer between the graphics card's onboard memory and the graphics processor. Ramdac speed is the capability of the digital-to-analogue converter that provides the graphics output from the card.

Graphics cards use their own dedicated video memory to store data, images and textures. The more you have, the better the performance. A card with 64MB is fine for office tasks, but we recommend at least 128MB or 256MB for the latest games and video applications.

Around £40 will buy you a Geforce FX 5200 or Radeon 9200 card with 128MB of Ram, which is good for 2D action/strategy games, image editing and less demanding 3D games.

To play 3D action games smoothly, look at £100–£150 cards. Serious gamers should consider the Geforce FX 6800 GT at £280-plus, Radeon 850 XT at £320-plus, or 7800 GTX at £350-plus.

Depending on the motherboard, you'll need an AGP or PCI Express graphics card. PCI Express is the newest interface standard, offering up to double the bandwidth of an AGP 8x slot for even faster and more complex graphics. Both ATI and Nvidia offer PCI Express versions of most of their cards. Nvidia also has its SLI (Scalable Link Interface) technology that lets you use two PCI Express graphics cards in SLI-enabled motherboards for ultimate performance. ATI's rival technology Crossfire is an alternative.

Look for support for both analogue (VGA) and digital (DVI) displays, and S-video and composite video outputs for use with TVs. Some 'all-in-one' cards have a built-in TV tuner and video-capture options, so you can save money rather than buying separate cards.

NOTEBOOKS

Evesham Voyager C550
£1,149 ★★★★★
Reviewed July 06
www.evesham.com
A mid-range dual-core notebook with a 15.4in display and ATI Mobility Radeon X1600 graphics.

Apple Macbook dual core
£749 ★★★★½
Reviewed August 06
www.apple.com/uk
This replacement to the Ibook brings with it improved performance and new features.

Samsung Q30
£1,499 ★★★★½
Reviewed June 06
www.samsung.co.uk
An ultraportable notebook that has style, but is not for those after performance.

Evesham Voyager C720
£1,499 ★★★★★
Reviewed February 06
www.evesham.com
Great gaming notebook with a 17in display and Geforce Go 7800 graphics.

Mesh Discovery D2400 PCW
£899 ★★★★½
Reviewed July 06
www.meshcomputers.com
Big and bulky, but a dual-core notebook with fast performance and decent battery life.

HOW TO BUY

Notebooks have caught on like wildfire with consumers thanks to plummeting prices and massive marketing campaigns. However, there are so many options that it's easy to get confused.

Decide what you want your notebook for. If it's for occasional use, running some office applications, accessing the Internet and email, then almost any low-cost notebook will do the job. If it's for gaming or running video-editing software, you will be looking for a notebook with a large 15in/17in screen – possibly widescreen – a high-end Nvidia or ATI graphics chip, 1GB of memory and an 80GB (or bigger) hard disk.

In the low-cost arena, Intel has its Mobile Celeron chip and AMD has Sempron. In the midrange/high-end space, there are Intel's Mobile Pentium 4 or Pentium 4 chips, while AMD offers Mobile Athlon 64 and Athlon 64. Expect to find these in desktop replacement systems and those used by gamers.

For the best in performance with power-saving technology, go for Intel's Pentium M or AMD's Turion 64 processors.

Any notebook you get should have in-built Bluetooth and Wifi connectivity, a 30-40GB hard disk drive, 512MB of Ram, 14-15in screen, USB2 or Firewire ports, DVD/CD-RW combo drive and three to four hours' battery life.

MOTHERBOARDS

SUB £100

1

ECS PF88
£64.63 ★★★★☆
Reviewed August 05
www.ecs.com.tw
The PF88 is feature-packed and compatible with both Intel and AMD processors.

2

Aopen i915GMm-HFS
£79 ★★★★☆
Reviewed July 05
www.aopen.com
The HFS makes the ideal platform for building a quiet, power-efficient Intel PC.

3

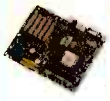
Asus A8N-SLI Deluxe
£98 ★★★★☆
Reviewed April 05
www.asus.com
A good, all-round AMD SLI board that is packed with plenty of features.

4

ECS 915-A
£61.81 ★★★★☆
Reviewed June 05
www.ecs.com.tw
All the features you'd expect from a modern Intel-based motherboard and outstanding value for money.

5

Asus K8N-E Deluxe
£59 ★★★★☆
Reviewed November 04
www.asus.com
A tidy AMD board with lots of room around the major components and a wide range of features.

6 

Epox 8HDA3+
£79.92 ★★★☆☆
Reviewed July 04
www.epox.com
An AMD board that stands out from the crowd thanks to its dual Lan and external Sata support.

7

MSI 945P Platinum
£99 ★★★☆☆
Reviewed November 05
www.msi.com.tw
An Intel board that features DTS Connect, so you can output true DTS surround-sound audio.

£100+

1

Gigabyte GA-8N-SLI Royal
£149 ★★★★☆
Reviewed October 05
www.giga-byte.com
Featuring an Nforce4 chipset, this model from Gigabyte supports all Intel 775 processors.

2

Asus M2N32-SLI Deluxe Wireless Edition
£136.59 ★★★★☆
Reviewed www.pcw.co.uk/2156925
www.asus.com.tw
This is one of the new motherboards to support the AMD AM2 socket.

3

ECS PF22 Extreme
£123 ★★★★☆
Reviewed February 06
www.ecs.com.tw
A good range of features including dual graphics support courtesy of ATI's Crossfire technology.

HOW TO BUY

The motherboard dictates the type of processor you can use, how well the other components communicate, the features on offer and future upgrade potential.

Cheap boards limit processor support, graphics and expansion options. Around £70–£100 gets you the latest technologies.

Most desktop and tower cases use a standard ATX-size motherboard but, if you're building a small system, look at compact MiniATX or MicroATX designs. If using an existing case, make sure you buy the right form factor.

Your choice is also dictated by the processor. You'll need Socket 775 for current Intel processors, Socket A for AMD Athlon XP or Duron, and Socket 939 for an Athlon 64. The Athlon 64 FX series requires Socket 940. If using an older CPU, check the socket type.

We would recommend an Intel P4 or Athlon 64 for a good all-round system. The Athlon 64 can address one terabyte of Ram (1,000GB) and handle difficult calculations with relative ease.

The new generation of processors also change the way data is transferred. Whereas P4s rely on the motherboard chipset to shuttle data between processor and memory, Athlon 64s avoid this by integrating the memory controller into the CPU die.

Divided into northbridge and southbridge, the chipset handles the communication between all the components and dictates the features on offer. Today's leading chipset manufacturers include Via, Silicon Integrated Systems (Sis), ATI, Nvidia and Intel. Chipsets can include integrated graphics.

Today's motherboards mainly use DDR or DDR2 Ram, available in 200, 266, 333 and 400, 667 and 800MHz modules.

Also consider the number of slots available. Fit dual in-line memory modules (Dimms) in pairs if the chipset supports dual-channel operation.

The latest boards support both older IDE and new, faster Serial ATA (Sata) hard disks. Check the number of connectors available for both.

Some chipsets provide Raid support, so data can be spread across two drives for extra performance or backups. SCSI controllers can be found on more expensive boards, or be added with expansion cards.

Also important is the number of USB2 and Firewire sockets for external add-ons. You may need serial, parallel and PS/2 interfaces if using older legacy peripherals. Look out, too, for onboard Ethernet networking, a built-in 56K modem and onboard sound. The latter is fine for all but audio buffs or avid gamers.

DIGITAL MUSIC PLAYERS

1

Apple Ipod
£219 ★★★★★
Reviewed January 06
www.apple.com/uk
All the usual Ipod features but now with the ability to play video.

2

Creative Zen Nano Plus
£99 ★★★★★
Reviewed December 05
http://europe.creative.com
1GB flash player that houses a radio, voice recorder and mp3 encoding from a line-in source.

3

Philips HDD6320
£229 ★★★★☆
Reviewed March 06
www.philips.co.uk
Sleek and stylish, this 30GB player from Philips is incredibly easy to use.

Apple Ipod Shuffle
£89 (1GB); £69 (512MB) ★★★★★
Reviewed May 05
www.apple.com/uk/ipod
Small yet perfectly formed, it's easy to use, has good sound and is set to be a big hit.

5

Iriver H340 SE
£339 ★★★★☆
Reviewed January 05
www.epinx.com
A good all-round player with a colour screen and built-in FM tuner.

HOW TO BUY

The mp3 music format recently celebrated its tenth birthday and in that short space of time it has revolutionised the music industry. On the way, it has spawned a global market for digital music players, none more famous than Apple's Ipod and related offerings.

There are two main categories that players can be divided into: Flash memory-based players, which range in size from 256MB to 1GB and mini hard drive-based models, which run from 4GB to 60GB. Prices for a 256MB player start as low as £20 rising to around £300 for a 60GB player. In terms of songs, the difference is the ability to hold 40 on one and 15,000 on the other. If you just want something for using on-the-move, then Flash-based players are the way to go, since they are very small and light.

The software used in many players determines how easy it is to use in terms of tracklisting and organising songs.

If you need a portable record store, then start by looking at the wide range of 4GB–6GB players and, if that's not enough, head for the 20GB, 40GB and 60GB models. Ensure whatever you buy supports playback in different formats. The ability to listen to FM radio and record voice is also a bonus. Most importantly, check out the battery life, since this can vary wildly between similar devices. ↘

HARD DRIVES

INTERNAL

1

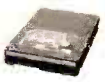
Seagate Barracuda ST3750640AS
£352.44 ★★★★½
Reviewed August 06
www.seagate.com
An internal hard drive that provides you with a whopping 750GB capacity.

2

Western Digital Raptor X
£243.17 ★★★★½
Reviewed June 06
www.wdc.com
Two 75GB platters combine to create one of the fastest non-SCSI hard drives.

3

Seagate Barracuda 7200.8 (ST3400832A) 400GB
£186.96 ★★★★½
Reviewed July 05
www.seagate.com
This massive 400GB drive offers impressive capacity and an 8ms seek time.

4 

Hitachi Deskstar 7K250 (250GB Sata150)
£88 ★★★★★
Reviewed May 04
www.hitachi.co.uk
Those needing a large Sata150 drive will find this a great bargain.

5

Samsung Spinpoint P120S
£80.11 ★★★★½
Reviewed February 06
www.samsung.co.uk
This isn't the fastest drive on the market, but it is extremely cool and quiet.

EXTERNAL

1

Maxtor Onetouch II Firewire 800 300GB
£179 ★★★★★
Reviewed November 05
www.maxtor.com
A good-quality 300GB USB and Firewire hard drive that comes with backup software.

2

Western Digital My Book Essential Edition
£149 ★★★★½
Reviewed June 06
www.wdc.com
This is a stylish external hard disk drive, but it lacks a network option.

3

Lacie Safe Mobile Hard Drive 80GB
£149 ★★★½☆
Reviewed December 05
www.lacie.co.uk
Featuring a fingerprint reader for security, this 80GB external hard drive would suit business users.

4

Buffalo Linkstation 120GB
£240 ★★★★½
Reviewed October 04
www.buffalotech.com
If you want easy-to-use external network storage, this is a great choice.

5

Buffalo Ministation HD-PHS40U2/UC
£70 ★★★★½
Reviewed April 06
www.buffalo-technology.com
This 40GB portable hard drive includes shock protection to minimise the risk of data loss.

HOW TO BUY

If you're building a high-performance system, buy the fastest drive you can afford; if you just want lots of capacity then slower drives offer better value.

