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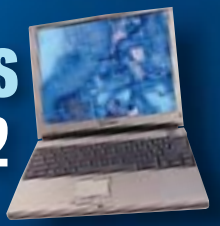
NT Power

Today's best systems ready for Windows 2000

Web tools tested & how to build your site

Notebooks

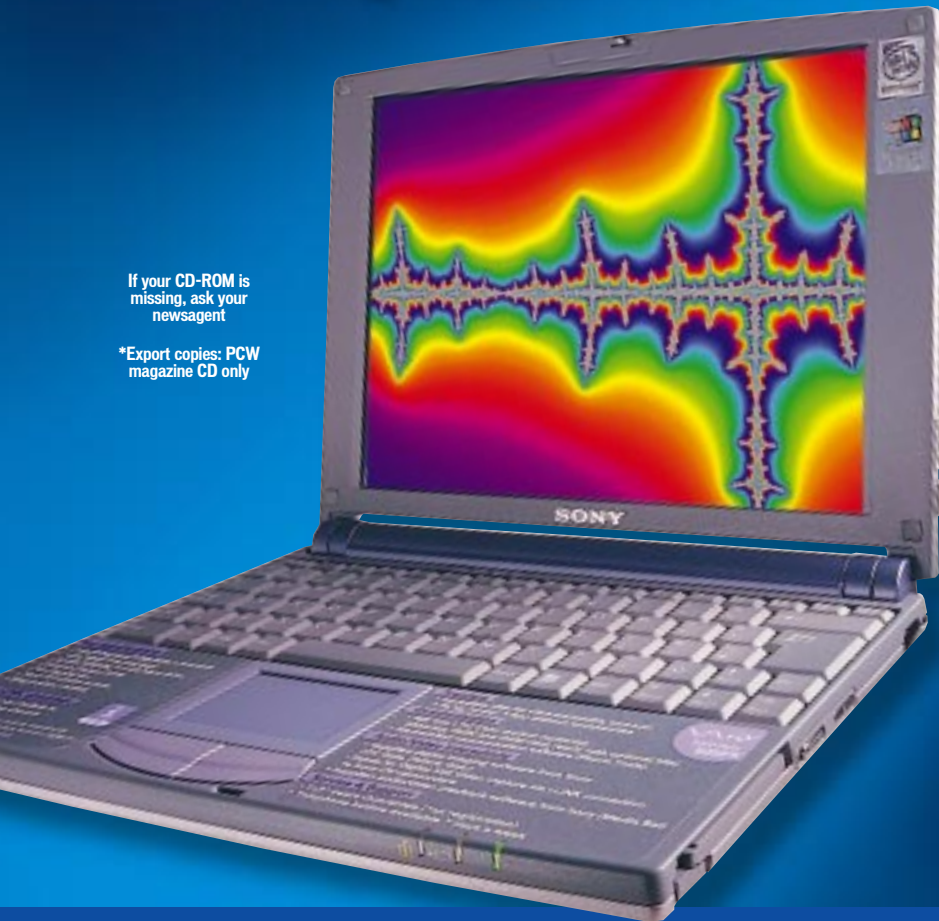
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SONY HiFD DRIVE ● YAMAHA SW1000XG

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ON CD



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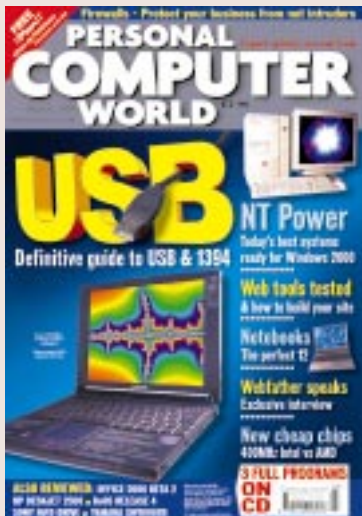
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The **Universal Serial Bus, or USB**, is set to revolutionise I/O.

The bus stops here

Ever wondered why your keyboard, mouse, joystick, modem, speakers and printer all need different plugs? I'm afraid it's been that way for some time. Believe it or not, the array of serial and parallel ports we're faced with has been essentially unchanged since the birth of the PC over 15 years ago. Experienced users may not think twice about this absurd situation, but I pity the first-timer confronted by the wealth of connectors at the back of a modern PC — it makes wiring the hi-fi seem like a walk in the park.

There is an alternative: it's called the Universal Serial Bus, or USB, and it's here today [p130]. All USB devices use the same type of plug, and no fewer than 127 of them can be chained together off a single USB port on a PC — and there's no problem connecting or disconnecting devices while the power's switched on.

USB as a technology has been around for several years, but it's only now that it's starting to catch on. Most PCs built in the past year have featured a pair of

USB ports — indeed, the Apple iMac has little else — but the big push began when Microsoft eventually got round to properly supporting it with the release of Windows 98. USB peripherals,

1999 promises to be the year that both USB AND AND ITS MORE VERSATILE COUSIN, FIREWIRE, hit the big time

including mice, keyboards, cameras and scanners, have already begun to arrive. At *PCW* we're great believers in USB and its faster, more versatile cousin, 1394, aka FireWire. 1999 promises to be the year both technologies hit the big time, so to whet your appetite we've explained how it all works, rounded up a wealth of devices, and seen what happens when you try to connect them all at the same time: I personally can't wait to dump my PC's prehistoric I/O system.

We're also very excited about the forthcoming Windows NT 5.0, now to be known as Windows 2000 (and unlikely to appear much before that date). In the past, Microsoft has pitched NT at high-end users and 95/98 for those less serious. In around a year's time, however, Windows 2000 will be the only desktop operating system that Microsoft wants you to use. In the run-up we've been testing the latest preview version of Windows 2000 [p144] and assessing its suitability for leisure and business users alike. We've also looked at the sort of processors and memory that are on the way in the next year. In the meantime we've tested four high-end workstations ideally suited to running NT 4.0 today, and Windows 2000 in a year's time.

As it's the tenth anniversary of the world wide web, we've group-tested the software that lets you build your own site [p190]. We've also interviewed Tim Berners-Lee [p122], arguably the man who came up with the idea in the first place. Also in this packed issue we've put 12 notebook computers through their paces [p170], tracked down the virus hunters [p116], looked at how to protect your business from internet intruders [p122] and taken a first look at brand-new budget 400MHz chips from Intel and AMD [p76]. The PC industry has never been more exciting, and you're in the right place to read about what's happening.

Gordon Laing, Editor

WELCOME TO THE **MARCH 1999** PERSONAL COMPUTER WORLD CD-ROM

March COVER DISC

GAMES

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LIBRARY

ENTERTAINMENT

INTERNET

Thinking of setting up your own business? Well take a look at the full versions of PlanIT's business software on this month's cover disc which includes the PlanIT Start Up Business Plan. There's also an exclusive, full MultiPath movie offer from Brilliant Digital Entertainment and a range of excellent upgrade offers with PhotoEnhancer, NetTracker and Music Ace. You will also find no less than five games demos including Thief and Heretic II, two of the latest and greatest games around, plus a range of internet tools and utilities, and much more in our Software Library.

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If you're going to be a millionaire the first thing you'll need is a good business plan and PlanIT will walk you through the process of analysing your business idea to create this important document.

strategies and raise finance. This program is straightforward and easy to use and is tailored specifically to the needs of UK users.

You will also find **PlanIT Financial Adviser** (£29.99 inc VAT) which is designed to help with financial decisions and investments. It can be used in your personal and business life and offers a simple, user-friendly interface.

So, now you can use PlanIT to analyse your finances and work out what else you can spend the money on!

➔ **For further information** on any of the PlanIT range of software, telephone 0181 875 4444. Alternatively, you can visit their website at www.planit.co.uk direct from the CD Online section of our disc.

PCW DETAILS

Platform Windows 95
Limitation Full version
Sales Contact
01494 455551
Technical Support
0181 8754459

Technical information to help you use the CD

✓ System Requirements

You will need a PC running Windows 3.1 or 95. The disc will run under NT but functionality may be reduced. Please check individual products for specific system requirements. For best results, run the CD on a Pentium PC with at least 16Mb of memory.

✓ How to use the CD-ROM

Put the disc into your CD drive. Windows 95 — The

PCW interactive loader will appear on your screen. If your CD doesn't autoloading, go to Start/Run and type <CD Drive>:\pcw.exe Windows 3.1 — From Windows Program Manager choose File/Run, then type <CD Drive>:\pcw.exe and press enter.

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'Faulty Discs' (left) for replacement disc information.

✓ Getting software onto our CD

PCW is keen to promote quality software and would

like to hear from you if you are interested in having your product included on a future cover disc.

• Phone Afshan Nasim on 0171 316 9592 or email afshan_nasim@vnu.co.uk

Photo Enhancer



Originally supplied to be used with the Kodak DC50 digital camera, PhotoEnhancer is a simple program which enables you to correct faults in photographic digital images. If photos are too bright or too dark, or off-colour from the poor use of a flash, this will put it right quickly and

conveniently without the need for a program like Paint Shop Pro or Photoshop, say. Tools include Marquee, Blur, Sharpen, Lighten and Darken. Filters include Daylight, Inside Flash and Heavy Shadow.

➔ **Note:** Camera operation options shown on the application menus only work with a Kodak DC50 digital camera attached to your system. If they are selected with no camera present, the program will crash.

PCW DETAILS

Platform Windows 95
Limitation Full version
Sales Contact
 01420 83811
Technical Support
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For more information, contact Bit UK

Phone 01420 83811 or fax 01420 80657. Web www.bit.co.uk

HoTMetal PRO 5

HoTMetal PRO 5.0 is the most powerful version yet of SoftQuad's HTML authoring and publishing tool. It is suitable both for professionals and those less experienced in website development and has all the necessary features to help the user easily develop sophisticated websites. It offers a comprehensive range of site development tools, all within one application, including the production of HTML for all flavours of browser, a customisable user interface and tools to create the funky graphics that no up-to-date site should be without.

HoTMetal PRO 5.0 uses Internet Explorer components in its implementation and offers: an Asset tab in the Resource Manager, a WYSIWYG Frames viewer, Page Preview, Site Maker preview and macros. Thumbnail View and the Open dialog preview window also require that Microsoft Active Desktop be installed: the software still operates satisfactorily under Windows 95 and NT 4.0 if Internet Explorer and Active Desktop are not installed but the above features will not be available.



New features include the combination of the HoTMetal PRO Editor and Information Manager from HoTMetal PRO 4.0 into a single application, offering editing and site management functions. The Resource Manager is new, too: it is an asset management tool which allows access to all kinds of web objects such as images, cascading style sheets, scripts and dynamic HTML plus many more new features for you to play with!

PCW DETAILS

Operating Systems
 Windows 95, 98 and
 NT 4.0
Limitations
 30-day limited demo
Sales Contact
 0181 387 4110
Technical Support
simon@uk.sq.com

MultiPath Movies Digital Projector

Multipath Movies, from Brilliant Digital Entertainment, are a new hybrid of video game and video movie which allow you to watch a story unfold in 3D animation and interact with the action along the way. The online library includes adventures from Xena - Warrior Princess, Ace Ventura,

Superman, Popeye and original titles — all available to order from the internet.

This month's cover disc contains a special copy of the Digital Player required to watch the movies. It carries watchable



previews of an adventure with Xena - Warrior Princess and a spooky story called 'The Evil Pen Pal'. Other previews are available from the Box Office at the Brilliant Digital Website. By using this exclusive version of the Player, *Personal Computer World* readers can download the full length version of 'Evil Pen Pal' from the online Box Office completely free. Just install the Player on your

PCW DETAILS

Platform Windows 95
Limitation Fully working player with access to one free movie.
Sales Contact
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Technical Support
 01895 831307

system and watch the preview movies. Then, while previewing Evil Pen Pal, click on Get Movie. This will launch your browser and take you to an order page for the Evil Pen Pal movie. You will need to set up your account by supplying your email address and credit card details. Evil Pen Pal will be made available for you to download completely free. In future, if you want to purchase another film, your details will already be stored so you can just go straight ahead and download your new movie — your account will be debited automatically. The movies are compact and relatively quick to download. If you already have the preview movie inside the Player (as mentioned) only the key files that open the full movie are downloaded and these are very small.

