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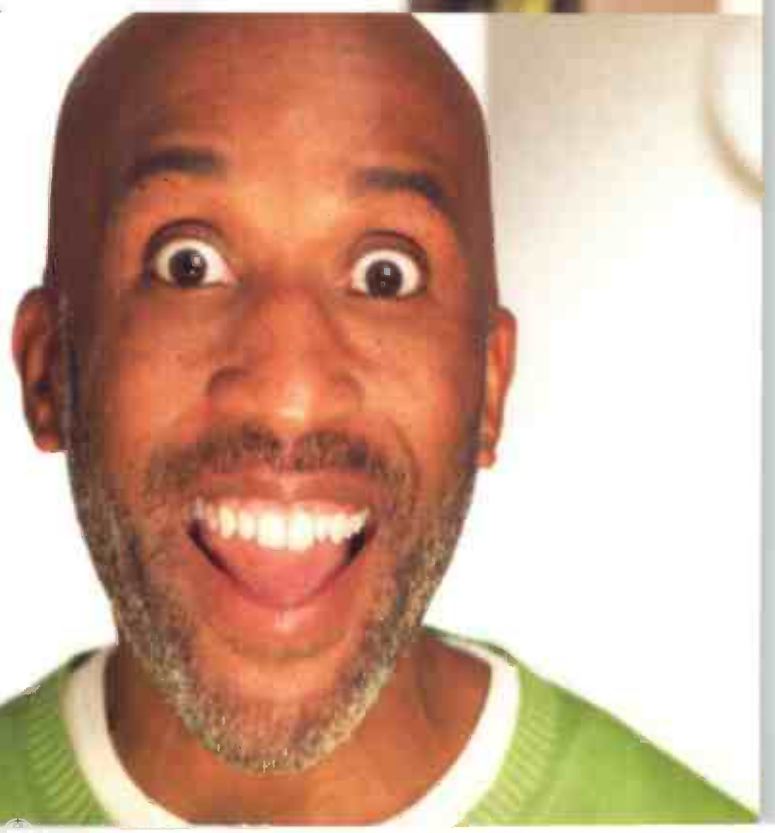

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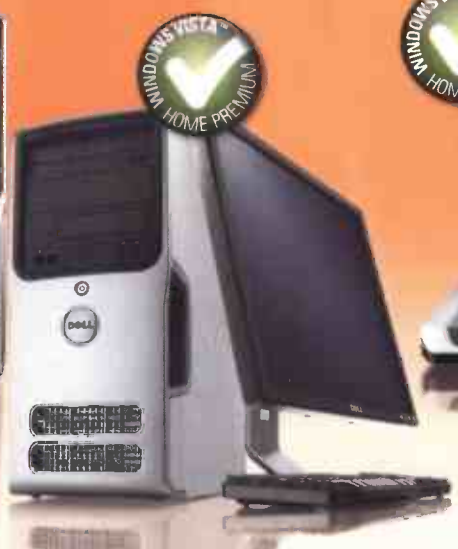

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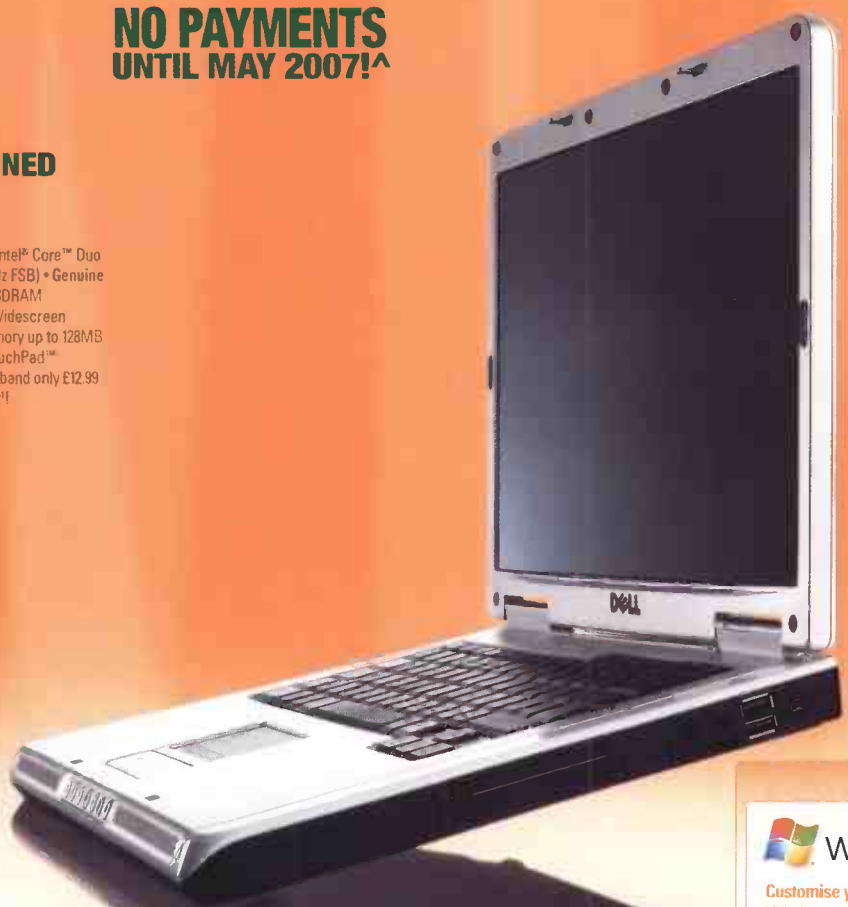

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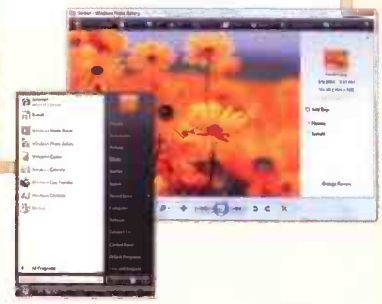

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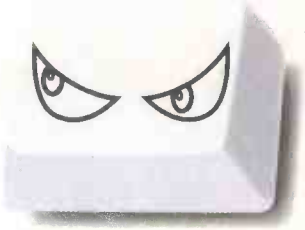

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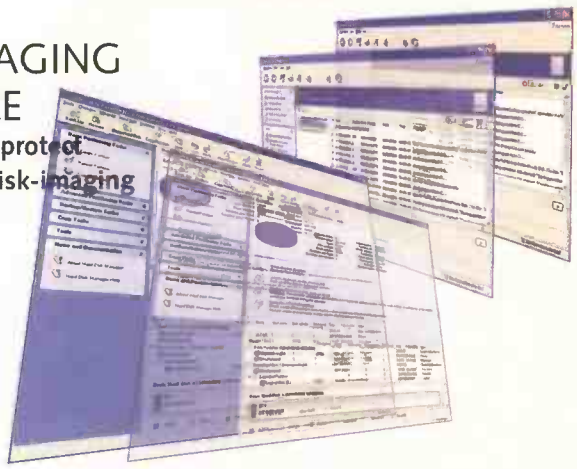

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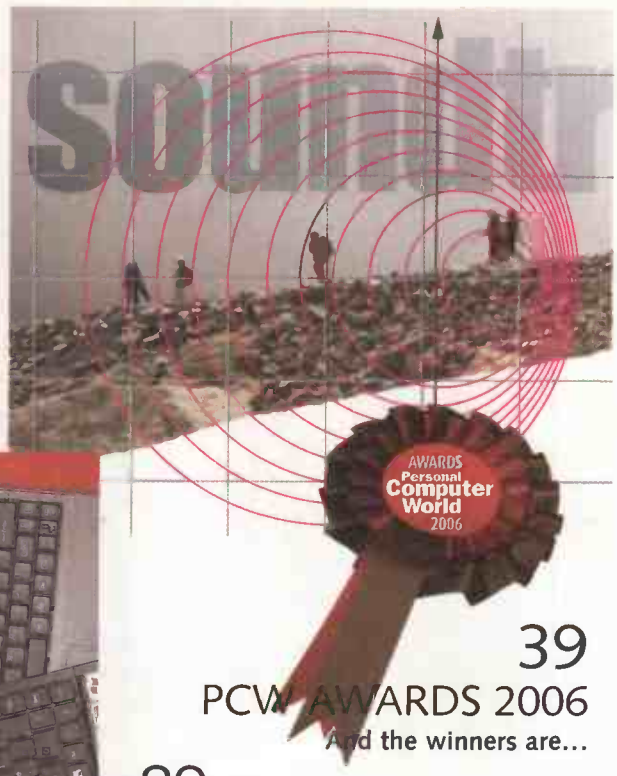

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dylan_armbrust@vnu.co.uk

Editorial

Apple may be polished, but it's what's inside that counts

The launch of the iPhone brings with it the usual media frenzy, but PR can only go so far, says Dylan Armbrust

By the time you read this you will no doubt have heard about Apple's launch of the iPhone, and much of the media hyperbole that has come with it. To hear Apple CEO Steve Jobs talking of "a revolutionary and magical product", you'd think peace on Earth had been achieved. But let's be honest, it is just a phone we're talking about here. I know there are a lot of Apple enthusiasts out there who might beg to differ, but let's keep things in perspective.

In some way, I have to give Apple and Jobs their due for making some seriously big splashes in the IT pond over the past few decades, but having been on the IT scene for a while, I just can't subscribe to Jobs' assertion, delivered during his presentation at MacWorld (**http://events.apple.com.edgesuite.net/j47d52oo/event/**), that Apple is responsible for revolutionising the computing industry over the years.

He says that the Macintosh, launched in 1984, changed the computer industry. In my opinion, it was the launch of the IBM PC in 1981 that was revolutionary. Yes, I'll concede that the GUI of the Mac was different, but it was a natural progression in the home computing field. Moving from a command line interface to a GUI is today's equivalent of home video recording technology moving from tape-based to hard drive-based systems. It's basically anticipated and expected.

'Portable music devices had been around long before the iPod came along'

The same argument applies to his assertion that the iPod changed the music industry. The digital audio player wasn't new and, like the Macintosh, was an expected extension of an existing technology. Portable music devices had been around long before the iPod came along. In fact, what pushed portable music devices into the mainstream was the Sony Walkman, launched in 1979, even though the portable 'stereobelt' had been invented by Andreas Pavel in 1977.

And now Jobs is claiming that the iPhone is "literally five years ahead of any other mobile phone". I've heard a lot of crazy claims in the past, but this one really made me laugh. While the iPhone is a nice-looking product, it still comes up short in several respects, the primary one being that it isn't 3G-enabled, which can only mean it *isn't* five years ahead of the mobile phone market.

I won't argue that the iPhone's multitouch technology isn't nifty but, again, it's not new. Just check out the multitouch demonstration by Jeff Han at the TED (Technology Entertainment and Design) Conference in 2006 (**http://video.google.com/videoplay?docid=8840171180276344444&q=multi-touch**).

What Apple is good at is taking existing technology and making it look nice, with a few, slightly better, user-friendly features. And then the company whips up a frenzy of media interest. I tip my hat to Apple's public relations department, but in the end any business needs a product that sells. When it comes to Apple, they have a mixed record in this regard.

Yes, the iPod is the dominant portable music player, with more than 100 million sold, but that can't be said for its computer products. Apple holds that its Macs are superior to PCs (don't forget, the Macintosh 'revolutionised' the computer industry, right?), yet they only make up about four per cent of computer sales worldwide. Perhaps it is true that the iPhone will have an impact on the mobile phone industry, and at $599 (£400) it darn well better. For now, I'll let the hype wash over me and keep my eye open for truly new, revolutionary technology. **PCW**

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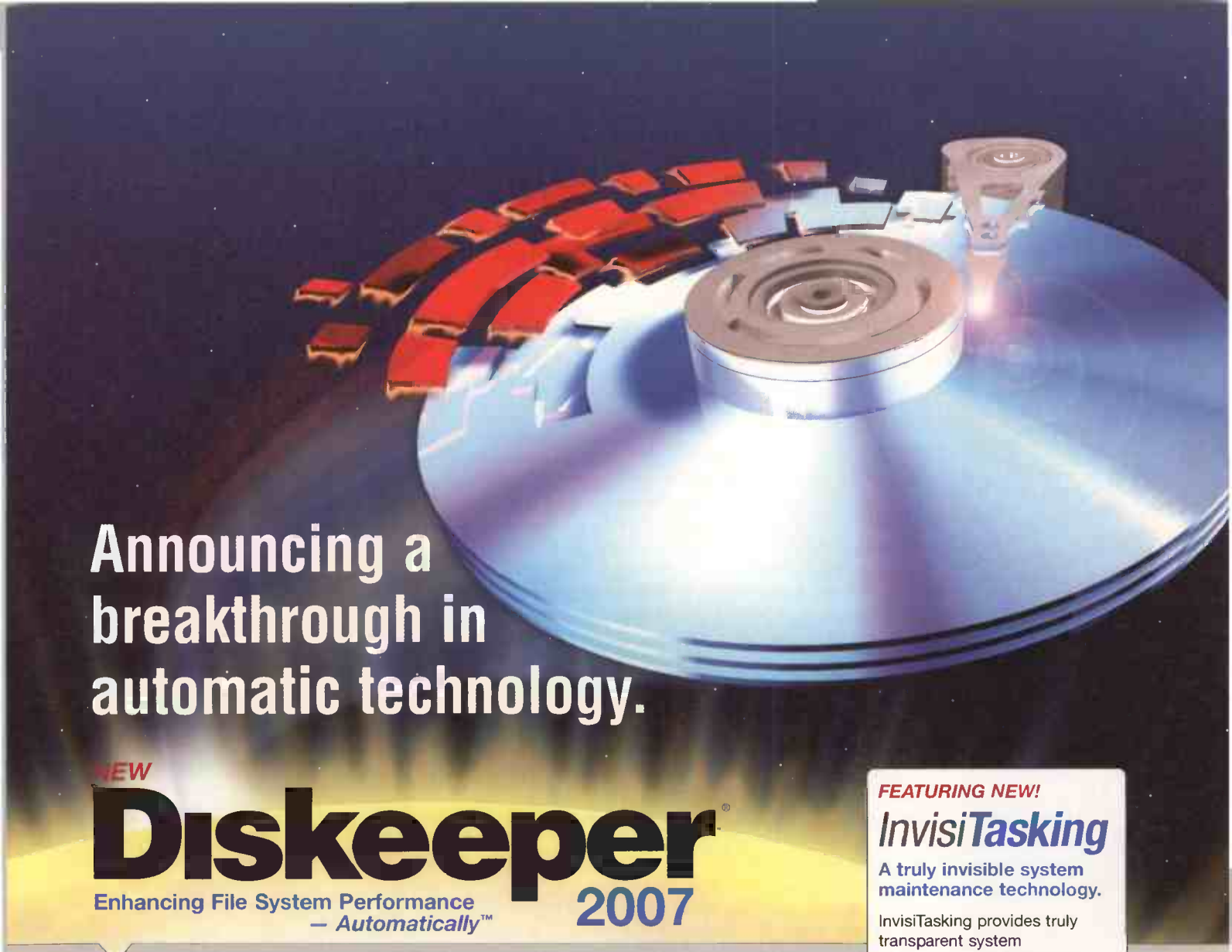

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XP is dead. Long live XP

A new computing era begins on 30 January with the consumer release of Microsoft's Vista operating system, which will render millions of new PCs instantly out of date.

Many PCs sold over Christmas came with upgrade options, though it remains to be seen how many users will change a working setup for the uncertainties of a new and unfamiliar OS. What is certain is that we will be living with both XP and Vista for some time.

Office 2007 is even more of a break with the past, with its revamped interface and file formats. It will even affect users of old versions of Office because they will need to install file-conversion filters.

Microsoft has promised to make the process as painless as possible, but users lacking links for instant upgrades may find themselves unable to open documents.

Microsoft chairman Bill Gates kicked off the consumer launch (enterprises got the products in November) at CES in Las Vegas, which has become the main US showcase of home computing.

His claim that Vista has inspired new PC designs may have been over the top (see news story, page 13), but our reports this month present the feel of a new era.

Wireless links are getting faster with Ultra Wideband (see news story, page 14) and the HD format battle shows signs of a resolution (see news story, page 15).

Low-cost, high-capacity Flash memory is enabling solid-state notebooks and changing the design of hard drives (see news story, page 16), which are themselves becoming phenomenally capacious (see news story, page 17).

PC World pre-order prices for the Home Basic, Home Premium, Business and Ultimate versions were £179.99, £219.99, £289.99 and £369.99. Respective US pricing for upgrades were $99.95 (£52), $159 (£83), $199 (£102) and $259 (£133). Pre-order price for the Home and Student edition of Office 2007 was £119.99.

Bill Gates introduced delegates at this year's Consumer Electronics Show to the start of a new era

Emerging flexible screens promise new, friendlier device formats (see news story, page 19). And at last someone has thought about how to future-proof new homes by providing easily installable fibre links (see news story, page 20).

Finally BT, which has begun a four-year rollout of its packet-switched 21st-Century Network, announced that it has signed up 10 million broadband users (see **www.pcw.co.uk/2171666**). That makes 13 million in the UK, including those using cable. Technical journalists who spent years trying to explain the web's significance, and were then blamed for the idiocy of the dot.com bubble, could gain a certain satisfaction from the news. We woz right! *Clive Akass*

Is Apple iGadget more style than substance?

Jobs had a dream, and the iPhone came true

Hyperbole works, as Apple chief executive Steve Jobs has shown many times. His claim to be reinventing the telecoms industry with a phone that is playing catch-up with rivals – in functionality if not style – was breathtaking, even by his standards. But the new iPhone received full-page coverage in national papers and slots on national news bulletins. The iPhone is a beautiful design, as you'd expect from Apple. It has a novel touchscreen, runs a version of the Mac OS, and can play music and video, browse the web and take pictures with its 2-megapixel camera.

UK operators were reported to be fighting over exclusive rights to the model, and most analysts predicted it will be a success. But its quad-band GSM/Edge links are slow compared with the UK's 3G and HSDPA, and buyers here may balk at the expected £250-£300 price tag with a two-year contract – twice as long as a standard agreement.

Telecoms is a tricky business and Jobs might have done well, before shooting his mouth off, to consider the case of handheld pioneer Palm, which has never recovered from arriving late at the smartphone ball.

• Apple anti-trust suit – page 16

New PCs shape up for Vista

Microsoft's new Vista operating system has inspired system builders to come up with a range of innovative hardware designs, Bill Gates claimed in his keynote speech at CES.

A more measured view might be that power-efficient processors have done more to change designs because they no longer require cases looking and sounding like an air-conditioner unit. And Apple's undoubted flair (see opposite) has clearly influenced one design picked out by Bill Gates: the Vaio media centre (pictured right).

But Apple computer design is conservative by the standards of the Windows-driven UMPC. Gates picked out a new Medion UMPC (pictured right), which we are told may come to Europe in a couple of months.

Small Californian firm OQO boasted on its website that Gates would feature its new ultra-mobile – the O2 – but the interesting design was granted no more than a brief showing in a video of new releases.

OQO actually had an ultra-mobile out before Microsoft came up with its Origami UMPC software, so maybe Gates regards it as something of a maverick. But unlike the Medion, for which no specs were available, the O2 is available in the US and will be sold in the UK by Expansys (**www.expansys.co.uk**). US prices start at $1,499 (£770).

The O2 is a similar size to the old Psion Series 5, but thicker at 5.6x3.3x1in, and just about pocketable. The pull-out button keyboard does not look half as good as Psion's, though.

Clockwise from top: Sony Vaio VGX-TP1; OQO O2 ultra-mobile; Medion ultra-mobile; HP Touchsmart screen

The version shown at CES was running Vista. It packs a 60GB hard disk and is available with a 1.2GHz or 1.5GHz Via C7M processor.

Non-Intel processors featured prominently in Gates' keynote speech, which may reflect Microsoft's pique following the chipmaker's flirtation with Apple. A featured HP Home Server was based on an AMD Live platform (see news story, page 14).

Gates also showcased an HP Touchsmart screen, which he said uses a new feature in Vista that allows accurate fingertip control for tasks, such as selecting pictures or print. "Touch never used to work very well because your fingers would be too big. Well, in the software we've come up with a way to let you target in a rich way," he said.

"It's just so obvious that you wonder why touch hasn't always been there as one of the great ways of doing interaction."

Gates said that by the 30 January consumer launch of Vista, more than 1.5 million devices will be compatible with it.

Clive Akass

Intel launches mainstream quad core

Intel chose CES to unveil a new quad-core processor aimed at mainstream desktops. The Core 2 Quad is designed for demanding multimedia applications.

Like the Core 2 Extreme QX6700 gaming chip launched last year, it consists of two dual-core chips in a single package. AMD, which insists that this is not true quad-core, plans to launch a tightly coupled quad-core Opteron later this year.

Core 2 Quad packs 8MB of Level 2 cache. The 2.4GHz Q6600 version is available now for £439 in bulk purchase. The 2.13GHz Q6400 will be released later this year.

Intel also released two quad-core Xeons – the 2.4GHz X3220 and the 2.1GHz X3210 – costing £439 and £356, respectively.

AMD is drawing up an open specification for small form factor PCs called the DTX standard, for quieter and more desktop-friendly machines. Details will be made available early this year.

- AMD's Live entertainment designs go live in Las Vegas – page 14

In brief

Hybrid camcorder

Hitachi is to launch the first camcorders allowing users to record to DVDs, or an internal 30GB hard drive. The DZH500A will be available in April for about £400.

→ **www.pcw.co.uk/2172192**

Remote TV

Slingbox, which lets you control your home TV via the web, was a gadget nobody knew they needed until it arrived. Its maker, Sling Media, has released a companion device, the Sling Catcher, allowing remote viewing on a TV.

→ **http://tinyurl.com/ydj62b**

Home control

Hawking Technologies has launched Home Remote, a package that allows you to monitor, secure and control your home over the internet. It will begin shipping in the US in March, priced at $199.99 (£121).

→ **www.pcw.co.uk /2172065**

PMP camera

Camera manufacturers often refresh their range after Christmas. Samsung's offer includes the 7.2-megapixel i70, which doubles as a portable media player.

→ **www.pcw.co.uk/2172061**

Blu burner

Lacie showed what it claims is the first external Blu-ray burner for PC and Macs. The drives are available online for £600.

→ **www.pcw.co.uk/2171935**

Asus Sideshow

A feature of Vista, Sideshow, allows auxiliary LCD displays to show information without fully booting the machine. A notebook range from Asus, the W5Fe, has a 2.8in QVGA LCD sideshow screen built into its lid.

→ **http://tinyurl.com/ydvrzq**

For longer, more in-depth versions of stories, go to the web links provided.

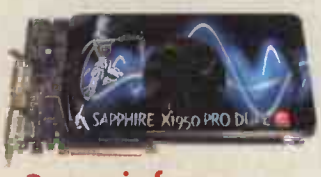
In brief

Crossfire card

Sapphire has unveiled a single graphics card that pack two ATI graphics processor units, in the wake of Nvidia's dual-GPU 7950GX2 graphics card. The Sapphire X1950 Pro Dual has two R570 processing units and uses a single x16 PCI Express slot.

It retains its internal Crossfire connector, so two dual-GPU cards can be linked, though no ATI driver is yet available. Sapphire hinted it could make the world's first quad-Crossfire setup, competing with Nvidia's quad-SLI.

• For more see **www.pcw.co.uk/2172147.**



Dynamic frame

Parrot unveiled a digital photo frame with a 7in LCD and 128MB memory, capable of storing 180 700KB pictures. A Bluetooth link allows direct uploading of pictures from a camera or laptop. It is Bluetooth-enabled to allow wireless transfer of photos. It will be sold from February for £134.

Youtube on tube

A new Netgear adapter lets you browse Youtube videos on TV using a remote control. The Wifi-enabled Digital Entertainer HD is the first of its kind, according to Netgear vice president of product marketing Vivek Pathela.

It also allows TVs to play digital music files, including iTunes tracks protected by Apple's FairPlay DRM technology.

The $349 (£179) adapter also acts as an interface to play videos from the web.

→ **www.netgear.com**

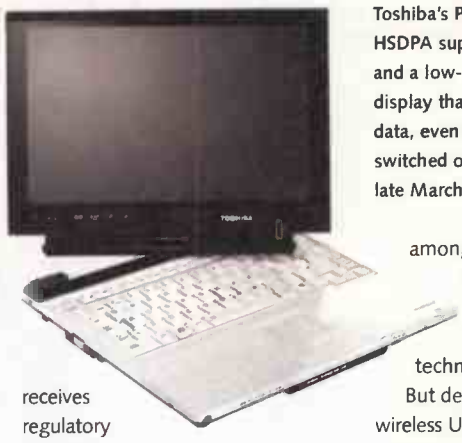
Now HDMI link goes wireless

The digital HDMI interface is the latest technology to be grafted on to emerging Ultra Wideband (UWB) links, which promise short-range communication at rates of up to 480Mbits/sec.

UWB is, in effect, a virtual wire that can be used with any protocol. A Bluetooth version has been drawn up and specifications for a Wireless USB implementation are expected to be finalised shortly.

Now Philips has announced a UWB wireless system that can replace a physical HDMI link and carry high-definition video without loss over 25ft. It supports digital-rights management to prevent interception of data in the air. A kit will be available in the US by May for a suggested price of $299 (£154), Philips said at CES.

The system will not be available in Europe until the technology receives regulatory approval.



Toshiba's Portege R400 has 3G and HSDPA support for mobile broadband and a low-drain Organic LED auxiliary display that shows emails and other data, even when the main machine is switched off. It will be available in late March for about £2,030.

The same applies to the wireless port replicator on Toshiba's new R400 tablet (pictured), which attracted a lot of attention at Cebit. This too connects using UWB, but with a range of just one metre.

Wireless USB has suffered serious delays because of squabbles among developers. Products such as exterior disks and digital cameras were expected to use the technologies by last Christmas.

But devices such as four-port wireless USB hubs and dongles for linking to PCs will appear during this quarter, according to Mike Krell, director of corporate communication at chipmaker Alereon.

He said at CES: "We'll see it built into laptops by mid-year, and in hard drives, cameras and mobile phones by Christmas [2007]."

• HDMI row – page 18

Gates shows off home media server

Microsoft unveiled new Windows Home Server software to be used in networked appliances storing photos, videos, TV recordings and other digital material.

Microsoft chairman Bill Gates showed it on an HP Media Smart Server in his CES opening keynote. There is nothing new in the idea – *PCW* has reviewed several home network-attached storage (NAS) devices, some based on Linux.

Following the Microsoft announcement, Linksys rolled out a network storage system aimed at home and small office users – and not using the Windows Home Server software. The NAS200 will retail at $179.99 (£92.31) with two 3.5in Sata drive bays – you have to use your own hard disks (see **www.pcw.co.uk//2172093**).

Microsoft's software is adapted from Windows Server 2003 and uses enterprise-class code. Gates said it is designed for homes where "you want storage available to multiple devices at all times".

The first devices are scheduled to ship next autumn for £250-£500. They will provide remote access to files via a web interface and will automatically push fresh content on mobile devices on connection.

Parents will be able to regulate the content that can be accessed by each computer in the house.

The HP Media Smart Sever is based on a design by AMD (below).

AMD's Live entertainment designs go live in Las Vegas

AMD fleshed out its Live entertainment platform, rival to Intel's Viiv, with the launch of reference designs for notebooks and a media server that was the basis of the HP design featured in Bill Gates' keynote in Las Vegas (see news story, above).

As well as providing a central store for digital content, the server will stream video, act as a print server and automatically refresh content on connected portable players.

Live systems use an AMD Turion 64 x2 dual-core processor and an advanced graphics card. Fujitsu-Siemens is one of several manufacturers expected to offer notebooks based on the Live design.

AMD also unveiled Live Home Cinema, which aims to replace the digital video recorder, sound system, DVD player and cable set-top box with a single device. AMD expects products based on the design to sell for between £500 and £1,500.

AMD is also offering a number of Live software applications designed to make it easier for consumers to manage digital content and devices. They will be bundled with products, but will also be free for download.

For more on this see **www.pcw.co.uk/2171985**.

LG pre-empts disc format war

The format war over high-definition video discs took a new twist at CES with the launch of a player supporting two rival technologies – Blu-ray and HD-DVD.

LG's new player supports both Blu-ray and HD-DVD

The much-anticipated launch of LG's Super Multi Blue Player followed an announcement by Hollywood giant Warner Bros that it would offer films supporting both formats on the same disc – one on each side.

If this trend continues it will mirror precisely the history of low-capacity DVDs, when a confusion of formats was resolved by the use of multiformat burners and players. It means all of the companies involved get a slice of technology royalties, which is what the disputes are really about.

LG said during a CES press conference that the dispute has slowed the adoption of high-definition standards because people are holding off buying for fear that they will choose a losing format.

The first Super Multi Blue Players are expected to hit US shops in February priced at $1,200 (£615) – about £100 more than a Blu-ray player. Toshiba has just launched an HD-DVD player in Britain for £450, with a premium version selling at about £649.

The LG player supports all Blu-ray functionality, but not some of the interactive features of HD-DVD.

→ **www.lge.com**

We're winning the war on movie sales, claims Blu-ray

The Blu-ray standards group claimed at CES that Blu-ray has overtaken HD-DVD in terms of sales of Hollywood movies, and that it now has a clear edge over its rival.

This is despite a year of setbacks for Blu-ray, including the delayed launch of Sony's Playstation 3 games console, which uses the technology. The PS3, which has yet to ship in Europe, is one of seven Blu-ray players available in the US, including the dual-mode LG (see above).

Seven of the eight major Hollywood studios sell films in the Blu-ray format – five of them exclusively – and 19 of last year's top 20 movies are available in the format, the group claimed.

HD-DVD players are cheaper than Blu-ray, and the format took an early lead, but competition will drive down Blu-ray prices now that more players are available, said Blu-ray group chairman Alan Parsons.

When asked if there was an end in sight to the format war, Parsons commented: "It's just a matter of time."

He believes people will opt for Blu-ray, not for its claimed technical advantages but because there were more movies available in the format.

Parsons welcomes LG's dual-mode player, but does not believe it will damage Blu-ray's takeup or development.

You can find a longer version of this story at **www.pcw.co.uk/2172085**.

Rob Jones

Sandisk mp3 player doubles as web radio

Flash memory specialist Sandisk launched three products at CES, in an attempt to break into the burgeoning convergence market.

Sansa Connect lets you download tracks from the internet

They include a 4GB $249 (£128) Wifi-enabled mp3 player called Sansa Connect. It downloads tracks directly from the web and also doubles as a web radio.

Sansa Connect comes with a microSD card slot, an embedded speaker and 2.2in screen. No prices or availability dates were given, but Sandisk said the device will work with multiple download sites.

The company also unveiled an 8GB portable media player called the Sansa View, which will ship in March for $299 (£154) and is just 1.7cm thick. It has a 4in widescreen display and an SD slot for up to 8GB more storage.

Sandisk also introduced a new class of device called a USBTV, designed to transfer video from a PC to TV without using a network.

Once loaded with video, you plug the device into a docking station that connects to your TV. It also incorporates digital rights management and decoders for major video formats. Prices have not yet been announced.

→ **www.sandisk.com**

• Sandisk 32GB SSD – page 16

In brief

Sensory gaming

Philips showed off a range of technologies and products at CES, from its latest Ambilight LCD TVs to a Streamium Wireless Music System and amBX – a much-heralded 'sensory gaming' technology.

According to Philips, this uses flashing wall lights, fans and a vibrating 'wrist rumbler' that can be controlled by software to "transform the entire gaming experience".

→ **http://tinyurl.com/yzrez6**

Mobile graphics

Asus is launching an external graphics card unit for gamers who want desktop performance on a laptop. The XG Station, which packs an Nvidia 7900GS card and 5.1 virtual surround sound, connects via a PCI Express card. Gamers can overclock while playing.

Asus claims the 7900GS gives nine times the performance of a laptop relying on Intel's 945GM integrated graphics.

The XG Station will be released in early Q2 and will sell for $300.

→ **http://tinyurl.com/yxnkqe**

TV web access

Sony is to give owners of its next generation of S series Bravia LCD TVs access to the internet without the need for a PC. But access, via a box called the Internet Video Link (IVL), will not allow general web access and users will only be able to access content from

selected providers, including AOL and Yahoo!.

The Bravia S series will launch shortly, while the IVL comes out in the US this summer. No prices or UK availability were announced.

→ **www.pcw.co.uk/2171993**

User files iPod anti-trust suit

A tussle over stock options offered to Apple chief executive Steve Jobs has overshadowed another legal battle that could cause a lot of trouble for the company.

User Melani Tucker has filed a lawsuit claiming the tie-up between iPod mp3 players and music bought at Apple's iTunes online music store violates US anti-trust laws.

She claims Apple illegally prevents music bought from iTunes to be played on rival music players, and does not make clear to customers that this is the case.

The suit calls for a ban on the tie-in and damages for anyone who has bought an iPod or iTunes music track.

A judge has dismissed a preliminary claim by Apple that the company's innovation would be stifled if interoperability were enforced and that the "anti-trust laws require companies to compete, not co-operate".

The case, which mirrors certain matters central to Microsoft anti-trust actions, follows similar cases by consumer groups in Europe. Jobs dismissed as "state-sponsored piracy" a French law that would forbid the iTunes tie-in.

AMD scores in Intel battle

A US judge has ordered Intel to produce documents that may prove it broke anti-trust laws by making exclusive chip deals with German PC vendors.

The decision in the anti-trust suit brought by AMD followed an investigation by a court-appointed anti-trust specialist, who requested evidence from non-US sources.

AMD chief administrative officer Thomas McCoy said: "This ruling removes any basis for Intel or its foreign customers to withhold evidence of Intel's exclusion.

"We will proceed vigorously to prove that Intel abuses its global monopoly power by limiting or excluding competition, which ultimately hurts consumers worldwide."

Hard drives go solid state...

Solid-state laptops moved a step closer to being mainstream at the CES show, with the launch of a 32GB Nand Flash drive from memory giant Sandisk.

The 1.8in Sandisk solid-state disk drive (SSD), designed to replace the traditional hard drive, follows Samsung's release late last year of an all-solid-state Q1 Origami UMPC, which uses a similar 32GB SSD.

SSDs are quieter and faster than hard disks because they have no moving parts. They also draw less than half the power. But disk makers are pushing rival hybrid drives that pack both high-capacity magnetic platters and gigabytes of Flash. The Sandisk SSD has a sustained read rate of 62MB per second and a random read rate of 7,000 inputs/outputs per second for a 512-byte transfer.

No moving parts... the SSD could become a laptop standard

Sandisk says a laptop using the SSD drive can boot Microsoft Windows Vista Enterprise in as little as 35 seconds.

Sandisk chief executive Eli Harari, who predicted 10 years ago that solid-state memory would oust the hard disk, said he expects to see increasing use of SSDs as memory costs fall.

Sandisk's 32GB SSD is expected to cost about £308 and will be available before summer. It was shown at Storage Vision in Las Vegas, which closed just before the start of CES.

→ www.sandisk.com

...but disk makers unite to push hybrids

Leading hard drive manufacturers have formed an alliance to promote the use of hybrid drives, which combine some of the advantages of solid-state disks (SSD) with the large capacities and low per-gigabyte cost of hard disks.

The Hybrid Storage Alliance, which comprises Hitachi, Samsung, Seagate and Toshiba, was launched at the Storage Vision exhibition – as was Sandisk's rival 1.8in all-solid-state drive (see above).

Hybrid drives pack the traditional magnetic platter of traditional drives, plus gigabytes of solid-state memory – enough to store whatever data and code is being used by the host machine.

Disk accesses and battery drain are thus minimised, while the performance can be close to that of an SSD. However, like hard disks, hybrids remain vulnerable to physical harm because damage is most likely to occur during disk accesses. But hybrids are more robust than traditional models.

The new Vista operating system is the first to support hybrids, and analysts IDC predict they will constitute 35 per cent of all laptop drives shipped by 2010.

Penny drops for clear transistors

There is nothing remarkable about the US penny, but here it is seen through an array 70 indium-oxide thin-film-transistors (TFT), lying on a 0.7 mm-thick glass plate.

The picture was taken by researchers at Chicago's Northwestern University, who claim to be the first to develop transparent transistors capable of a useful performance. In fact, they are faster than silicon transistors used to drive TFT displays and almost as fast as high-end polysilicon devices. They can be manufactured at low cost.

Professor Tobin Marks, who led the research team that developed the transistor, says the technology can enable car windshields to display maps, or shop windows to show updatable prices and information.

As conventional TFT display drivers block some light, transparent alternatives of this type could make displays more efficient.

The breakthrough was announced late last year in the journal *Nature Materials*.

Google offers patent search

Budding inventors and researchers can search more than seven million US patents online with a beta version of Google patent search.

It makes the full text of each patent available free of charge and supports searching by inventor, classification and filing date. The process should make double-checking the uniqueness of inventions much easier.

The search covers the entire collection of patents made available by the United States Patent Trademark Office, starting from the 1790s through to those issued in the middle of 2006.

Google says it hopes to expand to foreign patents in the future.

Hard drives hit 1 terabyte

Hitachi launched two world-first 1TB drives at the Consumer Electronics Show in Las Vegas. The Deskstar 7K1000, which will ship early this year, is priced at $399 (£205). Price, specifications and availability are yet to be announced for its sibling drive – the Cinemastar K1000 – which is optimised for streaming video. An enterprise-class 1TB drive is also being evaluated.

The Deskstar price works out at a low 20p per gigabyte. Hitachi's storage division says the new drives will enable home PCs to cope with the storage demands of high-definition video.

Relatively low-cost terabyte drives have been available for a few years, but they have consisted of arrays of smaller capacity disks.

The 3.5in, 7200rpm 7K1000 has five platters packing up to 148 billion bits of data per square inch.

Big enough to store a library... Hitachi's 1TB drive

A four-platter 750GB version will ship at the same time as the 1TB.

Data can be read off the platters into the drive's 32MB buffer at a maximum 1,070Mbytes/sec (media data rate) and there is a choice of Sata and parallel ATA interfaces.

Seagate says it will soon release a 1TB Barracuda drive, with four platters that will provide the highest levels of "power efficiency, heat dissipation and reliability", thanks to second-generation perpendicular recording. It said in a statement: "We expect to be the first to deliver 1TB hard drives in high volume for global customers during the first half of 2007."

Seagate has talked of pushing drive capacities up to 300TB, enough to store the entire contents of the Library of Congress.

Hitachi Global Storage Technologies also announced the development of software designed to optimise hard disk use in set-top boxes and personal video recorders.

→ **www.hitachigst.com**
www.seagate.com

Fastest Ram clocks 1.3GHz

Patriot Memory unveiled at CES what it claims is the world's fastest memory module. The memory manufacturer's 1.302GHz Extreme Performance PC2-10100 is, in effect, a DDR-2 module that can run at higher speeds.

Nam Hyung-Kim, director and principal analyst at research firm iSuppli, says it is not a great achievement to overclock memory and that the device will not be "meaningful to the market".

Overclocked memory runs hot and tends to be more expensive. Corsair's 1,111MHz DHX Dominator modules sell at about £200 and require specially crafted heatsinks and three 40mm fans.

Late last year Korean chip manufacturer Hynix Semiconductor launched a new family of high-capacity 1GB DDR2 Dram modules, which it claimed were the fastest yet.

DrayTek Broadband Firewall/Routers

Vigor3300V

DrayTek routers and firewalls provide a vast array of essential and advanced features, designed around users needs. The new Vigor2800 series provides compatibility with the latest ADSL2+ lines, as well as enhanced security, content filtering, VPN, 108Mb/s wireless and Voice-over-IP. Also available is the **Vigor2900** series for cable modem users and the new **Vigor3100** router/firewall for SDSL.

Vigor3100 SDSL

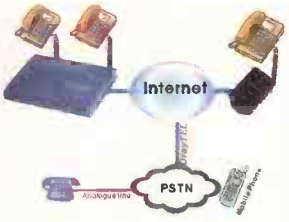
VigorTalk for DrayTEL
www.draytel.org

Vigor2900

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).

Vigor2800 Series

DrayTek VoIP-equipped routers let you use your broadband line to make and receive voice calls. Calls to any other VoIP-equipped users are completely free and you can make calls to regular phones via DrayTEL with national & international calls from just 1p/min.



Available from SEG
020 8381 5500
VoIP : 800800@draytel.org

For full details of all models visit
www.draytek.co.uk

Specification subject to change. Facilities vary with model.

PS3 'to win console war'

Sony's Playstation 3 will sell more than the combined sales of Microsoft's Xbox 360 and Nintendo's Wii consoles by 2010, according to Dublin analysts Research and Markets.

The company claims the Sony console will rack up 71 million sales, compared with the Xbox 360's 40 million and the Wii's 31 million.

But the PS3 will not match the market dominance of its predecessors because of launch delays, the analysts say.

PS3 is getting off to a slow start, according to a report from market analyst NDP, which showed that the Xbox 360 was the best-selling games console in the US in the two months up to the new year. Sales of the Xbox were almost two million, with the Wii running close at 1.8 million, and the PS3 following in third place with just 750,000 sold since its 17 November launch.

Critics knock HDMI interface

US chain Best Buy has insisted that products using the digital HDMI interface pass interoperability tests before going on sale, following reports that some brands are incompatible.

The problem, which could prevent a video player from streaming a movie to a TV, occurs during the 'handshaking', when two devices start to communicate. This is because some devices have yet to receive a firmware upgrade providing support for HDCP (High-Bandwidth Digital Content Protection) anti-piracy technology.

Pioneer offered free repairs in the UK to get its plasmas working with Sky HD boxes and recommended that viewers use analogue links to get a picture in the meantime.

Promoting the new HDMI version 1.3 interface at a roadshow in London, HDMI licensing representatives were shaken by blunt comments and awkward questions about compatibility from a group of analysts, press and manufacturers.

HDMI licensing president Les Chard claimed that most users have no problems and said: "The few problems that have arisen are the result of HDCP." However, Chard admitted that there have been problems with some set-top boxes, not with handshaking.

Chard said that by early February, all HDMI devices will have to pass testing by Simplay HD, an entity set up by HDMI licensing, which polices the technology.

Chard said there are sites around the world to handle the workload.

• See Straight Talking, page 32

Barry Fox

Cleaning that is not up to scratch

Conventional cloths and cleaning fluid containing Isopropyl Alcohol (IPA) can seriously damage the surface of LCD screens, according to Danish manufacturer AM products. It claims the alcohol permeates microscopic scratches caused by the cloths, resulting in visible bubbling of the underlying material. Naturally, it claims that its own cleaning kits, available at Micro Anvika, get round the problem. Prices start at £9.99.

→ **www.microanvika.com**

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E-paper to ship next year

Yes, pictured right is yet another prototype flexible screen, like many we have featured over the years. But this one, or something like it, is going into production and will be available next year.

Cambridge plastic transistor pioneer Plastic Logic has raised £50m to build a plant manufacturing "thin, light and robust" flexible active-matrix displays that it promises will provide a "reading experience closer to paper than any other technology".

Production at the plant in Dresden, Germany, will start next year and will grow to a predicted 41.6 million units in 2010.

Plastic Logic COO John Mills said the displays will enable electronic reader products with a battery life of thousands of pages. "Wireless connectivity will allow you to purchase and download a book or pick up the latest edition of your newspaper."

But flexible screens also have the potential of allowing new formats for truly portable computers, such as body-hugging models designed to fit in enlarged jacket or coat pockets. If flexibility improves, the screen could scroll out like the lid of a roll-top.

Ready to roll: Plastic Logic's flexible screen will be available next year

The new screens will use an imaging layer from US company E-ink, which will be driven by an active matrix of transistors from Plastic Logic, which specialises in the use of carbon-based polymer semiconductors rather than silicon.

One advantage is that circuits, including transistors, can be printed by inkjet. The E-ink pixels are bi-stable, which means they retain their state without power, making them easier on batteries – particularly on e-books, where an image changes infrequently.

The first products will be black and white, with four levels of grey, which is expected to rise to 16 on manufacture.

Colour screens are expected to follow in three to four years.

CSR faces Bluetooth patent battle

Plastic Logic (above) may be riding high, but another Cambridge company looks as if it might be embroiled in a potentially damaging court battle.

Cambridge Silicon Radio (CSR) is confident there is "absolutely no merit" in a patent-infringement suit filed against three of the company's biggest customers, and apparently involving its Bluetooth chips. The suit against Nokia, Samsung and Panasonic could hit CSR, even if it has no chance of success.

The case was brought by the non-profit Washington Research Foundation (WRF), which funds research in Washington State universities and labs, and helps commercialise the results. A cross-licensing agreement by members of Bluetooth Special Interest Group is intended to avoid patent disputes.

A billion Bluetooth devices have been shipped globally – most of them using chips from CSR.

→ **www.csr.com**

Samsung fuel cell drives laptop for 15 hours

Samsung has developed a fuel cell that will drive a laptop for 15 hours on a cupful (100cc) of methanol, the company has announced.

Another fuel cell, built into a docking station, can carry enough power to drive the Samsung Q35 notebook for month, according to a company statement.

Samsung did not say how much the second device weighs, nor did it explain the point of a battery-driven docking station, a device normally used only in places where there are likely to be mains supplies.

Auxiliary power supplies using fuel cells have long been available and Toshiba has demonstrated prototype battery packs using similar technology. But Samsung says products using its technology could be available by the end of the year.

It claims to have reduced the noise generated by prototypes to the extent that production versions will be as quiet as standard notebooks.

Fuel cells have long been regarded as an answer to the short battery life of notebooks, but there could be problems taking the highly volatile fuel on board an aircraft.

→ **www.samsung.com**

Cuddling shirt opens its arms

UK manufacturer Cute Circuit has designed a shirt that can hug you via a mobile phone. It has patches of smart fabric that expand and contract at Bluetooth commands.

The shirt can also be used to hug someone else in a similar garment. You don the shirt and hug yourself, and the shirt phones the second wearer and transmits the cuddle.

Cute Circuit co-founder Francesca Rosella said the hug shirt should go on sale later this year. "People want to feel connected with each other, so we've tried to help."

Palm OS returns home

Handheld pioneer Palm has bought back the Palm operating system from Japanese company Access. Access bought Palmsource, the software spin-off of the original firm, in 2005.

The new $44m deal casts doubt on an Access plan to develop a Linux-based version of the Palm OS. Palm said it will continue to use Microsoft's Windows Mobile software on some models.

Fujifilm SD

Fujifilm supports SD cards on three new digital cameras. The development follows four years of supplying models using the smaller xD cards it co-developed with Olympus, which have been criticised for being much slower and more expensive than rival formats. Slots on the new 6.3-megapixel FinePix A610, and 8.3-megapixel A800 and F32fd, can read both SD and xD cards.

Wide view

Researchers at South Korea's Hopman University have developed a cheap lens that produces a wide-angle image virtually free of fish-eye distortion. It will cost about £50 and is intended for use in security cameras and robot navigation.

In brief

Easy switching

Switching broadband providers will be easier from 14 February, when new rules force service providers (ISPs) to hand over migration authorisation codes (MACs). ISPs will have to ensure a discontinued line is not tagged as having a broadband connection, blocking the installation of a new service from commencing.

Ofcom said more than half the complaints it received in the year up to last September concerned service providers being slow to provide MACs to customers who wished to switch.

Stick to 8GB

Sony has doubled to 8GB the capacity of its Memory Stick Pro. The device goes on sale in February, priced at £228.

→ **www.sonydigital-link.com/memstick/**

Flash killer

Emerging phase-change memory is likely to supersede Flash because it is faster and can be scaled down more, according to researchers at IBM, Macronix and Qimonda, who are working on the technology.

→ **pcw.co.uk/2170671**

DIY Arabic

Auralog has added Arabic to the list of languages supported by its range of learning software. Tell Me More Arabic allows learners to learn by speaking with their computer, which will evaluate their pronunciation. It costs £220.

→ **www.auralog.com**

Firefox pays

The Mozilla Foundation, publisher of the free Firefox browser, reported revenues of $52.9m in 2005, owing in large part to its partnerships with search engines.

→ **www.mozilla.org**

Guns light up home fibre

A US firm claims to have solved the single biggest problem preventing the widespread use of fibre-optic networking – by taking a gun to it.

The gun fires a ferrule attached to an optical fibre, which then travels along ducting until it reaches a terminator box. The ferrule, which doubles as a plug, slots into the box to provide a network access point.

There is a similar connector at the other end of the fibre, which comes in standard lengths. Spare fibre is simply left on a reel, which hooks on to a special pole on a gateway box.

Each access point needs its own unshared link, so fibres radiate from the gateway as a star network. The single physical constraint is that, like standard Ethernet cable, ducts can have bends no sharper than the curvature of a coke can.

The joy of the system is that it avoids the very tricky business of terminating the optical cable, which requires expensive tools and training, according to Ken Weller, chief operating officer of the UK arm of developers Tenvera. "I got the hang of this after just a couple of days," he said.

Head-end distribution board with posts to hang fibre reels

The system is currently aimed at enabling builders and refurbishers to future-proof luxury homes, and it does not come cheap. Ducting of a five-bedroom house would cost about £3,000, but Weller estimates the investment to be, if anything, cheaper than the cost of installing the mains wiring.

But adding fibre will cost about £150 per terminal – and then you have the problem that few electronics devices are designed for optical input.

Different Tenvera modules can slot into the access point to offer a choice of gigabit Ethernet, HDMI, composite video or potentially any digital interface.

"Personally, I think HDMI will disappear eventually," Weller said. "It is only there because manufacturers have not got around to implementing optical ports."

He also agrees that prices could drop if fibre comes into widespread use. And he points out that houses can be ducted at the building stage and then fibred up later as the need arises.

The market is potentially huge. Britain is committed to building 200,000 homes within 10 years and still has no 'best practice' advice on how to prepare them for future networking demands, which may be greater than the capacity of copper cabling.

→ **www.futurereadyhomes.co.uk**

IBM slams OpenXML standard

The new OpenXML file formats for Office 2007 have been approved by the Ecma standards body in Europe, which is considered a fast-track route to endorsement as a global International Standards Organisation (ISO) standard.

The new XML-based formats, together with a completely revamped user interface, are the biggest break with the past in Microsoft's new office suite. Several organisations, including the EC, have argued that an open standard is needed for free document exchange between platforms.

A rival Open Document Format, also based on XML, already has ISO approval. Microsoft, fearful of losing lucrative government contracts, announced in late 2005 that OpenXML would be made available under a royalty-free license. But critics argue that it is not open because Microsoft retains control over its development.

Novell is working with Microsoft to reconcile the formats and says it will support OpenXML documents in the OpenOffice.org suite it ships with Suse Linux. Corel will support the format in Wordperfect.

But Bob Sutor, open-source standards chief at IBM, criticised Ecma's standardisation as endorsing a proprietary product and said he doubted that third parties could support OpenXML fully. He warned: "If they falter, watch out for people who try to blame those companies or open source itself, when the root of the problem may be with the Microsoft Office OpenXML spec in the first place."

Photoshop CS3's native debut

Adobe has released a beta of the next version of its image-editing product, Photoshop CS3. It is the first to run native on Intel-based Macs, which run the current version using a PowerPC emulator called Rosetta.

The beta is in Universal Binary format, which means it runs on both old and new Macs. It is also available for XP and Vista.

The beta times out after two days unless you provide a serial number for Photoshop CS2, Creative Suite 2, Creative Suite Production Studio, Design Bundle, Web Bundle or Video Bundle. You must be registered with Adobe.com.

The beta includes a key upgrade to Adobe Bridge and a preview release of the all-new Adobe Device Central, which allows Photoshop users to design and test content for small mobile screens.

→ **www.pcw.co.uk/2171752**

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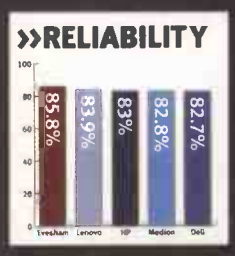

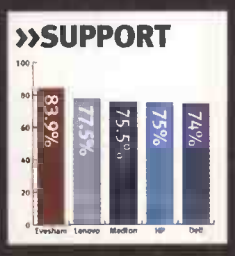

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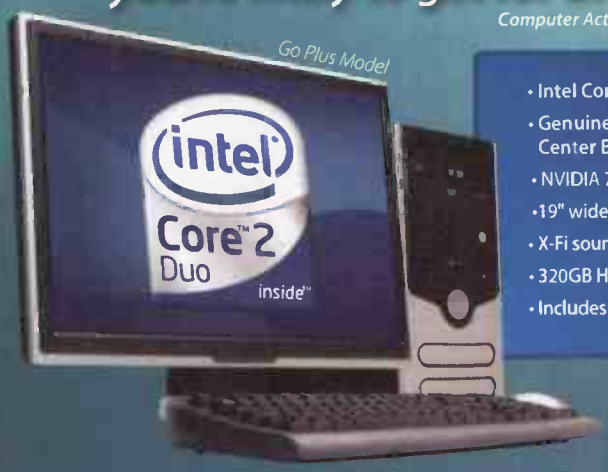

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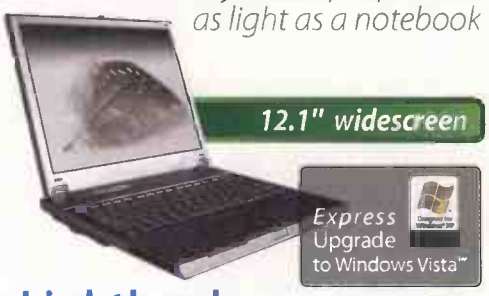

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LETTERS

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LETTER OF THE MONTH

How small is portable?

Your news article 'Ultra-mobile on the move' (*PCW*, February 2007) mentions the future of UMPC devices and states that they sell "largely on their portability", but why wait when you can already use ultra-portable devices?

I'm using my Spv3100 mobile with its slide-out Qwerty keyboard to type this email. After finishing I can either send this to you via my GPRS/3G/Edge connection or, as I am at home, connect via my Wifi.

I'm able to browse the internet comfortably on its landscape screen (even better when websites are designed for small mobile screens) and am even able to get broadband speeds depending on my location.

With its 2GB solid-state, micro-SD card, I have a collection of my favourite albums in mp3, and TV shows in Divx to watch and listen to while on the move, using my Bluetooth stereo headphones.

It has a wealth of available applications from a Microsoft Office suite, a Pdf reader, instant messaging, Skype, games, remote desktop, image editing and much more.

When I'm on the road, I use my installed Tom Tom and Bluetooth GPS to navigate. If I see a nice view on my journey, I can take a picture or video using the built-in camera, or even use it as a video phone. The device also has a touch-sensitive screen, handwriting recognition and voice control – all this on a device that weighs only 176g and can fit in my pocket, compared with the Samsung Q1, which weighs 734g and requires a bag.

Got to go! Got a call coming through – oh, and did I mention it's my phone as well?

Johnny Wan

Clive Akass replies: I made a comparison between the UMPC and the Nokia 770 (PCW, December, page 22) which makes a similar point about how much you can do on small handhelds. The ideal size for a true portable is one of the great unresolved questions in the evolution of these devices, given the fact that we are coming to the point where the format need no longer be constrained by what is possible with current technology.

Samsung Q1: Not so small

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LIVING THE DREAM?

I don't know which dreamworld the writer of your 'Letter of the month', Charles Smith, lives in (*PCW*, February 2007).

My PC is 10 years old. I have the skills to upgrade it. I'd love to have a newer one that is faster and consumes less power – great both for me as well as the environment. But will a small size mean I am no longer able to perform upgrades or expansions myself and will have to purchase a new unit? My PC cost £1,200 when I bought it and I could get a lot more with that now.

I can't say I'd be worried about Microsoft losing the money from software licensing, but will this really happen? People will still require applications and Microsoft is already looking in this direction with Office Live.

Pay £15 a month for my whole life to be held on secure servers? Show me a secure server. Banks can't do it. The NHS says it can do it for the National Care Record, but I will try my hardest to have my record excluded. There are skilled IT people out there who will find a way to do whatever they want – from 419 scams for the uneducated to more advanced phishing. They will continue developing their skills as new areas open up.

It seems that Charles has a lot more money than I, as I couldn't afford £15 a month at the moment, let alone what that might rise to in five years. Houses will be equipped with high-speed broadband internet. Who pays?

Rather than ask who will be the first to offer these services (someone will when it is worth

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Don't trash your old, eco-unfriendly equipment until absolutely necessary

their while financially), I'd ask what most people need from their home computing. I suspect that none of the answers will bear any relation to Charles' prognostications. I see a whole world of people out there who do not have a PC or internet access, and some people I work with are very grateful if I can give them a redundant but usable PC.
Mark Cronin

THE ECO DILEMMA

Good though most of Nigel Whitfield's energy-saving suggestions may be (*PCW*, January 2007), I feel he has made two glaring omissions. The first is the cost of mining or otherwise obtaining the raw materials from which new products are made. These have an ecological as well as economic cost, which has yet to be evaluated properly.

The second oversight is the cost of actually producing any of the new equipment Mr Whitfield proposes we acquire. Again, the true economic and ecological costs may be much greater than the few pounds we pay for the new items. And then there are the hidden costs of transporting, marketing and selling these new products, all of which cost more to our environment.

I would prefer to continue with my older equipment until it really is past it for one reason or another, rather than spend money (that I don't have) chasing a superficially more eco-friendly product. Yes, when the time comes we should find the most efficient device on the market, but don't chase the market, as tomorrow's kit will be even more efficient than today's.
Hally Hardie

Kelvyn Taylor replies: We agree entirely and, in fact, we discussed this side of the story in an earlier feature ('Our PCs, our planet', October 2006, **www.pcw.co.uk/2162599***). Get the most out of what equipment you have, but if you do have to buy new, then make an informed choice.*

GPS FOR WALKERS

I always read your magazine with interest and find the reviews very helpful – except when it comes to GPS (sat nav). Why is it assumed that GPS is only useful in a car?

I would love to see a review of a GPS system that would enable me to get from home to a car park, would show me which direction north was (whether true, magnetic or grid), and would help me by converting my position into a grid reference.

I am not interested in merely substituting the intelligence required to understand maps with an automated system that compels you to drive through deep fords. I would like a system that works with a map and with my intelligence, not one that tries to do things that humans can still do better with a bit of brainpower. I would like to take my GPS with me to use, not to leave it in the car for the next smash-and-grab artist that passes by and feels short of cash.

So please could you produce a review or mention features for those of us who prefer exercise (both physical and mental) to road rage!
Jim Druett

Kelvyn Taylor replies: There are many so-called 'lifestyle' GPS products, ranging from cheap digital compasses through to fully fledged systems with terrain mapping, and we plan to look at this area later in the year.

A HEX ON YOU

Thanks for an early Christmas present in your February edition.

The 'Troubleshooting Windows' article on page 48 included the following gem: "Make sure that Hexadecimal is selected and enter 1 in the Value data field."

I hate to think what would have happened if a decimal 1 had been entered instead of a Hexadecimal 1.

At least it brought a smile to my face.
Andrew Kaye

CLOUDED VISTA

In the February 2007 issue of *PCW*, I read the editorial column with interest. I was particularly surprised by Kelvyn Taylor's remarks about the "bits of kit that Vista didn't have any built-in drivers for".

Why shouldn't Vista have drivers for a three-year-old HP printer and scanner? It's not as if HP is a new kid on the block – it has been a key player for much longer than three years.

If Kelvyn has "followed Vista's development since the first 'Longhorn' alpha previews appeared in 2002", then this would amount to a period of four years. Microsoft should provide support for all the key vendors' hardware manufactured during this period. We all purchased hardware and software in good faith, and we all put up with the teething troubles during XP's launch and the subsequent hole-plugging since.

Vista's launch should not become an excuse for Microsoft or others to lose interest or stop driver updates in the hope that we will all rush out and invest in new hardware while existing equipment is still doing its job. Vista will be expensive enough as it is.
Keith Athersmith

Kelvyn Taylor replies: I should have explained that the problem lies at the door of the hardware manufacturers, not Microsoft.

The developer doesn't write any of the hardware drivers, but relies on vendors to provide these for incorporation into the operating system. With HP, there are a lot of supported printers in Vista, but HP appears to have been selective.

I understand that HP is expected to release more drivers in time for the retail release of Vista.

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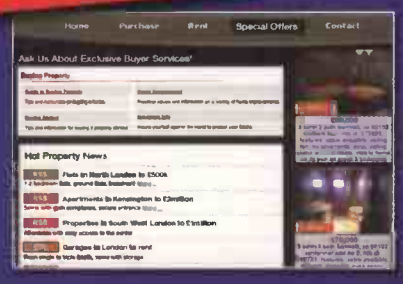

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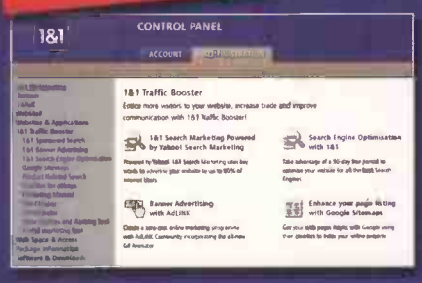

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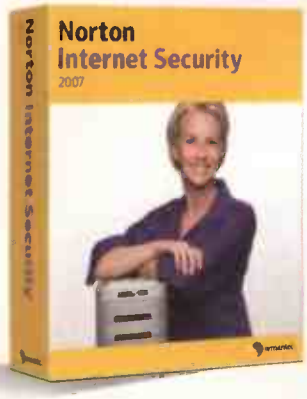

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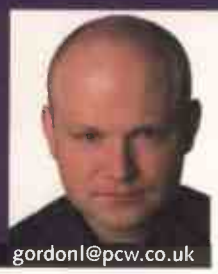

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Chomping at the 64-bit

Anyone who buys Vista will get to choose between the 32-bit and 64-bit version. So, will the 64-bit processor win hands down?

It's amazing to think it has been nearly four years since AMD introduced the 64-bit Opteron, with the Athlon 64 following only a few months later. Rather than developing a new 64-bit instruction set, AMD simply extended the existing x86 instructions and, bingo – you had a processor that ran existing 32-bit code with no problems, yet with the additional capability to support 64-bit operating systems.

Thanks to its decent 32-bit performance, the Athlon 64 soon became the processor of choice, with owners relaxing in the knowledge that it was also ready for 64-bit when they were. Some time later, Intel also adopted the same 64-bit extensions for its desktop processors (look for EMT64 in the specs) and now virtually every new PC has support for 64-bit operating systems.

So there are certainly plenty of 64-bit capable PCs out there, but what about the software? Apart from a handful of Linux and Windows XP Professional x64 installations, most of these 64-bit ready PCs are running 32-bit operating systems. But that could soon change.

'Vista will be the first version of Windows to include 64-bit versions from day one'

Vista will be the first version of Windows to include 64-bit versions from day one. There's no need to visit a special dealer, or even pay extra for 64-bit Vista either, as both it and the 32-bit versions come in the same retail box. Vista x64 is also available in the same Home, Home Premium, Business and Ultimate versions; indeed, everything apart from the Starter edition. In fact, I'd better stop calling it Vista x64 right now because it's such a part of the standard package, it doesn't even have its own name: it's just Vista.

So, for the first time, anyone who buys a copy of Vista will actually get to choose if they want to install the 32-bit or 64-bit version – assuming they have a 64-bit processor. This is great news for anyone who owns a 64-bit processor. At last they'll be able to exploit the full capabilities of their hardware with a mainstream OS. So, given the choice, you'd naturally install the 64-bit version, right? Not necessarily. The 64-bit version may run existing 32-bit applications, but the hardware needs special 64-bit drivers – and signed ones at that. Think of the number of times you've installed an unsigned driver under Windows XP and clicked the 'Continue Anyway' button. Not with 64-bit Vista you won't. You'll need proper, signed 64-bit drivers for all your hardware. And while major disk controllers, networking and graphics chipsets are supported, a great number of other devices are not – from printers and TV tuners to video capture devices.

But let's say you do have 64-bit drivers for all your hardware. The main reason you'd go for 64-bit Vista is support for more than 4GB of Ram. It's always good to break a ceiling, but not many motherboards are capable of supporting more than 4GB of Ram. Besides, the memory modules themselves are prohibitively expensive.

So the only people who should run 64-bit Vista are those with high-end motherboards with more than 4GB of Ram, and conservative hardware that is fully supported by 64-bit drivers. In short, high-performance workstations designed for applications such as Cad and video rendering.

To be fair to Microsoft, the PC industry is steadily moving towards 64-bit, and there will undoubtedly be better driver support along with more motherboards that can break 4GB, not to mention affordable memory. There'll also come a time when a killer application or game is only available in 64-bit, further driving its adoption. Who knows, maybe it'll only be a few years before we smile as fondly at the innocent days of 32-bit operating systems running with only 4GB as we do now at the 640KB days of Dos.

Today, though, while the latest Windows may be available in 64-bit, and you may have a 64-bit processor that can run it, I'd still recommend going for the 32-bit version for compatibility. After all, even in the unlikely event that all your devices have 64-bit drivers today, you may buy something in the future that doesn't.

Most system builders will install 32-bit Vista on new PCs, unless specifically instructed. The promise of a mainstream 64-bit OS running on a mainstream 64-bit processor may now be here, but most of us will remain 32-bit for a long while yet – including this traditionally early adopter. PCW

Barry Fox

barryf@pcw.co.uk

There's a fly in the HDMI ointment

Today's television sets are more sophisticated than ever, but HDMI compatibility issues are still a universal problem

Outspoken MD of Arcam, John Dawson, described the analogue Scart connector as "flawed brilliance" at a briefing in London recently to preach the digital connection gospel according to HDMI – popularly known as Digital Scart. Dawson warned the US company that licenses HDMI that the combination of HDMI with HDCP and AACS security encryption is equally flawed, but in different ways. "Security should be invisible," Dawson told Les Chard, president of HDMI licensing. But with HDMI it isn't.

The briefing was a curious event. We had to forcibly steer Les Chard away from clumsy demonstrations of a new 16-bit system called Deep Colour, which uses HDMI to deliver more colour than screens can deliver or the eye can see, and get him to talk about the more pressing issue of why some screens display nothing at all when connected by HDMI.

'Getting information on AACS is even more difficult than getting clarity from HDMI'

The compatibility issue had come to a head a few days earlier when US electronics retail chain Best Buy said that from Spring 2007 it would only stock products that have been tested for HDMI compatibility. Mike Vitelli, senior VP at Best Buy, has since blamed inconsistent implementation of HDMI for making it difficult for customers "to trust the standard".

As the London briefing created more confusion than it cleared we shouted Chard down when he came up with the old chestnut "it's all on our website". Under pressure he then reluctantly agreed to provide a plain English crib sheet on all things HDMI. I'm still waiting, so here's my own.

The French government passed a law decreeing that all TV sets sold in France after 1980 must have a 21-pin AV socket for easy connection. The standard was blessed by European body CENELEC and adopted throughout Europe.

The Scart (Syndicat de Constructeurs d'Appareils Radiorécepteurs et Téléviseurs) socket was a great idea for carrying all audio and video signals down a common lead, but it was spoiled by rotten, awful physical design. The pins in the plugs are not firmly anchored, so they slide back into the housing. And there is no locking device to hold a plug firmly into a socket.

Scart was never used in the US, and cannot handle digital signals. So HDMI (High-Definition Multimedia Interface) was developed by Intel's Silicon Image (along with Hitachi, Panasonic, Philips, Sony, Thomson/RCA and Toshiba).

HDCP encryption (High-Bandwidth Digital Content Protection) was later added by Intel, Silicon Image, Fox, Universal, Warner and Disney. HDCP stops users intercepting and copying HDMI signals as they travel from one piece of hardware to another. HDMI/HDCP works hand in glove with AACS (Advanced Access Content System) – the encryption system used by Blu-ray and HD-DVD. But so far blue laser players have been made under an interim licence.

The 'final adopter agreement', expected to take force during 2007, will add more security restrictions, such as Digital Only Tokens, that allow some programme material to be transported only by HDMI/HDCP, and Image Constraint Tokens that drastically reduce picture and sound quality sent to non-DMI/HDCP outputs.

Getting information on AACS is even more difficult than getting clarity from HDMI. After more than two years the News and Frequently Asked Questions sections of the AACS Licensing Authority website are still 'Coming Soon'.

In the UK, HDTV pictures from Sky satellite boxes would not show on Pioneer plasma screens. "The implementation of HDCP in some TV sets and set-top boxes, and the timing of the two-way communication, is not 100 per cent compatible," said box-maker Thomson. "HDCP was not part of the compliance testing of HDMI." Pioneer has had to offer a free repair service, while Sky told viewers how to bypass HDCP by using analogue!

HDMI/HDCP testing will be done by Simplay Labs, a subsidiary of Silicon Image. "We are definitely up to the challenge," assures Simplay.