OEM or 'brown box' drives are cheaper – this is the bare drive without the extras, such as cables, included in retail boxed versions.

The transfer rates in today's Ultra ATA drives are 100Mbytes/sec (133Mbytes/sec for Maxtor drives), while Serial ATA (Sata) drives are rated at 150Mbytes/sec. Check the seek times, spindle speed, buffer size and the areal density of the platters (disks).

Usually in milliseconds, seek time is how long a drive's heads take to find data on the disk. The speed at which the spindle holding the disks spins ranges from 4,200rpm for a notebook drive to 15,000rpm for some SCSI drives. Generally, faster speeds give better performance.

The larger the buffer (cache), the more recently written or stored data is held in the drive's memory, resulting in less time seeking the data on the disk.

Areal density is the amount of data stored on a given area of a drive's platter. The more data per square centimetre (gigabytes per platter), the less disk movement is required to bring it under the heads.

Originally Integrated Drive Electronics (IDE), then Enhanced IDE (E-IDE), this common parallel interface is usually written as ATA (AT Attachment), modified with speed improvements in recent years to Ultra ATA/xxx, where xxx is the peak bandwidth in Mbytes/sec. To differentiate Ultra ATA from Sata, the term Parallel ATA is used.

Faster Sata drives are more expensive than Parallel ATA. Sata uses two pairs of high-frequency cables, working at low voltage.

SCSI (Small Computer System Interface) drives are technically no different to ATA drives, but support up to 16 devices on a single channel and you can have multiple channels in a PC. The disadvantage, though, is price.

Most motherboards support Raid (Redundant Array of Independent Disks), which connects multiple drives, to improve performance or provide fault tolerance.

One problem you may hit is the inability to access the new drive's full capacity. Some older Bioses only support drives up to 137GB. This may be solved by updating the PC's Bios. Retail boxed disks often come with software to fool the Bios into recognising the disk, or you can buy a separate disk controller card, which fits into a PCI slot.

DVD DRIVES

1

NEC ND-4551A
£35 ★★★★★
Reviewed May 06
www.nec.co.uk
An excellent DVD drive supporting every format and Labelflash technology.

2

Pioneer DVR-110 Supermulti
£40 ★★★★★
Reviewed March 06
www.pioneer.co.uk
Supports all major formats, including DVD-Ram. Good value for money.

3

Toshiba SD-R6472
£83.42 ★★★★½
Reviewed September 05
www.span.com
A slimline dual-layer DVD writer that performs well and is perfect for small form factor PCs.

4

Philips DVDR16LSK
£59.99 ★★★★½
Reviewed October 05
www.philips.co.uk
An excellent Lightscribe-capable dual-layer DVD burner that's very keenly priced.

5

LG 12X Super Multi DVD
£116.99 ★★★★½
Reviewed January 05
www.lge.co.uk
Good-value external USB2/Firewire rewriter with all-format media support.

HOW TO BUY

DVD drives have largely replaced CD-Rom, CD-R and CD-RW drives in all but a few entry-level PCs and notebooks. Many systems still offer DVD-Rom drives as secondary drives – used for playback of discs only – while a growing number have a DVD writer or rewriter for burning your own DVDs as the main system drive.

DVD burners can be divided into internal and external drives. Internal drives are cheaper than their external counterparts, but require a level of knowledge so you can install them yourself. You can opt for one of the external offerings which can be hooked up simply via USB2 or Firewire.

Most drives are multi-format, meaning they can write to all key media types, so make sure yours supports DVD+R, DVD+RW, DVD-R and DVD-RW discs. Newer double and dual-layer drives can write to new discs which can store 8.5GB versus the 4.7GB capacity of existing discs. This is useful for backing up your DVD movie collection or chunks of your hard drive on a single disc.

The dual-layer drives cost little more than single-layer drives, so are a good investment. The same cannot be said for the cost of dual-layer discs. A branded, dual-layer 8.5GB disc will cost around £3.75. Rewriteable dual-layer discs will not arrive until the end of 2006.

PRINTERS

1 PHOTO PRINTERS

Epson Picturemate 100
£100 ★★★★★
Reviewed January 06
www.epson.co.uk
This is a high-quality photo printer that is both cheap and easy to use.

2 PHOTO PRINTERS

Canon Pixma IP5000
£129 ★★★★★
Reviewed June 05
www.canon.co.uk
If it's pixel-perfect printing you're after, look no further than the IP5000 – a real bargain.

3 PHOTO PRINTERS

HP Photosmart 8450
£170 ★★★★★
Reviewed April 05
www.hp.com/uk
HP's Photosmart 8450 is a bulky printer, but it's capable of producing stunning photo prints.

4 PHOTO PRINTERS

Epson Stylus Photo R340
£149 ★★★★½
Reviewed February 06
www.epson.co.uk
Excellent-quality prints and the ability to function without a PC.

1 MULTIFUNCTION DEVICES

Canon Pixma MP800R
£329 ★★★★★
Reviewed July 06
www.canon.co.uk
A capable MFD with built-in wireless networking that's easy to set up and use.

2 MULTIFUNCTION DEVICES

Dell Photo All In One 944
£121 ★★★½☆
Reviewed April 06
www.dell.co.uk
A bulky, but good-quality MFD that would suit both home and small office use.

1 LASER PRINTERS

Dell 1600n
£236 ★★★★½
Reviewed September 05
www.dell.co.uk
A good multifunction mono laser, perfectly suited to small or home offices.

2 LASER PRINTERS

Canon LBP-5200
£224 ★★★★½
Reviewed October 05
www.canon.co.uk
A great-value colour laser printer that's both small and capable of delivering quality prints.

3 LASER PRINTERS

Dell Laser Printer 1100
£93 ★★★★★
Reviewed November 05
www.dell.co.uk
A cheap mono laser printer, but it comes with a relatively small starter toner cartridge.

4 LASER PRINTERS

HP Laserjet 1020
£89 ★★★★★
Reviewed August 05
www.hp.com/uk
A great home laser printer that's fast, good quality and is one of the cheapest lasers available.

HOW TO BUY

If you don't need colour, consider a monochrome laser or LED printer. The latter tend to be cheaper and may last longer than a laser, but LED printers have a fixed resolution and can't take advantage of software-based resolution enhancements.

If you print hundreds of pages a week, a laser is the best option as they're cheaper and more reliable for high-volume printing. If you print a few pages a month, buy a cheap colour inkjet. If printing high-quality colour photos, buy a good photo printer.

Look for the manufacturer's quoted 'duty cycle' – this is how many pages a month the machine can handle. Choose a duty cycle three or four times larger than your expected average usage. Also check the printer's 'engine life' or 'total print volume' – after this expires, the printer's on borrowed time and uneconomical to repair.

Quoted printer speeds often refer to the speed the printer pushes a blank sheet of paper through the mechanism; for documents they tend to refer to lower quality settings. PCW's tests use real documents and photos, giving a better idea of print speed.

For serious inkjet photo printing, consider higher-end models that use six, seven or eight colour cartridges. Normal inkjets use three colours (cyan, yellow and magenta) plus black, while specialised photo printers add extra shades to improve colour fidelity. Cheaper models often combine three colours in a single cartridge, which is not as economical as using separate cartridges for each colour.

Some 'convertible printers' use four separate black cartridges for longer-life mono printing and you can replace three of them with cyan, magenta and yellow cartridges for colour printing.

Laser models for business use often have a large number of paper-handling options. They're usually modular so you can add features as required. They also have a wider range of interface options and consumables.

You'll often find bundled software with a printer. Their quality varies, but there can be some useful programs.

The quality and usability of the driver software is vital, but it's difficult to assess before buying. Check PCW's reviews and online forums (www.pcw.co.uk/forums) and read the manufacturer's technical support site for any known problems.

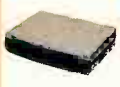
Third-party or refurbished consumables generally work fine, but can cause problems with quality and reliability. Your warranty may not cover the use of non-approved consumables.

TV TUNERS

1

Terratec Cinergy Hybrid T USB XS
£89 ★★★★½
Reviewed June 06
http://en.terratec.net
A dual-format USB TV tuner complete with remote control and portable aerial.

2



Nebula DigiTV
£99.95 ★★★★★
Reviewed August 05
www.nebula-electronics.com
This external USB2 tuner has a built-in web server to let you share TV over your network.

3

Twinhan Magic Box
£69.99 ★★★★★
Reviewed August 05
www.twinhan.com
A stylish external USB2 tuner with good software and an attractive price.

4

Terratec Cinergy 400 TV
£89.99 ★★★★½
Reviewed March 05
http://en.terratec.net
A PC Card-based analogue tuner with good software, it's a great buy for laptop users.

Visionplus VisionDTV
£69.99 ★★★★½
Reviewed November 04
www.twinhan.com
A bargain price and top-notch features make this a must-buy USB2 digital TV tuner.

HOW TO BUY

Internal TV tuners require a PCI slot. External options connect via USB and are easier to set up. Hi-speed USB2 is often needed and devices typically require Windows ME, 2000 or XP. Check if you run Windows 98 or NT.

A Freeview digital tuner offers the best channel choice, picture and sound, but may need an outdoor aerial or a wideband aerial (you can check at www.freeview.co.uk). Analogue terrestrial TV tuners may give better results if using an indoor receiver. If a digital tuner receives radio it doesn't always mean digital audio broadcasting (DAB) support. Look for Teletext and subtitle support.

Digital tuners record to disk for maximum quality; analogue signals need to be digitally encoded – look for mpeg-2 hardware for realtime video and audio encoding; cheaper tuners need your CPU to do this in software.

Most analogue systems let you capture video from a VCR or camcorder. Look for composite or S-video connectors and stereo phono inputs. Typically, an hour of mpeg-2 video uses up to 2GB of disk space. VHS-quality mpeg-1 gives just over an hour on a CD.

Better TV cards have personal video recorder functionality, letting you pause, fast forward and rewind live TV, and have an electronic programme guide to record shows to your PC.

MONITORS

1 20IN

Sony MFM-HT205
£649 ★★★★★
Reviewed June 06
www.sony.co.uk
An elegant widescreen multimedia monitor with superb image quality and a built-in TV tuner.

2

Belinea 10 20 30W
£319.99 ★★★★★
Reviewed July 06
www.belinea.co.uk
A high-quality MVA panel with great specifications, but lacks a DVI port.

1 19IN

Acer AL1922HS
£279 ★★★★★
Reviewed September 05
www.acer.co.uk
The AL1922HS offers a great balance of features, performance and price.

2

CTX S966A
£219 ★★★★★
Reviewed September 05
www.ctxeurope.com
Excellent value for money and looks a lot more expensive than it really is.

1 LCD

LG Flatron L1732P
£239 ★★★★★
Reviewed February 06
www.lge.co.uk
Fast response times make this 17in panel a good choice for gamers.

HOW TO BUY

Monitor resolution is the number of picture elements (pixels) displayed on a screen. In any TFT or LCD monitor, each pixel is composed of three sub-pixels coloured red, green and blue. The number of pixels equals the 'native' resolution; a 1,024 x 768 TFT will have exactly that number of pixels horizontally and vertically. Users wanting 1,600 x 1,200 will probably need an expensive 20in model – most 19in panels are currently limited to 1,280 x 1,024.

Modern TFTs can be viewed from a wide range of angles vertically and horizontally, but anything over +/- 45° makes no difference in normal use. Response time is the time taken for a pixel to reach maximum brightness. Some newer monitors now have response times as low as 4ms, but 12-25ms is typical.