Music Ace

Music Ace is an engaging and relaxed music education software program from Harmonic Vision, that provides an introduction to music fundamentals for new music students. It is suitable for both children and older students and its user-friendly interface (including Maestro Max) is continually present to direct and support the student. A choir of singing notes

participates in a series of 24 comprehensive lessons, playing a variety of challenging games with users, who can compose and listen to their own music from the unique Music Doodle Pad. Students can also



compose their own music using a variety of instrument sounds. These creative compositions can then be saved and played back. It is also possible to create pieces by modifying popular music selections from

the Jukebox section of the Music Doodle Pad.

The 24 lessons cover staff and keyboard relationship, keyboard basics, major scales and octaves, pitch identification, note reading and listening skills amongst many other features. Individuals can track their progress through lessons and games with a 'completion count', which provides a record of the number of times the user

has gone through each section of a lesson, as well as through 'games progress' which provides an account of high scores. Lively animations and colourful graphics complement the traditional music instruction.

Special Offer to readers of Personal Computer World

Music Ace normally sells for £29.95 (inc VAT, plus £6 p&p) but is now available to PCW readers for only £19.95 (inc VAT, plus £6 p&p).

➤ Personal Computer World readers should contact Guildsoft by phoning 01752 895100 and quoting the reference 903GUWOR.

PCW DETAILS

Operating systems
Windows 3.1, 386MHz or better.

Limitations Only a limited number of tutorials and games available.

Sales Contact
+44 (0) 1752 895100

Technical Support
01752 895100
(9am to 5.30pm)

Wargasm

Wargasm is a new kind of combat game, released by DID. It's a simulation game where the players check out battlefield and weather effects as if in the real world. The game allows players to fight from the air,



on foot or in a tank. In addition to the combat action, Wargasm allows strategic and tactical control of your forces and offers a multiple-player option.

When entering the game, you are presented with a map of global territories and your objective is to turn the map one colour. Once an enemy is identified you must assemble your forces from a selection of virtual troops and armoured fighting vehicles before going into battle. But if your force is made up from the wrong elements, it could spell disaster! Once in the midst of the battle, the tactical control of your forces is in your hands via a drag-and-drop interface. You can jump into any tank commander's seat to enjoy the full excitement of the combat!

PCW DETAILS

Operating System
Windows 95/98

Limitations Training levels and first level only.

Sales Contact
0161 827 8000

Technical Support
0161 827 8060

Heretic 2

Activision brings you Heretic II, a third-person action game based on the Quake II engine. It sets players on a quest through city and outdoor environments as they search for a



cure to an evil plague. Players take on the role of Corvus, the character from Heretic who has been banished to the Outer Worlds by D'sparil. As Corvus, the user can perform a variety of acrobatic, swimming and climbing manoeuvres in order to penetrate the mystery of the plague. Exploring city, swamp, canyon and dungeon levels, you use a variety of offensive and defensive spells such as the Sphere of Annihilation, Repulsion and Fireball in conjunction with a magical bow and staff to defeat the plague-ridden inhabitants of Parthoris.

Heretic II is not a battle tale but rather tells the further story of Corvus, the hero of the original Heretic game. For those who haven't played the first in this semi-series, Heretic was rather like Doom with a medieval setting.

PCW DETAILS

Operating System
Windows 95/98

Limitations Restricted levels and weapons.

Sales Any good software retailer.

Technical Support
None available.

Thief

Thief is a first person action adventure. You take the role of the hero Garrett, the master thief, and you are assigned a mission by your patron, Constantine, to steal a guarded sword. Stealth and intellect



are best your weapons as you slip through the silent corridors of a sleeping ancient town. You walk around a city with guarded prisons, haunted cathedrals and large mansions. Your victims are the city's

corrupt and privileged nobility whose wealth is yours — provided that their guards don't hear you coming! Having successfully completed your first mission your patron explains to you that this was merely a test and you are then assigned your real mission: to steal a gem known as the

'Eye'. As your quest progresses, a mystic dark world unfolds exposing the true identity of Constantine. Strength is all important in trying to discover, and get out of, the web of intrigue that surrounds you.

You are supplied with unique weapons to succeed in your goal. There is a blackjack which can be used to knock out unsuspecting opponents, a noise arrow to throw them off the trail and moss bombs to silence your footsteps in stone corridors. If all these weapons are not enough then the fire arrow, or your sword are always available. The revolutionary 'Dark Engine' provides advanced environmental simulation and advanced artificial intelligence brings you creatures with 'hearing' capabilities, which react to all sounds in the environment.

PCW DETAILS

Operating system
Windows 95/98
Limitations Restricted levels and weapons.
Sales Contact
0121 3324647
Technical Support
0121 6061800
techsupp@eidos.com

Tomb Raider III

Version three and we find Lara in India for her new adventure! Compared to previous versions Tomb Raider III is non-linear, both in the style of the game and within the levels. Users are able to choose their own path through the game by selecting the order in which they play each of the four main levels. These levels are also more open, with multiple routes to the same end so the player must make wise choices — if you don't replay every level of this adventure you'll probably miss parts of it.



Tomb Raider III contains five separate worlds which link together. After completing the first adventure, the subsequent three can be

played in any order before the fifth, concluding, level is undertaken. New features include enemies with 'pack' mentality, a new landscape system, improved texture palettes and improved water effects. New moves including crawl, monkey swing and speed dash.

PCW DETAILS

Platform Windows 95/98
Limitations One level only.
Sales Contact
0121 3324647
Technical Support
0121 356 0831

Glover

Hasbro Interactive brings you Glover! The story is that a good wizard, with magical gloves, accidentally mixes the wrong potions which results in one almighty explosion! This explosion sends one of his magic gloves sailing through the air while the other flies into a cauldron of evil — and suddenly the entire kingdom's power crystals are bouncing around like rubber balls. What a mess!

The user is challenged to put everything back in order again. For the user to restore the kingdom, he must return the gloves and crystals. He must also transform the balls and gloves to magical spells to beat his enemies, discover the secret sections and the crush level.

➤ The full game features

- Control of the glove and ball as a team, to solve unique puzzles
- The possibility of casting a variety of magical spells and exploring huge levels
- Unique 3D platform action
- Bizarre characters
- Seven different fantasy worlds to explore.
- There are more than 20 levels.



PCW DETAILS

Operating systems
Windows 95/98
Limitations
Restricted levels and weapons
Sales Contact
Hasbro Interactive
0181 569 1234
Technical Support
0990 745745

CD-ROM

HELPLINE

01685 354762

Software Library

Unless otherwise stated, new versions of the software featured are not upgrades, but stand-alone installations. If you wish to install the latest version of a product onto your machine, please ensure that you first uninstall/remove the older version.

What follows is a selection of just some of the many utilities included on our cover disc this month.

Some essential utilities

- **Add/Remove 4Good 2.0**
(Windows 95)
Get rid of those unwanted entries in Control Panels' Add/Remove list. (Limited-use shareware)
- **Adobe Acrobat Reader 3.01 + Search**
(Windows 3.1/95/NT)
View, navigate and print PDF files across all major computing platforms. (Fully-functioning reader)
- **Awave 4.9**
(Windows 95/98/NT)
Read a host of audio file formats from different platforms, synthesisers and trackers. Awave can be used as an audio file format converter, an audio editor, and audio player. (30-day shareware)

- **Catch-UP 1.2**
(Win95/NT/3.1/32s)
Search for the newest versions of many popular internet-distributed software applications and hardware drivers and generate a custom list of software updates and corresponding download sites. (Freeware)
- **GIF Construction Set 1.0Q**
(Windows 3.1/95)
A quick and professional way to create transparent, interlaced and animated GIF files for web pages. (30-day shareware)
- **Ed for Windows 3.80**
(Windows 3.1/95/NT)
Intelligent, language-sensitive editing. A one-stop productivity tool for programmers that slashes coding. (45-day trial)
- **EzDesk for Windows 1.8**
(Windows 95/NT)
Manage desktop icons layout and restore a previous desktop icon layout from a saved arrangement. (Limited function shareware)
- **Fontastic 5.0**
(Windows 95)
A font management tool that allows quick and easy viewing of all the fonts stored on your system, and the printing of samples. (31-day evaluation)

- **GetRight 3.2**
(Windows 95/NT)
Resume on errors while downloading files from web or ftp sites, schedule downloads and more. (30-day evaluation)
- **Graphics Workshop Professional 2.0a**
(Windows 95/NT)
View, convert and catalogue your images in a wide variety of formats. (Shareware)
- **Macro Express 1.0k**
(Windows 95/NT)
A macro utility that allows you to create macros manually or by recording them. Macros can be created and edited with an easy 'Scripting Editor' which allows you to see each step and command. (30-day trial)
- **MacSEE**
(Windows 3.1/95/NT)
Simple and fast transfer of files between a Mac and a PC-compatible system. Read and write directly to or from Macintosh disks on your PC. (Limited demo)
- **New version Microangelo 98**
(Windows 95)
Browse, manage, create and edit Windows 95 icons from 8 x 8 to 64 x 64 pixels in size and up to 256 colours. (30-day shareware)
- **Microsoft Excel & Word Viewers**
(Windows 95/NT)
Allows documents from any version of Microsoft Word or Excel to be shared

- with others. (Freeware)
- **UBE 98 1.8**
(Windows 98)
Security program which encrypts your current work as well as creating encrypted self-extracting .exe files for distribution to others. Uses 2,048-bit encryption technology. (Shareware)
- **Winarj 95/98**
(Windows 95/98)
A 32-bit Windows Shell for 'ARJ Archive Software'. This version is written for Windows 95/98 and supports long-file-names. (Time-limited demo).
- **WinZip 7.0**
(Windows 95/NT)
Industry-standard

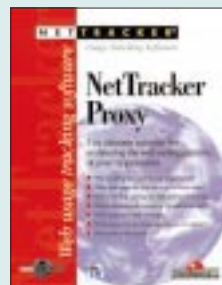
- compression/decompression utility for Windows 95 and NT. (21-day evaluation).
- New Software**
- **Roulette**
(Windows)
This great new game combines 100 percent accuracy with brilliant 24-bit rendered graphics, smooth animation and a genuine 'real feel'. (Limited demo)
- **STD Code Decoder 6.0**
(Windows)
List UK Telephone STD Codes and selected overseas codes, in numerical order, avoiding wasted calls, identifying mobile phones and

- premium rate lines. (Limited demo)
- **Web Scrapbook 1.00**
(Windows 95 and NT)
Eight simple steps to creating a web page. You don't need a single word of HTML! (Freeware)
- **Budget Tracker 1.0**
(Windows 95 and NT)
A budgetary control system that sets up single or multiple budgets, earmarks funds, registers commitments and spending of funds against budgets. (Limited demo)
- **Hardware Organizer 3.0**
(Windows 95/98/NT)
Allows computer

NetTracker Upgrade Offer



NetTracker 3.5 (Win95 and NT)
Provides network administrators with a simplified solution for monitoring their organisation's web surfing patterns, to increase productivity and assist in establishing corporate internet usage policies. (Limited demo).



➔ **Save up to £200 on NetTracker 3.5** with special offers on this month's cover disk. Quote reference 903GUPCW when you contact Guildsoft, and you'll be entitled to these special rates for the NetTracker range (all prices are exclusive of VAT):

- **NetTracker Standard only £195**
- **NetTracker Professional only £295 (reduced from £395)**
- **NetTracker Enterprise**

incl. 5-website license only £595 (reduced from £795)
• **NetTracker Proxy only £395 (reduced from £595)**

For more information visit www.guildsoft.com, email sales@guildsoft.com or phone 01752 895100. Guildsoft Ltd, The Software Centre, East Way, Lee Mill Industrial Estate, Ivybridge, Devon.

owners, small offices, and hardware dealers to organise, catalogue, and manage their hardware on their PCs.