The first HDMI standard was set in 2002, and it has taken until 2007 to get compatibility testing up and running. So here's another challenge for Simplay. Try putting together the words 'pig' and 'ear'. PCW

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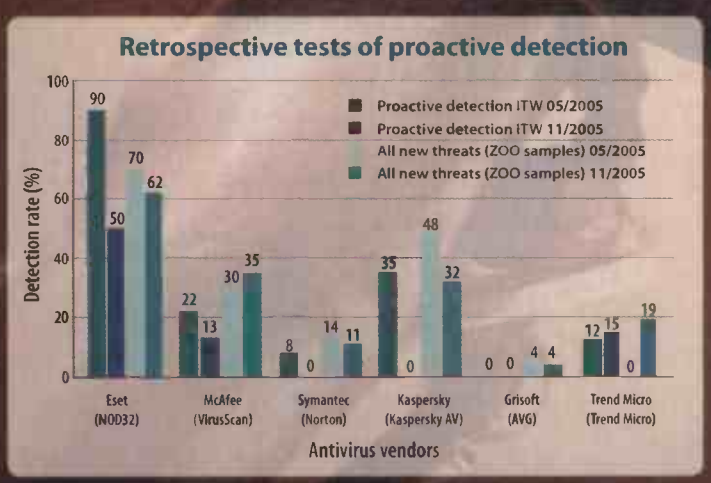

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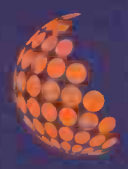

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Guy Kewney

guykewney@gmail.com

Remember: backup is not archive

When it's time to free up some space on your hard drive, remember the key word is archive, not backup

Imagine you're sitting at your PC and suddenly realise that you're running out of disk space. You'll need to delete some files, but don't want to lose them forever. What should you do? Most people would say, "Back up your files!"

You think so, too? Well think again. Recently, one of my colleagues – who should have known better, I might add – did just that. He used a website that allows 2GB of free online backup, and for an astonishingly small fee will allow you to back up your entire hard disk onto its servers.

My colleague decided that this was the way to go. "You don't want to use local CDs," he explained, "because they'll get destroyed in the fire if your main PC gets burned up!" So he went onto the internet and prepared to back up his hard disk. But two nasty surprises awaited him as he pressed 'Go' and sat back.

'You can download at 8Mbits/sec, but backup over the net is uploading, not downloading'

The first was the discovery that this was going to be one of those Scott of the Antarctic moments. "I may be some time," said Captain Oates, as he walked out of the tent to his death. My friend should have done the arithmetic.

Today's typical £500 PC will rarely have less than 80GB of disk storage, and it might even have 250GB or more. No doubt when my friend bought his machine he thought he'd never fill up a disk that big.

But after spending several months on allofmp3.com and downloading from his 8-megapixel camera, and saving clips from YouTube.com, and using his PC as a personal digital video recorder, he was on the brink.

Your ADSL line runs at about 512Kbits/sec upload speed – if you're lucky. It's more likely to be half that, or even less, if you're on a budget service. Yes, you can download at 8Mbits/sec, maybe even 10Mbits/sec, but backup over the internet is uploading, not downloading.

Here's the arithmetic. An upload speed of 256Kbits/sec means 32Kbytes/sec (1 byte = 8 bits, of course). That's a megabyte (1,024Kbytes) every 32 seconds. How many megabytes in a gigabyte? Yes – you're looking at (for a hard drive maker's gigabyte of 1,000MB) 32,000 seconds per GB. So for 80GB, that's 2,560,000 seconds. And 250GB is 8,000,000 seconds.

In minutes, the number is 133,333, which won't allow you to watch the progress bar while the data is backed up and still get down for supper. In fact, the 2,222 hour-long transfer will see you starve: it's actually 92.5 days.

My friend soon realised this and speedily cancelled the transfer. He went through the menu, selecting 'Urgent' and 'Important' files to back up. He selected only 5GB. Still, two days? "That can't be right!" he said. "I downloaded 5GB of Windows Vista in just an afternoon! Oh... right... that was downloading."

Two days later, it still wasn't done. Some of his fellow internet users had been uploading things, too; file sharing, Bit Torrent – that sort of thing. Contention on the line. But all things come to those who wait – and by the following weekend, it was done.

With a sigh of relief, he deleted the files, freeing up some space. He also deleted a few other files, less important ones that didn't need to be backed up, and got about his business. A month later, he realised he needed one of those deleted files after all and went to the internet backup site. He searched and searched for the files, but they were gone.

A very little investigation produced the following response from the internet backup operator: "Yes, that's the way we work. We keep backups of files on your disk. If you delete them, then you have a week to change your mind, and then we delete them too."

My colleague was absolutely furious. Fortunately, he'd had the sense enough to take the precaution of writing a DVD with the contents of those files, and so managed to avert a complete tragedy. But when he rang me to say: "You'll get a good story out of this, Guy!" I had to disappoint him.

"Robert," I said, sadly, "you're making a very simple mistake. You don't want a backup service. You want an archive service!" You will remember the difference, won't you? PCW

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The Memory Experts℠ at Crucial have the answers.

When you compare Crucial's outstanding quality, superior support, and innovative tools to our competitors, it's easy to see why our customers consistently praise their buying experience.

In 2005, Computeractive readers nominated Crucial as a "Best PC Accessory Company", and PC PRO magazine readers voted Crucial as "Online Vendor of the Year" in both 2003 and 2004.

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PCW Awards 2006

The results are in, and PCW's 2006 Awards are sure to impress. Here we tip our hats to some old faves, and a few newcomers as well

A quarter of a century after IBM unveiled the PC, we now have far more computing and electronic equipment in our homes than most of us would have dreamt possible back then, performing far more complex tasks and becoming an increasingly important part of our lives.

Over the past year in *PCW*, we've seen a huge range of new products – from sat nav to gaming systems and project management to super-charged PCs. Many of them have been excellent, and some have been downright revolutionary. While the world of computing may have changed, however, *PCW* is still bringing you hundreds of detailed reviews each year – just as it has done since its inception in 1978.

Starting on page 40, you can find out what our editorial team thinks were the most significant products of 2006, together with a look at the nominees, covering seven different categories, including an overall award for the *PCW* Product of the Year.

We've also been asking for your own opinions, accepting nominations from readers in 18 different categories, including stores, service suppliers, and hardware for both the PC and the digital home. We asked you to nominate your winners and state your reasons why. While some races were a close finish, in others the winners stand head and shoulders above the competition. And, in some cases, the results may well surprise you.

We'd like to congratulate all the winners and nominees, including those readers who have won a prize in our prize draw (see page 47 for a list of winners). Finally, we'd also like to thank all those readers who took the time to register their votes – your feedback is greatly valued by *PCW* and the industry.

To quote *Time* magazine, 2006 was the Year of You, so let's kick off with your awards, and find out which products and companies you've voted for as the best of 2006.

Desktop PCs

Dell
www.dell.co.uk

Overwhelmingly, the reason most *PCW* readers voted for Dell was value for money, and the company gained around three times as many recommendations as the nominees. Among other reasons cited were the quality of the systems, providing great performance, and the ease and speed with which complex customised orders can be delivered. Rather than being built down to a price, the systems are well specified and reliable. The company's reputation as a well-known global player was also important to many of our readers. As one reader said: "The name itself gives quality assurance."

Nominees
Mesh – www.meshcomputers.com
Evesham – www.evesham.com

Notebook PCs

Dell
www.dell.co.uk

With more users choosing a laptop, thanks to wireless networking in the home and office, competition in this part of the market has become keen. Prices have dropped to levels that would have been unthinkable a few years ago, while performance has increased dramatically. As with the desktop PC category, many of you chose Dell for its value for money, which is not that surprising with a range that starts at under £350. Technical excellence was also high on the list, with powerful desktop replacements also popular among readers, and ultra-portable models for those who spend their lives on the road.

Nominees
Sony – www.sony.co.uk
Acer – www.acer.co.uk

Digital cameras

Canon
www.canon.co.uk

With a wide range of cameras, from entry-level compact models you can just point and click, to the high-end EOS digital SLRs, Canon was rated far higher than any other manufacturer, with many readers commenting on the quality of the images from its cameras. Technical excellence was the overwhelming reason for choosing Canon, with robust build and quality lenses, along with ease of use and the availability a range of advanced features when you need them. "I'll never buy another brand," said one reader. Others expressed similar sentiments, saying that Canon's loyal following is testament to the quality of its range.

Nominees
Fujfilm – www.fujifilm.co.uk
Sony – www.sony.co.uk

Digital home entertainment

Sony
www.sony.co.uk

In a wide-ranging category, there were nominations for many companies covering hifi, video and other equipment, but Sony stands head and shoulders above the crowd by a large margin of votes. It's popular with *PCW* readers, chiefly for two reasons – the style and design of the products, and technical excellence. For many, these two come together in the Bravia range of flat-screen televisions, which received particular praise from several readers and are likely to come into their own even more, thanks to the increasing amounts of high-definition material likely to be available in 2007.

Nominees
Panasonic – www.panasonic.co.uk
Philips – www.philips.co.uk

Sat nav

Tom Tom
www.tomtom.com

Tom Tom's navigation products have won several *PCW* editorial awards in the past, and our readers seem to agree with our judgments. The Dutch company received almost five times as many votes as the nearest competitor. And – almost uniquely – the reasons for choosing Tom Tom were split fairly evenly between the four criteria that you could vote for. Ease of use was cited by many readers as an area where Tom Tom excels, together with the simple fact that "it just gets you there". With a range of sat navs to suit most pockets, and thoughtful design that's straightforward to use, Tom Tom is a deserving winner.

Nominees
Garmin – www.garmin.com/uk
Navman – www.navman.com

Graphics cards

XFX
www.xfxforce.com

With high-powered graphics needed for the latest games and multimedia, this was one of the most closely fought categories in the Reader Awards, with the nominees neck and neck, and XFX only just edging into the winning position. The company's range of high-end, high-performance Nvidia-based graphics cards is popular with *PCW* readers eager to get as much out of their systems as possible. But it's not just technical excellence and performance that made XFX come out on top. Many cited value for money, with the XFX range providing some of the most competitive Nvidia solutions around.

Nominees
Asus – http://uk.asus.com
Sapphire – www.sapphiretech.com/uk

Hard drives

Seagate
www.seagate.com

As more of our information is stored digitally, we need somewhere safe to keep it. Winning this category based on technical excellence and value for money, many readers commented on the reliability of Seagate disk drives, saying: "They just go on and on." But reliability isn't the only reason why so many voted for Seagate. The innovation it has brought to the storage market was just as important, particularly in the Barracuda 7200.10 – the first drives to use perpendicular recording, boosting the capacity of 3.5in disks to 750GB.

Nominees
Western Digital – www.westerndigital.com
Maxtor – www.maxtor.com

Inkjet printers

Epson
www.epson.co.uk

Inkjet printers are popular for printing out digital photographs and, by a large margin, Epson was the choice of *PCW* readers, citing both technical excellence and value for money as key reasons. Running an inkjet isn't always cheap, and another reason why it was voted in was the use of separate colour cartridges and the wide availability of third-party refills for Epson printers, both helping to keep the cost of ownership low. With a range that spans portable photo printers, desktop workhorses and large format printers, Epson has an inkjet for just about every need.

Nominees
HP – www.hp.co.uk
Canon – www.canon.co.uk

Broadband ISP

BT
www.bt.com/broadband

With hundreds of broadband suppliers in the country, there's lots of choice for anyone wanting to connect, but it seems BT is still the best choice for many *PCW* readers. With its large customer support operation and some new options, such as the Home Hub and BT Vision, the broadband service undoubtedly also attracts a lot of users because it comes from the default phone company for many in the UK. It's not the cheapest broadband available, but for many of the readers who voted for BT, reliability is important, with many citing technical excellence as the main reason for their choice.

Nominees
NTL – http://home.ntl.com
Telewest – www.telewest.co.uk

Laser printers

HP
www.hp.co.uk

The original HP Laserjet was one of the first laser printers available, and that's probably partly responsible for HP's position in our reader poll. None of the competition came anywhere close. Thanks to its early lead in the market, the Laserjet is still the printer with which others have to be compatible. With a wide range of both colour and mono laser printers, from budget models to sophisticated business printers with advanced paper handling and network options, HP provides value for money and technical excellence in equal measure.

Nominees
Epson – www.epson.co.uk
Brother – www.brother.co.uk

Memory

Crucial
www.crucial.com/uk

With huge files and hungry apps, high-performance memory is vital to system performance, especially if you're a keen overclocker. From standard memory to the Ballistix memory often used in *PCW's* Hands On Performance column, Crucial offers a vast range. Readers voted for the company by a margin of almost 2:1 over the nearest competitor in this category. Price and customer service were important factors in its success, as too was Crucial's website memory selector, mentioned by many readers, which makes it easy to find the memory chips to match any system.

Nominees
Corsair – www.corsair.com
Kingston – www.kingston.com

Monitors

Iiyama
www.iiyama.co.uk

In one of the most closely fought categories of the Reader Awards, Iiyama just crept in ahead of the nearest runner up. As one reader said, "You just can't beat these monitors." With extremely fast response times, the company's latest flat panels are popular with gamers, and the range also includes low-power models and others optimised for colour-sensitive tasks such as DTP. While technical excellence is the reason for most of Iiyama's votes, readers also felt the products represented good value for money and rated product design and styling quite highly.

Nominees
Samsung – www.samsung.com/uk
Dell – www.dell.co.uk

Motherboards

Asus
http://uk.asus.com

As with the memory category, this section of the Readers' awards was one where the winner scored a huge amount more than any of its nearest competitors. Overwhelmingly, you chose technical excellence as the reason to vote for Asus, with many commenting not only on how well its boards cater to the enthusiast and overclocker, but also on the stability of systems built around Asus motherboards. The broad range was praised, as was the company's combination of innovation, reliability and reasonable pricing. With good support, too, it's no surprise that so many of you voted Asus the best supplier of PC motherboards.

Nominees
Gigabyte – www.giga-byte.co.uk
MSI – www.msicomputer.co.uk

Multifunction printers

HP
www.hp.co.uk

For an increasing number of people, a multifunction device combining printing and scanning is a vital space saver. With its strong showing in the printer category, it's not too surprising that HP won this category, though the runners up were much closer behind. Again, you praised the technical excellence of the products, from a range that includes inkjet and laser-based products, both standalone and networked. As with laser printers, HP's reliability is an important factor for many readers. Product design rated highly, too, in an area where compromise is often inevitable.

Nominees
Epson – www.epson.co.uk
Canon – www.canon.co.uk

Networking equipment

Netgear
www.netgear.co.uk

Largely thanks to broadband, networking has moved out of the corporate realm and into homes and small businesses. In voting for Netgear in this category, one of the comments that many users made was that its equipment is easy to set up, even for novice users – something that's particularly important for security. The company's wide range of products cover just about every networking need for the home and small business – from broadband access to VoIP and Wifi. In casting their votes, *PCW* readers praised Netgear in almost equal measure for technical excellence, style and value for money.

Nominees
Belkin – www.belkin.com/uk
Linksys – www.linksys.com/uk

Online retailer

Scan
www.scan.co.uk

Bolton-based Scan was rated highly by many *PCW* readers, particularly in the areas of value for money and after-sales support and service. Indeed, one reader said he simply couldn't find enough superlatives to use about the company. While some online firms make it hard to contact them, and even harder to deal with problems that arise, Scan seems to engage with its customers: it openly displays both praise and criticism on its website. With a well laid out site and a good range of products, it provides a model that many other online sellers would do well to emulate.

Nominees
Amazon – www.amazon.co.uk
Dabs – www.dabs.com

PDA/smartphones

HP
www.hp.co.uk

Winning its third category in the reader votes, HP's PDAs were chosen by more readers than any others, thanks to the popularity of the iPaq series. With a range that includes both ordinary Pocket PCs and smartphone devices running Windows Mobile, HP caters to a wide range of needs. Readers rated technical excellence highly, along with design and style – something that's particularly important when you're carrying a device around. This was a closely run category. It's worth noting that if smartphones were the only entry, the result may well have been different.

Nominees
Nokia – www.nokia.co.uk
Sony-Ericsson – www.sony ericsson.com

Portable entertainment

Apple
www.apple.com/uk

While some pundits may say it's looking long in the tooth and faces serious competition from the likes of Zune, the iPod has once again given Apple a thumping victory over the competition, according to reader votes, scoring nearly double that of the nearest nominees. As you'd expect, an overwhelming number of people gave product design and style as the reason for their vote. However, it also scored well on technical excellence, thanks to Apple's continual updating of the basic design. As one reader commented, the iPod proves you can be both good and attractive.

Nominees
Sony – www.sony.co.uk
Creative – http://uk.europe.creative.com

the biggest brands at low low prices

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WAS £938.00
NOW £875.00
SAVE OVER £60!!

Sony Vaio C1S/G Core 2 Duo T5500 (Natura Green)

£874.99 inc vat
(£744.68 ex vat)
quicklinx 49JBPW

buy now pay Oct'07

Your Style, Your Colour, Your VAIO...

- Intel Core 2 Duo processor
- DVD±RW (+R double layer)
- Microsoft Windows XP Media Centre
- Vista Premium Ready
- 100GB hard disk drive
- 128 MB Memory
- 13.3" widescreen X-black LCD

SONY

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- Resolution: 1280 x 1024
- Pixel Pitch: 0.264 mm
- Brightness: 300cd/m2
- Contrast Ratio: 500:1
- Viewing Angle: 140°(H) 130°(V)

HP L1706 17" LCD Display

£109.99 inc vat (£93.61 ex vat)
quicklinx 3VB5PW

- Response Time: 8ms
- Resolution: 1280 x 1024
- Pixel Pitch: 0.264 mm
- Brightness: 300cd/m2
- Contrast Ratio: 500:1
- Viewing Angle: 140°(H) 130°(V)

DabsValue 17" TFT LCD

£98.99 inc vat (£84.25 ex vat)
quicklinx 4412PW
customer rating

- Response Time: 12ms
- Resolution: 1280 x 1024
- Pixel Pitch: 0.264 mm
- Brightness: 300cd/m2
- Contrast Ratio: 700:1
- DVI Input

HannsG JC171DP 17" TFT DVI

£99.99 inc vat (£85.10 ex vat)
quicklinx 4C9NPW
customer rating

- Sempron 3400+ mobile technology
- 512MB Memory
- 120GB HDD
- 17" WXGA Display
- DVD±RW
- XPMediaCentre

Acer Aspire Sempron3400+

£479.98 inc vat (£408.50 ex vat)
quicklinx 4CFKPW

buy now pay Oct'07

- Turion 64 X2 mobile technology
- 1024MB Memory
- 120GB HDD
- 14.1" TFT Display
- DVD±R (+R double layer)
- XPMediaCentre

HP Pavilion dv2104eu

£599.99 inc vat (£510.63 ex vat)
quicklinx 49CZPW

buy now pay Oct'07

- 6.3 Megapixel
- Shoot at up to ISO 3200 equivalent
- 3x optical zoom lens
- XD-Picture Card
- 2.5" LCD screen

Fuji FinePix F31 fd Digital Camera

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(£174.74 ex vat)
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40 FREE Prints
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snapfish

- Now you can use your iPod, PDA, MP3, CD, cassette player, PC, or laptop to listen to your favourite tunes through any FM stereo receiver.

Belkin Tunecast II FM Transmitter

£14.99 inc vat (£12.76 ex vat)
quicklinx 43TYPW

- Simple, cost effective storage
- Very easy-to-use and preformatted for simple set up – just plug and play

Iomega 320GB USB2 7200rpm

£74.98 inc vat (£63.82 ex vat)
quicklinx 45JHPW
customer rating

- 25ppm Mono
- 18ppm Colour
- Hi-Speed USB
- 4800 x 1200 dpi
- Pictbridge
- PC & Mac compatible

Lexmark X5470

£57.11 inc vat (£48.61 ex vat)
quicklinx 49F6PW
customer rating

where people in the know go

Prices exclude delivery and are subject to change without notice. E&OE. Check www.dabs.com for latest prices.

dabs.com

Product of the year

Intel

Core microarchitecture

www.pcw.co.uk/2163672
www.intel.com

While PCs have carried on getting faster over the past few years, it has been done in the old-fashioned way – just by turning up the speed.

With the new Core architecture – the basis of Intel's new generation of x86 processors – innovation is back in fashion. Intel's latest generation of chips provides a radical update, capable of outperforming older ones while using less power and running at lower clock speeds. It's one of the most significant changes to the PC since the introduction of the Pentium over a decade ago.

The new microarchitecture is about more than just a better power/performance ratio, too. While the first generation of Core 2 Duo processors have, in effect, two processors on a chip, they pave the way for systems with even more cores in the future, pushing the boundaries of performance even further. Portable computing – and the planet – will benefit as well, thanks to the smart power management built into the chips.

Thanks to the new chips, *PCW's* labs have this year seen their fastest PC ever, and we're confident there's much more to come. So, for a combination of engineering excellence, outstanding performance and innovation, the Core microarchitecture is, rightly, the *PCW* Product of the year 2006.

Business product of the year

VMware Server

www.pcw.co.uk/2153904
www.vmware.com

VMware Server is – amazingly – a free product. It allows you to create virtual servers on a Linux or Windows host. With its simple setup and wizard-based configuration, plus a selection of pre-built virtual servers available as complementary downloads, VMware can potentially save your business lots of time and money.

Whether you simply want to allow more efficient use of your hardware, or test configurations and software changes without impacting a live system, it's a stable and flexible solution, with few limitations – you can even run full-scale production systems. With so much on offer, and free, it's the obvious choice for our Business product of the year.

Nominee

Mamut Enterprise E5

www.pcw.co.uk/2170610
www.mamut.com/uk

MAMUT mamut.com
Personal Computer World NOMINEE AWARDS 2006

Mamut Enterprise E5 provides a complete business management solution for small and medium-size businesses, covering accounts, payroll, stock, HR and customer management. It packs all this in, without breaking the bank, offering smaller firms the sort of integrated management tools that were previously the preserve of much larger and expensive packages such as SAP.

Best desktop PC

Chillblast

Fusion Hardcore Crossfire

www.pcw.co.uk/2160510
www.chillblast.com

Still top of our performance tables several months after its review, Chillblast's Fusion Hardcore Crossfire is based on an overclocked Core 2 Duo E6700 chip and scored a whopping 424 in Sysmark 2004 SE, 7,930 in PCmark05 and 17,388 in 3Dmark05. Optimised for gaming, with 2GB of memory and twin ATI X1900 graphics cards in a Crossfire configuration, there's plenty of storage and connectivity, with 474GB of disk space and support for external Sata drives, together with Gigabit Ethernet, wireless, USB, floppy drive, card reader and Firewire. Solidly built and well specified, we've still yet to see a faster computer in *PCW's* labs.

Personal Computer World WINNER AWARDS 2006

Personal Computer World NOMINEE AWARDS 2006

Nominee

Hi-Grade Ultis Tachyon

www.pcw.co.uk/2167786
www.higrade.com

Hi-Grade's Ultis Tachyon provided another strong showing for new technology in the shape of Intel's Core 2 Quad processor – the QX6700. The biggest drawback is that it draws a huge amount of power compared with others, and some apps aren't ready for four cores.

Best notebook PC

Samsung

Q1

Personal Computer World WINNER AWARDS 2006

www.pcw.co.uk/2155011
www.samsung.co.uk

According to some, Samsung's Q1, the first Microsoft 'Origami' Ultra-Mobile PC (UMPC), doesn't even qualify to be in this category, while others think it's the first of a new breed of machine that will revolutionise mobile computing as we know it. With an on-screen keyboard and handwriting recognition, built-in microphones for speech recognition and VoIP, and only a 7in screen, it's certainly a departure from traditional mobile computing. But only time will tell whether Samsung's Q1 is destined to be recorded in history as a bold innovation or a white elephant. None the less, the technological excellence and research behind the Samsung Q1 certainly make it a worthy winner of this year's award.

Personal Computer World NOMINEE AWARDS 2006

Nominee

Lenovo Thinkpad X60

www.pcw.co.uk/2155329
www.lenovo.com/uk

With its remarkable battery life, Lenovo's Thinkpad X60 is one of the few laptops you really could use all day without needing to cart around a charger. Combined with respectable performance and a fingerprint scanner, this is a reliable workhorse for those who value function rather than style.

Best component

Intel

Core 2 Duo E6700

www.pcw.co.uk/2160312
www.intel.com

Released in the summer of 2006, Intel's Core 2 Duo E6700 manages some remarkable feats. Compared with previous generations, it manages to drop both clock speed and power consumption, while still offering a performance boost. Much of this is due to the radical new Core microarchitecture, which brings better power management, smarter memory access, a cache that's dynamically shared between the two cores, and the ability to process four instructions at a time.

With 4MB of L2 cache and a high-speed Front Side Bus, the E6700 is streets ahead of its rivals, beaten only by Intel's own Extreme versions of the Core 2.

Nominee

ATI Radeon X1900

www.pcw.co.uk/2149098
http://ati.amd.com

Reviewed at the beginning of 2006, ATI's Radeon X1900 provided extraordinary performance then, and still does now, performing well against rival products and providing great value for money. With realistic picture quality thanks to Adaptive Anti-Aliasing and Parallax Occlusion Mapping, this is still one of the best single GPU graphics cards around.

Best peripheral

Sling Media

Slingbox

www.pcw.co.uk/2164071
http://uk.slingmedia.com

Being away from home doesn't mean you have to miss your favourite TV programmes anymore. Sling Media's Slingbox hooks up to your satellite, cable or Freeview receiver, allowing you to control it via your broadband connection. Not only that, it provides an on-screen remote control that mimics your receiver's real one – so no more worries about forgetting to set timers – and streams the picture to you wherever you are. Picture quality may not be perfect, but it's simple to set up and works well, even with the limited upload speed of most domestic broadband connections.

Nominee

Dell 3007WFP

www.pcw.co.uk/2154389
www.dell.co.uk

With a maximum resolution of 2,560x1,600, this 30in widescreen, flat-panel monitor is beyond high definition. Dell's 3007WFP provides a massive desktop and plenty of space for working with large design documents, video editing or gaming. You'll need a very serious graphics card to make the most of it, but at £1,500, this is a great buy.

Best software

Mozilla
Firefox 2

www.pcw.co.uk/2164538
www.mozilla.com

Mozilla Firefox has been one of the great free software success stories of recent years, garnering plenty of praise and earning a reputation as an advanced and stable browser. Even if you don't use Firefox yourself, it has arguably been responsible for some of the long-overdue changes to Internet Explorer. The second release doesn't offer dramatic changes to the features, but there's plenty that's new under the hood and a better installer for Windows. With improvements to tabbed browsing and bookmarks, plus automatic phishing protection and less bloat than Internet Explorer, Firefox 2 is a worthy successor to the original.

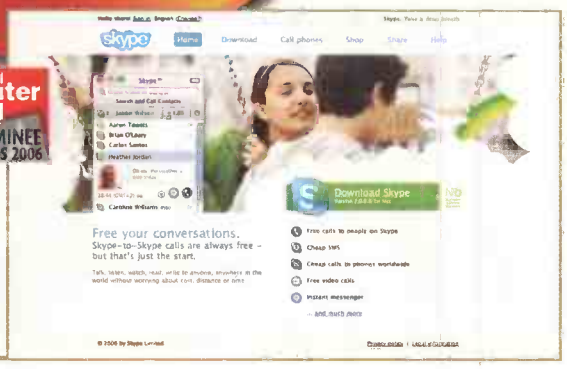
Personal Computer World WINNER AWARDS 2006

Nominee

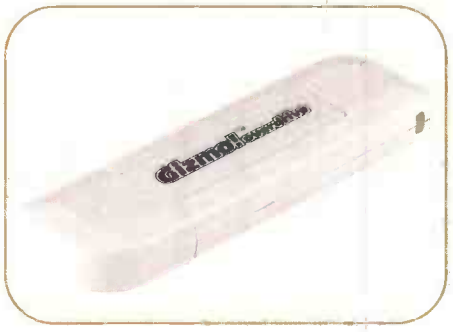
Skype 2

www.pcw.co.uk/2149080
www.skype.com

Skype made free internet telephony accessible to a non-technical audience, with much easier setup than competing systems. Skype 2 adds video, previously the domain of IM software. It outperforms rivals and is a real winner.



PRIZE DRAW WINNERS



Congratulations to all the following *PCW* readers who've won one of our great prizes.

First prize

Shuttle XPC G5 8300H PC and monitor:
Stephen Bennet

Runners up

Tiscali ADSL Max broadband package:
Jim Howard

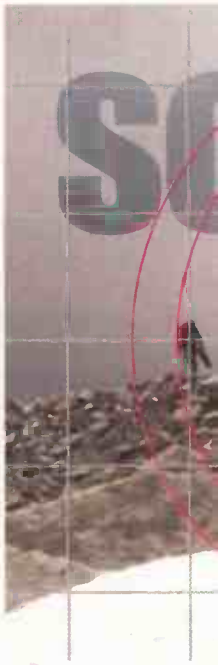
tiscali.
INTERNET WITH A PASSION.

Crucial 2GB Ballistix memory kit:
David Nisbet

Crucial 2GB Gizmo USB drive:
Pete Gibson
Chris Smith
Luke Massey
Ali McMorran
John Spittal
John Joyce
Christopher Robinson
Bob Fearnley
Kelly Varley
Billy Hannant

PCW on CD-Rom:
Paul Tomlinson
Clayton Scarrott
Barry Leigh
Judith Evans
Tom Crisp
Michael Cairns
Luke Massey
Michelle Cowley
Gary Edwards
Steve Hammatt

Sensational soundtracks



It's not that difficult to capture and create the perfect soundtracks on your PC. Karl Foster explains the ins and outs, from software to mixing

Whether you're creating a video, presentation or podcast, with well-balanced audio your production will engage an audience rather than force them to cover their ears. Far too many productions are blighted by noise, poor tone and a lacklustre score. Yet it only takes a little thought and effort to create sound that excites. You don't need composers, studios or voiceover artists – the computer, some specialist technology and tips on technique, along with your own sensibilities, will do the trick.

If you haven't got a musical bone in your body, but your production demands a tune, there are ways to sort it. And if the sound of your recorded voice makes you cringe, that's easily rectified, too. With a compelling tale to tell, you're most of the way there, so let's look at how to ensure a production's soundtrack truly completes the piece.

There are extras to buy, but they need not cost a lot, and some pro-studio advice to take in, although it's largely common sense. We'll start by looking at voice narratives for video and podcasts, moving on to movies and music later, so keep your ears fresh, be critical of your work, and stay receptive to the practices of professional producers.

Loud and clear

Quality capture of the human voice is crucial to success. Everybody has a voice and so the audience is sensitised towards it. Timbre varies, but whomever the speaker, the idea is to record what is spoken or sung as cleanly and as fully as possible. The first instinct is to plug a microphone into your soundcard's mic socket, hold it in front of your mouth, hit Record and start waffling. But you'll end up with a thin, noisy recording because the tools and technique are not right for the job.

When system sound won't hack it, use a quality Firewire audio interface such as the Yamaha GO46

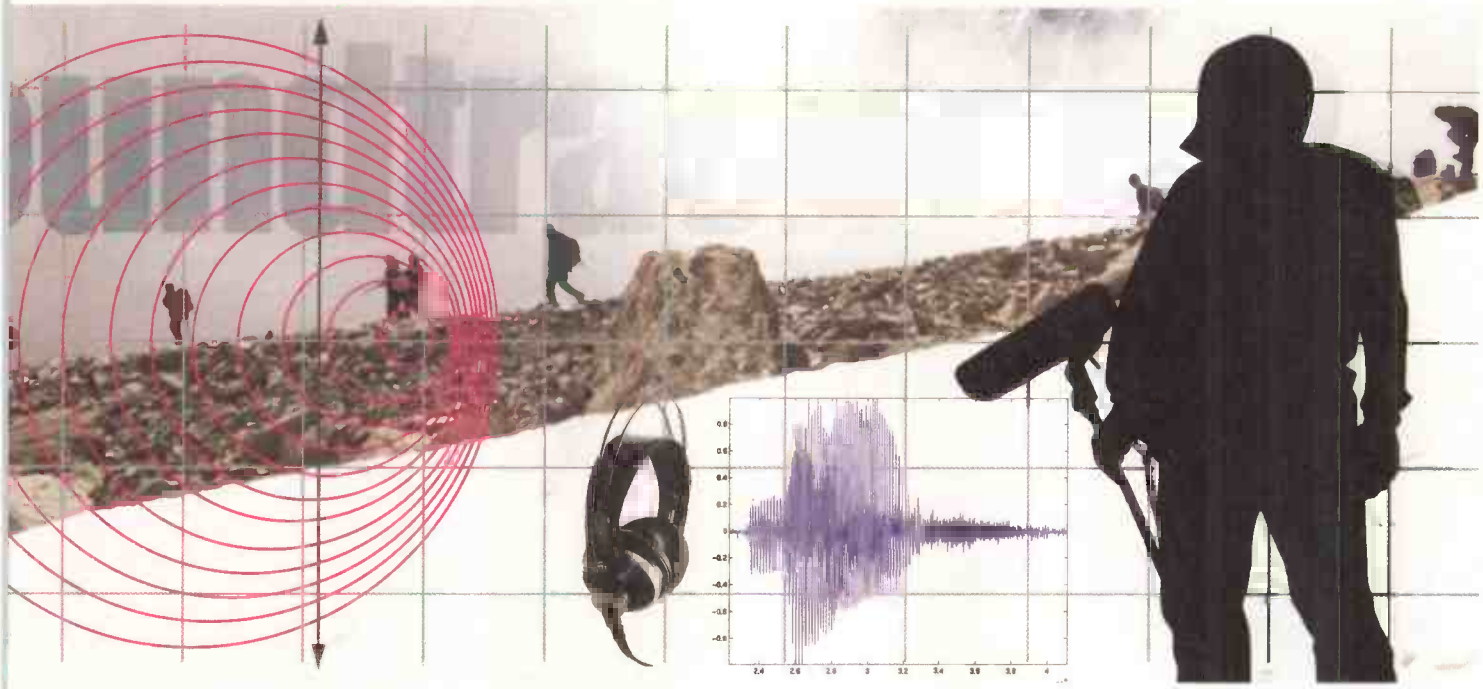
Soundcards are useless for our purposes. Not only does re-plugging mean scrabbling around at the back of the PC, but also soundcard sockets provide a very small, easily tarnished, contact patch that can create distortion of the audio signal. Most importantly, however, the connections are unbalanced. A microphone cable makes an efficient aerial and so the electromagnetic interference pumping out of your computer setup will be received, recorded and then amplified into a take-ruining buzz. It's better, then, to use an external desktop audio interface with balanced connections. The sockets will be more accessible and, used with balanced cables, noise at the pre-amplification stage will be less of a worry.

Yamaha (**www.yamaha-europe.com**) has recently unveiled a portable hardware audio interface – the £279 GO46 – which not only has impressive analogue-to-digital conversion specs and balanced connectors, but also links to your computer via Firewire, so it can be cabled up and placed within easy reach. There are USB2 interfaces that do the same job, but you'll not be able to daisy-chain them should you wish to expand. See Edirol (**www.edirol.co.uk**), M-Audio (**www.m-audio.co.uk**) and Echo (**www.echoaudio.com**) for more interface options. Whatever you choose, make sure it has XLR sockets (the name for the standard three-pin round connectors used for microphones) and phantom power (a way of powering a mic via its signal cables) so you can use the right type of microphone.

Taking the mic

You're probably familiar with the 1/4-in or 6.3mm jack plug that's used to connect electric guitars and dynamic microphones to preamplifiers. In studio circles, you'll find that microphones hook up via three-pin XLR connectors, one of two types of balanced connector. There's also the tip/ring/sleeve (TRS) type, which looks like a stereo headphone jack, but the XLR connector is used to deliver power to active microphones called condensers. Passive mics, such as those bundled with multimedia PCs or used by singers on stage, generate an electrical signal mechanically and are not very sensitive. Condenser mics work by modifying an existing voltage (48V phantom power) and are much more sensitive, capturing a wider tonal range, thus making your voice sound rich and natural.

With such sensitivity, however, comes a downside. The human body makes sound other than speech. Breathing is a major problem, while certain other noises can mess with people's minds if heard through in-ear headphones. Then there's mechanical noise from handling or other sources. To counter the latter, invest in a boom-arm microphone stand, such as Quiklok's (**www.quiklok.com**), or one from a major mic manufacturer. This will enable you to position the microphone without having to resort to a desk stand. And ensure you get a cradle with the mic; it's a unit that supports the microphone's barrel



via bungee cords for further mechanical damping. An AKG Perception 200 (**www.akg.com**) with a cradle and stand, for example, costs less than £150, and there are other good condenser mics available from Sennheiser (**www.sennheiser.co.uk**), Beyer Dynamic (**www.beyerdynamic.co.uk**), Audio-Technica (**www.audio-technica.com**) and Rode (**www.rode.com.au**).

A popular technique for reducing noise from breath is to invert the mic and suspend it opposite the bridge of your nose, where it's out of the path of mouth and nostrils. Otherwise, a windshield (also known as a pop shield or pop filter), such as Shure's PS-6 popper stopper (**www.shure.co.uk**), can be clamped to the stand, its cloth diaphragm reducing the pickup of vocal 'plosives'.

Moving the mic further away from the body helps limit other body-generated sounds, but that means turning up the recording level.

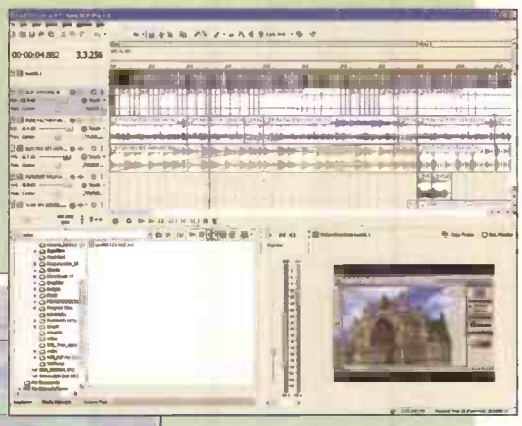
Environmental concerns

So far, we've a condenser mic, suitably positioned and suspended, plugged into a phantom-powered XLR socket on the audio interface and the digital signal is being fed

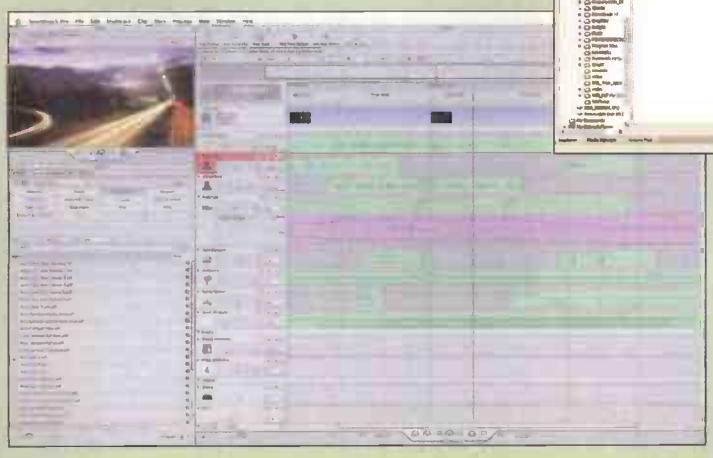
Sound software

Most video-editing packages have reasonable audio capabilities and, for simple soundtracks, could be all you need. However, if you want more sophistication, you should consider a dedicated audio sequencing package. There are the big audio/Midi music production suites, such as Logic Pro 7.2 (**www.apple.com/uk**), Cubase 4 (**www.steinberg.net**) and Pro Tools 7.3 (**www.digidesign.com**), but audio-only podcasts merely require a simple audio recorder/editor, while audio for video can be arranged on a modest software budget.

Excellent sub-£100 editors include Wavelab Essential (**www.steinberg.net**) and Sound Forge Audio Studio 8 (**www.sonymediasoftware.com**) for the PC, and Peak LE 5 (**www.bias-inc.com**) for the Mac. And if you've no budget at all, there's the free open-source Audacity (**http://audacity.sourceforge.net**) for both platforms, plus Linux. Managing multiple tracks of audio, the elements of which must be tightly matched to video, is best managed with software orientated more towards arranging sound clips than Midi data. Those accustomed to Sony's Vegas video-editing software will find Acid Pro 6's environment very familiar (this costs less than £300).



Right: Acid Pro 6 is a multitrack audio sequencer with video preview. It's ideal for soundtrack creation



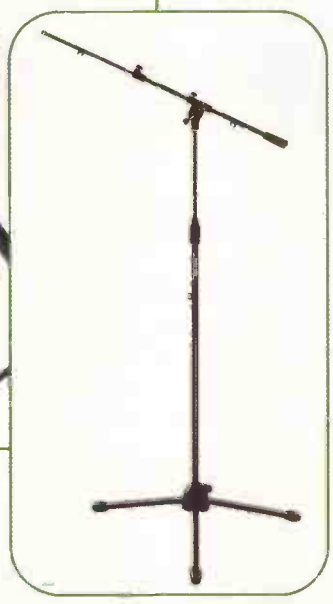
Left: Soundtrack Pro has powerful tools for authoring complex soundtracks

Adobe (**www.adobe.co.uk**) supports Premiere with Audition 2.0 at £287.88, while Mac users with Final Cut Pro can upgrade to the Studio edition, which features Soundtrack Pro. Each package shows a preview of the video footage, making it easy to drop in music clips, sound effects and dialogue bang on cue, apply audio processing and output high-resolution audio files that match the action perfectly.

into your audio recording or video-editing software (see box 'Sound software' on the previous page). The mic connection is balanced, so there's no interference, and the digital link and computer system are reasonably quiet. But what's that whine in the background? The mic is so sensitive that it's picking up the whirr of the computer's fan. When choosing a condenser, get one with a cardioid pickup pattern – so called because the pattern is heart-shaped – which means it's sensitive at the front, less so at the sides, and not sensitive at the rear. This helps cut down on noise emanating from particular directions, unlike an omnidirectional model, although it's just as good, if possible, to move the computer into another room.

Double-glazing lessens the intrusion of road noise, and recording when the house is empty (with the phone unplugged) is also wise, but there's still the acoustic properties of the room. As the mic moves further away, it picks up reflections from your voice bouncing off walls, tables, equipment – any hard surface – so deaden the room as much as possible. Drawn curtains, soft furnishings and carpets help absorb unwanted reflections. Some people even resort to wall drapes and baffles on the ceiling to further dampen the acoustic. If you want a particular ambience, it's best applied later in software when the recording's over.

Above: A condenser mic with shockmount, such as the AKG Perception 200, ensures excellent voice recording



Left: Handling a mic, or using a desk stand, is not on – get a boom-arm such as this Quiklok A206

AKG 171 Studio, or similar, closed-back headphones are good for vocal monitoring

Time to perform

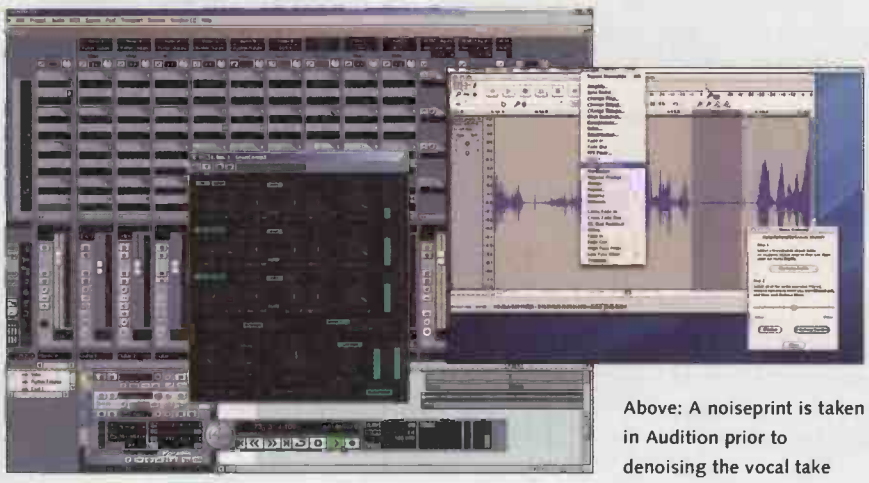
The secret to recording a good narrative is to prepare. Unlike live broadcasts, in which the presenter often has to wing it as events unfold, you've got the time to get notes together. However, if it's all too tightly scripted, you're likely to come across as stilted because it's hard to write natural-sounding speech – that's why good speechwriters are worth their weight in gold. Type up notes as the sequence unfolds, checking facts as you go, and aim for a steady pace, with pauses so the audience can take in the visuals.

Naturally, you need to be able to hear what you're doing, perhaps while recording, certainly while talking over a backing track, and definitely when checking each take. During the recording, you can't monitor backing material on speakers because it'll feed into the mic, so headphones are essential. Closed-back types, as used in recording studios, are the best buy because a well-fitting pair eliminates backing-track spill into the mic and is useful for rough mix monitoring in noisy environments, or when you can't crank up the main speakers. The AKG K 171 Studio, retailing at about £80, is a good choice, as is the similarly priced Beyer Dynamic DT100.

Mixing it

When preparing an audio mix, check for unwanted noise. While balanced connectors may have been used for the microphone, it's still possible to find hiss and hum in the background, with 50Hz (or 60Hz in some countries) mains hum being a common problem. A capable audio editor will have a noise removal filter, by which a section of what's meant to be silence can be sampled to get a 'noise print'. The values thus obtained are then effectively subtracted from the whole track, removing noise and leaving the programme material intact. Once that's sorted, you should move on to stereo positioning, if you're outputting to stereo. Run the vocals straight down the middle (pan centre), unless two or more people are speaking, in which case you could emulate their on-screen positions via the panning controls.

If you've bought licence-free music, it should be fine as is, with the stereo channels panned hard left and hard right, if necessary. But the backing may overpower the narrative, so reduce its volume slightly when the voice comes in – a technique called 'ducking'. Also, if certain frequencies of the backing material still interfere with the voice, use equalisation (EQ, a sophisticated, frequency-specific tone control) to knock them back.



Above: A noiseprint is taken in Audition prior to denoising the vocal take

Freeware multiband compressor Grancomp3 (www.x-buz.com) adds punch to a Cubase project

Finally, should the results still sound limp, apply a stereo-linked compression preset to the mix. In crude terms, a compressor squashes down the loud parts so that the quiet parts seem louder. Multiband compression operates on independent ranges of frequencies and is useful for maintaining clarity and balance while giving the whole mix more punch.

Once you've rehearsed and checked that the recording level meters are showing a healthy signal, not so high as to distort and not so low as to need a level boost afterwards, relax and press Record. Some people find it useful to speak as if talking to a friend sitting opposite. That way, they're less self-conscious about the performance and sound more natural. If you fluff, don't worry – you can try again until it's right. Also, if the sound of your voice coming over the headphones is offputting, take them off, but remember to turn the headphone level knob right down during the take.

Samples and bits

When setting up to perform, you'll need to establish the appropriate capture resolution. As you will probably know, CD audio data has a sample rate of 44.1KHz, with 16 data bits per sample, and is stereo. This gives sufficient resolution and data per sample for high-quality audio reproduction and means that elements can be placed at various positions within the stereo panorama, which lends clarity to a mix.

However, recording studios use higher sample rates and greater bit depths than this, because the higher the resolution, the more leeway there is when processing material. In a modern sound studio, audio capture resolution starts at 96KHz with 24-bit sampling, and can go up to 192KHz, regardless of the final delivery medium. Hence, if you're planning a solo narrative and want to keep quality high while processing the sound, set your audio editor to record at a high sample rate and make it mono. Again, studio engineers record most things in mono (drum kits being a notable exception) because engineers and producers are the people creating the stereo panorama. Your voice and mic are mono anyway, so stereo is a waste of bytes.

The affordable audio interface options mentioned earlier are capable of recording and playing 96KHz, 24-bit audio, so use that resolution for capture, then dither down and compress to your preferred delivery format at the final stage. On that subject, Apple's iPod supports the compressed Aac format, but not Windows Media Audio (WMA), whereas Creative's popular Zen range, in common with many other portables, supports WMA, but not Aac. Both, however, support mp3, so it's still the best format to use if you want a wide audience among mobile users.

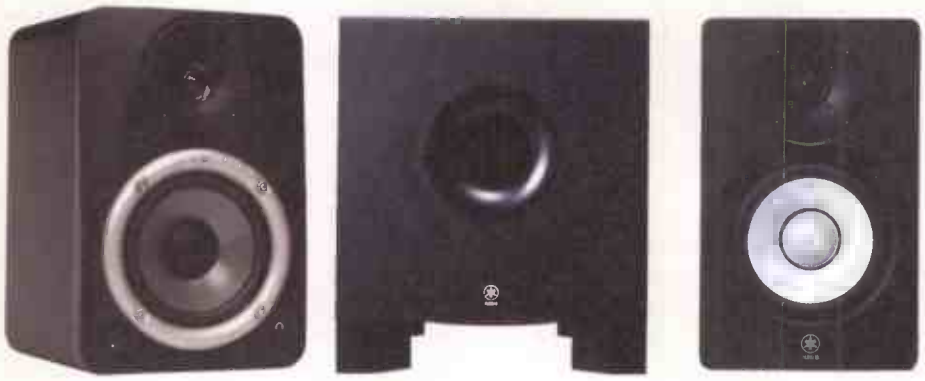
The iPod doesn't do WMA and the Zen doesn't do Aac, so podcasters stick with mp3

For audio-only podcasts, the choice of compression options set in the audio-editing software's export dialogue is up to your own ears, but for monophonic voice, reckon on 128Kbits/sec as the minimum. Music deserves stereo at 164Kbits/sec or more, while a 44.1KHz sample rate at 16-bit is good for both. However, whether podcasting or mixing audio for visuals, it's as well to have a clear picture of what the audience is likely to hear, which is not possible with domestic speaker systems, or with headphones.

Speakers' corner

When studio engineers talk about monitors, they're not referring to visual displays, but to the speakers they use to achieve an accurate mix. Their monitors must have a broad, even frequency response, not colouring the sound in any way. Home stereo equipment is no good because it's 'sweetened' to sound good in the showroom, while the multimedia speakers bundled with computers often make for useful bookends, but little else. Headphones, meanwhile, under-represent the bass.

For quality monitoring, choose a pair of near-field reference monitors, so called because they're placed close to you and what you hear on them will sound good on any decent consumer system. M-Audio markets affordable Studiophile monitors with built-in amplification, so you don't have to worry about a separate amp.



Left: Nearfield reference monitors, such as Studiophile DX4s, give a clear representation of your mix

Middle and right: A pair of Yamaha HS50M cabs, plus HS10W woofer, provide pro-quality 2.1 monitoring

At the entry level, a pair of £129 DX4s provides 18W per channel and the cabinets are equipped with 1/4-in TRS balanced connections to reduce in-cable interference. Moving up, Yamaha produces the HS50M, a £129 bi-amplified cabinet delivering 70W. One pair, in conjunction with the HS10W 150W subwoofer (£329), is good for 2.1-channel mixing, with a frequency range from a floor-rumbling 30Hz up to a bat-worrying 20KHz. If you've budgeted for five HS50Ms, or similar, and an audio interface with six or more balanced outputs, then 5.1 surround-sound mixing becomes an option.

Other top picks include powered studio monitors from Tannoy (**www.tannoy.com** – the Reveal series, in particular), Behringer (**www.behringer.co.uk**) and Fostex (**www.fostexinternational.com**).

Music and SFX

Now that you can hear what's going on, you can add spice to your soundtrack with music and sound effects (see box. 'Mixing it' on the previous page). Don't worry if you can't hold a tune. There are libraries online that host selections of music for every occasion. Be sure, however, to heed their licensing terms. Production-music houses, such as Focus (**www.focusmusic.co.uk**), supply premium, rights-managed content for which you'll need a licence from the MCPS (see box 'Copyright matters' on the next page). Such material is typically well-produced and available in high-quality stereo Wav or Aiff formats at CD and DVD quality, so paying extra could pay dividends.

Alternatively, there's royalty-free music. You pay for it once and then use it as you will, although you should still check the vendor's terms. Some impose limitations, so aim to arrange a buyout of the material so there are no future costs. Try CSS Music (**www.cssmusic.com**), Globalcuts (**www.globalcuts.com**) and the aptly named Royalty Free Music (**www.royaltyfreemusic.com**) for streamed previews of production-quality files so you can audition before you buy.

Sound effects (SFX) are easier because it's difficult to press a rights claim to something that goes 'boink', 'swoosh', or otherwise. SFX compilations on CD abound, and you may have files supplied with your video or soundtrack-editing software, but for a handle on leading publishers, visit Time+Space (**www.timespace.com**). And if your appetite knows no bounds, try **www.sound-effects-library.com**, a portal to 87 libraries from around the world, including the BBC's enormous collection.

As with editing video, placing SFX and incorporating music takes some thought. A dolorous tune while promoting product benefits will make for a grim presentation, whereas thrash metal over a pastoral video will induce sanity-threatening cognitive dissonance. Sound effects, meanwhile, are cheesy if thrown in liberally and obtrusively, so use your good taste. There's nothing to stop you cutting the video to match certain sections of music – it's common practice in TV and film to ensure everything gels.

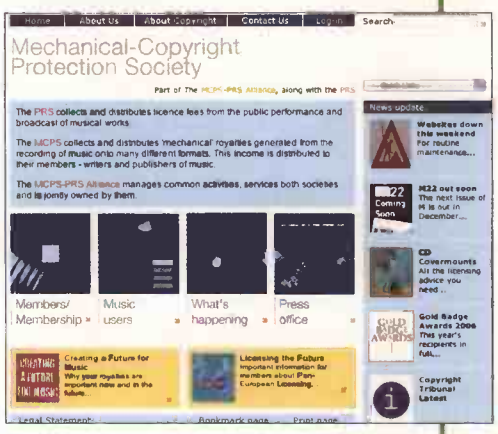
When you import stereo audio, it may appear on two mono tracks, so pan one hard left and the other hard right to maintain separation. The resolution of the material you've bought is less of a concern than with video because you've got the technology to downsample it to suit the medium.

Copyright matters

If the material you've recorded is your own creation, you own the copyright as soon as it's committed to disk. The problems come when incorporating the work of others into your production. A slideshow created for personal enjoyment with, say, a backing track from a favourite album shouldn't be a worry because you can make a copy for personal use. But if you distribute that slideshow, whether for financial gain or not, you could fall foul of copyright law, if the copyright holder notices what you're doing.

Using rights-free material from a library music vendor is OK if you've paid for it, but licensed content from production libraries will attract a fee, based on how many copies you make.

The body that administers the fees charged for copying music in the UK is the Mechanical Copyright Protection Society (**www.mcps.co.uk**) and its website hosts extensive guidance on usage and pricing. The Limited Availability Licensing Agreement seems most applicable to small runs of non-commercial audio-visual works, and you can find the conditions, fees, exceptions and application form online.



If you're planning to use copyrighted music commercially, you'll need to pay royalties via the MCPS

Another caveat is, if you play your slideshow with music to a room full of people, perhaps at a camera club, then you'll need to clear it with the Performing Right Society (**www.prs.co.uk**), which issues licenses for public airings. Again, cost details are available online, or call 0800 068 4828.

Compress and publish

If you can buy 24-bit, 48KHz audio content, that's great because it's the highest quality most consumers can enjoy. It's the resolution of audio for movies on DVD, although the audio may be processed for surround playback using DTS or AC-3 codecs. There are future consumer formats afoot, but for now, DVD or CD-quality audio is fine for home movies. Your video-editing software will dither the audio mix for output while processing the video, and the specs we gave earlier for podcasts also apply to video content destined for an online audience. If you're rendering a slideshow or presentation from hard drive or CD, stick with CD-quality audio – mono for voice and stereo if you'll be including other material.

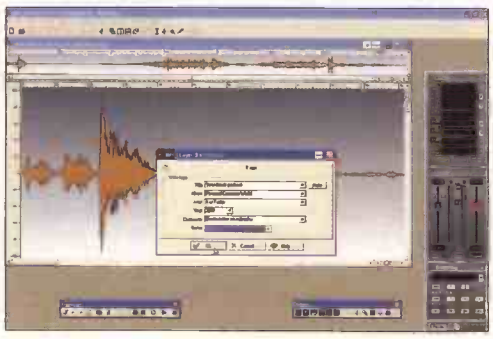
Above: Adobe Premiere Pro has impressive sound-management tools, but an audio sequencer still has its uses

Left: When mixing stereo, as with Final Cut Pro, shift the pan controls to maintain stereo separation

Finally, it's as well to mark up the file properly for future reference and the edification of others. Mp3 players, for example, display information (metadata) embedded in the media file, so make sure the info is there – a process called tagging. Audio- or video-editing software should offer access to the properties of the audio, and in the dialogue there'll be fields to fill out. Boxes such as Title, Author, Year, Copyright, Genre and Comments can be populated and will show up when the recipient examines the file.

It's all part of presenting your product in its best possible light and, following our advice, you'll be able to concoct a production to which you're proud to put your name – at least, for the soundtrack. As for the video, that's a whole different ball game. **PCW**

Below: Audio editor Wavelab (www.steinberg.net) enables you to tag files on export



WHERE FANTASY BECOMES REALITY.

It wasn't long ago that computer monitors were just big, dull, beige boxes. Now there's the Fantasy range from LG. A monitor that's as good on the outside as it is on the inside. With its exceptional contrast ratio of 2000:1 and response time of 4ms, it gives the clearest and sharpest image ever seen on an LCD monitor while looking like a piece of designer furniture. Available in 3 different designs.

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Eliminate spam

The war on junk email is never-ending, but Nigel Whitfield offers some anti-spam tips

At the start of 2004, Bill Gates made a rash promise: with Microsoft's might, the problem of spam could be elminated in two years. We're all used to Microsoft's deadlines slipping, but a solution to the problem of spam seems further off than ever. The number of junk messages has increased, filtering techniques that seemed to catch most of the rubbish a couple of years ago no longer work, and many of us spend more time than ever filtering the junk from our mailboxes.

Are there any new technologies we could adopt to help us win back control of our inboxes? Is the solution to take on the spammers in the courtroom? Or should we bite the bullet and admit that internet email just wasn't designed to protect us from the chancers, scammers and crooks? Some even say the open standards that underpin the internet's email system should be replaced with a next-generation alternative that can keep the spammers at bay.

We'll take a look at why there's so much junk, the best ways you can keep on top of it, and explain some of the tactics you can use to help play a part in the battle against spam.

Why spam?

While you may never have met anyone who has been taken in by the claims in junk email, they do exist. And with millions of copies of each mail sent at near zero cost, it only needs a few people to fall for a scam to make it profitable.

Even legitimate companies sometimes believe bulk email is a reasonable marketing tactic: often ending up themselves the unwitting dupes of less scrupulous mailing companies (see box on the next page). If you receive unsolicited email at a personal address from a company in the UK, call them on the phone and politely tell them you won't be buying or recommending their products – as we've found out, it can make a difference.

Zombie hordes

Spam hasn't suddenly become more profitable, however; one of the reasons there's so much more spam around now is the sheer number of users with broadband connections and, on top of that, the number who are running systems that don't have adequate protection against security threats.

When spam first appeared, most mail servers on the internet would happily accept and pass on just about any email. SMTP (Simple Mail Transfer Protocol) was orginally

designed for this specific purpose, to enable you to easily send and relay email via any convenient SMTP server – there is no built-in authentication mechanism in SMTP. As this convenience started to be abused, the majority of such 'open relays' were eventually closed. So, nowadays a mail server typically receives email only for the addresses it actually manages, or for which it is a backup. And servers have other protection too, such as a maximum number of recipients or connections from one source. So, a spammer can no longer find an open SMTP relay and just fire millions of messages at it, leaving it to deliver them in its own time.

Instead, a lot of spam is sent directly to the receiving mail server for each address; that means connecting to many different servers around the world. If it all had to be done from one place, it would take time to do, not to mention eat up a fair bit of bandwidth – the sort of activity that can be easily spotted by an ISP monitoring its network.

Thanks to broadband, and the ropey security on many home computers, this problem is solved by so-called 'bot nets' – networks of compromised PCs (known as 'zombie' PCs) that can be remotely

'Spammers can no longer find open SMTP relays to fire millions of emails at'

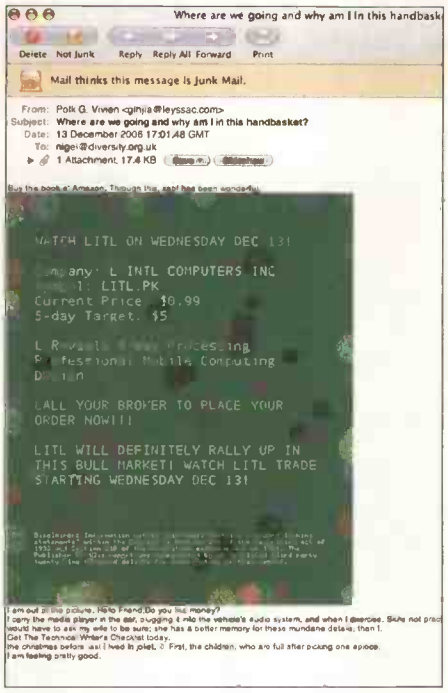
controlled, and used to send spam without the owner even realising. With thousands of machines sending messages, from all over the world, it's harder to spot a pattern to the traffic, and the spammers can reach many recipients in a very short time.

In the picture

That may explain how so much spam is being sent, when there are so few open relays. But it still doesn't account for how much of it ends up in your inbox. When we looked at anti-spam tools in *PCW* a couple of years ago, some of them were remarkably effective, removing or flagging a high percentage of the junk.

Now, though, it's a different story. A typical inbox will be full of not just the old-fashioned ads for assorted erotic enhancements, but offers of exclusive watches and – most recently – tips for shares to buy. Needless to say, the pills don't work, the watches are likely fake and you'll lose money on the shares. But how does all this evade your spam filtering?

The spammers are cunning; a couple of years ago, Bayesian filtering was touted as one of the great tools for spotting spam. Instead of merely just looking for key words and phrases in a message, and filtering on



With the marketing message embedded in a picture, and random text to fool Bayesian analysis, messages such as this have become a familiar sight in many inboxes

those, it analysed spam for all the words, and allowed you to 'train' the system with good and bad messages. The idea is that some combinations of words are typical of spam, but the same words in other contexts might not be. By weighing the probabilities, a Bayesian filter can capture a lot of spam.

However, it didn't take long for spammers to cotton on to it, and that's why much junk mail contains seemingly random portions of text – you might not see it if it's in white on a white background, but it's there – and Bayesian filters read it alongside the spam. Put enough random ordinary words and phrases in and there's a good chance the message will sail through your filter.

There are other techniques too; systems such as Cloudmark and DCC calculate check sums or fingerprints of spam messages and share them on servers. Mail servers can use the fingerprints to identify junk, and the systems are designed with a certain amount of fuzziness, to allow for common customisations in messages. But once again, while it might take a lot of effort for a single system to customise millions of junk emails, slowing down the sending, due to the zombie networks putting massive computing power in the hands of the senders, enough random junk can be included in messages to make fingerprinting less reliable.

And then, there's the latest technique: image spam. While spammers have often used images to show their products, there's a recent marked increase in their use: according to McAfee, it's now 40 per cent of spam and rising, four times the level last year. This is evident for 'pump-and-dump' share scams (where the object of the spam is to inflate the value of a company's shares by conning you into buying them). With no real text available for scanning, and messages arriving from a huge number of different IP addresses, it's very hard to spot these messages when they arrive at a mail server. In theory, you could run character recognition on the messages, but that would use an awful lot of processing time. You can't simply block messages with images either, since so many people share photographs, or attach their company logo as a signature to emails.

Fighting back

With so much spam around, it's no wonder that some people are wondering if the internet needs a new mail system. However, this is not likely to happen. For one thing, there are simply too many people using existing standards to make migration easy.

Email marketing? Just say no

Among the many spams received in the mailboxes of *PCW* staff have been some promoting what looks like reputable software products or well-known mail-order companies. The small print claims that the messages are sent in accordance with Data Protection legislation, using lists from a third-party list supplier.

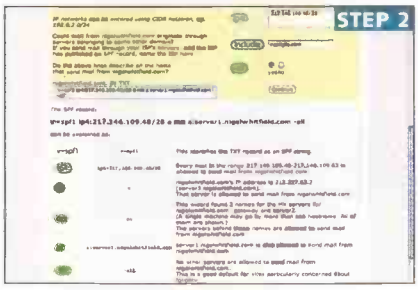
There's a problem, though. No matter what the message says, when these unsolicited messages arrive in personal email inboxes, they are still in breach of the UK regulations. *PCW* put this point to two of the companies concerned – which we can't name – who told us they were assured that the addresses in the lists were legitimate, laying the blame solely on the firms that claim to provide marketing services. One of the firms told us that after its experience of advertising its software product – and the number of complaints it received – it wouldn't be using email marketing again and was currently in a legal dispute with the mailing firm.

So, while your company may be offered a 'compliant' list of email addresses, or a service that says it will stay within the law, the only list you can really trust is a list of people you know for sure have opted in. Bulk emailing may look like an attractive strategy, but even if you try to deal with reputable companies, it can still backfire and lose you sales, rather than gain them.

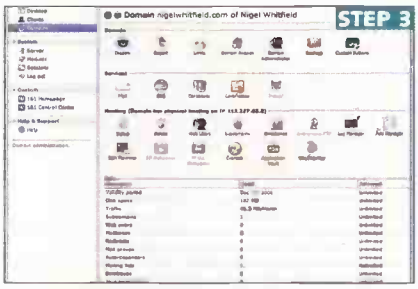
Implementing SPF on your server, step by step

Adding an SPF record to your own domain is very simple. Here's how to do it. Note, that for the final step, the exact details will depend on the software you use to manage your own domain; if you can't add 'TXT' records to it, you may need to ask your domain hosting company or ISP for help.

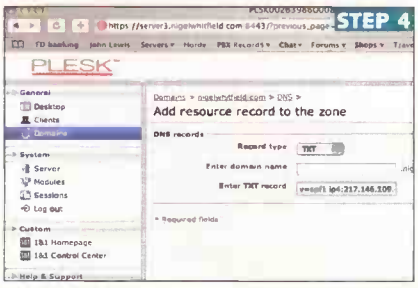
Step 1
Start at www.openspf.org and enter your domain name in the box on the front page. Then click Go to start the wizard, which will show you this page. The wizard will work out most of the settings for you, based on which computers are known to receive email for your domain, but you should check them carefully.



Step 2
Scroll down. We've added the address for our home broadband network and the wizard has created our SPF details in the text box, so you can copy and paste them. But remember to change the ~all to –all, so that mail will be rejected if it doesn't match your settings; with ~all, warnings will be generated instead.



Step 3
Now you can add the information to your domain details. Here, we're using the Plesk web admin server, which allows us to manage our DNS information easily. Click on Domains, choose the domain you're updating, then click the DNS button.



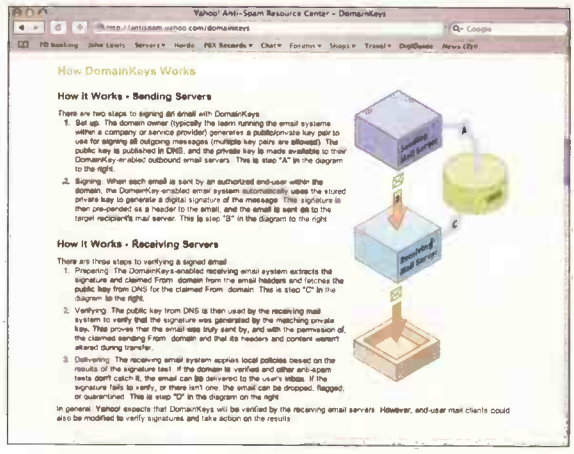
Step 4
Click the Add New Record button. Choose TXT as the record type, and in the bottom box, paste the code from OpenSPF's wizard, without the enclosing quotes. Click OK.

For another, there are those zombie hordes; with so many systems compromised, it surely wouldn't be long before spammers found a way to hijack them. Solutions are likely to be technical – including new techniques to verify email, which can be piggybacked on to the existing systems – and legal, fighting spammers in court, where they breach laws on junk mail.

Meanwhile, what can you do to keep your inbox clear? It's obvious that, especially with image spam, it can be very hard for desktop anti-spam software to do an effective job. It will still, of course, work on many of the other types of junk mail, by simply looking for keywords, blocking known spam domains or simply using a whitelist of your known contacts. But it seems that to manage the problem effectively, spam really needs to be fought on the world's email servers.

One of the traditional tools to do that was the blacklist – a list of IP addresses of known spammers, which enables mail servers to reject messages as soon as the spammer tries to connect. While such lists have their place, and can prevent commercial email marketing firms from pestering you, as organisations like Spamhaus (**www.spamhaus.org**) have found out, business spammers tend to fight in the courts when their 'right' to pollute our inboxes is infringed.

Like SPF, Domain Keys allows you to say which mail servers are trusted to send messages purporting to come from your domain



There are other techniques to determine spammers too; one is to try and send a mail back to each machine that sends you a message; but this can be resource-intensive, and not always reliable. More practical are two new technologies. One is greylisting (see box on the next page), which can help stop one-shot mailing attempts by spammers, and the other is the Sender Policy Framework (SPF). Both can be added to your own mail server, and are being used by a growing number of ISPs, hosting companies and businesses.