The ISO 13406-2 standard specifies minimum requirements for display contrast, viewing angle, brightness, reflections, flicker, contrast and defective pixels. ISO 13406-2 has stringent standards for defective pixels. Only Class I TFTs are guaranteed no defective pixels – most consumer models are Class II. Some manufacturers offer dead pixel guarantees with Class II TFTs – check the policy before you buy.

DIGITAL CAMERAS

1 DIGITAL SLR

Nikon Coolpix S6
£349 ★★★★★
Reviewed www.pcw.co.uk/2157327
www.nikon.co.uk
A decent compact camera with Wifi and a host of useful features.

2

Konica Minolta Dynax 5D
£649.99 ★★★★★
Reviewed December 05
www.konicaminolta.co.uk
A very usable camera, although it's a little weighty. Anti-shake mechanism is excellent.

1 PROSUMER

Fujifilm Finepix S9500 Zoom
£469.99 ★★★★★
Reviewed February 06
www.fujifilm.co.uk
A serious contender to entry-level digital SLRs with a 10x zoom and 9megapixel CCD.

2

Olympus E-500
£600 ★★★★★
Reviewed April 06
www.olympus.co.uk
The long awaited successor to the popular E-300 doesn't fail to impress.

1 COMPACT

Canon Powershot A520
£239 ★★★★★
Reviewed July 05
www.canon.co.uk
Perfect for those who want a versatile and easy-to-use digicam without spending a fortune.

HOW TO BUY

In general, the higher the megapixel count of a digital camera's sensor – and the bigger the sensor's physical size – the more detailed the images. A small sensor and high megapixel count won't always produce better image quality. Four to 5megapixels is good for 8 x 10in or larger prints. The quoted 'effective' pixels number is the camera's true megapixel resolution.

Forget digital zoom and concentrate on the optical zoom, which zooms in on the subject and produces a better-quality image. Digital zooms simply crop into the centre of the picture. Look at the selection of automatic or preset picture modes for standard shots, portraits, night shots and landscapes, plus macro modes for close-up photography.

Movie modes aren't as good as even a basic camcorder, but are fine for short movie clips to play on your PC. Most offer 15fps, but some are 30fps, which means the video will be smoother. Experienced photographers will want manual controls for aperture and shutter priority, white balance and focusing. Good cameras should also provide quick and easy access to image quality, resolution and format settings.

ROUTERS

1 WIRELESS/MODEM

Netgear 108 ADSL router
£159 ★★★★★
Reviewed April 05
www.netgear.co.uk
If you need a Super-G router with built-in ADSL modem, this offering from Netgear is great value.

2

Ozenda 11g ADSL Router
£70 ★★★★★
Reviewed November 04
www.ozenda.com
Ozenda has come up trumps – wireless ADSL doesn't get any easier than this.

1 WIRELESS

Linksys WAG54G (wireless)
£76 ★★★★★
Reviewed August 05
www.linksys.com
This 802.11g wireless model offers advanced features for home and professional users.

2

D-Link DSL-G624M
£110 ★★★★★
Reviewed March 06
www.d-link.co.uk
Combines Mimo technology with Super G to give faster speeds and extended coverage.

1 VOIP

Intertex IX66+ ADSL Airsip GW (wireless VoIP)
£269.08 ★★★★★
Reviewed March 05
www.intertex.se
For a small business needing multi-user VoIP telephony, the Intertex IX66+ is hard to beat.

HOW TO BUY

The router is at the heart of any home network. Costing less than £100, they are an inexpensive way to exploit the advantages of being able to share information between the computing devices in your home. A router is a simple networking device to which you connect your PCs and notebooks using a network cable. They often include built-in firewalls and other security measures, making them ideal for protecting your PCs from intruders. The router connects to your broadband modem, as long as your modem uses an RJ45 Ethernet connection – most routers don't support USB modems. Special broadband routers, also called ADSL gateways, come with built-in ADSL modems. If your broadband is provided via a cable company's set-top box, you should buy a standard router without a built-in modem. Once hooked up, your devices can share broadband as well as swap data. Wireless (Wifi) routers are increasingly popular in the home market, allowing devices to remotely connect to the Internet and each other without the need for cables – but wireless routers usually have network (Ethernet) ports to let you connect non-wireless devices.

PRODUCT INDEX

Below is a list of every product reviewed by PCW over the past three months, to help you find the full reviews quickly and easily in your back issues.

Key: ★ Editor's Choice ★ Recommended ★ Great Value All scores are out of five

	COMPANY	PRODUCT	ISSUE	SCORE
★	3am Labs	Log Me In IT Reach	June 06	5
★	ACDsystems	Pro Photo Manager	June 06	4
★	Acer	Aspire 9503EWSMi (notebook)	May 06	4
★	Acer	Travelmate TM4202 (notebook)	July 06	4
	Acoustic Energy	Wifi Radio	May 06	4
	Adobe	Encore DVD 2.0 (DVD authoring)	July 06	3
	Agatha Christie	And Then There Were None	May 06	3
	AJP	M551G-E (notebook)	May 06	3
	Ambros	Shuttle SD36G5M (PC)	June 06	4
	Aopen	G325 (PC case)	July 06	3
	Aopen	i975a-YDG (m'board)	July 06	4
	Apple	Boot Camp (utility)	July 06	4
★	Apple	iLife '06 (multimedia suite)	May 06	4
	Apple	Imac	May 06	4
	Apple	Ipod AV Connection Kit	May 06	2
	Apple	Mac Mini (Intel version)	June 06	4
	Arturia	Storm 3 (audio-sequencing)	June 06	3
	Asus	N4L-VM DH (m'board)	July 06	4
	Asus	W3V (notebook)	May 06	3
★	ATI	All-in-Wonder X1900 (graphics card)	May 06	5
	Avanquest	Ghostsurf Platinum: Identity Protector	June 06	3
	Avanquest	Netobjects Fusion 9	May 06	4
	Avanquest	Web Easy 6 Professional	July 06	3
	Averatec	4155 (notebook)	July 06	3
★	AVG	AVG Free for Linux (anti-virus)	June 06	4
★	Belinea	10 20 30W (TFT monitor)	July 06	4
	Brother	MFC-820CW (MFD)	June 06	4
	Buffalo	Terastation Pro (storage)	June 06	4
	CA	Etrust Internet Security Suite	May 06	3
	CA	Business Protection Suite r2	July 06	2
	CA	Etrust Internet Security Suite	July 06	3
	Cakewalk	Sonar Home Studio 4 (audio)	June 06	4
	Canon	Laser Shot LBP 5200	May 06	3
★	Canon	MV960 (camcorder)	July 06	4
★	Canon	Pixma MP800R (MFD)	July 06	5
★	Chillblast	Atlantis Crossfire (desktop)	June 06	5
	Codemasters	Toca 3	June 06	4
	Creative	I-Trigue L3800 (speakers)	July 06	3
★	Corel	Coreldraw X3	May 06	5
	Cube	Cube 247 Omega ST2 (PC)	June 06	4
★	Dell	3100cn (laser printer)	May 06	5
	Dell	Dimension 5150c	May 06	3
	Dell	Dimension 5150c (PC)	June 06	3
	D-Link	DKVM-8E (KVM switch)	June 06	4
	D-Link	Netdefend DFL-M510 (security)	July 06	4
★	Draytel	Vigortalk (VoIP adapter)	May 06	4
	EA Games	The Godfather	July 06	4
	EA Games	LOTR: Battle for Middle-Earth II	July 06	4
	EA Games	The Sims 2: Open for Business	July 06	3
★	Eizo	Flexscan S2110W (monitor)	May 06	4
★	Eizo	Flexscan S2410W (monitor)	June 06	4
	Elonex	Elonex Artisan VX (PC)	June 06	3
	Elonex	Prosentia 800 (desktop)	May 06	4
	Elonex	Prowire 153 (notebook)	May 06	4
★	Enermax	Laureate EB305C (storage)	June 06	4
	Enlight	EN-7473 Home Media Case	May 06	4
	Epson	Aculaser C1100N (laser printer)	May 06	4
	Epson	Stylus Photo RX640 (MFD)	July 06	4
	Evesham	Axis Dominator 79GT (desktop)	June 06	4
	Evesham	Blue Media BM6380GPS (sat nav)	May 06	2
	Evesham	Ebox V (Media Center PC)	June 06	4
	Evesham	Nav-Cam 7000 (sat nav)	May 06	2
	Evesham	Voyager A215 (notebook)	May 06	3
★	Evesham	Voyager C550 (notebook)	July 06	5
★	EVGA	7800GS CO Superclocked	May 06	5
★	Freecom	DVB-T USB Stick (USB TV tuner)	June 06	3
★	Fujitsu Siemens	Amilo M 6450G (notebook)	May 06	4
★	Fujitsu Siemens	Scaleo E (Media Center PC)	June 06	4
★	Gainward	Bliss 6800GS GLH (graphics)	July 06	5
	Gainward	Bliss 7800GT GLH (graphics)	July 06	4
★	Garmin	Street Pilot i3 (sat nav)	May 06	4
	Gecube	Radeon X1800GTO 256MB	July 06	4
	Gigabyte	GC-PTV-TAF (TV tuner card)	June 06	4
	Google	Google Mini (search appliance)	July 06	4
	Hauppauge	WinTV-HVR 900 (USB TV tuner)	June 06	3
	Hawking Tech	HWU54DM (wireless adapter)	June 06	3
	Hela	Lap Up 2340 (notebook stand)	July 06	3
	Hela	Perific Mouse	May 06	2
★	HP	Color Laserjet 2600n	May 06	4
	HP	Compaq nx6125 (EK157ET)	May 06	4
	Hi-Grade	DMS II 3200 (Media Center PC)	June 06	4
	Hi-Grade	Notino C5515-1700 (notebook)	May 06	4
★	Hi-Touch	S400 (photo printer)	July 06	4
	Hitachi	7K100 (notebook drive)	June 06	4
	Human Concepts	Orgplus 6 (utility software)	June 06	4
★	Image Line	FL Studio 6 (audio-sequencing)	June 06	4
	Intervideo	Ivideo to go (video conversion)	June 06	3
★	Intuit	Quickbooks Pro 2006 (accounts)	July 06	5
	Iolo	System Mechanic 6 (utility)	June 06	4
	Kensington	SX2000 (speakers)	July 06	3
★	Kodak	Easyshare v570 (digital camera)	June 06	4
	Konica Minolta	Magicolor 2430DL (laser printer)	May 06	4
	Kworld	DVBT-350U (USB TV tuner)	June 06	2
	Lexmark	C510n (laser printer)	May 06	4
	Lexmark	X8350	July 06	4
★	Linksys	SRW224P (switch)	July 06	5
	Linksys	WTR54GS Travel Router	July 06	4
	Logitech	Cordless Desktop S 530 Laser for Mac	June 06	4
	Logitech	Wireless Music System	May 06	3
	Logitech	Z-5450 (speakers)	June 06	4
	Logitech	Z-5450 (speakers)	May 06	4
	Lucasarts	Star Wars: Empire at War	June 06	3
	Magellan	Roadmate 300 (sat nav)	May 06	3
	Magellan	Roadmate 800 (sat nav)	May 06	4
	Magix	Music Studio 11 Deluxe (audio)	June 06	2
	Magix	Photos on CD & DVD 5.0	July 06	4
	Majesco	Advent Rising	June 06	2
	McAfee	Internet Security Suite 2006	July 06	3
	Medion	Go Pal PNA350 (sat nav)	May 06	2
	Mesh	Cubex Media TV PCW (PC)	June 06	4
	Mesh	Discovery D2400PCW (laptop)	July 06	4
	Mesh	Pegasus 3070 (notebook)	May 06	3
★	Mesh	Pegasus 7800 SLI (notebook)	June 06	4
	Mesh	Pegasus 7800GTX (notebook)	June 06	4
	Mesh	Titan X1800 Fire (desktop)	May 06	4
	Microsoft	SQL Server 2005 Express	July 06	4
	Mio	268+ (sat nav)	May 06	3
	MSI	Mega Sky 580 (USB TV tuner)	June 06	3
	MV	Sirius+ (notebook)	May 06	2
	MYOB	Accounting Plus 15	June 06	4
	Navman	ICN520 (sat nav)	May 06	2
★	NEC	ND-4551A (removable storage)	May 06	5
★	Network Box	SME 250 (security appliance)	June 06	5
★	Nexus	Anti-Vibration Mounting Kit	May 06	5
★	Novogo	A30 (sat nav)	May 06	4
	Novogo	V30 (sat nav)	July 06	3
★	Nvidia	Geforce 7900GT (graphics card)	June 06	4
	Olympus	E-330 (digital SLR)	July 06	4
	OKI	C3200 (laser printer)	May 06	3
★	Onspeed	Mobile (mobile Internet)	June 06	5
	Panda Software	Platinum 2006 Internet Security	July 06	4
★	Panrix	Mantis (Media Center PC)	June 06	4
	Passive	HFX Silent Case Kit	June 06	4
★	Philips	Showline MCP9350i	July 06	4
	Pinnacle	PCTV USB Stick (USB TV tuner)	June 06	3
★	Pioneer	DVR-111 (storage)	July 06	4
	Plextor	PX-EH40L (removable storage)	June 06	4
	Plustek	Opticard 820 (scanner)	July 06	3
	Raritan	Z-Series Z4200U (KVM remote)	July 06	3
★	RDM	Remote Desktop for Mobiles 2	May 06	4
	Rock	Pegasus 330 (laptop)	July 06	3
★	Rock	Xtreme 64 (notebook)	May 06	4
★	Roxio	MyDVD Premier (video-editing)	June 06	4
★	Samsung	Pro 815 (digital camera)	May 06	4
	Samsung	P-P300ME (projector)	June 06	4
	Samsung	Samsung Q1 (handheld PC)	July 06	4
	Sandisk	Sansa m250 (media player)	July 06	3
	Shuttle	Shuttle XPC P 2500G (SFF PC)	July 06	4
	Skylook	Skylook 1.5 (VoIP service)	July 06	3
	Sony	MDR-NC50 (speakers)	July 06	4
★	Sony	MFM-HT205 (monitor)	June 06	5
	Sony	Vaio VGN-SZ1M (notebook)	July 06	4
★	Sony	Vaio VGX-XL 100 (PC)	June 06	4
	Sony	VPL-HS50 (projector)	May 06	4
★	Steinberg	Cubase SE 3 (audio-sequencing)	June 06	5
★	Symantec	Norton Internet Security 2006	July 06	5
	Tandberg	420LTO (backup drive)	June 06	4
★	Terratec	Aureon 7.1 (soundcard)	June 06	4
★	Terratec	CinergyT USB XS (USB TV tuner)	June 06	4
	Tesco	Internet Phone (VoIP service)	July 06	4
★	THQ	Psychonauts	May 06	4
	THQ	Stubbs the Zombie	May 06	4
★	Tom Tom	One (sat nav)	May 06	4
	Toshiba	Satellite P100 (notebook)	July 06	4
	Trendnet	TEW-429UB (wireless adapter)	June 06	4
	Trend Micro	PC-cillin Internet Security 14	July 06	4
	Viamichelin	X930 (sat nav)	May 06	3
★	VMware	Server (utility software)	June 06	5
	Viewsonic	VX922 (monitor)	May 06	4
	VoIPvoice	Uconnect	May 06	3
	Western Digital	My Book Essential Edition (storage)	June 06	4
	Vonage	Ustarcom Wifi Phone	May 06	3
	Xerox	Phaser 6120 (laser printer)	May 06	4
★	Yahoo	Mail Beta (webmail)	July 06	4
★	Zonelabs	Zonealarm ISS 6	July 06	5
	Zyxel	Zywall 35 UTM (security)	June 06	4