• **MailKing 1.1**

(Windows 95 and NT)

A powerful and easy to use email merge tool for Windows which uses many contact databases, spreadsheets and

address books directly, without importing.

(Limited demo)

• **Music Organizer 3.0**

(Windows 95/98/NT)

Allows music collectors, audio-philosophers, hobbyists, dealers, and clubs to organise, catalogue, and manage their collections.

(Limited demo)

• **Oxford University Press Patch**

(Windows 95)

The Press Patch is a fix patch for our readers who experienced 'Run Time Errors' and were unable to run the Concise Oxford Dictionary that was given away with the January '99 issue of PCW.

(Freeware)

• **Recipe Organizer 3.0**

(Windows 95/98/NT)

Recipe Organizer enables recipe collectors, and chefs to organise, catalogue, and manage their recipe collections.

(Limited demo)

• **Software Organizer 3.0**

(Windows 95/98/NT)

Software Organizer

enables computer owners, institutions, and software dealers, as well as computer clubs to organise, catalogue, and manage their information about software.

(Limited demo)

• **Stay Alive 2.0**

(Windows 95/98/NT)

Keep your applications running after they crash. Stay Alive

enables you to save your work and avoid the pain of having to repeat it.

(Limited demo)

• **Wine Organizer 3.0**

(Windows 95/98/NT)

Wine collectors, hobbyists, wine clubs, and cellar owners can organise, catalogue, and manage their collections.

(Limited demo)

VNUNET WWW.VNU.CO.UK

Vnuset.com offers speed of delivery, accuracy and breadth of coverage from five market-leading weekly newspapers: *Computing*, *Accountancy Age*, *PC Dealer*, *Network News* and *PC Week* generating up to 50 stories every day of the working week. With correspondents in Europe, the US and Asia contributing daily to the VNU Newswire, a round-the-clock news service is available exclusively at vnuset.com.

More detailed information is available in a wealth of in-depth articles, covering news analysis and product reviews, from VNU's stable of monthly publications, including such titles as *Personal Computer World* and *Management Consultancy*, plus some of the best editorial material from VNU Publications' portfolio of 15 business and consumer titles.



JOBNET WWW.VNU.CO.UK

Jobworld.co.uk is a free service which provides you with access to thousands of new IT, business and finance vacancies every day. All you have to do is browse the site by job sector or search on a specific set of job skills or requirements.

The Jobworld Email Alert service offers extra freedom by sending only details which match the job seeker's preferences, allowing the recipient to control exactly what information is sent and when. Jobworld also offers links to job sites overseas, a guide to IT contracting and comprehensive lists of jobs from the top recruitment agencies in the UK.

www.jobworld.co.uk — *be the first to know!*



PCW CD OnLine

Access the internet direct from the opening screen!

CD Online offers an extension to the normal content contained on the disc by taking you directly to the on-line web sites of the companies featured. You'll be able to find out more about their products, the company itself and you could even send them an email and talk to them directly. If you're connected to the internet, you can visit these sites via the Content Links of the CD-Online section. In addition to the links, you can access the *Personal Computer World*, Vnuset.com and Jobworld.co.uk web sites, and a live up-to-date Technical Info page about this month's cover-mounted CD-ROM. There is even a sneak preview of what will be on next month's disc! If you've enjoyed the magazine and the CD, you can subscribe via email while you're online! If you have any other comments to make about the CD, please feel free to email us at PCW_CD@VNU.CO.UK.

➔ **To access CD Online**, click on the banner at the top of the main screen. This will automatically start your browser and open the main menu. If you don't already have a browser installed, you can install the latest versions of Internet Explorer or Netscape straight from the disc.

CompuServe

You can enjoy one month's free membership to CompuServe, which includes

- **Free** Unlimited access for one month*
- **Free** Online tour of CompuServe
- **Free** Email address
- **Free** 5Mb of web space

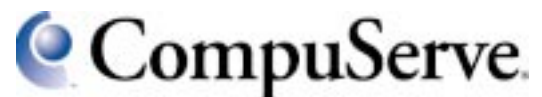
CompuServe is the UK's most exciting online internet service offering fast and easy access to the internet and its own exclusive online services. CompuServe organises the internet into easy-to-use categories so that you can find what you want at the touch of a button. Go shopping, book holidays and flights, find out about the latest films, keep up-to-date with news as it happens or simply keep in touch with family and friends around the world with CompuServe email.

*The free online time is available during the first month following registration only, subject to our Fair Use Policy (GO UKFAIRUSE). You must be 18 years old or over to register for CompuServe membership. Premium Services (clearly marked) carry a surcharge and are excluded from the free online time. After your free trial your membership will continue and

payments will be charged automatically when due, unless you decide to cancel your membership.

PCW DETAILS

Platform
Windows 95 and 3.1
Limitations One month free membership. Unlimited access.
Contact
0990 134819



Lexon PC prices

In last month's issue we group-tested ten PCs costing £499+VAT. Shortly after publication of the issue, Lexon (Editor's Choice with its Entra 333) was forced to raise the price of its system to £549+VAT.

Lexon claims this was due to dollar fluctuation following floatation of the euro, resulting in a rise of component prices which could not be swallowed by the original system price.

Lexon posted this change on its web site immediately. In the features table we misprinted details of the Lexon system's processor and on-site warranty. Our apologies to Hi-Grade whose number was printed on Lexon's review.

While at the time of publishing, the costs shown relative to goods reviewed are accurate and in accordance with the details as advised by the supplier, it is nevertheless incumbent upon the consumer to obtain verification prior to placing an order due to third-party fluctuations in the marketplace which may ultimately affect the actual sale price.

NEW COMMS

Net gets off B-roads at last – and it's wonderful

ADSL, which pumps up to 2Mbit/sec down a standard phone line, has arrived at last – and it will change lives.

How quickly will depend on the pricing, and on how fast BT can boost its infrastructure, and on how soon people latch on to the potential.

Virgin Net, one of four providers running pilots in London, linked up my home and I was more than impressed. It seemed a momentous occasion, like the advent of mains electricity. ADSL, and cable modems, will surely become so ubiquitous that people will take them for granted.

ADSL does not always seem fast because you can only get data as fast as the web can deliver. One purpose of the pilots is to see what people use it for, to help service providers to cache popular content on fast servers. This will relieve backbone demand and ensure fast delivery.

Still, even the downstream path of 256Kbit/sec or more

ADSL (Asymmetric Digital Subscriber Line) is one of several similar technologies going under the heading xDSL. It piggybacks a high-frequency signal onto a phone line, providing a *permanent* net link. Normal phone functions are unaffected. ADSL requires some tweaking at your exchange, and currently a BT engineer has to fit three boxes at your home: a splitter to filter off the HF signal, an ADSL modem, and a router. A standard for a slightly slower version called UDSL, or DSL, has been agreed. This can be user-installed and may be deployed as a cheaper alternative.

is four times as fast as a single ISDN line. And the upstream speed is well fast enough for video, to which one of the London pilots is dedicated.

Just as important, which I did not fully appreciate until ADSL was in place, is that it is always on. This makes feasible many web features that have never quite taken off, particularly those like magazine delivery that use push technology.

Other obvious uses are security (you can maintain a permanent video 'eye'), game playing, videophones and even standard phone calls using voice-over-IP. A big question is what this will do to standard

phone revenues. The impact on e-trade could be such that ADSL may become free, financed by ads and transaction revenues, says John Swinge-

wood, director of BT Internet. In the short term it will be more costly and the rollout across Britain could take three years or more. Some see a possible conflict between BT's commercial interests and those of users, even Britain's: this is, after all, the IT equivalent of the M1. So be prepared to lobby your MP if prices are set too high or the rollout is too slow.

I've only just got my link and will write more next month on how it pans out. CLIVE AKASS

Fast graphics boards challenge new PIII

The successor to the PII chip has been named... wait for it...the PIII. Intel says the chip, codenamed Katmai and due to launch at the end of February, will offer faster



graphics thanks partly to

70 new machine-code calls. These are called the 'streaming SIMD extensions' or KNI – Katmai new Instructions.

We will be able to write more about the PIII (right) after the launch. But developers have been using the new code for months as

Intel did not wish to repeat the mistakes of the MMX launch, when there was a wait for supporting apps.

The PIII extends the performance gap over entry-level Celerons, in line with Intel's policy of targeting different chips for different markets, rather than the early one-Pentium-for-all strategy.

But users are starting to question whether KNI is redundant. Geometry acceleration on 3D graphics cards like the Voodoo2 offload most jobs from the CPU. One California graphics

chipset maker plans a card with full geometry acceleration for around £100. So, just to play cutting edge games, should you buy this or Intel's £400-plus Godzilla?

● Fujitsu has picked S3's Savage3D accelerator for a new line of games PCs. It is the only one fully supporting S3TC texture compression, part of the DirectX 6 API. S3TC cuts the band-width needed to get data from RAM, allowing higher-quality textures and boosting performance.

Meanwhile, Diamond

has reiterated its support for nVidia in the wake of 3Dfx's surprise merger with STB, which turns 3Dfx into a major board supplier for new PCs but leaves allies like Diamond in the cold. See page 52.

AJITH RAM



● Chips for 2000 AD ... see page 144

● More chip news ...see page 48

DIGITAL TV

Microsoft challenges Jini with new global plug-and-play plan

Microsoft has unveiled a rival to Sun's Java-based Jini, which aims to allow all manner of intelligent devices to talk to each other.

The Universal Plug and Play (P&P) technology is based on the net standards TCP/IP and XML (eXtensible Markup Language), Microsoft says.

Sun-developed Java is a source of some contention between the two companies.

Partners backing Microsoft on Universal P&P include Intel, Texas Instruments, 3Com, Cisco, AT&T, Compaq, Dell and Hewlett-Packard. Sun is conspicuously absent. So is IBM, which is reportedly working on similar technology called Tspaces.

Rumours of a Microsoft answer to Jini, due to launch by the time you read this, have been around for months. But Sun chief operating officer Ed Zander said at CES: 'We believe we're going into a post-PC era that is non-proprietary.'

Microsoft is downplaying similarities with Jini. Instead the technology is presented as an extension of Windows P&P.

Universal P&P amounts to a barebones peer-to-peer networking technology. It allows devices on a network to assign themselves an IP address, locate each other, and publish their functions in an XML document.

It will, says Microsoft, be leaner than Jini, requiring only a 25Kb to 35Kb TCP/IP protocol stack and a 15Kb to 25Kb ultra-small web server. This is about the same as Jini's 48Kb core but, unlike Jini, it will not require a Java virtual machine. Microsoft says it will work on multiple networking layers, including Universal

from Dominique Deckmyn in Las Vegas

Serial Bus (USB), Irda, Firewire and IP. Microsoft showed at the Consumer Electronics Show how a handheld PC could use Universal P&P to use a printer.

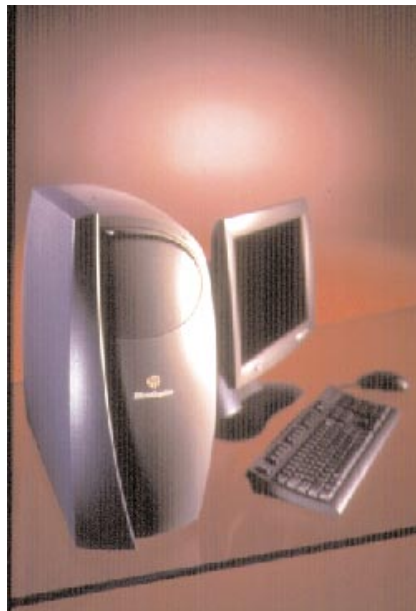
'Jini requires everything to be rewritten in Java,' said Phil Holden, Windows group product manager. 'That's

fine, if you like Java. We've chosen a more practical approach.'

Microsoft hopes to present a completed specification and reference design at its WinHEC event in April. The technology will be a feature of Windows 2000.

Products based on Universal Plug and Play are expected by Christmas, said Holden.