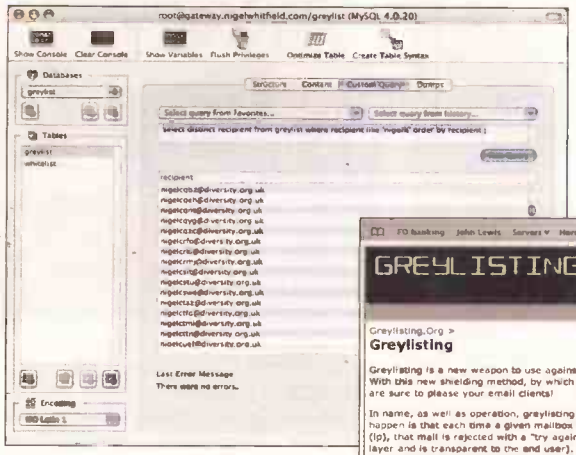
SPF spots the forgers

SPF is a solution designed to solve one particular spam problem – forged senders. If you've ever had your email address used to send spam, you'll know how many bounces and angry messages you can receive; the problem can be especially bad if you have a domain of your own with a catch-all email address, where messages to anything at that domain end up in your inbox.

SPF works by adding extra information to the domain system, saying which IP addresses are allowed to send mail for a particular domain. A receiving mail server can then check and see if the computer claiming to send from, for example, nigelwhitfield.com, is allowed to by SPF and depending on the SPF settings, can either issue a warning, or reject the email.

'The problem of spam needs to be fought on the world's email servers'

It's not perfect though; if you automatically forward mail from one address to another via an alias or mailing list service, SPF breaks, because the forwarding computer won't be authorised for the domain of the original sender. Instead, if mail is forwarded, servers need to rewrite the message envelope – which can mean that bounces no longer reach the original sender if the message fails



Left: The database built by greylisting reveals thousands of attempts to send to seemingly random addresses – more than 1,500 variations on a theme of 'nigel' in 7,000 delivery attempts

Right: Greylisting proved to be an extremely effective tactic in deterring the zombie hordes

after being forwarded. And because SPF is still fairly uncommon, not everyone adds SPF information to their domains, or checks it on their mail servers.

However, if you want to protect your own domain, and only send through your own or your ISP's email servers, you can set up SPF information easily, using the wizard at **www.openspf.org**; you can see exactly how it's done in the step-by-step workshop on the previous page. To check other people's SPF information, you may need to update your mail server software, and that's easier than you may think, since recent versions of systems such as Postfix and Sendmail allow plug-in filters. Adding SPF filtering to the *PCW* Mail Server project we built two years ago (**www.nigelwhitfield.com/ v2/work.php?c=3**) was simple, using the Perl policy daemon from OpenSPF.

SPF isn't the only way to protect your domain from being used to send spam, Domain Keys is an alternative, which uses digital signatures on email headers and can even verify that a message body hasn't been tampered with. More information about Domain Keys is at **http://antispam.yahoo.com/domainkeys**. It's not as straightforward to implement as SPF, but similarly relies on additional information being inserted into the DNS, and then checked by mail servers. And there are open-source implementations for many of the main mail server packages.

How effective?

We added both greylisting and SPF-checking to our mail server. Although it's hard to get a conclusive figure in the relatively short time since the system's been in use, we saw a massive drop in the amount of spam that ended up in our inboxes. Greylisting proved an effective tactic; in one day, the number of one-off attempts to deliver messages was more than 14,000. Looking at the database that the greylisting software compiled, it was clear that many of those messages would be bounced anyway, as they were to made up addresses, eg nigelozhk@ rather than nigel@. But with the sender forged, the bounces would bounce, leaving the mail administrator with a large number of error messages to wade through.

SPF filtering stopped fewer messages – about 300 in the first 24 hours – but that's still a welcome improvement. In total, in the period before the new filters were added, our test server would typically receive 21,000 email messages per day; of those, almost 15,000 would be rejected, either by the existing spam filtering, or because they were to invalid addresses – some creating bounces. A further 6,000 messages would find their way to users' mailboxes, many of those being image spam, or bounces caused by forged sender addresses.

With the new techniques, many messages never made it as far as the spam filter, being rejected instead by greylisting or SPF. The number of messages actually delivered to users was about 1,000; a massive drop that's broadly in line with estimates of how much junk there is on the internet.

Fight the good fight

If you are suffering from too much junk, and your current filters aren't working, it's worth looking at adding greylisting to your mail server, or asking your ISP to implement it for you. Though it's not quite as effective, if you have your own domain, you should consider using SPF as well – even if you don't run a mail server to check incoming messages, you can protect yourself from others who pick your domain as the sender of their junk.

Users who don't control their own email are best off ensuring their ISP uses greylisting and SPF or Domain Keys – and then filtering the rest of their email using a good desktop anti-spam tool.

There's no doubt that fighting junk is an arms race, and constantly updating your software can be annoying. But with email such an important tool for many, it's a race that you can't afford to pull out of. **PCW**

How greylisting can reduce the spam

One technique that many mail administrators are using is greylisting. So far, it's proving surprisingly effective at rejecting a lot of spam and, unlike other solutions, there's no risk of false positives and false negatives.

Greylisting (**www.greylisting.org**) doesn't worry about the content of an email. Instead, when an email server receives a message, it simply rejects it with a temporary failure code. A standard mail server will see the response, and simply queue the message to deliver later. Most spam software doesn't do that; it just sees anything other than an 'OK' response as a problem, and goes on to the next address on the list.

Genuine messages will be retried by the sending server – how often depends on the way they're configured, but half an hour or an hour is common. The next time the greylisting system sees the same combination of sending server, address and recipient, it passes the mail through straight away – perhaps performing other anti-spam and anti-virus checks too.

There are refinements possible; some greylisting software will automatically add a sending mail server to an approved list, if it sends a certain number of mails, for example, so regular contacts will find that their messages are no longer greylisted.

Best of all, you can easily add greylisting to a mail server; it took less than 15 minutes, for example, to add the gld tool (**www.gasmi.net/gld.html**) to our OpenBSD mail server, plugging it into the existing Postfix mail system alongside a check for SPF.

But won't the spammers just try resending their messages? Possibly; but anything that slows down the time it takes them to send their junk means there's less of it, and more opportunities for systems such as DCC or Cloudmark to gather fingerprints that will spot the spam.

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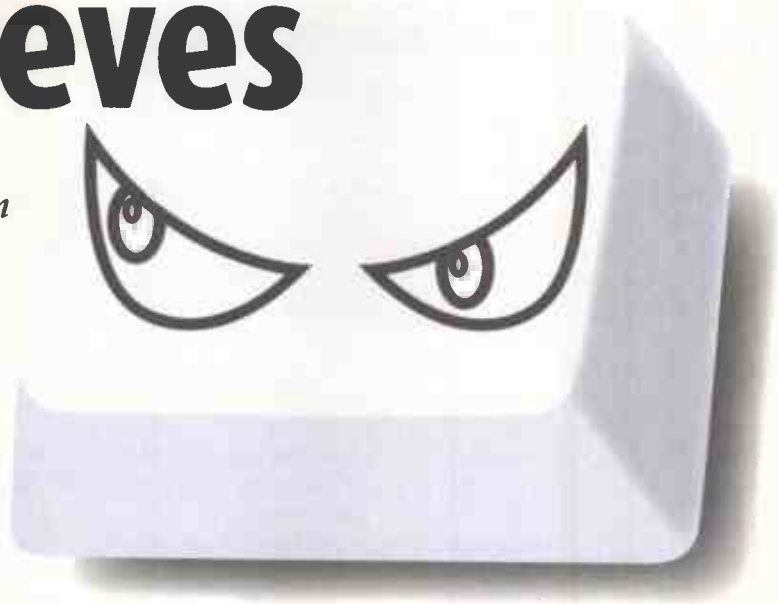


Data thieves are making increasing use of keyloggers to record keystrokes on your computer. According to a study by the security firm Idefense, distribution of these programs increased by a huge 65 per cent last year. They are mainly installed to gain access, unnoticed, to sensitive user data. In the current Spyware Report from Webroot (**www.webroot.com**) for example, Perfect Keylogger ranks at number two in the top 10 of spyware tools. Astonishingly, this program is not a dodgy hacker tool but is sold quite openly and legally at **www.blazingtools.com** (ironically, on the same page as the company's anti-spyware package). It's billed as a tool for you to keep track of who's using your PC.

Finding keyloggers

If you want to track down software keyloggers, you will usually need to use specialised utilities – you often can't find them using the built-in Windows utilities because they hide themselves so they don't show up in the Task Manager or Explorer. Autostart entries are also hidden from the Windows Msconfig utility. You may have more success using virus and spyware scanners, as one of our lab tests showed. This is particularly true if you are looking for protection from the malware that many keyloggers leave behind. These can usually be detected with the help of a scanner program and up-to-date signature files. The free Spybot Search & Destroy immediately uncovered Perfect Keylogger and removed it at the next restart.

An alternative tool, Anti-Keylogger (**www.myplanetsoft.com/free/index.php**), is free and just 50KB in size, but it too found Perfect Keylogger. Tests using anti-virus programs from McAfee, Kaspersky and Antivir also uncovered Perfect Keylogger without problems.

Kernel-based keyloggers such as Elite Keylogger are in a different league, however; they exhibit no telltale process signatures because they are usually started quietly as drivers. You'll often find that even process and task managers such as Taskinfo 6.2 don't reveal any suspicious signs. In our tests, we found that Spybot and Ad-Aware – both of which have good reputations as spyware detectors – failed to alert us to Elite's presence. Some virus scanners also failed to find it, among them NOD32, F-Secure and Kaspersky. In short, Elite Keylogger stubbornly resisted all attempts to detect it. Anti-Keylogger, mentioned above, could not prevent Elite from continuing to collect data.

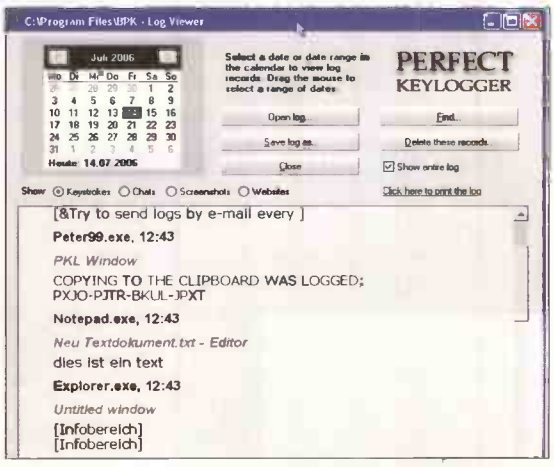
Anyone worried about the security and privacy of their computer will rightly wonder why this is. How can so many well-known and reputable security packages fail to spot such a potential threat?

Commercial reality

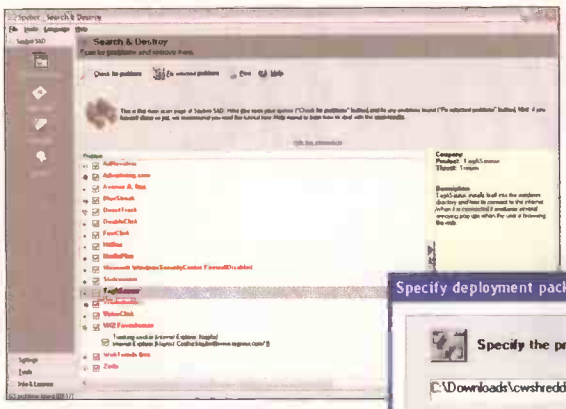
The answer is that, unlike hacker products which are usually spread to a system by viruses or Trojans and can be detected and dealt with by anti-virus products, keyloggers inhabit a different part of the computing ecology, with a sort of 'protected species status'.

In other words, some anti-virus and security product manufacturers are afraid of legal action from the creators of keylogging software, and so don't report their products as malware. That's due in part to the fact that, while a virus or Trojan only has malicious uses, keyloggers are often sold with the claim that they can help you monitor what your spouse, children or employees are doing with a computer. Spying on people in this way may not be ethical, but in many parts of the world it's entirely legal, putting spyware and anti-virus authors in an awkward position if they were to label keylogging programs as malicious.

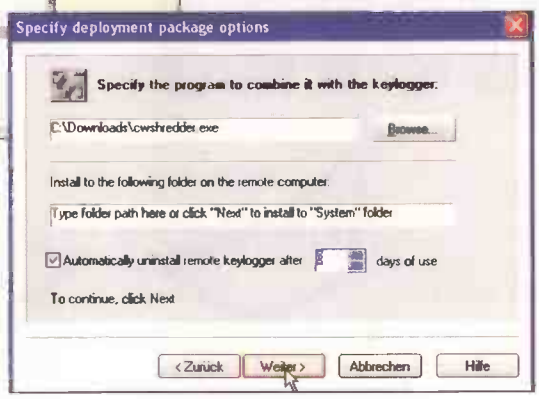
So, if you really want to be sure your computer is clean and not being monitored, you can't rely on your usual security tools. You'll need, instead, to use some more specialised techniques.



Perfect Keylogger records both keyboard input and the contents of the clipboard



Left: Well-known virus and spyware tools often fail to detect keyloggers and label them as malware



Below: With simple tools keyloggers can be hidden in standard programs

How they work

Before looking at how to remove them, it's helpful to understand a little about how these programs work. From a technical point of view, a keylogger is an arrangement for capturing and recording keyboard input. Everything you type on your keyboard is captured and saved, usually in such a way that you can't get at the captured data. There are both software and hardware keyloggers; the latter are physical devices that sit between the keyboard and the PC.

Software keyloggers typically hook themselves into the system at a low level, often masquerading as device drivers and intercepting system calls, so they have access to everything typed on the keyboard. They may even capture the screen, and mouse movements, to help subvert attempts at security using dropdown forms on websites, or on-screen keyboards. And they can be hidden with innocent-looking software.

Hardware logging

While most keyloggers are software based, and they're the type most users will come across, it's worth bearing in mind that for less than £40 you can buy a hardware keylogger which can't be detected by any security utility. It's extremely easy to install; you just put the keylogger between the target computer's PS/2 keyboard socket and the keyboard plug. In a best-case scenario this will allow you to capture over 250,000 keystrokes. Getting the data off the keylogger is just as easy, using the supplied KLogger-Reader software.

The only thing that offers any protection against hardware keyloggers such as this is to physically inspect the computer and its connections. Even if the PS/2 port is blocked using software and the keyboard is connected via USB, relatively inconspicuous USB keyloggers may be connected. Even harder to detect are devices fixed inside the keyboard case – not a difficult task for someone who's good with a soldering iron. One trick here, if you want to be absolutely secure, is to put a drop of nail varnish on the screw heads on the back of the keyboard so that any tampering is quickly evident.

If you're really concerned about security, wireless keyboards are another potential problem, too. It's true that infra-red keyboards are very low-powered and reception will break up at a distance of more than a couple of metres, but nonetheless it is quite easy to intercept them. The classical wireless keyboards, which operate at around 27MHz, pose a much greater risk, as they radiate their data, unencrypted, over a distance of up to 30m. Everything that is entered can be read and logged with the aid of a modified wireless keyboard and a CB radio. Bluetooth keyboards, which operate at 2.4GHz, are usually more secure and it requires much more effort to intercept them, thanks to the frequency-hopping process they use. However, you should take care to ensure that you only use them with authentication and encryption activated.

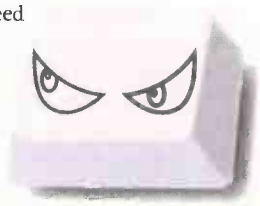
Software logging

One of the most effective remedies for software keyloggers is the Chinese general anti-rootkit tool Icesword (see **http://pjf.blogone.net**), which has an English interface. This tool is only 700KB, but is widely recognised by IT experts as one of the best rootkit detectors. It points out not only hidden processes, but also changes to the Windows kernel, exposing alterations in the System Service Descriptor Table, which is often used as a hiding place by rootkits.

However, you should proceed with caution and take a backup before you attempt to remove a hidden process, a Registry entry or a driver, as Icesword does not create any backups of its own, and actions performed using it cannot be undone. Before you start, save a copy of your boot partition, or at least the Registry, on a second hard disk or on a DVD, and create a system restore point.

'It's becoming more common to spy on unsuspecting PC users'

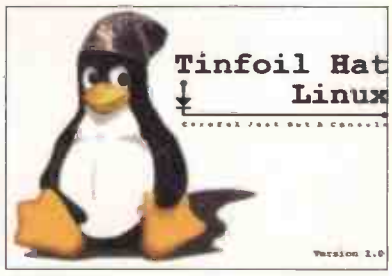
Suspicious objects appear in red in the Process and SSDT windows. To spot real threats, you need in-depth knowledge of the system to differentiate between benign and malicious objects. Some objects cannot be deleted directly from the window in which they are displayed, but you can use built-in tools that can be activated via the Registry and File menus. Neither is user-friendly, but they can delete entries that are protected by rootkits.



Icesword displays hooks – where software may be intercepting system routines – in red. As it does not know which hooks belong to a firewall and which belong to something nasty, you will have to search the web to find out which name the parasite could be hiding behind. In our test we found, for example, that the file vsdata.sys belongs to the Zone Alarm Desktop Firewall. A second suspicious file is called \SystemRoot\system32\drivers\crusoe2k.sys – it did not

Mac and Linux keyloggers

If you think that running an operating system such as Mac OSX or Linux will keep you safe from keyloggers, you're wrong. Viruses and Trojans with keylogger functions are becoming more and more common on these platforms as well. They are, however, much less widespread and, in addition, there are Linux distributions such as Tinfoil (**http://tinfoilhat.shmoo.com**), that make it very difficult for data thieves to bug your PC.



Linux distributions such as Tinfoil are designed to help protect your data

Hardware keyloggers can be bought for less than £40, and won't be detected by anything other than visual examination

show up in the Windows Explorer. We checked again using Rootkit Revealer, and that complained about the file as well. If you want to carry out more detailed research, we recommend using the Metasploit malware research tool (**http://metasploit.com/research/misc/mwsearch/index.html**). You can also find a helpful step-by-step guide to using Icesword at **www.castlecops.com/t165203-IceSword_Instructions_in_English_Illustrated.html**.

Removing pests

Once you know where a parasite is, and which files it uses, you can start to remove it relatively easily. Because they're well hidden using rootkit techniques, the only way to get at keyloggers while the computer is running is with Icesword or a similar tool. Alternatively, you can start the PC using a spyware-free boot CD and then delete the keylogger from the hard disk. You can do this with, for example, Ultimate Boot CD for Windows (for more detail on how to use this see our feature at **www.pcw.co.uk/2167121**). Deleting it with Icesword is simple; just activate the File menu entry and then find and delete crusoe2k.sys from the File Explorer. Alternatively, you can find the files using Icesword, and delete them manually when you've booted your system from CD later.

After rebooting, the keylogger should no longer be active, and you can now do some more clearing up and repair work including, for example, locating the log files. This can be very tedious if you do not know their names – sometimes the only thing to do is to find the largest and most recent files in the Windows directory (usually in the system32 subdirectory) and experimentally rename them until the next system start, then delete them completely. If you're working on a strange PC, and perhaps without Administrator privileges as well, you really don't have much of a chance and, rather than spending hours trying to clean up a system, your best bet may be to assume it's infected, and work around that. For example, using a virtual keyboard can allow you to use a potentially infected computer safely.

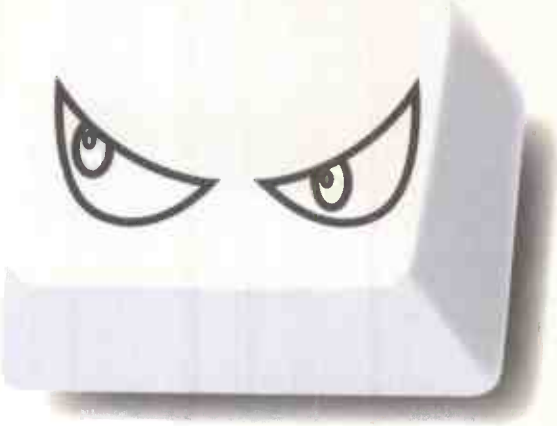
Windows has this feature built in. Just choose Start/Run and then enter OSK then a virtual, mouse-controlled keyboard will appear on screen.

The free Mouse Only Keyboard from **www.myplanetsoft.com** goes a step further, with all the characters input using the mouse masked by asterisks. The effectiveness of this technique is questionable, however, as you can't be absolutely certain that a keylogger is not continuously generating screenshots or intercepting form data using a BHO (Browser Helper Object) in Internet Explorer.

If, on the other hand, you have installation privileges on the PC you're using, you can remove just about all keyloggers. We've tested some products that are able to deactivate even kernel keyloggers on the fly. This means that, even if such spyware is active, it can be suppressed by a program such as Advanced Anti Keylogger ($60, from **http://logger.net**). After installing Advanced Anti Keylogger the PC is restarted and all programs that work at kernel level are placed in quarantine. You can then define simple rules for these programs, including whether you allow them to run or not.

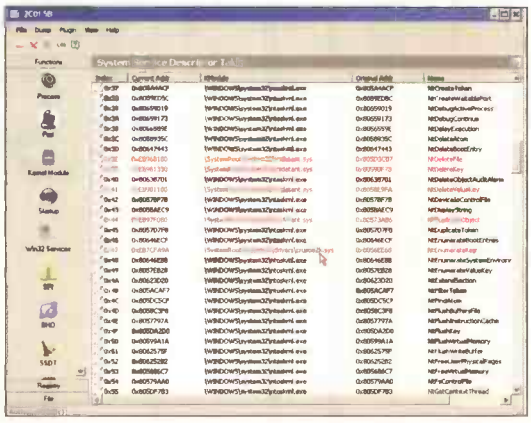
Prevention is better than cure

Keyloggers are among the most dangerous IT threats. It's becoming more common to spy on unsuspecting PC users, be it a suspicious partner or employer or data thieves with an interest in stealing your credit card data and online banking passwords. Most classical virus or spyware detectors fail to offer adequate protection against keyloggers, although they're starting to incorporate this



functionality. The only way to weed them out is by using advanced anti-rootkit tools.

To stop other people installing keyloggers on your PC, you should control access to your computer, for example by using a secure Bios password and checking for the presence of hardware keyloggers on a regular basis. A professional desktop firewall, such as Zone Alarm Pro, can prevent a keylogger from transmitting data unchallenged, but this does not offer perfect protection; the most advanced keyloggers will still be able to send their information home. **PCW**



Icesword is one of the most effective tools for tracking down and removing keyloggers and other rootkits

Six steps for dealing with keyloggers

If a keylogger has found its way into your system, it's not the end of the world. Here are some tips to solve the problem.

STEP 1 Assume the worst – that your system has been totally compromised by kernel keyloggers. Make an image of the infected hard disk.
STEP 2 Scan your system, one after another, with Spybot, Rootkit Revealer and Icesword to track down the data spies. Afterwards, terminate them and securely delete their log files.
STEP 3 If you are not sure whether you deleted all the files successfully and don't want to overlook the extent of damage caused by previous surveillance activity, format your hard disk, reinstall the operating system and change all your passwords.
STEP 4 Make sure that you are the only person with secure access to your PC. Work exclusively with an encrypted boot partition in combination with a smartcard or a USB token.
STEP 5 If that is not possible, you can secure your system using anti-keylogger programs (Anti-Elite Keylogger, Advanced Anti Keylogger); you will be better protected by using a tool like Processguard (**www.diamondcs.com.au**), as it is behaviour based and blocks all processes and programs which actively change system structures.
STEP 6 If you can not carry out these protective measures for technical or organisational reasons then you should not trust the PC with any data whose misuse could be personally damaging.

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EDITED BY
WILL STAPLEY

REVIEWS

GET TOTALLY WIRED

We've seen some monster laptops in the past few months, not least Dell's 20in XPS M2010 behemoth. This month, we return to what laptops were originally designed for – portability. All of the models in our group test are lighter than 2.7kg, with Evesham's effort keeping its weight down to 1.7kg. Turn to page 98 to discover which one came out on top.

Nintendo's Wii was a must-have at Christmas, but sold out so fast many were left disappointed. Whether or not stocks are replenished, check out our review on page 67.

We've got a bumper selection of peripherals this month, including a wristwatch from Aigo that plays video, Sandisk's e280, an update of its popular e260 mp3 player, and a network camera from Peak Hardware to monitor your home while you're away.

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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.

Personal Computer World EDITOR'S CHOICE — Editor's Choice
Personal Computer World RECOMMENDED — Recommended
Personal Computer World GREAT VALUE — Great Value

'Nintendo has created its own set of rules based around the Wii's unique selling point – its controller'

Read the review on page 67

NOTEBOOK

Panasonic Toughbook CF-W5

A durable and highly portable laptop for those with deep pockets

The CF-W5 is Panasonic's latest attempt to woo the corporate elite and those with deep pockets into buying a tougher ultra-portable laptop.

Unlike the fully ruggerdised CF-74 (see **www.pcw.co.uk/2162709**) we reviewed a few months back, it isn't an ugly laptop covered in rubber bits. Instead, the silver plastic casing is subtle and attractive.

Panasonic brands the CF-W5 as semi-ruggerdised, which means it should withstand a 30cm drop. The hard disk has air-bag cushioning, so your data should be safe if the laptop is ever dropped from a height of 76cm. It can withstand a 100kg mass on top of it without the unit being damaged, thanks to ribbed casing on the back of the LCD.

We had no hesitation in putting all Panasonic's claims to the test and the laptop passed with flying colours, which is quite an impressive feat given it weighs only 1.6kg, including the power supply.

At the heart of the laptop lies an ultra low-voltage Intel Core Solo U1400. It consumes up to five times less power than a mobile dual-core processor from Intel. The downside is that, unlike the newer Core Duo models, it only has a single core ticking along at a lethargic 1.2GHz.

At the time of writing, the CF-W5 had problems running our Sysmark 2004 SE and PCmark05 benchmarks. We're looking into this and will post an update as soon as the problem is rectified. However, the slow processor, uninspiring 1GB of DDR2 Ram and 60GB hard disk suggest it's not going to set the world alight in terms of performance.

With such limited power, the laptop doesn't need fans to aid cooling, which means it is near-silent during operation. All you'll hear is the hard drive whirring away.

The choice of processor also increases battery life. In our Mobilemark productivity test, which simulates typical usage, the CF-W5 managed to keep going for a very impressive six hours and 22 minutes.

As well as standard features such as 802.11g Wifi and two USB2 ports, the laptop houses a superb, albeit unusual, circular trackpad below the keyboard that functions like an iPod click-wheel.

We were surprised to see an internal DVD rewriter in a laptop of this size. The rewriter weighs only 58g – much less than the standard 200g we usually expect.

The screen is a 12.1in affair with a limiting native resolution of 1,024x768 pixels. Its backlight is uneven and shows noticeable bleeding from the bottom. The end result of this is unwanted colour gradients, which we've commented on in our Test Bed blog (**http://labs.pcw.co.uk/2006/11/first_impressio.html**).

Panasonic informed us that it uses third-party LCD screens in all its products. Before fitting them to its Toughbook laptops, Panasonic fits a brighter backlight, shaves 1mm off the glass to make it lighter and thinner, and then puts the whole thing back together. This process may be the cause of the effects we noticed.

With the exception of the LCD, the laptop is very well built and remarkably solid for such a nimble device. We certainly enjoyed using it, but despite the relatively low specification, its rugged nature pushes the price to a stomach-churning £1,680.

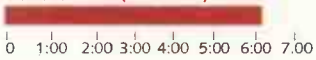
If you do a lot of travelling and fear for your laptop's safety, you might consider the Toughbook CF-W5, but a much cheaper laptop can also be protected by a tough laptop bag. In short, the Toughbook CF-W5 is a laptop for those who don't need performance and don't mind paying over the odds.

Emil Larsen

Performance

Sysmark 2004 SE: **112**

Mobilemark **6:22 (hours:mins)**



Details

Price £1,680
Best price www.pcw.co.uk/bestprices
Contact Panasonic www.toughbook.eu
Specifications Intel Core Solo ULV U1400 (1.2GHz, 2MB L2 cache) • Intel 945GMS chipset • 12.1in LCD • 1GB DDR2 Ram • 60GB hard disk • DVD writer • 802.11a/b/g wireless • 1.6kg

Verdict

Pros Lightweight; tough; excellent battery life; attractive; quiet; decent trackpad
Cons Uneven backlight; poor performance; very expensive

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

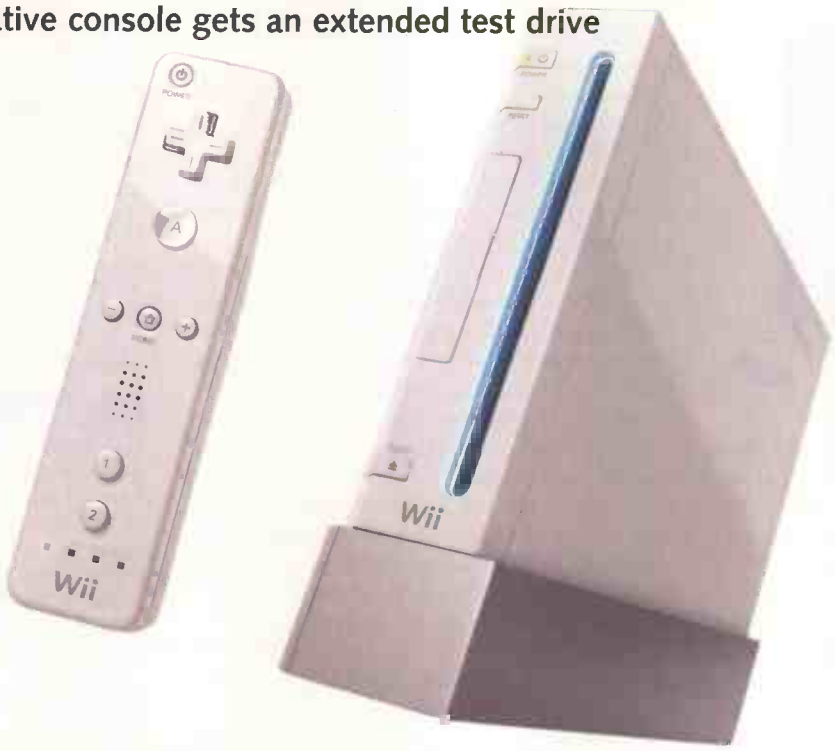
Overall A well-built and attractive notebook that can take a knock or two, but the high price will deter many

★★★☆☆

GAMES CONSOLE

Nintendo Wii

This innovative console gets an extended test drive



The Wii is finally here, arriving amid the usual record-breaking sales statistics associated with a new Nintendo games console.

Being the 'fastest-selling console in the known universe' doesn't guarantee long-term success, though. After our sneak preview (**www.pcw.co.uk/2166447**) we got our hands on the genuine article to give it a test drive.

The Wii's design is a long way from the colourful, kid-friendly look of Nintendo's previous console, the Gamecube. But while the Wii's forerunner sold well in Japan, it never came close to matching the worldwide success of its main rival – Sony's Playstation 2. This time Nintendo has decided on a new strategy.

Rather than taking on the next generation Playstation and Xbox at their own game, Nintendo has created its own set of rules based around the Wii's unique selling point – its controller.

The Wii's controller looks nothing like the traditional games console joypad. It comes in two pieces for a start – the Wii Remote and the Nunchuk. The Remote is the main controller and includes a motion sensor and an on-screen pointer. This liberates players from the usual dual-thumbstick control system and has the potential to make for a much more interactive experience.

The Wii Sports game that comes with the console allows players to use the controller to simulate all manner of activity – from playing tennis to bowling. It's a lot of fun and could see the console crossing over into the mainstream, assuming that games developers can come up with titles that are engaging and take full advantage of the controller. As it is, the launch line-up features nothing that's truly 'must-have'.

Microsoft has laid down the gauntlet in terms of graphics and online features with its year-old Xbox 360 and the Wii will have a hard time competing in either of these areas. Nintendo's console offers no high-definition visuals and graphically looks similar to the Gamecube. The Wii is backwards-compatible with the Cube, which made it possible for us to compare the new Zelda game in both formats. Visually, they were almost identical, but the Wii version was more fun to play because of the way it exploits the motion-sensing and on-screen aiming aspects of the control system.

Internet functions are promising but limited. The Wii is Wifi-ready, so all those with a wireless network need to do is enter an SSID and a Wep or WPA encryption key. Our model performed a couple of system updates, and we had to agree to terms and conditions before we could browse Nintendo's online offerings.

The Wii is supposed to feature several online channels, but there's not a lot to it at the moment. Neither the news nor the weather channels were up and running when we wrote this review. There were no Wii software applications to download and no messageboard photos to browse.

Nintendo has, however, managed to get its much-vaunted Virtual Console up and running in time for the launch. This system works a little like Xbox Live Arcade, where games can be purchased online and downloaded directly to the console. Only a handful of Virtual Console games are currently available.

Overall, the Wii has made a promising debut. Time will tell how well it stacks up against the technically superior Xbox 360 (**www.pcw.co.uk/2147007**) and the new Playstation 3 (**www.pcw.co.uk/2171141**), but the console has the potential to appeal beyond the hardcore gaming market to those who wouldn't normally buy a games console. *Jonathan Parkyn*

Details

Price £180
Best price www.pcw.co.uk/bestprices
Contact www.nintendo-europe.com
Specifications IBM PowerPC Broadway processor • 512MB internal flash memory • ATI-developed graphics chip • Two USB ports • SD memory card slot • 802.11b/g • Wii Remote wireless (Bluetooth) controller (up to four can be connected) • Nunchuck controller • Sensor bar for on-screen pointer • Online multiplayer for selected titles • Virtual Console download service • Photo browser • Stand • Wireless communication with DS console • Four Gamecube controller ports • Two Gamecube memory card ports • 44x157x215mm (wxdxh)

Verdict

Pros Small; cheap; innovative controller; accessible software; backwards-compatibility and downloadable Nintendo/Sega classics
Cons Less raw power than its rivals; few 'added value' features; no HD

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

Overall The easy controller could win consoles a fresh following, but strong software will be needed
★★★★☆

19IN TFT

Formac Gallery 1900 TNX

Looking for something a little different? This 19in TFT might be right up your street

Despite its name, this Formac monitor is equally at home on a PC, albeit with a decidedly Mac-like approach to form and function. As with Apple's own widescreen Cinema displays, the Gallery 1900 TNX combines all its connectivity into a single cable and shows a marked dislike of control buttons. It also comes fitted with only a digital DVI-D interface.

The Gallery 1900 offers no on-screen menus; only power and brightness controls. The lack of analogue inputs means there's little need for user adjustments. The Gallery 1900 forgoes a choice of colour temperatures or warm/cool modes in favour of keeping the monitor at its optimum performance settings at all times.

It is aimed at the budget-conscious user who wants a good-looking monitor without the need for professional-grade colour and viewing angles.

Being fitted with a fast 3ms TN panel, this monitor excels at high-speed gaming performance and provides a bright, clear display for regular desktop work.

To the rear, behind two USB2 ports, a single hinged stand offers the only ergonomic adjustment available, providing a single tilt function. The stand can protrude quite far backwards, depending on the level of tilt you require. This, in turn, can result in the whole monitor taking up more desk space than you might imagine.

Stylistically, this is a display that looks different. Set in a clear plastic surround, the panel appears almost to float above your desk. It has a polished appearance, which gives it an expensive look. Straight edges are replaced by gentle curves, lending it a retro but modern feel. A small white power LED pulses below its three big, albeit unobtrusive, control buttons.

If you want a no-nonsense monitor with plenty of style, tidy cabling and good image quality, then the Formac Gallery 1900 TNX won't disappoint – but beware the lack of analogue inputs. *Paul Monckton*

Details

Price £233
Best price www.pcw.co.uk/bestprices
Contact Formac www.formac.com
Specifications 19in TN panel • 1,280x1,024 • 4:3 aspect ratio • 280 cd/m2 brightness • 700:1 contrast ratio • 3ms response time (grey to grey) • Viewing angles (H/V) 150°/150° • 2-port USB hub • External power supply • DVI-D connection • 530x210x450mm (wxdxh) • 5.7kg • One-year warranty

Verdict

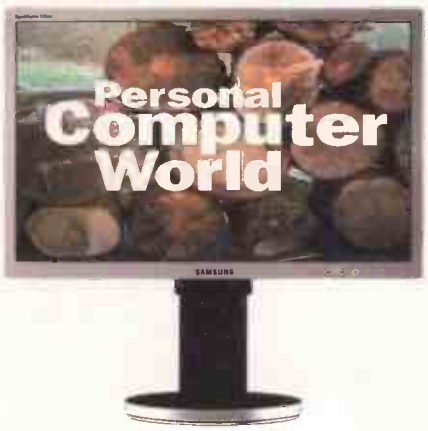
Pros Simple to use; distinctive design; image quality
Cons No on-screen menus; no VGA input; limited image control
Features ★★★★☆
Performance ★★★★☆
Value for money ★★★★☆
Overall A digital-only panel with no bells and whistles, but good image quality and styling ★★★★☆

22IN TFT

Samsung Syncmaster 225BW

A quality 22in monitor, with a good selection of features

Personal Computer World RECOMMENDED



Samsung's new monitor, the Syncmaster 225BW, has a neat matte silver finish, with a pleasingly thin bezel. It's based on a 1,680x1,050 resolution widescreen TN-based panel (**www.pcw.co.uk/2149165**), with a gamer-friendly 5ms response time. The display offers good colour and readability, and the rarely seen inclusion of HDCP (High-Bandwidth Digital Content Protection) support means it'll allow playback of the latest content-protected HD formats. The monitor's stand has tilt, swivel and height adjustments, but no cable management, leaving your PC and power connections to hang below the monitor bezel.

Six control buttons offer access to a clear on-screen menu. The Enter button doubles as an input selector to enable switching quickly from VGA to DVI connections.

Speakers for the 225BW are an optional extra (about £16). The slimline unit clips onto the bottom of the display, adding a pair of stereo speakers, a volume control, and headphone and microphone sockets.

It costs more than most budget 22in TFTs, but the 225BW has more features. The Down navigation button brings up a menu from which you can choose brightness presets. These let you switch between configurations for close-up work and DVD viewing.

A Samsung software CD includes a monitor driver and a pair of utilities. Natural Color calibration software ensures optimum display setup and basic colour-matching. Magic Tune ensures your monitor displays the optimum image quality without the need to navigate, and allows users to save their own settings.

The Syncmaster 225BW is a good choice if you plan to use Windows Vista or want the best quality from your display. *Paul Monckton*

Details

Price £370
Best price www.pcw.co.uk/bestprices
Contact Samsung www.samsung.co.uk
Specifications 22in widescreen class II TN panel • 1,680x1,050 resolution • 700:1 contrast ratio • 280 cd/m2 brightness • Viewing angles (H/V) 160°/160° • 5ms response time • VGA & DVI inputs • Optional stereo speakers • Tilt, swivel and height adjustment • HDCP support • 505x220x408mm (wxdxh) • 6.9kg • Three-year warranty

Verdict

Pros HDCP; software support; good image quality
Cons Price; no USB; no cable management
Features ★★★★☆
Performance ★★★★☆
Value for money ★★★★☆
Overall Good features, but pricey ★★★★☆

22IN TFT MONITOR

Iiyama Prolite E2200WS

Iiyama's latest widescreen TFT is low on frills, but also low on cost

Housed in a simple yet tidy chassis, the Prolite E2200WS follows a similar design to previous models in the Prolite range. It's finished in matt black, with a pleasingly thin bezel and a narrow speaker grille beneath the screen. There are few design flourishes, but build quality is very good.

This Iiyama TFT is part of a new crop of 22in widescreen monitors from various manufacturers, all of which use a TN-based panel with a 5ms response time. This delivers the speed gamers demand, without the added cost of high-spec MVA or S-IPS panels favoured by graphics professionals.

Dual VGA and DVI inputs allow simultaneous connection of your PC and another device, such as a games console, while the widescreen aspect ratio is ideal for DVD playback or for use with the Media Center capabilities of the new Windows Vista operating system.

The Prolite E2200WS is a budget display in its class, so you don't get some of the features we've seen on competing products in this format. Most noticeably, the monitor stand offers a rather stiff tilt adjustment. It's also lacking brightness presets or extras such as calibration software. The display, however, is bright and has good colour response. Despite its fairly low price, it comes with a three-year, on-site warranty as standard.

Six control buttons provide access to the on-screen menu system. One of these is an auto setup button, provided for convenient configuration when using the VGA port. The menu itself is very easy to navigate. Although no sRGB mode is provided, there is a selection of colour temperatures available to match your preference.

All in all, the Prolite E2200WS is well built, performs well and comes at a decent price. *Paul Monckton*

Details

Price £292.58
Best price www.pcw.co.uk/bestprices
Contact Iiyama www.iiyama.co.uk
Specifications 22in widescreen class II TN panel • 1,680x1,050 resolution • 1000:1 contrast ratio • 300 cd/m2 brightness • Viewing angles (horizontal/vertical): 170°/160° • 5ms response time • VGA & DVI inputs • 2 1W speakers • Tilting stand • Internal power supply • Vesa mount • 517x173x444mm (wxdxh) • 5.8kg • Three-year, on-site warranty

Verdict

Pros Price; build quality; warranty
Cons Tilt-only stand; no HDCP; no software
Features ★★★☆☆
Performance ★★★★☆
Value for money ★★★★☆

Overall An excellent entry-level 22in widescreen display, albeit a bit low on extras
★★★★☆

22IN TFT

Viewsonic VG2230wm

An affordable 22in widescreen TFT, ideal for work or home use

Personal Computer World RECOMMENDED

Heading up Viewsonic's new Graphic range of business-orientated monitors, the VG2230wm is the largest. The range has no fewer than 10 models, varying in size from 17in to 22in, and available in standard 4:3 and wide 16:10 aspect ratios.

As with the rest of the VG range, VG2230wm's design shows plenty of attention to detail. Finished in a satin matt black, the thin bezel is embellished with a silver trim with curves that make space for five silver buttons on the left-hand edge of the case.

Boasting a 1,680x1,050 pixel widescreen display, the VG2230wm is ideal for spreadsheet work, or for viewing full-page documents side by side. The screen is large and impressive, and can display text well.

Although the quoted contrast ratio of 700:1 is lower than Iiyama Prolite E2200WS's ratio of 1000:1, we thought the image contrast delivered by the VG2230wm was as good as, if not better than, the Prolite. Colours are rich and saturated, and an sRGB mode is provided for quick and easy colour matching.

It may cost a little more than budget monitors in its class, but the design alone warrants the extra money. In addition, it comes with an excellent ergonomic stand offering tilt, swivel and a large 135mm height adjustment. It's also fitted with VGA and DVI inputs.

Our only criticism of the VG2230wm is the location and size of the control buttons. Tucking them out of sight may improve the monitor's clean looks, but we found them rather tricky to use and the button legends difficult to read.

If you like the design and high-resolution of the VG2230wm but want to spend a little less money, Viewsonic has two 20in versions available starting at £257.33. *Paul Monckton*

Details

Price £337.23
Best price www.pcw.co.uk/bestprices
Contact Viewsonic www.viewsoniceurope.com
Specifications 22in widescreen class II TN panel • 1,680x1,050 • 700:1 contrast ratio • 280 cd/m2 brightness • 5ms response time • Two 2W speakers • VGA & DVI inputs • Tilt, swivel and height adjustment • Internal power supply • 519x250x436-571mm (wxdxh) • 6.6kg • Three-year warranty

Verdict

Pros Build quality; good features; design; ergonomics
Cons Fiddly control buttons; no USB ports
Features ★★★★☆
Performance ★★★★☆
Value for money ★★★★☆

Overall A well-made, stylish and ergonomic display that performs well
★★★★☆

MULTIMEDIA PLAYER

Aigo A029

Strap your media to your wrist to enjoy on the move

Aigo's rather unusual A029 digital watch is a fully featured multimedia player, complete with a photo viewer, mp3 player, video player, e-book reader and voice recorder. You can configure the screensaver to show the time, and if you disable the 'auto off' function it behaves as a wristwatch when idle. Considering it *is* a watch, these features are pretty handy, although you have to charge it nightly.

Despite first impressions – it screams Kinder Egg toy! – you can't help but like the A029. There are a few designs from which to choose, all of which come with a jelly rubber strap and a comfortable and surprisingly secure fastener.

Sound quality is reasonable through the supplied headphones that plug into the side of the device. It comes with a handful of basic options for adjusting audio, including graphic equaliser presets, but we were left frustrated that the sound cuts off if you navigate back to the main menu to read an e-book.

The rest of the features are fairly basic. The video format support is somewhat lacking and it wasn't clear whether this was a codec or a screen resolution issue. It doesn't come with conversion software to get correctly formatted files on to the watch either, and storage capacity is just 1GB, so you'll need to save space.

The display's quality is excellent, especially when viewing photos, but it's doubtful many people will want to watch a film on a 1.3in wrist screen.

In truth, the A029 is an mp3 player of reasonable quality, but its other features are more gimmicky than useful. With a well-designed control layout, it's easy to navigate menus on the move. While it might appeal to, say, an avid jogger, we doubt it will have mass appeal. Still, the A029 is a likeable product that left us pleasantly surprised. *Paul Lester*

Details

Price £79.99 (512MB), £99.99 (1GB)
Best price www.pcw.co.uk/bestprices
Contact www.aigo.co.uk
Specifications 512MB/1GB capacity USB2 • Mp3, Wma, Ogg, Avi, Jpeg, Txt • 1.3in LCD display (160x128 resolution) • 2.5 hours video playback • 4.5 hours music playback

Verdict

Pros Comfortable to wear; slimline; decent audio quality; good display
Cons Limited features for controlling media; poor video support
Features ★★★☆☆
Performance ★★★★☆
Value for money ★★★★☆
Overall While some of the features don't perform particularly well, this is a surprisingly effective solution for playing music on the move
★★★★☆

MP3 PLAYER

Sandisk Sansa e280

Personal Computer World RECOMMENDED

Sandisk squares up to the iPod Nano with an 8GB powerhouse

It would appear Sandisk is trying to beat Apple at its own game with the Sansa e280, a media player sporting a glowing blue scroll wheel that navigates in exactly the same way as Apple's Nano.

Unlike Apple's touchpad, though, this is a raised mechanical wheel that accompanies a centre select button and four additional playback controls. While it's very responsive, the surrounding buttons are difficult to press. In addition to a photo viewer, it also has a video playback and voice recorder built in.

Video and photo content is transferred using the conversion software supplied, although file sizes nearly double when converting compressed video files to the .mov format the player supports. You can transfer music by drag and drop, or by syncing with Windows Media Player, and you'll find everything sorted into typical categories for easy browsing. Sound quality is excellent, and although the viewing angle isn't great the screen is bright and clear and does a decent job of showing off videos or photos.

You'll get more than 20 hours of audio playback from the device, and you can replace the battery supplied, thanks to the removable back panel. You'll also find a micro SD card reader to top up the 8GB capacity if you need it and, together with a decent array of options for managing music, pictures and video, it seems Sandisk's player has most bases covered.

There's nothing jaw-dropping about the e280, though, and iPod owners will still argue that Apple scores more points for style and usability. Those who consider value for money and additional features more important, or those looking for a suitable alternative to Apple's baby, may find that the e280 has more than enough to offer. *Paul Lester*

Details

Price £149
Best price www.pcw.co.uk/bestprices
Contact Sandisk www.sandisk.co.uk
Specifications 8GB capacity • Micro SD expansion slot • Carry case • Mp3, Wma, Wav, Jpeg, Bmp, .mov • 20-hour battery life • 1.8in display • 88x43x12 (hxwxd) • 75g

Verdict

Pros Great sound quality; feature-packed; decent battery life; dedicated voice recorder controls; good value for money
Cons Poor viewing angle on LCD; control buttons awkward to operate
Features ★★★★☆
Performance ★★★★☆
Value for money ★★★★★
Overall Sandisk's Sansa e280 is a great player that offers a range of features at a reasonable price
★★★★☆

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NETWORK CAMERA

Peak Mpeg4 Pan/Tilt Internet Camera

A low-cost way to monitor your home via the internet

A cunning way to spy on Santa Claus next Christmas

If you're planning trips away, being able to check up on your home may be a tempting proposal. Network cameras, unlike standard webcams, provide you with live video footage and are accessible from any internet-connected PC, without the need for your home PC to be switched on.

The rather unimaginatively named Mpeg4 Pan/Tilt Internet Camera from Peak (available in the UK through Spot On UK **www.spotonuk.com**) is a relatively cheap network camera, but one that nonetheless comes with a decent set of features.

With an Apple-white design, the camera looks pretty slick and will hook up to your router either via a standard Ethernet cable or a wireless connection. Unlike many similarly priced network cameras, it also has the ability to pan its lens 170° horizontally and 135° vertically, giving you a decent field of view.

We gave both the wired Ethernet and wireless connections a go and experienced no problems getting the camera to talk to the router. The software interface, accessed via a standard web browser, is reasonably uncluttered with the live video window taking up most of the home page.

Settings such as camera angle, brightness, audio and zoom sit on the right, while the various menu shortcuts are placed along the top of the screen. Hovering over one brings up further options, which can be a pain if you have an over-sensitive mouse.

Video quality is acceptable in general, but doesn't compare well with the quality offered by more expensive network cameras such as the Axis 212 PTZ (see **www.pcw.co.uk/2167923**). Although a zoom option is available from the main window, this isn't an optical zoom function so basically just increases the pixel size. Indeed, zooming in by even a small amount vastly reduces picture quality, making it a rather pointless feature and not one we see many people using.

The lens can be shifted either using the horizontal and vertical navigation bars, or by simply clicking on an area of the live video to centre on. The camera is quick to respond to movement requests but the motor is rather noisy, so if you're keeping tabs on an intruder they'll soon know the game's up.

While on the subject of noise, it's worth noting that the camera houses an internal microphone. But the audio we experienced was of a poor quality and frequently cut out altogether.

If you plan to use the camera to monitor for intrusions, you can designate up to three motion-detection zones. If movement is detected in any of these zones the alarm will be triggered; all other movement will be ignored.

A schedule can be set up to activate the detection only at certain times and on specific days of the week. Video or snapshot files (various resolutions are available) can be emailed or transferred to a network folder but, unlike most other network cameras, uploading to an FTP site isn't supported.

The main problem we have with this internet camera is the interface. For example, setting up email notifications when movement is detected proved a real task, and one that wasn't helped by the lack of an error logging system, or even a simple error code database. Other limitations, such as the lack of FTP support, are disappointing.

Despite these flaws, if you're after a cheap network camera, the pan and tilt lens of this Peak model will no doubt appeal. *Will Stapley*

Details

Price £128
Best price www.pcw.co.uk/bestprices
Contact Spot On www.spotonuk.com
Specifications Cmos sensor • 640x480, 320x240, 160x112 video modes • 30fps • 170° horizontal pan • 135° vertical tilt • Ethernet port • 802.11g wireless • Built-in microphone

Verdict

Pros Cheap; pan and tilt lens
Cons Interface could be improved; digital zoom only; no FTP support; image quality

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

Overall A cheap pan and tilt camera that performs reasonably well, but you're frequently reminded of its budget nature ★★★☆☆

DIGITAL CAMERA

Casio Exilim EX-770

A superbly stylish, compact digital camera

Personal Computer World RECOMMENDED

The Casio Exilim range has done well for itself in the past, and the new EX-770 is one of the most compact 7MP digicams we've seen. It's slim, very stylish and available in a range of colours.

While it looks as if it's overloaded with controls, they are well utilised, making it very usable on the move. The EX-770 houses a wide range of features for fine-tuning your photos. Those with a good knowledge of photography should find enough here to get the most from their shots.

The functions you'll use most, such as flash and shooting modes, Iso sensitivity and white balance adjustment, are made accessible as shortcuts on a vertical menu that sits over the LCD. After a bit of practice it takes just seconds to make quick adjustments to your shot for the environment.

The LCD is bright and clear, and does a great job at previewing your photos. Unfortunately, as a replacement viewfinder it slips up a little. At the widest zoom setting it's not bad, but zoom in and try to find the right shot and artefacts combined with a fairly slow refresh rates obscure the screen somewhat. The resulting photos are good for the most part, the Macro mode is excellent and close-up shots after dark are impressive – but an Iso sensitivity of 800 means that long-distance night shots can be noisy.

As a point-and-shoot solution the EX-770 is very capable, and the automatic mode is good at making quick adjustments to the shot depending on lighting, so this a great camera for beginners. It's usable and quite forgiving in terms of camera shake, and its portability makes it an ideal solution if you want to carry it around.

Hunt around online and you'll be able to save a bit of cash, but at a little over £200 this is a reasonably priced digicam for the performance on offer. *Paul Lester*

Details

Price £230
Best price www.pcw.co.uk/bestprices
Contact www.casio.co.uk
Specifications 7.2MP CCD • Photos up to 3,072x2,304 • Movies up to 704x384 • 6MB memory • Card slot for SDHC/SD/MMC • F2.7(W) to F5.2(T) • f=6.2(W) to 18.6(T)mm • 3x optical zoom, 4x digital zoom • 1/2,000 sec shutter speed • Iso sensitivity 800 • 2.8" LCD • 95x60x17mm (wxdxh)• 127g

Verdict

Pros Slim and compact; good point-and-shoot solution; quality LCD; usable menu and controls
Cons LCD falls down as a viewfinder
Features ★★★★☆
Performance ★★★★☆
Value for money ★★★★☆
Overall The EX-770 is capable, stylish and portable. It's ideal for beginners and advanced users
★★★★☆

INKJET PRINTER

HP Photosmart A618

Create 7x5in photos at home with HP's £100 compact photo printer

It's no secret that home photo printing is on the up. Most of us own a digital camera, so why should we bother with high street processing when printing snaps in the front room is quicker and simpler? Cost per print could be a problem, but with compact photo-printers such as the HP Photosmart A618 churning out 6x4s at a rate of 18p each, the gap has closed dramatically. What's more, the A618 can print the larger 7x5in format, making it a versatile choice.

After a recent price drop, the A618 represents good value for money, so where have compromises been made? Our biggest concern lies with image quality. While the HP Vivera ink and dedicated photo paper tag team work to produce good detail and colour reproduction, the finished article didn't impress us as much as the Canon Pixma mini260. Printing speed is also slow in comparison, scraping 110 seconds for a 6x4in print and 130 seconds for a 7x5in print.

But in terms of features, the A618 is second to none. Its memory card slots support most formats and it features a port for USB keys and PictBridge, plus integrated Bluetooth for wireless printing. Then there's a 6cm adjustable screen, carry handle, space for an optional battery pack and a PhotoFix feature to enhance the richness of an image without a computer, albeit only slightly. For a reasonable £100, this is a very impressive set of features.

The tri-colour print cartridge is easily replaced and costs £15, or £25 with 120 sheets of 6x4in paper. A pack of 25-sheet 7x5in paper costs £6 from the HP website (**www.hp.co.uk**).

Although the A618 is slower than its competitors and doesn't match up quality wise, its range of features and ability to print at 7x5in sizes still make it a good, if not essential, buy. *Luke Peters*

Details

Price £99
Best price www.pcw.co.uk/bestprices
Contact www.hp.com/uk
Specifications Thermal printing • 4,800x1,200dpi (optimised) printing from a computer • Print speed to 98ppm • 1,200dpi printing from removable media • 20-sheet input and output trays • 252x116x129mm (wxdxh) • 1.57kg

Verdict

Pros Prints at 7x5in; integrated Bluetooth; cheap to run; carry handle and optional battery pack
Cons Print quality not as good as other devices; takes longer to print than others
Features ★★★★★
Performance ★★★☆☆
Value for money ★★★★☆
Overall A cracking printer, but the print quality loses points gained by its 7x5in capability
★★★★☆

PROFESSIONAL A3+ PHOTO INKJET PRINTER

HP Photosmart Pro B9180

Personal Computer World RECOMMENDED

A range of powerful features makes the Photosmart Pro B9180 a force to be reckoned with

HP's latest Photosmart is packed with the latest print technology to get the most from text or photos. Several new types of paper are available for use with the B9180. The new ink formulation and flexible media handling allow reproduction on media, such as stretchable 385gsm canvas. HP's Vivera pigment inks are water resistant and, according to HP, last up to 200 years. The B9180 uses eight ink tanks: photo black, matte black, light grey, light cyan, light magenta, cyan, magenta and yellow. This combination of ink allows a wide gamut of colours and black and white prints.

Two black cartridges are installed simultaneously, but are used individually, depending on the type of paper you're printing on.

Four print-heads supply ink to the paper, offering a total of 8,448 nozzles. HP doesn't disclose the print dpi in its literature, but trust us – it's good. Although the print heads are designed to last for the lifetime of the printer, they can be replaced without shipping the printer for repair should they become worn.

When you turn on the printer for the first time, an automated self-calibration process starts. The procedure uses a few sheets of paper (provided in a pack) to ensure the colour output is exactly as specified.

The B9180 prints each test page and measures it with a built-in densitometer, tweaking its internal settings to ensure images remain within specification. No user intervention is required other than feeding the paper.

A wide selection of ICC colour profiles is provided to ensure consistent and accurate colour matching, whichever paper you choose. To make the most of the B9180, you're likely to change paper types frequently. Because different papers need different colour profiles, HP has provided an application to help you keep them organised and incorporate profiles of your own.

Many photographers use Adobe Photoshop to process and print images, and HP provides a Photoshop plug-in to bring together the appropriate settings and allow you to save frequently used configurations.

Two print trays are provided. The lower tray is fully covered and accepts up to 200 pages of plain paper or 60 sheets of photo paper. The upper tray folds down to allow a single sheet of paper to be fed with a thickness of up to 1.5mm.

Printing a 6x4in photograph at the best quality settings took nearly two minutes. Stepping down to fast draft mode reduced the time to 42 seconds. Much of this time was taken up by the printer setting up to print. Once ink started to hit the page, only 12 seconds elapsed before the finished print was in our hands.

In all our tests, and regardless what paper we printed on, results from the Photosmart Pro B9180 were stunning. When printing on speciality papers such as canvas and watercolour paper, it's hard to believe they were produced by an inkjet printer. On a variety of gloss, matte and semi-gloss papers, photographic output is the best we've seen.

Colour reproduction, black density, image detail and finish are superb. The Photosmart Pro B9180 stands out in terms of quality and the breadth of what it can do.

If you just want to print out holiday snaps, there's no need to spend this kind of money, but if you're into photography or graphic arts, the B9810 will bring your images to life in ways you had never imagined.

Whether you're an enthusiast or a professional, the HP Photosmart Pro B9180 delivers the quality, speed and print longevity you'll need to exhibit, or even sell your work.

Paul Monckton

Details

Price £499
Best price www.pcw.co.uk/bestprices
Contact www.hp.com
Specifications 8-colour pigment-based ink system • Four print heads with a total of 8,448 nozzles • Built-in densitometric calibration • Borderless prints up to A3+ • Support for speciality fine art papers • High-speed USB 2.0 and 10/100-Base-TX connections • 675x430x235mm (wxdxh) • 17.1kg

Verdict

Pros Superb image quality; media handling; speed; durability
Cons Less user-friendly than a consumer model

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

Overall The Photosmart Pro B9180 is aimed at professionals, but anyone who wants to print big, professional-quality photos won't be disappointed

★★★★★

MONO LASER MULTIFUNCTION DEVICE

Oki B2500 MFP

Personal Computer World RECOMMENDED

A compact multifunction laser with a low price but high running costs

Oki's B2500 MFP is a budget mono laser printer, scanner and copier aimed at individual users. It's a compact unit and the relatively small footprint means it won't take up too much space in a home-office environment. It's also silent during standby, which will similarly appeal to home users.

A control panel sits at the top and provides quick access to photocopying and various other menu options, with a two-line LCD indicating what's going on.

Setup certainly shouldn't pose too many problems. We managed to get the printer up and running in just five minutes – all you need to do is remove the packaging, load some paper and insert the toner cartridge.

A 250-sheet input tray is situated at the bottom of the unit, while a single-sheet feeder allows quick loading for other paper types. There's no real output tray; instead, the sheets are ejected just underneath the scanning unit and a flip-out piece of plastic stops them from tumbling to the floor. The downside of this method is that only 50 output sheets can be handled at any one time but, for home users, this shouldn't be too much of a problem.

Print quality is very impressive considering the price of the unit. With budget lasers we often see quality issues, but text printed by the B2500 MFP is incredibly sharp and clear.

As far as speeds go, Oki quotes the B2500 MFP's print speed at 16ppm (pages per minute). Our plain text tests showed this to be pretty near the mark, with a rate of 14.7ppm. Our sample Pdf took a little longer to be printed at 12.13ppm.

As with all printers, and indeed any product that requires frequent maintenance, total cost of ownership is an important factor when it comes to making a purchase decision. The RRP for the printer is £149, but it can be picked up for about £120.

The standard toner cartridge costs £71 and is good for 2,200 pages (3.2p per page, assuming five per cent coverage), but the printer actually ships with a 1,500-page cartridge as standard. This is common with laser printers and allows manufacturers to reduce that all-important initial outlay for the printer. Should you be happy splashing out a little extra when the starter cartridge is on its last legs, a high-capacity 4,000-page (£90/2.3p per page) version is available and offers better value for money.

Although this isn't outrageously expensive, the Dell 1710n mono laser we recently reviewed (see **www.pcw.co.uk/2158194**) is a fair bit cheaper to run, with a 3,000-page toner at £64 (2.1p per page) and a 6,000-page version for £81 (1.4p per page).

Aside from the toner, there are no other consumables to replace and each new toner cartridge comes with its own image drum.

The maximum monthly duty cycle for the B2500 MFP is 2,000 pages. If you think you'll exceed this, you'd be better off opting for a more expensive model. Oki has various models in this range. This model is the cheapest, while the B4525 MFP sits at the top, with a duty cycle of 12,500 pages.

If you're prepared to pay the reasonably high running costs, the B2500 MFP is a great printer that's hard to beat in terms of ease of use and print quality. Finally, it's worth noting that this is a Windows-only printer. *Will Stapley*

Details

Price £149
Best price www.pcw.co.uk/bestprices
Contact Oki www.oki.co.uk
Specifications Mono laser • Colour scanner (600x600dpi) • 16ppm • Starter toner cartridge 1,500 pages • 250-sheet input tray • USB • Windows 98/ME/2000/XP • 447x386x344mm (wxdxh) • 11kg

Verdict

Pros Low price; easy to set up
Cons High toner costs
Features ★★★★☆
Performance ★★★★★
Value for money ★★★★☆

Overall Good quality, easy to set up and a low RRP, but the running costs are fairly high ★★★★☆

WIFI RADIO

BT Internet Radio

Internet radio anywhere, provided you have a long mains lead

If you're a seasoned Wifi user, the likelihood is that you'll expect each new device introduced to the network to sulk at first. There's no such story with BT's Internet Radio, a near-portable stereo gadget promising streamed audio content from thousands of net-radio stations, or your own computer, over any Wifi network.

The device's design and construction is decidedly Home Hub – white plastic, rounded corners, aesthetically challenged – but it is truly plug and play, sniffing out a wireless router in moments and ready to go without a qualm. Although there's what looks to be a battery compartment at the rear, it only runs off the mains.

Encrypted networks pose no problem, even if it takes a while to enter a 128-bit Wep key via the tuning dial, and the two-line, blue-backlit LCD is quick to announce that live or on-demand content is ready for streaming.

Stations are organised by continent, country and then alphabetically. Words scroll across a display that's hard to read at eye-level, so you need to look from above.

You need patience to explore the Real Audio, Wma and mp3-streamed stations available. First boot reveals 2,226 American stations. Their narrow-bandwidth output sounds thin, as is the norm with internet radio stations.

The test of audio quality is with streamed content from a local PC or Mac, which the radio can finger over the network to access shared folders. Mp3, Aac, Wma and more show up organised by tag, so you can entertain folks with playlists of your own audio collection via the boxy-sounding stereo speakers. If you've bought your music via iTunes or other DRM (Digital Rights Management) download services, you're out of luck because the radio can't play rights-managed content.

Uncompressed audio streaming is possible, but even full-bore Wav and Aiff files still sound unpleasant.

Internet radios are a good idea for language lovers or homesick ex-pats who can put up with the limited audio bandwidth and drop-outs of streamed delivery. But they may baulk at the design, sound quality and price of BT's offering.

Karl Foster

Details

Price £149.99
Best price www.pcw.co.uk/bestprices
Contact BT www.shop.bt.com
Specifications Stereo 1.5W output • Headphone socket • USB • 802.11b and 802.11g compatible • Plays Real Audio, Wma, mp3, Aac, Wav and Aiff • 2-line, 16-character backlit display • 12 user memories • Clock and alarm • 285x134x95mm (wxdxh)

Verdict

Pros Easy setup; plays a wide range of formats; integral alarm clock
Cons Poor design and construction; LCD hard to read; boxy sound; cannot play DRM content; does not take batteries; expensive

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

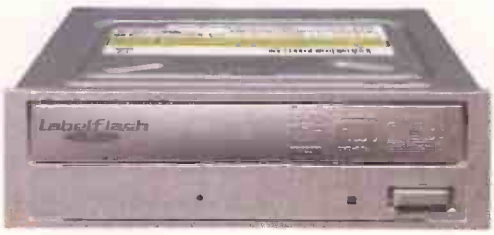
Overall Simple to get up and running, but BT's Internet Radio falls down in too many areas
★★☆☆☆

LABELFLASH DVD WRITER

NEC AD-7173A

A fast DVD writer that lets you etch labels onto discs

Personal Computer World RECOMMENDED



In early 2005 HP and Lite-on launched Lightscribe, a technology that etches images onto the top side of DVDs. Fujifilm and Yamaha responded in mid-2005 with their similar Labelflash technology, but cunningly charged fewer royalties for it.

Both technologies let you put any image or text onto the top of the disc. This makes using a permanent marker or sticking a label onto discs a thing of the past. After burning a DVD, you flip it over and pop the disc back in the drive and then burn an image to it.

Initially, we couldn't get this Labelflash drive to burn images, for the bizarre reason that we were using a US version of Nero 7. Nero versions 6.6.1.3 and 7.0.8.2 (European) and above are compatible, however.

When we were provided with working software, making attractive discs was a doddle. You select Nero Design Cover, create the image you want to use (as in any other paint program) and then hit Burn.

The drive boasts some of the fastest write speeds we've seen. At 18x for +/-R, we filled a full DVD in just six minutes, 40 seconds. Image-burning time ranges from seven minutes to 26 minutes at the highest quality. By choosing a much higher contrast we produced an even more vibrant image in 45 minutes. We've seen Labelflash discs online, selling for £1 each, which is twice the price of Lightscribe discs.

The debate continues to rage as to which produces better results, and it is generally accepted that Labelflash produces better contrast, whereas Lightscribe produces more vivid images.

In the furore over Blu-ray and HD-DVD, Labelflash has been overlooked. There's no reason why we won't see image-burning on future Blu-ray/HD-DVD formats, and this evolutionary and underestimated technology deserves more credit than it has had.

Industry insiders say that full-colour images will eventually be a reality, but don't hold your breath as there are significant technical hurdles to jump before this happens.

Emil Larsen

Details

Price £25
Best price www.pcw.co.uk/bestprices
Contact NEC www.nec.co.uk
Specifications DVD-R/RW: 18x/6x • DVD+R/RW: 18x/8x • Dual layer-R/+R: 8x/8x • DVD-Ram: 12x • CD-R/RW: 48x/32x • 1,000dpi Labelflash

Verdict

Pros Fast drive; images are a nice touch; easy to use
Cons Limited software support; discs more expensive than Lightscribe

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

Overall A competent and fast DVD drive with Labelflash capabilities
★★★★☆

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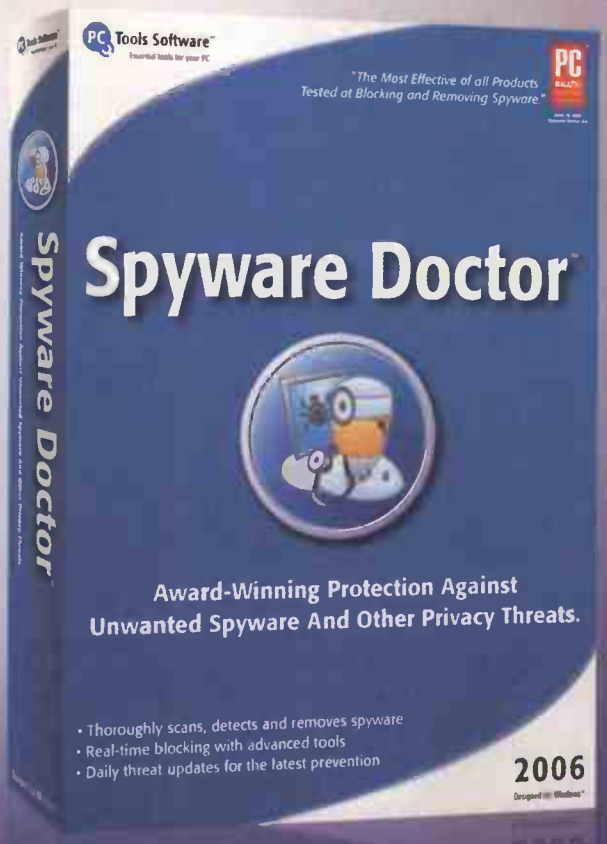

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PC Magazine Editors' Choice June 19, 2005, Spyware Doctor V3.2

PC Magazine Best of the Year 2005 - Anti Spyware 27 December 2005, Spyware Doctor V3.2

For a *free* Spyware Doctor scan go to www.spywaredoctor.co.uk

Spyware Doctor 4.0 November 2006 | Spyware Doctor 3.2 Issue 237, December 2005 | Spyware Doctor 3.5 Issue 157, April 2006 | Spyware Doctor 3.2 Issue 71, 2006 | Spyware Doctor 3.8 Issue 139, July 2006 | Spyware Doctor 3.8 August 2006 | Spyware Doctor 3.2 September 2005 | Spyware Doctor 3.8 August 2006 | Spyware Doctor 3.5 May 2006

VIDEO CONVERTER

Terratec Grabster AV400 MKII

The transfer of analogue video direct to DVD via USB is made a sight slicker

Techno-joy starts early in life, so it is possible to accumulate a horde of technology that becomes obsolete. Videotapes are a case in point. Films are remastered for DVD, but it's up to you to preserve memories captured with analogue camcorders.