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GECube ATIX 1300 512MB AGPx8 ..... £89.95
GECube ATIX 1600 Pro 256MB AGPx8 ..... £99.95
Club 3D Nvidia 6600GT 128MB AGPx8 ..... £109.95
ASUS NVIDIA 6600GT 128MB AGPx8 ..... £134.95
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ASUS NVIDIA EN7900GT Top 256MB £249.95
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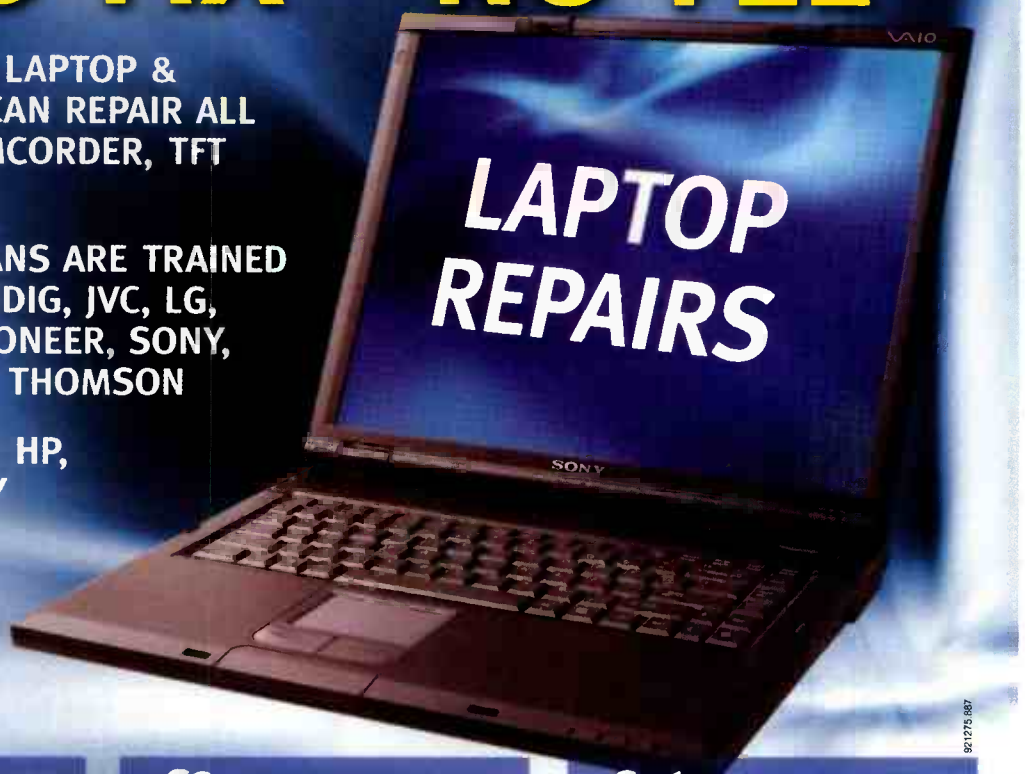

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USING THE COVER DISC

The PCW cover disc uses a web-browser-style interface. To get full functionality, you'll need to use Microsoft Internet Explorer (version 5.5 or later). Unfortunately, Netscape doesn't properly support this software. However, we have also provided links to the featured programs so you can still copy them to your hard disk or install them manually (the standard download dialogue box will appear). Programs can be found in the \software\folder on the disc.

STARTING THE DISC

The CD-Rom (or DVD) should auto-start. If it doesn't, double-click the CD-Rom/DVD icon in My Computer or open the terms.htm file on the root of the disc.

PROBLEMS?

Please note that we cannot give support on individual programs contained on this disc. If you have problems running the disc or any of its content, please note these guidelines:

FAULTY DISC

If the disc is physically damaged and will not load, return it to this address for a replacement: PCW August 2006, cover disc ABT, 306 St Mary's Lane, Upminster, Essex RM14 3HL quoting reference: 'PCW Vol 29 No 8'.

PROBLEMS INSTALLING/ RUNNING THE SOFTWARE

Check the support page on the disc or check the manufacturer's site.

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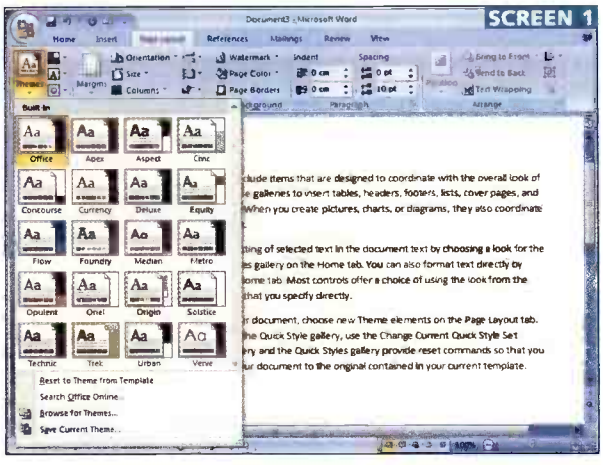
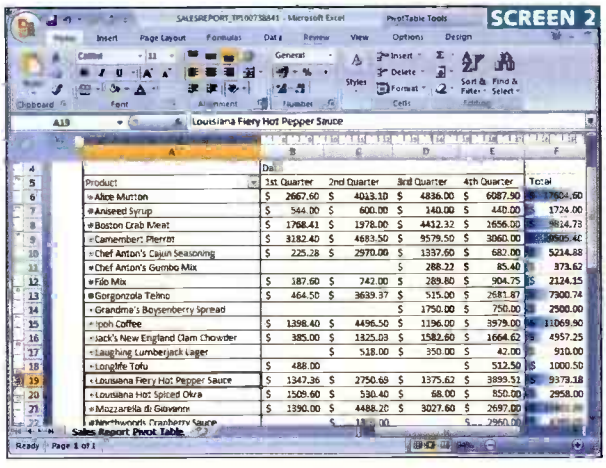


Word's interface is very different



You can get Excel to highlight different values with shading

INFORMATION

System requirements:

When upgrading from Microsoft Office 2003 to the 2007 release you may not need to upgrade your hardware, although you may need to upgrade to a supported operating system. When upgrading from Microsoft Office 2000 or Office XP to the 2007 release you will need to ensure that your hardware and operating system meet the minimum 2007 Office system requirements, listed here. Operating system: Microsoft Windows XP Service Pack (SP) 1 or later. Computer and processor: 500MHz processor or higher, 256MB Ram or higher; Hard disk: 2GB necessary for install; disk space will be freed after installation if the original download package is removed; Internet connection: required for product activation; Monitor resolution: 800 x 600 minimum, 1,024 x 768 or higher recommended; Additional components: Microsoft Internet Explorer 6.0 with service packs

Contact

www.microsoft.com/uk/office/preview

Registration

Microsoft Office Professional Plus Beta 2 requires a serial code which you can obtain from www.microsoft.com/emea/Office2007beta/33/

Need to know

Microsoft Office Professional Plus 2007 Beta 2 will expire on 1 February 2007. As this is a Beta product no support will be provided by either VNU or Microsoft. Information about online Office Beta community user groups can be found at www.microsoft.com/office/preview/community/community.mspx

In June's *PCW*, we previewed the first beta version of Microsoft Office 2007. The second, public beta version has now been released and it's included on this month's cover CD and DVD, so you can try it for yourselves. This is the Professional Plus edition, so as well as the usual quartet of Word, Excel, Powerpoint and Outlook, you will find Access, Infopath and Publisher. This is the version most suitable for the professional user. We won't go into installation issues here, as that is explained on the CD, but we will take you on a tour of the suite members, showing changes to the interface and new features.