- Microsoft trial - page 38
- More from CES - page 31



Silicon Graphics, famous for its Hollywood-class graphics stations, has launched two revolutionary desktop-priced models using Windows NT and Intel processors. They are functionally PCs but use an architecture redesigned around a new Cobalt chipset which directly links the processor(s), graphics system and RAM — an arrangement that's a claimed six times faster than a 2x AGP graphics port. They also boast two 64-bit PCI buses — one dedicated to the hard disk. The entry-level SGI 320, available now, uses up to two 450MHz PII processors and 1Gb of RAM. Prices (all here quoted ex VAT) start at £2,340 with no monitor. Shipping in a few weeks is the SGI 540 which can use up to four 450MHz Xeons. Prices start at £4,130. Both models are optimised for SGI's £1,720 1600x1024 17.3in 1600SW flatpanel monitor. The models are a major win for NT, which has seen a steady drift of graphics applications and users from the Mac platform. SGI 07000 320540; www.sgi.co.uk/visual

SGI ships 'Super PC'

ISP SPEED TEST

Which net providers offer the fastest access? Do modems matter? Does it make a difference whether you live in Scotland or Southend? Help us find the answers by going to www.speed.pcw.co.uk and taking part in our biggest ISP test ever. It should take less than two minutes and your help will be appreciated. Results will be published in a forthcoming issue of PCW.

WIN98 NET SHARING

Windows 98 is to allow linked PCs to share a net connection. The feature will be available as a free download and as part of Windows 2000.

Air guitarists get real

There's hope at last for all those air guitarists who could play just as well as Jimi Hendrix if only they knew how to play a guitar.

A program called The Axe, from Harmonix, allows you to play like a master with none of the tiresome business of learning technique.

It works like an instrumental karaoke: you play lead to a backing track — except that the software provides

the notes. You do the bending of the notes and other effects using the mouse or keyboard.

You are not restricted to heavy metal, either. You get a choice of electric guitar, jazz guitar, piano, trumpet, sax or scat voice.

I tried it at Comdex last year and it's great fun. You can buy it online for \$19.95 from www.theaxe.com.

CLIVE AKASS



'You were playing Pete Townsend!? Does that mean you had to go smashing up your PC!'

short stories

HAYES FIGHTS ON
Modem pioneer Hayes said it expects to seal a survival deal in February after going into Chapter 11 protection for the second time in five years. Most of its 250 US staff were laid off but at its profitable European division in Surrey, Hayes' small team of sales, marketing and administrative staff are continuing as usual.

VNU NEWSWIRE



This 21in Eizo FlexScan T960 offers a 1600x1200 resolution at a refresh rate of 92Hz on a low-reflection flat screen. It packs a USB hub and twin video inputs and costs £959 ex VAT.

Professional Display Systems
01483 719500

DISPLAYS

Projectors challenge big screens

Digital projector systems are emerging as a serious rival to big gas-plasma screens that can cost £10,000 and more (see Tim Bjarin, opposite).

The projectors use three internal LCD displays, corresponding to a computer's RGB output. The three colour images are merged via a prism and projected onto a screen.

These devices have been used mostly by business people for laptop-based present-

ations, and until recently cost almost as much as plasma displays. In Focus's LP750, featured in last month's gadgets, lists at £7,044 inc VAT.



But prices are falling and the new Ask A4 Compact (pictured, above) lists at just under £4,000 and is selling for just £3,250 ex VAT. Prices could fall to below £2,000 by next year as the number of companies making the gadgetry increases — currently most models are based on an Epson engine.

Those sort of prices could extend the use of these devices to homes and small businesses. They can be used to project video and TV as well as computer displays.

The Ask A4 Compact weighs just 3.5kg and supports resolutions up to 1024x768 (1152x 870 Mac) and includes a remote control.

ASK 01753 701050; In Focus 0181 213 2100



This is the domestic bliss NatWest envisages you will enjoy with its new online banking service, which is direct dial rather than net-based because of security fears. Facilities include credit transfers, payments, ordering cheque books and statements.

www.natwest.co.uk

POINT OF VIEW

The perils of D-I-Y

Being a computer journalist is a bit like working in a busy toyshop: you are surrounded by toys you don't have time to play with. The Christmas break, despite a bout of flu, gave me a few spare hours and I grabbed the chance.

Naturally, I tried to do too much. I gave my venerable Dotlink PC a heart transplant in the form of a Gigabyte GA-5SG100 motherboard, a 350MHz K6-2 processor and 64Mb of RAM, giving me virtually a new PC for just £250 (I was given a 3Dfx graphics card).

I also decided to partition the 3Gb drive on my other home PC, a two-year-old 166MHz MMX running Win95, and install both Windows 98 and the new BeOS 4.0 as a dual-boot system. And then to network the two machines.

Some 24 hours later the revamped Dotlink was up and running — but cutting out every few minutes. And the MMX was a disaster zone. What had

happened was this. The BeOS disk packs Partition Magic for setting up the dual boot. This involves a hair-raising remapping of the hard drive, but it went smoothly enough in my case.

The BeOS install was still more nerve-racking. A screen message warned me that it would wipe all the data on my secondary partition, and was I sure I wanted to go ahead? Of course I wasn't sure, given that I had been given no indication which partition was which.

I went ahead anyway and the BeOS installed itself happily down to the last screen message. Then it announced that it could not write my MBR (master boot record) and could not therefore install a boot manager. I left it there, a ghost on my machine (Windows can't see the BeOS partition) as my priority was to get the PC going. The Win98 install hung when

Setup lost the very CD drive it was running from. It blamed 'incorrect plug and play' information from the secondary IDE drive. So there I was with two unusable PCs and a partner complaining loudly that she had nothing on which to write an overdue essay.

Win98 insisted that I needed a BIOS upgrade to get it to run so I reverted to Win95 — Microsoft had provided an easy uninstall procedure. But something odd has happened to the registry, so I cannot get Win95 to use my new plug-and-play D-link network card.

The Dotlink is good news. I reseated the CPU fan, which I'd set slightly askew, and the PC has run fine ever since. In fact, I was impressed at how easy the heart swap was. PCs have become so modular, you can slot them together like Lego.

But the other upgrade shows the hassles you can get into if something does go wrong. If you cost out your time, D-I-Y can be a false economy.

Clive Akass



tells a tale of two PC upgrades

It's home, home on the range for network firms

IBM and Cisco plan to persuade people to network all kinds of home devices, from PCs to entertainment systems, security devices and fire alarms.

Cisco chief executive John Chambers demonstrated a system using a combination of cable, phone and radio links.

He featured home

from Jan Howells in Las Vegas

broadband products, including a Hitachi set-top box that delivers a standard TV signal with a windowed net link.

'The internet revolution was started by big businesses... Today, consumers are the driving force,' he said.

Home networking will generate around \$4 billion by 2002, according to market researcher Wedbush-Morgan (Forrester Research reckons \$2 billion).

IBM is pushing its Home Director which connects home systems such as PCs, security and lighting.

Product manager Craig Merrigan said: 'Home networking will be a way for builders to differentiate new homes.'

Sharewave used CES to launch its new 2.4GHz wireless home net, while Intelogis showed off one based on power lines, writes *Tim Bajarin*.

Two companies showed me networks based on phone lines, which look perhaps the best approach.

Wireless and phone nets will reach 10Mbit/sec by next year, the developers hope.

PC or TV – which should be boss?

The most interesting debate on home networks is whether the PC or TV will be the network server. PC companies believe that it should be a PC. But Howard Stringer, president of Sony US, opined in his CES keynote that the digital television will be the server of choice. This is an important issue which will pit the industries against each other. But digital TVs cannot be made without chips and even hard drives from the PC industry.

The PC industry is also ahead in controlling operating systems. Some TV companies want to create their own, but they will be aware of the growing support of software developers for Windows CE and Personal Java. It seems they will be forced to use PC technology whether they like it or not.

TIM BAJARIN

Talking net aid for drivers

Some 1.3 million Windows CE devices have been sold, said Microsoft senior vice president of consumer strategy, Craig Mundie.

New classes of CE device, such as the AutoPC and the Sega Dreamcast game console, are just reaching the market. Microsoft demonstrated the latter running WebTV software as a 'game'.

It also showed an AutoPC system using General Magic's Portico, which provides messaging and other services using voice recognition.

It used Portico to obtain a list of hotels near the car, whose position was obtained through AutoPC's GPS (Global Positioning System) system.



Pictured above is a prototype AutoPC system developed by the Silicon Valley firm Clarion (www.autopc.com).

DOMINIQUE DECKMYN

DigiTV gives us a smart VCR

The hottest product category at this year's CES was the emerging standards for **digital television** and digital high definition television (HDTV).

Most observers see DTV as stopgap until HDTV gets cheap enough for mainstream buyers. But I see this interim period as being short lived. Last year at this time, HDTV was \$15,000; this year should see some half that price and prices might get as low as \$5,000 early next year. The cheaper models used rear projection rather than active-matrix or gas plasma screens (which are still \$12,000 and more).

The other hot topic was **digital video recording systems** coming from Replay Networks and Tivo — front-end systems that serve as receivers for digital cable and satellite broadcasts. Each deploys MPEG II compression and large hard disks that allow you to store up to 27 hours of content. They also allow you to pause a show and return to it as if there has been no interruption. Replay calls it 'Prime Time Anytime'. Cost for the entry-level 7-hour version is \$799.

Also prominent at CES was the all-in-one PC design popularised by the iMac.

Hitachi, NEC and Samsung already have similar systems that use flatpanel displays. In fact, many of the top PC vendors are all working on similar products that will be out this summer.

However, the new twist Apple has given to the iMac (*see pages 34 and 74*) is causing them to rethink their designs. Now the iMac comes in colours, the new all-in-one PC products coming out in beige pale in comparison.

So, I expect them to do some fast dancing and try to change the colours of at least some of their models by the time they debut later this year.

CES used to highlight the gaming market, but that has moved to a mid-year show that now takes place in Atlanta. But, if you want to see the latest and greatest TVs, stereos, and consumer electronic products, this is the show that defines what this industry will bring to market in 1999.

Tim Bajarin



letter from the CES

short stories

► **HONEST JOHN BULL**
Britain tops the European league for honesty in software use, according to a survey commissioned by the Business Software Alliance. Nearly seven in ten (68 percent) of UK software managers checked their licences at least twice a year compared with an average of 40 in ten across Europe. Also, the BSA claims, people believe the penalties for software piracy should be higher and they regard it as being as serious as tax fraud.
BSA 0800 510510

► **FIT CANDIDATE**
ArcSoft's £24.99 (inc VAT) PhotoPrinter version 2.0 is said to save money by allowing you to fit several photos quickly and efficiently onto a single sheet of paper. A sister product, PhotoFantasy, which costs £29.99 inc VAT, allows you to stick your photos onto a wide selection of fantasy backgrounds.
Gem 01279 822800



► **20.4GB HARD DRIVE**
Western Digital has launched a four-platter 20.4Gb hard drive using technology licensed six months ago from IBM. It features a high-speed Ultra ATA/66 interface and Data Lifeguard, which is said to isolate and repair damage before data is lost.
Western Digital 01372 360055

► **DOS ON PSION 5**
You can run any of thousands of DOS programs on a Psion Series 5 palmtop using NB Information's £24.99 (inc VAT) XTM utility, which emulates an early XT PC. It supports text and CGA graphics modes at 320x200 and 640x200 resolutions.
NBI www.nb-info.co.uk

PROCESSORS

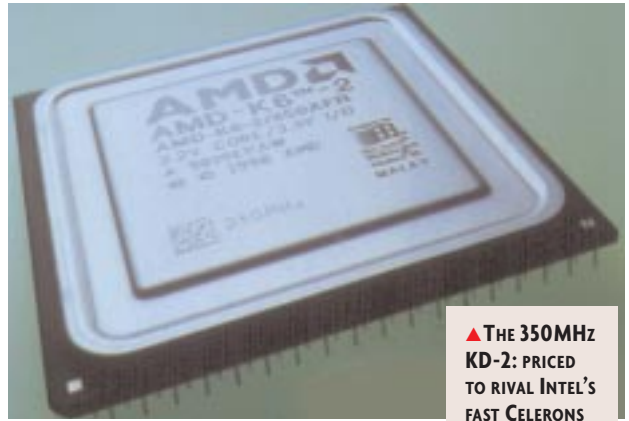
Intel blocks overclocking

Fast Celerons launched last month will not allow overclocking, Intel says. First versions of the 366MHz and 400MHz chips will not be affected but a 'clock lock' will be built in to production versions.