Analogue-to-digital converters enable you to port a video feed from any analogue device into capture software. Terratec has applied a design eye to the matter and devised the Grabster AV400 MKII, a USB device offering hardware Mpeg encoding to lighten the load on the system's processor during capture.

It is bundled with the expected S-video, composite and Scart connectors, although there is no RF input. Terratec also includes budget capture and editing suite Ulead Moviefactory 5 **(www.pcw.co.uk/2152902)**.

Any video source with the appropriate outs can be put through the Grabster, so recording satellite and cable TV is an option, although there is the inevitable degradation of image quality characteristic of analogue technology. Nevertheless, the system promises portability and good conversion performance, even if it has a habit of falling off its unsecured stand.

Setup is easy: plug in the Grabster, load the drivers from disc, install Ulead's software and plug in the analogue source. S-video and composite output appear cleanly in the interface, which invites you to render video to disc in a wide variety of file formats, or burn straight to recordable DVD.

Moviefactory 5 is entry-level, but there is a support pack for Ulead Video Studio 10 downloadable from the publisher's website. You can import the recorded material into any decent video editor.

For easy creation of VCDs, SVCDs and DVDs from video, the Grabster fits the bill. It lacks sophistication but does the job and is well priced. *Karl Foster*

Details

Price £99.99
Best price www.pcw.co.uk/bestprices
Contact Terratec www.terratec.co.uk
Specifications USB 1.1 hardware Mpeg encoder • Composite, stereo audio and S-video in • Scart in/out adaptor • Pal and NTSC support • Pal capture to 720x576 pixels, 25fps • NTSC capture to 720x480 pixels, 29.9fps • 115x83x23mm (wxdxh)

Verdict

Pros Easy setup; hardware Mpeg encoding; one-click transfer to DVD in software; well-constructed hardware; accessory bundle; portable
Cons Encoder stand falls off; no RF connector; limited creative options in software; no printed manual

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

Overall For hassle-free video conversion the Grabster fits the bill, but it has its limitations ★★★★☆

PORTABLE HARD DRIVE

Buffalo Drivestation Duo

Keep your files safe with this 1TB portable hard drive

Personal Computer World RECOMMENDED

Roughly the size of two bricks, the Buffalo Drivestation Duo consists of two 7,200rpm Serial-ATA hard drives, a power supply with cooling and the electronics to make it work. Ports provide Hi-Speed USB2, and 4-pin and 6-pin Firewire interfaces.

Setup is easy thanks to the CD installation wizard. It takes you through installation and cable connection (USB and Firewire cables are supplied) and installs a Raid utility, which allows you to configure the Drivestation Duo in one of three Raid modes.

Having two hard disks gives you the option of employing them as individual drives or combining them in one of two ways. By default you will see two hard drives. Selecting Spanning Mode combines them into one volume, while choosing Raid 1 Mirror produces a single volume with a redundant mirrored copy. The Raid 1 mode therefore offers maximum protection from disk errors, but at the cost of half the total disk space.

A switch at the rear of the device allows you to enable automatic power mode. In this mode, the drives will power up only when requested via a USB signal.

Many users of the Drivestation Duo will use it for fast, reliable data backup. Also supplied on CD is a copy of Memeo Autobackup. It will back up crucial files silently in the background, without the need to configure manual or scheduled backups.

Being portable, the Drivestation Duo is great for moving data between PCs. When the drive is disconnected, Memeo is clever enough to keep track of those files you've been working on so they can be saved when the drive is plugged back in.

Ranging from 500MB to 1.5TB in size, the Drivestation Duo often offers better value per gigabyte than its single-drive cousin, the Drivestation Combo. You also get the benefits of Raid 1 mirroring. *Paul Monckton*

Details

Price £159.80 (500GB)
Best price www.pcw.co.uk/bestprices
Contact Buffalo www.buffalo-technology.com
Specifications 500GB 7,200rpm Serial-ATA hard disks • 11ms seek time (maximum) • Raid 1 and spanning modes • Drive encryption • Memeo backup software 163x221x99mm (wxdxh) • 2.9kg • Two-year warranty

Verdict

Pros Easy to use; power-saving features; software and documentation
Cons Two drives means a bulky chassis; lacking in style

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

Overall A capacious and reliable backup solution, with good software support ★★★★☆

GRAPHICS CARD

Asus EN8800GTS

A high-end card for gaming enthusiasts and Vista

The Asus EN8800GTS is the latest graphics card we've seen to sport Nvidia's 8800GTS processor. The chip may be one step down from the king of the hill, the 8800GTX, but it still packs a considerable punch.

The card is shorter than 8800GTX boards, making it easier to install, and it draws less power – Nvidia recommends a 400W power supply.

The graphics processing unit (GPU) runs at 500MHz and has 640MB DDR3 Ram ticking along at 1.8GHz. It's one of the first cards to support DirectX 10, a standard Microsoft is making available only to Vista users. This should improve gaming effects in the way DirectX 9 did over previous versions.

At 1,024x768, the EN8800GTS scored a huge 25,827 and 9,609 in 3Dmark03 and 3Dmark05, respectively. At this resolution it averaged 83.7fps (frames per second) in Doom3, which was disappointing as it was beaten by overclocked X1900XTX cards that cost £100 less.

It's similarly priced to Nvidia's dual-GPU 7950GX2, but in tests the 7950GX2 outperformed the EN8800GTS by a reasonable margin in all games at low resolutions.

The EN8800GTS overtakes the 7950GX2 performance-wise when resolutions are set to 1,600x1,200 with 8x FSAA and 16xAF (anisotropic filtering). It has playable frame rates where older cards clapped out and is quieter than the 7950GX2.

The huge box contains the games GTI Racing and Ghost Recon Advanced Warfighters, and a full version of 3Dmark06 to see how your system performs. A single DVI-VGA dongle and composite cables are also included.

The Asus EN8800GTS is suitable for gamers who have high-resolution monitors, but it will be overkill for others, who would be better off opting for an older and cheaper model. *Emil Larsen*

Performance

3Dmark05* 9,609

0 | 5,000 | 10,000 | 15,000

*Tested at 1,024x768 in 32-bit colour

Details

Price £387.75
Best price www.pcw.co.uk/bestprices
Contact www.asus.co.uk
Specifications Nvidia 8800GTS • 500MHz core • 800MHz memory (1800MHz effective) • X16 PCI express • Two x DVI-I • S-video out • 640MB GDDR3 Ram

Verdict

Pros DirectX 10; high 3Dmark scores
Cons Average at lower resolutions
Features ★★★★★
Performance ★★★★½
Value for money ★★★½☆
Overall One for high-resolution gamers, but not a must-have until DirectX 10 games arrive
★★★★½

GRAPHICS CARD

Sapphire Radeon X1950 Pro AGP

Give your AGP system a new lease of gaming life

Personal Computer World RECOMMENDED

The AGP slot celebrates its 10th birthday this year and refuses to disappear, despite being superseded by PCI Express in 2004. The Sapphire Radeon X1950 Pro is based on ATI's RV 570 chip running at 580MHz.

An x16 PCI Express slot offers read transfer rates that are double that of an AGP 8x slot, but this wasn't reflected in tests. In 3Dmark03 the card scored a respectable 14,441 and 7,233 in 3Dmark05.

Compared with a PCI Express X1950 Pro, these scores represent decreases of eight per cent in 3Dmark03 and 16 per cent in 3Dmark05.

In real-world gaming tests, we found a decrease due to using AGP of 11 per cent in Far Cry, while Half-Life 2 suffered most at 47fps – 23 per cent slower than a PCI Express equivalent.

When x4 Full Scene Anti-Aliasing (FSAA), which smoothes edges, was turned on we saw no decrease at low resolutions. The PCI Express version saw drops with FSAA (although still scoring high overall). However, it has further to fall and FSAA isn't affected by the bandwidth constrictions of AGP.

Despite a moderate performance hit for using AGP, this card still provides good performance in all games at 1,024x768 and 1,280x1024 resolutions. At high resolutions, gaming proved unplayable with this card.

The card features two DVI-I ports that can handle digital and analogue monitors when used with the two bundled dongles. S-video and composite cables are included to hook your PC up to a TV.

The X1950 Pro doesn't support DirectX 10 like the 8800GTS and has a more modest performance, but an equally modest price tag to boot. The card costs the same as PCI Express version at £155, which is a fair price for the fastest AGP available. *Emil Larsen*

Performance

3Dmark05* 7,233

0 | 5,000 | 10,000 | 15,000

*Tested at 1,024x768 in 32-bit colour

Details

Price £155
Best price www.pcw.co.uk/bestprices
Contact www.sapphiretech.com/uk
Specifications ATI Radeon X1950 Pro • 580MHz core • 700MHz memory (1,400MHz effective) • 512MB GDDR3 Ram • 8x AGP • Two DVI-I sockets • S-video out

Verdict

Pros Fastest AGP on the market
Cons Slower than PCI Express equivalent
Features ★★★★½
Performance ★★★★½
Value for money ★★★★½
Overall The best bet for AGP users to get decent frame rates
★★★★½

SOFTWARE DVD PLAYER

Intervideo WinDVD 8 Gold

Solid DVD playback, but HD compatibility doesn't come as standard

With new high-definition (HD) movie disc formats upon us, it's no shock to find manufacturers of DVD player software releasing new versions of applications.

It is, however, surprising that Intervideo's WinDVD 8 Gold doesn't support Blu-ray or HD-DVD out of the box, despite namechecking the formats on its packaging.

Read the small print and you'll find that a separate purchase from Intervideo's website is required for this.

At the time of writing, we were unable to qualify how much this would cost (Intervideo's site says: 'Available soon – check back often!'). We hope it's not much, as the £29 asking price of the application makes it more expensive than some hardware DVD players.

So apart from being nearly HD-ready, what's new? There's support for Vista (see **www.pcw.co.uk/2163791**) and Intel Core 2 Duo (see **www.pcw.co.uk/2160312**) processors, but a lot of the new stuff is gimmicky. Overlaying video effects such as Vintage or Abstract onto your movies is not something we would recommend.

Most of the interesting features are reserved for the more expensive Platinum edition. Here you'll find HD file format playback, the capability to run WinDVD as a UPnP server, and even a feature that lets you set a movie as your Windows desktop background. All this and more can be yours for the princely sum of £43.

WinDVD 8 Gold suffers from an annoying installation routine that attempts to clutter your PC with all manner of third-party software (Google Toolbar, Google Desktop, RealPlayer and QuickTime). We have no complaints about audio and video playback quality, however. Both are excellent, and the software provides plenty of opportunity to tweak picture and sound. *Jonathan Parkyn*

Details

Price £28.99
Best price www.pcw.co.uk/bestprices
Contact Intervideo www.intervideo.com
System requirements 1GHz processor • 256MB Ram • 200MB hard disk space • DVD drive • Windows XP/Vista

Verdict

Pros Good audio and video quality; plenty of settings to play with
Cons Expensive; HD-DVD and Blu-ray support require additional purchase

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

Overall It looks as if we'll have to wait until version 9 for the full HD makeover. In the meantime, WinDVD 8 is a solid, if expensive, DVD player

★★★☆☆

ANTI-VIRUS

Prevx 1

Effective and flexible anti-malware software

This software is seen by its developers as a complete replacement for well-known packages from Symantec and McAfee. Its main focus is heuristic detection of viruses and spyware by identifying virus-like behaviour as opposed to scanning databases. This is more suited to dealing with new viruses that have not been formally identified.

Scanning took one hour and two minutes for the 26GB of files on our PC. This is a poor time compared with other anti-virus and anti-spyware programs, which take a third of the time. System resources are slim at 32MB memory usage during idle and 69MB memory usage during scanning. Scanning was CPU-intensive, ranging from 5-90 per cent usage.

We were sceptical about how well Prevx would perform. Beta versions of the software battered the user with notifications in black boxes. Jargon was used to describe what was happening and there was a feeling that it was software you would install if all else failed.

But the 1.0 revision is an excellent step forward and pop-up clutter has been reduced drastically in the final retail software. Program authentication still occurs by comparing your program to a standard one located on Prevx's servers.

The program is very discreet, but advanced options allow you to customise almost any aspect of protection. The interface uses a simple traffic light colouring to represent danger, and a program history is included. We were mostly green apart from three drivers it flagged as amber, meaning unknown.

Prevx is best described as an extra layer of protection for the paranoid, and we wouldn't feel comfortable relying on it as our sole protection from viruses. But with individual 12-month licences costing £12.75, it's great value for money. *Emil Larsen*

Details

Price £12.95/year
Best price www.pcw.co.uk/bestprices
Contact Prevx www.prevx.com
System requirements 600MHz processor • 128MB Ram • 12MB hard disk space • Windows XP/2000

Verdict

Pros Stops unknown viruses; stops auto-installing programs; user friendly
Cons Slow scanning time; not a complete internet security solution

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

Overall It may make the already paranoid even more so, but heuristic detection is flexible and effective

★★★★☆

MOBILE GPS

Navman Travelassist

Navpix photo navigation comes to your mobile

Navman's Travelassist package, available for Symbian 60 smartphones and Pocket PCs, brings the Navpix photo-navigation system to your handheld. In addition, the supplied Bluetooth GPS receiver offers Sirfstar III navigation, and you'll find eight-digit postcode searching, in addition to POI (Points of Interest) or Navpix selection.

It's a fairly basic package but we were impressed by the speedy time-to-first fix and stability of the Bluetooth connection to the receiver. Maps are fairly basic but very clear, despite the relatively small screen on mobile phones and PDAs. Unfortunately, the refresh rate is very slow – around a screen per second. The software also seems over-reliant on motorways, preferring to direct us quite a way off course to join one even when a more direct route was available. This is frustrating due to the erroneous time-to-destination information you're given. We found this to be wildly inaccurate, often over an hour out. There's also no night mode, which is pretty distracting as the clean white maps can look quite dazzling. You get free traffic updates for a year, but in practice the lack of information provided means they are of limited use.

A fairly basic set of features omits many of the more useful aspects of a dedicated device, and at £169 for UK maps or £199 for European we were disappointed not to get a bit more control over the journey.

If you're a big fan of the Navpix system you might enjoy having this functionality on your mobile. For most, the limited features of a mobile solution together with the drawbacks of the Travelassist package mean that, aside from portability and convenience, there's no reason to buy this over a dedicated GPS device. Alternatives such as Route66 (see **www.pcw.co.uk/2151472**) are more user friendly.

Paul Lester

Details

Price £169 UK maps; £199 European
Best price www.pcw.co.uk/bestprices
Contact www.navman.com
System requirements Sirfstar III navigation • Eight-digit postcode searches • Compatible with Navman B10 and B20 Bluetooth GPS receivers • Available for Symbian S60, Windows Mobile 2003/2000SE/2003 Phone/2003SE phone • Free traffic updates for a year

Verdict

Pros Clear maps; stable GPS and Bluetooth; Navpix
Cons Inaccurate journey information; slow map refresh; no night mode
Features ★★★☆☆
Ease of use ★★☆☆☆
Value for money ★★☆☆☆
Overall Offers good basic functionality, but a number of drawbacks mean it's not really a permanent GPS replacement
★★★☆☆

INSTANT MESSAGING

Meebo

Access your IM accounts from a single web page

Personal Computer World RECOMMENDED

More and more people are using Instant Messaging (IM) as a fast and cheap way to communicate, and with a range of clients now available many people sign up for more than one.

If you then want to log on from another PC you'll need the right software. A handy solution is Meebo, a site offering instant access to all the major IM networks. Browse to the Meebo page and you'll find support for Aim, Yahoo, Google Talk, ICQ, Jabber and MSN Messenger.

Enter the username and password for whichever service you want to use and Meebo will log you in and take you to a page that acts as a canvas, with contacts and any open conversation windows in the main area. From here you can initiate conversations and move windows around the page. It's also possible to detach the window or buddy list; this then loads in a separate browser and behaves as a regular application.

Since this service is intended for convenience rather than a direct replacement for IM software, don't expect the full range of emoticons, effects or control you'd normally have. It's quick and easy to use, you won't be asked to download anything, and with support for all major clients it's a pretty adaptable service.

If you sign up for a Meebo account, which is free, you can control multiple IM accounts from the same page. All your buddies are added to the same buddy list, with icons used to signify which IM service they are set up with. To access all your IM accounts at once simply sign in from the main Meebo page, after which you'll be logged into all the IM services you've set up.

As a free tool, Meebo is excellent. While not as functional as the official clients, it's ideal for those who want to access multiple clients at once or chat from a machine other than their own PC.

Paul Lester

Details

Price Free
Best price www.pcw.co.uk/bestprices
Contact Meebo www.meebo.com
System requirements Internet access

Verdict

Pros Fast and easy to use; no download required; canvas for arranging IM windows; control multiple accounts at once
Cons No support for additional IM features such as emoticons and services
Features ★★★★☆
Ease of use ★★★★★
Value for money ★★★★★
Overall An excellent service for providing free and instant access to a range of IM accounts
★★★★★

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- Integrated VIA Unichrome Graphics
- Onboard 6 Channel Sound
- 1.44Mb Floppy Disk Drive
- Stylish Silver / Black Sigma MX Case
- Six USB Ports (2 Front / 4 Rear)
- 350w Power Supply Unit
- 17" TFT Flat Panel Display
- Logitech® Internet Pro Keyboard
- Logitech® Optical Mouse
- Logitech® S200 2.1 Speaker System
- 1 yr RTB Warranty incl Free Collection & Return

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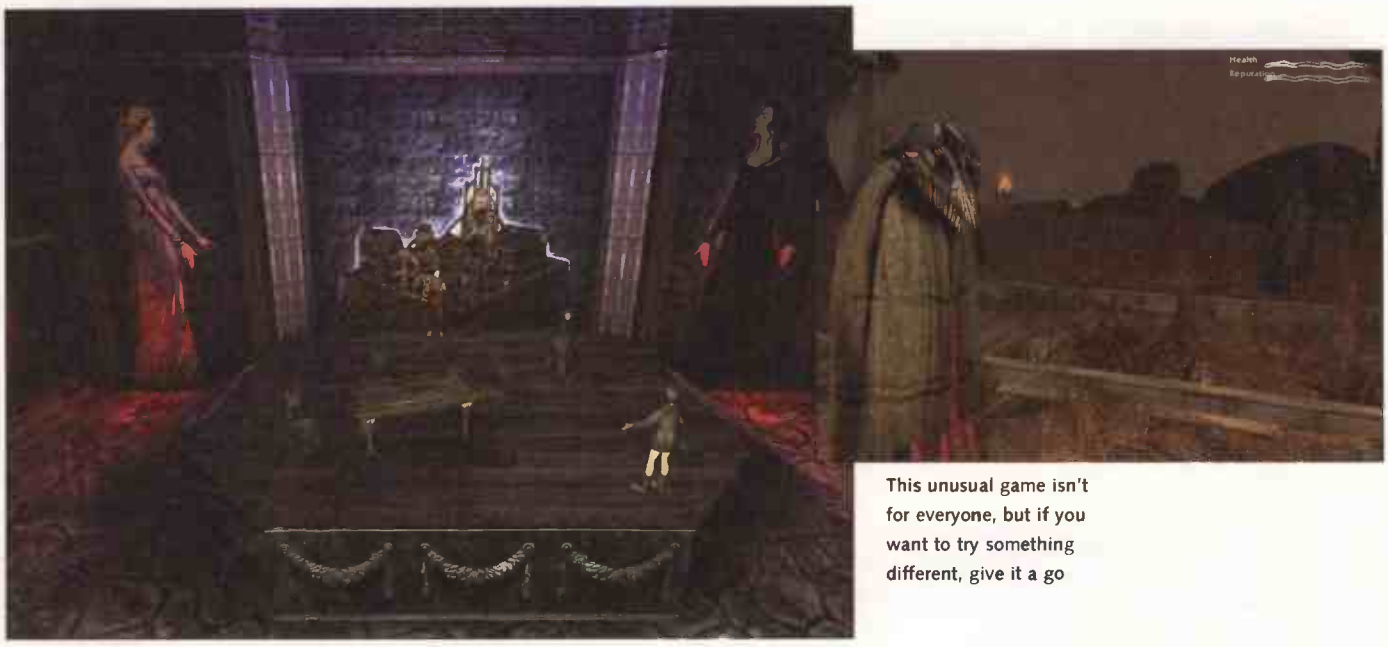
ACTION ADVENTURE

Pathologic

Personal Computer World RECOMMENDED

From Russia with strangeness comes this unusual and unsettling flawed gem



This unusual game isn't for everyone, but if you want to try something different, give it a go

It's possible that many people will more readily associate Russia with vodka and furry hats than video games. That is, of course, until you remind them that the former Soviet Union was the birthplace of one of the greatest games ever made.

While Buka Entertainment's Pathologic is unlikely to unseat Comrade Tetris in the universal popularity stakes, it could lay claim to being one of the weirdest and most overlooked games in recent memory.

Pathologic achieved much critical acclaim on its initial release in Russia before slipping quietly into UK stores in late 2006.

It doesn't help that the game resolutely defies classification. It's a first-person title with an action element, but its spookily slow pace shares little with most modern shooters. There's a role-playing aspect in that your character has certain attributes that are affected by your in-game actions and an inventory of usable items. But Pathologic owes just as much to the adventure genre, given that its curious storyline is influenced by the places you go, by the people you meet and, importantly, by what you say to them.

To describe Pathologic in terms of either its plot or gameplay does it little or no justice. Players have the choice of three characters (although the third is only available once the game has been completed with one of the other two), each with their own strengths and weaknesses. In each case the initial setup is also slightly different, although all the characters begin the game by arriving in the same strange town just as things start to go very, very wrong for all its inhabitants.

As the town falls apart around you, the main objective – if indeed there is one – is to keep your character (and several other non-player characters) alive. You'll need to last for a set number of in-game days, during which you'll be able to complete a series of 'main' story quests and numerous side missions.

You'll need to employ a variety of skills, including stealth tactics, weapons proficiency and puzzle solving. You'll discover many items and trade them with others. And you'll often be faced with a moral choice, the outcome of which could have repercussions elsewhere.

It's not a perfect piece of entertainment by any stretch of the imagination. Enemy AI (artificial intelligence) is distinctly dubious, for a start, and combat is pretty lousy. There's also quite a lot of ground to cover in the game, but no sprint button. Instead, you're left to trudge slowly but surely from one place to another, which can often be an annoyingly uneventful experience.

Pathologic is a game of contradictions. On a technical level, for example, the visuals look fairly primitive, but from a design point of view it's a masterpiece. The art direction itself, meanwhile, is at once beautiful, foreign and wholly unsettling. And the fact that large portions of the game are virtually incomprehensible (helped in part by what appears to be some shockingly bad translation) renders it simultaneously fascinating and infuriating.

Like a strange, little-known arthouse movie, Pathologic is an antidote to all the samey sequels and by-the-book blockbusters out there, but it's certainly not everyone's cup of tea. Since you can pick it up at a budget price much lower than the one we've quoted here, however, we recommend anyone who's interested in trying something a bit different to give it a go. We guarantee you won't have played anything even remotely like it before. *Jonathan Parkyn*

Details

Price £29.99
Best price www.pcw.co.uk/bestprices
Contact Buka Entertainment www.pathologic-game.com
System requirements 1GHz processor • 256MB Ram • 2GB hard disk space • Windows 98/ME/2000/XP

Verdict

Overall Very strange, occasionally disturbing and yet profoundly satisfying, Pathologic is a mature, intelligent game that deserves a much wider audience than it's likely to get

★★★★½

SIMULATION

Sid Meier's Railroads

Hit the track with this new rail sim from an old hand

Sid Meier has a long and illustrious career that includes Sid Meier's Pirates (**www.2kgames.com/pirates/pirates**) and the Civilization (**www.civ3.com**) series. Railroads is something of a return to the developer's old Railroad Tycoon (**www.2kgames.com/railroads**) stomping ground. Though apparently not a direct sequel to Tycoon, Railroads doesn't attempt to mess with its predecessor's formula much either. In many ways, this latest rail sim is a back-to-basics move for Sid and co.

As with Tycoon, the main objective of the game is to generate money by putting together and managing your own railway network, and success is closely linked to your ability to exploit industry and economics. However, while previous games have tended to focus on the minutiae, Railroads is much more accessible, with a simplified user interface and gameplay that's easy to pick up.

The game presents several historical and imaginary single-player scenarios to tackle. The historical side of things allows you to play as a 'real' rail tycoon and provides a selection of engines that are accurate for the period. Naturally for an American game, there is a heavy US bias, but there's a surprising amount of Euro-content, too, including several British scenarios and the ability to play as Isambard Kingdom Brunel.

The simpler, friendlier approach is reflected in the game's visuals. These have an almost cartoon-like quality, with colourful landscapes and models lending the game an appropriate train-set feel.

Existing fans of the series who are used to a bit more depth and slightly bigger maps may be a little disappointed, while the subject matter undoubtedly has only a niche appeal. However, Railroads is a pretty fun game while the novelty lasts. *Jonathan Parkyn*

Details

Price £29.99
Best price www.pcw.co.uk/bestprices
Contact 2K Games www.2kgames.com
System requirements 1.4GHz processor • 512MB Ram • 1.7GB hard disk space • Windows 2000/XP

Verdict

Overall Railroads probably isn't up there with Sid Meier's greatest hits, but it's a well-constructed and playable sim nonetheless

★★★☆☆

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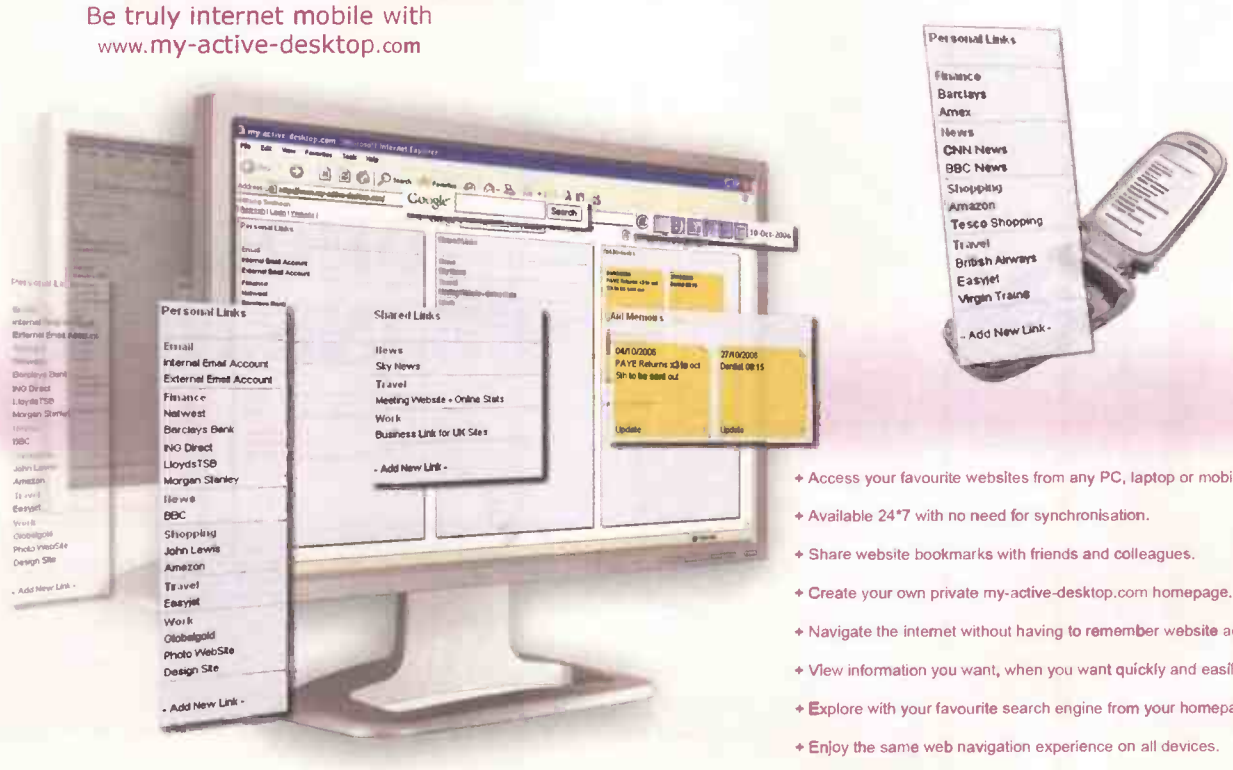

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STRATEGY

Medieval II Total War

Lay siege to your PC and social life with this highly sophisticated strategy game

Personal Computer World RECOMMENDED

War: what is it good for? Absolutely nothing – except for inspiring an awful lot of computer games, apparently. Medieval II is the fourth game in the combat-heavy Total War series and possibly the best yet.

There are two basic types of strategic gameplay on offer. You can leap straight into a battle – either one from history or a custom battle, where you choose the location, the factions involved and even the weather. A Grand Campaign, on the other hand, sees you taking a wider view. Campaigns still involve warfare, but in between battles you'll need to carefully supervise your empire as it spreads, building and managing castles and cities to generate cash and resources.

One of the most impressive aspects of Medieval II is its sense of scale. Not only does the game span hundreds of years (1080-1530), it also covers a wide range of environments – from Europe and Africa to South America.

Within this vast battlefield, however, is a staggering level of detail. You may start off with only five factions, but this broadens to 21 once you complete a campaign. Each faction has its own units – 250 in total – all with their individual strengths and weaknesses. They aren't all soldiers, either. Special units such as spies, assassins, priests and even eligible princesses can be deployed in a variety of covert and diplomatic moves.

A Norman-based tutorial attempts to ease players gently into the swing of things and the interface has been streamlined to make things more straightforward, but this is a complex game. It's satisfying to master, however, and between all the campaigns, battles and online multiplayer, there's so much to do you'll be playing the original long after the inevitable expansion pack hits the shelves.

Jonathan Parkyn

Details

Price £34.99
Best price www.pcw.co.uk/bestprices
Contact Sega www.totalwar.com
System requirements 1.8GHz processor • 512MB Ram • 11GB hard disk space • DVD-Rom • Windows 2000/XP

Verdict

Overall Profoundly detailed, deeply satisfying and just plain huge, Medieval II: Total War is an object lesson to strategy games developers everywhere

★★★★★

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Personal Computer World

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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.

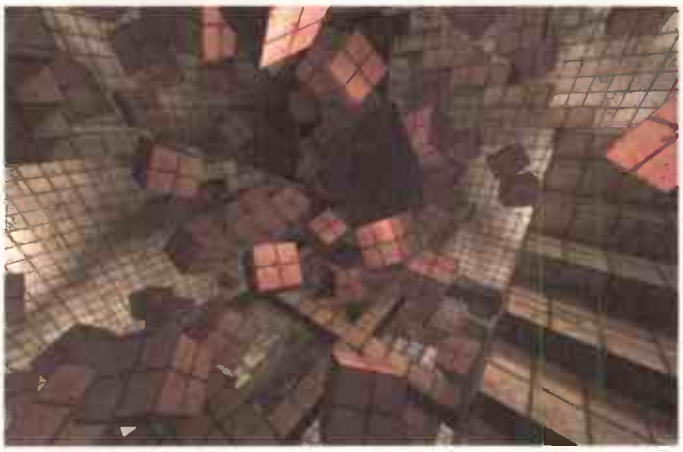
It's true that speed isn't everything, but it's an important part of the buying equation, especially when there are so many components out there. As many of our PC group tests are based on price bands, checking the performance is even more important – if the core system is underperforming, you need to 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.

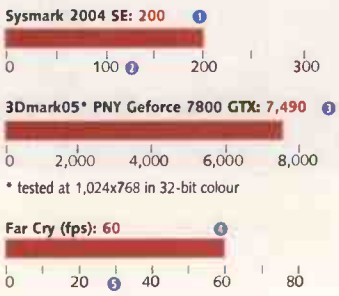
Far Cry is a real-world DirectX 9 test



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

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CISCO SYSTEMS

ON TEST

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Editor's Choice

'It's now possible to produce lightweight laptops that can combine high performance with impressive battery life'

Lightweight laptops

Wallet, keys, phone... can we add laptop to the list? Cliff Joseph tests the notebooks that claim true portability

Laptops once fell into two main categories. There were 'desktop replacements' that were powerful enough to replace a desktop PC, but tended to be big and heavy with limited battery life. These laptops were primarily designed for business users who might travel from time to time, but generally did most of their work in an office where they had access to a mains power supply.

Alternatively you could opt for an 'ultraportable' machine designed for people who need to work on the move. It would be much smaller and lighter and would provide better battery life, although it might not be able to provide the same performance as a desktop replacement system.

However, the recent shift towards more efficient processor designs, such as Intel's Core and Core 2 ranges, has produced processors that run faster while consuming far less power than previous generations of processors. This means that it's now possible to produce lightweight laptops that can combine high-performance with impressive battery life.

There are still a few compromises that have to be made to keep the size and weight down, the most obvious being the screen size. Most of the lightweight laptops submitted for this review had a fairly compact 12in screen, although both Hewlett-Packard and Packard-Bell did manage to squeeze a 14in screen into their laptops while staying under our 2.5kg weight limit.

In fact we saw 12in, 13in and 14in displays featured on the laptops submitted for this group test, giving a wide range of features and price points to choose from. So read on to find out which of these lightweight marvels is the right one for you.

Evesham Lightbook

Price £999 **Contact** Evesham www.evesham.com

Evesham's Lightbook lives up to its name. With its external power adapter it only weighs about 1.7kg, making it the lightest model in the group. It's neatly designed, with a slimline, metallic grey casing that measures 3.5cm thick when folded shut.

The screen panel is a little flimsy and tends to flex easily, but Evesham includes a padded carrying case with the Lightbook to provide some protection when you're travelling.

We were pleased to see that the Lightbook has a memory card slot and a Firewire port, so you can easily transfer photos or video clips onto it. There's also a fingerprint reader to prevent unauthorised users from accessing your data.

If portability is your priority, the Lightbook is the obvious choice. However its lightweight design brings drawbacks. Most of its rivals are based on an Intel Core 2 Duo processor, but the Lightbook uses an older Core Solo processor running at a mere 1.2GHz. Unsurprisingly it emerges as the poorest all-round performer in our suite of benchmark tests. To be fair, though, the Lightbook will be perfectly adequate for surfing the web, sending emails and running ordinary business software when you're on the road.

It's odd that the Lightboook's battery life isn't longer, especially as the Core Solo CPU is supposed to be a power miser. It's beaten by most of its rivals in our productivity and DVD playback tests. Even so, almost three hours for productivity software and well over two hours for playing DVDs are still very respectable results.

Our main criticism regards price. At almost £1,000 the Lightbook is one of the most expensive laptops in the group, and although its lightweight design has obvious appeal, some people might prefer to pay a little less for a model that provides greater performance and battery life.

Verdict

Pros The slimmest, lightest laptop in the group
Cons Expensive; unremarkable performance and battery life

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

Overall Attractive, light and portable, but expensive considering its lowly specification
★★★☆☆

Fujitsu-Siemens Amilo Si 1520

Price £699 **Contact** Fujitsu-Siemens www.nice-pc.co.uk

At £699 the Amilo Si 1520 from Fujitsu-Siemens is one of the least expensive laptops in the group, yet it manages to provide attractive design, good performance and a useful range of features.

The Amilo is neatly designed in silver, with a black trim around the edges. The edges of the unit are tapered, giving it a streamlined appearance and making it easy to slip into a bag. Inside the solidly built chassis is a 1.66GHz Core 2 Duo processor with 512MB of Ram and an 80GB hard disk. That's not the fastest processor in this group, but the Amilo still produces quite respectable results in most of our performance tests and it will be more than adequate for running ordinary business applications or even doing the occasional spot of digital photography or multimedia editing. It's got a built-in Firewire port too, so you can easily connect a DV camcorder and import video clips straight onto the hard disk.

Admittedly, 3D graphics performance isn't particularly impressive, as the Amilo opts for an integrated graphics processor that shares some of the main system Ram. But none of these laptops provides very good 3D performance so this isn't a big weakness.

Battery performance is a mixed bag. When playing DVDs the Amilo manages to last for almost a full three hours, so it's a good choice if you want to while away the hours on a long plane or train ride. But it only manages to last about an extra 25 minutes when running ordinary business software. That still gives you well over three hours of working time, although rivals such as Sony and Samsung can beat that quite easily.

It may not have any particularly outstanding features, but the Amilo nonetheless provides good performance and an attractive, lightweight design at a competitive price.

Verdict

Pros Solid performance and design, and an attractive price
Cons 3D performance is disappointing

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

Overall An attractive, lightweight laptop for those on a tight budget
★★★☆☆

HP Compaq nc6400

Price £880 **Contact** HP www.hp.com/uk

HP's focus with the Compaq nc6400 is obvious, as it comes equipped with security features that are clearly aimed at business users.

Like the Evesham Lightbook, the nc6400 is equipped with a small fingerprint reader on the bottom right-hand corner of the keyboard. This allows the machine to check your fingerprint to make sure no unauthorised users can get at the contents of the hard disk. There's also a 'smart card' slot on the right-hand edge of the unit, which allows businesses to use a security card for yet another layer of protection.

These security features are obviously intended to attract business users who might be concerned about protecting their important data while they're on the road. To be honest, though, we would have swapped these features for a slightly more robust design. The panel that holds the LCD screen is a little flimsy and bends rather more easily than we would have liked. We were also disappointed that the nc6400 only has a DVD-Rom/CD-RW drive, rather than a full DVD rewriter.

In other respects, the nc6400 is a well designed and attractive laptop. Its matte-black design is rather bland, but inside there's a 1.83GHz Core 2 Duo processor that provides good performance in most areas. The only obvious exception is its 3D graphics performance, although that's not likely to deter business users

It's also got an attractive 14.1in widescreen display, which is good for watching DVDs or working on spreadsheets or presentations. Battery life is adequate, but not remarkable ib this group, at just over one and a half hours for DVD playback and almost three and a half hours for general productivity work.

Home users might prefer something a little more rugged, but the nc6400's security features and three-year warranty will certainly appeal to business users who need to protect commercially sensitive data.

Verdict

Pros Good performance and unusual security features
Cons Build quality could be improved
Features ★★★☆☆
Performance ★★★★☆
Value for money ★★★☆☆
Overall Dull, but secure and squarely aimed at business users
★★★☆☆

Mesh Pegasus S271

Price £799 **Contact** Mesh www.meshcomputers.com

In many ways, the Pegasus is a resolutely unremarkable laptop. Its price, performance and battery life are all fairly average for this group of laptops, and even its two-year warranty only falls between the one and three-year warranties provided by its competitors.

However there are some aspects of the Pegasus that make it attractive enough to stand out from its rivals. The first thing we noticed was the Pegasus' solid construction. Some of these lightweight laptops are a little flimsy, with the panelling around the flat-screen display causing particular concern on a couple of models. In contrast the Pegasus is quite solidly built and its screen panel looks to have been reinforced to prevent it from bending too much, thereby reducing the risk of damage to the screen.

We also liked the 12in screen itself, which was bright and colourful. It'll certainly be good for watching DVD films when you're on a train or plane – though the highly reflective coating on the screen might be a bit distracting if you're just typing numbers into a spreadsheet.

The other quite unusual feature of the Pegasus is the fact that it contains an AMD processor. Intel's Core and Core 2 processors have hogged the limelight recently and this is the only laptop in our group test to have opted for AMD instead. Its 1.6GHz Turion 64 X2 processor isn't the fastest processor in this group, but it is backed up by 1GB of memory and an ATI Radeon Express 1120 graphics chip. That combination is more than powerful enough for running office software and even a bit of multimedia editing work.

The Pegasus was also the clear winner in our 3D graphics tests, so it might even be up to a bit of games-playing if you get bored watching DVDs on your travels.

Personal Computer World RECOMMENDED

Verdict

Pros Solidly built; good all-round performance
Cons Reflective coating on the screen can be distracting
Features ★★★★☆
Performance ★★★★☆
Value for money ★★★★☆
Overall A good all-rounder – solidly built, good screen and consistent performance
★★★★☆

Packard Bell Easynote GN Skype Edition

Price £699.99 **Contact** Packard Bell www.packardbell.com

It's not the most powerful laptop in this group, but Packard Bell's Easynote provides excellent value for money. It is based on a 1.6GHz Core 2 Duo processor, which can't match the 1.8GHz and 2GHz processors used by some of its rivals. Even so the Easynote's performance is strong enough to cope with office software, digital photography and video editing.

Where the Easynote really scores, though, is on its wide feature set. At just £699.99, the Easynote is one of the cheapest products reviewed here, yet it includes a 14in widescreen display that is matched only by the HP Compaq nc6400, which is almost £200 more expensive. We would have liked the screen to be a bit brighter, but it's perfectly adequate for watching DVDs or working with big spreadsheets or presentations.

There's also a little webcam built into the display and the Skype software is pre-installed (Skype can now handle videoconferencing as well as internet phone calls – hence the 'Skype Edition' in the model name). Other video features include a Firewire port for connecting a DV camcorder and a composite video output so that you can record your video projects onto VCR or display them on a bigger TV screen.

The size of the screen pushes the weight close to our 2.5kg limit, but the Easynote is still light enough to carry around without too much trouble.

Battery life is also quite respectable – almost four hours when running business software and about two and a half hours for DVD playback – although this is one area where it is beaten by a number of its rivals.

Even so, the Easynote's sheer value for money is still hard to beat. There are more powerful laptops available, but the Easynote provides both good performance and versatile multimedia features at a very competitive price.

Verdict

Pros 14in screen; built-in webcam and video output.
Cons Poor 3D performance; heavier than its 12in rivals

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

Overall A versatile multimedia laptop at an attractive price
★★★★☆

Samsung NP-Q35T006/SUK

Price £1,056.32 **Contact** Samsung www.samsung.com

Samsung's Q35 is a powerful yet lightweight laptop that also boasts impressive battery life. However it is also the most expensive laptop in this group.

The Q35 is the only laptop to boast an Intel Core 2 Duo processor running at 2GHz. It also nudges ahead of its rivals in terms of Ram, boasting 1.25GB (256MB on the motherboard plus a separate 1GB Dimm module) and a healthy 120GB hard disk. Oddly, we couldn't get it to run our PCmark test, but it was the clear winner in most of our other benchmark tests. The only exception was its 3D graphics performance, where the superior graphics chip in the Mesh Pegasus took first place. The Q35 won't be much of a games machine, but in all other respects it's a very capable performer and will handle business software with ease, along with more demanding audio and video work. It's also got a Firewire port and memory card slot for quickly transferring photos and video clips.

We were also impressed by the Q35's battery life. Because it features the most powerful processor in this group you might expect it to consume battery power more quickly. In fact the opposite holds true and the Q35 provides very impressive battery life – a massive five hours when running productivity software and almost three hours worth of DVD playback (pipped at the post in this test only by the score of Fujitsu-Siemens' Amilo notebook).

Our only small criticism is that, as with several of these lightweight laptops, the Q35 could be a bit more solidly built. The screen panel is fairly flexible and bends more than we would have liked.

At just over £1,000, the Q35 is the most expensive laptop reviewed here, but its performance, compact design and outstanding battery life mean that it will earn its keep when you're on the road.

Personal Computer World EDITOR'S CHOICE

Verdict

Pros Strong performance and outstanding battery life
Cons Poor 3D performance; expensive

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

Overall A portable powerhouse, although relatively expensive
★★★★☆

Sony Vaio VGN-C1S/W.CEK

Price £999 **Contact** http://shop.sonystyle-europe.com

Sony's Vaio VGN-C1S has no outstanding features but it strikes a balance between performance, portability, screen size and battery life.

As always the Vaio shows off Sony's flair for design, with a keyboard that is big and comfortable to use but neat and uncluttered to look at. The hardware specification is fairly conventional though – a 1.66GHz Core 2 Duo processor, 1GB of Ram and a 100GB hard disk. It's not a top performer, but it does produce a solid and consistent set of results in our benchmark tests, and should be perfectly adequate for most home or business users who need to work on the move. However, like most of its rivals, it uses a low-cost integrated graphics processor, which means that it's not much use for 3D graphics or games.

One feature worth mentioning is the 13.3in screen. The lightest laptops all have 12in screens, which some people might find a little too small for tasks such as word processing or spreadsheet work. On the other hand, the 14in screens used by HP and Packard Bell mean that those laptops tend to be quite a bit larger and heavier. The Vaio's 13.3in screen is a good compromise – easy on the eye when running business software, but still small enough to slip easily into a briefcase or backpack.

The screen quality is pretty good too – bright, colourful and well suited to watching DVDs when travelling. Unfortunately the Vaio wouldn't run our DVD playback tests, so we were unable to get an accurate score for its battery life here. However it lasted for well over four hours when running business software.

Our only small qualm is that the Vaio is a little pricey compared to rival laptops with a similar specification. People on a tight budget might prefer a less expensive option such as the Mesh Pegasus or Fujitsu's Amilo.

Verdict

Pros Attractive design; high-quality display
Cons Expensive; poor 3D performance

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

Overall A well-designed laptop, although you pay extra for the 'Sony style'
★★★☆☆

By the (Mac)book – the Apple alternative

Apple has always had a reputation for high prices, but its latest Macbook model (**www.apple.com/uk**) compares favourably with any of the PC laptops reviewed here – and with a weight of 2.36kg it fits our review criteria as a lightweight laptop too.

The Macbook was recently upgraded to use the Core 2 Duo processor. The new model wasn't available in time for us to perform thorough testing, but our first impressions are good. The Macbook is priced at £879 and includes a 13.3in display, 2GHz Core 2 Duo processor, 1GB of Ram and 80GB hard disk, and an integrated Intel 950 graphics processor. That's a very similar spec to the Samsung Q35 that got our Editor's Choice award, but the Macbook is more than £150 cheaper. The Q35 has a larger hard disk (120GB), but the Macbook has a built-in webcam along with Apple's Photobooth software that lets you experiment with digital photos and special effects.

Software has always been one of Apple's strong points, and the Macbook also comes bundled with Apple's iLife suite. This includes programs such as the iMovie video-editor, and the Garageband audio software that you can use for recording your own music or creating podcasts. There's also iDVD for burning DVDs and iWeb for creating your own web pages.

And, of course, now that Apple uses the same Intel processors as most of its PC rivals, it's also possible to run Windows on the Macbook as well. Apple's Boot Camp software allows you to dual boot – switching between the Mac OS or Windows whenever you want, but you do have to reboot each time.

That's a pretty good package for £879, and there's also a £749 version available that has 1.83GHz processor, 512MB of Ram, 60GB hard disk and just a DVD-Rom/CD-RW drive – however the 2GHz model is better value for money at just £130 extra. Both these models are available in white, but Apple also sells a black version for £999. The matte-black design is very nice and has a strangely tactile quality to it, but the only difference between this and the £879 model is the colour and a larger 120GB hard disk. That seems like a bit of cheek on Apple's part – however, the Black Macbook still comes in at less than the Samsung Q35, so perhaps Apple is finally learning to be competitive after all. It's also rumoured that Apple is about to launch an 'ultra-thin' version of the Macbook that will be even slimmer and lighter. However, Apple is famously secretive about its product plans so at the time of writing (late December 2006) we had yet to confirm any definite news on this.

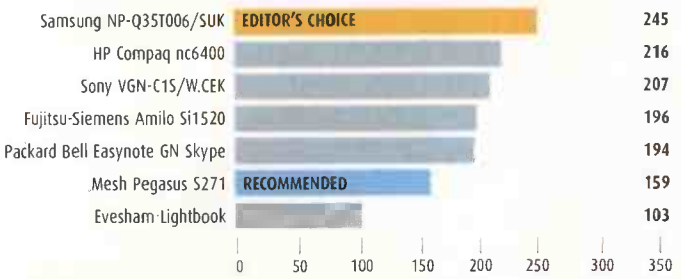
Handheld in black and white – the Macbook is available in both colours, although the black model is £120 more expensive

Lab results

The lightweight laptops tested here may be portable, but they pack in enough features to rival bigger, less convenient machines

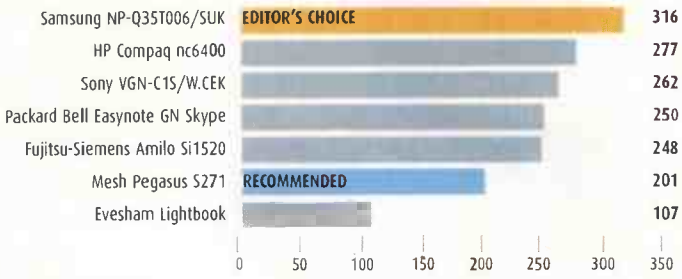
Sysmark 2004 SE (overall)

Bigger is better



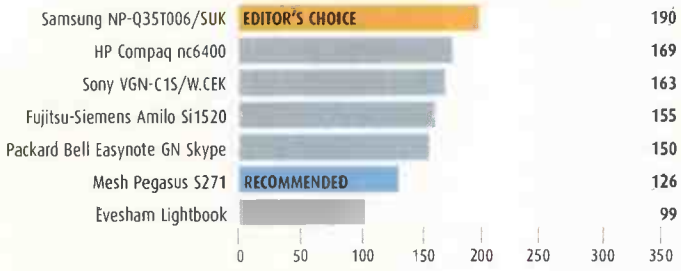
Sysmark 2004 SE internet content creation

Bigger is better



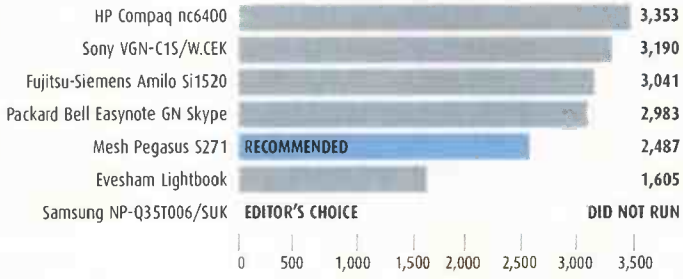
Sysmark 2004 SE (office productivity)

Bigger is better



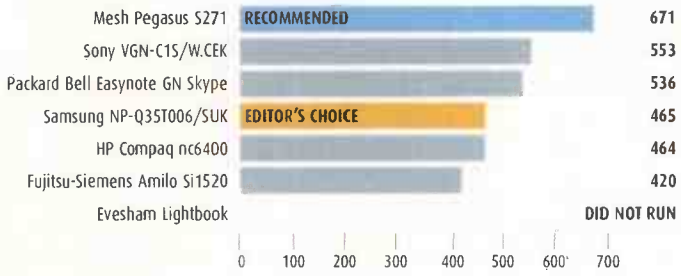
PCmark05 (overall)

Bigger is better



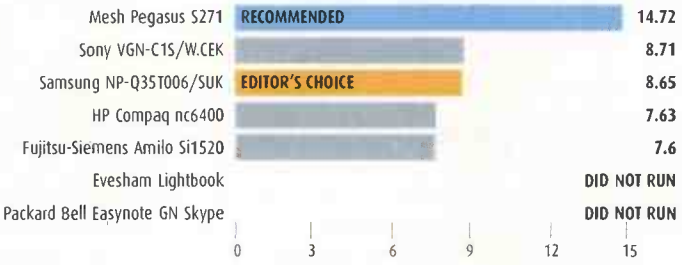
3Dmark05 (1,024x768 in 32-bit colour)

Bigger is better



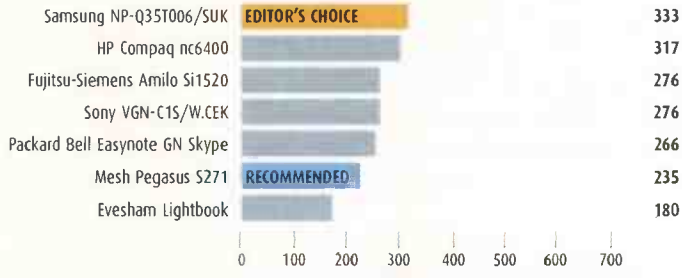
Far Cry (1,024x768 in 32-bit colour)

Bigger is better



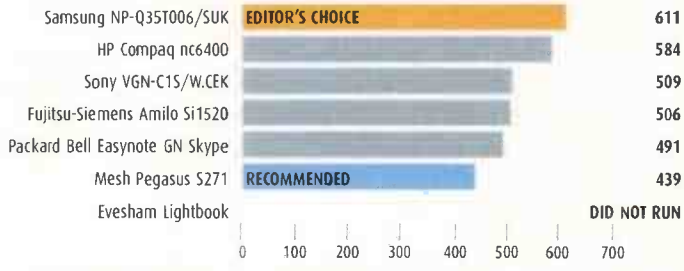
Cinebench (1 CPU)

Bigger is better



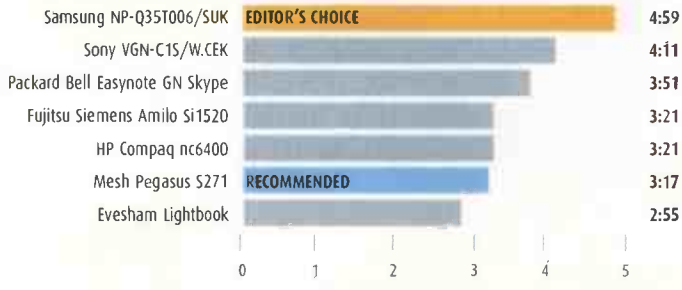
Cinebench (multiple CPUs)

Bigger is better



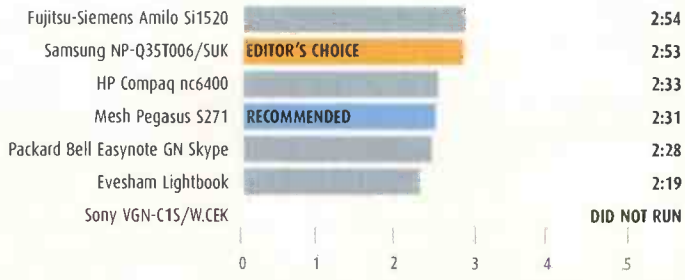
Mobilemark05 productivity (hours:minutes)

Bigger is better



Mobilemark05 DVD playback (hours:minutes)

Bigger is better



Please see page 87 for an explanation of how we tested the PCs

ASUS EN8800

Combine Performance and Value

DirectX 10 Ready with Ghost Recon and GTI Racing Bundle

Playing 3D games is probably the main reason for many of you to purchase a graphics card, and it takes a high-performance product to run today's sophisticated game titles. In addition, with the Vista operating system poised to change personal computing and digital home entertainment, a card that is ready for the revolution is something you should look into when you're shopping for a new graphics solution.

The Performance Beast

The ASUS EN8800 series, which includes two models: EN8800GTX/HTDP/768M and EN8800GTS/HTDP/640M, will certainly solve the above issues. First of all, they are powered by Nvidia's latest GeForce 8800 GPUs The former actually scored 10,531 in 3DMark06 at 1280x1024 resolution, which is more than fast enough to handle the hottest 3D games.

DirectX 10 and Vista Ready

Second, both models of the EN8800 series are DirectX 10-ready and are fully-compatible with Shader Model 4.0, and enables efficient batch process of game objects and data. The result is far richer and more immersive gaming experience. DirectX 10 support also means compatibility with the up coming Microsoft Vista operating system.

Value Bundle - 3D Games and Graphics Benchmark Tool

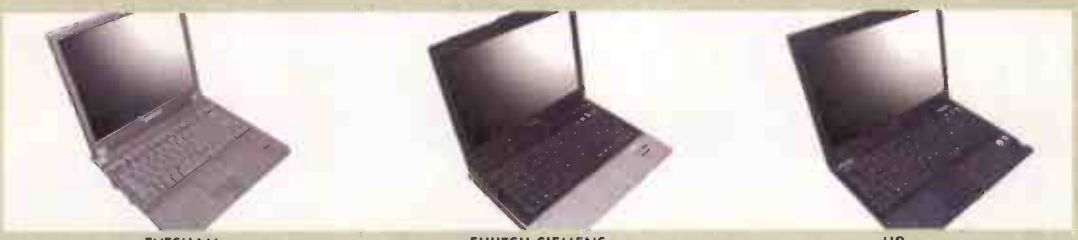
Since you're buying the card for games, what's better than getting two popular games right out of the box. The EN8800 series bundles Ghost Recon Advanced Warfighter from Ubisoft and GTI Racing from Techland. 3Dmark06 Advanced Version, the premier graphics benchmark software, is also available with the purchase of the two new graphics cards. Whether it's for gamers or overclockers, the EN8800 series offers excellent value in return.

▲ ASUS scores 10,531 on 3DMark06.

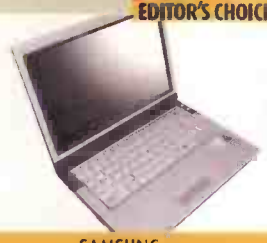
Splendid Video Intelligence Technology

To make all images on your monitor look that much better, the EN8800 series incorporates Splendid Video Intelligence Technology, an exclusive feature found only on ASUS solutions. With Splendid, images enabled by ASUS graphics cards are fine tuned to deliver vibrant visual representations in conditions most favorable to the human eye. Splendid works on top of NVIDIA's PureVideotm technology to offer sharp decoded video.

Just like what the headline said. The EN8800 series is a combination of high performance and getting the biggest bang for the buck. Please do check out the two new cards if you're looking to upgrade your computer setup.



MANUFACTURER	EVESHAM	FUJITSU SIEMENS	HP
Model name	Evesham Lightbook	Amilo Si 1520	Compaq nc6400
Price inc VAT	£999	£699	£880
Sales telephone	0870 160 9500	0870 606 6677	0845 270 4142
URL	www.evesham.com	www.nice-pc.co.uk	www.hp.com/uk
HARDWARE			
Processor	Intel Core Solo ULV U1400 (1.2GHz)	Intel Core 2 Duo T5500 (1.66GHz)	Intel Core 2 Duo T5600 (1.83GHz)
Chipset	Intel i945GMS/ICH7-M	Intel i945GM/ICH7-M	Intel i945GM/ICH7-M
Available memory/type	1GB PC2-667 DDR2	512MB PC2-533 DDR2	512MB PC2-667 DDR2
Occupied/spare memory slots	1/0	1/1	0/1
Max memory supported	1GB	2GB	4GB
Hard disk manufacturer and model	Hitachi HTC426060G5CE00	Fujitsu MHV2080BH	Hitachi HTS721080G9SA00
Hard disk size	60GB	80GB	80GB
No of Express card slots	0	1	0
No of PC Card slots	1	0	1
No of Firewire/serial/parallel/PS/2 ports	1/0/0/0	1/0/0/0	0/0/0/0
No of USB ports	3	4	3
MULTIMEDIA			
Optical drive	Matshita UJ-8325	Philips SDVD8820	GCC-4237N DVD/CD-RW
Optical drive formats and speed (max)	8x DVD, 4x DVD+/-R, 2.4x DVD+RW, 2x DVD-RW, 2.4x DVD+R DL, 2x DVD-Ram	8x DVD, 8x DVD+/-R, 8x DVD+RW, 6x DVD-RW, 6x DVD+R DL, 4x DVD-R DL	8x DVD, 24x CD-R/RW
Soundchip	Realtek ALC260	Conexant Cx20549	AD1981HD
Graphics type/memory	Integrated Intel GMA950/up to 64MB shared system memory	Integrated Intel GMA950/up to 128MB shared system memory	Integrated Intel GMA950/up to 128MB shared system memory
Screen size and (maximum resolution)	12in XGA (1,024x768)	12in WXGA Crystalview (1,280x800)	14.1in WXGA (1,280x800)
OTHER INFORMATION			
Misc hardware/modem	Fingerprint reader, 4-in-1 card reader, 10/100 Lan,V.90 modem	4-in-1 card reader, 10/100 Lan, V.92 modem, DVI-I out, S-video out	Finger print reader, SD card reader, Smart Card reader, 10/100/1,000 Lan, V.90 modem, S-video out
Wireless technology	802.11a/b/g	802.11a/b/g, Bluetooth	802.11a/b/g, Bluetooth
Weight (kg)	1.65	2.3	2.7
Dimensions (wxdxh) mm	281x237x35	299x220x33	333x290x29
Operating system	Microsoft Windows XP Home SP2	Microsoft Windows XP Home SP2	Microsoft Windows XP Professional SP2
Bundled software	Microsoft Works 8.5, Sonic DVD Media Creator, Bullguard security suite	Microsoft Works Suite 8	HP Protect Tools
Standard warranty (RTB = return to base, C&R = collect and return)	2yrs on site, 1yr RTB	1yr courier C&R	3yr C&R
SCORES			
Features	★★★☆☆	★★★☆☆	★★★☆☆
Performance	★★☆☆☆	★★★☆☆	★★★★☆
Value for money	★★★☆☆	★★★★☆	★★★☆☆
OVERALL	★★★☆☆	★★★☆☆	★★★☆☆

Personal Computer World RECOMMENDED		Personal Computer World EDITOR'S CHOICE	
			
MESH	**PACKARD BELL**	**SAMSUNG**	**SONY**
Pegasus S271	Easynote GN Skype Edition	NP-Q35T006/SUK	VGN-C1S/W.CEK
£799	£699.99	£1,056.32	£999
0844 736 0440	01628 512 400	01932 455 000	020 7365 2947
www.meshcomputers.com	www.packardbell.co.uk	www.samsung.com/uk	http://shop.sonystyle-europe.com
AMD Turion64 X2 TL-52 (1.6GHz)	Intel Core 2 Duo T5200 (1.6GHz)	Intel Core 2 Duo T7200 (2GHz)	Intel Core 2 Duo T5500 (1.66GHz)
ATI RS482M/ATI SB450	Intel I945GM / ICH7-M	Intel i945GM/ICH7-M	Intel i945GM/ICH7-M
1GB PC2-667 DDR2	1GB PC-533 DDR2	1GB PC2-533 DDR2	1GB PC2-533 DDR2
2/0	2/0	1/0	2/0
2GB	4GB	1.5GB	2GB
Toshiba MK8032GSX	Seagate ST916082A	Fujitsu MHV2120AH	Hitachi HTS541010G9A00
80	160GB	120GB	100GB
1	1	0	1
0	0	1	0
1/0/0/0	1/0/0/0	1/0/0/0	1/0/0/0
3	4	2	2
Hitachi GMA-4082N	Matshita UJ-850D	Teac DV-W28EA	Pioneer DVR-K16M
8x DVD, 8x DVD+/-R, 4x DVD+/-RW, 2.4x DVD+R DL, 3x DVD-Ram	8x DVD, 8x DVD+/-R, 8x DVD+RW, 6x DVD-RW, 4x DVD+/-R DL	8x DVD, 8x DVD+/-R, 4x DVD -/+RW, 2.4x DVD+R DL, 5x DVD-Ram	8x DVD, 8x DVD+/-R, 8x DVD +RW, 6x DVD -RW, 4x DVD+/-R DL, 5x DVD-Ram
Realtek ALC883	Sigmatel Stac9200	AD1986A	Realtek ALC262
Integrated ATI Express 1150/up to 128MB shared system memory	Integrated Intel GMA950/up to 128MB of shared system memory	Integrated Intel GMA950/up to 128MB shared system memory	Integrated Intel GMA950/up to 128MB shared system memory
12.1in WXGA (1,280x800)	14in WXGA Diamondview (1,280x800)	12.1in WXGA (1,280x800)	13.3in WXGA X-Black (1,280x800)
3-in-1 card reader, 10/100/1,000 Lan, V.90 modem, external USB TV Tuner	4-in-1 card reader, 10/100/Lan, V.90 modem	Memory Stick reader, 10/100 Lan, V.90 modem	Magic Gate card reader, 10/100/Lan, V.92 modem
802.11g, Bluetooth	802.11a/b/g	802.11a/b/g, Bluetooth	802.11 a/b/g
2.75	2.7	2.4	2.5
303x225x28	337x240x33	299x214x35.8	330x235x37.2
Microsoft Windows XP Home SP2	Microsoft Windows Media Center	Microsoft Windows XP Professional	Microsoft Windows Media Center
Cyberlink DVD Suite	Photo Impact 10 SE, Powercinema 4.7, Video Studio 9 SE, Metaboli, Skype, Record Now, DVD LE, Norton Internet security	AVS now, Norton AntiVirus 2005, Adobe Reader 6	SonicStageCP 4.0 Video & TVDVgate Plus 2.2, WinDVD 5.0 Photo, Adobe Photoshop Elements 4.0, Roxio DigitalMedia SE 7, Click to DVD 2.5, Adobe Reader 7.0, MS Works 8.5, MS Office 2003 STT (try & buy), Norton Internet Security 20069(with 90 days free virus update), NortonNorton Ghost 10 (try & buy), VAIO Recovery Utility 2.6, Skype 2.0, Google software package
2yr C&R	1yr C&R	1yr C&R	1 yr RTB
★★★★☆	★★★★☆	★★★★☆	★★★★☆
★★★★☆	★★★☆☆	★★★★☆	★★★☆☆
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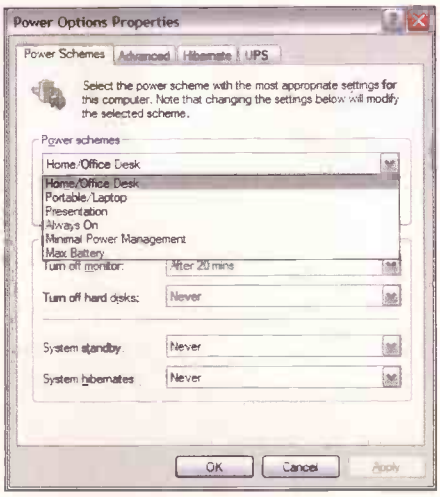
★★★★☆	★★★★☆	★★★★☆	★★★☆☆

How to maximise your laptop's battery

The point of a lightweight laptop is that you'll use it on the move a lot – on planes, trains and other places where you may not have easy access to a mains power supply. Obviously, then, battery life is a crucial factor. For those who are relatively new to the world of portable computing, here's a quick guide to getting the best out of your new purchase and squeezing that little bit extra out of your battery.

In Windows XP, click on the Power Options Control Panel applet (Start/Control Panel – see screen, right) to see your laptop's power management features. The first tab here is the Power Schemes pulldown menu. This includes a number of power 'schemes' – predefined groups of settings that are designed for different working environments. There will be a 'Desk' setting, which assumes that you're using the laptop on an office desk with a mains power supply. This will leave the monitor and hard disk running most of the time as there's no need to conserve battery power. Alternatively you can select options such as the 'Max Batttery' scheme, which turns off the monitor and hard disk very quickly if the computer isn't used for a few minutes (maybe you're in a coffee shop and you just stopped for a drink). This minimises the drain on the battery in order to keep the machine running for as long as possible.

One thing worth knowing about is the difference between just shutting the laptop down, and using the 'standby' and 'hibernation' modes. When you shut the computer down it doesn't use any battery power at all, but you do have to wait for it to start up and then open your applications all over again before you can start work once more.



Tweaking Windows power options can help you to maximise your laptop's battery life

If you just want to shut the laptop down briefly – perhaps to take a phone call or a short meeting – you can use Standby mode. This turns most of the computer components off to preserve power, but uses just a small amount of battery power to preserve the contents of the laptop's Ram, such as open applications and documents. Just hit the power button again and the laptop will go straight back to your open documents so that you can get right back to work.

If you want to shut the computer down for a longer period (perhaps you don't know how long that meeting is going to last...) you can use Hibernation mode instead. This copies the contents of the laptop's Ram into a special hibernation file on the hard disk, and then shuts the laptop down completely so that there's no drain on the battery at all. When the laptop wakes from Hibernation it automatically copies the stored data back into Ram so that you can carry on working from where you left off.