There have been quite a few changes since Beta 1, so if things don't tally with the June preview, read on. Obviously, things may still change, so don't expect the final release to be exactly what you see here, and do remember that the purpose of a beta release is to gather feedback – send yours to Microsoft and play your part in shaping the final version of Office 2007.

Office Word 2007

Although there are some familiar-looking icons on the toolbars, the Word interface is radically different from previous versions. Click the round Office Logo top left (the Microsoft Office Button) and you'll get the file menu. Next to that is the Quick Access toolbar, which can be customised and already contains such essentials as the Save and Undo buttons.

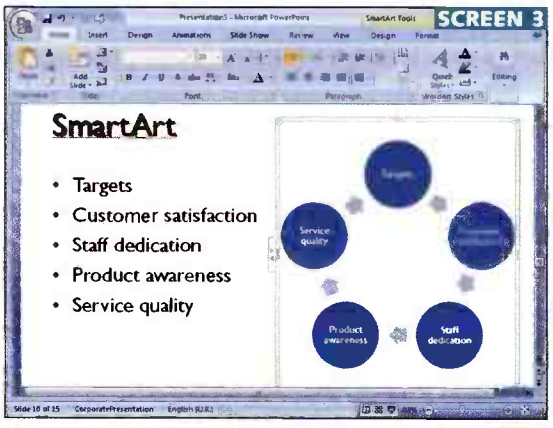
Moving down a layer, what at first look like menu headings are tabs, changing the toolbars below to suit the task in hand. This tab/toolbar arrangement is known as the Ribbon. On the Home tab are the clipboard tools, font and paragraph formatting, styles (restored from the Beta 1 name of Quick Formatting), and find/replace. The Insert tab provides one-stop access to cover pages, shapes and illustrations, tables, links, dates, headers and footers, symbols and so on. Many of these choices produce extra tabs. Insert a table, for example, and you'll get tabs for formatting and layout, providing all the options you would previously have had to winkle out one at a time from the Table menu.

When you make a selection from a list or palette, such as font or style, you'll get a preview of the result as you pass the pointer over the various options (see screen 1).

You can keep typing and editing (and using keyboard shortcuts) whichever tab is open. In any tab, right-click in your text. You'll get a mini-formatting bar. If you need to write to a word-count target, look at the cleaned-up status bar which gives you a running count of both the total words and those in selected text.

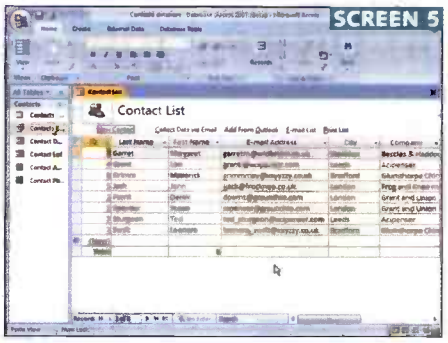
Office Excel 2007

If you've ever felt Excel's worksheets cramped your style, check out the new sizes – you can have up to one million rows and 16,000

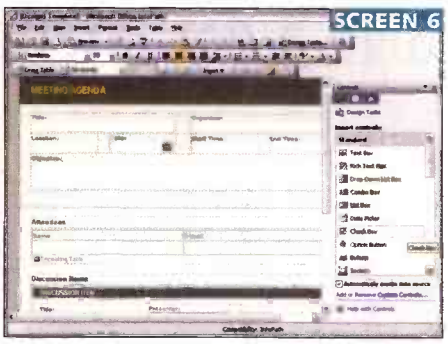


Create diagrams and more with Powerpoint's Smart Art

Outlook's new To-Do bar keeps track of tasks



Access makes it simple to use a database



Infopath lets you design and distribute forms

columns. The interface follows the new standard, with the File menu accessible from the Office button, the Quick Access toolbar alongside and the Ribbon below. Here you'll find Home – covering most of your input and formatting needs, as well as basic sorting and formulas. Insert covers much the same as Word, with the addition of pivot tables and charting. The latter is worth investigation, as again you get extra Ribbon tools for the design, layout and formatting of your charts. The Formulas ribbon offers advanced functions, cell naming and auditing tools; Data brings advanced sorting and external data management; and as with Word there are separate ribbons for reviewing and screen view options.

One thing not to be missed is conditional formatting. Select a range of cells, then in the Home ribbon, go to the Styles group, then Conditional Formatting. Without having to define any rules, you can choose from coloured bars, icons or shading to accent higher and lower values (see screen 2). It's very quick and once again you can preview the result. If you're familiar with pivot tables (or would like to be) take a look at the Sales Report Template, which shows how easy this formerly troublesome concept has become.

Office Powerpoint 2007

With a similar layout to Word and Excel, Powerpoint 2007's Home ribbon lets you add and format slides, and the Insert, Review and View ribbons perform much as in Excel or Word. The Design ribbon lets you choose from sets of integrated Themes as well as fine-tuning the background, and the arrangement of objects on the slide. The Animations ribbon provides facilities for animating individual objects on a slide, as well as transition effects between slides. Beneath all this is the familiar three-pane slide list, current slide and notes panes.

One trick definitely worth exploring is converting text to Smart Art (known in the previous beta as IGX graphics). This is a much-improved counterpart to the previous Office diagrams for representing flow charts, hierarchies, Venn diagrams and so on. Create a bulleted list on a slide in customary fashion, then right-click anywhere in the list and choose 'Convert to Smart Art'. You'll get a palette of different diagram types in which to express your original ideas (see screen 3).

Office Outlook 2007

Of all the major components, Outlook has changed the least, retaining much of the layout and the menu bar of version 2003. The message compose, message read and contact-editing windows all have the new look, with the first having tabs for Message, Insert, Options and Format Text. Outlook 2007 will import your email account settings, messages, contacts and calendars from previous versions automatically, so you should be able to get started immediately. The new To-Do bar provides a consolidated summary of imminent appointments and scheduled tasks (see screen 4). There is also the addition of an RSS reader for those looking for integrated news feeds.

Office Access 2007

If the word 'database' has hitherto plunged you into despair, this could be your chance to break through that barrier. Start up Access 2007, go to the Office button again, choose New, then select a template from the Office Online section – we chose Contacts.

After a few seconds download, this saves a database to your hard disk and presents you with an empty table. We've added a few fictitious entries in screen 5, and by right-clicking on any column head you can hide the Phone Number field and show the City field.

We're still on the Home ribbon, where we can format text; change views; find and replace; add and remove records; and sort or filter records – for example, to find all the CEOs based outside London.

Moving to the Create ribbon, you can create new tables, forms, reports and queries. There are more fields available than those shown, as you'll see if you select the 'Contact Extended' table from the Navigation pane. The External Data ribbon lets you import data from other sources, such as a spreadsheet or Outlook folder – which is probably where you would start if compiling a contacts list. It also lets you export to a variety of destinations including pdf and Sharepoint.

Finally, the Data Tools ribbon gives you a shortcut to VBA programming, relationships, analysis and other tools.

Office Infopath 2007

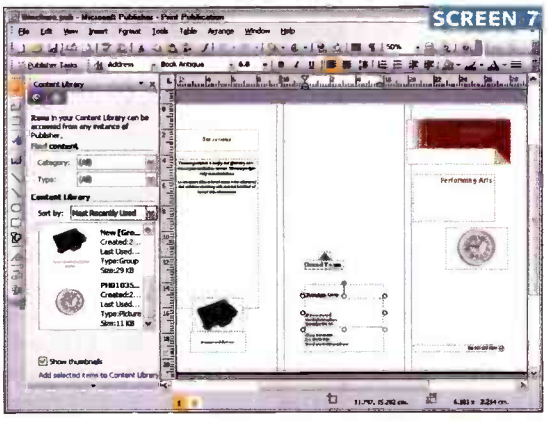
Infopath is a tool for designing electronic forms then distributing them either via a network location, a web page, Microsoft Sharepoint server or an Outlook mailing list. Unlike previous versions you don't need Infopath itself to fill out a form – this can be done, for example, in any compatible browser such as Internet Explorer. The interface in this Beta 2 version hasn't changed since version 2003 (see screen 6).

Office Publisher 2007

In its Beta 2 incarnation, Publisher retains its familiar menus and toolbars and, as ever, there's a huge range of templates to produce anything from advertisements to websites. Publisher pioneered the concept of font and colour schemes, and that's still there, although it has yet to sport the Preview feature seen in other suite members.

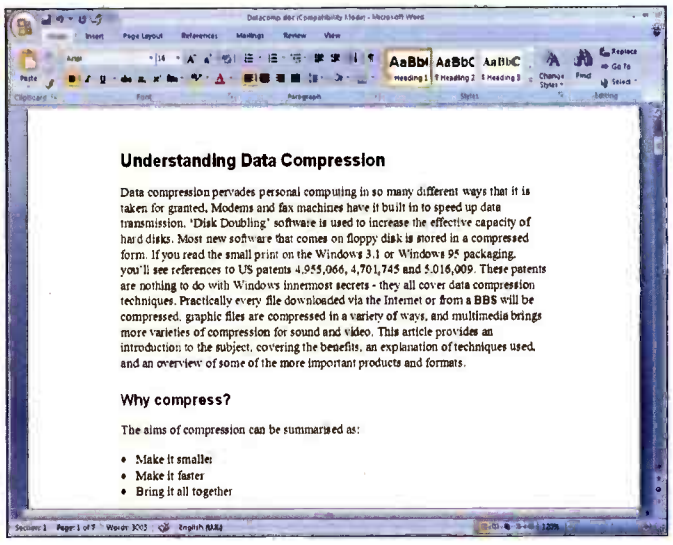
In the Content Library (see screen 7) select any graphic, story or block of text, right-click and 'Add to Content Library' for permanent storage. You retrieve contents from the library by clicking the forward arrow in the Task Pane.

A great new feature common to all the main members of the Office 2007 suite is the export to pdf feature – simply use File, Publish as pdf or XPS. Choose pdf as the format in the Save dialogue, and in seconds your creation will appear fully formatted in Acrobat Reader.