Some users claim to have run the chips at 550MHz and 600MHz. Intel declined to say how the clock lock works.

AMD pre-empted the launch of the chips by cutting the price of its fast K6-2s by up to \$60 as part of a continuing price war. Late last year Intel slashed prices of its 300MHz and 333MHz Celerons in a bid to shift stocks.

Cyrix and some distributors then claimed Intel was dumping Slot One Celerons to push



▲ **THE 350MHz KD-2: PRICED TO RIVAL INTEL'S FAST CELERONS**

Socket 370 processors into the marketplace.

Bulk prices for the 366MHz and 400MHz Celerons are \$123 and \$158 respectively. The 350MHz K6-2 is around \$100, and the 400MHz is \$175 over the

counter:

bulk price will be about that of the 400MHz Celeron. Prices of Intel's 300A and 333MHz Celerons drop to \$71 and \$90 respectively. Intel also cut 350MHz and 400MHz PII prices by five and six percent respectively to \$202 and \$353.

Later this quarter AMD will release a 450MHz K6-2 and in February its new K6-3, also known as Sharptooth, will reach volume production

Rana Mainee, European research director, says AMD will feel strong enough later this year to maintain its prices if Intel undercuts them.

MIKE MAGEE

Enter three new Xeons

Intel has introduced three 450MHz additions to its high-end Pentium II Xeon chip family. The processors come with 512Kb, 1Mb and 2Mb of Level 2 cache (costing respectively \$824, \$1980 and \$3692) and are designed for use in servers and workstations. The chipset and processors will support four-way symmetric multiprocessing (SMP) machines. Intel says systems using the 2Mb Xeon gave 10 percent better performance than a 400MHz Xeon with 1Mb of Level 2 cache.

Ham it up with a radio scanner

We would be the last to suggest that any PCW reader might need (or even wish) to eavesdrop police radio channels, which is illegal.

But they represent just a small slice of the 0.01 to 1300MHz frequency range covered by Icom's PC-based IC-PCR1000 radio scanner.

You can receive amateur radio, emergency services, air traffic control, marine band and normal radio services.

The £199.99 device, the size of a small modem and plugging into your serial port, is controlled by a choice of two user



interfaces, one designed for beginners and the other for advanced use.

Icom 01227 741741; www.icomuk.co.uk

short stories

WOMEN'S TROUBLES

Women are more prone to Ecstasy than men, according to research carried out by Release, using the statistical analysis package SPSS. More women than men in a survey of 550 users reported pleasant effects — but also, more reported problems such as nausea and mood swings.

SPSS 01483 71200



PRINTS CHARMING

Sony has achieved unexpected success with its Mavica range of digital cameras, which use a floppy disk to store pictures. Its new FVP-1 digital printer will provide instant 114 x 85mm colour prints straight from disc at resolutions of up to 1.4 megapixels. The FVP-1 is available now for about £600.

Sony 0990 111999

RECYCLING INITIATIVE

A laser toner recycling scheme in aid of the British Institute for Brain-Damaged Children has now been extended to cover inkjet cartridges.

Ring 01278 684060 for a free information pack.

ADEPT AT ADAPTATION

ISDN terminal adapters are one area where USB should score quickly over standard serial ports, which can be overloaded by devices.

Electronic Frontier is selling the DrayTek Vigor128 for £149 (ex VAT), or £189 (ex VAT) for an iMac version.

Electronic Frontier
0118 981 0600

MACINTOSH

New big Macs drop SCSI

Dominique Deckmyn reports from MacWorld.

Apple has rolled out a new family of **PowerMac G3 professional systems** featuring PowerPC G3 chips running at up to 400MHz with a 100MHz bus, up to 1Gb of RAM and a maximum 100Gb of disk storage.

The machines, unveiled at MacWorld in San Francisco, have four expansion slots and are equipped with standard 100Mbit Ethernet.

More controversially, they dispense with the Mac's traditional SCSI interface in favour of Universal Serial Bus (USB) and Firewire ports. Steve Jobs claimed 'history has passed by' SCSI although a SCSI add-on card is available for \$49.

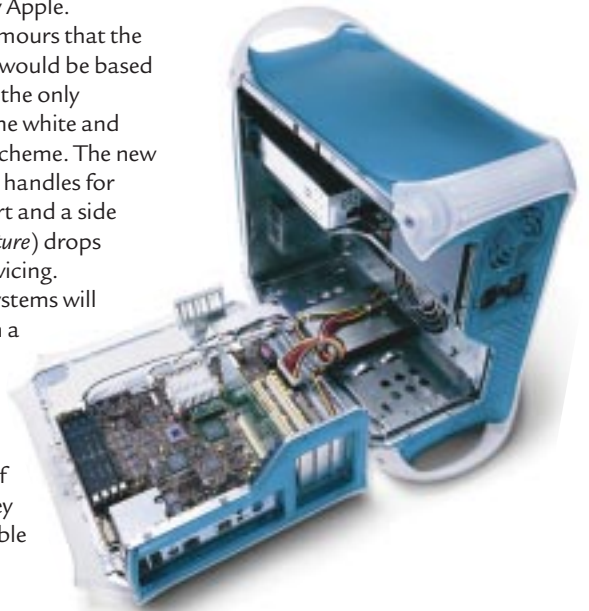
The Firewire bus allows peripherals such as video

cameras to be connected at speeds of up to 400Mbits/sec. Firewire, known more prosaically as 1394, was originally developed by Apple.

Despite rumours that the new systems would be based on the iMac, the only similarity is the white and blue colour scheme. The new systems have handles for easy transport and a side panel (see picture) drops down for servicing.

The new systems will all come with a built-in ATI Rage128 graphics accelerator with 16Mb of memory. They will be available immediately, priced from

\$1,599 to \$2,999. Jobs claimed they outperform the fastest Pentium II systems by a wide margin.



Rhapsody unveiled

Steve Jobs also announced the Mac OS X Server operating system based on the technology acquired from NeXT. It was formerly named Rhapsody and is a precursor to Apple's next-generation desktop operating system, Mac OS X, which Jobs now said will ship 'in less than a year'.

Mac OS X Server is based on the Mach microkernel and will ship with an Apache web server and Apple's WebObjects development environment. Jobs demonstrated a rack of 50 iMacs, all running video streaming off a server running Mac OS X Server.

The operating system will ship in February, priced at \$955 per server, for an unlimited number of clients. A new G3 PowerMac equipped as a server, with Mac OS X Server, will cost \$4,999 [full review next month].

Shades of success

Triumphant Steve Jobs claimed in his MacWorld keynote that **800,000 iMacs had been sold** since their 15th August launch — and he took dealers by surprise by announcing four new translucent shades of the all-in-one design: grape, tangerine, lime and strawberry [see Gadgets, p74]. Jobs also announced a new line of iMacs, priced at \$100 below the original iMac at \$1,199 and with a faster 266MHz G3 processor and a 6Gb hard drive. Missing, though, was the long-expected introduction of a consumer portable machine.



Trial and error

Graham Lea reports on Microsoft's **current court battle** and its possible impact on users.

At half time in the epic trial between the US Department of Justice (DoJ) and Microsoft, it looks as though Microsoft is losing. At issue is whether Microsoft has competed unfairly against competitors such as Netscape (by allegedly pressuring PC makers, software vendors and online service providers to use Internet Explorer rather than Navigator); Sun (by allegedly corrupting Java); and Apple (by the alleged techno-sabotage of QuickTime), to give just three examples.

The first stage of the present case, which started last May, is being decided in the US District Court in Washington DC by Judge Thomas Penfield Jackson, and a decision is likely to take a few more months. Whichever side wins, it is probable that the loser will take the case to the Court of Appeal and/or the Supreme Court, where decisions are made by politically appointed judges who mostly favour big business.

As usual, the victims are users, who pay an ever-higher price for the operating system at a time when all other hardware and software costs are decreasing dramatically. According to data that came to light during the trial, the cost of Microsoft operating systems increased 260 percent between 1990 and 1996 when other costs have gone down. Microsoft cannot argue that the increased capability of Windows justifies the increase, because all hardware and software has seen similar or greater increases in functionality, and lower prices, as a result of competition.

Microsoft's 49 percent profitability is the highest of any major US corporation, so the inevitable conclusion is that Microsoft is exploiting its monopoly, as well as using the monopoly to leverage its way into other markets like the internet. Microsoft's entrenched monopoly (which it denies) has resulted in package software developers like Intuit only developing for Windows, while others have scaled back their Mac

and Unix versions. A brave few like Corel and Star Division have recognised the need to support new developments like Linux. Innovators like Norway-based Opera Software, the producer of a browser that in many ways beats both IE and Navigator, finds that the market for pre-loads is effectively blocked by Microsoft's business practices.

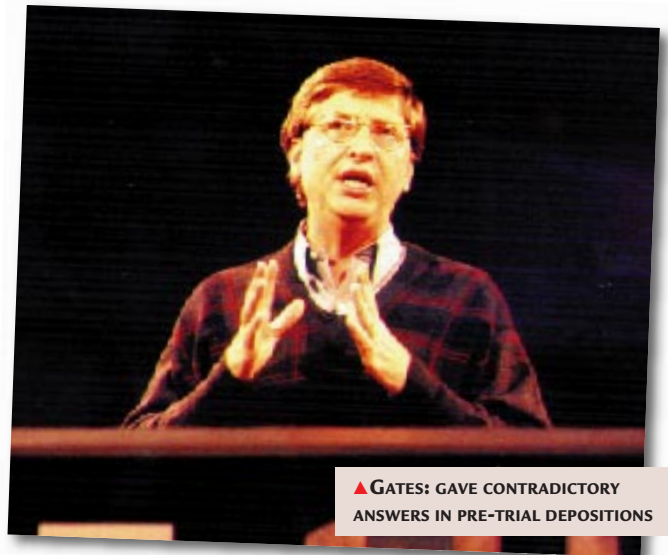
Microsoft maintains its monopoly by means of a choke hold on PC makers, making it very difficult for them to load Linux without Windows, for example, if they wish to install Windows on other models for a price that allows them to remain competitive.

The procedure in the court is for each witness to present written testimony in advance, to save court time, and then to be cross-examined on it. The DoJ has now presented the 12 witnesses it was allowed, and Microsoft's witnesses (nine of them senior employees) are now being

subjected to cross-examination. Bill Gates' appearances in seven video-taped excerpts from his three days of compulsory

deposition before the trial started has not helped Microsoft's case. He was most reluctant to answer questions, and many times his answers contradicted email evidence that the DoJ introduced.

Microsoft's propaganda has focused on a plea that it be left alone by the government and allowed to innovate, but the problem with this defence is that it is hard to think of any significant Microsoft innovation other than its anti-competitive marketing practices. Microsoft wants exemption



▲ GATES: GAVE CONTRADICTORY ANSWERS IN PRE-TRIAL DEPOSITIONS

from the competition laws, saying in effect that because cars can go faster, there should be no speed limits.

In many ways, the real battleground is not Judge Jackson's courtroom, but the court of public opinion that Microsoft has been doing its best to influence. There is no evidence of impact on users so far, or even on Microsoft's share price, which has risen to record levels.

Even if the District Court does find against Microsoft, it will be hard to devise remedies that would be effective in bringing back choice for users and making possible fair competition between software vendors. The remedy most discussed has been the break-up of Microsoft into operating systems and applications companies, but this is unlikely to work for several reasons, not least the time it would take before it happened.

Whatever happens in the coming months, the result of the trial will affect all users and determine if there will be fair competition between software producers, and whether users will be offered truly innovative, competitive software at reasonable prices.