Editor's Choice

Editor's Choice Samsung NP-Q35T006/SUK
Recommended Mesh Pegasus S271

Samsung NP-Q35T006/SUK

Mesh Pegasus S271

This is a strong group of products and we were impressed to see lightweight, portable designs based on the latest processors selling for well under £1,000.

Ironically the lightest laptop in the group, Evesham's Lightbook, had the poorest processor performance and battery life. Its strength was too small to offset poor performance in other areas.

At the other end of the spectrum is Packard Bell's Easynote. Although this has a 14in screen it is excellent value at £699.99. The price includes attractive added features, such as a built-in webcam and composite video output. The screen is marred by its relative lack of brightness, but the Easynote is good value for money, as is the Amilo from Fujitsu-Siemens, which also comes in at £699. The Amilo was a 12in model, but bright and good for watching DVDs while travelling.

The other 14in laptop was HP's Compaq nc6400, but we were concerned about the lack of rigidity in the screen frame. The lack of a proper DVD burner also let the nc6400 down, although its security features might appeal to business users.

Sony's 13.3in Vaio is a good compromise between the 12in and 14in screens of its rivals although it is a bit expensive for a machine with a fairly mid-range specification.

Based purely on its specification, the obvious candidate for Editor's Choice was Samsung's Q35, with its 2GHz Core 2 Duo processor, 1.25GB of Ram and 120GB hard disk. The Q35 ran away with the top scores in our battery life tests, lasting almost five hours when running productivity software and providing almost three hours of non-stop DVD playback. It's the most expensive laptop here but its performance and battery life justify the price and make this a worthy Editor's Choice.

If you're on a tight budget, we suggest the Mesh Pegasus S271 as our Recommended alternative. It's slower than the Q35, using a 1.6GHz AMD Turion 64 X2 processor, but provides good performance, battery life, high build quality and a 12in display for a modest price of £799. It's the only laptop here to provide decent 3D performance, so you can have an occasional games session on it too. **PCW**

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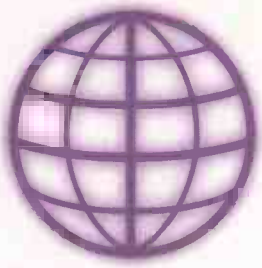

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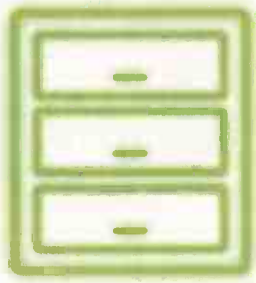

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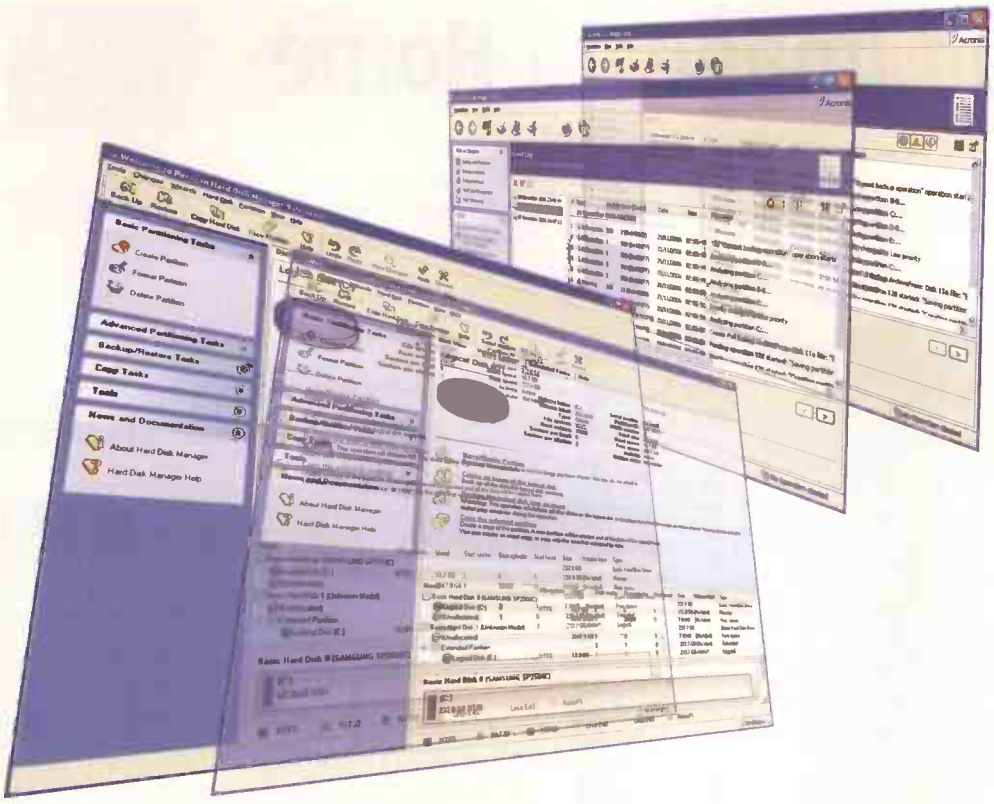

ON TEST

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Editor's Choice

'Backup has always been a foreign concept for the average home PC user, at least in part because of the extra work, time and cost'

An image is worth a thousand files

Disk-imaging applications can help protect your precious data, so Terry Relph-Knight takes a tour of the top five packages

Your personal data, and the digital working environment it occupies, can easily become the most valuable aspect of your system. In the past the software tools for preserving these assets were split into backup utilities and environment migration utilities. Now a new generation of disk-imaging software is emerging that combines elements of both, along with enhanced usability. In this group test we review five of these disk-imaging programs.

Many PCs are now sold with the operating system and applications pre-installed as a compressed hidden partition on the hard disk. In the event of a serious corruption or deletion of the OS, or applications that are installed on the main working partition, providing there is no hardware fault, the system can be restored to its original condition from the hidden partition. However, this doesn't protect your work files and is ineffective if there is a permanent hard disk failure.

Backup has always been a foreign concept for the average home PC user, at least in part because of the extra work, time, cost and complexity involved. Probably the only way this situation will ever really change is if backup is built in to the operating system and hardware and by default happens automatically and transparently to the end user. At least some versions of Windows Vista will include a basic imaging utility that uses the VHD (Microsoft virtual hard disk) file format.

For some time the only suitable media for low-cost backup with suitable speed and capacity has been an auxiliary hard disk. The availability of low-cost external drives, with USB2 and/or Firewire interfaces, is beginning to make personal backup a more palatable proposition. Now let's look at the best tools for the actual job of getting the data onto these drives.

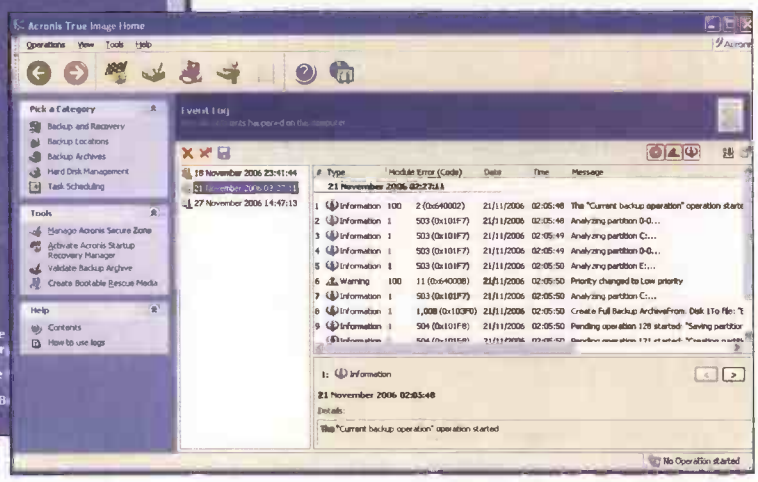
Acronis True Image 10 Home

Personal Computer World EDITOR'S CHOICE

Price £39.94 (download), £48.37 (CD) **Contact** Acronis www.acronis.com

Left: The Acronis True Image 10 Home opening screen, showing the multiple menus and task entry points

Below: The Acronis Event Log display



Acronis is gaining a growing reputation in the field of disk imaging software. Acronis True Image 10 Home is the simplest of its product range, and the company also makes four other imaging products aimed at the corporate market.

The installation splash screen offers you three choices; install the product, access the user guide or access the technical support via the Acronis website. Installation is straightforward, requiring only the entry of a 25-character unlock code and a system reboot.

Although the user interface is fairly easy to follow, Acronis provides rather a surfeit of routes to achieve the same objective. The main window has a toolbar with five tool icons. Access to these same tools is duplicated, not only in a vertical menu box along the left edge of the Acronis window, but access to three of these tools is also duplicated in the main area of the window. There is even a dropdown menu, accessed from a text menu along the very top of the Acronis window, which duplicates access to these tools all over again.

This gratuitous repetition is unnecessary, inefficient and just makes the user interface look much more complex and busy than it really needs to be. The main area of the window is split into three; Pick a task, Manage a task or Pick a tool. There are only two tasks shown; backup or recovery. Selecting backup opens the 'Create backup' wizard.

The opening step of the backup wizard provides a choice of imaging the entire disk, imaging a partition, or only backing up specific folders or files. This flexibility demonstrates the strength of the Acronis product, as some disk-imaging software is limited to only saving images of an entire disk, or only saving a partition. For example Runtime Software's Drive Image XML (see page 105) only saves images of partitions. The Acronis backup options allow even finer detail as, on step two of the wizard, it is possible to choose to back up classes of data based on file extension, or even on file type, such as all video or all audio files.

You can also choose to back up your application settings or your Microsoft Outlook messages, settings, accounts and address book. Acronis True Image 10 Home is the only product, out of the five reviewed here, to allow this level of detail.

The third step of the wizard varies according to your choice of data type to back up, but in all cases it allows specific data selection. On step four you specify a destination for your backup. Acronis True Image 10 Home is the only product in this group test that can create a true hidden partition on the source hard disk as a backup destination. Although this is certainly convenient, it is the least secure backup method because it is the most vulnerable to hardware failure.

Step five allows a choice of full, incremental or differential backup (see 'Working with disk images' on page 109 for an explanation of the difference).

In step six you can set backup options. In the final steps, you can add a text comment, and see a summary of the proposed backup as well as the 'Proceed' button.

As the above description of just the backup procedure shows, Acronis True Image Home is a powerful, feature-rich product. It's the only product of the five reviewed to already include Microsoft Vista support and it uses Windows Explorer to browse its images to give you a familiar look and feel.

Verdict

Pros A feature-rich powerful product
Cons Superfluous repetition of user controls makes interface clumsy

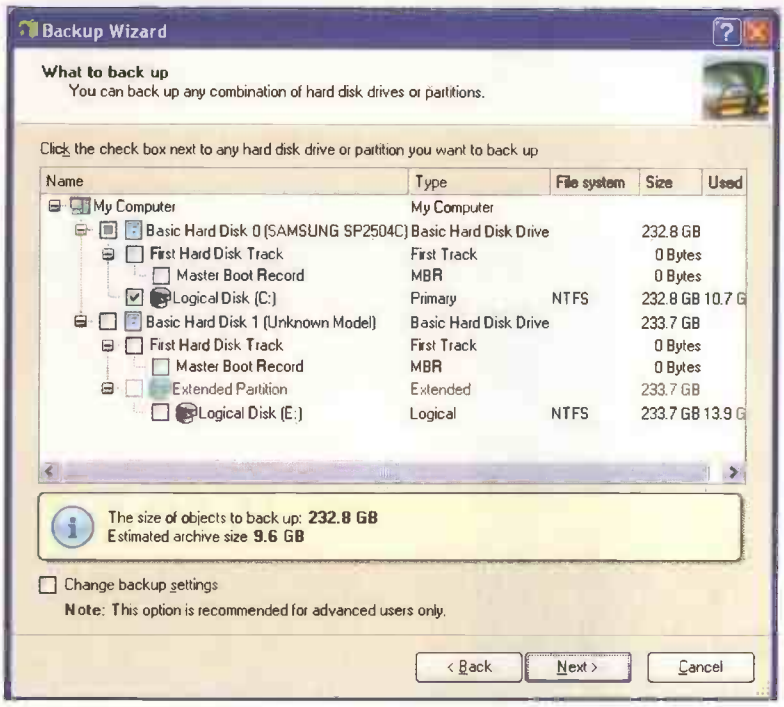
Features ★★★★★
Ease of use ★★★☆☆
Value for money ★★★★☆

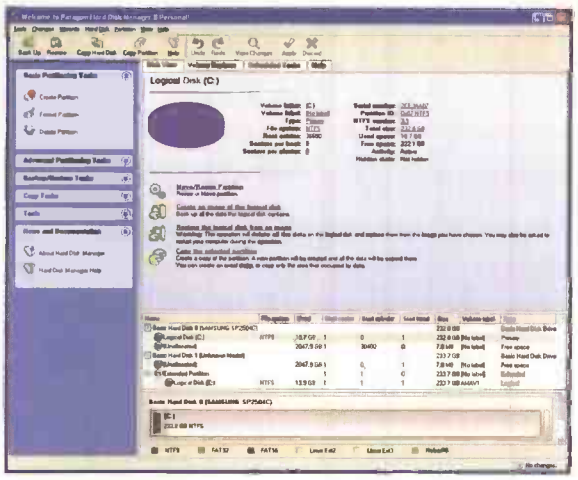
Overall Although the front end of the Acronis user interface is confusing, due to its multiple task entry points, the individual task wizards provide a safe and clear guide to using this feature-rich product ★★★★☆

Paragon Hard Disk Manager 8

Personal Computer World RECOMMENDED

Price £50.47 (download price), £57.25 (CD) **Contact** Paragon www.paragon-software.com





Above: The start screen for Paragon Hard Disk Manager 8 Personal provides some immediately useful information about the hard disks in a system

Left: A screen from the Paragon Backup wizard showing detailed information about the hard disks in the system

Paragon, founded in 1994, is an international software company that specialises in disk management and storage management utilities. Paragon Hard Disk Manager 8 Personal is its newly released home and small-business product.

As the name implies, this Paragon product is rather more than just a disk-imaging and backup utility. In addition it provides a toolkit for hard disk repair and maintenance. Tools include a Master Boot Record (MBR) updater, a sector editor, a disk defragmenter, filesystem conversion, a disk surface test and more.

Paragon uses the standard Installshield wizard for the installation and once installed, following a reboot, the product is ready to use. For online purchases you receive a key via email that allows download of the full program. Rather than include the ability to generate a recovery CD image from within the main application, Paragon provides its recovery CD as a separate downloadable Iso image which will need to be burnt to a blank CD using a third-party CD burner.

Some disk-imaging products here, such as Symantec Norton Save & Restore or R-Tools R-Drive Image, go to some lengths to make the backup and restore process as simple as possible by using wizards and limiting the information on screen at any time. Although Paragon also uses wizards to guide you through the backup or restore processes, it will suit those who like to see a little bit more information on the screen. The start screen is particularly informative about the status of the hard disks in a system. For example, it shows the type and version of filing system used on each disk, the disk serial number, the partition IDs and the partition type.

Clicking on the Back Up icon at the extreme left of the top toolbar brings up the Back Up Wizard. Using seven successive screens, this allows you to specify the data to back up, alter backup settings, select the data destination, schedule the backup and check your selections.

On the penultimate screen the wizard displays the message 'Press Next to start the backup process'. Clicking 'Next' reveals a final screen where you click on 'Finish' to close the wizard. At this point, if you chose immediate, rather than scheduled backup, you might expect the specified image backup to start. In practice it is necessary to click on the Apply changes icon in the top toolbar before any commands are processed.

This slightly confusing behaviour occurs because, by default, the software runs in 'virtual mode', which allows rollback of any command choices before they are committed. This option can be turned off by selecting – Tools – Settings – Virtual mode option. The 'Allow virtual mode' box can then be unchecked to allow an immediate response to backup commands. The simple addition of an explanatory message to the appropriate wizard screen would clear up this confusion.

As purely a disk-imaging product and compared to the other four products in this group test, the higher cost and slightly below average backup speed of Paragon Hard Disk Manager 8 Personal, combined with the slight confusion caused by the Virtual mode option, would result in a low overall score for this software. But the undeniably useful extra features make this an excellent all-in-one package.

Verdict

Pros More than just disk-imaging software, Paragon Hard Disk Manager 8 Personal also provides a collection of useful hard disk management and repair tools

Cons On first acquaintance this software appears to refuse commands, due to the default setting of the 'virtual mode' feature

Features ★★★★★

Ease of use ★★★★★

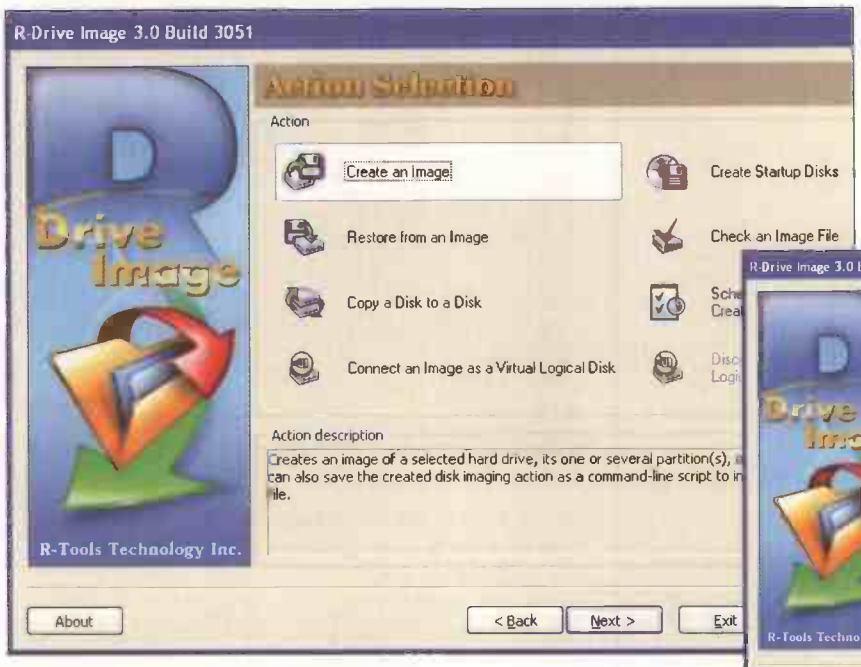
Value for money ★★★★★

Overall More features than most disk-imaging packages, but this is reflected in the relatively high price

★★★★★

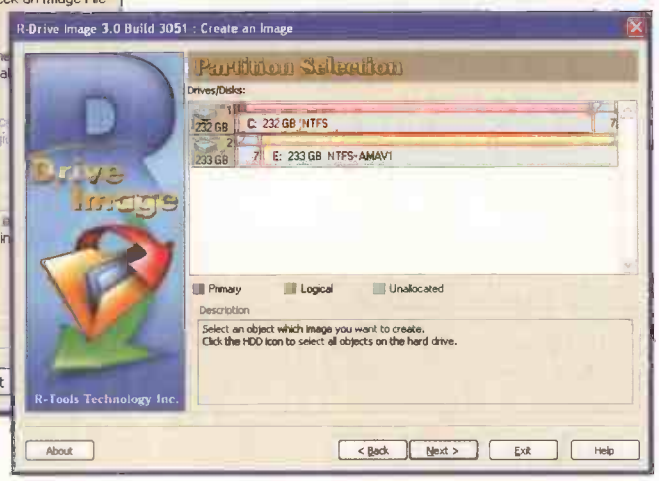
R-Tools R-Drive Image 3.0

Price £29.99 (download only) **Contact** R-Tools www.r-tt.com



Left: R-Tools R-Drive Image 3.0 has a simple, clear interface that presents all the start options using eight task icons next to a text description of their function

Below: The R-Drive Image 3.0 partition selection screen from the Create Image wizard



We reviewed Canadian company R-Tools' R-Studio, a good but complex data recovery tool, in our March 2006 issue (see **www.pcw.co.uk/2151217**). By contrast, R-Drive Image is a bit of a welcome surprise, since it is unexpectedly simple and very easy to use. The software features a graphical boot mode that makes it possible to restart directly from Windows to restore data to the system and other locked partitions, in many cases eliminating the need to use a restore CD. The program does have the ability to generate restore disks, either by burning directly to a CD or DVD, as an Iso image for burning to a CD using a third-party burning software, or even to a couple of 3.5in floppy disks if you wish.

Installation using the R-Tools install wizard is simple and very fast, but does require a reboot. The full downloaded program can be used for 15 days for evaluation purposes. Paying customers receive a registration key by email to unlock the software.

From the start-up screen you are offered eight possible task choices; Create an image, Restore from an image, Copy a disk to a disk, Connect an image as a virtual logical disk, Create start-up disks, Check an image file, Schedule/create a script and Disconnect virtual logical disks.

There is no menu toolbar and all operations are wizard- rather than console-based, so for example clicking the Disk Image icon on the opening screen leads to a series of further screens, as each step of the backup setup unfolds. Images and files are stored with the .arc file extension, a well-established archive file format. Unfortunately R-Drive Image doesn't provide a log file and, although a progress bar is displayed during a backup, there is no record of time taken to complete a task.

R-Drive Image can create images of single or multiple partitions, a logical disk, or an entire hard drive. It doesn't provide individual folder or file backup but you can choose to restore individual folders or files from a backup image. The 'Copy a disk to disk' option does exactly that, allowing you to make a clone rather than creating an image file. Image verification is a separate step, accessed via the 'Check an image' icon. This is a process that can take some time, but it's certainly advisable, particularly before archiving an image.

All R-Drive Image actions can be scripted, by recording while stepping through the necessary wizard. The script is saved as a command line and can be included and run with other commands in a command-line batch file.

To explore and access the files in an R-Tools image you have to mount it as a virtual disk, by assigning it a logical drive letter using the Connect an image wizard. The image will then appear on the host system as a logical disk and can be explored via Windows Explorer.

R-Tools says that its technical support is available 24/7 and that the average email response time is less than four hours. Telephone support is available from 9am-6pm (Eastern Time), Monday through Friday, but since it's a Canadian operation, this may limit its appeal to UK residents.

Although it's not as full featured as some disk-imaging tools there's something very appealing about R-Drive Image, it looks good and the user interface is easy to use, with no loose ends, or confusing multiple paths.

Verdict

Pros A focused set of features, with a wizard for every function, requiring only the minimum of user input, make R-Drive Image easy to use
Cons No individual folder or file backup, although individual folders and files can be selectively restored from an image file

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

Overall R-Drive Image 3.0 has a clear and easy user interface and the unusual option to restart into restore mode without using a boot disk, although boot media are also supported

★★★☆☆

Runtime Software Drive Image XML

Price Free **Contact** Runtime Software www.runtime.org/dixml.htm

Above: Runtime's Drive Image XML opening screen with its simple, five-button menu

Left: Drive Image XML's backup image browser

Runtime's Drive Image XML isn't the prettiest of programs, but it's free to download, although to some extent you get what you pay for. All too many commercial utilities look cosmetically wonderful, but have flaws in their user interface and functionality. Runtime says that a drawback of other imaging products is that they use proprietary file formats, rendering backup data inaccessible other than from the imaging product itself. Drive Image XML uses XML for its image files, which can be processed using a number of third-party tools.

Since this is a free utility, service and support are minimal. You can email questions about Drive Image XML to Runtime, but there is no telephone support.

Drive Image XML can only perform backups of logical drives and complete hard disk partitions. If you want to back up a multi-partition disk you will have to perform a separate backup for each partition.

Menu choices on the opening screen are: Welcome, Backup, Restore, Drive to drive and Browse. These are accessed via a vertical row of buttons down the left-hand side of the application window, or from a standard pulldown text menu from the top menu bar. Selecting Backup opens a drive selection panel in the main area of the application window. With a drive or drives selected, clicking on the Next button at the bottom of this panel opens a three-step wizard that displays the selected source partition or partitions on the first screen. The following screen allows selection of the backup destination and setting of the limited number of backup options, such as compression and large file splitting. Progressing to the next and final screen starts the backup and shows progress through a text log and a segmented progress bar.

During its operation Drive Image XML does display a fair amount of information about the partitions and drives it is manipulating. For example the type of filesystems used, the total number of sectors available, the number of sectors in each partition and the physical drive number, are shown.

Backups are stored as an XML file that contains a drive description and a data (.dat) file that contains the binary image data. If the 'Split large files' option is selected, multiple Dat files will be created, limited to no more than 4GB in size. You will need to do this if the image files are to be stored on a Fat 32-formatted drive (Fat 32 cannot handle files over 4GB). Since Drive Image XML is the only product in this group that doesn't feature built-in CD and DVD burning, to back up to CD or DVD you will have to perform a partition backup onto hard disk using the split large files setting, and then use a suitable third-party burning program to write the backup files to CD or DVD.

Only the complete image can be restored with Drive Image XML; there is no option to restore individual folders or files as there is with the other four programs reviewed in this group test.

For simple image backups Drive Image XML is a cost-free solution that saves images in a non-proprietary format that should be reasonably future proof. In our tests, with compression off, which is the default mode, its backup rate was a little faster than the R-Tools or Paragon products, but with compression on, it was the slowest product of the five reviewed.

One neat free extra that Runtime offers is a Drive Image XML plug-in for the free BartPE (**www.nu2.nu/pebuilder**) that lets you create a bootable Windows CD for emergency use.

Verdict

Pros A simple freeware program that provides basic partition backup
Cons Flexibility is limited and only minimal technical support is provided

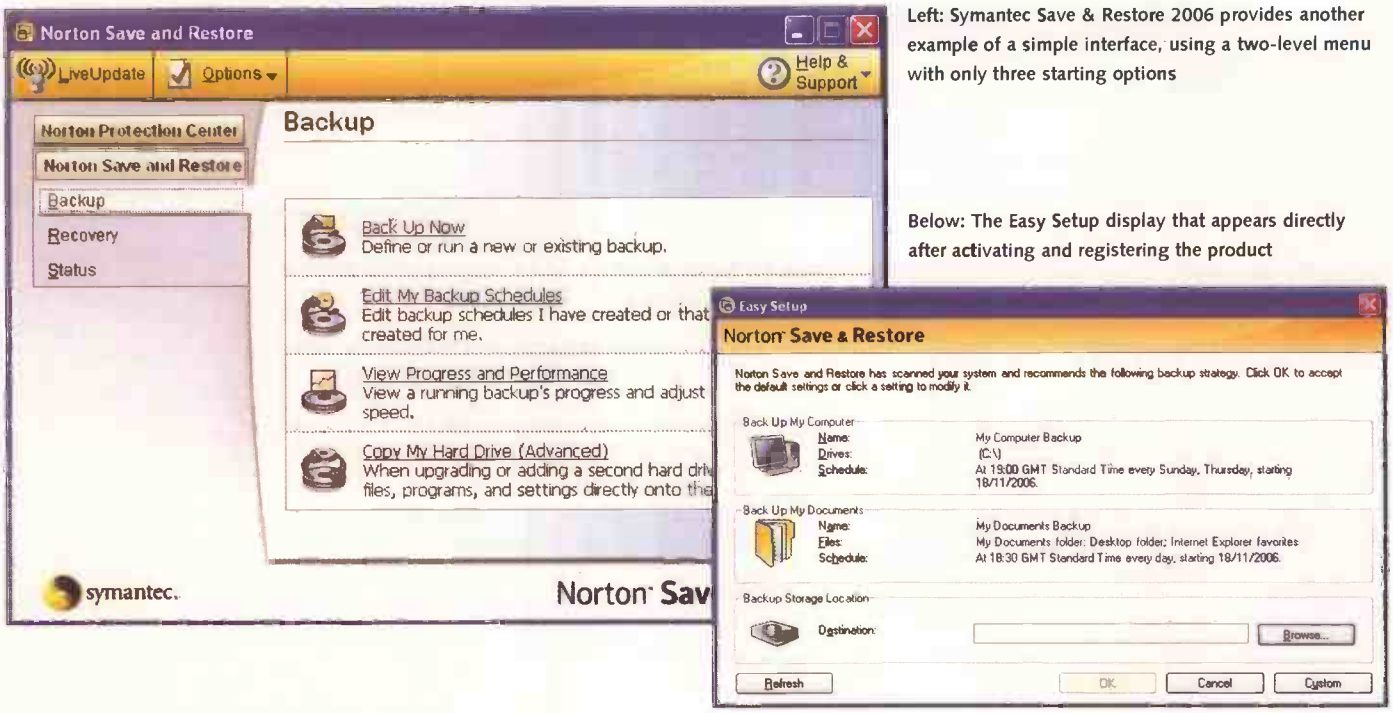
Features ★☆☆☆☆
Ease of use ★★★★★
Value for money ★★★☆☆

Overall Provides solid, simple image backup for no outlay. Backup files are saved in XML format and can easily be read by many other utilities

★★☆☆☆

Symantec Norton Save & Restore

Price £46.99 (download), £54.04 (CD) **Contact** Symantec www.symantec.co.uk



Left: Symantec Save & Restore 2006 provides another example of a simple interface, using a two-level menu with only three starting options

Below: The Easy Setup display that appears directly after activating and registering the product

Symantec is a well-established software company with a wide range of products and Norton Ghost, a disk-imaging product now up to version 10.0, has been part of its range for some time. Norton Save and Restore 2006 is a new product based largely on Ghost technology. Compared to Ghost 10, the new features offered by Save and Restore are: specific file and folder backup, group backup by file type, integration of the Norton Protection Centre console and the ability to trigger a backup from Norton Internet Security 2006 virus or worm outbreak notifications.

Generally Symantec products all have a cosmetically polished presentation and user interface. Norton Save & Restore is no exception, although installation turns out to be a bit of a minefield. The start-up splash screen from the product CD offers a choice of Install, Driver validation, Update locator, Read me, or Watch a product tour. The first and the last two options are fairly self evident. Driver validation checks to see if the device drivers present within the recovery OS are sufficient to operate the essential device services required during recovery (during system recovery Save & Restore loads and runs within its own operating system). Update locator searches for any Norton anti-virus definitions present on your disk and saves them to a desktop folder.

During installation a message appears recommending that you first test the 'Symantec Recovery Environment' by booting from the product CD, in effect dry-running the system recovery procedure. You are advised to refer to 'the online help file' for more information, but, since the product, including the online help, has yet to be installed, this isn't possible. Exploring the CD doesn't reveal any obvious help on this issue. During the install procedure an option is displayed to run the driver validation, which does test the recovery environment.

Although obviously dependent on your system specification, booting system recovery from the CD is a fairly slow process that can take several minutes. As the recovery environment boots, a brief message is displayed advising you to press F6 to install any SCSI, Raid or Sata drivers required. Just as with an original Windows install, these will need to be on floppy disk and hence your system must include a floppy drive in this case.

Eventually you are presented with a user licence agreement screen which bears the warning 'This software contains a Microsoft security feature that will cause your system to reboot, without prior notification, after 24 hours of continuous use'. This refers to the recovery environment, not the software, but it's not clear and the hard-copy manual mentions none of this in the section covering installation. Installation requires activation which generates a further product key. This is needed for any future installs and you're encouraged to create a Norton account and register the product. It's all a bit of a nuisance when all you want to do is get up and running.

Rather than provide direct access to all its controls through its menu structure, Norton Save & Restore makes extensive use of wizards, with hidden controls that only appear when needed. While obviously intended to help the user, in practice this can be unsettling and makes it difficult to grasp the overall architecture of the program. This is a common mistake when wizards are implemented without providing an alternative route to perform the same tasks.

Verdict

Pros An easy-to-use product, with a simple user interface

Cons Wizard-based approach makes it difficult to navigate manually to a required setting or feature; only runs on Windows XP

Features ★★★☆☆

Ease of use ★★★★☆

Value for money ★★★☆☆

Overall As a first release version this program still has some rough edges and inconsistencies in the user interface. However it's a promising product that's well featured and is the fastest performer

★★★☆☆

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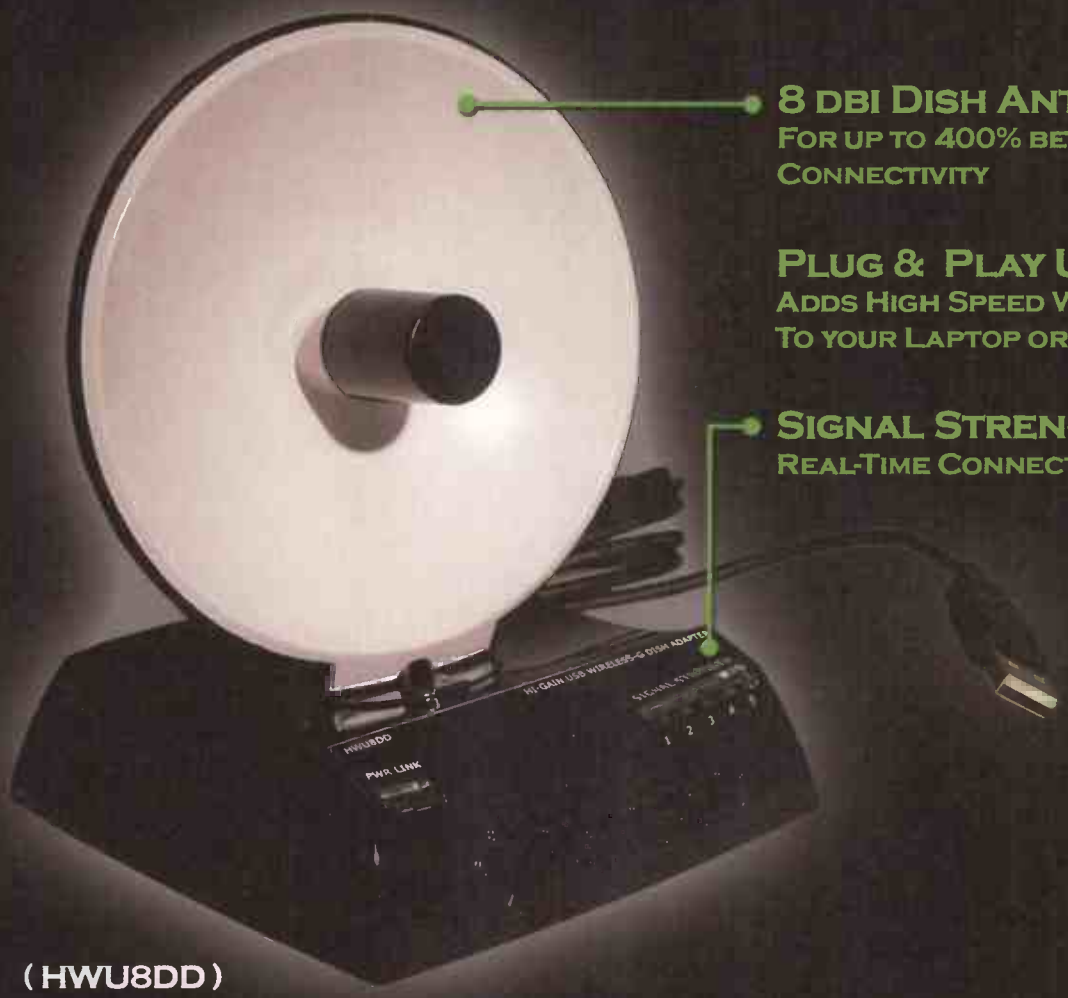

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Drive-imaging software

MANUFACTURER	ACRONIS (Personal Computer World EDITOR'S CHOICE)	PARAGON (Personal Computer World RECOMMENDED)	R-TOOLS TECHNOLOGY	RUNTIME SOFTWARE	SYMANTEC
Product name	True Image 10 Home	Hard Disk Manager 8 Personal	R-Drive Image 3.0	Drive Image XML V 1.18	Norton Save & Restore 2006
Download only price	£39.94	£50.47	£29.99	Free	£46.99
Download & CD price	£48.37	£57.25	N/A	N/A	£54.04
URL	www.acronis.com	www.paragon-software.com	www.r-tt.com	www.runtime.org/dixml.htm	www.symantec.co.uk
Phone	020 8987 5440	N/A	N/A	N/A	+353 1 803 5400
GENERAL FEATURES					
Bootable version	✔	✔	✔	✘	✔
On-the-fly operation	✔	✔	✔	✔	✔
Allows backup Explore	✔	✔	✔	✔	✔
Scheduled backups	✔	✔	✔	✔	✔
Event-triggered backups	✔	✘	✔	✘	✔
Backup task priority setting	✔		✘	✘	✔
Built-in CD and DVD recording	✔	✔	✔	✘	✔
Spanning across removable media	✔	✔	✔	✔	✔
Backups to same disk secure partition	✔	✔	✘	✘	✘
Incremental backups	✔	✘	✔	✘	✔
Differential backups	✔	✔	✘	✘	✘
Multiple recovery points	✘	✘	✘	✘	✔
Individual file or folder backup	✔	✔	✘	✘	✔
Backup by file type or category	✔	✘	✘	✘	✔
Microsoft Outlook backup	✔	✘	✘	✘	✘
Backup of application settings	✔	✘	✘	✘	✘
Supports backup Rules creation	✔		✘	✘	✘
Save to FTP	✔		✘	✘	✘
Number of compression levels (ex Off)	3	3	12	1	3
Option to skip or include OS aux files	✘	✔	✘	✘	✘
Password image protection	✔	✔	✔	✘	✔
Backup encryption	✘	✘	✘	✘	✔
Email backup status notification	✔	✔	✘	✘	✔
Requires install of .Net Framework	✘	✘	✘	✘	✔
OS SUPPORT					
Windows 95	✘	✔	✘	✘	✘
Windows 98SE	✘	✔	✔	✘	✘
Windows ME	✘	✔	✔	✘	✘
Windows NT	✘	✔	✘	✘	✘
Windows 2000	✔	✔	✔	✘	✘
Windows 2003 server	✘	✘	✔	✔	✘
Windows XP Home	✔	✔	✔	✔	✔
Windows XP Pro	✔	✔	✔	✔	✔
Windows XP MCE	✔	✔	✔	✔	✔
Windows XP Pro x64	✔	✔	✘	✘	✘
Windows Vista	✔	✘	✘	✘	✘
Linux	✘	✘	✘	✘	✘
Unix	✘	✘	✘	✘	✘
FILESYSTEM SUPPORT					
Fat 12	✘	✘	✘	✔	✘
Fat 16	✔	✔	✔	✔	✔
Fat 32	✔	✔	✔	✔	✔
VFat	✘		✘	✘	✘
NTFS	✔	✔	✔	✔	✔
NTFS5	✘	✘	✘	✘	✘
NTFS+EFS	✘	✘	✘	✘	✘
Linux Ext2	✔	✔	✘	✘	✔
Linux Ext3	✔	✔	✘	✘	✔
Linux Swap	✔	✔	✘	✘	✔
UFS1	✘	✘	✘	✘	✘
UFS2	✘	✘	✘	✘	✘
STORAGE MEDIA SUPPORT					
Network storage	✔	✔	✔	✔	✔
USB drives	✔	✔	✔	✔	✔
Firewire drives	✔	✔	✔	✔	✔
CDs and DVDs	✔	✔	✔	✘	✔
Jaz & Zip drive support	✔	✔	✔	✘	✔
SCORES					
Features	★★★★★	★★★★★	★★★☆☆	★☆☆☆☆	★★★☆☆
Ease of use	★★★☆☆	★★☆☆☆	★★★★★	★★★★★	★★★★☆
Value for money	★★★★☆	★★★☆☆	★★★★☆	★★★☆☆	★★★☆☆
OVERALL	★★★★	★★★	★★★	★★	★★★

Working with disk images

With hard disks today commonly offering between 80 and 500GB, disk images are large awkward things to manage. Some of the imaging software in this group test offers an almost bewildering range of options, so it helps if you have a clear idea of the various features available in your chosen imaging software and a clear strategy for your approach to image backups.

External hard drives are a convenient way of backing up your data

The other half of the solution

The big stumbling block for many people when backing up or imaging a system is that the software is only half the solution. Image storage, in the form of a Firewire or USB plug-in drive, or a network server with dedicated imaging space, is also required. Even with image compression, this will need to be close to the size of the source data set. Luckily the price of large internal hard drives is now reasonable, and even external drives (pictured) are dropping rapidly in price: these are much more convenient as they can be removed and stored in a safe place away from your PC. You can even make your own external drive by buying a DIY enclosure for around £20 or so.

Different types of backup

Image backups of many gigabytes can take a long time so many new imaging applications allow incremental and/or differential backup after the initial full image is saved. Incremental backups save space and time, since a chain of incremental files, each file containing only the changes made since the previous file, is created. This continues until a specified number of files are reached and then the process starts again. Incremental backups are vulnerable to breaks in this chain of files.

Differential backups also start with a full backup, but then record only the differences between this and the current state, in a single differential file. Incremental or differential backup, plus compression, can save a lot of time and backup disk space.

Incremental backups allow multiple recovery points, so that your working disk can be restored to the state it was in at different points in time. The number of recovery points can often be specified and the process scheduled, so for example you can choose to save images for each week of your last four weeks worth of work, with an image increment saved every Friday at 6pm. Rather than using a timed schedule you can also set events as triggers. So for example an incremental backup could be triggered whenever a user logs off, or when a new application is installed.

Image browsing

The huge drawback with the early backup solutions was that the backup files and their contents were, at best, only identified by a log and could not be read or searched for contents. Modern imaging software includes a browser that allows the contents of an image to be viewed just like an ordinary hard drive or directory, and even allow individual files to be selected and restored.

Editor's Choice

Editor's Choice Acronis True Image 10 Home
Recommended Paragon Hard Disk Manager 8 Personal

Acronis True Image 10 Home

Paragon Hard Disk Manager 8 Personal

Once a very niche category, some of these disk-imaging products are now taking over more of the functions of traditional backup software. This means your choice will be determined very much by your specific needs for a feature or mix of features. For example, only the Paragon product runs under Windows 95. If you need to back up Windows 95 PCs, Paragon is your only choice in this group. Or if you want to back up your Outlook files separately, only Acronis True Image 10 Home offers a specific option to do this.

Also, for the four programs that do have built-in CD and DVD burning, each one varies in its list of supported CD and DVD writers – be sure to check before you buy.

R-Tools' R-Drive Image 3.0 is low cost, very easy to use and has a very reasonable selection of features. On cost grounds, Runtime's Drive Image XML is unbeatable, because it's freeware. It's also very easy to use, but has limited features and no built-in facility to burn to CD or DVD. In an emergency when you don't have access to other backup software and need to image a partition, Drive Image XML will get you out of trouble at no cost.

Apart from a few rough spots in the interface, Symantec's Save & Restore 2006 is easy to use, with reasonable features, but it's one of the more expensive products and it only runs on Windows XP.

As our overall scores show, the pros and cons of each program balance out to give all five products very similar overall scores, which is good news for buyers and a reflection of the maturity of this software category. However, it's our task to choose winners here and, based on its outstanding imaging flexibility we've given our Editor's Choice award to Acronis True Image 10 Home. It's feature-rich, reasonably priced and offers unsurpassed flexibility. Although we thought the menu system was a little fussy, the various dedicated wizards make any backup or restore task extremely easy.

If you don't mind paying a bit more and want extra partition maintenance and recovery tools, Paragon Hard Disk Manager 8 Personal is our Recommended choice. Its 'virtual mode' default setting could confuse novice users, but its extra features justify the higher cost if you prefer an all-in-one approach. **PCW**

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Source Code: V252

COMPILED BY ALAN STEVENS

BUSINESS

SECURE IN THE KNOWLEDGE

The *PCW* business section this month contains the usual eclectic mix of new technologies and products designed for use particularly by the small organisation, albeit with something of a security theme running throughout.

With Windows Vista software now generally available in the marketplace, for example, we have a feature looking at the security enhancements in the new Microsoft operating system and how these can be of benefit to the small company thinking of upgrading.

We also put an innovative, new authentication management solution through its paces as well as what claims to be a 'zero-configuration' VPN (virtual private network) solution, which you can download and use for free. Plus, we zoom in on an affordable, yet very professional, new wireless surveillance camera from Linksys.

Also in this issue you'll find reviews of the latest Intel vPro manageable business desktop from HP, a new suite of business management tools, an Ethernet switch and a utility to help switch network settings in a hurry. All available now but, remember, you saw them here first.

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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.

'The HP Compaq dc7700 family is easy to manage and offers models to suit all budgets'

Read the review on page 119

Vista migration

Small businesses will need to plan carefully for a migration to Microsoft Vista to ensure a smooth transition and that they remain secure, explains Jon Thompson

It's a sure bet that hackers everywhere are furiously trying to be the first to 'break' Windows Vista, but Microsoft claims to have a wide range of defensive tricks up its sleeve.

Bill Gates' Trustworthy Computing initiative promises to set new standards in reliability, usability and above all security, and Vista is undoubtedly among its flagship products. But with so many skilled and malicious individuals ranged against it, it will need a radical approach to remain secure.

For SMEs (small to medium enterprises), any enforced, radical change in approach is crucial. Understanding the implications of new working practices is paramount to any successful, large-scale migration.

But while Vista's new security measures will protect you from stealthy malware and foolish users alike, there's also scope for them to trip you up, unless you carry out some careful planning. So how much work will you need to do to ensure a successful deployment?

In an email sent to Microsoft staff in 2002, Gates declared that: "Trustworthy Computing is computing that is as available, reliable and secure as electricity, water services and telephony." Since then Trustworthy Computing has developed into an initiative whose basic tenets are security, privacy, reliability and business integrity. So, what threats must the new operating system overcome to ensure these demands are met?

Breaking and entering

A popular hacking technique is to capture credentials as they go by on a busy network. This entails using a piece of software called a 'sniffer', which looks for data packets containing usernames and passwords. Vista will have to prevent such malware being installed via malicious payloads to emails or explicitly by would-be internal hackers.

Allied to sniffers are keyloggers (see feature, page 61). Usually carried as attachments to dodgy emails, keyloggers make even secure communication with https websites vulnerable to attack. They do this by capturing keystrokes before they enter the secure connection. A good anti-spyware or anti-virus program may pick up keyloggers, but it will only do so reliably if it's updated regularly.

Even without network sniffing or keylogging, it's still possible to gain access with relative ease by cracking passwords. This entails trying many passwords against a known user account name in the hope that one will be correct. The key to preventing this is to change passwords regularly enough so as not to present a stationary target, but not so frequently that they can be easily forgotten. Left alone, some users will keep the same password for years, so Vista must make them expire automatically after a reasonable length of time. Thirty days is what many authorities on network security recommend.

'Left alone, some users will keep the same password for years'

While the precautions mentioned so far will keep your network relatively safe, there is a form of attack that can grant almost magical access: the buffer overflow.

Let's take as an example a simple program that allows you to enter a string of characters. The data you enter is stored in a buffer straight after the code. If buffers were dynamic, all would be well, but in practice they tend to be of a fixed length. If you enter too much data without checking the length first, the program will allow it to run off the end of the buffer and corrupt whatever follows.

By carefully crafting the data that overflows the buffer, you can make the processor continue and execute the rest of your 'data,' which is in fact machine code. This runs as the user who started the program originally, which makes the buffer overflow particularly dangerous if mounted against software running under a privileged account.

Luckily buffer overflows are difficult to write but they can be devastating, and many patches are dedicated to replacing old code with new, just to avoid buffer overflows.

Windows Vista needs to address these and other threats by taking an approach that combines usability with security. It achieves this primarily with a mechanism that will require careful planning if your deployment is to go smoothly.

Shall we overcome?

The list of defences employed by Vista to thwart the attentions of would-be hackers is extensive, and covered in more detail in the box on page 113, but perhaps the single biggest and most visible change to the way windows now works is the concept of User Account Control (UAC). It's also capable of providing businesses with the biggest of

their headaches in migrating to the new operating system.

UAC is designed to reduce the risk from all forms of malware in one fell swoop by requiring all users (both normal and administrators) to use unprivileged accounts. Because of this, UAC is also the aspect of Vista that will require the most planning before you roll out the new operating system to users' desktops.

The reason administrators are unprivileged is that unless explicitly carrying out administration functions, there's no reason their accounts need elevated access rights. When these are required, however, administrators can temporarily grant them. This is done automatically through a mechanism called Administrator Approval Mode. When required Vista will prompt the administrator to confirm that they understand they are elevating their status before continuing. Privileges will immediately fall back to those of a regular user when the task is complete.

If a normal user attempts to perform an operation that requires elevated privileges, however, Vista will explain that they require the intervention of an administrator to grant one-time authorisation for the task to take place. So any software – whether it's an application, a secret hacking tool such as a sniffer, or even malware trying to install itself – will need the explicit approval of an administrator first. A side effect of this is that users are alerted the moment any form of malware tries to silently install itself.

When a program requires privileged access to operating system resources, Vista's User Access Control mechanism intercedes and asks for administrator verification. This is something careful planning should prevent the user from seeing in all but genuine cases of attempted security violation

Because of this notification process, the UAC mechanism will need to be planned for properly and users will need training in what to do if they encounter a mysterious security pop-up during the course of their day. This training needs backing by information issued to all users, explaining the procedure for handling and reporting such events when they happen unexpectedly.

To reduce the extra workload on support desk and administration staff that UAC is bound to cause, migration planning has to include an assessment of the applications the users will run, to minimise the likelihood of such prompts appearing during their normal work (see screen 1). The reason is that supposedly unprivileged programs that run perfectly well under XP carry out operations deemed privileged in Vista. Fortunately, Microsoft has released a tool that will help you work out which of your applications will need elevated privileges to run. See the box below for details.

Migration tools

Because Vista treats user accounts and settings in a more secure way, there are bound to be plenty of hidden gotchas to trip up the wary business and prolong the process

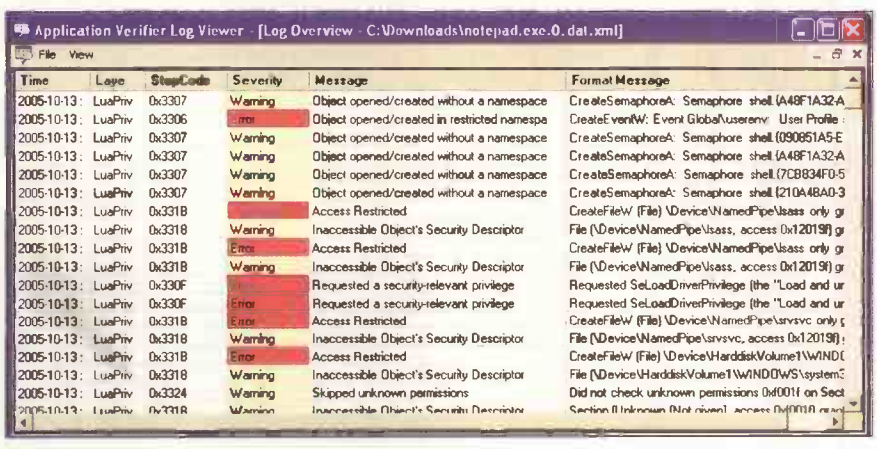
UAC – The implications

Vista defends against malicious code partly using a mechanism called User Account Control (UAC). This ensures that no accounts have any privileged access, and that administrators must explicitly grant themselves elevated privileges as and when they need to.

Some applications that were previously run by unprivileged users under XP might be considered to perform privileged operations in Vista. Because of this, it's important to assess your business-critical software as part of planning your Vista deployment. The knock-on effect for developers is that they will need to ensure users can complete certain tasks without their software requiring such special access.

Luckily Microsoft has released a toolkit in an attempt to make these assessments less painful. Their Application Verifier is designed to test programs for privileged operations, even if they previously installed and ran under unprivileged accounts on XP.

You can download Application Verifier free from Microsoft at **http://msdn.microsoft.com/library/default.asp?url=/library/en-us/dnlong/html/AccProtVista.asp**.



Getting bespoke software to run smoothly without privileged access to system resources is made easier with Application Verifier, a free tool from Microsoft

This page also contains links to detailed information about running the tool and how to make applications unprivileged.

Install the toolkit under an administrator account, deselect all testing options other than LUAPRIV, and then set the tool running and collecting data. It will continue to run after you log out.

Now log into a normal user account and run the application that you want to test. After thoroughly exercising it, logging back into an administrator account will give you access to the results.

If your application fails the test by trying to access privileged resources, Application Verifier will tell you.

If the package tested was a commercial package, you will need to upgrade to a Vista-compatible version.

For applications developed in-house, however, redevelopment will be necessary before failing software will run smoothly.

Standards for trusted computing

While Microsoft continues to promote its Trustworthy Computing initiative, the idea of 'trusted' computing has a more formal meaning. Organised and administered by the US Department of Defense (DoD), the Trusted Computer System Evaluation Criteria (TCSEC) set out a number of divisions running from A to D, which define increasing levels of trust and security.

The lowest division is D, reserved for systems that fail all criteria by providing minimal or easily subverted protection. Systems falling into category C1 provide a little more protection by enforcing basic usage limits. It's only when we get to C2 that login procedures and audit trails make an appearance.

What most people consider reasonably secure is what the DoD defines as division B, and there are a few subdivisions here too. Software rated B1 has to be able to remove identified vulnerabilities using distributed patches. B2 builds on this by providing things like separate administrator and operator accounts with strict configuration management controls. At the top of this division is B3, which must also contain a security administrator account and intrusion detection facilities.

The pinnacle of security is the A division. To enter this division, systems must have designs that are verified secure. A2, the highest classification, also has to have the source code verified secure.

of migrating to the new operating system. For big installations, manual migrations could prove to be a nightmare. But fortunately Microsoft has published both detailed help and a tool that will help you plan and carry out your upgrades.

The User State Migration Tool (USMT) is designed to smooth large migrations by capturing the user's account and application settings along with all their files, before migrating them to the newly installed operating system (see screen 2). It can operate either directly on the machines that are being upgraded or be used to transfer users from older hardware that is incapable of running Vista.

Using USMT you can create standard operating environments for clearly identified groups of users. In turn this will help to break your migration down into more manageable tasks. You can define standard permissions and access control lists for files and directories, for example, and create account settings including default password life and specify account lockouts after a certain number of incorrect passwords have been entered, to discourage password crackers.

By including all the applications users need in such an environment (and none that they don't) in a standard build and ensuring that the applications are Vista-compatible, you should have relatively few problems with UAC and privileged operations when users begin using the new environment.

As usual though, proper planning is essential. A test migration in a lab environment to iron out any problems is the first practical step. Next select a group of users to migrate. Some businesses choose a group of knowledgeable users who can help understand any problems, while others choose a group whose function is not business critical.

Whichever you choose, you need to ensure that if disaster strikes, you can back out of your changes quickly and cleanly. This means taking a backup of the 'pioneer' machines before you begin. Once you understand how to overcome the problems particular to your site, you can plan a properly phased rollout.

Usefully, USMT will allow you to store data for the users you're migrating locally, as part of the upgrade, or on a shared folder on a server. Microsoft says that on average, a user's total data storage requirements are about 75MB for a desktop user when using a central email server, 200MB for a user who stores email locally, and about 300MB for a laptop user.

When migrating to new hardware in addition to the new operating system, you'll obviously have to store your users' data remotely. For this, USMT is a godsend.

You can read more about migrating users with USMT at **http://technet.microsoft.com/en-us/windowsvista/aa905115.aspx**.

A new beginning?

Microsoft has worked hard to ensure that deployment of its new operating system begins securely and remains that way. Security measures buried deep in the operating system, such as Address Space Layout Randomisation, will keep you safe from covert attacks such as buffer overflows. User Access Control will ensure that your users are unable to install infected code or hacking tools, even by mistake.

Successful migration to any OS usually consists of not one but two parts: careful planning and the migration itself. In the case of Vista, there's a third element, which is to ensure that the software you install for your users requires no privileged access to system resources once it's up and running, because it won't be set up that way by default.

As with all deployments, the secret is to start small with a test, take note of the results, and then plan your full migration carefully, rolling it out in manageable phases as distinct tasks. Take stock at the end of each phase and adapt to any problems you encounter before you move on. That way, you stand the best chance of a smooth migration to the new operating system. **PCW**

Command Prompt

SCREEN 2

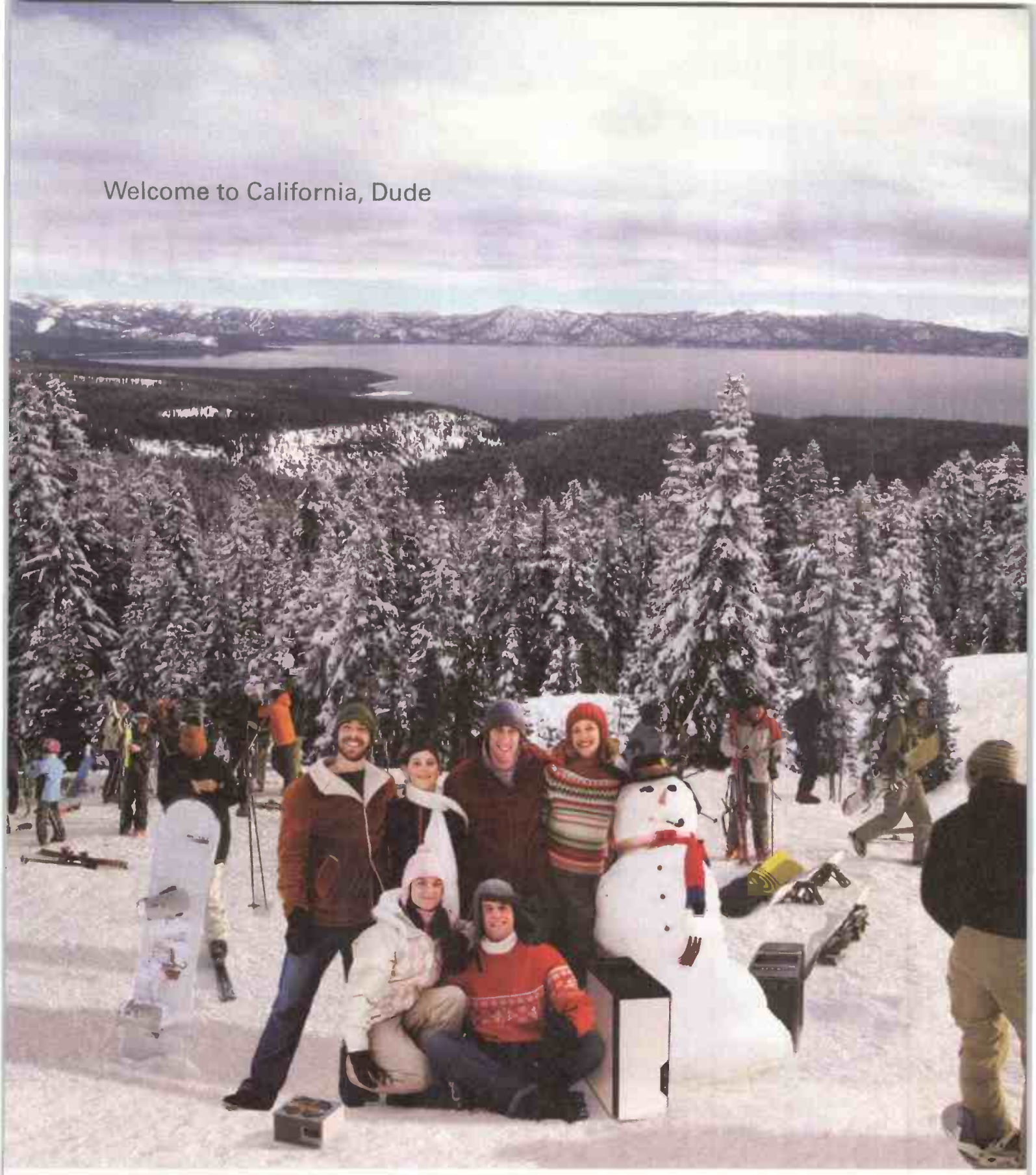
```
                                Fails if the files cannot be decrypted.
                                copyraw: Copies encrypted EFS files.
 /encrypt                       Encrypts the store.
                                You must also specify /key or /keyfile.
 /key:KeyString                 Specifies the key.
 /keyfile:FileName              Specifies the location and name of a .txt file that
                                contains the key.
 /noconpress                    Specifies that the store is not compressed.
  l:FileName                    Specifies the location and name of the log.
  v:Level                       Enables verbose output in the log. You can
                                specify 0, 1, 4, 5, 8, 9, 12, or 13. Default is 0.
  progress:FileName             Specifies the location and name of the
                                optional progress log.
 /c                             When specified, the command continues to run even
                                if there are nonfatal errors.
 /r:TimesToRetry                Specifies the number of times to retry
                                when an error occurs (default is 3).
 /w:SecondsToWait               Specifies the time to wait before retrying a failed
                                attempt (default is 1 second).
  all                           Migrates all the users.
  ui:[Domain\]UserName          Migrates the specified user(s). To migrate a local
                                user, specify UserName only. Domain and UserName
                                can contain wildcard
                                characters (* or ?).
 /ue:[Domain\]UserName          Excludes the specified user(s) from the
                                migration. To exclude a local user, specify UserName
                                only. Domain and UserName can contain wildcard
                                characters (* or ?).
 /uel:NumberOfDays:[YYYY/MM/DD]
                                Specifies that the migration should exclude users that
                                have not logged on within the specified time.
                                NumberOfDays can be 0 to exclude all users who are
                                not currently logged on.
  i:FileName                    Specifies the location and name of a .xml file that
                                contains rules that define what state to migrate.
 /help or /?                    Displays Help at the command line.
 /config:FileName               Specifies the Config.xml file that
                                USMT should use.

Notes:
* For more information about these options, see Usmt.chm.
* You cannot specify /all with the /ui, /ue or /uel options.
* You can specify /i, /ui, /ue and /uel more than once if necessary.
* You cannot specify /key and /keyfile together.
* You cannot specify /encrypt and /noconpress together.

C:\Program Files\USMT30>md store
```

The User State Migration Tool can help transfer users to Vista and set appropriate permissions for them too

Welcome to California, Dude



This is California? Home of beach babes and surf contests? It might surprise you that California is also the home of snow bunnies and championship ski runs. Just like it might surprise you that Antec's world headquarters is located in California's Silicon Valley, the heart of technological innovation. Our unique California spirit of performance and originality help make Antec's products market leaders. Like our all-new Nine Hundred advanced gaming case or our environmentally friendly EarthWatts power supplies. So whether it's snowboarding or silicon chips or silent PC cases, think California. Think Antec. Think the Power of You.

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System requirements
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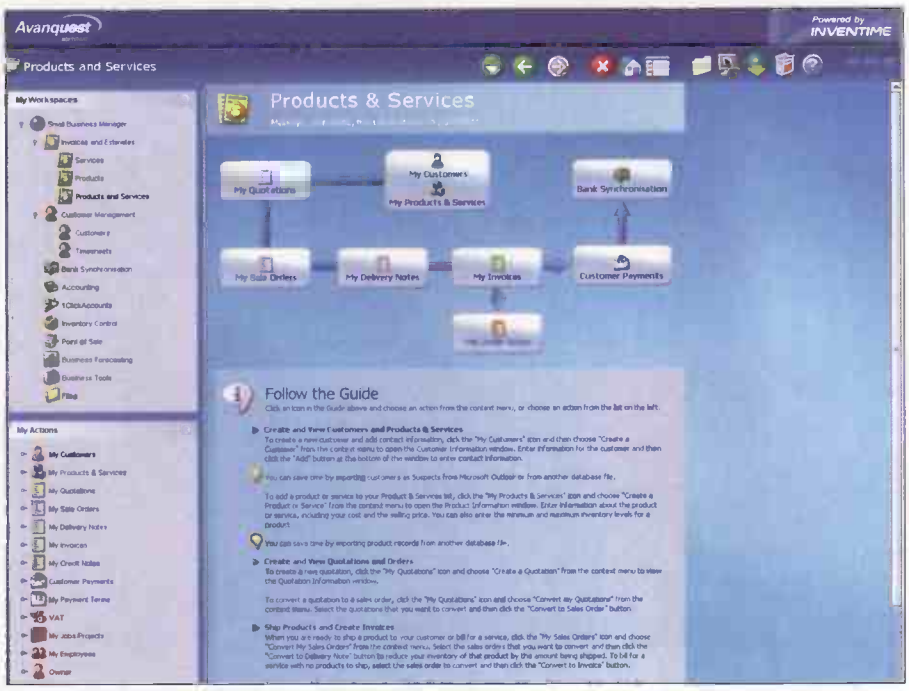
BUSINESS MANAGEMENT SOFTWARE

Avanquest Small Business Manager

Integrated modules for accounts, invoicing, customer management and more



With its mix of web and Windows interfaces, we found Avanquest Small Business Manager 2007 hard to get to grips with and lacking in functionality

Aimed at companies with up to 50 employees, Avanquest's Small Business Manager 2007 is something of a curate's egg. Good in parts, but the good bits are spoilt by an interface that is far from intuitive, a lack of supporting advice and information, and an approach to business management we found hard to get to grips with.

On the plus side, it comprises a suite of seven integrated modules that can be purchased together, or mixed and matched to suit your requirements.

Key among these is the accounting module, which provides basic profit and loss facilities, with a useful optional 1Click Accounts add-on that can generate accounting records direct from online bank statements. Invoicing, however, isn't included, so most companies will also need to buy the separate invoices and estimates module, plus the bank reconciliation module.

Each of these modules costs £39.99 ex Vat, with inventory control another £49.99 on top. A basic customer management module is also available for £39.99 ex Vat, which can import contact and appointments information from Outlook. Plus there's a business forecasting module (£39.99) and a point-of-sales module (£99.99), the latter adding support for cash registers and PC terminals for customer transactions.

Payroll, however, isn't an option, which means outsourcing, handling the payroll manually or using a specialist payroll application, which wouldn't be able to exchange information with the Avanquest suite.

The software supports multiple users, has its own built-in security and can be installed onto a single PC or a network with a shared database. However, you can't host the database and a network client on the same server, as with some rival products. Installation is straightforward, but you get very little help to, for example, configure your company, add customers and customise invoices. Product and service-based companies are both supported and some wizards are provided, along with a modicum of local and online help. But there's a lot of jargon and we weren't sure what we were being asked, or why, a lot of the time.

Also lacking are the tutorials and access to online support we've come to expect from all-encompassing small-business packages. There's also only one Pdf manual, and the only link provided is to the Avanquest website to buy other software packages.

Another big issue was the user interface, which mixes together web and Windows GUIs, neither of which proves particularly intuitive. It's all there, but presented in an unfamiliar way and we found it easy to get lost as we tried to work through some of the basic procedures. Similarly, it was difficult to navigate the steps required to complete common transactions. Added to which we were concerned to find passwords displayed in plain text when setting up new users or editing their details – something you don't expect to see in this kind of application.

Lastly, most small businesses want to be able to share financial information with accountants and advisors. Competitive products from companies such as Sage and Intuit may cost more, but they make this easy, especially when the same or compatible software is used by the accountants/advisors involved. The Avanquest package struggles to meet this requirement and isn't something most financial professionals would be familiar with.

Alan Stevens

Details

Price £233.83 (£199 ex Vat) for full suite (one user)
Best price www.pcw.co.uk/bestprices
Contact Avanquest 0800 289 041 www.avanquest.co.uk
System requirements 800MHz Pentium III or higher • 256MB Ram • 250MB – 1GB free disk space • Windows 2000, XP or 2003 • Internet Explorer 5.5 or above • Microsoft Outlook recommended • can be installed on a client/server network with a shared database

Verdict

Pros Choice of integrated modules; automatic generation of accounting records from online bank accounts; point-of-sale module
Cons Difficult to get to grips with; quirky interface; no payroll module; not widely used; little supporting information and advice

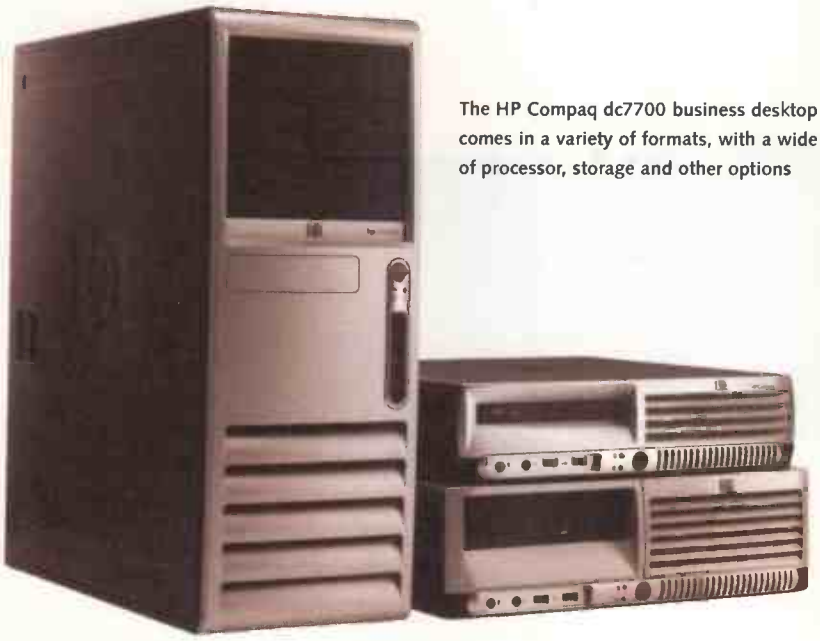
Features ★★☆☆☆
Ease of use ★☆☆☆☆
Value for money ★★☆☆☆

Overall Appears to have what's required to manage a small business, but doesn't measure up against the more established competitor options
★★☆☆☆

BUSINESS PC

HP Compaq dc7700

A family of desktops that ticks all the right boxes



The HP Compaq dc7700 business desktop series comes in a variety of formats, with a wide choice of processor, storage and other options

It doesn't have to offer the ultimate in performance, but a business PC does need to be reasonably quick. It also needs to able to run a variety of applications, and must be easy to manage and maintain. Business buyers will also want a name they can trust and hardware that won't need replacing every few months. The latest HP Compaq dc7700 family of business desktops fulfils all this criteria with ease, offering models to suit all budgets.