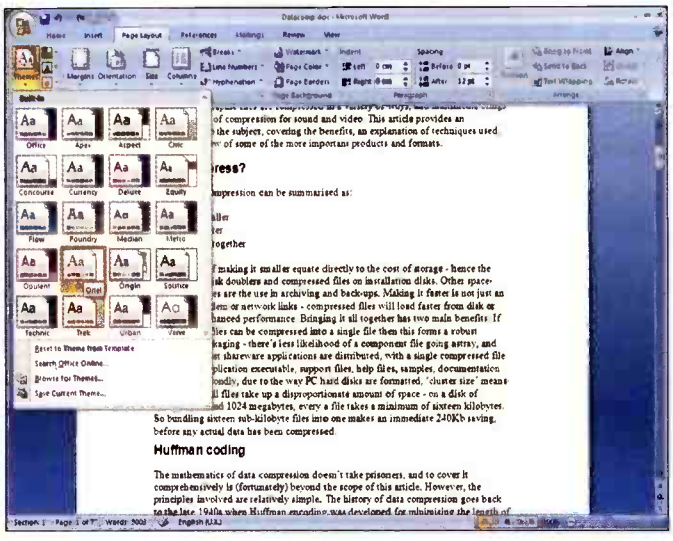


The Content Library in Publisher lets you store images and text ↘

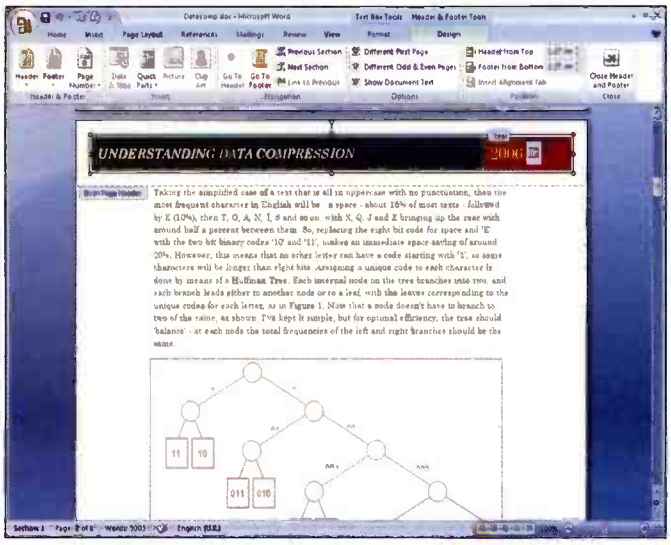
Give a document an Office Word 2007 makeover



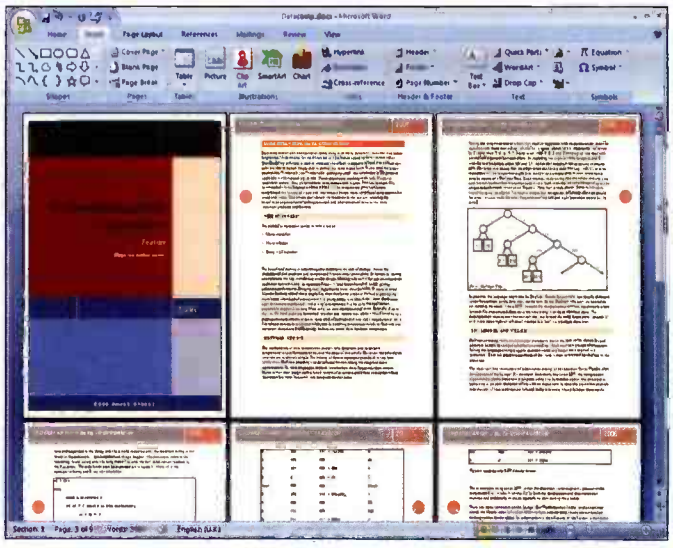
1 We took an old, strictly black-and-white, Arial-and-Times Word document in Word 97 format, and gave it a Word 2007-style makeover. The first step is to open it as normal in Word 2007, from the Office button. The Word title bar shows the document is open in 'Compatibility Mode', so the next step is to convert it to the new Word format by going back to the Office button, choosing Convert, and confirming the action. Having done that, we'll be ready to apply a Theme to the document.



2 To apply a theme, change to the Page Layout ribbon, click on Themes, far left, then choose a Theme from the gallery – we chose Oriel. You won't see any changes (or a preview) yet, but don't panic. If you want further information on the chosen theme, click one of the three buttons alongside to see the colour scheme, font set, or line and fill effects. Now go back to the home Ribbon and, in the Styles group, click the Change Styles button, then choose a Style Set – we chose Modern. The Preview function should spring into action, so you can see the results before you commit to a choice. Having made a choice, you should find the Themes gallery has also gained preview power.



3 The next step was to add some Headers, so we turned to the Header and Footer group in the Insert ribbon, clicked the Header button and chose Tiles from the header gallery. Inserting a header opens the Header and Footer Tools ribbon, so we were able to tick 'Different first page' in the Options group to remove the header from the first page, and 'Different Odd and Even Pages'. Although the position of the Tiles header is symmetrical (ie not aligned according to left- or right-hand page), we needed the last option for the page numbering. Back at the Insert ribbon, we clicked on Page Number, chose Circle Right for the odd pages and repeated the process with Circle Left for the even pages.



4 Finally we went back to the beginning of the document (Control & Home) then, from the Pages group in the Insert ribbon, added a cover page, choosing the built-in Tiles page. OK, we have to admit we cheated a little – our choices weren't quite this decisive, and we did experiment a lot. But that's the beauty of it – you can swap Style sets and Themes independently, and change headers and page numbering with just a few clicks. And finally, here's a multi-page view of our revamped document.

Paragon Drive Copy 8 Personal

Hassle-free cloning of complete hard drives or individual partitions

Replacing your tired old hard drive with a speedy, high-capacity model is one of the most effective PC upgrades you can make. Don't go through the tedious process of reinstalling Windows and your applications on the new drive, though: just run Drive Copy instead, and it'll clone your existing drive in the shortest possible time.

Once your new system is up and running, you can also use the program as a simple backup tool. Who wants to go to the trouble of using a file-based backup program, manually specifying files and folders, hoping that you're backing up all the information you need? Image backups are much easier, can be set up with just a few mouse clicks and, short of hard drive failure, you can be sure no vital data will be lost.

There is the issue of backup time, of course. Drive Copy 8 keeps this overhead to a minimum, though, by using a combination of techniques. By default the program doesn't copy unused sectors, for instance. And it also skips dynamically updated Windows files that are unlikely to be necessary on the new drive, such as the paging file, hibernation file and so on. You can change both of these settings if it's essential to have an exact drive clone, but otherwise they'll both help boost overall performance.

Alternatively, if you prefer the absolute minimum of hassle, then use the program's built-in scheduler. In a minute or two you'll have it configured to automatically run unattended backups every day, week or month, providing maximum data security for the minimum effort.

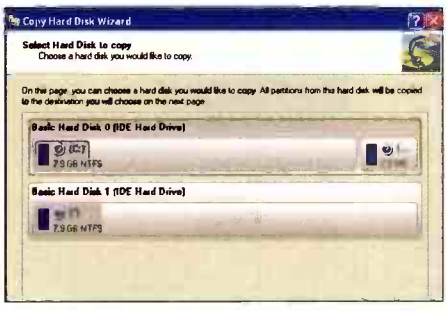
INFORMATION

System requirements 128MB of Ram, Windows 98 or later, 40MB hard drive space, Internet Explorer 5 or later

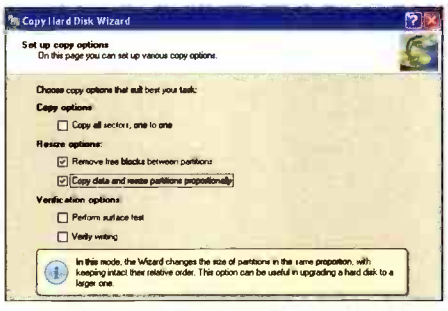
Contact www.paragon.ag

Registration Follow the link during installation, or visit http://registration.paragon-software.com/dcse

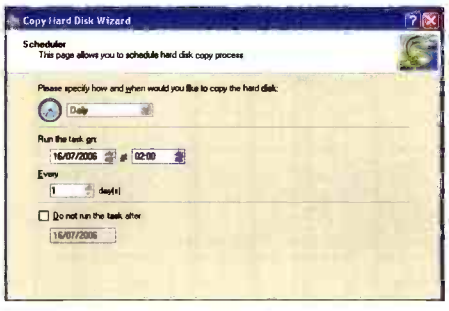
Get fast, automatic backups in three simple steps



1 Drive Copy 8 will back up your system just as fast as the hard drive will allow, but if that's still too slow then you can always schedule backups to run when you're not around. Launch the program, click 'Schedule Hard Disk Copy', then the Next button and use the cursor keys to choose the disk you're aiming to clone.



2 Click Next, choose your destination drive (external USB or Firewire models are fine) and click Next again. Then click on the various copy options to read more about them. You can enable 'Copy data and resize partitions proportionally' if you're copying data from a small drive to a larger one, for instance.



3 Click Next to review the options you've selected, then Next to accept them. Finally, choose how often you'd like the backup job to run, the date and time it should start, then click Next > Finish. And that's it. Click the Scheduled Tasks tab to review your backup jobs, or just leave them to do their work.

UPGRADE OFFER

SAVE 20% ON ANY PARAGON PRODUCT

PARAGON PRODUCTS

Partition Manager
CD-Rom Emulator
Paragon Drive Backup
Disk Wiper
Exact Image
NTFS for Linux

Drive Copy 8 is just one of many drive-related tools in the Paragon product range. It also has Partition Manager 7, to create, copy, resize and move hard drive partitions without losing any data. CD-Rom Emulator 3 creates virtual CD/DVD drives and images, helping you avoid the need for constant disk-swapping when you use particular applications or games. And there are other tools to back up data, create drive images, delete files securely, and more. To get 20 per cent off any of these programs, just visit **www.paragon-software.com/eshop.htm** and enter the coupon code specified in your registration email, but be quick – it's only valid for seven days from the date of receipt of your registration email.

Style Master 4.03

Everything you need to design, code and troubleshoot CSS files

Cascading stylesheets (CSS) are the key to any modern website, but working with them isn't always easy. In fact many development tools and CSS editors leave you coding them by hand, with no clear view of how changes will affect your finished site. Western Civilisation's Style Master changes all that.

Try out this program, for example, and you'll find its 'X-Ray' feature makes clear the relationship between a web page and its CSS file. Click any part of your web page, and Style Master instantly shows you which statements are used to style it; click a statement in the style sheet and Style Master highlights which elements of the page it styles.

This visual approach to coding doesn't stop there. The program is packed with Wysiwyg editors, wizards and advanced colour-picking tools, which let you build stylesheets, navbars, layouts or whole sites at speed.

If that seems like too much hassle, then you could just start with one of Style Master's genuinely attractive and stylish bundled templates.

Of course there are plenty of hand-coding options for those of you who want to take full control.

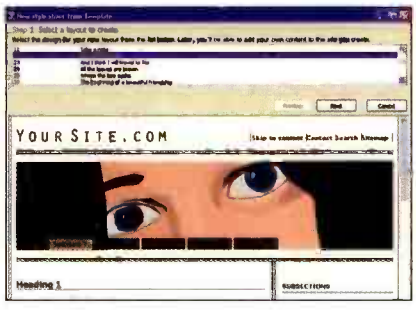
You also get validation tools to ensure your code works properly (with helpful details on how various browsers support stylesheets), formatting tools to keep it clean, and even reports to identify unused CSS statements.

It's this great combination of tools that makes Style Master an ideal CSS editor for everyone, from beginner to expert.

INFORMATION

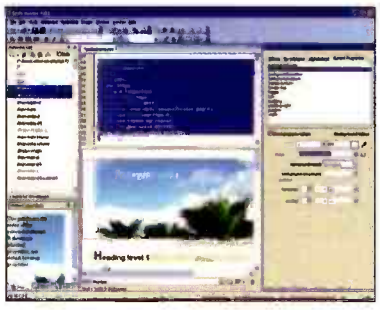
System requirements
Windows 2000/XP, 10MB disk space
Contact www.westciv.com
Registration Not required

Build stylish, standards-based websites, no CSS knowledge required



1 Hand coding cascading stylesheets (CSS) can be a complicated nightmare, so it's just as well Style Master makes it entirely unnecessary. Click File > New, for instance, and you can create CSS from an existing HTML file, or choose to build one from one of the bundled templates. These are varied and high-quality designs, well worth a closer look.