➔ Graham_Lea@heterodox.com is an independent computer industry analyst specialising in Microsoft. He comments daily on the trial at www.theregister.co.uk

Just because you're paranoid...

...doesn't mean that **viruses, bugs and security hazards** are not out to get you. Does it?

The announcement of a new super-smart virus which infects NT networks sent a shiver through the IT industry late last year. First reports of the Remote Explorer virus made it sound like the binary equivalent of getting anthrax in your air conditioning.

Panicking NT administrators flooded Microsoft and anti-virus companies with queries about the virus.

But there were soon accusations that Network Associates Inc. (NAI), which detected the virus in an MCI WorldCom network on December 17, had hyped the problem. NAI was also criticised for waiting four days before releasing the code, breaking an industry rule on sharing anti-virus information; the name of the victim also leaked out, contrary to standard practice.

Nick Fitzgerald, editor of the Anti-Virus Bulletin, said: 'If the virus was as dangerous as NAI said it was, then it was irresponsible not to share the code; if it was not that dangerous, then its initial press announcement was misleading.'

Nevertheless, he agreed that the new virus, written in C, leaves no room for complacency. NAI, which now owns the Dr Solomon anti-virus range, described it as one of the most sophisticated yet discovered. It infects program (.EXE) files, and renders text and HTML files unusable by encrypting them.

What makes it unique is that when an infected .EXE file is run by a user with administrative privileges, the virus installs itself as an NT service — and proceeds to infect files in machines within that user's privileged domain or domains.

Fitzgerald says there are three reassuring factors:

- The code is bug-ridden and the virus is easily spotted.
- At press time, the MCI WorldCom outbreak was the only one that had been reported. Affected parts of the network were quickly quarantined to stop it spreading.
- Someone with administrative privileges is needed to spread the virus. MCI WorldCom is undergoing a big shake-up, and there has been speculation that the virus was the work of a disgruntled employee.

On the other hand, first instances of viruses can be relatively crude and later versions may be more dangerous. Virus scares have the benefit of alerting people to the general problem — and there are several dangerous new strains floating about. Even as the Remote Explorer furore began to die down there was a warning about another alleged threat,

called the Russian New Year after its origin and time of announcement. This uses HTML and the Excel function

CALL to steal or copy files, though no real-life instances have yet been detailed. Fitzgerald said: 'The main thing is to get people

regularly updating their virus checkers. That way, when a new strain does break out, it won't get very far.'

...the binary equivalent of anthrax in your air conditioning

Microsoft says Remote Explorer 'does not exploit any security vulnerabilities' in NT and that normal anti-virus precautions will reduce the threat. These include logging on as an NT administrator only when necessary.

To check if your system is infected, go to Control Panel/Services to see if one called Remote Explorer has been installed. It is run from a file that is stored in %systemroot%\system32\drivers\IE403R.SYS

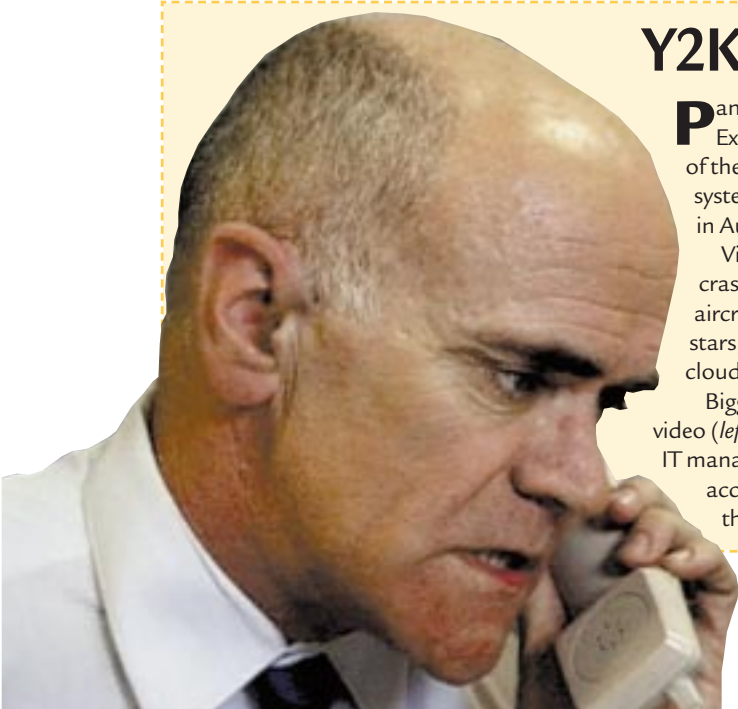
Leading anti-virus firms such as Symantec have fixes both for the virus and the encrypted files.

Y2K panic goes sky high

Panic of the Month is the millennium bug rather than the Remote Explorer virus. Curiously, one of the first reported date problems of the year concerned not Y2K but certain Global Positioning Satellite systems which could only count up to 20 years — a time that expires in August.

Visions of planes wandering aimlessly around the skies until they crashed were dispelled by Those In The Know, who said all the world's aircraft had been checked. Anyway, all pilots know how to guide by the stars, don't they? Isn't that the Pole Star we glimpsed through those clouds? Doesn't that point south?

Biggest scare was in Australia where a Y2K consciousness-raising video (*left*) reportedly sent waves of terror through the ranks of antipodean IT managers. The video, called 'Neighbours meets the Year 2000', was later accused of being over the top. If you want to monger a Y2K scare, the UK distributor is Look Multimedia (0171 255 2670).



Adobe fills its web gap

Graphics specialist Adobe has bought into the professional web authoring market with the purchase of the Cyberstudio web authoring tools as part of an acquisition of Golive Systems. Adobe's only, somewhat limited, success in this field has been with its low-end PageMill tool, featured in this month's web authoring group test (p190). Now it has become an instant front-runner for Mac-based web

package aimed at the more technical end of the market, keeping it distinctly separate from PageMill, which is aimed at the creation of smaller sites. Adobe says Cyberstudio outsells its nearest Mac competitor, Macromedia's Dreamweaver, by two to one. And Bruce Chizen, worldwide marketing vice president, said Adobe would port the software to Windows at 'internet speed'. He declined to give a ship date. Macromedia,

meanwhile, is not sitting on its laurels. Dreamweaver 2 came too late to earn a place in the group test, but it nonetheless threatens to out-Adobe Adobe for a combination of power and ease of use. See next month's PCW for a full review.



▲ DREAMWEAVER: OUTSOLD, BUT THE NEW VERSION IS A WORTHY RIVAL TO CYBERSTUDIO

NIK RAWLINSON

Graduates on the fast track to success

Doing well for itself is a software company that took off in an undergraduate's bedroom at Churchill College just three years ago and has developed innovative web server software competing with the likes of Netscape and Microsoft, and open-sourced Apache.

Computer science graduates Adam Twiss, 22, and Damian Reeves, 24, claim their Zeus Web Server software is the fastest and most scalable commercially available. Zeus Technology has already racked up 300 customers across the globe, including big names such as Lycos, MCI and Cable & Wireless. The web server software has full FrontPage support, Apache compatibility, and is believed to be the only commercial server to offer 128-bit SSLv3 encryption worldwide.

The latest version 3.1 provides solutions for web hosting, intranets and secure e-commerce. Twiss said: 'In a nutshell, we simply have one process which handles thousands of connections, whereas the competition has a process per connection. Thus we utilise the hardware's resources more efficiently and achieve vastly superior performance and scalability figures.'

'We designed new software from scratch: most server software is produced to the original NCSA (National Centre for Supercomputing

Applications) web server software. We took a clean piece of paper and worked out what was needed to speed things up.' Today, 73 percent of the server software is exported with 60 percent going to the US. Customers are mostly ISPs and large web hosting companies. General manager Bryan Amesbury says: 'Competitors can only host around 4,000 sites on one server, whereas Zeus can handle 10,000.'

All aspects of the server software can be configured and managed via any HTML browser. A programming interface for interacting with external authentication services allows developers to produce efficient web applications quickly.

A round of funding has just closed with a group of City investors taking a minority equity stake. The company is talking about going public in 2000. <www.zeustech.net>

➔ **Connectivity specialist** Adder Technology has been named among the top 50 fastest growing technology companies in the Eastern Region [Deloitte & Touche Technology Fast 50 Awards 1998 <www.fast50.co.uk>]. Its latest product, AdderView, allows up to four computers to be controlled and monitored from a single keyboard,

monitor and mouse. One application might be a networked desktop PC sitting alongside one providing web browsing or email services, where the two have to be kept separate for security reasons. Pricing starts at £149.

Adder Technology was formed by Cambridge engineering graduate Adrian Dickens in 1984 as a publishing company. From writing books for home computer users he moved on to printer sharing, then produced a range of intelligent keyboard, video and mouse switches for sharing peripherals among computers.

Products for larger installations include SmartViewPro which can connect hundreds of computers. Customers include Barclays and Lloyds Bank, UUNet, British Airways and BT. <www.addertec.com>

➔ **Filmgoers** who have seen the Dreamworks release *The Prince of Egypt* will have had a taste of work produced by software from Cambridge Animation. Work is almost complete on a new Warner Bros feature, *Iron Giant*, based on the Ted Hughes story, which uses the Cambridge company's latest software, Animo 20. The filmmakers are hoping for a summer release. <www.cam-ani.co.uk>

Caroline Swift



continues her reports from Silicon Fen

The new year sales

Tim Bjarin predicts how the industry will fare as we enter a **more promising phase** in the PC world.

This time last year, almost everyone thought 1998 would be a solid year for Silicon Valley companies, with a host of colour printers, low-cost PCs and powerful servers coming out. Many thought the work of Intel and HP on the new IA 64 processor would bear fruit.

But the Asian economic flu, mistakes by some PC vendors with key products, and changing distribution trends, have caused many to look for better times in 1999. And IA 64 will probably not see the light of day until 2001.

PC sales worldwide will still come in at about 12 percent growth, an amazing figure given the Asian troubles. PC sales in the US will show about an 18 percent growth for 1998, with Europe coming in just a bit behind. But because of shrinking margins, US revenues will show a two percent growth or less.

Demand for PCs went up, but hardly anybody made any serious profits in 1998 except Dell and Gateway, whose direct-selling model has given them an edge. They can also get to market first with products using the latest Intel chip — though other PC vendors continue to create products that compete with the best on offer.

So, what's in store for 1999? First, Compaq, IBM and HP will have to get better distribution models in place if they want to keep up with an ever-changing PC market. This is tricky as they have invested heavily in dealer relationships, but the wave of the future is build-to-order, direct selling to both business and home users. The three have a key advantage in either selling model: they excel in support and service. But to stay on top, all the top five will have to continue to innovate in the technology of PCs, portables, servers, printers and even imaging technology — a market that is really taking off.

Any company that does not create a strong web-based commerce presence will be hurt. Intel is selling \$1 billion worth of products from its site each month, and Cisco records sales of about \$500 million monthly. PC vendors already have a web presence in several areas, but they have not embraced the e-commerce model as aggressively as I



▲ THE EASTERN MARKET SUFFERED AN ECONOMIC VERTIGO THAT LED TO A DISAPPOINTING 1998 FOR COMPUTING SALES AND PROFITS

believe they should. Companies like Compaq and IBM are afraid of burning their traditional dealers.

One vendor, Hewlett-Packard, is doing a bang-up job in one area, though. It is leading the charge into smaller, lighter mobile computing and has jumped on the Windows CE bandwagon in a big way. Its New Jornada 850 is a solid example of providing a new form factor that takes portable computing to a new level.

Two factors should help keep sales of PCs strong in 1999. First, many companies are looking at buying new PCs that can handle Windows 98 as a way to deal with the Y2K problem fast. And Intel's Pentium III (formerly Katmai) chips, due to launch next month, could encourage many users who want high-speed processing both in the office and the home to upgrade in 1999. These chips will start at 450MHz and go to over 650MHz by the end of 1999.

Aggressive roll-outs of cable modems, providing megabit-plus access to most big cities in America, could also drive PC sales up.