For our review, HP sent us an ultra-slim desktop, equipped with a top-range Intel Core 2 Duo processor. However, it's worth noting that the dc7700 family includes desk-side mini-towers, and more conventional desktops with a choice of Celeron and Pentium 4 processors, as well as the Core 2 Duo. Moreover, because they're all based on the same motherboard technology, with the same Intel Q965 Express chipset and serial ATA (Sata) storage, it's possible to employ a common disk image across the whole range for faster deployment and simpler support.

The dc7700 is also an Intel vPro platform, which means it has built-in virtualisation extensions and hardware support for out-of-band remote management as standard. Compatible management software is required to get the full benefit, but with suitable vPro tools it's possible to find all the desktops on the network, apply software updates remotely, change the system setup and quarantine infected computers, even when users have switched off. You can even change local Bios settings in Windows using the desktop utilities provided.

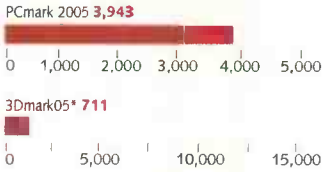
HP products are well known for their build quality and the dc7700 is no exception. If anything, the latest models are even quieter and more solidly made than before, with no tools required to open the case or service any of the components. Despite its small size, everything is neatly arranged inside our ultra-slim model, with room for up to 3GB of synchronous DDR2 memory and a couple of PCI adapters – not that many buyers will want to add anything.

Our model, for example, came with 1GB of Ram as standard, which is more than enough for most applications, plus an 80GB Sata hard disk and an integrated Gigabit Ethernet network interface. The only disappointment was the integrated Intel Graphics Media Accelerator 3000, which is far from being state of the art and only has 252MB of video memory at its disposal. It's fine for Word, Excel and most other productivity tools, but if you're going to run anything demanding we'd recommend one of the optional ATI or Nvidia adapters, which also support multi-monitor setups.

Speaking of monitors, the display has to be ordered separately. To this end HP supplied us with an LP2065 – a 20.1in widescreen flat panel with 1,600x1,200 resolution. This comes with a height-adjustable stand and the ability to rotate the display for either landscape or portrait viewing. The monitor is highly usable with a bright, clear image, although at £229 ex Vat it does bump up the price. And if you need something a little cheaper, other displays can be specified instead.

Other features of note include a Trusted Platform Module chip on the motherboard and a bundle of software, including HP Protect Tools Security Manager. Plus you get a three-year, on-site warranty included in the price of what proves to be a flexible and affordable family of business desktop PCs. *Alan Stevens*

Performance



*Tested at 1,024x768 in 32-bit colour

Details

Price Ultra-slim desktop PC £598.08 (£509 ex Vat); HP LP2065 monitor £269.08 (£229 ex Vat)
Best price www.pcw.co.uk/bestprices
Contact HP 0870 241 3625 www.hp.com
Specifications 2.13GHz Intel Core 2 dual-core processor • Intel Q965 Express chipset • 1GB DDR2-667 memory • Single 80GB 7,200rpm Sata drive • CD-RW/DVD Rom drive • Integrated Gigabit Ethernet interface • 6 x USB2 ports • Integrated Intel Graphics Media Accelerator 3000 • HP LP2065 widescreen 20.1in monitor • 1,600x1,200 resolution, 75Hz refresh

Verdict

Pros Solid and well built; choice of processors, including dual-core; Intel vPro remote management; common support image can be applied across entire dc7700 family
Cons Cheap mouse; onboard video lacks performance

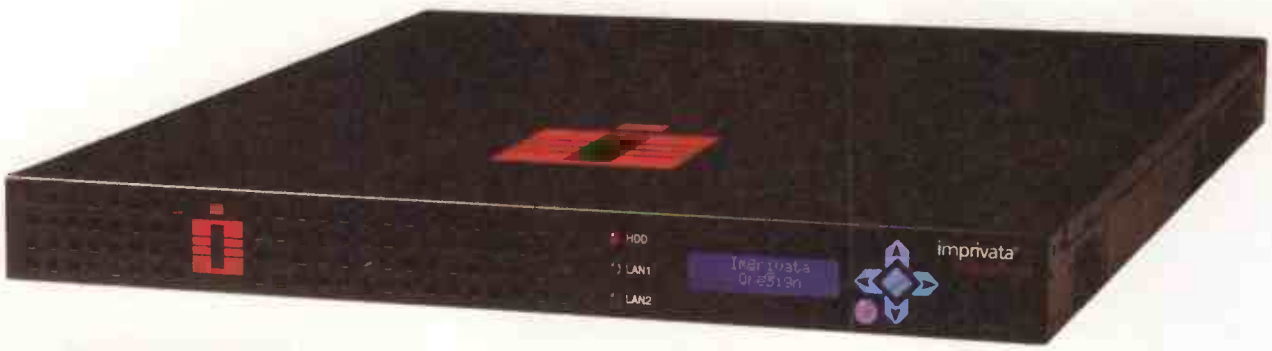
Features ★★★★☆
Performance ★★★☆☆
Value for money ★★★★☆

Overall A good family of general-purpose desktops, now with vPro management, suitable for a wide range of applications ★★★★☆

AUTHENTICATION MANAGEMENT

Imprivata Onesign

Replace your Windows passwords with something stronger



The Imprivata Onesign solution is implemented using Linux-based appliances deployed in redundant, high-availability pairs

Passwords are a far from foolproof way of authenticating users but they are reasonably easy to manage. Two-factor authentication technologies such as USB tokens, smart cards and fingerprint readers, may be more secure but can be complex and expensive to deploy. Imprivata Onesign Authentication Management simplifies the management of such technologies with an innovative appliance-based solution that can be further extended to support single sign-on and physical access controls.

There are two parts to the Imprivata solution – the Onesign server, and a software agent installed on client Windows PCs. In fact, the server is made up of two 1U rackmount Linux appliances configured as a constantly synchronised high-availability pair, so that should one appliance fail users can still log on using the hot standby unit with failover handled transparently. A third, 'warm' standby unit, can also be deployed for the really paranoid.

Installation starts with powering up the appliances and assigning an IP address from the front panel. You then connect to the built-in web server using an SSL-enabled browser and run through the configuration required to get the appliances licensed and working on the host network. Then a quick reboot and onto an almost identical web interface to configure the authentication management.

We found the interface easy to follow. You also get good supporting documentation which is a real help if you're setting the box up yourself.

The first step is to synchronise the list of users maintained by the appliance with your existing network directory. This will, typically, be an NT or Active Directory domain, although Novell Edirectory, Oracle Internet Directory, Sun One Directory Server and other products are also supported.

Security policies are then assigned to users who can be notified by email as to how they should log on to the network. Before that can happen, however, they will need the Onesign agent which they can self-install from a link in the email notification. The agent extends the standard Windows login module and can, if preferred, be installed using third-party software distribution tools with an implementation for use with Terminal Server and Citrix Metaframe also available.

The authentication hardware will need to be installed separately and will only be included if you buy the starter kit that comes with Vasco Digipass tokens. However, there's support for a range of technologies, including One-Time password (OTP) tokens, smart cards, USB tokens and fingerprint readers. The Imprivata appliance also has a built-in Radius server and a Vacman controller for use with other Vasco security products.

Again, there's nothing complex about the setup required to use such products, but it can be involved and smaller organisations may want to leave this part of the deployment to a specialist reseller or consultant.

The basic authentication management can also be extended by licensing the optional Single Sign-On module with support for building access controls (Onesign Physical/Logical) another optional extra.

The result is a secure, strong authentication solution that's easy to deploy and manage. You also get a good range of monitoring and reporting tools to track user access and help comply with legislative requirements. And it compares well on price against competitive solutions, although smaller companies may find the buy-in costs a little on the high side.

Details

Price From £18.80 (£16 ex Vat) per user
Best price www.pcw.co.uk/bestprices
Contact Imprivata 01923 813 511 www.imprivata.com
Specifications Pair of 1U rackmount appliances running Novell Suse Linux Enterprise 9 • Supports OTP (One-Time Password) tokens, proximity cards, USB tokens and finger biometrics • Integrated Vasco token management • Clients require Windows 2000/XP/2003 with Internet Explorer 6.0 or later

Verdict

Pros Appliance-based; redundant hardware for high-availability; support for a wide range of strong authentication technology; easy to manage
Cons Very noisy fans; may be beyond the budget of smaller companies

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

Overall Takes a lot of the hassle and expense out of deploying strong authentication technologies, but you need to be a fairly large organisation to justify the purchase
★★★☆☆

VIDEO SURVEILLANCE

Linksys Wireless-G PTZ WVC200

Personal Computer World RECOMMENDED

Keep an eye on your business with this professional-quality internet camera

If you want to see who's in reception, monitor the car park or keep an eye on the stock room from home you'll need a lot more than a basic webcam. However, professional CCTV equipment can be expensive, not to mention time-consuming to maintain. We tested the new Linksys Wireless-G PTZ (Pan/Tilt/Zoom) Internet Camera, and found it to be a flexible and very usable alternative for small businesses looking for an affordable surveillance solution.

The Linksys camera (model number WVC200) is encased in a protective plastic bubble which can either be mounted on the desktop stand provided or fixed to a wall or ceiling. It's not really rugged enough to be deployed in an exposed location, but would be fine in a lobby or warehouse where it will be protected from the worst of the elements.

Unfortunately, there's no Power over Ethernet support, which is disappointing, but the WVC200 does have an 802.11b/g wireless interface, so locating the camera shouldn't be that difficult. We mounted it on a wall in an entry way and simply ran an extension cord through the false ceiling to the AC adapter supplied.

You do have to connect using a cable to configure the basic network settings but that can be done before it's fixed in situ, and as part of our setup we configured the camera to connect to a WPA-protected wireless access point and were then able to dispense with the fixed wire altogether.

A built-in web server is used to manage the camera with an ActiveX component that can be downloaded on access to view the video stream and remotely pan and tilt the camera, zoom the image and so on. Dynamic DNS support is another key feature and Linksys has bundled a year's free subscription to its Sololink DDNS service to help simplify remote access.

Image quality isn't fantastic, but then you wouldn't expect movie-like results on a device of this nature. Maximum resolution is 640 x 480 pixels at up to 30 frames per second with Mpeg4 or optional Mjpeg encoding. All of which is more than enough for most business applications, enabling you to read car number plates, for example, and follow moving objects over a standard 802.11g link.

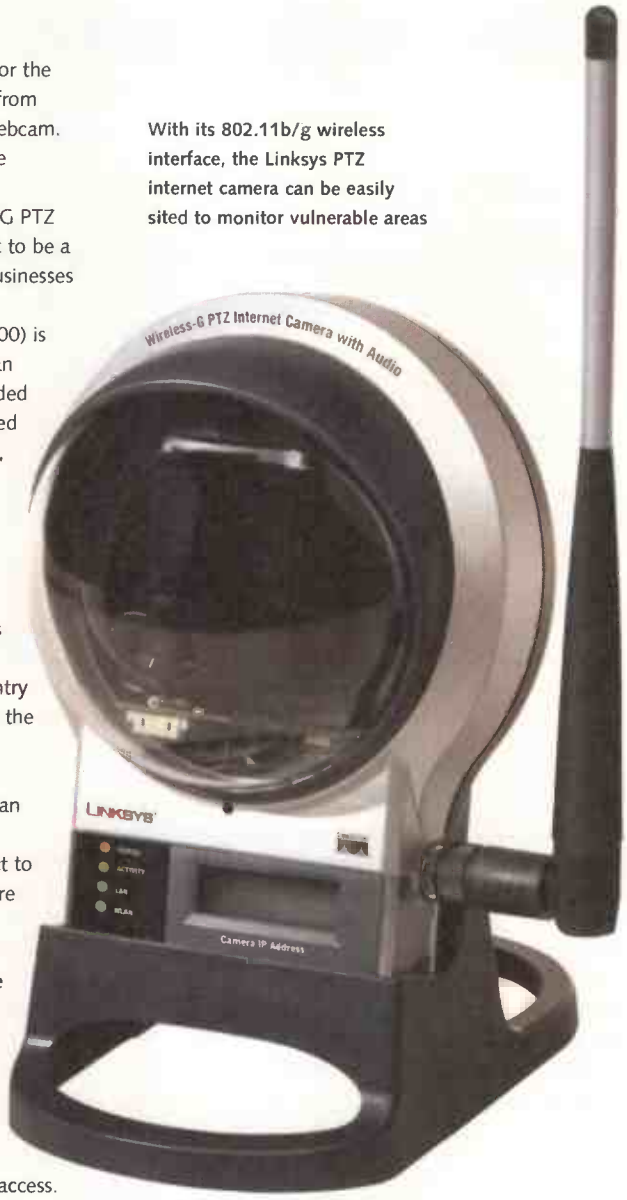
A built-in microphone allows for sound monitoring/recording but there's no speaker so you'll have to make other arrangements if you want to use the camera to control building entry, for example.

That aside, we were very impressed with the performance. The camera worked exceptionally well in low-light conditions and can also be used with an infra-red light source at night, although you have to provide the IR lighting separately. The pan/tilt/zoom functions worked smoothly, enabling us to monitor a large area with ease. We were also able to set the camera to patrol up to nine preset points or constantly scan across its whole field of view.

Up to 10 named users can connect to the camera at any time with additional software provided to monitor up to nine cameras and make recordings to hard disk. Recordings can be started manually, time-scheduled or triggered when motion is detected and played back using Windows Media Player. You can also set the camera to send out alerts by email, complete with a short video clip when motion is detected.

So, altogether a very comprehensive wireless video surveillance bundle at a price that any small business can afford.

Alan Stevens



With its 802.11b/g wireless interface, the Linksys PTZ internet camera can be easily sited to monitor vulnerable areas

Details

Price £164.50 (£140 ex Vat)
Best price www.pcw.co.uk/bestprices
Contact Linksys 0800 068 0327 www.linksys.com
System requirements 1/5in Cmos sensor; focal length 500mm to infinity; Maximum video resolution 640x480 • Maximum frame rate 30fps • Pan/tilt/zoom controls • 10/100Mbits/sec wired Ethernet port • 802.11b/g wireless interface • Wep/WPA security • DDNS support • Bundled monitoring and hard disk recording utility

Verdict

Pros Wireless; works well even in low-light conditions; pan/tilt/zoom controls; integrated web server; bundled monitoring and recording software
Cons No Power over Ethernet support; integrated microphone but no speakers

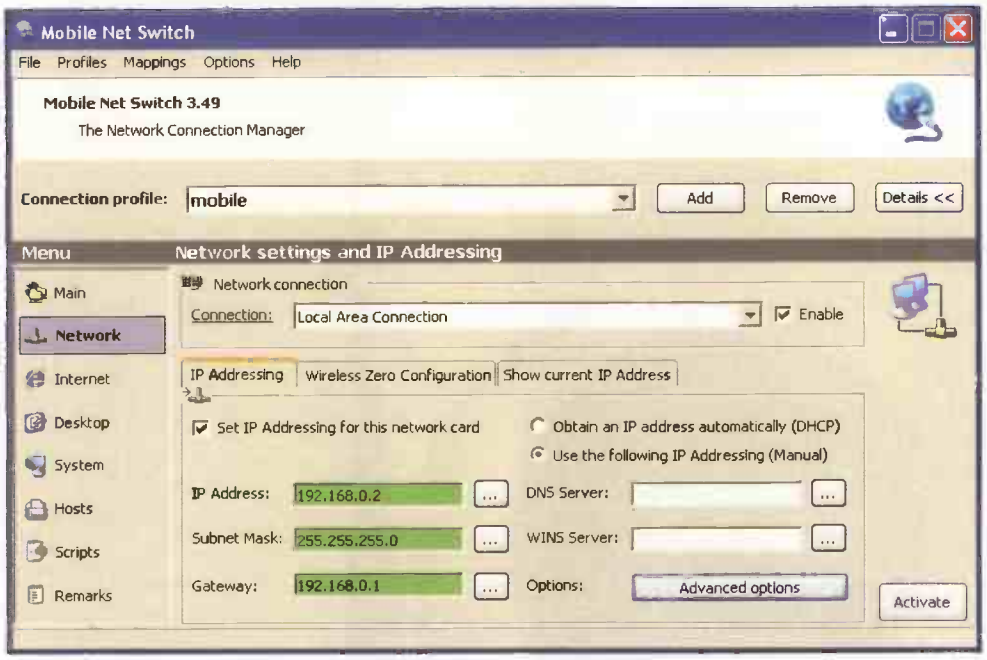
Features ★★★★☆
Performance ★★★★☆
Value for money ★★★★☆

Overall A very affordable, yet effective, business-quality internet camera suitable for a wide range of surveillance applications ★★★★☆

NETWORK UTILITY SOFTWARE

Mobile Net Switch

One-button setup of network and Windows settings



Mobile Net Switch lets you change network settings and a whole lot more at the click of a button

Changing your network settings every time you need to work from home or at another office can be a complicated, tedious and time-consuming, but Mobile Net Switch can change all that. More than that, this utility doesn't just stop at network settings; it even lets you configure multiple profiles containing everything from your logon name, password and drive mappings to web, email and desktop preferences, all of which can be applied dynamically, at the click of a button.

Simple in concept and equally simple to use, Mobile Net Switch can be downloaded and installed on any PC running Windows 2000 or later. It can also be used with Windows 98 and NT, although these platforms aren't supported and will only work if you download and install WMI (Windows Management Instrumentation) from the Microsoft website.

Start the program and an easy-to-follow console is used to add, edit, copy and remove profiles with online and Pdf documentation to help. The default profile will contain your existing setup to which you can add others, for example to configure a notebook for use on a home Lan or to connect to another network where you have to work on site.

A series of menu tabs splits the settings into different categories, starting with a main menu, where you can specify a username and password to use, with the password encrypted and stored in the Registry. Associated drive and printer mappings can also be set here, along with the name and port of any proxy server you may need to use.

On the network menu, you can then choose the connection to set up and choose either automatic configuration using DHCP or manual IP addressing. You can select an appropriate wireless setup for use with the Windows Wireless Zero Configuration option if available. The XP desktop firewall can be configured through the Mobile Net Switch profile, along with Netbios and other advanced settings.

Elsewhere, you can configure the start-up page for your browser (Internet Explorer and Firefox are both supported) and set the screen resolution, desktop wallpaper and volume level you want to apply. The default time zone, printer and Outlook or Outlook Express email profile can similarly be configured plus, with a little bit of extra preparatory work, it's even possible to avoid bounced emails by telling your software which SMTP host to use.

Lastly, additional entries can be added to the local hosts file, plus you can choose to execute custom scripts before and/or after a profile is executed, making for very a comprehensive list indeed.

Despite this, profiles are quick and easy to build, and applying one couldn't be easier. Just click to activate it, either from the main console or optional desktop tray icon, and the settings are applied immediately. No need to log off or reboot; the changes are made and you're good to go straight away.

It was delightfully simple. We did, though, need a few practice runs to get the exact setups we wanted. We also found it important to change all the settings that might apply because, with multiple profiles, you can't be certain what the existing setup will be.

Still, you soon get used to how it works and it quickly becomes an invaluable tool. And it costs only €24 (about £16 ex Vat) to register the fully functional download and remove the initial registration screen.

Alan Stevens

Details

Price £18.80 (£16 ex Vat)
Best price www.pcw.co.uk/bestprices
Contact RH Computing
+31 842 241 345 (fax only)
www.mobilenetswitch.com
System requirements Windows 2000 (Professional and Server), Windows XP (Professional, Home • Tablet PC and Media Center Edition) • Windows Server 2003 (Web, Standard and Enterprise) • Also functions on Windows 98/NT when WMI is installed

Verdict

Pros Applies all changes dynamically; supports fixed and wireless networking; can change drive and printer mappings; can reconfigure desktop settings
Cons You must change all the relevant settings in each profile

Features ★★★★½
Ease of use ★★★★★
Value for money ★★★★½

Overall An essential tool for mobile professionals wanting to connect to multiple networks
★★★★½

NETWORK SWITCH

D-Link Web Smart Switch DES-1228

A switch with a light touch when it comes to management

Silent in use, D-Link's DES-1228 delivers a lot of functionality in an easy-to-manage package

D-Link's DES-1228 is part of the company's lightly managed family of Web Smart Switches, offering much of the functionality of more expensive products but without the complexity.

Designed to be used either as a main backbone switch in small companies or as a cascaded solution on larger departmental networks, the DES-1228 can be used standalone or rackmounted using the brackets supplied. A single power supply is built in and there are 24 10/100Mbits/sec UTP ports at the front, with associated status LEDs arranged in a block alongside.

You also get four Gigabit Ethernet connectors for server uplinks or attachment to other switches. Two of these are UTP only, while two are feature-shared UTP and mini-GBIC connectors which, with the right adapters, enable the D-Link switch to support uplinks using fibre as well as twisted-pair cabling.

A Windows Smart Console utility is supplied to discover and monitor the D-Link switches, while for more detailed configuration a web interface is employed. Using this, you can set the port speed and other characteristics although, as they're all self-negotiating, very little manual intervention is required.

More useful is the ability to aggregate bandwidth using port trunking, with support for up to six trunks of up to eight ports each. You can also segment the network using 802.1Q Virtual Lans (VLans), both for security and to improve throughput.

Support for 802.1x authentication is yet another option, although this requires an external Radius server to support it. Plus you get 802.1p priority tagging and a built-in security engine designed to detect and block Denial of Service and other packet-based attacks.

We found the pleasingly silent DES-1228 quick and easy to deploy, although the web interface is somewhat basic and the supporting documentation a little lacking in places. There's also a 48-port version (the DES-1252 at £230.18 ex Vat) and another (the DES-1228P at £295.52 ex Vat) with support for Power over Ethernet.

Alan Stevens

Details

Price £161.39 (£137.35 ex Vat)
Best price www.pcw.co.uk/bestprices
Contact D-Link 020 8955 9000 www.dlink.co.uk
Specifications 1U rackmount Ethernet switch • 24 10/100Mbits/sec UTP ports • 4 Gigabit Ethernet ports (2 with shared mini-GBIC connectors • 12.8Gbits/sec switching capacity • 8K MAC address table • Support for port trunking, 802.1Q VLans • 802.1p priority tagging, 802.1D Spanning Tree, 802.1x authentication

Verdict

Pros Silent; web-based management; port trunking; 802.1Q VLans
Cons Documentation could be improved; single power supply

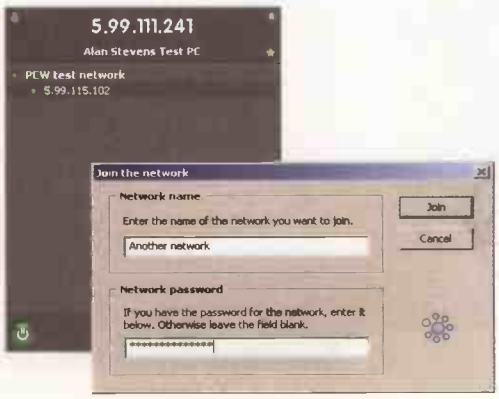
Features ★★★★☆
Performance ★★★★☆
Value for money ★★★★☆

Overall Sought-after features without the cost and complexity ★★★★☆

VIRTUAL PRIVATE NETWORKING

Log Me In Hamachi

Build secure networks quickly, simply and for free



Log Me In Hamachi enables you to build a secure private network quickly and easily, linking PCs together over the internet. But there are limits to what you can do with it and if you want to match all the functionality of a conventional virtual private network (VPN), a good deal of extra configuration work is required.

The basic software is very quick to install, the Hamachi setup creating a virtual network adapter and associated control applet on each client. Using this you then either create a new private network or join an existing one. Either way, special mediation servers hosted by Log Me In are used to establish the UDP connections involved, after which all communication is peer-to-peer and encrypted for security.

Once connected it's possible to chat with other members, share files and run applications like VNC and Remote Desktop. However, the Hamachi client does need to be installed and connected at both ends in order for tools like Remote Desktop to work. Moreover, to access resources on Nas (network-attached storage) servers and other systems without the Hamachi client installed, a deal of additional setup work is required both on the client PCs and intervening routers.

On the plus side, Hamachi will work with most Nat (Network Address Translation) routers, firewalls and proxy servers. The basic product can also be used for free to support networks of up to 16 users. Plus there's a chargeable premium version which adds extra network management controls and additional capacity.

We found Hamachi very easy to use and there are Linux and Mac versions as well as a Windows client. However, additional development work is needed to enable it to work seamlessly with Nas and other network servers.

Alan Stevens

Details

Price Basic version is free, premium licences start at £2.94 per month
Best price www.pcw.co.uk/bestprices
Contact Log Me In 0871 733 3166 www.logmein.com
Specifications Windows 2000/XP/2003 PC with an internet connection • Linux (2.4 kernel or later) and Mac OSX versions available (command-line implementations only)

Verdict

Pros Basic version free; works with most Nat routers and firewalls; simple to use; Windows file sharing
Cons Software needs to be installed and connected at both ends; complex extra configuration work required for general remote Lan access

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

Overall Needs development to be more than a niche product ★★★☆☆

THE DESIGNERS : #1

SMALL IN SIZE.
BIG IN PERFORMANCE.

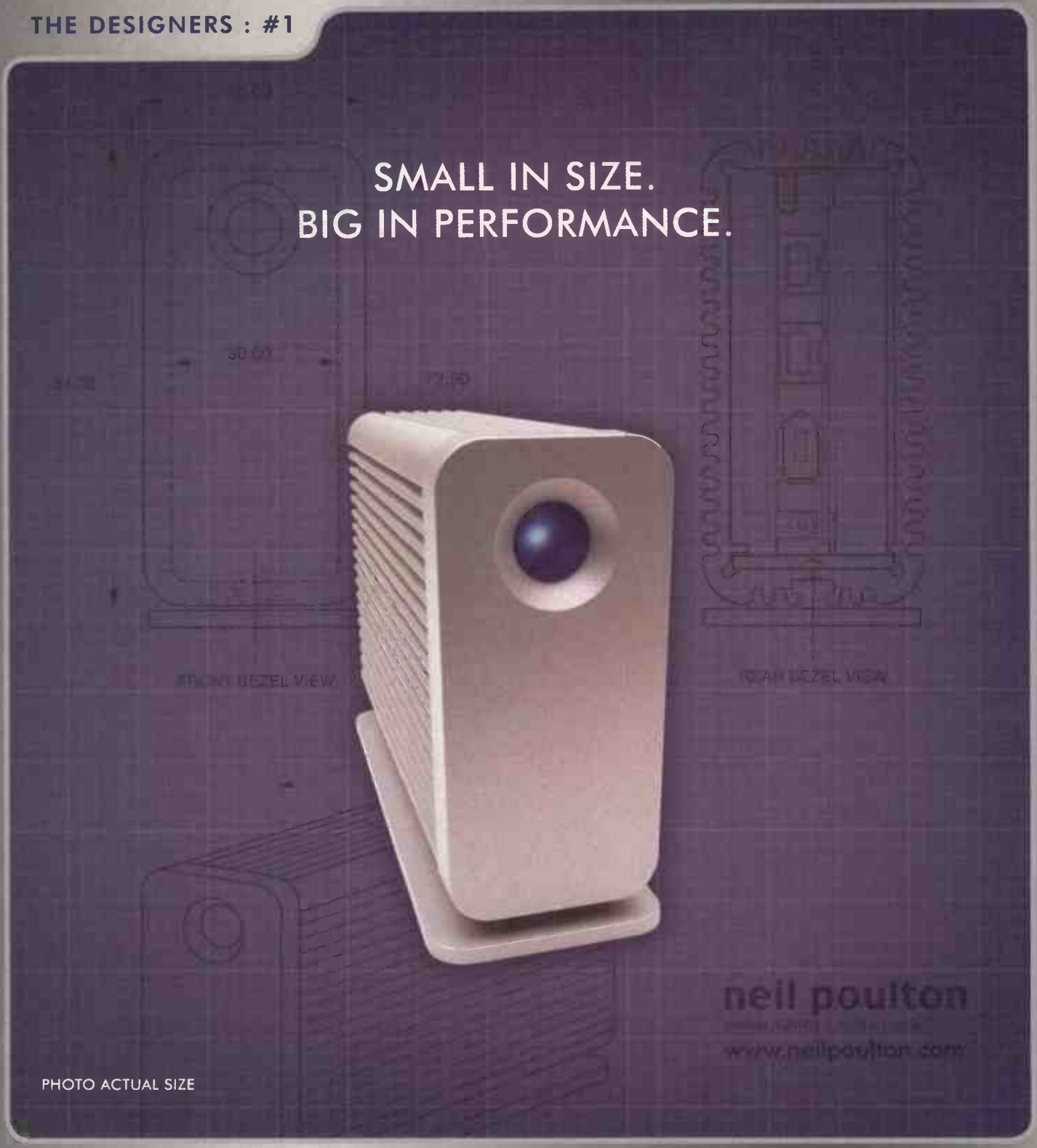


PHOTO ACTUAL SIZE

USB & FIREWIRE | 160GB – 320GB*

LACIE LITTLE BIG DISK : DESIGN BY NEIL POULTON

The fastest, highest capacity portable hard drive available also happens to be the smallest, most compact design on the market today. Designed by Neil Poulton for LaCie, there's nothing else like it. The unique casing, which resembles a radiator, extracts heat away from the internal components, keeping them safe and cool without a noisy fan. This little character with big credentials is the result of a perfect marriage of high design and advanced engineering. **www.lacie.com/uk**

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Practical advice from the industry's experts

EDITED BY NIGEL WHITFIELD

HANDS ON

FOOD FOR THOUGHT

Those of a creative bent will find plenty of food for thought this month, with a look at how to automate mixing in Niall Magennis' Sound column, and tips for creating realistic lighting effects from Ken McMahon in Digital imaging.

Boy (and girl) racers can find out just how much a hardware Raid card will improve performance from Gordon Laing, who also concludes his look at building your own media server, in the Hardware column.

There are tips on what not to store from Mark Whitehorn, and for a different approach to finding information, discover Excel lookups with Stephen Wells.

Tim Nott's Word processing column is packed with tips, as usual, and in Windows he explains the benefits of using NTFS formatting on your hard drive. Partitions are also the theme in Barry Shilliday's Linux column, while Alan Stevens explains router security in Networks, and Tim Anderson takes a look at cross-platform development in Visual programming.

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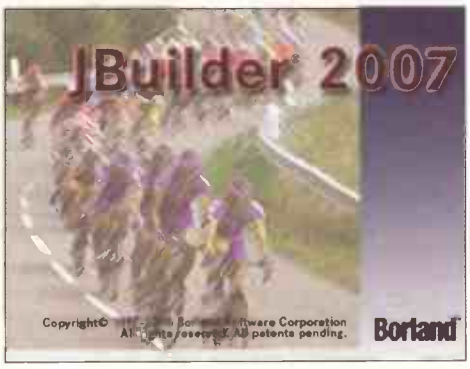


Far left: Hardware controllers can make recording complex compilations easier (see page 150).

Left: JBuilder 2007 launches (see page 145)

Advice from our experts

Your problems answered and some tips to expand your knowledge

DATABASES

On the edge

Q Is there an easy way to get the text boxes and their labels to line up to the margin from the left or right edges of a form? I'm using Access and building lots of forms with lots of text boxes.
Will James

A The Align feature, found under Format on the top menu, lets you align objects easily. This handy feature offers options for Left, Right, Top, Bottom and To Grid. If you don't have a form open on screen, the Align option may be greyed out, and if you don't have at least one control selected you won't get the full list of five alignment options.

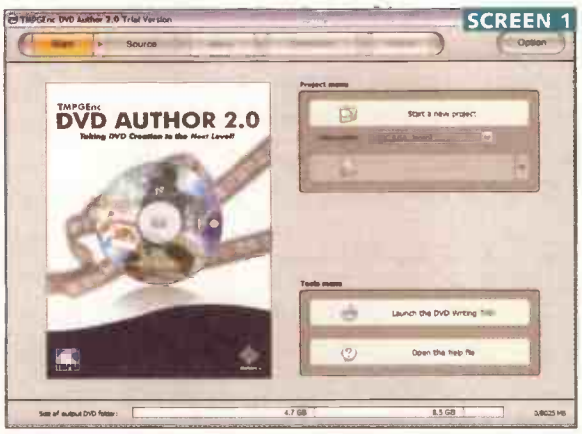
Drag a 'rubber-band' to surround or pass through each text box and label you wish to move. Click Format, Align and pick an option, say, Right. All objects will align with the one furthest to the right. Each object must have sufficient free form area to slide to the right: an overlap will cause an object to 'stall'. If you want to move just labels, click on the first one, then Shift & click on any others; use the same process to select just text boxes (or other controls).

DIGITAL IMAGING

Candid camera

Q I have copied an hour-long video from a Canon Hi-8 camcorder onto a DVD-Ram disc using a Panasonic DVD recorder. I have copied the .vro file onto my hard drive and now want to email a five-minute clip to a friend.

However, because the video is in .vro format I can't extract the clip using Pinnacle Studio 7. Is there an easy way of converting the file to a format that I can edit with Studio 7? Also what would be the best format to use to send the clip?
Angus Turner



Download a 14-day trial to extract your files in a format you can use

A The Panasonic .vro file will contain either a single, or a number of .vob files which are Mpeg-2 DVD video files. You need to extract these files so that you can edit them, but the version of Pinnacle Studio you are using is quite old and may not support editing of Mpeg-2 video. If that's the case, you'll either have to upgrade your video editor or transcode the files into another format.

'Five minutes is a lot of video to send by email, so break it up'

To extract the files in a format you can use try TMPGEnc DVD Author 2.0 – you can download a 14-day trial version from **http://tmpgenc.pegasys-inc.com/en/product/tda20.html** (see screen 1). Alternatively, AVS Video Tools **http://tmpgenc.pegasys-inc.com/en/product/tda20.html** will do the job for $29.95 (£15.25); the trial download places a watermark on video output. Don't try to convert the file you've copied to your hard drive, instead use the original .vro file on the DVD-Ram disc.

To encode a clip for email choose a codec, such as DivX, H264 or Wmv, that allows you to specify the size, frame rate and bit rate, then choose a combination that produces the required file size.

Five minutes is a lot of video to send by email, so break it up into smaller installments. You'll be able to encode a one-minute clip at 25 frames per second, 360 x 288 (a quarter of the original DVD frame size) with good-quality results in a file about 2MB in size. That's quite a large attachment, but manageable over a broadband link.

HARDWARE

Matching ports

Q I have a new computer which has no parallel printer port. I also have an HP Laserjet 4M printer which will only work from the parallel port. Is there any way that I can use this printer with my computer or do I have to buy a new printer that has a USB interface?
Stewart Cockcroft

You can easily create formulas from labels

SCREEN 2

Arial 10

D7 =2006 Income-2005 Income

	A	B	C		E
1		2005	2006		
2					
3	Sales	£ 219,945	£365,222		
4	Costs	£ 123,456	£152,312		
5	Income	£ 96,489	£212,910		
6					
7	Difference			£116,421	
8					
9					
10					

A There are adapters that should allow you to use your Laserjet 4M with a modern PC, and there are two main approaches open to you. The most obvious is to use a parallel port to USB adapter; these cost about £20 and are widely available from companies such as Belkin, Keyspan and Maplin, although they may not work with all printers. We would advise asking first and ensuring there's a money-back option if it doesn't work with your particular printer.

Another option which, while pricier, offers greater flexibility and is more likely to work is a print server. Print servers, such as the Netgear PS101, cost about £45 and equip your printer with an Ethernet network port, allowing you to communicate with it using the network adapter in your PC.

Better still, you could connect the print server to a hub or switch and easily share the printer between any computer on your network. There are also wireless print servers, which give you the freedom to locate the printer in another room and not worry about cabling.

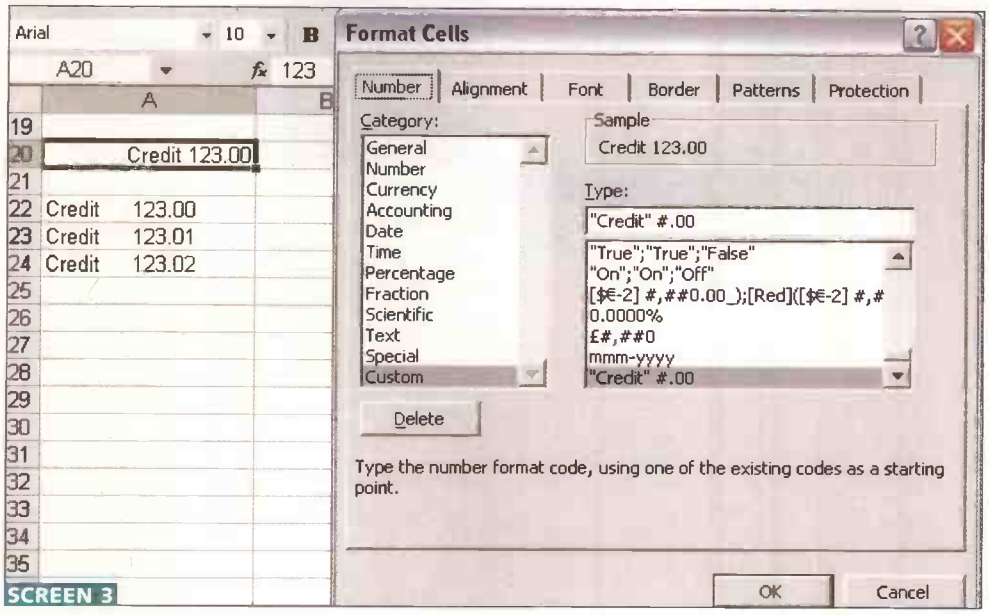
LINUX

Music manager

Q I'm a user of Ubuntu (Edgy Eft) and after hearing good things about Amarok I decided to install it to manage my music and my iPod. I installed using 'apt-get' and it added Amarok to my menu. It all seems to work, except it won't recognise my iPod. I tried booting Kubuntu from CD, and it works without a problem there. Do I need to install Kubuntu, or can I get it working on Gnome?
Sam Taylor

A Generally speaking KDE applications run fine on Gnome and vice-versa; usually the appearance will differ but not much else. Amarok depends on a number of libraries to work correctly, and all the essential ones are installed. However, a couple of extra libraries are needed for getting devices recognised in KDE applications under Gnome, and these haven't been included in Amarok's dependencies in Ubuntu.

To fix this, just run 'sudo apt-get install kdebase-kio-plugins' and restart Amarok.



SCREEN 3

SPREADSHEETS

Interesting poser

Q Is it possible to calculate a simple interest rate from a compound one in Excel?
Nick Lydon

A Yes, you use the Nominal function for this. Say the compound interest rate is 5.12 per cent and it is entered in cell B2. And say the number of compounding periods per year is 12. In another cell you can enter

```
=NOMINAL(B2,12)
```

and you would get the result of five per cent. In other words, if you started with £100 and earned one-twelfth of five per cent every month on the previous month's balance you would have £105.12 after 12 months. Alternatively, to calculate the compound rate from the simple interest rate, you can use the Effect function.

Figure it out

Q I'm sure there is some way to do calculations in Excel using row and column labels but I can't seem to make it work. Can you clarify this feature, please?
Jenny McPhee

A You first need to choose Options on the Tools menu and under the Calculation tab look for Workbook options. Check the box labelled Accept labels in formulas. To try this out put the labels 2005 and 2006 in cells B1 and C1, respectively, of a blank worksheet. In A3 and A4 put Sales and Costs. Enter some figures in cells B3 to C4. To work out the Income in cells B5 and B6 you can simply enter:

```
=Sales-Costs
```

in both those cells. This is because within the same column you can omit the column label.

To enter the difference between the 2006 income in cell C5 and the 2005 income shown in B5 (see screen 2) you can enter into cell D7:

```
=2006 Income-2005 Income
```

Happy birthdate

Q Knowing a person's date of birth, how can I calculate their current age in Excel?
Rod Wickens

A If the date of birth is in cell A1, in B1 enter:

```
=DATEDIF(A1,TODAY(),"y")
```

and in C1 enter:

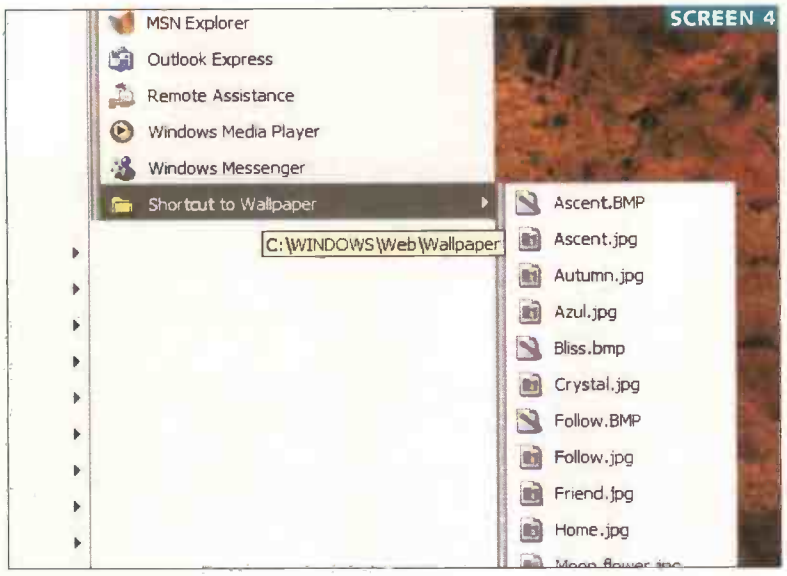
```
=DATEDIF(A1,TODAY(),"ym")
```

Format cells B1 and C1 as a number with no decimals. If you have a list of birthdates in column A you can drag the formulas down columns B and C for the equivalent current ages.

Mixed cells

Q I seem to remember that in an old version of Excel (I believe it was Excel 5) if you were using text and numbers in the same cell you could tab numbers, using Alt & Tab, thus allowing text to remain to the left ↘

Formatting for text and numbers



Create menus for folders

of the cell and tab the figures to the right.

Unfortunately, this facility does not appear to be available in any Excel version since. I am presently using Excel 2003 – can you help me with the problem please? With the template I have created I cannot afford to insert extra columns to break it up into two cells.
Maura Irish

A This is new to me. It sounds more like something one could probably do in another spreadsheet. I can only suggest two possible solutions. One would be to put your text in a Custom format as in "Credit" #.00 (see screen 3).

If you entered 123 in a cell this format would display, Credit 123.00, aligned right. The other suggestion would be to enter in a cell that had been formatted as General, Credit 123.00 – inserting several spaces between the text and the number. This will align left and the space will be retained if you drag the entry down the column. It would probably be best to redesign your template with extra columns.

Seeking help

Q The Report Manager seems to be useful for printing multiple sheet reports. But I clicked on Help, and discovered that xlmain8.hlp was not present.

Do you know where I can get this file? I have looked on Office 2000 and XP CDs.
Derek Rothwell

A Xlmain8.hlp was the full Help file for Excel 97 which was Version 8. Microsoft hasn't updated the link and has installed the information for Excel Version 9, included in Office 2000, and Excel 10, included in Office XP, on its website.

If you enter Report Manager in a recent version of Excel Help it will take you online to a description of this add-in, but I don't think there is much

Ready and waiting to be built

HARDWARE

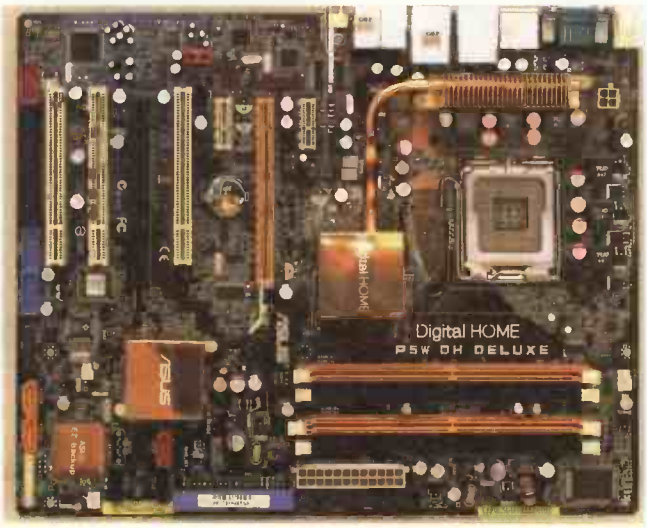
Q I'd like to build a Core 2 Duo PC and have my eye on the Asus P5W DH Deluxe board as it's supposed to be good for overclocking. I'm sure I read somewhere you have to update it to work with the new processor. Is that true?
Peter Neal

A The Asus P5W DH Deluxe is a very popular motherboard for LGA 775 processors, as it's a rock-solid performer that also offers decent overclocking facilities for those who like to tweak. We tested it in *PCW*'s January Hardware and Performance columns (see **www.pcw.co.uk/2168157** and **www.pcw.co.uk/2168652** and used it for a media server project in this month's Hands on Hardware.

It's a great choice for the Core 2 Duo, but as you've read, it needs to be updated to support the new processor. Many P5W DH Deluxes are labelled as Core 2 Duo-ready, but are still running an older Bios which won't support them. We tested one such model which was running Bios version 0301. Annoyingly, this earlier Bios version simply won't allow your system to boot up if fitted with a Core 2 Duo. You'll need to update the Bios to one of the latest versions, but of course to do so you'll need to be able to start up the system.

The only solution to this catch-22 is to temporarily fit an older LGA 775 Pentium processor, start up the system, update the Bios, then shut down and swap the Pentium for the Core 2 Duo. Clearly this is highly inconvenient if you don't have a spare LGA 775 Pentium to hand, or one you could easily borrow.

To be fair to Asus, this problem affects many so-called Core 2 Duo-ready motherboards equipped with the older, but powerful, 975X chipset. If you can't guarantee a 975X-based motherboard is running a Core 2 Duo-compatible Bios and can't get hold of an LGA 775 Pentium just to update it, then we would advise going for a newer 965 chipset model, as these are all genuinely ready for Core 2 Duo. There's more information in *PCW*'s January Hardware column, which you can find online at the URL listed earlier.



more it will tell you than was covered in the *PCW* October 2006 column (see **www.pcw.co.uk/2163396**).

WINDOWS

Expanding files

Q I have a shortcut on my Windows XP Start menu to one of my folders that I use frequently. I use the Windows XP Start menu – not the Classic menu.

I remember reading some time ago that I can make the directory on the Start menu auto-expand, that is, appear with a black triangle by its side, and show a further column of its contents when either clicked or when the mouse is hovered over it, but I can't remember how. Can you refresh my memory?

Andrew Kaye

A We covered this at length in *PCW* January 2006, but the easiest way to achieve this is to find the parent folder of the target folder in Explorer. Right-drag the target folder out of Explorer and on to the Start button. When the Start menu opens, drag the folder on to the All Programs entry, and when that opens drag to the desired position, release the button and choose 'Create shortcuts here'. This will give you the cascading menu for the folder (see screen 4).

Note that this trick doesn't work on the 'pinned' section of the Start menu (top-left at top level); although you will get a shortcut to the folder, it won't cascade – it will just open the folder in a new window.

WORD PROCESSING

Home alone

Q Pressing my Home key causes the cursor to move to the beginning of the line in Word. To make it go to the beginning of the first line in Word I have to press Ctrl & Home. I'm sure it used to do this latter action without adding the Ctrl function.

Is there a way to achieve this?

Vince Emmerson

A That's the way it has always been in Word and many other applications: Home on its own takes you to the beginning of the line, and with Control held down, the start of the document. You can change this behaviour, however.

Command Prompt — SCREEN 5

```
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Documents and Settings\Tim>x:

X:\i386>expand -r courbd.tt_ c:\windows\fonts
Microsoft (R) File Expansion Utility  Version 5.1.2600.0
Copyright (C) Microsoft Corp 1990-1999.  All rights reserved.

Expanding courbd.tt_ to c:\windows\fonts\courbd.ttf.
courbd.tt_: 174225 bytes expanded to 312920 bytes, 79% increase.


X:\i386>
```

Restoring a missing XP font

Go to Tools Customise, Keyboard. Choose 'All Commands' in the left list and select 'StartOfDocument' from the list on the right. You'll then be able to assign a new combination – or just use the Home key on its own.

Courier takes off

Q When closing down my PC, I noticed that six Windows XP Updates were to be carried out at shutdown. However, when I next opened a .rtf document using Wordpad, I found that all my upright bold text had become italic and I could not produce any upright bold characters on newly typed text. I was using the Courier New font but on further investigation I found that the Bold option seem to be working correctly on all other fonts except Courier New. Is this a newly added Microsoft feature?

Ray Dance

'Home with Control held down takes you to the start of the document'

A It may well be a new Microsoft feature, but what we think to be more likely is that the Courier Bold font file has gone missing from the Fonts folder. Search your disk for the file COURBD.TTF. If it's not present, nor in the Recycle Bin, and you can't make a copy from another computer, then you can reinstall it from the XP installation CD, or the hard disk if the i386 folder is present. You'll need to open a command prompt window then navigate to the i386 folder on the CD or hard disk (see screen 5). Type:

```
Expand -r courbd.tt_ ↙
C:\windows\fonts
```

(Key: ↙ code string continues)

This will restore the missing font file and your document will boldly go, so to speak.

Back compatible

Q Is it possible to open Word 2007 (docx) files in Word 2003, or do I need to 'save as' in 2007 to get a 2003-compatible file?

Maddy Jessel

A Microsoft has issued a compatibility pack for Office 2000-2003, which you can find at **http://tinyurl.com/y5a879**. You can also get this through automatic Office Updates, so check the 'Files of Type' list in the File Open dialogue in Word 2000-2003. If Docx is listed then you have the pack installed. If you haven't got the pack and try to open a Docx in Word 2003, you'll be directed toward the download – make sure you first have all current Office updates installed. Note that the compatibility pack is two-way – you'll be able to save to the Docx and other Office 2007 formats in 2003.

LET US HELP YOU

All our experts welcome your queries. Please respond to the appropriate address below

Databases database@pcw.co.uk
Digital imaging & video digitalimaging@pcw.co.uk
Hardware hardware@pcw.co.uk
Linux linux@pcw.co.uk
Networks networks@pcw.co.uk
Performance performance@pcw.co.uk
Sound sound@pcw.co.uk
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.

Become a media mogul

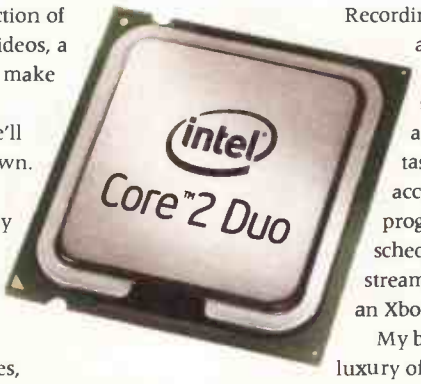
How to create your own media server step by step

If you have a growing collection of digital music, photos and videos, a Media Server can help you make the most of them. In this month's Hardware column, we'll show you how to build your own.

The key to any successful project is first thinking carefully about what you want to achieve. This is especially crucial for any media server project because they can vary considerably in their capabilities, depending on your requirements.

If you just want basic file-serving, perhaps with the extra security of Raid, then you could get away with something as simple as a network-attached storage (Nas) device. If, however, you'd like to record TV shows or stream content to appliances that require certain software services running, you'll almost certainly need a Windows PC. Then if that PC were also doubling-up as an entertainment PC in your front room, you'd want it to be as quiet and good looking as possible.

In last month's Hardware column, we covered a number of options and scenarios you should consider when building a media server. This month we'll put together a working example. The particular configuration described here suits my own personal requirements, but the choices made are applicable to other systems and the end result is a flexible media server which will be ideal for many people.



If you're building a media server from scratch, Intel Core 2 Duo offers an ideal combination of performance and low power consumption

Requirements

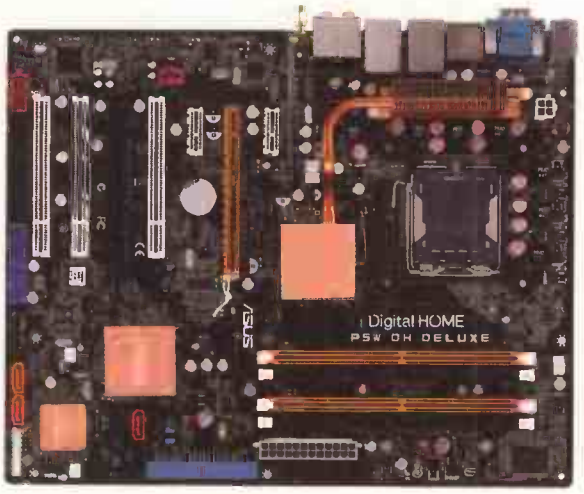
During the early planning stages I decided my own media server would do more than just store and serve files. It would also record TV shows and support a number of streaming appliances. Like most servers, though, it would need plenty of storage capacity and include some degree of redundancy to protect the data.

Recording TV shows and supporting a broad range of streaming appliances ruled out a simple Nas, so I was looking at equipping a PC for the task. It would also need to access a decent electronic programming guide (EPG) for scheduling recordings, and streaming clients would include an Xbox 360 games console.

My budget couldn't afford the luxury of a dedicated PC running by itself, so the media server would also need to double-up as my main entertainment PC in the living room. It therefore ideally needed to be as discreet as possible. With these basic requirements in place, I could go about finalising the specification.

Core specification

The processor, memory and motherboard requirements for a media server can be quite modest and are dictated by the requirements of the software you want run. Had mine just been serving files from a spare room, I could have got away with recycling an older system, but since it would also double-up as my main entertainment PC it needed something extra.



The Asus P5W DH Deluxe is a stable and fully-featured motherboard for LGA775 processors, but for Core 2 Duo support it'll need the latest bios

The easiest solution was to decide on a good standalone entertainment PC specification, then beef it up with whatever would be required by the server side of things. Luckily, modern desktop components are so powerful, the only area which needed additional work was the storage.

As the system would be running most of the time, it was important to choose components that could run quietly, while ideally consuming as little power as possible. Intel's Core 2 Duo meets both requirements and has sufficient muscle to handle multiple clients. Using components I knew to be stable from earlier tests, I fitted a Core 2 Duo E6700 processor into an Asus P5W DH Deluxe motherboard with 2GB of Crucial DDR-2 memory and a Zalman CNPS9500 heatsink to keep the processor cool, with the minimum of noise.

If you also intend to use your media server as an entertainment PC, the choice of graphics card is important. I used a Gigabyte NX66256DP Nvidia Geforce 6600 PCI-Express graphics card, which runs silently and has sufficient power to decode H.264 high-definition video. It was fine for my requirements, but if you're also after HDMI connectivity, support for HDCP copy protection or better 3D performance, you'd want to go for a better model; at least it's a component that's easily upgraded if necessary.

Finally, for the TV recording side of things, I opted to recycle a pair of tried and trusted GDI Black Gold DVB PCI tuner cards. If you were buying new, though, you may wish to consider one of GDI's newer dual tuner products.

Storage

So far I've pretty much described an entertainment PC, and while that's certainly part of the system requirements, what exactly turns it into

a server? As far as this project's concerned, it's the software and storage.

In terms of storage, it's easy to stick your head in the sand and just fit the biggest hard disk available, but while it'll deliver plenty of capacity, I'm just not comfortable entrusting my media collection to a single disk. If it fails, you stand to lose too much, not just in terms of time spent ripping discs, but more crucially digital photos, which may not exist anywhere else.

Protection against disk failure is an essential aspect of any server, and Raid is the technology to do the job. Following tests in recent Hardware and Performance columns, I opted for a Raid 5 array to deliver decent fault tolerance with a minimal loss of capacity. I initially went for an array with three affordable 300GB Seagate 7200.9 hard disks to give 600GB capacity, but adding a fourth disk would be an easy upgrade in the future, taking the array to 900GB.

To maximise transportability, I connected these disks to a Promise Fast Trak TX4310 Raid host adapter, although for greater performance and expandability you may wish to go for a hardware Raid card such as the Promise Supertrak EX8350. It's not the cheapest Raid 5 solution (and requires a PCI Express x4 slot), but has decent read and write performance, a low CPU overhead and plenty of upgradability, with support for up to eight disks.

As discussed in last month's column, though, (**www.pcw.co.uk/2172064**) software-based Raid 5 as offered by the TX4310 and most motherboard controllers doesn't have sufficient write speed for reliable TV recording, especially if you're recording two shows simultaneously. So I connected an additional 300GB disk to the motherboard controller for temporary TV storage and installed the operating system on it as well. This may seem like overkill, especially as Raid 1 has sufficient performance for recording TV, but there are portability advantages to keeping the array separate. Besides, in order to deliver 600GB using Raid 1, you'd still need four 300GB disks.

Appearance

The physical appearance of servers and how much noise they make is of little concern to most people, but if like me your media server is doubling-up as a Media PC in your living room, you'll want to give it some thought.

In terms of the core specification described, the system certainly had the potential to be compact and almost silent, but the additional requirement of at least four hard disks put paid to that. While you could pack them together in a small case, you'd have an accident waiting to happen. Hard disks need decent airflow to maximise their lifespan and you should always leave at least an inch of space between them.

Four hard disks with adequate spacing clearly rules out a low-profile case, but at least a conventional tower chassis gives you more options in terms of graphics cards, quiet cooling and a decent PSU. So to accommodate the storage, I ended up recycling an older Coolermaster tower. While this didn't have the discreet appearance I was after, it was a good compromise for the required components.

On the upside, the machine itself doesn't have to be in direct view. Long cables for the outputs and infra-red sensor allow you to be quite creative with positioning – behind a sofa, for instance. You could even put it in another room and run the cables and IR sensor through a wall.

I was also astonished to discover that the four Seagate disks running simultaneously didn't generate that much noise. I wouldn't normally recommend a Raid array for a discreet living room entertainment PC, but if your media server is doubling-up as one, it's not as bad as you may fear.

Entertainment server

So that's my own media server. It protects my data against disk failure, records TV shows, serves media to a variety of clients and works as my main entertainment system. The requirement for a Raid array means it's bigger and noisier than I'd like for the living room, but that's the compromise I've made for data redundancy.

If you've built a server for media files, we'd love to hear how it's working and whether you'd do anything differently a second time. **PCW**

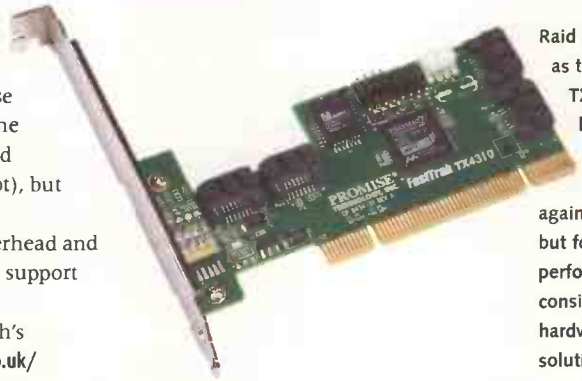
Which operating system to choose

The choice of operating system and software for a media server depends entirely on what you want it to do. If you want to record TV shows, then you'll need an operating system that supports the tuners and the desired PVR (personal video recorder) software. Similarly, most streaming appliances require software services that only run under certain operating systems.

Most streaming appliances, TV tuner cards and PVR programs are designed to work with Windows XP, while Media Center extenders require Windows XP Media Center Edition. Since I wanted to support the full streaming capabilities of an Xbox 360 games console, I was restricted to Windows XP MCE 2005, but this operating system would also take care of my video recording while providing a front-end when the system was used as an entertainment PC.

I could have opted for Windows Vista Home Premium or Ultimate (if I also needed remote desktop), but until I get used to the latest Windows interface, I prefer the look of MCE 2005. I may need to switch to Vista to support protected HD content in the future, though.

A media server could happily run a desktop operating system. Windows XP MCE 2005 includes facilities to stream to network appliances



Raid cards such as the Promise TX4310 can help protect your media collection against disk failure, but for the best performance consider a hardware Raid 5 solution such as Supertrak EX8350

MORE HANDS ON PERFORMANCE Go to www.pcw.co.uk/tags/hardware_performance

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.

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Delivering the goods

Find out how software and hardware-based Raid controllers perform

In recent Performance columns, we compared the features and performance of several popular Raid technologies using up to four hard disks. This month we're following up those reports with tests using a more sophisticated hardware Raid controller.

Software vs hardware

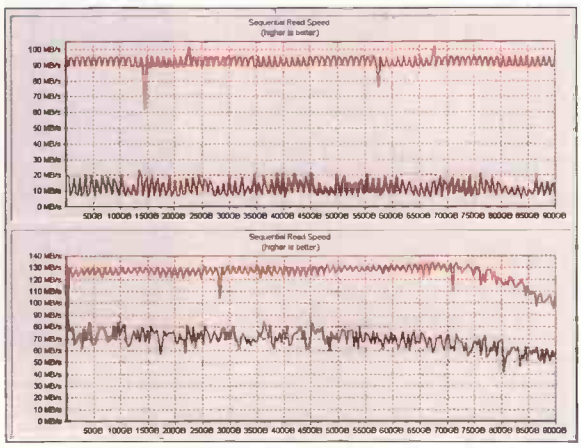
Many motherboards and budget host adapter cards offer the choice of Raid Levels 0, 1 or 5. Raid 1 makes an identical copy of one disk on another to provide 100 per cent redundancy, albeit at the cost of half the total capacity and slower speed than Raid 0. Raid 5 uses three or more disks and delivers 100 per cent redundancy by writing parity data on all of them. The advantage over Raid 1 is only losing one disk worth of capacity to redundancy.

Raid 5 sounds ideal, but the calculation of parity data is complex and normally offloaded to your main processor by common motherboard controllers. It may be cheap to implement, but it results in greater overheads on your main CPU and often very poor write-speeds.

Hardware Raid controllers solve this problem by employing their own processors to take care of the necessary numbercrunching for Raid 5. Unsurprisingly, the additional components increase the cost of the controller, but that's the price you pay for ultimate Raid performance.

We compared the Promise Fast Trak TX4310 tested in earlier editions against the Promise Supertrak EX8350. The TX4310 supports up to four serial ATA (Sata) hard disks and offers hardware Raid 0 and 1, but uses your main processor to deliver software-based Raid 5.

The EX8350 supports up to eight Sata hard disks and features a 500MHz Intel IOP333 XScale processor with 128MB of DDR memory to deliver accelerated hardware Raid 0, 1, 5 and even 6, which protects against failures on two disks at the same time. The EX8350 needs a PCI Express x4 slot, but will also work in the x16 slots used by graphics cards. The TX4310 and EX8350 cost £84 and £250 ex Vat, respectively, and are available from **www.span.com**.



Results from a four-disk Raid 5 array using software (top) and hardware, (bottom). Note the massive difference in write speed: approximately 12.1Mbytes/sec and 69.1Mbytes/sec for software and hardware Raid 5, respectively

For consistency with previous issues, we used the same test system, built around an Asus N4L-VM DH motherboard, with an Intel Core Duo T2600 and 2GB of Crucial Ballistix DDR2 memory. We used four identical Seagate 300GB 7200.9 Barracuda hard disks for each Raid array, but booted Windows from a separate Seagate 400GB 7200.8 disk. We used a separate disk for the OS because the HD Tach benchmark can only perform write tests on unpartitioned volumes (**www.simplisoftware.com**). Each Raid array was built using the Promise adapter's Bios controls, and we ran HD Tach's Long Read mode with write testing enabled.

Results

With all four disks connected to the TX4310 and configured as Raid 0, the array measured 1.2TB and delivered average read and write speeds of 104Mbytes/sec and 72.8MMbytes/sec, respectively, with a 106Mbytes/sec burst rate. Switching to Raid 5 on the TX4310 delivered a 900GB array, with average read and write speeds of 92.1Mbytes/sec and 12.1Mbytes/sec, respectively, and a burst rate of 102Mbytes/sec. The TX4310 arrays used the controller's default 16KB block size.

With all four disks connected to the EX8350 and configured as Raid 0, the 1.2TB array delivered average read and write speeds of 138Mbytes/sec and 74Mbytes/sec, respectively, with a 257.1Mbytes/sec burst rate. Switching to Raid 5, the 900GB array delivered average read and write speeds of 125.3Mbytes/sec and 69.1Mbytes/sec, respectively, with a 241.6Mbytes/sec burst rate. The EX8350 results were using the smallest 32KB block size, although we tested at the 64KB and 128KB settings. The overall Raid 0 performance decreased slightly with larger block sizes, and while the Raid 5 read performance also fell with larger block sizes, its write speed increased to as much as 80.2Mbytes/sec.

Superior performance

The EX8350 clearly delivers superior performance. By exploiting the faster PCI Express interface, its read and burst speeds are greatly increased, but the most impressive figure is the Raid 5 write performance. On the software-based TX4310, the Raid 5 array delivered a paltry 12.1Mbytes/sec. In stark contrast, the hardware-based EX8350 boasted Raid 5 write speeds of at least 69.1Mbytes/sec, which matched its Raid 0 write performance.

Hardware acceleration removes the major downside to Raid 5 and allows arrays to be used for high-performance applications such as recording video streams. If you want uncompromised Raid performance, go for a hardware card on a PCI Express bus. **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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NTFS revisited

Make the most of your hard drive with NTFS

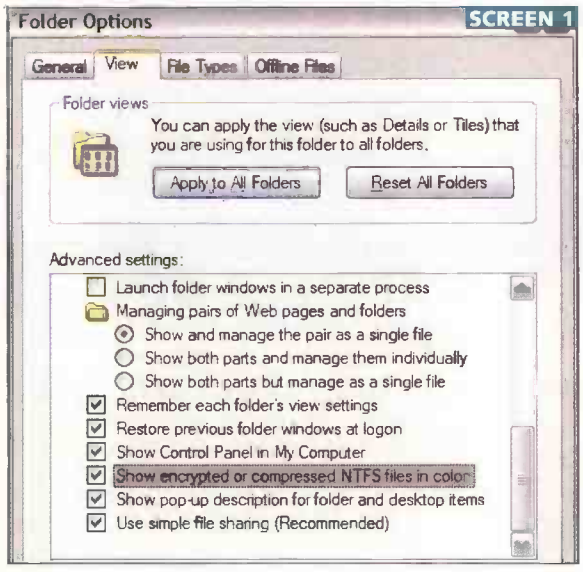
We've dealt with the pros and cons of the NTFS file system compared with Fat32 in the past: to recap, NTFS wins all round. It can deal with larger disks, larger files and is more robust.

Although it has been around since 1993, it was only implemented in Windows NT and 2000: users of 95, 98 and ME were stuck with Fat and Fat32. Windows XP reunited the 'pros' with the 'consumers', with NTFS as an option in both Pro and Home versions.

Apart from supporting bigger disks (256TB) and bigger files (16TB), NTFS offers metadata and journalling. The first lets you see more information about your files; for example, the shutter speed and aperture setting of a digital photo. The second keeps a record of changes to the file system before the changes are made. So if, for instance, there's a power failure in the middle of a disk write, it becomes much easier for the operating system to sort this out on rebooting. For the user, this means the reprimand and detention following an 'improper shutdown' in Windows ME and 98 are things of the past.

NTFS brings with it three extras: compression, quotas and encryption. The first lets you save disk space by compressing files and folders. System-wide file compression is nothing new: MS-Dos 6.2 came with Drivespace, and this was pre-dated by Stac Electronics Stacker in 1991. Unlike those utilities, however, NTFS compression can be used with individual files and folders as well as a drive. Although the techniques are similar, this is not the same as creating compressed (Zip) folders.

Compressed files and folders should have their names in blue (see screen 1). Check this option is enabled in Folder Options, View. Certain files and folders are compressed by default. In your Windows folder, all the hotfix uninstall folders will be in blue, with names such as $NtUninstallKB925486$.