2 Even the best templates won't suit everyone, so the chances are you'll want to vary some aspects of the generated CSS. And that's no trouble at all. Building a new navigation bar, say, is as simple as clicking Design > Wizards > Navbar Wizard, and letting the program guide you through creating the exact navigation style you need.



3 Perhaps you need more fine-tuning, such as a different title graphic. Double-click the template image, and you'll see that this is governed by CSS 'banner' settings. Manually edit them in the CSS file if you like, but it's easier to use the Smart Editor to tweak the image name, background colour or whatever you want to change.

UPGRADE OFFER

STYLE MASTER 4.5

NEW FEATURES

Collect and store CSS code
Organise code with Smart Sections
Much improved Code Validation tool
Enhanced Design Pane
View all CCS properties
Many new interface enhancements

The very latest version of Style Master includes a number of new features, such as the facility to create snippets of CSS code, to avoid repetition and to save development time. Once you've finished your code, the much-improved validater will check for errors and enable you to quickly jump to potential issues. These and many more improvements make it a key upgrade for all web developers.

Style Master 4.5 retails for $59.99 (£320 approx), but as a Style Master 4 user, you can upgrade for only $29.99 (£16 approx). Better still, Westciv, the developer of Style Master, is throwing in the CSS Level 1 Course, worth $29.99 (£16 approx), free of charge, to help you with the first stages of your CSS development. To upgrade, simply head to **https://order.kagi.com/?WC7** where you can find more information.

Netobjects Fusion 8

Develop stylish websites in minutes with this Wysiwyg tool

If you want to build a professional website, then you could learn HTML, CSS, scripting and databases, buy an expensive development environment and go on a course. But it's probably easier to install Netobjects 8, a top-quality Wysiwyg editor that delivers excellent results and requires no previous design experience.

The process starts with the New Site Wizard. Choose a site design from the 17 different categories, specify which common pages you'd like to include (about, contact, FAQ and more), and Netobjects Fusion builds them for you, ready to populate with your own text and graphics.

If you don't like the built-in styles, it's easy enough to open a Blank Site and create your own. Even these blank pages come with a basic layout and heading, and it's easy to customise them to add more sophisticated features. There's a handy navigation bar, for instance. Drop the control onto the page, then customise it to use graphics buttons or text, display horizontally or vertically, use fly-out sub-menus and more. A host of plug-ins are available, to help you add content: there's support for embedding Flash applets, videos, sounds, ActiveX components, Java applets and more, plus you get plenty of control.

The real stars are the Netobjects components. Whether you want to design forms without the hassle of CGI scripting, add ticker tapes or rollovers, create data-driven pages or even build a complete ecommerce site, there's an option to help. And they can all be used by anyone, from pros to total beginners.

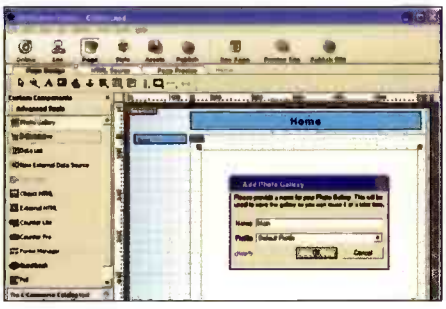
INFORMATION

System requirements 128MB of Ram, Windows 98 or later, 200MB hard disk space, Internet Explorer 6 or later

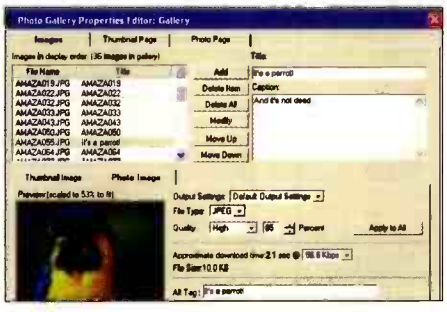
Contact www.netobjects.com

Registration Go to www.netobjects.com/vnu

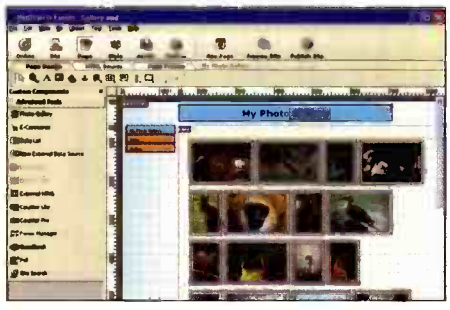
Build a professional online photo gallery in minutes



1 A web thumbnail gallery is a great way to share your latest digital photos, and Netobjects Fusion makes it particularly easy to set up. Click File > New Site > Blank Site to begin, give the site a name, and click Save. Double-click Home to see the main site page, click Advanced Tools > Photo Gallery, and draw the gallery on your page.



2 Enter a name for your gallery, click OK and add the photos you'd like to share. Then click on the Images tab and add a title and caption for each shot. Click the Photo Image tab and choose 'Use Original Image' in the Output Settings box, to ensure it doesn't produce a scaled-down version, then click the Thumbnail Page tab.



3 Explore the Template list to find a stylish way of presenting your thumbnails. Choose the number of columns you'd like (more means smaller thumbnails), click Done and resize the thumbnails manually until you're happy. Finally click Publish > Publish Settings, choose FTP as the Server Type, add your site details and get your page online.

UPGRADE OFFER

NEW FEATURES

- Flash banners & navigation
- Embed a Google Search component
- Automatic version control
- Easily build secure sites
- Powerful form validation tools
- Direct support for ASP.net

NETOBJECTS FUSION 9

The latest word in Wysiwyg web development provides support for developing Flash banners and navigation, ensuring your site will look better than ever. New drag-and-drop components to add Google Search, password-protect your site and more, give it extra functionality. And a new version control system saves old versions of your site remotely, so it's easy to recover in case of disaster. Upgrading to Netobjects Fusion 9 costs only £70.95, saving £61 off the regular price, and you can find out more at **www.netobjects.com/vnu**.

Ashampoo Burning Studio 2005

Create audio, mp3 or data CDs with just a few mouse clicks

INFORMATION

System requirements Windows 98 or later, 20MB disk space, Internet Explorer 4 or later
Contact www.ashampoo.com
Registration Follow the instructions during installation, or click Internet > Register

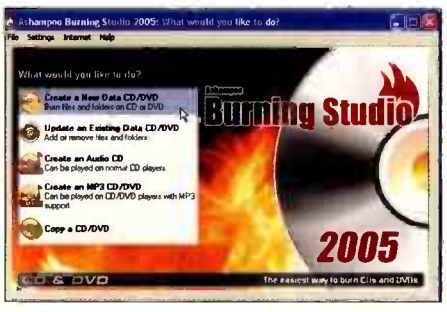
Try burning a CD or DVD with some programs, and you'll be drowned in options. UDF or UDF/ISO? Which UDF partition type would you like? Do you need DVD-Video compatibility? How about file caching? If this often seems unnecessarily complicated, then you might like to give Ashampoo Burning Studio 2005 a try. It simplifies CD and DVD burning by stripping out the rarely used extras, leaving just the core features you need.

If you want to create an audio CD, say, one click takes you to the 'Edit Playlist' screen. You can then specify which audio files to use, or drag and drop files across from Explorer. Click Next > Write CD/DVD, and that's it.

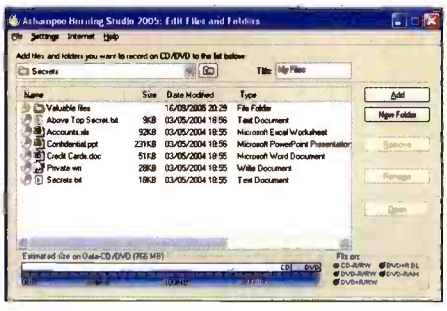
Other options follow much the same pattern. To create a data CD or DVD, for instance, just choose that entry from the opening menu, drag and drop in the files or folders you need, then burn them to disc in a couple of mouse clicks. It's just as easy to update that disc later, copy a disc or create an mp3 CD/DVD.

Don't think this simplicity means Burning Studio 2005 is lacking in features, though. Tracks on your audio CD have their volume normalised by default, for instance (although you can disable this if you like). And you can verify data discs when writing, burn in Disc At Once mode (or not), finalise a disc or modify it across several sessions, and more. Plenty of control, then, but Ashampoo ensures these extra options never get in your way, so your disc-burning activities are always as straightforward and speedy as possible.

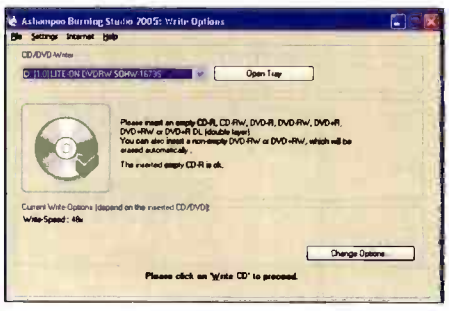
Back up your most vital data in minutes



1 DVD-RW and CD-RW discs are ideal for quick, occasional backups, and Ashampoo Burning Studio 2005 is just the application to make them happen. Launch the program, check the Settings menu to confirm its various options are configured correctly for you, then choose 'Create a New Data CD/DVD' to begin.



2 You could now click 'Add', and specify the files and folders to back up, but it's easier to drag and drop them in from Explorer. The panel at the bottom of the screen indicates when there's too much data for a particular disc type: ours totals 766MB, too much for a regular CD, so that indicator turns red.



3 Click Next when you're done, to see the Write screen. There are a few manually configurable settings hidden behind the 'Write Options' button (write speed, simulate or verify the recording, finalise the CD), but generally you'll just be able to click 'Write CD', then watch while your files are quickly backed up.

UPGRADE OFFER

NEW FEATURES

Create compressed backup files
Password protection adds security
Automatically split large archives
Integrated audio CD ripper
Built-in Blu-ray support
New support for flac audio files

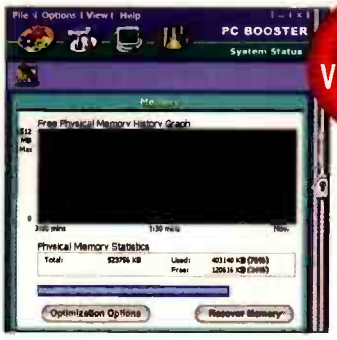
SAVE 40% ON BURNING STUDIO 6

The latest version of Burning Studio adds powerful new backup features, including compression, password protection and the ability to automatically split large archives over multiple discs.

There's write support for the latest Blu-ray drives, an integrated CD ripper (store audio tracks as wma or wav files), and you can now build audio CDs from flac files, as well as wav, mp3, wma and ogg.

Regular upgrades were never expensive at £14.99, but with an amazing 40 per cent discount this drops to a very reasonable £8.99. Click Internet > Upgrade... within Burning Studio 2005 to find out more, and place your order.

PC Booster 3



FULL VERSION

INFORMATION

System requirements
Windows 98 or later, 7MB disk space
Contact www.bluesquad.com
Registration
www.bluesquad.co.uk/vnu/booster/register

PC Booster includes PC burn-in tests and a memory-optimisation tool along with its range of Windows tweaks

Optimising your PC can be a full-time job, but fortunately there is an alternative to browsing the Registry, trawling through the Windows interface or poking around obscure Control Panel applets: PC Booster brings together over 60 different power user settings and makes them available from one straightforward interface.