The Asian crisis will still haunt us in 1999, but we are starting to see signs of improvement, especially in Korea and

Hong Kong. And if Japan can get its act together in banking, it too could see an upward turn in 1999. But, even if Asia remains flat, most analysts still see demand for PCs rising in the US and Europe this year — though squeezing profits out will remain tough.

Believe it or not, I think the best years for the IT industry are still ahead of us. We have spent the past 20 years bringing technology to business, but have only scratched the surface when it comes to bringing digital technology to the masses.

PC-based technology accounts for \$850 billion in yearly revenues worldwide today; by 2005, with the adoption of PC-based technology by mainstream consumers, yearly revenues of digital technology could account for close to \$2 trillion.

The only question for any PC vendor is how they capitalise on this eventual demand for technology by mainstream users, and how they navigate the e-commerce jungle as it rewrites the way we do business in the very near future.

short stories

WALES DOMAIN

Welsh businesses are calling for their own top-level domain name. Gwent-based Citypages, which designs and markets web pages, has told UK domain registrar Nominet that many small- and medium-size Welsh businesses are requesting a Welsh domain. Nominet said it didn't have the power to create a Welsh domain, but Citypages says it will not give up its campaign.

JOBSITE

An internet recruitment service is hoping to take the work out of finding the perfect job. Jobsite offers CV distribution, which matches you to companies who are looking for people with your qualifications. It will also notify you when positions come up that match your preferences.

DOMAIN NAMES

Internet One (IO) has created a shared named depository, enabling different companies, organisations and individuals that legitimately use the same trade names in the real world to use such names on the internet without conflict or fear of 'cybersquatting'. With the growth of the internet, domain names have increasingly come into conflict with trademarks. Often two companies, sometimes in disparate markets, use the shared global medium to trade under the same name. The new database overcomes this problem by listing any company or individual that registers, allowing users to pick from a list when two or more share a name. The World Intellectual Property Organisation, which handles trademark disputes, has told IO that it supports the initiative.

www.io.io

E-COMMERCE

Spam frittered by new email law

Unsolicited email could be drastically reduced after two opposing groups agreed in December on a policy to outlaw spam while still allowing email to be used as a legitimate marketing vehicle.

The Direct Marketing Association (DMA) and anti-spam activists agreed that an opt-in policy was the most successful targeting method for online marketers. Traditional direct mail, as well as fax and telephone marketing, works on an opt-out basis, where consumers have to specifically request to be taken off lists. The DMA had wanted to extend this approach to email but anti-spam groups strongly disagreed, believing this was an intrusion of privacy as the responsibility is passed to the recipient.

At the meeting, the two sides also agreed to support

legislation which prohibits spammers from using false email addresses or headers for commercial email, without stopping otherwise legal email marketing.

John Mozena, of the Coalition Against Unsolicited Commercial Email (CAUCE), said it was a positive move, but would have preferred a more proactive action. 'We wish the DMA would endorse legislation to enforce opt-in,' he said.

A global database of all the email addresses of consumers who have asked not to receive direct marketing by email will be created to help co-ordinate the efforts of anti-spam organisations. It will then be available free to consumers as well as businesses and individuals to check before embarking on a mass email marketing campaign.

VNU NEWSWIRE

IT input is OK

Information overload is no longer the problem it once was, a report from Reuters has revealed. The report, called **Out of the Abyss: Surviving the Information Age**, interviewed business managers from around the world about how they managed their information technologies. It found that although many managers were still receiving too much information from many different sources, most were not so concerned about it as in the past. Only 26 percent felt they were overloaded. However, 40 percent of managers still said that fatigue from managing their information load was affecting their personal life, and 33 percent said it was affecting their health.

SUSAN PEDERSON

Baby, you're a site for sore eyes

A new web site will prove to be a godsend for new and expecting parents who don't know one end of a baby from the other. Babyworld, the first British-based site for mothers, provides information on all things maternal, from health issues and new product details to on-line breast-feeding demonstrations.

www.babyworld.co.uk



short stories

BLUE MOUNTAIN DEFEATS MICROSOFT

A small online greeting card company may soon win a legal battle against Microsoft. The US-based Blue Mountain is suing Microsoft over its Internet Explorer email product Outlook Express, which it says filters its greeting cards into a junk mail folder. Blue Mountain says that Microsoft set out to destroy its business, which was a threat to MSN's own greeting card service. The judge ruled that Microsoft must help Blue Mountain adapt its code to prevent the cards from being discarded.

GOING, GOING, GONE

An online auction house is offering internet users a way to clear out their hall cupboards and earn a little cash at the same time. QXL Exchange connects internet users from across Europe to buy and sell everything from appalling Christmas jumpers and Furbys to cars and computers. The main QXL site also offers goods and services from a wide range of companies.

www.qxl.com

INTERACTIVE 3D MOVIES

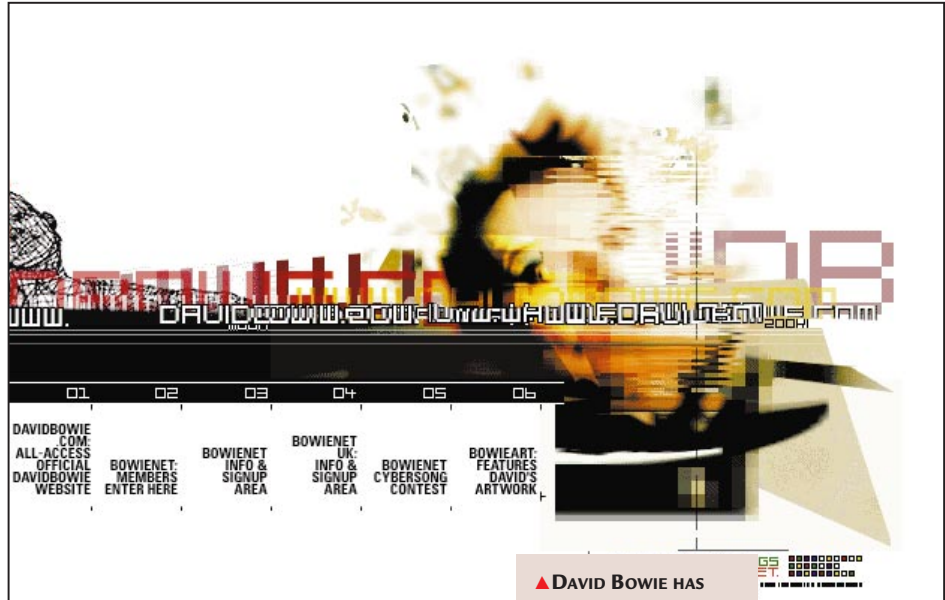
Internet users can now take a starring role in their own 3D interactive movies with TV characters such as Xena Warrior Princess, Ace Ventura and Superman. Brilliant Digital Entertainment (BDE) has launched a viewer that will let users make the plot decisions during its 'webisodes'. Short movie snippets are available for free on its web site, while full-length movies can be bought over the web or on CD-ROM.

<http://www.bde3d.com/>



MUSIC ON THE NET

Liquid music drowns net pirates



▲ **DAVID BOWIE HAS SUBSTITUTED OUTER SPACE FOR CYBERSPACE WITH THE UK LAUNCH OF HIS VERY OWN ISP, BOWIENET. FOR £10.39 A MONTH, FANS WILL GET INTERNET ACCESS, ONE EMAIL ADDRESS, 20MB OF WEB SPACE AND EXCLUSIVE ACCESS TO BOWIE'S UNRELEASED SONGS AND VIDEOS AS WELL AS CHATROOMS, NEWSGROUPS AND ONLINE GAMING. SOME CRITICS HAVE CALLED IT A VANITY PROJECT, BUT BOWIE IS LAUGHING ALL THE WAY TO THE BANK: BOWIENET HAS BEEN VALUED ON THE STOCK EXCHANGE FOR US\$500 MILLION.**
WWW.DAVIDBOWIE.COM

Anyone creating an unauthorised copy of a music track was forced to include the credit card number with the copies, which anyone who had the media file could see. Zip disks, however, have their own serial numbers so don't require a credit card based password. Up to 100 minutes of

Digital music software company Liquid Audio has teamed up with removable-storage maker Iomega to give consumers a secure way of downloading music from the internet directly onto Zip drives, creating what they claim to be a secure copyright-protected way of distributing music online.

As part of the Initiative, Iomega will bundle the Liquid Music player with select Zip drives. The software allows users to playback music downloaded from the internet, disallowing unauthorised second-generation copying of sound files.

Liquid Audio and Iomega have also partnered with online music retailing site SoundStone.com to create Tunus Collectus, a monthly music club that will allow site visitors to download selected tracks by popular artists. 'Our goal is to continually provide new portability options for consumers to help propel the legitimate sale of music on the internet,'

said Gerry Kearby, Liquid Audio chief executive. Liquid Audio recently signed agreements with Diamond Multimedia Systems and Adaptec to port secure Liquid Audio files to their players. The Recording Industry Association of America is said to be happy with the deal. Heavyweight record labels have been increasingly worried about the ease of music piracy on the internet and the lack, in their eyes, of a secure online distribution solution.

Previously, consumers wanting to purchase music in Liquid Audio format had to provide a credit card number that was bound to each file as part of a password.

Liquid Audio format can fit on to a Zip disk, the companies claim. Supporters of rival digital music format MP3, however, claim the deal is unimportant as users do not want more security. Unlike Liquid Audio music, MP3 format music files can be reproduced freely.

VNU NEWSWIRE

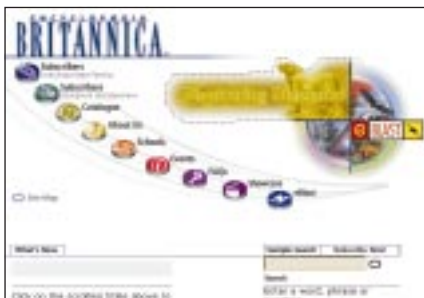
short stories

MUSIC TO YOUR EARS
Music fans will want to check out dotmusic, the self-proclaimed 'insider's guide to music'. The web site features 50 artist micro-sites which are creating fan communities, as well as a live countdown of each Saturday's singles chart. An online shop is also available.
www.dotmusic.com



LINEONE PRICING DEAL
LineOne has entered the cut-throat bidding war for internet users by cutting its membership charges. It reduced its monthly rate from £14.95 to £9.99 in December. Members get five email addresses and unlimited internet access as well as online newspapers and content.
www.linone.net 0800 111 210

BRITANNICA OFFER
The online version of Encyclopaedia Britannica is positioning itself as an access point for schools information. The site now includes thousands of links which have passed the organisation's criteria for accuracy. Institutional subscriptions cost from £180 a year, or about £30 to individuals.
www.britannica.co.uk



MOBILE LINKS

Green light for Orange trial

Orange has announced plans to trial technology for **accessing internet services using mobile phones**, but analysts said the operator may be painting the future a little too Orange.

Orange is the first UK mobile operator to announce a public trial using Unwired Planet's (UP) server and micro browser technology. Cellnet and Vodaphone are also known to be interested in the technology. Using UP's technology, Orange will be able to offer a range of internet-enabled information services.

Orange's chief executive, Hans Snook, said the trial brings the company one step closer to its vision of the wire-

free future. 'Orange believes that 90 percent of voice and data will be wirefree by 2010,' he added. But analysts said that the data capabilities of wireless networks are always likely to lag behind fixed networks.

'If you look at the progress with wireless technology using data traffic, yes, it can do the job, but it's nothing revolutionary compared to the progress of a fixed network,' said Dirk Bout, an analyst at Dataquest. An operator like Vodaphone is more realistic about the current capabilities of wireless, said Bout. They recognise its shortfalls and don't boast about the future. 'I believe Orange is painting it a bit too rosy,' he said.

The suitability of wireless data depends on the application, thinks Tim Hayson, principal engineer at Orange.

'If you look at the existing use of data, like extremely high bandwidth environments, some of those will have to remain fixed in the short term,' he said.