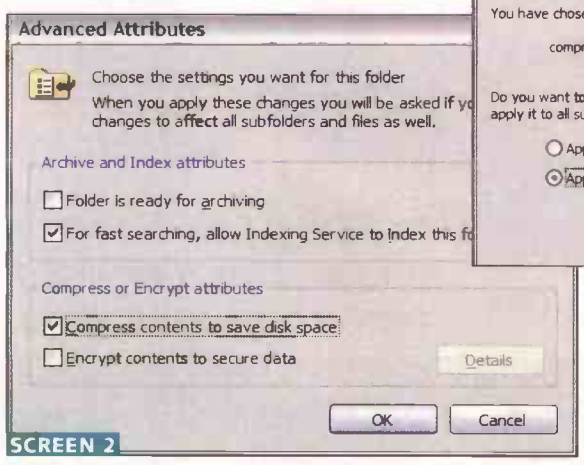


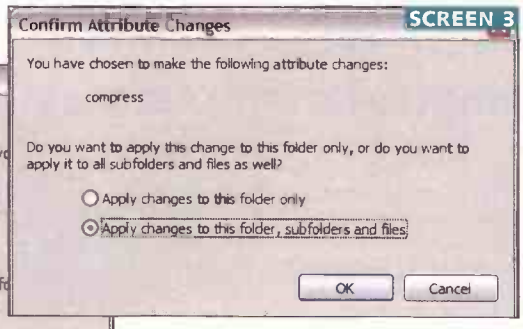
Show compressed files in blue, encrypted in green

You can compress files and folders by right-clicking on them, selecting Properties and clicking the Advanced button on the General tab (see screen 2). A new dialogue will have an option to compress the contents. If you're working on a folder and you click OK, then OK or Apply from Properties, you'll be asked to confirm whether or not you want all the subfolders and their files compressed (see screen 3). Although compression and decompression are completely transparent, there is a school of thought that compression slows down your PC, as the processor has to decompress files each time they're opened. A rival opinion maintains the opposite, as the bottleneck lies not in the processor but in the disk controller, and with fewer bytes to read, files open more quickly. Some files, such as text files and Word Doc files (famously described by a Microsoft spokesperson as being "mostly air") compress well. Others, such as Jpg and Gif images, mp3 or other sound files, video files and the new Office 2007 XML format are already compressed. And it is these files that are likely to be taking up the most space on the average PC.

Status quota

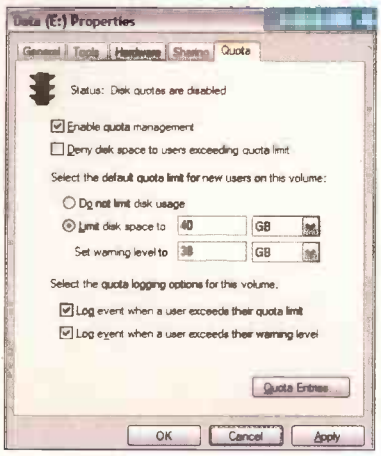
Quotas let a system administrator limit the amount of disk space that users' files can occupy. Although this can be a useful way to restrict the amount of disk space that children can use on the family PC, for example, it isn't very

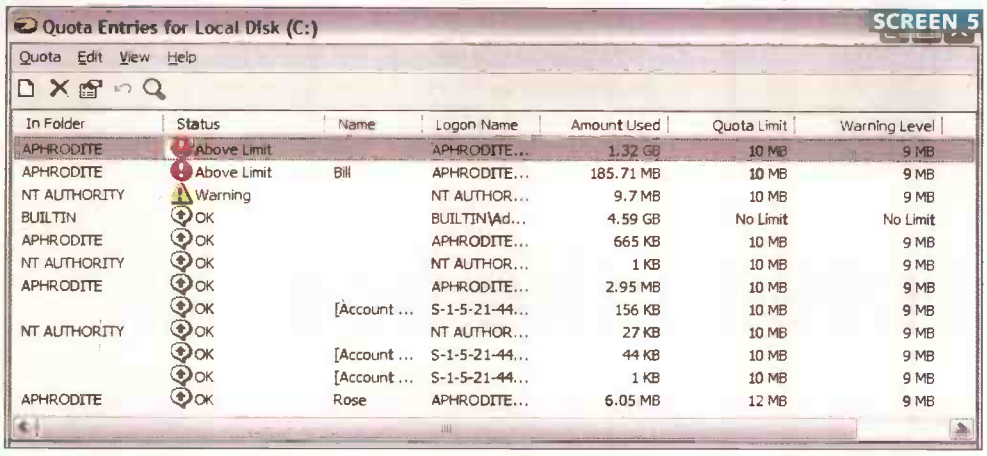




Above: Compressing subfolders and their contents

Left: Compressing a folder





Left: Setting disk space limits for users

Right: Viewing the quota log

versatile. Quota restrictions only apply to limited accounts and are set on a per-volume basis, so you can assign different quotas to different partitions. Quotas are also based on uncompressed file size, so there is no incentive to compress files or folders, and as quotas are based on volumes, it doesn't matter in which folder the user saves a file – so saving in Shared Documents counts the same as in My Documents, assuming these are on the same partition.

To assign quotas you need to be logged on with administrator status. Right-click on a drive letter, select Properties and turn to the Quotas tab. First you need to enable quota management from the first checkbox (see screen 4). Next you can choose whether or not to deny disk space to users who exceed the limit. If you do this, and a user tries to save or copy a file that would push them over the limit, they'll either get an 'Insufficient disk space' message from Windows, or an error message from an application stating that it could not save the file. Next you have options for limiting disk usage. If you select the 'Do not limit disk usage' option, this will enable you to view disk usage on a per-user basis.

You then set the two limits – one for an overall limit and one for a warning threshold – and check the boxes for logging events. Once you've pressed OK or Apply, you'll be able to see the log by pressing the Quota Entries button (see screen 5). This log contains no time or date fields, but you can retrieve this information from the Event Viewer if you look for entries with 'ntfs' as the source. Also, here it is possible to change an individual user's quota by right-clicking on a log item for that user.

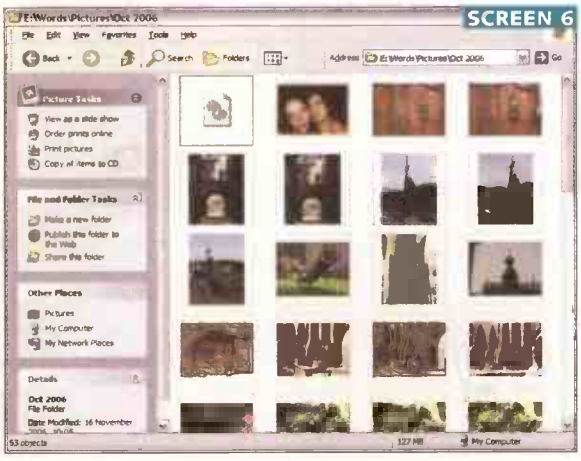
Encryption is only available in XP Pro, and like compression is completely transparent to the user. Although you might have a password-protected user account, someone with physical access to your PC – a thief, for example – could bypass this by installing a different operating system or putting the hard disk in another computer. Encryption scrambles the actual files, so even if thieves manage to get access, they will only see gobbledegook. There are a number of caveats to encryption which mean it is essential to back up your encryption certificate – should this or your user account be damaged or changed you won't be able to access the encrypted files. We'll look at encryption in detail next month.

Master class

In January's column (see **www.pcw.co.uk/2168779**) I described how to add a hard disk to your PC. I mentioned that when using the 'cable select' position on the drive's jumpers, the drive connector nearer the motherboard on the cable became the slave and the end one the master. I also mentioned using Acronis Migrate Easy to transfer the contents of the old disk to the new, and stated that "It really couldn't be easier". I obviously didn't read the Acronis manual all the way through, but eagle-eyed reader Mike Hepworth did, where, he noted, it states the opposite – the nearer connector becomes the master. Well, I have the two traditional excuses. First, I'm a software guy, not hardware. Second, it worked for me – and has also done so with other PCs.

So who is right? It turns out that the situation is rather complicated. A hard disk jumpered for cable select works according to the state of pin number 28. If this is grounded (earthed in British English), then the drive is the master. If it is open-circuit, that is not connected, it becomes the slave. Older standard 40-conductor IDE cables did not support cable select, though they could be modified by cutting the pin 28 conductor between the two drive connectors – hence the intermediate connector became the master.

More recent IDE connectors have 80 conductors, although the connectors themselves only have 40 (or more usually 39) pins. The extra conductors are all grounded and interspersed with the connected ones to decrease cross-talk between the data conductors. And the end connector, not the intermediate one, has pin 28 grounded, so the disk connected to this will be the master. The terms master and slave are misleading. Neither drive controls the other, but the so-called master becomes drive 0 on the IDE channel, and the slave, drive 1.



Nameless thumbnails in XP

Department of shifty tips

If you hold down the Shift key while opening a folder in thumbnail view, or switching to thumbnail view, the filenames won't be shown (XP only) (see screen 6). If you hold down the Shift key when clicking on a link in Internet Explorer, it will open in a new page. Shift & Delete sends a file or folder straight to oblivion, bypassing the Recycle Bin. **PCW**

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.

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Putting the boot in

Linux partitions explained, and find out how to dual-boot with Windows

For most people new to Linux, their biggest concern will undoubtedly be how to install it alongside Windows. Most people will understandably want to dip their toes in before wiping out what they're accustomed to, and many may still need to use specific Windows applications even if they do decide to switch to Linux full time.

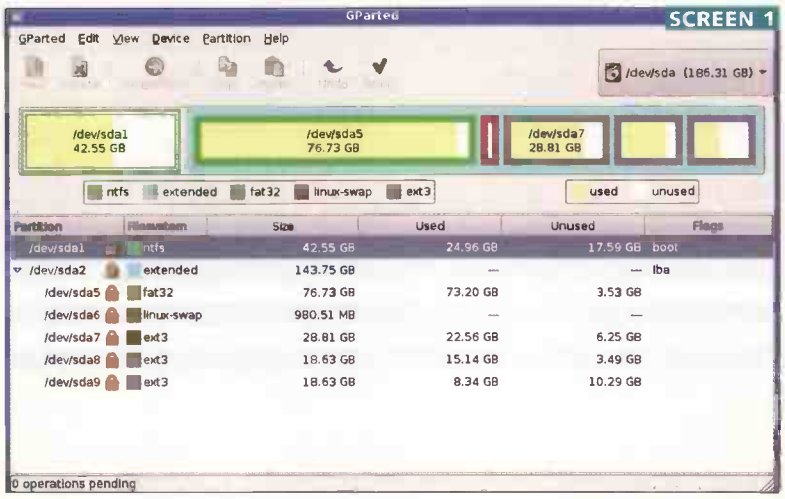
Thanks to what began with the Knoppix distribution (**www.knoppix.com**), many Linux distributions can boot directly from CD or DVD, allowing users to try things out before committing in any way. These work entirely from CD and don't need to modify the hard drive at all.

Although things are considerably easier than they were a few years ago, when it comes to Linux installation it's a good idea to understand a few concepts about dual-booting if you want to go down that route. Installation programs are generally good enough, but a basic understanding is helpful to ensure you know what you are doing.

If you don't need to dual-boot with Windows and are happy to wipe the hard drive clean, then you'll find that a Linux installation is no more difficult than a Windows one. If anything it's actually easier, especially as driver downloads are generally not needed at all.

Common Linux device names

Primary master	hda
Primary slave	hdb
Secondary master	hdc
Secondary slave	hdd
First Sata/USB	sda
Second Sata/USB	sdb



A hard drive's partitions managed by Gparted

Partition basics

On a PC, the hard drive needs to be split up into partitions before it can be used. A partition acts, to all intents and purposes, as a separate hard drive. Each partition can have its own file system, or indeed its own operating system. Linux does, in fact, allow you to use an entire hard drive for data without any partitions, and it even allows you to use other partitioning schemes (such as those used by Macs), but here we will concentrate on a traditional PC setup.

A hard drive can be split into four bootable partitions. These are known as primary partitions. Initially, back in the days of MS-Dos, this was the upper limit. In order to allow for more partitions, it was made possible for one of those primary partitions to be marked as an extended partition. This itself could then be split up into any number of logical partitions. As a result, a hard drive can have one-to-four primary partitions. Alternatively, it can have one-to-three primary partitions and a number of extra logical partitions. Primary and logical partitions behave the same.

The information about partitions is stored on the master boot record, commonly referred to as the MBR. This is 512 bytes of data, stored in the first sector of the hard drive, outside of any partitions.

The MBR also holds executable code, since the PC must use this to start an operating system. If you install a copy of Windows, the traditional Dos MBR is installed. This is a simple piece of code: it checks each primary partition and whichever is marked as active is then booted.

Every partition can have executable code installed in its first sector, and this code is run on whichever partition is active. One limitation of the Dos MBR is that it can only boot primary partitions.

Linux partitioning

In Microsoft Windows, each partition the operating system can read receives a drive letter (such as C: or D:). These are fairly arbitrary and can change if you add or remove new hardware. They are also mixed in with network drives and other hardware. Any file system that isn't readable won't receive a drive letter at all.

Grub problems solved

Dual-booting is normally configured to work automatically, and our typical example is one where little or no knowledge is needed to get everything up and running. There are, however, some important issues to bear in mind when running a dual-boot system from the MBR.

If you reinstall Windows, it impolitely overwrites the MBR and marks its own partition as active. That means Windows is guaranteed to boot up, but it also prevents you from booting Linux afterwards. For this reason, it is essential to install Linux after Windows.

If you want to remove Linux from a dual-booting PC, do not simply remove the Linux partitions. This is because grub works in two parts: the boot code that sits on the MBR, and the remaining code sitting on the Linux partition. Grub cannot start without both, so removal of the Linux partition will prevent the computer from booting.

One solution to this is to run the Windows installation CD, and choose only to reinstall the MBR. There is also Linux software available that will install a Dos-compatible MBR, such as ms-sys (http://ms-sys.sf.net).

Avoid installing grub onto the MBR of your boot drive if you have Linux installed on an external drive. This is for the same reasons as above. If your external drive is not plugged in, grub will be unable to boot the PC.

The most sensible way to avoid all of these problems is to place grub on a primary partition instead of the MBR. As long as Linux is installed onto a primary partition, it isn't necessary to modify the Dos MBR. Simply mark the Linux partition or the Windows partition as active to switch between bootloading with grub or booting directly into Windows. A reinstall of Windows would require switching the active partition back to Linux and nothing more.

In Linux, the situation is totally different. Every partition is referenced by a device name, which refers directly to the partition number on the hard drive. Primary partitions are numbered one to four, and logical partitions are five and up. Since any hard drive can have up to four primary partitions, the first four numbers are reserved, whether they're in use or not. In other words, if you have two primary partitions and three logical partitions, these will count as partitions 1, 2, 5, 6 and 7.

The device name starts with a prefix of 'hd' for IDE hard drives and 'sd' for any other – such as SCSI, serial ATA (Sata) or USB – hard drives. This is followed by a letter to distinguish one physical drive from another. See box on previous page for a list of common device names.

The sum of all partitions

Combined together, this gives a device name that refers directly to a specific partition – hda2 would be the second primary partition on an IDE drive, hda5 the first logical partition, and sda3 would be the third primary partition on the first Sata or USB drive. See screen 1 for an example.

It is the first Sata hard drive, so the device is /dev/sda. The drive has a 42GB primary partition (sda1), and the rest of the drive is an extended partition (sda2), represented with a cyan border. This is subdivided into five logical partitions (sda5 to sda9). Note that the first partition is marked with the 'boot' flag. This means the partition is active, which in turn means a Dos MBR would boot this partition directly.

A typical grub bootloader screen. This one is from Fedora Core 6

Typical setups

As an example of a common situation, let's take a PC with an 80GB hard drive and Windows XP installed. The drive consists of a single primary partition, which takes up the entire drive. It is an IDE drive, in the typical primary master position, and so the device name is hda and the partition is hda1.

When starting up the PC, the Bios runs the code on the MBR, which finds that the first partition is active. This is then booted and Windows XP starts up.

We have decided to put a copy of Ubuntu Linux onto the PC. Ubuntu needs its own partition, and we don't want to delete our installation of Windows. For this to work the current partition must be reduced in size in order to make space for Ubuntu.

The Ubuntu desktop CD will do this for us, and we reduce the first partition to 40GB and create two new logical partitions: one 39GB partition for Ubuntu itself and a 1GB partition for virtual memory (swap). The disk is now laid out quite differently: hda1 contains the copy of Windows; hda5 has a Linux file system; and hda6 contains a partition for virtual memory.

At the end of the installation, we need to install the Linux bootloader (grub). This can go in one of two places: the MBR or the boot sector of a partition. In our case, it is impossible to put grub onto a partition. Remember the Dos MBR can boot only a primary partition, and we have only one, which is occupied with Windows. While it would be possible to install grub onto the Linux file system (hda5), it would be impossible to boot this with the Dos MBR installed.

Once grub is installed onto the MBR, the new setup is complete. When the PC is switched on, the Bios executes the MBR code as usual, which now starts up the Linux bootloader (see screen 2). This in turn allows us to choose whether to boot Linux or Windows: our dual-boot system is ready. PCW

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.
Email digitalimaging@pcw.co.uk
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A ray of light

How digital effects can bring natural light to your images

Lighting is one of the most important factors in photography. Most of the time, it's provided by the sun, but that's not to say you can't control it. Making the right decisions about the relative positions of the camera and subject, as well as the time of day at which you shoot photos, can make the difference between a stunning image full of atmosphere and mood, or a lacklustre snapshot.

The problem is that the sun is not always willing to oblige. You may find yourself in situations where the sun is in the wrong place or you are, or it's the wrong time of day (or night) and unwanted shadows are everywhere. Indoor photography brings its own set of lighting problems, which are usually made worse by the standard solution – a flash unit attached to the camera.

The good news is that the magic of digital post-processing extends to lighting effects. Even if the lighting was poor at the time of capture, you can do something about it afterwards.

In this month's column, I'll explain how to do this using the lighting effects filters in Photoshop and Paint Shop Pro, I'll show how to create your own lighting effects using an alpha channel, and look at a lighting effects plug-in that can bend light so that it wraps around 3D objects just like the real thing.

Photoshop sheds light

Screen 1 shows Photoshop's lighting controls dialogue box, which is opened by Filter>Render>Lighting Effects. This dialogue box provides a lot of controls but, regrettably, there's no live preview and the preview thumbnail isn't really big enough to see the effect properly.

The Style pulldown menu provides more than a dozen predefined lighting setups. As they stand you probably won't find them all that useful, but they do provide a good basis from which to start. Screen 2 shows a selection of the available presets.

Photoshop's Lighting Effects dialogue has good controls, but poor preview

Three types of light are available – Spotlight, Omni and Directional. Omni, which shines in all directions from above the image, and Spot, which casts an elliptical beam, are definitely the most useful. Directional tends to cast fairly even illumination over the entire image.

You can reposition lights over or outside the image by dragging and dropping. The spread, angle and throw of the beam, indicated by an elliptical border, is adjusted using handles on the individual lights. Sliders provide control over intensity and focus, and lights can also be coloured.

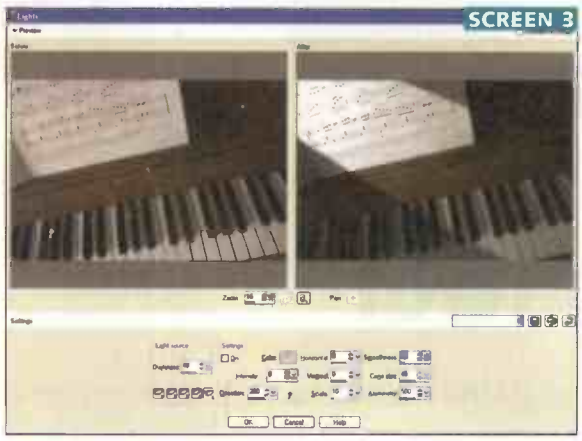
As well as adding lights to the scene and changing their characteristics, you can define the reflective properties of the subject. Shining a spotlight onto a rug will produce a different effect to the same light shining on a car door or a tabletop. By using the four sliders in the Properties pane of the Lighting Effects dialogue box to control gloss, material, exposure and ambience, you can achieve a more realistic effect for specific materials.

The result depends as much on the ambient lighting and texture of the image as anything else. Pushing the gloss slider to its maximum shiny position and the material slider all the way to metallic won't help you get a realistic reflection from a tartan rug, but with the right material these sliders can be used to good effect.

Another clever trick in the Lighting Effects toolbox is the texture channel. This allows you to select one of the

Photoshop's Lighting Effects presets, clockwise from top left: default, blue omni, five lights down, soft spotlight with texture channel, soft spotlight and soft direct light. The final image has a green texture channel applied

image channels for use as a bump, or displacement map, shifting the image pixels by an amount and in a direction dependent on the greyscale value of the corresponding pixels in the bump map. This has the effect of adding texture to the image and making it look even more like it has been directionally lit from a low angle. In screen 2, the final image uses the same lighting effects setup as the one immediately to its left, with texture channel applied using the green channel and an amount of 50.



Paint Shop Pro Photo XI's lights dialogue has good controls and good preview

Paint Shop Pro effects

Paint Shop Pro's users are almost as well served in the lighting department as Photoshop's. To access Paint Shop Pro Photo XI's Lights dialogue box, select Effects>Illumination Effects>Lights. This dialogue box is similar to Photoshop's and, although the range of effects and controls isn't quite as versatile, at least the Paint Shop Pro dialogue box is resizable and you can preview the effect live in the picture window.

Paint Shop Pro has five lights and, rather than adding or removing lights from the image, you simply switch them on or off. Like Photoshop's, you can reposition or angle them, and adjust the spread of the beam by dragging and dropping and adjusting handles. Paint Shop Pro doesn't have different light types, but offers versatile adjustment options, which makes them all but unnecessary.

Cone Size can be adjusted from 1°to 90° so you can produce highly directional spots, or diffuse lighting, along with everything in between. Smoothness controls the rate at which the light fades. At higher settings, it simulates real-world light, which fades in proportion to the square of the distance. At lower settings you can use the Smoothness control to simulate a shaft of directional light coming through a door or window (see screen 3).

Paint Shop Pro has fewer lighting presets than Photoshop but, given that you don't have to add lights to get started, they're even less useful. What is useful is that, having created your own lighting setups from scratch, you can save them for later use on other images.

DIY lighting

You don't need a lighting filter to create lighting effects; you can achieve a similar effect quite easily by making tonal adjustments and limiting them to part of the image using selections. The technique I'm about to describe uses a simple selection saved to an alpha channel. If your application doesn't support alpha channels, just use the selection directly on the image layer.

First you need to duplicate the background layer: in Photoshop you do this by dragging it onto the New Layer button in the Layers palette. Press Ctrl & L to open the Levels dialogue box and darken the layer by dragging the white Output Levels slider on the right of the ramp towards the middle. Keep dragging it until the number in the box above it is about 160. What this does is clip the image highlights so that all of the pixels with a value above 160 are lowered.

Next, make your selection to define the light path using your preferred selection tool. For this example I used the Polygonal Lasso. You need to ensure that the selection extends to the image boundary, or the light will come to a halt abruptly.

Now choose Save Selection from the Select menu and call the new alpha channel 'light'. Click the channels tab in the Layers palette and select the light alpha channel, then apply the Gaussian blur filter to soften the edges. Make sure to deselect (Ctrl & D) before you do this or the blur won't work properly.

Go back to the Layers tab, select the background layer copy, then choose Select>Load Selection to load the soft-edged selection back in. Click the New Adjustment Layer button on the Layers palette, select Levels from the popup menu, and drag the right-hand output slider to the left to lighten the masked layer (see screen 4).

That's basically it, although there's plenty more you can – and probably should – do to add a bit more realism to the effect. For one thing, the light is consistent across the image, whereas in reality it would be brighter closer to the source. You can fix this by adding a gradient fill to the adjustment layer mask. Edit the mask using brush tools to add and remove light to enhance the effect and make it more realistic. You can keep light out of the shadows this way. It helps a lot if you choose your lighting effect to fit with the existing ambient lighting and shadows in the shot, as I've done in this example. Plus you can make the light run behind foreground objects.

All of this can add up to quite a lot of work. If you haven't got the patience and adding light is something you find yourself having to do frequently, have a look at DFT Light (**www.digitalfilmtools.com/light/**). This Photoshop plug-in – which will work with Paint Shop Pro and other image editors that support Photoshop plug-ins – does everything that the lighting effects filters can do and more.

One thing it's particularly good at is casting shadows. In the bad old days this was done by placing a gel with the shadow image over the light source. Light 3.0 uses masks – there are 567 from which to choose – to simulate light shining through anything from trees and iron railings to elaborate window frames. If you can't find the template you need (and to be honest there are a fair few – for example, eagle with crest, Paul Revere and the Liberty Bell – you'll likely never use), you can make your own.

But the killer feature is displacement maps. Unlike the channel bump maps used by Photoshop's lighting effects, rather than adding texture these deform the light path so it appears to follow surface contours. DFT Light 3.0 costs $50 (£25) and a 30-day trial download is available from the DFT website. **PCW**

Creating a lighting effect with channels and a levels adjustment layer

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.

→ Comments welcome on the Word processing column.
Email wp@pcw.co.uk
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Border control

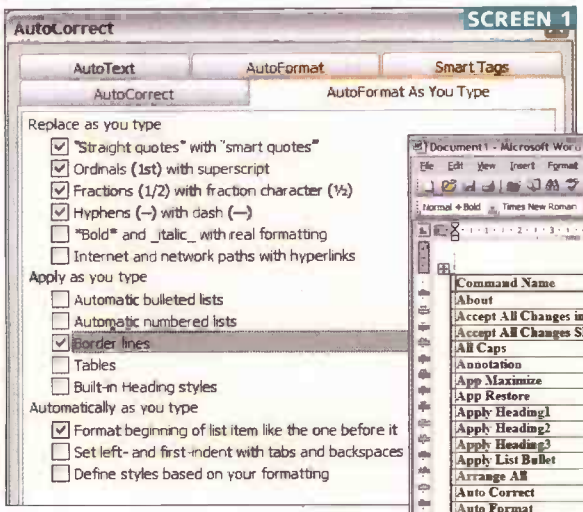
Take a look at borders, and gather some useful word processing tips

Reader Brian Tunbridge, using Word 2000, found that typing three asterisks between paragraphs produced a row of small squares when he hit the Return key. This was fine in some situations, and he found he could also cut and paste the paragraph and the row of squares elsewhere in the document. However, he often found he wasn't able to delete the row.

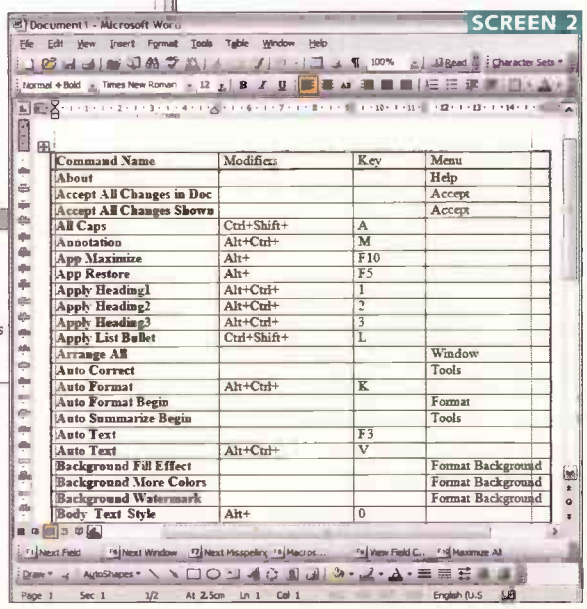
That is because this isn't a row of characters or shapes, but a border – part of the preceding paragraph's formatting. You can achieve a similar effect manually from Format, Borders and Shading by specifying a custom three-point dotted line at the bottom only. Other triple keys also produce paragraph borders – try experimenting with the minus, underscore, equals, hash and tilde keys. If you would rather do without automatic borders, you can turn off the feature from Tools, Autocorrect, Autoformat as you type (see screen 1).

The border button on the formatting toolbar can also prove useful in managing borders – click the little arrow beside it and you will get a palette of options. You can drag this off the toolbar to keep it open (there's also a Tables and Borders toolbar, but this is principally concerned with tables and their formatting). Although the palette doesn't offer the style options of the Borders and Shading dialogue, it does have two clever memory tricks. First it remembers the last border style used, so if you've set up a custom border in the dialogue it will use that. Second, it remembers the last button used, which becomes the default on the Formatting toolbar, so if you want to repeat a border action you don't need to open the palette. I find this especially useful in removing borders.

Three centred asterisks is also a convention used in writing to denote, for example, a change of scene in a novel in the middle of a chapter. If you want to do this without losing the automatic border feature, then remember, as with all 'auto-business' you can undo the border with Alt & Backspace or Control & Z, which will change the border back into three asterisks. A better method is to put a space between the asterisks – this won't be converted to a border and the spacing looks more professional.



Automatic borders can be turned off here



Get a list of all Word's keyboard shortcuts

What does this button do?

If you want to know the key combination assigned to a command in Word, go to Tools, Customise and click the Keyboard button. Scroll through the Category and Command lists to find the command you want and you'll see the key assignment in the Current Keys box. If, on the other hand, you want to find out what command is executed by a particular keystroke combination, and it's not obvious from just pressing those keys, go to any command and enter the combination into the 'Press new shortcut keys' box. The current assignment will be shown below. For a complete list of all the keyboard shortcuts, go to Tools, Macro, Macros and select Word Commands from the 'Macros in:' box. Run ListCommands from the list above and you'll be offered a choice of creating a new document showing the current menu and keyboard settings or all Word commands – the latter includes those commands (such as ListCommands itself) that are not usually accessible from the menus or keyboard (see screen 2).

Herberwatch

Regular readers of this column will be familiar with Paul Herber's Diacrit (see screen 3). For those who aren't, it is a utility that enables you to enter characters not usually accessible from the keyboard. Like the Windows Character Map, it can be used in any text-inputting situation. But where it scores over the Character Map is that

the characters are grouped into separate toolbars by language – there are, by my count, 110 of these ranging from Armenian to Welsh, as well as useful collections such as fractions, currencies and arrows. The latest version increases the Greek capabilities to include ancient, modern and Coptic, and adds support for Thai, Syriac, Sanskrit, Sami (Lapland) plus the APL programming symbols. You will need a fully Unicode-aware version of Windows (such as 2000, XP or Vista) to access all the characters and may also need the relevant fonts installed, such as Mangal for the Hindi characters. You can download a trial version (limited to the first two characters in each toolbar) from **www.pherber.com**, and registration for the full version costs £10 ex Vat.

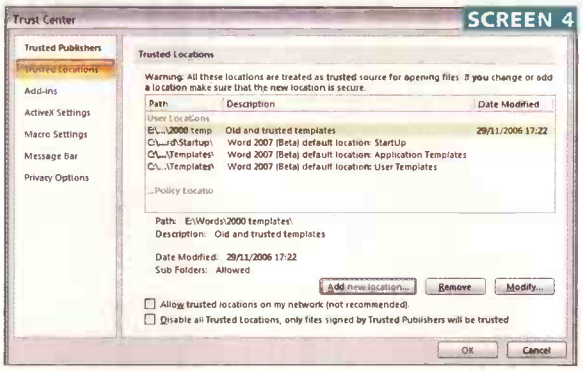
Turning the 2007 corner

If you're upgrading to Word 2007 and want to use macros from previous versions, there are a number of hurdles to jump. For a start, you need to make a few changes just to be able to get macros into the interface. Open the Office menu and click the Word Options button. In the Personalise section, tick the box to 'Show developer tab in the Ribbon'. This will produce a tab with a load of highly technical stuff, but the Code panel at the left gives you access to existing macros and the VBA editor.

The next hurdle is one of security. If you open a document created in a previous version of Word, which contains macros, or whose template contains macros, you will get an alert stating that your security settings have disabled unsigned macros. This applies even if you wrote or recorded the code in the macros. You can enable content on a piecemeal basis, but a better method is to go back to Word Options, turn to the Trust Centre page, then click the Trust Centre Settings... button. Choose Trusted Locations (see screen 4), and you'll be able to add your previous templates folder to the list of trusted locations.

If you want to continue to use your old templates, go to the Advanced section of Word Options and scroll down until you see the File Locations button. This will let you specify the location of user templates, and you can set this to your previous folder. This will make all the macros in your templates 'trusted' and will be the default folder for templates when you create a new document. I have always kept my templates in a sub-folder of My Documents so they get backed up with my documents. Finally, at time of writing we were still with beta 2, so the final version may vary in minor details.

The final hurdle is in running your macros. You can't add them to a menu, (remember menus?), and you can only add a macro – or any other command – to the Quick Access Toolbar by going to Word Options, Customisation. You can, however, still assign a macro to a key combination by clicking the Keyboard shortcuts Customise button on that page. If you are planning on adding several buttons to the Quick Access Toolbar then tick the box to place it below the Ribbon – this will allow it more breathing space.



Top: Diacrit goes Coptic

Bottom: Add your old templates folder as a trusted location

Curiosity corner

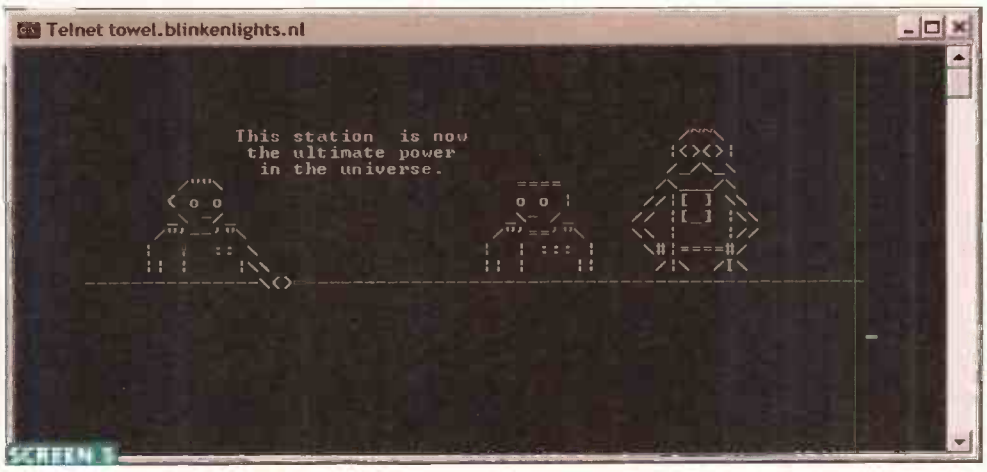
We've sung the praises of Unicode rather a lot lately, so let's not overlook the creative possibilities of Ascii. For a piece of wonderful geekishness, combining the subtleties of Asciianimation and the perennial popularity of the film *Star Wars*, point your browser at **www.asciimation.co.nz**. We first mentioned this in Hands on six years ago, and the author Simon Jansen, who began work on this epic in 1997, has now completed the final episode, in which Luke finds the princess. Purists, such as Wordperfect 5.1 fans, may prefer the command-line version, which you can get by opening a command prompt and typing:

```
telnet towel.blinkenlights.nl
```

There's no need for a browser, but you need a connection to that newfangled internet thing (see screen 5).

Here's another curiosity for Wordperfect users, brought to our attention by reader Michael Steward. Type \cheetah followed by Enter and you'll get – a cheetah. Or at least a picture of one. This isn't an 'Easter Egg' or undocumented feature, but part of the Quickwords mechanism. This works in a similar way to Word's Autotext, in that you can assign often-used blocks of text to an abbreviation – for example set 'pcw' to expand to 'Personal Computer World'. And, as with Word, this works with graphics too. If you go to Insert, Quickwords, you'll see that a few entries have already been set up, for opening or closing a letter (Dear Sir or Madam, Yours sincerely) and the entry for \cheetah, which inserts the graphic.

Again, as with Word, you can add your own entries by typing and highlighting the full text (or graphic), then opening the Quickwords dialogue, typing in an abbreviation, then clicking the 'Add Entry' button. You don't have to start the abbreviation with a backslash, but it does help to prevent unintentional Quickwording. **PCW**



Eat your heart out, George Lucas

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.
Email spreadsheets@pcw.co.uk
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Lookout for lookup tables

Search through data using Excel's lookup functions

SCREEN 1

	A	B	C	D	E
1			**Organiser**	**Date**	**Location**
2		Spring Dance	Betty	May 5	W.I. Hall
3		Annual Meeting	Arthur	Jul 7	Village Hall
4		Summer Fair	Sid and Lulu	Aug 11	Westcliff Park
5		Harvest Festival	Rev. Jim	Sep 22	St. Martin's Hall
6		Christmas Party	Holly and Ivy	Dec 15	Village Hall
7					

I've been chivvied into this month's subject from both ends of the spreadsheet experience spectrum. David Shaw asks, "Would it be possible to do a feature on the use of VLOOKUP, HLOOKUP and LOOKUP in Excel?" And Victor Arotsky chides me over a recent column for "the sin of long nested IF formulas, usually an error in my experience, though you can partially be forgiven by your alternative recommendation of a lookup table".

I don't think Microsoft sees nested IF formulas and lookup tables as competing solutions to a problem. They are offered in Excel for different user needs. But let's look at lookups.

Things are looking up

All the lookup functions follow the same idea. You might enter a part number and they can return a part's description from a table, or enter a name and they look up an address. There are lookup functions in a mobile phone. Highlight a contact's name in the phone book and it will display their phone number.

The Excel LOOKUP function has two forms: vector and array. Stay with me on this. The vector version looks in a single-column or single-row range and returns a value from the same position in another column or row. It lets you specify the column or row with the value to be searched, and lets you specify the column or row with the answers in it.

SCREEN 2

Table | Spring Dance

	A	B	C	D	E
1			Organiser	Date	Location
2		Spring Dance	Betty	May 5	W.I. Hall
3		Annual Meeting	Arthur	Jul 7	Village Hall
4		Summer Fair	Sid and Lulu	Aug 11	Westcliff Park
5		Harvest Festival	Rev. Jim	Sep 22	St. Martin's Hall
6		Christmas Party	Holly and Ivy	Dec 15	Village Hall
7					
8					

Top: The data about village events is in this table

Bottom: Highlight a range and enter a Name in the box

There is no point in worrying about the array form of LOOKUP, as Microsoft says it is only included for compatibility with other publishers' spreadsheets. It has been superseded in Excel by VLOOKUP and HLOOKUP.

The LOOKUP vector version has three arguments: the lookup value, the lookup range and the result range. To illustrate you need a table, and this one is in the range B2:E6 on a worksheet named Data (see screen 1). Highlight that range, and in the Name box at the left of the Formula Bar enter Table (see screen 2). There are four columns and you're initially interested in what is held in columns B and D: the names of village events and their dates. Highlight the range, B2:B6 and in the Name box type Event. As the Date column has a label you can highlight D1:D6, press Shift & Ctrl & F3, and when it says Create names in Top row, click OK.

In a newsletter on another worksheet (see screen 3), you can now enter Summer Fair in cell B2 and the date of that event will be displayed if you enter in cell D2

```
=LOOKUP(B2,Event,Date)
```

Unfortunately, if you enter some of the other events in cell B2 you will only see N/A in D2 (meaning no value is available) because LOOKUP requires the looked up values to be in ascending order. Sometimes you can do that. As it stands, with this example you can't.

Sort it out

One solution would be to click within the table, choose Sort on the Data menu and sort by Column B, Ascending. Now the lookup range is in alphabetical order and you'll find that you'll get the correct date when you enter any event on the newsletter worksheet.

An easier solution is to use VLOOKUP instead of LOOKUP. This function has four arguments: the lookup value, the data table array,

SCREEN 3

Bradley Hand ITC | 12

D2 | =INDEX(Table,MATCH(B2,Event,),3)

We look forward to seeing you at the Spring Dance on May 5

Homeowners' Newsletter

Heading of the newsletter, with a movable date

	A	B	C	D	E	F	G
9			Spring Dance	Annual Meeting	Summer Fair	Harvest Festival	Christmas Party
10		Organiser	Betty	Arthur	Sid and Lulu	Rev. Jim	Holly and Ivy
11		Date	May 5	Jul 7	Aug 11	Sep 22	Dec 15
12		Location	W.I. Hall	Village Hall	Westcliff Park	St. Martin's Hall	Village Hall
13							
14							

SCREEN 4

The table with columns and rows transposed

the column index number and a logical value which, in effect, overcomes the problem of the lookup values being in order.

With the table in the original order as shown in screen 1, it works like this. The lookup value is the same, B2. But unlike with LOOKUP, you can't specify the column in the table that has the lookup values. It's always the first column in the array. In this case the range named Table does have the events in column one. The third argument is the index number for the column containing the answers. This is counted across with the first column in the array – column B here – being 1.

What you are looking for is in column D, so the third argument in the VLOOKUP function is 3. If you enter FALSE for the fourth argument you overcome the problem of the events not being in alphabetical order. So the formula to be entered in D2 of the newsletter worksheet is

```
=VLOOKUP(B2,Table,3,FALSE)
```

Now let's suppose the same data were laid out another way. Highlight the whole table from B1 to E6. On the Edit menu choose Copy. Click on cell B9. Choose Paste Special on the Edit menu and check the Transpose box. Click OK. With a minor formatting adjustment, the table now looks like screen 4 and you can do a horizontal lookup.

Going sideways

HLOOKUP has a similar set of arguments: lookup value, table array, row index number and a logical value. The lookup value is still in cell B2 on the newsletter sheet. The table array is changed to B9:G12 on the Data worksheet, and the row index number is still 3. Again, you add FALSE as the fourth argument because the events in row 1 of the array are not in alphabetic order. The new formula is

```
=HLOOKUP(B2,Data!B9:G12,3,FALSE)
```

On the newsletter sheet you can enter any of the events in cell B2 and you'll see the correct date displayed. Incidentally, as you would be likely to publish this newsletter for more than one year, it would be more convenient to pick the events from a list rather than type them in each time.

SCREEN 5

Pick the event on the dropdown box and the date is changed

Click on cell B2 and choose Validation on the Data menu. Under Settings, in the Allow box, select List. In the Source box enter =Event. This is the Name of the range to use, preceded by an equals sign. In future, when you click on this cell you will see a dropdown arrow. Clicking on that will offer you the various annual events to choose from (see screen 5).

'It always seems that every task in Excel can be accomplished in a number of ways'

It always seems that every task in Excel can be accomplished in a number of ways. This is equally true of picking data from a table. In some instances, you can use the Add-In called the Lookup Wizard. It creates formulas using a combination of the INDEX and MATCH functions. In this instance, it's quicker to simply enter this formula in cell D2 of the newsletter sheet

```
=INDEX(Table,MATCH(B2,Event,),3)
```

The INDEX function picks out the right date from the table, once given the correct row and column. Its arguments, in its array form, are array, row number, column number. The array here is represented by the name Table. The column number for the dates is 3. The row number is found by the MATCH function. That has three arguments: lookup value, lookup array and an optional match type. If the third argument is not specified, it is assumed to be 1, which means MATCH finds the largest value that is equal to or less than the lookup value. In this case, the MATCH function's lookup value is in cell B2 and the lookup array is represented by Name, Event, so we put MATCH(B2,Event) and use that as the second argument for the INDEX function.

Lookup Wizard

I mentioned the Lookup Wizard. If you prefer to let that compose your formula, choose Add-Ins on the Tools menu. Check the box against Lookup Wizard and it adds this feature to your Tools menu. If it's not in the Add-Ins list, load it from your Office disc.

Start on the Newsletter worksheet and choose the Wizard. Step 1 is to look for the range to search. Click the little minus sign at the end of the box and highlight the complete table B1:E6 on the Data sheet. This range includes both the column and row labels. Step 2 asks which column has the value to find. As you need a date, choose Date. Then it asks for the row with the value to find. Temporarily pick Annual Meeting (see screen 6). Move on to Step 3. Choose 'Copy just the formula' to a single cell, then in Step 4 choose D2.

The formula will probably read something like

```
=INDEX(Data!$B$1:$E$6, MATCH↙
("Annual Meeting",Data!↙
$B$1:$B$6,), MATCH("Date",↙
'Myworkbook.xls'!Details,))
```

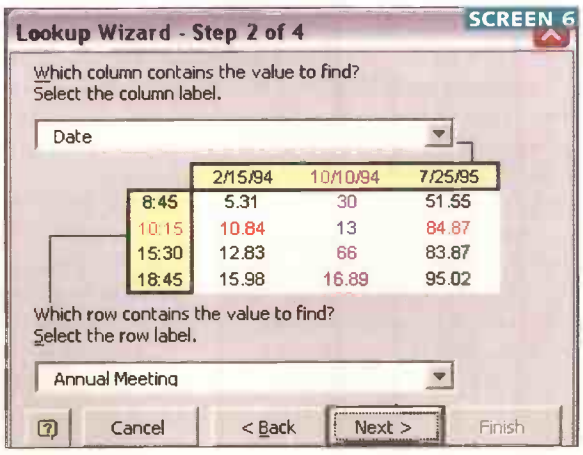
(Key: ↙ code string continues)

But you don't need the name of the file in there so delete Myworkbook.xls and the quotes around it. You also don't want to be limited to the date of the annual meeting, so substitute B2 for Annual Meeting and its quotes. Now the formula will read

```
=INDEX(Data!$B$1:$E$6, ↙
MATCH(B2,Data!$B$1:$B$6,), ↙
MATCH("Date",Details,))
```

Personally, I think you would be better off becoming familiar with the Index/Match combo and writing your own briefer formulas. PCW

Step 2 of the Lookup Wizard



SCREEN 6

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 May issue. Email sound@pcw.co.uk *Please do not send unsolicited file attachments.*

The sound of music

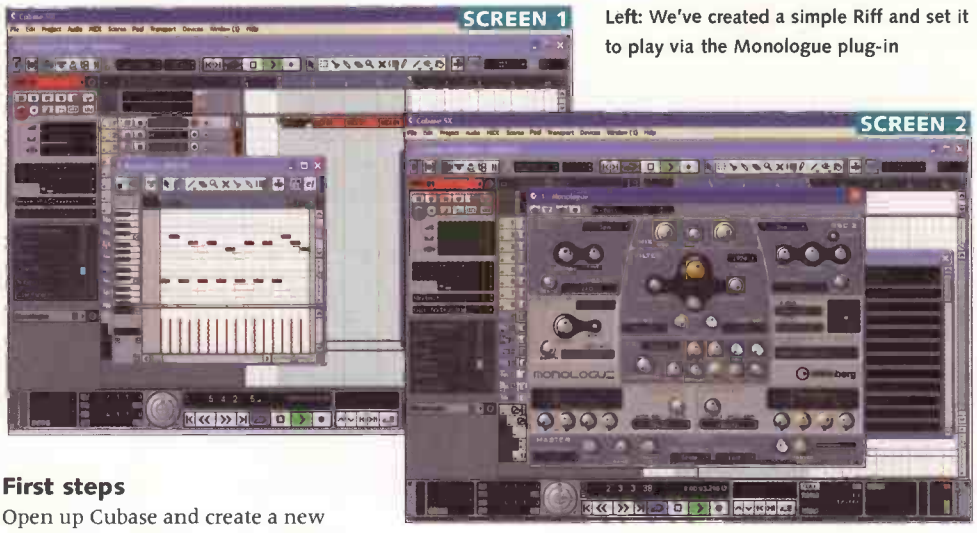
Using Cubase's automation features to take the strain out of mixing

Sometimes it can feel as if you need the arms of an octopus to control everything in your home studio when you're trying to record or mix a track. There are so many knobs, switches and sliders to control that it can seem overwhelming. But now you can simplify the process. This month, we'll look at how automation in Cubase can help you control nearly every parameter of not just the softsynths and effects, but also the main mixer in Steinberg's premier sequencer.

Automation gives you total control over all the sliders, dials and switches on the different bits of virtual kit you use within your sequencer. This means you can give strict instructions to each device to tell it exactly what it should be doing at any time during your track. For example, you can tell the mixer to fade up track three just before the chorus kicks in for the second time and instruct the reverb effect to lengthen the reverb tail during the third verse. And you can do all this without having to move any knobs or sliders while your track is playing. Once you've grasped the basics, you'll be able to use automation to add extra movement and creativity to your tracks.

We'll start by showing you how to create and edit automation data for your plug-ins. Then we'll explain how to use automation to control your mixes. We'll be using Cubase SX version 3, but you should be able to follow this workshop using earlier versions of the software.

As we've already discussed, Cubase allows you to automate lots of functions, but thankfully automation is applied to all these functions in much the same way. Let's start by looking at how you can add automation to a part that's being played by a synth plug-in.



Left: We've created a simple Riff and set it to play via the Monologue plug-in

First steps

Open up Cubase and create a new project. Once you've set up the new project, create a single bar part on a Midi track and fill it with a simple arpeggio or any type of synth riff. Now copy the part four times and set it to loop. Next we need to set up a synth plug-in to play this part, so click on the Devices menu and select VST Instruments. In the instrument rack that appears, click in the first box, select the Monologue synth, choose Mini Bass as the preset, and then assign the Midi track to play via this synth. Press Pay to listen to your synth riff (see screen 1).

Now that we've got our synth set up and playing a riff, we can look at adding automation. Click on the Monologue synth to bring its interface to the fore. If you look at the top left-hand corner of the Monologue window, you'll notice two buttons labelled 'R' and 'W'. These letters indicate that the buttons are used to read and write automation data. Naturally, we want to start by first recording some automation information, so click on the W button to enable the write mode.

With the W button lit up in the Monologue interface and the loop playing, move the filter knob to start writing automation data into Cubase. When you've finished moving the knob around, hit the W button again to turn off write mode. You've now recorded your first bit of automation into Cubase. To hear what you've recorded, click on the R button on the Monologue synth to put it into read mode (see screen 2).

In read mode the Monologue synth follows the automation data that has been recorded

With the read mode activated and playback started, you'll notice that the filter knob on the Monologue synth moves to recreate the movements you recorded previously. In fact, the filter knob is copying every movement you made exactly as it was recorded.

You can change the recorded data by clicking on the W button again and recording new automation movements. However, this isn't a very accurate way of editing automation information and it makes it difficult to make small changes to what you've recorded. To make detailed changes, you need to head back to the main Arrange window.

Making changes

If you look down the list of tracks in the arrange window, you'll see that

Hardware help

If your keyboard's knobs and sliders send out Midi data, you can often map these to the controls of softsynth and effects in Cubase. Once the knobs and sliders are mapped to the proper controls, you can use them to record automation data. Being able to physically grab hold of more than one slider or dial at a time makes it a lot easier to control synths on the fly. Companies such as M-audio now even sell hardware controllers that are made specifically for this task.

Hardware controllers can make it easier to record complex automation

there's a new track marked VST Instruments at the bottom. This is the track that contains the recorded automation data for your VST instruments. If you click on the plus sign on this track, it'll expand to show an entry for your Monologue synth. Click on the plus sign on the first line after the Monologue folder to show the Filter-Cutoff data that has been recorded (see screen 3).

As with most data in Cubase, this recorded automation information can be edited using the standard editing tools. Switch to the drawing tool and try drawing in a new curve that the filter will follow. Hit Play and you should hear the filter move to follow the changes you have made. Now switch to the Object Selection tool and click on an individual point in the data and move it up or down to change its value. Again, hit Play to hear the changes you have made.

Now let's turn our attention to effects. Bring up the main mixer window and look for the channel that is being used for the audio output – not the Midi output – of the Monologue instrument. On this track, click on the Edit button to call up the channel's Settings window. In the window insert the Quadrafuzz plug-in into the first slot in the effects section and then call up Guitar as the preset.

In the Quadrafuzz editor window you'll see there are again two buttons marked R and W. Click on both buttons to enable read and write. Now switch back to the Arrange window and click on the plus sign next to the bottom track that's marked Monologue 1. This will expand to show a track marked Mute. Click on the Mute text and a pop-up list will appear. From this select Quadrafuzz band 2. This corresponds to the Low Mid control on the effect.

We haven't actually recorded any automation data for this controller. Instead, we're going to create it from scratch, so call up the Cubase Line tool. Use this to draw in a ramp so that the level of the Low Mid control gradually increases over the four bars of our loop (see screen 4). Now if you hit the Play button you should be able to hear the changes you've just made. You can add more automation tracks to control different elements of the distortion effect, but this step should have given you an idea how the system works.

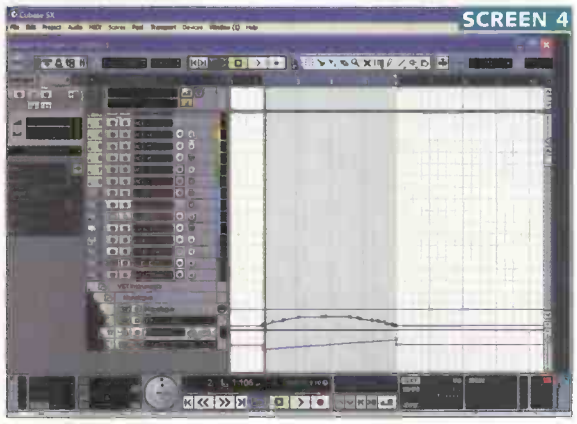
Automatic mixing

Now that we've seen how you can use automation to control synth and effect plug-ins, it's time to look at how you can also use automation to control your mixes. Move back up to your Midi track in the main Arrange window and click on the plus sign underneath the Midi icon to the left of the track. You should now be able to see the line for the automation data for the tracks volume control.

Let's create a volume ramp so that our synth track gradually fades in over the four bars. Call up the pencil tool and click once at the start of the loop and once at the end of the loop to create two individual points. Now drag the first point all the way to the bottom and push the second point up to its maximum level. Now when you hit Play the synth should gradually fade in over time.

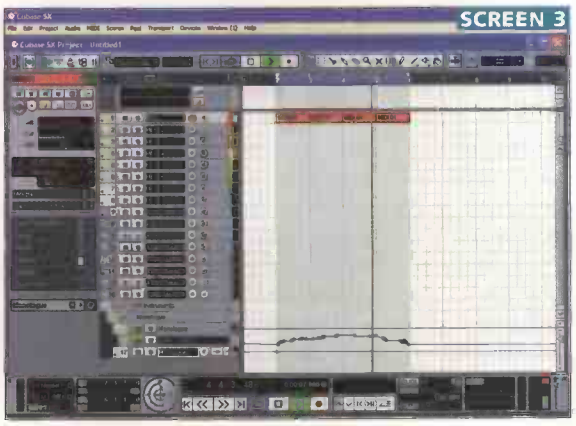
By now you should have a good understanding how automation in Cubase works across synths, effects and the main mixer. Almost every aspect of the software can be automated in a similar way, so try experimenting with different ways in which automation can be used. PCW

SCREEN 4



Automation gives you precise control over effects settings

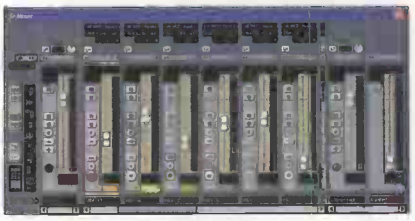
SCREEN 3



Here you can see the track that contains the automation data for Filter-Cutoff

Overlaying automation

When putting a mix together, you don't have try to do everything in one go. You can always record the automation for one channel on one pass, and then rewind the track and start recording the automation for another channel. In this way, you can build up more complex mixes gradually. Then when you've got all the main automation data recorded you can go back and do another run to tweak the settings.



You can use automation to build up complex mixes by recording multiple passes of automation

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
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Lock down your router

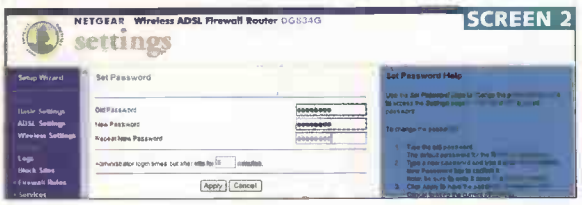
How to keep your broadband router secure, from passwords to encryption

I'm always being asked questions about network security, so in this month's column I decided to address some of the things you should and shouldn't do to keep your network secure. In particular, I'll be looking at how you can lock down your network router, for which I'll be using a Netgear DG834G and a Belkin N1 wireless router as examples, although the principles are the same, regardless of the hardware involved.

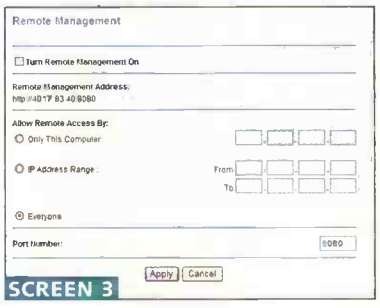
Where's the firewall?

A firewall is an absolute must on any internet-connected PC and Windows XP comes with a pretty good desktop implementation as standard. As such, one of the most common questions I'm asked is if a desktop firewall is really necessary when a router with a built-in firewall is used to connect to the internet. Strictly speaking, the answer ought to be no. You don't need multiple firewalls all trying to do the same thing, but there are a couple of caveats.

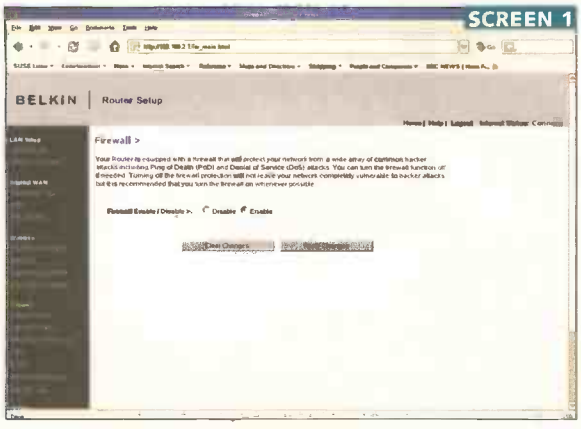
The first is the need to be able to trust the software involved. Firewalls are complex applications and if you pay peanuts for a no-name or ancient second-hand router, the firewall it provides may not be all you would hope for. I would recommend, in those circumstances, to err on the side of caution and enable a desktop firewall as well.



Above: The default passwords used to gain administrative access to a router are widely known. Change yours to something secret



Right: If you do not absolutely need to manage your router remotely, it's a good idea to block this kind of access on both the Wan port and via wireless, if supported



Below: Most routers have a built-in firewall of some kind, but this is of little use if it's not turned on

On the positive side, most modern products, with their stateful packet inspection (SPI) firewalls, should be OK – but the firewall does need to be turned on to be effective (see screen 1). That may sound obvious, but I've received routers straight from the factory with the built-in firewall disabled. Even where the basic firewall has been turned on, other security measures, such as protection against Denial of Service (DoS) attacks, will often be left to the customer to enable.

You also need to think about how each PC on the network will be used. For example, you might have a notebook which you take out and about, possibly connecting to the internet at wireless hot spots, in which case additional desktop protection will definitely be required.

Furthermore, if you need to set up firewall rules to allow gaming, peer-to-peer file sharing and other traffic to particular PCs, you may want the added protection of a desktop firewall on those that are not used for such purposes.

Lastly, don't run away with the idea that a firewall is all you need. Unless you've splashed out on a full-blown Unified Threat Management (UTM) appliance, your firewall will only block traffic based on its port number and, hopefully, identify and block common DoS and other attacks. Additional desktop and possibly server software will therefore be needed to screen out viruses, spam, spyware and other potential threats.

Management passwords

Next up come passwords, with virtually all routers configured with a default admin account and associated password to log in and manage the setup – typically via a browser.

I'm giving no secrets away if I tell you that most of those passwords are either 'admin' or 'password' or sometimes even left blank. Everyone knows this, and leaving them that way is little better than having no password at all, especially if you have a wireless router and haven't taken steps to protect that either – something I'll cover shortly.

The first thing you should do with a new router, therefore, is configure your own admin password (see screen 2). Likewise, if you have a separate firewall, change the admin password on that and on any VPN or other internet-connected appliances you might have. It's not foolproof, but it does dissuade the casual hacker.

Check to see if your router has an option to block remote management over the Wan (internet) connection (see screen 3) and via a wireless link if it has built-in Wifi. Many do, and it makes your router much more secure, as it will not responding to pings received over the Wan port – yet another option on some products.

UPnP support

A lot of routers come with Universal Plug and Play (UPnP) support – a protocol designed to enable devices to configure themselves and others on the network. That may sound fine in theory, but it could be exploited to gain access to your Lan. So, if you don't need it, turn it off (see screen 4).

For example, it's feasible for a Trojan, received as an email attachment, to use UPnP to open a port in your firewall to create a backdoor for other nasties to get in.

Wireless security

Then there's the little matter of wireless security. This is a topic I've covered before, but it's well worth visiting again given the huge growth in wireless connectivity over the past year or so.

First off, you may well have been told to disable SSID broadcasts, the mechanism by which your wireless router or access point publicly advertises itself to potential users. However, I don't normally bother since even if you stop such broadcasts the SSID will still be transmitted inside data packets, where it's pretty easy to find using freely available wireless sniffer utilities. Moreover, it can make life difficult for you and others who need to legitimately connect to a Lan, so I tend to leave the SSID alone.

I would, however, always use MAC (Media Access Control) address filtering if available. MAC addresses are unique 48-bit numbers, usually represented by six pairs (tuples) of hexadecimal digits (for example, 00:09:5B:98:73:46). These addresses are assigned to each networking device and on most wireless routers you can use them to either specify which clients are allowed to connect or, less often, to specifically bar certain systems.

On the downside, you'll have to discover and enter the MAC addresses of all your 'friendly' clients. However, most routers have the ability to show you a list of connected systems, complete with their MAC addresses, and some even let you automatically build your filtering rules based on this information (see screen 5).

MAC addresses can be programmed into software and forged, but it's not easy to do. And if you explicitly block access except to known addresses, hackers would need to try a huge number of combinations to force their way in. Such filtering may not be very practical on a large Lan, admittedly, but on a home or small-business network it can certainly be worth the effort.

Encryption, encryption

Finally, there's encryption, which is where the data transmitted over a wireless connection is scrambled to prevent it being intercepted and read. Lots of different technologies are available to do this, and there are pros and cons to each, making it difficult to decide which to use. However, the golden rule is this – always use some form of encryption, no matter what. If you don't, you're not protected, and anyone will be able to connect to your wireless network.

At the very least, you should use Wired Equivalent Privacy (Wep) encryption as, although relatively easy to crack (given the right software), it's available in virtually every Wifi product, and you don't have to be a technical wizard to use it (see screen 6).

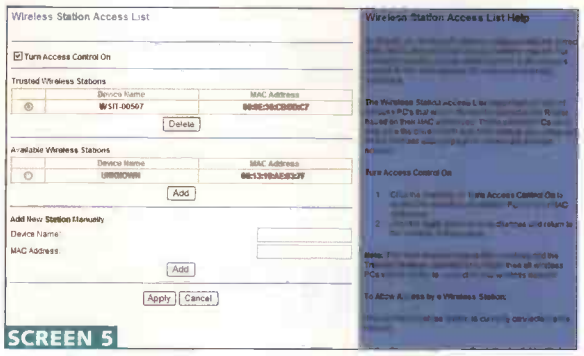
You'll also find plenty of tools to help. Vendors such as Buffalo, D-Link and Linksys, for example, have one-button options on some routers to automatically distribute encryption keys to clients equipped with their matching wireless adapters. If you use the Wireless Network Setup Wizard provided in Windows XP, for example, you can automate the distribution and installation of encryption keys to other XP systems, regardless of the adapter involved.

If you want greater protection than that which is offered by Wep, then Wifi Protected Access (WPA) or WPA2 should be used (see screen 7). However, because they're more recent technologies, WPA/WPA2 may not be available on older wireless routers and access points. Sometimes this can be fixed by upgrading the router/access point firmware, but not always.

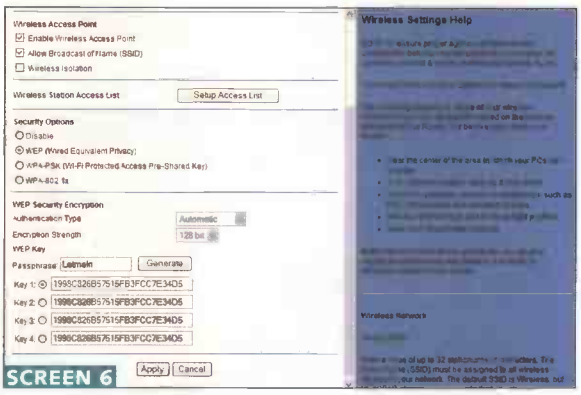
Similarly, if you need to support older notebooks with built-in wireless adapters, you may find that Wep encryption is your only option, in which case you'll have to default to the lowest common denominator and use Wep even if WPA/WPA2 are available on the router.

A little bit more

Of course, there are other things you ought to do to keep your router locked down and your network secure, such as making use of any DMZ (Demilitarized Zone) and port-forwarding facilities to isolate public-facing servers or PCs used for gaming and peer-to-peer network sharing. You should also check for and apply firmware upgrades on a regular basis and, perhaps, consider replacing the router altogether to take advantage of newer technologies, such as WPA/WPA2 encryption, not available when the original purchase was made. After all, routers don't cost much nowadays and it is your first line of network defence. **PCW**



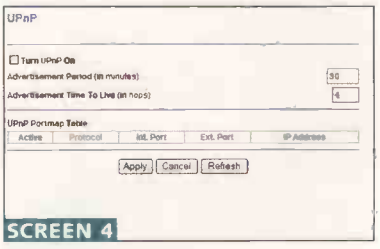
SCREEN 5



SCREEN 6

Top: Mac address filtering can stop wireless clients not on my 'friendly user' list connecting to the Netgear router

Bottom: Enable Wep encryption on your wireless network and use the longest keys possible. It's not uncrackable, but better than nothing



SCREEN 4

If you don't need UPnP support on your router, turn it off

SCREEN 7

Below: Although some older wireless notebooks don't support it, use WPA/WPA2 encryption as it's a lot more secure than Wep

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
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What not to store

The database solution to a copyright conundrum explained

James Rufton wrote in with an apparently simple question. He is a publisher who acquires song copyrights (sounds like an interesting job). Often he buys the worldwide copyright, but some copyrights are acquired for a specific country or countries. He needs to track, for each song, the countries for which he owns the copyright.

The solution (so far) is easy. We need a table for the songs, another for the countries and a junction table that spells out, for each song, the appropriate countries (see screen 1). From these we can see that we own the copyright for the song 'Fule, U no y I no luv u' in Albania and Angola.

We could, if we wished, add the entry 'the world' into the country table. The good news is that this makes it very easy to store a common situation but it also means that the database would be able to store both 'the world' and one or more countries for the same song. We could debate the pros and cons of this but there are some other issues that are more pressing.

One is that there are about 192 countries in the world (see later as to why I am unsure about the exact number). Suppose that for a particular song, Peter owns the copyright for all countries except France. Given the data structure above, he will have to select 191 countries for that song. Even if he gives himself a combo box from which to make the selections, it will be very time consuming. In addition, when he queries the database, he will get a list of 191 countries. That is remarkably unhelpful because it becomes very difficult to see the information contained in the data. Here's an example of what I mean.

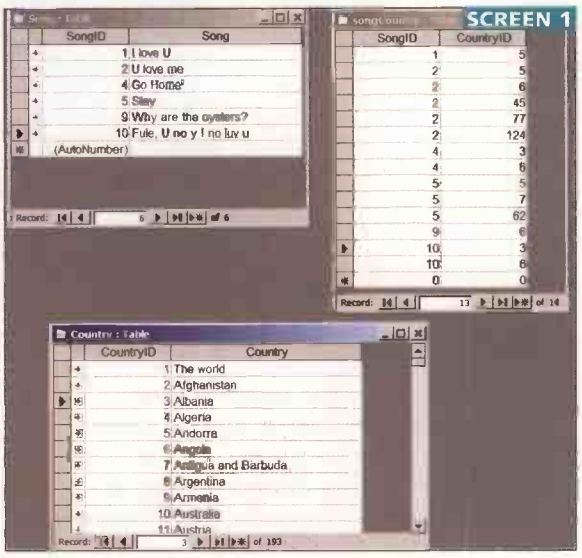
Suppose that for a song called 'I love U tube' we hold the copyright in Afghanistan, Albania, Algeria, Andorra, Angola, Antigua and Barbuda, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahamas and Bahrain.

But for 'U love Me' we hold the copyright for Afghanistan, Albania, Algeria, Andorra, Angola, Antigua and Barbuda, Argentina, Australia, Austria, Azerbaijan, Bahamas and Bahrain.

How long did it take you to spot the difference? And this is only for about a dozen countries; what if the two lists were around 190 countries long? The problem is that the volume of data tends to overwhelm the information we are trying to understand.

What we have here is a manifestation of a broader class of problem. In any many-to-many relationship, if the relationship is of one item to almost all of the other items – in this case, for a given song we hold the copyright in most, but not all, countries – then we are storing too much data.

The solution is easy; instead of storing the data, we store the anti-data. We use the junction table to store the countries for which we don't hold the copyright.