There are settings related to performance, for instance, letting you optimise the File Indexing Service or Windows Prefetcher in a couple of clicks. You can boost your Internet connection speed by tweaking key TCP/IP settings and disabling the NTFS 'Last Access' time stamp also improves the performance of your file system.

Other settings are more about PC management. Click the System icon and you'll be able to change the location of common system folders such as My Documents, Favorites and My Pictures. Other options let you carry out useful tasks, such as clearing Internet Explorer cookies, temporary Internet files and history, or deleting your Windows temporary files.

You can tweak these settings manually or use the Auto Tune option and let PC Booster decide what changes it should make. And if you don't like the results, it backs up your original settings before you start, and you can restore them at any time by clicking File > Restore Backup.

UPGRADE OFFER
SAVE £5 ON PC BOOSTER 4

Upgrade to the latest PC Booster 4 and you'll gain extras such as a memory optimisation bar, which displays the amount of Ram your system has available and lets you free up more at the click of a button. There are also new XP settings in the hard disk and System sections, while Before and After tests show how much you've gained from PC Boosters tweaks. Interested? Then visit **www.bluesquad.co.uk/vnu/booster/offer** to find out more, and enter the promotional code **BOOSTER** to save £5 off the usual £19.95 price.

AV MP3 Player-Morpher 2

ON OUR COVER DVD

FULL VERSION

INFORMATION

System requirements
Windows 98 or later, 50MB hard drive space
Contact www.audio4fun.com
Registration Visit www.audio4fun.com/mp3player_pcwgift.php, enter the code audio4fun and click Submit

Apply special effects to your favourite audio files and create something unique

The world is full of audio players, so you probably don't see any imminent need to install another one. But don't judge AV MP3 Player-Morpher just yet, because there's more to this than any other mp3 player we've seen.

You get exceptional file format support, for instance, with the program playing all the common audio file types and plenty of uncommon ones, too.

There's a wide range of functionality, including modules to burn audio CDs, design disc labels and covers or rip tracks from CDs. But the really interesting features are the morphing special effects you can apply, in real time, to any audio file you happen to be playing.

The Tempo Morpher, for example, lets you speed up or slow down a track, while keeping distortion to a minimum. The Voice Morpher changes the pitch and timbre of a voice; Cher Modulation applies some bizarre vocal-type modulations inspired by the song *Believe*; and the Frequency Morpher provides complex sound pitch adjustments with the aid of a frequency graph.

The results you get from these tools are sometimes great, sometimes not, but playing around with them is always interesting. If they're a little too experimental, you can always restrict yourself to applying one of the 16 EQ presets. Combine these with some of the 30+ single effects.

UPGRADE OFFER
AV MUSIC MORPHER GOLD 3

Music Morpher Gold 3 takes all the features of MP3 Player-Morpher, and adds new ones such as the Voice Remover, more special effects (Wah-Wah filter, Dynamics Morpher, Multiband Dynamics) and plug-in DirectX effects for additional audio tweaking. The Label editor now designs DVD covers, as well as CDs, and the Burner can create both audio and data CDs. All this would normally cost $99.95 (£56 approx), but as a PCW reader you can get a $30 (£16 approx) discount for the upgrade. Follow the link at **www.audio4fun.com/mp3player_pcwgift.php** to order.

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COMPETITION

WIN! Prey and a Dell Dimension 9150 PC

Enter the dark world of Prey and play it on a 3GHz Dell PC

To celebrate the release of Prey, 2K Games is giving one *PCW* reader the chance to win a copy of the game and a Dell Dimension 9150 PC.

Prey tells the story of Tommy, a Cherokee garage mechanic stuck on a reservation going nowhere. His life changes when an otherworldly crisis forces him to awaken spiritual powers from his long-forgotten birthright. Abducted along with his people to a menacing mothership orbiting Earth, he sets out to save himself and his girlfriend and eventually his planet.

This is a serious, dark story, based on authentic Cherokee mythology. Gamers enter an unpredictable world where nothing can be taken for granted. Most of the game takes place within a living ship, a giant entity that can sense and react to Tommy's presence.

Prey makes use of Joseph Campbell's renowned story structure, The Hero's Journey, for guiding the main character arc. Campbell's extensive work on mythological story progression was made famous when George Lucas used it for Luke Skywalker's story arc in the original *Star Wars*.

It is built on an enhanced Doom 3 engine, the most impressive 3D engine used in a released game. It is packed with features such as portal technology, which adds a new dimension to gameplay, allowing enemies to appear out of thin air and create new and completely original puzzles and gameplay styles. There are several never-before-seen gameplay elements featured in the game, such as Spirit Walking, Wall Walking and Deathwalk, and multiplayer game support that takes advantage of the unique gameplay styles in Prey.

2K Games is also giving away a Dell Dimension 9150 PC on which to play this game. Equipped with a 3GHz Intel processor, 2,048MB of DDR memory, 160GB hard disk, a 256MB PCI Express Nvidia T Geforce 7900 GS graphics card and a crisp 17in monitor, it is the perfect accompaniment to Prey. The lucky first-prize winner will win the computer plus a copy of the game. Four runners-up will also each win a copy of Prey.

For your chance to win a copy of the Prey game and a great gaming PC to go with it, just answer the question and follow the instructions on how to enter.

The winners of the June competition are Jim Reeve, who wins a copy of Elder Scrolls IV Oblivion and a Dell Dimension 9150 PC. Mike Carolan, Allison Hall, Mahbur Rashid and Phillip Yates each win a copy of Elder Scrolls IV Oblivion.

PCW Prey competition

How to enter

For your chance to win the prizes from 2K Games, tick the box next to the correct answer to the question below, fill in the coupon and send it to 2K Games competition, *PCW*, PO Box 10218 Sutton Coldfield, B76 1ZB by the closing date. Or go to **www.pcw.co.uk/competitions** and follow the instructions. The competition opens on 22 June and closes on 23 July 2006.

Prey is based on mythology from which Native American people?

- Apache ☐
- Cherokee ☐
- Sioux ☐

Name: _____

Address: _____

_____

_____ Post code: _____

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This competition is open to readers of *PCW*, except for employees (and their families) of VNU Business Publications and 2K Games. *PCW* is the sole judge of the competition and the Editor's choice is final. Offer applies to residents of the UK and the Irish Republic only. Entrants must be over the age of 18 and only one entry per household will be accepted. Winners will be selected at random from all correct entries received. No cash alternative is available in lieu of prizes. VNU will use all reasonable endeavours to notify the winner(s) within 14 days of the close of the competition. VNU reserves the right to substitute the prize for one of greater or equal value if circumstances make this unavoidable. Prizes will be dispatched by the competition sponsor(s) and the winner(s) name(s) and address(es) will be provided to the competition sponsor(s) for this purpose. No purchase of the magazine is necessary to enter the competition. VNU will use all reasonable efforts to ensure that the prizes are as described on this page. However, VNU cannot accept any liability in respect of any prize, and any queries regarding a prize should be taken up directly with the sponsor of that prize.
We will use the details provided to contact you regarding this competition. ☐ Tick box to receive information about products and services from the VNU Group by email. ☐ Tick box to receive information about products and services from selected companies by email. ☐ Tick box if you do not want to receive information about products and services from the VNU Group by post/telephone. ☐ Tick box if you do not want to receive information about products and services from selected companies by post/telephone.

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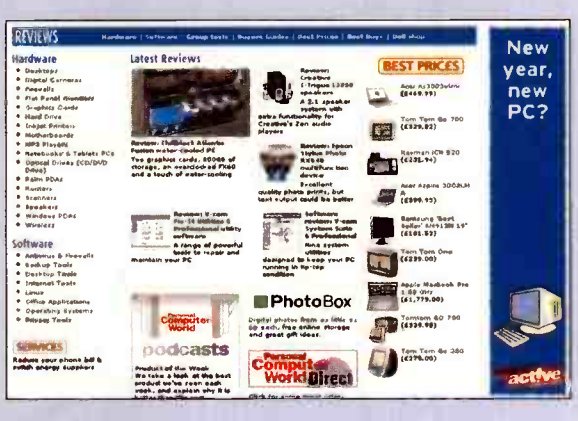

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There's lots more in September's PCW
DON'T MISS IT...

AUGUST 2001

From the archives: Take a look at the important events in technology five, 15 and 25 years ago.

Five years ago, we took a sneaky first peek at the world's first dual-Athlon PC, courtesy of Evesham.com. It featured a pair of 1.2GHz 'Palomino' Athlon MPs, running on a 266MHz bus fitted onto the only dual-Athlon motherboard available at the time, Tyan's Thunder K7 S2462. Evesham shunned the onboard video and SCSI in favour of a 64MB Leadtek Winfast Geforce3 graphics card, along with Soundblaster Live 5.1 cards and a couple of 256MB Dimms.

All this resulted in a blisteringly fast machine, which burst through our Seti@home test in a record-breaking three minutes 20 seconds, compared to around eight minutes for a single 1.33GHz Athlon. It also scored highly in our other tests so all in all we were very impressed.

In our Test Drive section, ultraportable notebooks came under scrutiny. Mark Broomer, MD of a small media company, and house-husband Geoff Lunn tested four of the latest models for ease of use. They came to very different conclusions as to which one they'd choose – Mark preferred HP's Omnibook 500, as he liked its useful docking station. He warmed to the way it could be used as a fully specified desktop PC when in the office, but with the ability to leave bits behind when on the move.

Geoff loved the feature-laden Sony Vaio C1VE and would have 'loved to buy one'. But in his occasional job of lecturing on banking technology, he opted for IBM's Thinkpad X21 as it met his needs for processing and storing big video images while he was on the road.

AUGUST 1981

This was the year of our Printer Survey, with 140 printer manufacturers, importers and distributors compiled into one massive table. Offering the most up-to-date information, it covered everything from dot matrix and daisywheel to line printers, and gave full details of price, print speeds, interfaces and dimensions.

Microholism, by Dr David Buchanan, told the tale of Harry B – a fictitious character based on the experiences of real individuals suffering from 'microcomputer addiction'. Harry's earliest surge of elation came when his first program ran without an error listing, and from then on he was hooked.

He met Jane, who helped turn his thoughts away from computing, but he soon decided to devote more time to computers by way of a university lectureship. Harry spent hours at his VDU without raising suspicions from Jane or colleagues. But the growing pile of *PCW* back issues and the Eprom cards in the wardrobe gave his secret away. Jane and Harry separated and poor Harry ended up with a virtually incurable form of the syndrome.

AUGUST 1991

With the Unix world accustomed to fast processing, a massive amount of memory, high-resolution screens and instantly accessible networking, the idea of Unix on a notebook computer was a battery-exhausting one. In fact, the 20MHz Mips processor-powered Sony News 3250 didn't even come with a battery, requiring mains power to work. It also needed an add-on transceiver for network connection.

Another 'Unix walkstation' reviewed was Trigem's SLT-100 powered by Sun's 25MHz Sparc processor. This had limited screen resolution, poor battery life and an overcrowded keyboard. Our reviewer, Peter Jackson, acknowledged that both companies successfully delivered luggable Unix workstations, despite limitations.

Simon Rockman hit the roads to trace the route across northern France to the Champagne caves in Epanay with a GPS sat nav system. After some technical hitches with the adapter, the GPS was set to get its first satellite fix. But it failed, leaving Simon reliant on paper-based maps and electronic encyclopaedias.

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