Three tables of data for the song-copyright question

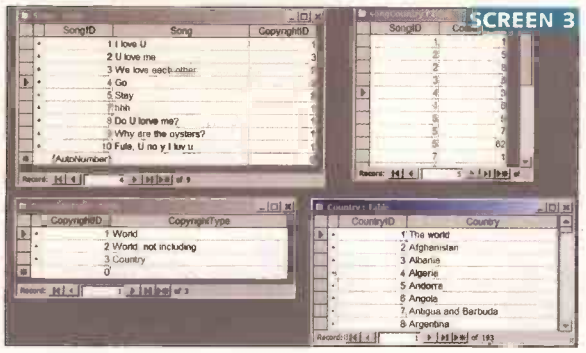
If we take the example above, we use the same structure but the meaning is reversed. So the data above would be interpreted to mean that we own the worldwide copyright for the song 'Fule, U no y I no luv u', except for Albania and Angola.

We could create an interface to make this clear (see screen 2). This form is included in the sample file DBCMar07Simple.mdb. If you've bought the DVD edition of *PCW*, you'll find this database on the cover disc. It is also on the web at **www.pcw.co.uk/2151344**. Please note that the form is very simple, includes no error checking and is certainly not for production; I simply include it to illustrate what could be done.

OK, that was easy. We have taken a well-understood data structure and simply reversed the sense of the data in one of the tables. Now let's make it more complex. Suppose that our ownership of copyright falls into three distinct classes. We can own the world copyright, the world copyright (except for a few countries) or copyright in just a few countries.

If we reverse the sense of the junction table, then it is easy to cope with cases one and two above, but case three will mean we have to make perhaps 180 selections for each song.

A form can be built to explain where copyright is held



Here you can see the extra table added to identify the class of copyright held

Of course, if we don't reverse the sense of the junction table, then case two has the same problem. So, either way, we are in trouble. What we need is a different solution. The good news is that there are several. All have their pros and cons; I'll show you one and highlight its good points and bad.

In this solution we still use one junction table and we use a flag in the song table to flip the sense of the data held in the junction table as appropriate for each song. Looking at some of the data may help to make this clearer (see screen 3).

Song one 'I love U' is of copyright type one, which means it is a world copyright. This is confirmed in the Songcountry table where song one is tied to 'The world'.

Song two 'U Love me' is of copyright type three, which means it is copyright only in the listed countries. Those listed are five and eight – Andorra and Argentina.

Song three 'We love each other' is of copyright type two, which means it is copyright worldwide except for the listed country, which is Angola.

We can, of course, create a user interface to take the sting out of this complexity for users of the system. This shows the copyright type in words, together with the appropriate countries (see screens 4-6).

The advantage of this kind of system is that it can significantly reduce the amount of user input required, as well as making the information much easier to see. But there are several downsides. The meaning of the data in the junction table SongCountry is now dependent on the value in a column in another table. If we lose that table, we lose the meaning of the data in SongCountry. In addition, it is possible to select meaningless combinations, such as a world copyright and some specific countries. This is not an insurmountable problem of course; one way around it is to add code to the form to ensure that these selections cannot be made.

Finally, if we have a situation where we hold the copyright in about half the countries in the world, we are still going to have to make about 90 selections. One answer to that is to see if the copyright allocations often occur in common blocks (such as US, Mexico, Canada and UK). If so, we can name these blocks and then allocate the copyright to the named block. In fact, we already have one named block that we are using, it is 'The World'.

About 192 countries?

Yes, I can count, but the number of countries in the world is actually quite a complex and political issue. The United Nations currently recognises 192 but others recognise a few more. For instance, the Vatican is a country but chooses not be a member of the UN. Then there's Taiwan, over which opinions differ. Please don't even mention Scotland and Wales (which are, apparently not countries in this context); I'm just a humble database dude trying to avoid controversy. For more information, see, for example, **http://geography.about.com/cs/countries/a/numbercountries.htm**.

A form which gives a user-friendly rendition of a song for which world copyright is held

Call me revisited

Salo Heimann read the September 2006 issue about splitting phone numbers at a specific point (see **www.pcw.co.uk/2161960**). He has a database that stores area codes and telephone numbers in the same field, with each part separated by a dash, eg 0208-12345678. Of course, not all area codes are the same length, for example 012345-67890, so he wants to be able to find the dash and split the data at that point.

We can use a query and a couple of functions to do this. The first function we need is called InStr (as in 'In String'). If you give this function a string and a character, it will tell you the position of that character in the string.

So, we have a table called Phones and a field within it called PhoneId that holds the phone number. We create a query and add a field to the query:

```
PosOfLeftMostDash:InStr↙
([PhoneID],"-")
```

(Key: ↙ code string continues)

When we run the query, if the PhoneID field contains the data string 012345-67890 then this function will return 7.

Now there is another function in Access called Left. If you give it a string and a position, then it will return the left-most part of the string up to, and including, that position. So, for example, Left('012345-67890',7) will return 012345-. The clever bit here is that we can use InStr to tell us where the dash is and substitute that into the Left function. So, for example:

```
Code:Left([Phoneid],(InStr↙
([PhoneID],"-")-1))
```

will return the dialling code of a phone number stored in the field PhoneID.

As you can probably guess, there is a function called Right which we can also use to our advantage here. I have added a query called SplitPhoneNo to DBCMar07.MDB which demonstrates several uses of these functions. **PCW**

Above left: And one for copyright held in a few select countries

Left: And the third flavour, one where almost worldwide copyright pertains

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
Please do not send unsolicited file attachments.

Microsoft goes cross-platform

We explore Microsoft's cross-platform runtime for Windows Presentation Foundation

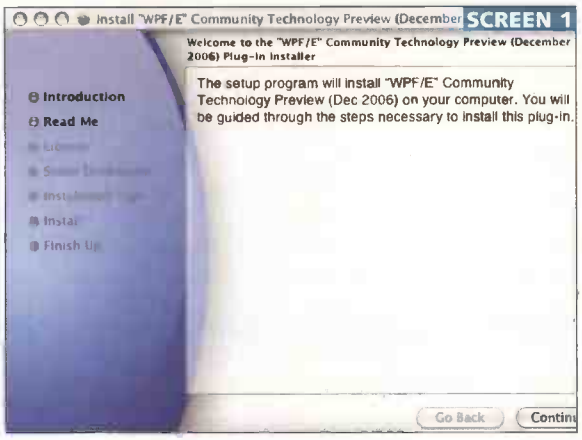
Microsoft has released the first preview of Windows Presentation Foundation/Everywhere (WPF/E), a Flash-like browser plug-in that lets you play multimedia and render XAML, an XML language for defining graphics and a user interface. Currently you can code against it with Javascript, though Microsoft is promising a small .Net runtime in the final release, which will let you code in C# or VB.Net, provided you stick to a small, as yet unspecified subset of the .Net Framework.

Cross-platform in this context means Windows and Mac, Internet Explorer, Firefox and Safari, although this might be extended to mobile devices and to Linux at a future date.

Although it uses the Windows Presentation Foundation name, WPF/E is a much-reduced subset of its desktop cousin, with only a limited range of objects available. That said, even in the preview it has a capable runtime for graphics and multimedia, and includes its own video player for files in .wmv format (Windows Media Video). Although the .Net runtime is absent in this version, you can still write code in Javascript and interact with the WPF/E control from HTML.

Why not use Flash? Flash has many advantages, including maturity, ubiquity and high efficiency. Another option is SVG, the W3C standard for vector graphics in web pages, although there are more browsers with the Flash runtime than have SVG viewers. Adobe has a free SVG viewer, but has frozen its development following its acquisition of Macromedia.

Even so, WPF/E has advantages. The WPF/E player renders an XML format directly, whereas Adobe's XML user interface language must be compiled to the Flash SWF format before it will run. Another factor is that although



On the Mac, you will be prompted to install WPF/E if the plug-in is not present

Microsoft lacks Adobe's expertise in design tools, it has strength in developer tools. Microsoft is making WPF/E easy to work with for developers, with integration into Visual Studio and ASP.Net. If Microsoft succeeds in establishing XAML on the Windows desktop, WPF/E will become an obvious choice for XAML developers moving to the web. WPF/E is no immediate threat to Flash, but it does give it competition.

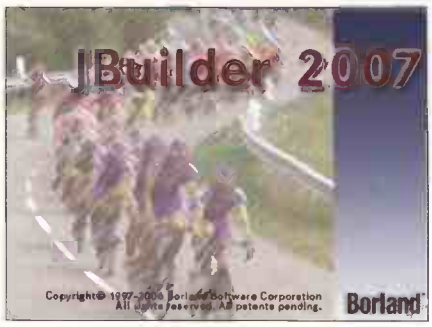
Hands on with WPF/E

You can work with WPF/E with just a text editor, or you can export XAML for WPF/E from a tool such as Microsoft's Expression Design. The control itself takes several forms, using ActiveX for Internet Explorer and a plug-in for Firefox and other browsers. The HTML code varies slightly according to the platform and browser being used, but you can avoid these complexities by referencing the script aghost.js, provided by Microsoft. This works by you putting a placeholder element into your HTML page, usually a div, and then having a block of Javascript which creates an agHost object and sets its properties, such as size and background colour. The Javascript object is linked to the

Codegear gets started

Last year Borland first announced that it would sell off its development tools, and then nine months later said it would keep them after all, in the form of a wholly owned subsidiary called Codegear. The products concerned include Delphi, still the best programming tool for native Win32 applications, and JBuilder, the Java IDE. Codegear's formation ends a period of anxiety for users of these tools, although there are still worries over how the company will compete in a world of free Java IDEs and Microsoft's Visual Studio.

"Everything we're focused on is the developer and the developer role," said Codegear's product vice-president Michael Swindell. "Under Borland we were a set of products within a lifecycle company." He is referring to Borland's transition from developer tools to application lifecycle products, high-end



JBuilder 2007 is Codegear's first new product

project management software aimed at enterprises. Products such as Delphi and JBuilder apparently suffered under-investment as a result; under Codegear this should change. Delphi is a gem; but Codegear is unlikely to have an easy ride in this difficult market.

Microsoft's Expression and the platform wars

WPF/E is another piece in Microsoft's efforts to win over designers and developers to its platform. It is part of the battle for the next generation of applications that live on the web, rather than on the desktop. Although Microsoft has a well-regarded web application server, in the form of ASP.Net supported by SQL Server and the .Net Framework, it has lost out to Adobe when it comes to web design.

Flash is the de facto standard for vector graphics and animations in browser-based applications. This is not just decorative, but forms the user interface for a rich web application. Adobe also dominates the designer tools market. Designers tend to create graphics and user-interface prototypes in Photoshop, Director and Flash, which are handed to developers for implementation. Since Adobe is now extending its tools and runtimes to work on the desktop as well as on the web, it is competing directly with Microsoft in application development.

The web has also changed expectations of how applications should work. There is a school of thought that says all applications on a particular platform should have the same look and feel, the idea being that once you learn one, you can use them all. The designer-oriented web, by contrast, has resulted in diversification. Flash apps are very customised, with each designer creating their own style of user interface elements, such as lists and buttons. If the design is strong, such apps can still be usable. This has been a huge influence on Microsoft with its next-generation Windows presentation layer in .Net Framework 3.0.

Microsoft's thinking has been to provide designers with compelling tools, to have a chance of winning the next round in the platform wars. The outcome is Expression Studio, a suite of three products. Expression Web is the successor to Frontpage, a website designer. Expression Designer is for creating vector-based illustrations that export to XAML. Expression Blend is for creating a graphical user interface, again for export to XAML. Designer is the most powerful tool, but in some ways Blend is more interesting, as it provides an alternative design surface for creating a Windows user interface. Blend projects can be opened directly in Visual Studio, and vice versa, so that designers and developers can work together on the same code.

This sample in Expression Blend shows the kind of rich graphical user interface Microsoft expects to become the norm. Note the reflection effect

placeholder element by its name. A key argument to the agHost constructor is the name of the XAML file that will be rendered by WPF/E. To deploy the page, all you need on the web server is the HTML page, the XAML file, and the agHost.js script. Not many people will have the control installed as yet, but they will be prompted to install the plug-in when they load the page (see screen 1).

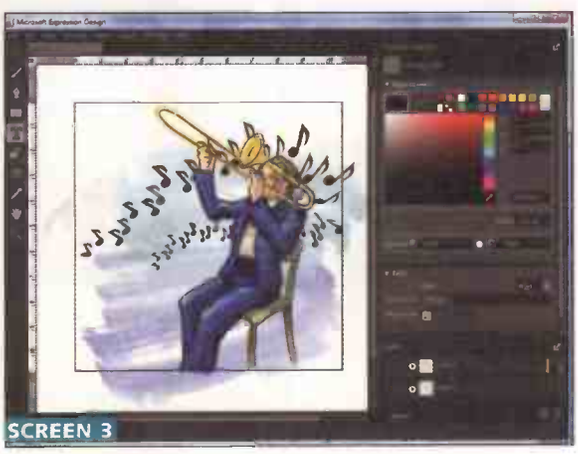
I downloaded the WPF/E SDK and installed the application template into Visual Studio 2005. To do this, you need the Web Application Project add-in installed. When you start a new project based on this template, you get an HTML document, an XAML document, and a couple of Javascript library files, including the agHost.js mentioned above.

Next, I modified the XAML file to display some animated text, based on the SDK examples. There's no need to use Javascript for an animation. In outline, the XAML consists of two Canvas elements, one nested in the other. The inner Canvas has a TextBlock element containing the text to be animated, and an element called Canvas.Triggers, which lets you define event handlers. The event in this case is Canvas.Loaded, and the handler declares an animation that cycles the position of the TextBlock.

I tested the animation in Visual Studio, and then uploaded the four files to a web server: two Javascript files, the HTML page and the XAML document. Like Flash, WPF/E executes on the client, so any web server will do. Some web servers are configured to allow access only to certain file types. In my case, .XAML was being blocked, so I asked the ISP to change this setting. The example now ran on Windows. Next I navigated to the site using an Intel Mac. Safari reported that a plug-in was needed and directed me to the download site. Installation was smooth. The example worked the same as on Windows (see screen 2).

Even for this simple example, working with WPF/E was painful. Visual Studio's intellisense seems to be out of step with the current WPF/E XAML implementation, mis-reporting some valid XAML as errors. The documentation is sketchy, and there are some striking gaps in WPF/E itself, such as the lack of text input control. I also tried exporting images from Expression Design to XAML compatible with WPFE/E (see screen 3). It worked, but was slow and not very stable. Still, Microsoft seems determined to compete with Adobe in design. The introduction of a cross-platform runtime for XAML and .Net is certainly a notable event. PCW

The WPF/E example displayed in Safari



Working on an image in Expression Design, ready for export to XAML

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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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Prices are for guide purposes only and may be subject to change

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 32-bit CPUs, while some newer Pentium 4s, the Pentium D and Athlon 64 are 64-bit models. To take full advantage of this, you need a 64-bit operating system and applications.

More memory can be supported by 64-bit systems - 32-bit Windows or Linux systems are limited to 4GB of Ram, whereas a 64-bit 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, in effect, 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 recommend that 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.

1

Higrade Ultis Tachyon QX6700
£2,178 ★★★★☆
Reviewed January 07
www.higrade.com
Quad core makes its debut with this powerful PC from Higrade.

2

Advent DHE X22
£900 ★★★★☆
Reviewed February 07
www.pcworld.co.uk
One of the smallest Media Center desktops we've seen.

Chillblast Phantom
£1,879.99 ★★★★☆
Reviewed Winter 06/07
www.chillblast.com
PC home workers and enthusiasts alike will appreciate this PC, even if you never open it up. Far too expensive.

GRAPHICS CARDS

SUB £200

1

Gainward Bliss 6800GS GLH
£176.19 ★★★★★
Reviewed July 06
www.overclockers.co.uk
A terrific graphics card for those who like to dabble with overclocking.

2

3D Fuzion Geforce 7600GS
£75.20 ★★★★☆
Reviewed November 06
www.novatech.co.uk
A good value card for those on a tight budget.

3

Sapphire Radeon X1600 XT Ultimate
£110 ★★★★☆
Reviewed September 06
www.sapphiretech.com
Not totally fan free, but still one of the quietest cards around, and performs well.

£200-£349

1

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.

2

Gainward Bliss 7800GT GLH
£244.89 ★★★★☆
Reviewed July 06
www.overclockers.co.uk
A little expensive, but this card has plenty of overclocking potential.

3

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.

4

Gecube X850XT Platinum Edition Uniwise
£307 ★★★★☆
Reviewed January 06
www.gecube.com
High-end performance and quiet cooling for AGP motherboards.

£350+

1

MSI NX7950GX2
£408.85 ★★★★☆
Reviewed September 06
www.msicomputer.com
A dual-core card that paves the way for DIY quad-SLI.

2

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.

3

Sapphire Toxic X1900XTX 512MB
£421.83 ★★★★☆
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 its 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.

About £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 8-speed 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.

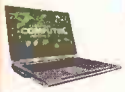
NOTEBOOKS

1

Samsung NP-Q35T006/SUK
£1,056.32 ★★★★☆
Reviewed March 2007
www.samsung.com/uk/
A portable powerhouse with exceptional battery life.

2

Mesh Pegasus S271
£799 ★★★★☆
Reviewed March 2007
www.meshcomputers.com
A good, solidly built all-round notebook with decent battery life.

3 

Evesham Voyager C720DC
£1,499 ★★★★☆
Reviewed November 06
www.evesham.com
A super-fast notebook with Intel's new mobile Core 2 Duo processor.

4

Rock Xtreme CTX Pro
£1,807.75 ★★★☆☆
Reviewed February 07
www.rockdirect.com
Rock debuts Nvidia's Geforce Go 7950GTX mobile graphics.

5

Acer Aspire 5652
£1,149 ★★★★☆
Reviewed November 06
www.acer.co.uk
A fast notebook with high-speed mobile internet.

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 why you want a notebook. Is it for occasional use, running some office applications, and accessing the internet and email? If so, then almost any low-cost notebook will do the job. If it's for gaming or running video-editing software, you should look 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 mid-range/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 Core Duo 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, 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 **Gigabyte GA-M61VME-S2**
£39 ★★★★★
Reviewed Winter 06/07
www.giga-byte.com
Building a cheap, quiet PC for your granny? Job done.

6 **ECS RS485M-M**
£43.06 ★★★★☆
Reviewed January 07
www.ecs.com.tw
Good budget motherboard for PC builders with home theatre in mind.

7 **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.

£100+

1 **Gigabyte GA-965P-DQ6**
£164.44 ★★★★☆
Reviewed October 06
www.giga-byte.com
A decent Core 2 Duo motherboard that's loaded with overclocking features.

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 **Intel D975XBX2**
£180 ★★★☆☆
Reviewed February 07
www.intel.com
The first quad-core motherboard from Intel is a good all-rounder.

HOW TO BUY

The motherboard dictates the type of processor you can use, how well the components communicate, the features on offer and future upgrade potential. About £70–£100 gets you the latest technologies.

We recommend an Intel P4 or Athlon 64 for a good all-round system. The Athlon 64 can address one terabyte of Ram (1,000GB).

The new generation of processors change the way data is transferred. Athlon 64s integrate 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 motherboards mainly use DDR or DDR2 Ram.

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. SCSI controllers are found on more expensive boards, or can be added with expansion cards.

Also important is the number of USB2 and Firewire sockets for external add-ons. Look out, too, for onboard Ethernet networking, a built-in 56K modem and onboard sound.

DIGITAL MUSIC PLAYERS

1 **Sandisk Sansa e280**
£149 ★★★★☆
Reviewed March 07
www.sandisk.co.uk
Great range of features for a very reasonable price.

2 **Sandisk Sansa e260**
£149 ★★★★★
Reviewed September 06
www.sandisk.co.uk
User-friendly and feature-rich, this mp3 player is capable of being a Nano-killer.

3 **Netac A200**
£69.99 ★★★★★
Reviewed www.pcw.co.uk/2162508
www.netac.co.uk
Broadcast your tunes directly to an FM radio with this compact portable media player.

4 **Apple iPod**
£219 ★★★★★
Reviewed January 06
www.apple.com/uk
All the usual iPod features, but now with the ability to play video.

5 **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.

HOW TO BUY

There are two main categories of mp3 player: 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 about £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 need a portable record store, then go for a 4GB–6GB player – up to the range of 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.

yoyo TECH.co.uk
House Of Technology

Metallic Gray Case with 550W PSU
Antec
Mft Code: TITAN550
YOYO Code: 8046
£114.28 INC VAT

Stacker 830 ATX/BTX Computer Case
Mft Code: RC-830
YOYO Code: 3025
£163.07 INC VAT

Socket AM2 NF 590 SLI PCI-E Motherboard
Mft Code: Fatal1ty AN9 32X
YOYO Code: 5146
£137.14 INC VAT

Socket 775 PCI-E SATA II Motherboard
Mft Code: AW9D-MAX
YOYO Code: 5243
£139.50 INC VAT

Eclipse II Keyboard Illuminated Red/Blue/Purple User changable Colours USB
Saitek
£30.35 INC VAT
YoYo Code: 45459

500GB 7200rpm SATA 2 Hard Disk Drive
Western Digital
Mft Code: WD5000YS
YOYO Code: 80259
£126.48 INC VAT

750GB 7200rpm SATA 2 Hard Disk Drive
Seagate
Mft Code: ST3750640AS
YOYO Code: 4438
£219.02 INC VAT

Core 2 Duo E6600 Socket 775 CPU
intel
Mft Code: BX805576600
YOYO Code: 5142
£204.93 INC VAT

5200+ Socket AM2 2.6Ghz CPU
AMD
Mft Code: ADA5200CSBOX
YOYO Code: 10467
£189.84 INC VAT

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London W1T 2JL

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8800GTS 640MB PCI-E Graphics Card
ASUS
Mft Code: EN8800GTS/HDP/768M
YOYO Code: 8582
£292.99 INC VAT

512MB 7950GT XT PCI-E Graphics Card
XFX
Mft Code: PV-T71J-YHE9
YOYO Code: 10131
£176.43 INC VAT

2Gb(2X1Gb) XMS2 Dominator, DDR2 PC8500, 240 Pins Memory
CORSAIR
Mft Code: TWIN2X2048-8500C5D
YOYO Code: 80372
£257.95 INC VAT

2GB(1 x 1GB) Kit 1066MHZ PC8500 Memory
OCZ
Mft Code: OCZ2N1066SR2GK
YOYO Code: 4977
£300.49 INC VAT

REVO 64 SPU 5 Port SATA Raid Card PRO
£43.24 INC VAT
YoYo Code: 5217

Galaxy 850W ATX2.2 Modular PSU
ENERMAX
Mft Code: EGA850EWL
YOYO Code: 73127
£162.24 INC VAT

750W ATX 12V PSU
Mft Code: SST-ST75ZF
YOYO Code: 4388
£106.31 INC VAT

Quiet Dual Heatpipe VGA GPU Cooler
ZALMAN
Mft Code: VF900-Cu
YOYO Code: 4393
£26.44 INC VAT

ATI Silencer Accelero X2 ATI X1800 and X1900 Series
arctic cooling
Mft Code: AC-ATIS-X2
YOYO Code: 4327
£14.13 INC VAT

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HARD DRIVES

INTERNAL

1. **Seagate Barracuda ST3750640AS**
£352.44 ★★★★★
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 ★★★★☆
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 ★★★★☆
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 ★★★★☆
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 ★★★★☆
Reviewed June 06
www.wdc.com
A stylish external hard drive, but it lacks a network option.

3. **Lacie Safe Mobile Hard Drive 80GB**
£149 ★★★★☆
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 ★★★★☆
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 ★★★★☆
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.

The transfer rates in today's Ultra ATA drives are 100Mbytes/sec (133Mbytes/sec for Maxtor drives), while Sata (serial ATA) drives are rated at 150Mbytes/sec. Check the seek times, spindle speed, buffer size and the areal density of the platters (disks).

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.

Faster Sata drives are more expensive than parallel ATA. Sata uses two pairs of high-frequency cables, working at low voltage.

SCSI 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.

Most motherboards support Raid (Redundant Array of Independent Disks), which connects multiple drives to improve performance or provide fault tolerance.

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 ★★★★☆
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 ★★★★☆
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 ★★★★☆
Reviewed January 05
www.lge.co.uk
Good-value external USB2/Firewire rewriter with all-format media support.

HOW TO BUY

DVD burners can be divided into internal and external drives. Internal drives are cheaper, but require a level of knowledge so you can install them yourself. External drives can be hooked up simply via USB2 or Firewire.

Make sure your drive supports DVD+R, DVD+RW, DVD-R and DVD-RW discs. Newer double and dual-layer drives can write to new discs that can store 8.5GB. This is useful for backing up your DVD movie collection.

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 about £3.75.

PRINTERS

PHOTO PRINTERS

1 **HP Photosmart Pro B9180**
£499 ★★★★★
Reviewed March 07
www.hp.co.uk
A range of powerful features makes this printer a force to be reckoned with.

2 **Canon Pixma IP6700D**
£149 ★★★★☆
Reviewed January 07
www.canon.co.uk
A very competent printer, with the added bonus of an auto-duplex feature.

3 **Canon Selphy CP730**
£170 ★★★★☆
Reviewed January 07
www.canon.co.uk
A simple-to-use dye-sublimation printer that produces good photos.

4 **Epson Stylus Photo R360**
£149.99 ★★★☆☆
Reviewed January 07
www.epson.co.uk
A good choice if you want to use an LCD control panel, with great-quality prints.

MULTIFUNCTION DEVICES

1 **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 **Brother MFC-440CN**
£179.99 ★★★★☆
Reviewed February 07
www.brother.co.uk
A mid-range entry from Brother's new all-in-one range.

LASER PRINTERS

1 **Oki B2500 MFP**
£149 ★★★★☆
Reviewed March 07
www.oki.co.uk
Expensive toner, but a low RRP and great print quality.

2 **HP Color Laserjet 2605dn**
£299 ★★★★★
Reviewed September 06
www.hp.com/uk
An affordable colour laser that would benefit any small business.

3 **Samsung CLP-300**
£179.99 ★★★★☆
Reviewed February 07
www.samsung.co.uk
Samsung combines inkjet-like convenience with laser-quality documents.

4 **Brother MFC-8860DN**
£527.58 ★★★★☆
Reviewed November 06
www.brother.co.uk
Fax, copy, print and colour scanning combined in a laser multifunction device.

HOW TO BUY

If you don't need colour, consider a monchrome laser or LED printer. The latter tend to be cheaper.

If you print hundreds of pages a week, a laser is cheaper and more reliable for high-volume printing. If you print a few pages a month, buy a cheap colour inkjet.

Look for the manufacturer's quoted 'duty cycle' - how many pages a month the machine can handle.

Quoted printer speeds often refer to the speed the printer pushes a blank sheet of paper through the mechanism; for documents they refer to lower quality settings. Our 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.

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 often have a large number of paper-handling options. They're usually modular so you can add features as required.

The quality and usability of the driver software is vital. Check Our reviews and online forums (**www.pcw.co.uk/forums**), and read the manufacturer's technical support site for any known problems.

TV TUNERS

1 **Terratec Cinergy Hybrid T USB XS**
£89 ★★★★☆
Reviewed June 06
http://en.terratec.net
A dual-format USB TV tuner, complete with remote control and portable aerial.

2 **Elgato EyeTV**
£69.95 ★★★★☆
Reviewed November 06
www.elgato.com
A digital TV receiver and recorder for Mac OSX.

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 ★★★★☆
Reviewed March 05
http://en.terratec.net
A PC Card-based analogue tuner with good software. It's a great buy for laptop users.

5 **Kworld Dual TV Tuner DVB-T 220**
£49.99 ★★★☆☆
Reviewed October 06
www.kworld.com.tw
This device provides one analogue and one digital tuner at a decent price.

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.

A Freeview digital tuner offers the best channel choice, picture and sound, but may need an outdoor aerial (check **www.freeview.co.uk**).

Digital tuners record to disk for maximum quality; analogue signals need to be digitally encoded - look for mpeg2 hardware for real-time video and audio encoding.

Most analogue systems let you capture video from a VCR or camcorder. Look for composite or S-video connectors and stereo phono inputs.

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G11 Gaming Keyboard
Logitech
Mft Code: 967929-0120
YOYO Code: 98341
£38.52 INC VAT

Copperhead Gaming Chaos Green LED Mouse
Razer
Mft Code: RZ01-050300-R1M1
YOYO Code: 63069
£45.57 INC VAT

19" LCD Monitor 5ms Black
ASUS
Mft Code: VW192S
YOYO Code: 4902
£146.05 INC VAT

22" 5ms Widescreen TFT Monitor
MIRAI
Mft Code: DML-522W100
YOYO Code: 80120
£218.13 INC VAT

Reseractor-1 Plus V2 - Liquid Cooling
ZALMAN
£160.45 INC VAT
YoYo Code: 9909

320GB Porsche USB2.0 External HDD
LACIE
Mft Code: 300968EK
YOYO Code: 4985
£75.61 INC VAT

1TB Big Disk USB2.0 8MB External Hard Drive
LACIE
Mft Code: 300966EK
YOYO Code: 4422
£283.06 INC VAT

Cyborg Evo Force Joystick
Saitek
Mft Code: PS2TE
YOYO Code: 52109
£36.15 INC VAT

R440 Force Feedback Steering Wheel
Saitek
Mft Code: R440
YOYO Code: 90699
£43.49 INC VAT

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MONITORS

20IN

1 **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.

19IN

1 **Hanns.G HW191**
£150 ★★★★☆
Reviewed November 06
www.hannsg.com
A superb value-for-money monitor.

2 **Formac Gallery 1900 TNX**
£233 ★★★★☆
Reviewed March 07
www.formac.com
Good image quality and distinctive styling.

17IN+

1 **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 1,024x768 TFT will have exactly that number of pixels horizontally and vertically. Users wanting 1,600x1,200 will probably need an expensive 20in model – most 19in panels are currently limited to 1,280x1,024.

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, so check the policy before you buy.

DIGITAL CAMERAS

DIGI SLR

1 **Canon Eos 400D**
£649 (body only) ★★★★☆
Reviewed December 06
www.canon.co.uk
A quality digital SLR, complete with a 10-megapixel sensor and dust removal system.

PROSUMER

1 **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 9-megapixel CCD.

COMPACT

1 **Canon Powershot A640**
£329 ★★★★☆
Reviewed January 07
www.canon.co.uk
Outstanding image quality and a host of features make for an enticing camera.

2 **Casio Exilim EX-770**
£230 ★★★★☆
Reviewed March 07
www.casio.co.uk
A superbly stylish compact digital camera.

3 **Fujifilm Finepix Z3**
£249.99 ★★★★☆
Reviewed December 06
www.fujifilm.co.uk
A stylish digital compact, with excellent build quality.

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 five megapixels is good for 8x10in 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 are not as good as a basic camcorder, but are fine for short movie clips to play on your PC. Most offer 15fps (frames per second), 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

WIRELESS/MODEM

1 **Zyxel P-336M**
£73 ★★★★☆
Reviewed Winter 06/07
www.zyxel.co.uk
Clearly demonstrates that Super G remains a valid choice, as it is both cheap and effective.

2 **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.

WIRELESS

1 **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.

VOIP

1 **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 connect to the internet and each other remotely, 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
	2X	Application Server	Dec 06	2
★	Ableton	Live 6 (audio software)	Jan 07	5
	Acer	Aspire 5101 AWLMi	Win 07	4
	Acer	p610	Win 07	3
★	Acronis	Trueimage Home 10	Win 07	5
	Adaptec	Snap Server 110	Dec 06	3
★	Adobe	Photoshop Elements 5	Jan 07	4
	Adobe	Premiere Elements 3	Feb 07	4
	Ahead	Nero 7 Premium Reloaded	Win 07	4
	Akasa	Integral P2 E-Sata	Dec 06	4
★	Altiris	Software Virtualisation	Dec 06	4
	Ambros	Shuttle SS31T (PC)	Feb 07	3
	AOpen	i945GTm-VHL (motherboard)	Jan 07	4
★	Apple	iMac 24in	Dec 06	4
	Apple	iPod Shuffle	Dec 06	4
	Apple	Mac Mini	Dec 06	3
	Astaro	Security Gateway	Dec 06	2
	Asus	A6Rp-AP026H	Win 07	3
★	Asus	F3F (£699 laptop)	Dec 06	5
★	Asus	F3Jv (notebook computer)	Jan 07	4
	Asus	M2N32 WS Professional	Win 07	4
	Atari	Neverwinter Nights 2	Win 07	4
	Aventail	EX-750 Appliance	Win 07	3
	Axis	212 PTZ	Feb 07	4
	Belkin	N1 (wireless router)	Feb 07	3
	Billion	Biguard S10	Feb 07	3
	Brother	MFC-440CN	Feb 07	4
★	Buffalo	Airstation Nfiniti WZRG300N	Feb 07	4
	Buffalo	Linkstation Multimedia Server	Dec 06	3
	Buffalo	Terastation Home Server	Dec 06	4
	Canon	DC95r (digital camcorder)	Feb 07	3
★	Canon	EOS 400D (Digital SLR)	Dec 06	4
	Canon	Ixus 900TI (digital camera)	Jan 07	4
	Canon	Selphy CP730 (photo printer)	Jan 07	4
	Canon	Pixma mini260 (photo printer)	Jan 07	4
	Canon	Pixma IP6700D (inkjet printer)	Jan 07	4
★	Canon	Powershot A640	Feb 07	4
	Chillblast	Phantom	Win 07	4
	Corel	Paint Shop Pro Photo XI	Jan 07	4
	Dell	Dimension C521 (PC)	Feb 07	3
	Dell	Powerconnect 3424	Dec 06	3
	Dell	Poweredge 1950	Feb 07	3
	Dell	XPS M1210	Win 07	4
	D-Link	DIR-635 (wireless router)	Feb 07	4
	EA	Battlefield 2142 (game)	Jan 07	4
	EA	Cricket 07	Win 07	3
	ECS	RS485M-M (motherboard)	Jan 07	4
	Electronic Arts	Tiger Woods PGA Tour 2007	Feb 07	4
	Empire Interactive	Wings over Europe	Dec 06	2
	Enermax	Galaxy (power supply)	Dec 06	4
	Epson	P-5000	Win 07	4
	Epson	Stylus Photo R360	Jan 07	3
	Evesham	Axis STR Plus (PC)	Feb 07	3
	Evesham	Quest A430 (£699 laptop)	Dec 06	3
	Evesham	Solar XK (PC)	Feb 07	4
★	Evesham	Voyager C530 (notebook PC)	Jan 07	5
	Exspect	Recharge4	Feb -07	4
	Freecom	Storage Gateway WLAN	Dec 06	4
	Fujifilm	Z3 (Digital Camera)	Dec 06	4
★	Fujitsu-Siemens	Amilo Pi 1505	Win 07	5
	Garmin	Nuvi 310	Win 07	4
	Gigabyte	GA-M61VME-S2	Win 07	4
	Gigabyte	GV-NX88S640H-RH	Win 07	4
	Gizoo	IDE Sata Driver	Feb 07	4
★	Google	Docs and Spreadsheets	Win 07	5
	Google	Mini 2 (search appliance)	Jan 07	3
	Grisoft	AVG Internet Security	Feb 07	4
	Hi-Grade	A9700 (£699 laptop)	Dec 06	3
	Hi-Grade	Hi-Grade Ultis Tachyon QX6700 (desktop computer)	Jan 07	4
	Hi-Grade	Notino D7000-5500 (notebook)	Jan 07	3
	Hi-Grade	Notino W5600	Win 07	3
	HP	Ipaq HW6915 (PDA)	Jan 07	3
	HP	Laserjet p2015	Win 07	3
★	HP	Photosmart 07360 (inkjet)	Jan 07	5
★	HP	Proliant ML370 Generation 5	Feb 07	4
★	HP	Procurve Switch 1800 series (Ethernet switch)	Jan 07	3
	HP Compaq	NX7400 (notebook)	Jan 07	3
	Hyundai	N91W (19in TFT)	Dec 06	4
★	IBM	Lotus Sametime 7.5	Jan 07	4
	Intel	D975XBX2 (motherboard)	Feb 07	3
	Intervideo	DVD Copy 5 Platinum	Dec 06	3
★	Iomega	Storcenter Network Hard Drive	Dec 06	4
	Ipswitch	Imail Server Plus 2006 (Email server)	Jan 07	2
	Kodak	Scan Station 100	Jan 07	3
★	La Cie	Ethernet Disk Mini	Dec 06	4
★	Lego	Star Wars II (3D Action)	Dec 06	4
	Lexmark	P350	Win 07	3
	Linksys	EFG120 (network storage)	Dec 06	3
	Linksys	WRT300N-UK (wireless router)	Feb 07	3
★	Logitech	Revolution (laser mouse)	Dec 06	5
★	Logitech	V450 (travel mouse)	Jan 07	5
	Magellan	Roadmate 3050T	Win 07	3
★	Mamut	Enterprise E5	Feb 07	4
	Mandriva	2007 Free Linux	Win 07	4
	Map24	Map24 Mobile	Jan 07	4
	Maxtor	Shared Storage II	Dec 06	4
★	McAfee	Total Protection 2007	Dec 06	4
★	Medion	Gopal PNA465	Win 07	5
★	Mesh	0820 Value + (PC)	Feb 07	4
	Mesh	Mesh Elite E6600 Express	Jan 07	4
	Mesh	Elite Fire X1950 PCW (PC)	Dec 06	4
	Microsoft	Age of Empires III: War Chiefs	Feb 07	4
	Microsoft	Windows Vista RC1	Dec 06	N/A
★	Microsoft	Xbox 360 HD-DVD Player	Win 07	4
★	Mio	Digiwalker C510E	Win 07	4
	Mogo	Mouse (travel mouse)	Dec 06	3
	MSI	Megabook M662 (notebook)	Jan 07	3
	MSI	Megabook M662	Dec 06	3
★	MSI	Megabook M670	Win 07	4
★	MV	Moebius 13" (£699 laptop)	Dec 06	4
	Navman	F20 (GPS navigation)	Feb 07	4
	Navman	N40i	Win 07	3
★	Navman	N60i	Win 07	4
	Neodigits	Helios X5000	Win 07	3
	Netgear	Rangemax Next WNR834B	Feb 07	3
	Netgear	SPH101 (Skype Wifi phone)	Jan 07	2
★	Nikon	Nikon D80 (Digital SLR)	Jan 07	5
	Nintendo	DS Browser (handheld console)	Feb 07	3
	Nintendo	Nintendo Wii preview	Jan-07	N/A
	Novogo	S700	Win 07	4
	Orlogix	Automagic CD-R	Dec 06	3
★	Outerlight	The Ship (game)	Jan 07	4
	Palm	Treo 750v (PDA phone)	Jan 07	4
	Palo Alto	Business Plan Pro 2007	Jan 07	3
	Panda	Internet Security 2007	Win 07	4
	PC-Cillin	Internet Security 2007	Feb 07	3
	PC Nextday	Zoostorm 1-3301 Versatile PC	Feb 07	4
	PC Specialist	Trident s500 (PC)	Feb 07	3
★	Pentax	Optio T-20	Win 07	4
★	Philips	SLM5500	Dec 06	4
★	Phoenix	Recover Pro 6	Dec 06	4
	Plextor	PX-EH25L (network storage)	Dec 06	2
	Pocket	Mindmap	Dec 06	4
★	Qstarz	BT-Q815 (GPS receiver)	Feb 07	4
★	Relic	Company of Heroes	Dec 06	5
★	Ricoh	Caplio R5 (digital camera)	Feb 07	4
★	RIM	Blackberry Pearl 8100	Jan 07	5
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★	Sage	Start-Up	Dec 06	4
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★	Sonicwall	SSL-VPN 200	Jan 07	4
	Sony	AIT-5 (SDX-1100)	Win 07	4
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	Sony	Vaio VGN-SZ3XWP	Win 07	3
	Sony	Vaio VGX-XL202 (Media Center)	Feb 07	3
	Sony	VGN-C1Z/B (notebook)	Jan 07	4
★	Sophos	Security Suite SBE 2.0	Feb 07	4
	Steinberg	Cubase 4 and Cubase Studio 4	Win 07	4
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★	Tesco	Internet Security	Win 07	4
	T-Mobile	MDA Vario II HSPDA	Jan 07	4
★	Tomtom	One Europe	Win 07	4
	Toshiba	Satellite A110-275	Dec 06	4
	Toshiba	Satellite Pro A120	Win 07	3
★	Trendnet	TEW-631BRP (wireless router)	Feb 07	4
	Ubisoft	Dark Messiah	Feb 07	3
	Ubisoft	Tom Clancy's Splinter Cell Double Agent	Win 07	4
	Ulead	Photo Impact 12 (photo editing)	Feb 07	4
	Viamichelin	X-950	Win 07	3
	Viewsonic	VX-1945wm View Dock	Win 07	3
	Virgin	Virgin Mobile Lobster 700TV	Jan 07	3
	Vivendi	Joint Task Force (game)	Jan 07	3
	VMware	Infrastructure 3	Dec 06	3
★	Watford	Performa 3500+RV (PC)	Feb 07	5
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	Wyse	Streaming Manager	Win 07	3
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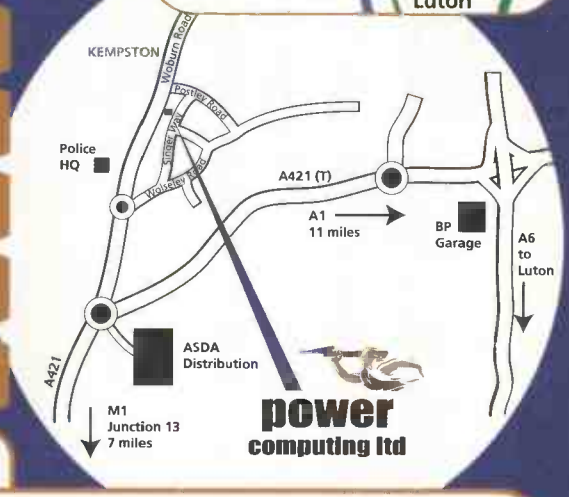

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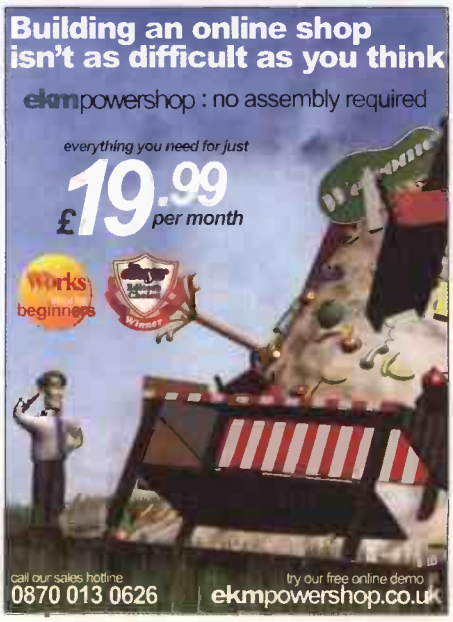

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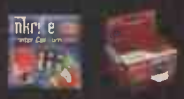

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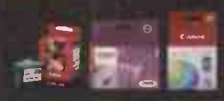

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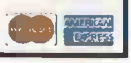

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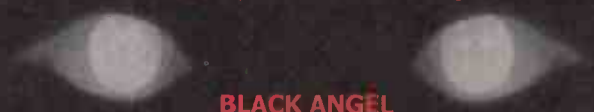

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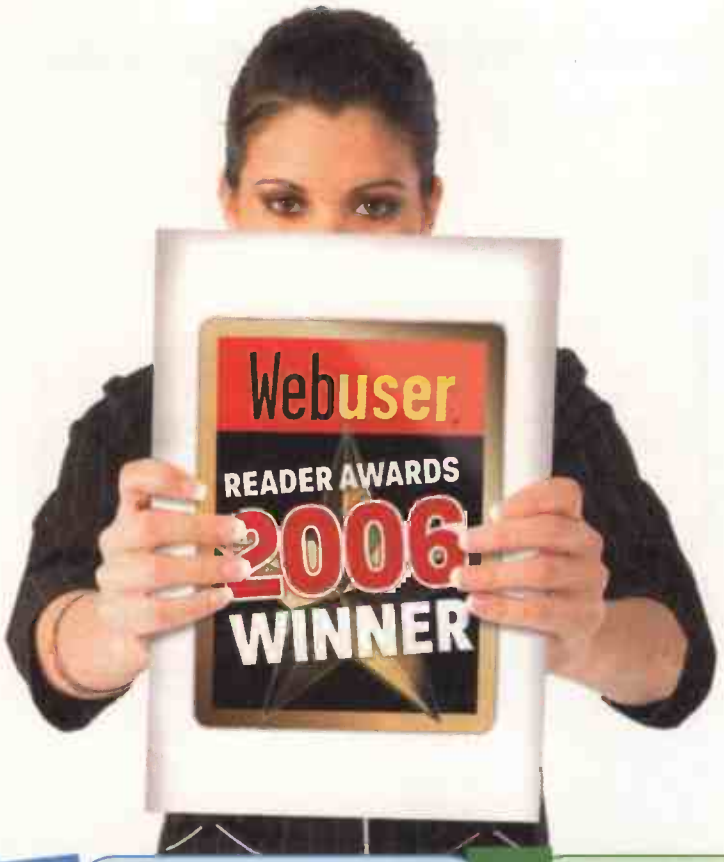

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The PCW cover disc uses a web browser-style interface. To get full functionality, you'll need to use Microsoft Internet Explorer (version 5.5 or later). Unfortunately, Netscape doesn't properly support this software. However, we have also provided 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

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Registry Mechanic 5.2

Improve your PC's performance

Buy a new PC and it'll come with a compact, finely tuned Registry containing only the settings required by Windows, and nothing else at all. Excellent. Unfortunately this desirable situation doesn't last long because just about every application you install adds its own collection of Registry keys, and many of these will be left behind even if you remove the program later. Over time, your Registry becomes a complete mess, cluttered with hundreds of broken and redundant entries, so it takes longer to access, requires more system resources and can cause programs to crash or behave oddly.

There's no real way to avoid this gradual degradation of the Registry, but if you run Registry Mechanic occasionally you can reverse it. Click the Start Scan button and it zooms into action, cross-checking just about every area of your Registry and looking for potential errors.

When the program has finished you will see the list of issues with your system and can choose exactly which ones you'd like fixed. Or, simply allow Registry Mechanic to go ahead and resolve them all. It's unlikely to delete anything you need, and backups are automatically made of every altered setting so it's easy to restore things. You can even have the program create a System Restore Point before it makes a single change, giving you two layers of protection against accidents. Either way, by the time the process is complete you'll have a compact, efficient and error-free Registry, and a more reliable system, with perhaps a little extra free system memory thrown in for good measure.

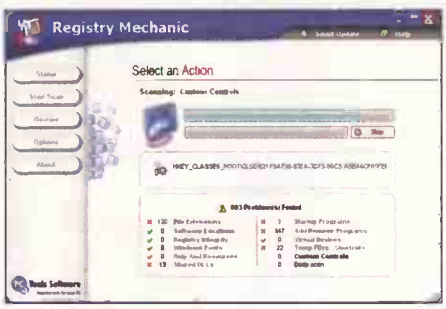
INFORMATION

System requirements Windows 98/Me/2000 Professional/XP, 8MB disk space, Internet Explorer 5.5 or later

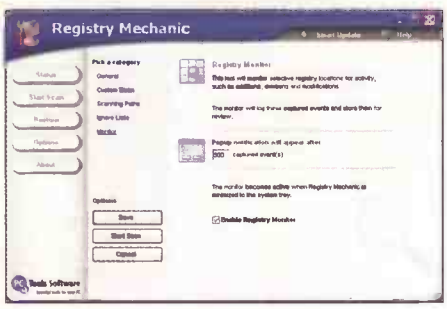
Contact www.pctools.com

Registration Get your code at **www.pctools.com/registry-mechanic/free/promo/VNURM52**

Three reasons this program should be your Registry checker of choice



1 Some Registry analysis tools take an age to examine your system — but not this one. Even including the in-depth deep scan check only resulted in a scan time of about two-and-a-half minutes on our test system, and if you opt for a custom scan and leave out, say, the check on your program shortcuts, then that can be cut further still.



2 Explore the Options area and you'll find that Registry Mechanic is very configurable. You can have the program scan your system to look for lost files rather than just delete broken Registry settings, for instance. And there's a useful bonus in the Registry Monitor that watches key Registry locations and raises an alert when a specified number of modifications has been made.

3 There's more to Registry Mechanic than simply checking for errors, though. The program also includes a defragmenter, rearranging your Registry entries into contiguous blocks to reduce disk space and memory requirements. Click Compact Registry, wait for an analysis of how much can be saved, then click Compact Now to optimise your Registry.

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Registry Mechanic 6 features a new, modular architecture, enabling new features to be plugged in easily and sent out immediately with program updates. Performance enhancements include Registry pruning, where subkeys are removed if they're empty, saving more space. And a new Monitor interface lets you view changes to key areas of the Registry as your applications make them – an ideal troubleshooting tool. You can get 20 per cent off the retail price (currently £19.95) by heading to **www.pctools.com**, choosing the software products you require, then entering discount coupon code VNU1206 in the checkout cart.

Magix Music Maker 12 Silver

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You're a big music fan and would love to write your own songs, if it weren't for one tiny problem: a complete lack of any musical ability. Sound familiar? Then this could be the tool that finally unleashes your creativity on the world. Because Magix Music Maker 12 Silver lets you build professional-sounding songs in minutes; no musical experience is required.

The best place to start is by browsing through the samples provided. You only get two libraries in this version – HipHop Volume 8 and RockPop Volume 5 – but that still leaves you plenty of room for experiments. The Rock and Pop library comes with nine different guitar styles; for instance, a light acoustic sound, a harder indie edge, a guitar solo or two, an Iron Maiden-style sound, and more. Each sample is short, but high quality, and you get it in different keys so it's easy to get the sound you need.

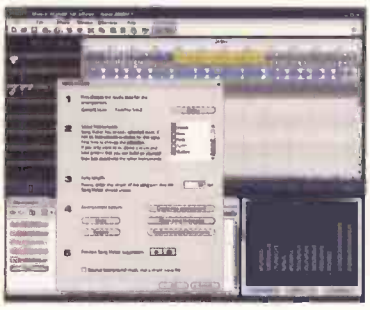
Once you've found a sample you like, drag and drop it onto the Arranger, stretch it out for more bars, and add other samples to suit. No idea what you're doing? No matter. Click Play and Music Maker 12 will repeat your composition over and over again, dynamically updating as you make changes. If you don't like an effect, experiment with it until you do.

The results are surprisingly good. Open the demonstration arrangement for a song you could easily imagine hearing on the radio. If nothing else, it offers a perfect example of how to construct a guitar intro from the Magix samples. Remix that tune or create your own, then export the finished results as an mp3 or Wma file.

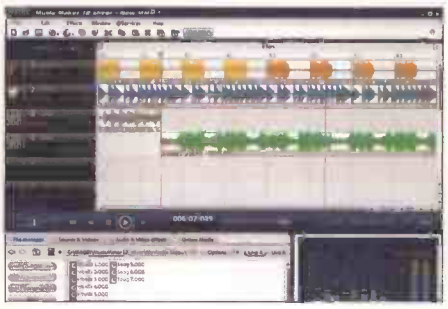
INFORMATION

System requirements 256MB Ram, 1,024x768 resolution display, Windows 2000/XP, 500MB disk space
Contact www.magix.com
Registration Not required

Songwriting for beginners: it's easier than you think



1 The quickest way to get started is with the automatic songwriting feature. To use this, click '1 Click', pick the Rock style and click OK. Check only Drums, Vocals and Guitars, set the song length to 60 seconds, and click Create new arrangement. Music Maker will build and replay a song automatically. Create more new arrangements until you find one you like.



2 You can now dress up that base arrangement with extra samples, or perhaps create new tunes entirely on your own. Click My Projects > Soundloops, choose the style you want and the type of instrument, then click a sample to hear it. Double-click a sample you like to add it to the Arranger and stretch it to last, however many bars you need. Add more samples on other tracks to build up the sound.

3 You only get two libraries of samples with this version of Music Maker, but there are many ways you can extend these. Click Synthesizer to add drum and keyboard patterns of your own, for instance, or right-click on a sample for ways to change the way it sounds. These start with a wide range of sound effects (echo, vocoder and so on) to versatile EQ settings and a professional mixing desk.

UPGRADE OFFER

MAGIX MUSIC MAKER 12 DELUXE

NEW FEATURES

- Over 3,000 sound loops
- 12 virtual instruments
- Magix Vital Instruments
- 5.1 surround-sound editing
- Magix Remix Maker
- Create your own video clip

Upgrade to Magix Music Maker 12 Deluxe and you'll get more than 3,000 looped samples in 10 different styles, greatly expanding your musical range. Virtual instruments such as synths and drum machines help you create loops of your own, and the new Magix Vital Instruments offer very realistic sounds, including guitar slides, pianos with string resonance, and more. 5.1 surround-sound editing lets you place each instrument in space, the Remix Maker builds remixes in a couple of clicks, and you can even create video clips to go along with the songs. All these professional features can be yours for only £47.99. Click Help > Activate Program > Activate Now to find out more.

Ashampoo Office 2005

Microsoft Office-compatible spreadsheet and word processor

When most people need productivity software, they reach for a copy of Microsoft Office. But if you don't want to splash out on Office 2007, there is a simple solution: pick something else – and Ashampoo Office 2005 is an ideal candidate.

This package doesn't drown you in extra programs that make it seem like a good deal, but which you'll never use. Instead, it bundles all its features into a word processor (TextMaker), and a spreadsheet (PlanMaker), and there's nothing else to get in the way.

Learning the core programs won't take long as their interfaces bear a strong resemblance to Word and Excel, but with less toolbar clutter. But that doesn't mean they're short on features: TextMaker comes with plenty of text formatting options, can handle complex nested tables, has a simple form designer and mail merge options. The spreadsheet PlanMaker includes more than 320 mathematical functions, an integrated charting module for producing graphs, automatic and conditional formatting options, and more.

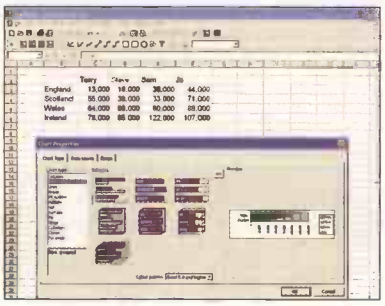
Keep exploring and you'll find small improvements over Office, too, such as the Quick Path feature in the Open and Save As dialogs, providing speedy access to commonly used folders. Or the Drop Pictures option when printing, letting you produce fast text-only previews of your current document.

And, of course, both TextMaker and PlanMaker will read and write Office files from version 97 to XP, among many formats, so you'll be able to share work with others.

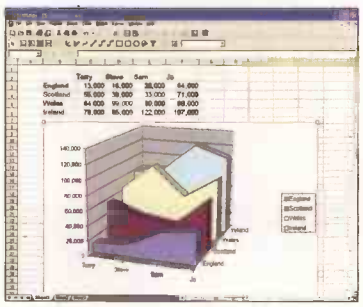
INFORMATION

System requirements Windows 98 or later, 20MB disk space
Contact www.ashampoo.com
Registration Click 'Get free key' during installation

Get your documents finished at speed – without Microsoft Office



1 We know this looks just like a grab of Excel, but it's actually Ashampoo PlanMaker. Honest. You'll still be able to use it right away, though, entering data as normal. Click Object > New Chart Frame and highlight that data and any headings to see plenty of graph options, ranging from chart types to all the usual series and data source settings.



2 If your graph doesn't look as you'd expect, then right-click it and select Chart Properties for more tweaks. You might add captions, for instance. Play around with the colours, swap axes or turn off the background grid. Even customise 3D settings such as rotation and elevation angles, or tweak the perspective effect, while a preview shows you the effect of each change.

3 Happy now? Then save your data in Microsoft Excel's XLS format, ready to share with others. Or paste the table or graph into Ashampoo's word processor TextMaker, where you can use the text formatting, table management, form editing, mail merge, index or table of contents generation and other features, then save the results as a Word-compatible .doc file.

UPGRADE OFFER

NEW FEATURES

OpenOffice/OpenDocument file support
Opens password-protected Word files
Equation editor creates formulae
AutoShapes-compatible drawing function
TextArt gallery of type effects
Unicode improves language support

ASHAMPOO OFFICE 2006

The latest version of Ashampoo adds features such as OpenDocument support to TextMaker, which can now also open password-protected Word files. There's a new Equation Editor for building complex formulae, drawing tools compatible with Microsoft AutoShapes, a TextArt utility for applying fancy effects to the text of your choice, Unicode support, and more. The list price for Office 2006 is £34.99, but upgrade from 2005 and you need only pay £20.99 – a 40 per cent discount. Just click on 'SoftMaker Web Site' and afterwards choose 'Buy an upgrade to Ashampoo Office 2006' in the 'Help' menu of the application.

O&O BlueCon XXL V5

Get a dead PC booting again with this disaster recovery tool

It might be a virus or a Trojan, a software bug or simple human error: sooner or later your PC is bound to face a data disaster. You can surround yourself with tools to undelete files or recover your hard drive master boot record, but if you can't get Windows to boot none of these will help. You need stronger disaster recovery medicine, such as O&O BlueCon XXL V5.

Enable BlueCon on your system and it'll load its own environment during the PC boot process. Normally, you won't need to use it, so just sit back, wait a few seconds, and the boot will continue as normal. But if Windows won't start for some reason, then press a key when the BlueCon message appears and you'll get access to a range of command-line tools that could help you recover the situation.

Maybe a driver or service has malfunctioned, for instance. If this is something critical then it could stop Windows from loading, even in Safe Mode. Boot into BlueCon, though, and you might be able to deactivate the faulty software and replace it with a newer version.

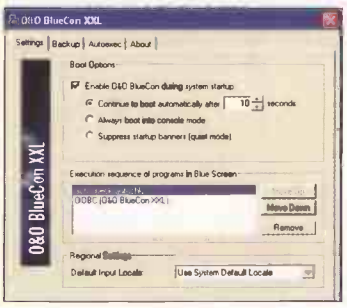
Or perhaps there's a Registry problem. BlueCon provides a command-line Registry editor you can use to fix any issues.

You also get an Undelete tool for recovering vital system or data files, and an editor for working with Ascii files, such as Boot.ini. And if none of these help, at least the basic Dos commands, such as Copy, will help you retrieve vital data and move it to a new hard drive. So just install it, right now: one day you might be glad you did.

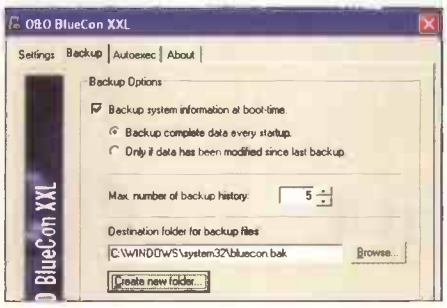
INFORMATION

System requirements Windows 2000/XP (and access to the installation CD), 10MB disk space
Contact www.oo-software.com
Registration Pay a visit to **www.oo-software.com/en/special/oobluecon**

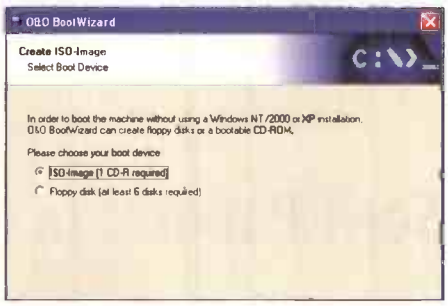
Insure your PC against Windows boot problems within minutes



1 BlueCon XXL V5 isn't big or flashy, and when installed it simply adds a new BlueCon XXL applet to the Control Panel. Double-click this, click the Settings tab and check 'Enable O&O BlueCon during system startup'. By default this adds a 10-second pause to let you enable BlueCon, if necessary. If this seems too long, then reduce it here to, say, three or four seconds.



2 Click the Backup tab and check 'Backup system information at boot-time' to let BlueCon save the system part of your Registry each time Windows is loaded. You'll need to create the folder it specifies manually, as the program won't do that on its own. Click Create new folder > OK > OK to complete the process and BlueCon will be available from your very next boot.



3 If your PC has suffered major disk corruption, then it's possible BlueCon XXL won't load properly, either. To protect against this, launch the O&O BootWizard from the O&O Software folder on your Start Menu. Point this at your Windows 2000/XP CD and it'll build an Iso image that may be used to burn a bootable CD, making the BlueCon environment available for any PC, even if the hard disk has failed.

UPGRADE OFFER

NEW FEATURES

- Graphical user interface
- Display system events
- User account manager
- Recover System Restore Points
- Enable network support
- Detailed system information

O&O BLUECON 6

The latest version of BlueCon provides a graphical interface with full mouse support and a file manager. There's also an Event Viewer to display system events, which may help you diagnose your PC problems. There's a user manager to apply, delete and change user accounts and their passwords, and it's possible to recover Windows XP System Restore Points, even if your system won't start in Safe Mode. The full list price for O&O BlueCon 6 is $149.95, but as a registered owner of O&O BlueCon XXL you need only pay $89.95 (about £46). See your upgrade email from O&O Software for details, or visit **www.oo-software.com/en/products/oobluecon/upgrade**.

BB FlashBack Express 1.5.3

INFORMATION

System requirements 128MB Ram, Windows 98/Me/2000/XP, 17MB disk space
Contact www.bbsoftware.co.uk
Registration Click 'Register Now' during installation, or visit **www.bbsoftware.co.uk/rfl.aspx?rid=156&app=FBExpress**, before 1 June 2007

FlashBack Express is one of the most configurable screen recorders available

Most people document software with lots of words and a few screen grabs, which generally produces acceptable results. But if you want something better, we have the ideal candidate.

BB FlashBack Express provides a powerful screen recorder, designed to create a movie from your on-screen activities. Doesn't sound like anything special, right? But then you haven't seen exactly what FlashBack Express has to offer – such as its ability to reduce movie file size by turning off Windows graphic effects and setting plain desktop wallpaper until the movie is done.

There are audio features, such as the ability to include a narration from your microphone or record normal PC sounds. You can choose the quality settings and mp3 compression levels, again potentially keeping the file size very low.

Move to the player and you'll find that mouse clicks are highlighted on the screen, making it easy for viewers to follow what you're doing. You can then export the movie to Avi, with complete control over frame rate and image scale. And there's a neat autoscroll feature that shrinks the dimension of the movie even further, but then scrolls around within that window to keep the mouse cursor in view. Or, export your movie to a Flash file, where FlashBack Express even creates an HTML template to display it for you.

UPGRADE OFFER
GET HOLD OF BB FLASHBACK FOR JUST £80

FlashBack adds a variety of ways to edit your recorded movies. You can add mp3 or Wav files, for instance, or include text boxes, callouts and images. Other functions help tidy up the movie, remove mistakes and crop to any area. You can export the results as a Microsoft PowerPoint file, a Wmv or standalone executable file (.exe), along with Flash and Avi. The list price for BB FlashBack is £99, but as a registered owner of BB FlashBack Express you pay £80. To find out more, visit **www.bbsoftware.co.uk/Store.aspx** and select the Upgrade BB FlashBack Express to BB FlashBack.

Serif Panorama Plus 1

ON OUR COVER DVD

INFORMATION

System requirements Windows 98se/Me/2000/XP, 130MB disk space
Contact www.serif.com
Registration Click Help > Registration Wizard

Add the images on the left and the program produces the panorama on the left. All you need do is sit and watch panoramaplus.png

You've got a high-quality digital camera, and you know how to use it. Yet, somehow, your pictures never quite seem to capture the full magic of your favourite holiday spots. So what's going wrong? One potential reason is that when you stand and look at a spectacular mountain range, you're soaking in something like a 170° view of the surroundings. Even wide-angle camera lenses don't offer much more than half that, and so the pictures never include quite as much of the view as you'd like.

One solution is to take a shot of the left part of the view, another of the centre, another over on the right, then blend them together to create a panorama. Sounds good, but pasting multiple images over each other, then blending them with pixel-perfect precision, is a fiddly business. Which is why it's better to let Panorama Plus manage the whole business for you.

Launch the program and click 'Start from scratch' on the splash screen, then point Panorama Plus at the images you want to make into a panorama. Rotate particular shots by 90°, if necessary, and click Create Panorama. The program analyses each image, searches for matching features, then blends your pictures into one, seamless photo. The whole process is over in seconds, and you can then save the results as Jpegs. It's an effective, simple tool that's a must for any digital photographer.

UPGRADE OFFER
SAVE 25 PER CENT ON SERIF PANORAMA PLUS 3

The latest version of Panorama Plus extends the program by letting you create panoramas from movie clips, as well as still images. New editing options include 'straighten' to fix angled horizons and 'autocrop' to find the largest image available with clean, straight edges. And there's now support for saving images in Gif, Tiff, Pdf and QuickTime VR format, as well as Jpeg. Ordinary visitors to the Serif website are expected to pay £39.99 for this, but as a registered owner of version 1 you'll be able to upgrade for only £29.99. To find out more, contact Serif on 0800 3767070 or visit **www.serif.com**.

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Ultimate PC tune-up

Maybe your personal New Year's resolutions are already long forgotten, but that doesn't mean you can't put your PC through a seasonal workout. Learn how to rejuvenate even the most sluggish PC with a few simple tips and tricks.

£999 PCs

Not long ago, a PC for less than a grand would have been considered a bargain. But nowadays we expect all the bells and whistles for this sort of price. So what do you actually get? We've got six of the best from which to choose.

HD Ready projectors

Even though some aspects of the technology are still mired in controversy, high-definition TV and movies are here to stay. And what better way to watch HD content as it was intended to be seen than with one of the latest HD Ready projectors? Of course, you can still use them to view Powerpoint slides if you really want to.

Making the move from XP

Not everyone's going to want to move fully to Windows Vista from day one. The smarter folks will hedge their bets by running it in parallel with XP first. Our practical guide will show you the easiest way to do this.

There's lots more in April's PCW DON'T MISS IT...

MARCH 2002

From the archives: Take a look at the important events in technology five, 15 and 25 years ago.

The focus of this month's PCW was flat-screen PCs. As well as reporting on the new lamp-esque iMac, our group test looked at PCs with LCD panels.

Evesham ran away with the honour of Editor's Choice, thanks to the biggest and best display on test – a 17in Samsung panel. We concluded Evesham had kept to the theme of space saving by squeezing a whole Pentium 4-based system into a very small case, without many compromises.

Also this month, Toshiba showed off its idea for a next-generation, 30GB optical disc, now known as HD-DVD. We revealed that the high capacity was achieved using a blue laser, with a 405nm wavelength fine enough to address the densely packed data.

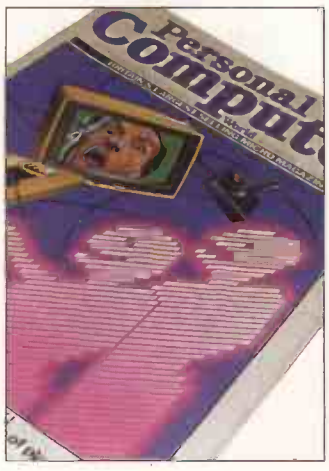
Finally, Nik Rawlinson pondered the repercussions of the FBI Trojan horse 'Magic Lantern' that had outraged privacy and security advocates. The claim was that big anti-virus companies were putting a backdoor into their products for Magic Lantern to give the FBI easy access to PCs. The proliferation of Magic Lantern is still shrouded in secrecy, but virus writers were able to mimic Magic Lantern and utilise the hole.

MARCH 1982

In March 1982, you'd have been hard pushed to find a computer that could print in colour, but Guy Kewney reported on a new spreadsheet program – Micromodeller – that made colour printing possible. It displayed complicated sets of financial data, which would be helpful if users were trained to 'think in colour'.

Meanwhile, Dick Pountain benchmarked the upmarket HP-125. He was eager to see how the huge price tag of £4,800 could be justified. The HP-125 featured a keyboard, processor and display all housed separately. It was the terminal facilities that set it apart from other computers running the 64KB CP/M operating system, thanks to versatile function keys that allowed the user to navigate the system.

Finally, Vincent Tseng looked at Texas Instruments' relaunched home micro – the TI-99/4A. The test version had a host of peripherals, including a main console unit, a speech synthesiser unit and a thermal printer. Vincent was impressed with the TI-99/4A, especially the £299 price for the basic model.



MARCH 1992

Adorning the cover of PCW was the Momenta notebook. Trumpeted as a radical rethink in the way people use PCs, the development costs of this pen-based notebook topped $40m.

The sleek, black notebook comprised a monitor, keyboard and stylus, and was one of the first tablet PCs with a foldout keyboard. It had no floppy disk drive or mouse, but then it wasn't designed as a desktop PC.

Reviewer Tony Capelli checked out anti-virus utility Untouchable, which was claimed to detect 100 per cent of computer viruses and repair infected files. Although a good product, Tony found that Untouchable failed to live up to the hype, likening it to a spare tyre: it will get you out of trouble, but it won't stop you getting a puncture.

Tim Bajarin reported that Apple was pushing hard on digital organisers and multimedia kits. Although only coming to fruition 15 years later, back then it was already planning Mac-style front ends for digital products such as phones, TVs and even toilets.

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