UP's software uses the WAP (wireless application protocol), a set of standards created by Ericsson, Nokia, Motorola and UP. It includes a programming language that lets web developers create sites suitable for viewing on mobile handsets. Orange says commercial services based on WAP will be launched sometime this year.

VNU NEWSWIRE



Cooking up a treat with SimplyFood

Gastronomes can pick up some hints at SimplyFood, a new web site from Carlton TV dedicated to eating and drinking. The site highlights the latest trends in the world of food, recipes, and a guide to cooking terms and techniques.

Lovers of the grape will appreciate the wine section, which tells you how to tell your Cabernet from your Chablis and gives advice on picking out the perfect bottle for that special occasion.

www.simplyfood.co.uk

Master horror writer Stephen King has launched his own web site to counter masses of bogus ones started. King himself is not a wired guy and has spent years trying to avoid the net. Site visitors can now read a mini-biography of him written in part by his wife, Tabitha; past, present and future book titles, as well as information such as why he became a writer and where he gets his ideas.
www.stephenking.com

Graphic details

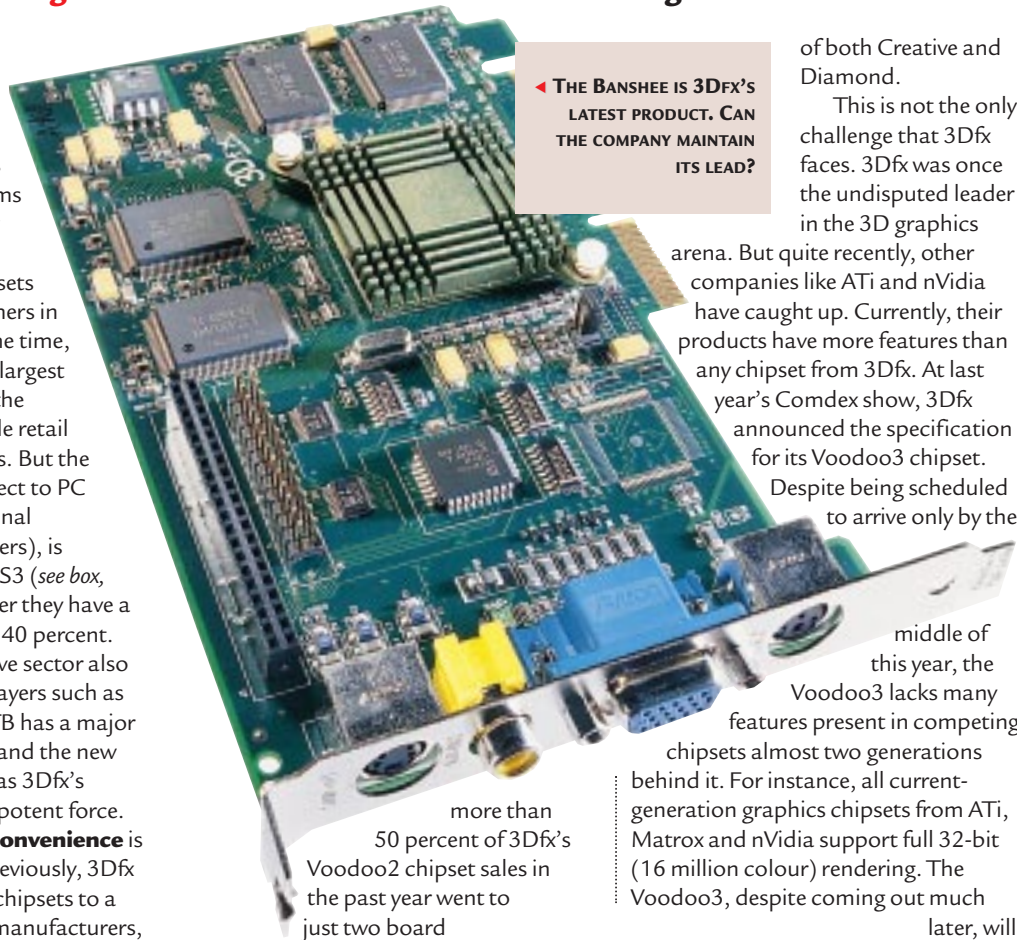
Ajith Ram on **the merger of 3Dfx and STB**. How convenient a marriage is it?

The merger of graphics chipset developer 3Dfx Interactive and graphics board maker STB Systems has taken the market by surprise. 3Dfx's highly successful Voodoo chipsets have been good performers in 3D applications for some time, and the company is the largest supplier of chipsets for the lucrative and high-profile retail market in graphics cards. But the market in cards sold direct to PC makers, or OEMs (Original Equipment Manufacturers), is currently dominated by S3 (see box, below) and ATi — together they have a market share of around 40 percent. This intensely competitive sector also contains other major players such as Matrox and 3DLabs. STB has a major presence in this market and the new merger is seen by many as 3Dfx's attempt to emerge as a potent force.

This marriage of convenience is not without its perils. Previously, 3Dfx depended on selling its chipsets to a large number of board manufacturers, such as STB and Diamond, to survive in an intensely competitive market. The merger changes this scenario completely.

All board manufacturers which once used 3Dfx chipsets will have to look elsewhere. Also, 3Dfx will lose the marketing muscle of some of the industry's leading players. For example,

Creative Labs and Diamond Multimedia. 3Dfx is now left with the task of recapturing this market in its new incarnation as a board manufacturer. And that is not going to be easy given the strong brand value



of both Creative and Diamond.

This is not the only challenge that 3Dfx faces. 3Dfx was once the undisputed leader in the 3D graphics

arena. But quite recently, other companies like ATi and nVidia have caught up. Currently, their products have more features than any chipset from 3Dfx. At last year's Comdex show, 3Dfx announced the specification for its Voodoo3 chipset.

Despite being scheduled to arrive only by the

middle of this year, the Voodoo3 lacks many features present in competing

chipsets almost two generations behind it. For instance, all current-generation graphics chipsets from ATi, Matrox and nVidia support full 32-bit (16 million colour) rendering. The Voodoo3, despite coming out much

later, will support only 16-bit (16,000 colour) rendering.

This marriage of convenience is not without its perils

Another, similar, problem is lack of a 32-bit Z-buffer. The Z-buffer is used by 3D applications like games to determine what image needs to be displayed after the current one. At high resolutions, a full 32-bit Z-buffer is needed to avoid ugly artefacts on-screen. Unlike its contemporaries, the Voodoo3 will support only a 16-bit Z-buffer.

Chipsets from ATi, Matrox and S3 already boast hardware support for DVD playback but the Voodoo3 will have no such capability. This means that OEM PC systems using Voodoo3 may have to depend on the CPU for DVD playback — and this method is both resource-hungry and unreliable. 3Dfx will be hoping that the merger will help it tide over its current technological inferiority.

S3 could benefit from Intel match

Another company manoeuvring in the graphics field is S3, which recently announced a long-term agreement with Intel. It includes a 10-year cross-licence agreement for all S3 and Intel patents for the development of certain semiconductor products. S3 also announced that Intel is to purchase warrants to buy S3 shares. It had been rumoured that Intel was considering licensing S3 technology for the 64-bit Merced chip. S3 is the second largest supplier of graphics chipsets for ready-installed boards. This deal with Intel is a vital shot in the arm for S3 which has recently suffered financial problems. S3 was one of the first companies to introduce a graphics chipset, called Virge, with 3D capabilities. But this faced heavy criticism for poor performance. The mistake was rectified to a large extent last year with the introduction of the Savage 3D chipset, which has enjoyed better success. The deal with Intel is likely to pay rich dividends in S3's next-generation chipsets based on the Savage 3D architecture.

GAMES NEWS

Turok sequel throws down another gauntlet



▲ **TUROK 2: SEEDS OF EVIL: AND CAN YOU GET MORE EVIL-LOOKING THAN THIS, THE CHALLENGING SEQUEL TO TUROK: DINOSAUR HUNTER?**

The ancient mantle of Turok has been passed on once again, through the generations of the Saquin tribe, Fireseed, to Joshua the next firstborn son. And so the sequel to the game Turok: Dinosaur Hunter has been launched. **Turok 2: Seeds Of Evil** has more than 30 enemies, each with unique strengths and weaknesses. Enemies have fish-eye vision and sound sensitivity like real predators, and highly accurate collision detection allows players to target specific areas of an enemy's body. There are six Quest levels and five multi-player levels covering 30 virtual square miles. Turok 2 is out now, priced £39.99.

Eidos Interactive is releasing a new strategy game called **Warzone 2100**. The world has been destroyed by nuclear warheads following a technical error in a satellite defence system. Less than a million people survived the devastation and the player has to attempt to rebuild a new world from ashes, battling against other bands of survivors for the remnants of a lost

civilisation. Warzone 2100

combines fast arcade action with strategic planning and features realistic terrain effects, real-time combat and cinematic effects. The game will be priced at £39.99.

One of the biggest arcade games in gaming history is due to hit our screens again, in 3D. Activision is introducing the next generation of the most addictive space shoot-em-up arcade game ever. The all new **Asteroids** vows to meld the classic fire-shield-thrust style of gameplay and nostalgic sound effects with vast new hyperspace 3D worlds, explosive effects and loads more enemies and weapons. Watch out for a review in our *Screenplay* section next month.

ETELKA CLARK

Reviews in Screenplay this month (p281): Tomb Raider 3, Tiger Woods 99, Buggy, Close Combat: The Russian Front, Carmageddon 2 and World League Soccer 99.

Top 10 products Last month

Peripherals

1	Dynamode 56K PCI Modem	DYNA	-
2	SONY DSC-F1 Digital Camera	SONY	-
3	3COM 56Kv90 Voice/FX ext	3COM	5
4	SoundBlaster Live! Value PCI	Creative	-
5	SoundBlaster PC128 PCI	Creative	11
6	Sidewinder Freestyle Pro	Microsoft	18
7	SoundBlaster Live PCI	Creative	14
8	P75 to P200MMX	Evergreen	7
9	Umax Astra 1220S Flatbed	Umax	20
10	Sidewinder F/F PRO + UR/AS	Microsoft	-

Windows software

1	Free Access Starter Kit	Software w/h	-
2	Encarta RefSuite 99	Microsoft	3
3	Norton AV Suite + 1yr U/G	Symantec	-
4	Windows 98 U/G CD	Microsoft	4
5	Partition Magic 4.0 U/G	POW	-
6	Office Pro 97+Books U/G	Microsoft	5
7	Office 97 Stand V/Comp	Microsoft	-
8	Norton Systemworks V1	Symantec	6
9	ViaVoice 98 Home Edition	IBM	19
10	Partition Magic 4.0	POW	12

DOS software

1	Turbo Pascal v7 DOS	Inprise	1
2	PKZIP for DOS	Pioneer	4
3	Turbo Pascal v7.0	Inprise	5
4	IBM PC DOS v7.0	IBM	-
5	Novell 3.2.5 User	Novell	10
6	Novell NW 3.2.5 User	Novell	-
7	NetWare v5 server	Novell	-
8	NetWare 5 U/G server 5USR	Novell	-
9	DataEase v5.12	DataEase	-
10	[Information not available]		

CD-ROMs

1	South Park Desktop Themes	Telstar	-
2	Simpsons Virtual Springfield	Fox Int.	-
3	Star Wars: Behind The Magic	Lucas Arts	1
4	Simpsons Cartoon Studio	Fox Int.	-
5	Dancing Baby Screensaver	Jellyfish	-
6	James Bond Ultimate Dossier	Eidos	-
7	Dancing Baby CD Player	Jellyfish	-
8	Lego Creator	Lego Media	-
9	Top Of The Pops Mix Factory	BBC	-
10	Dance eJay	Fast Trak	7

Games

1	FIFA '99	Elect. Arts	-
2	Tomb Raider 3	Eidos	1
3	South Park	Acclaim	3
4	Half Life	Sierra	2
5	Worms	[Sold out]	-
6	Simpsons Virtual Springfield	Fox Int.	6
7	Gangsters	Eidos	-
8	Sim City 2000: Classic	Electr. Arts	-
9	Blood 2: The Chosen		-
10	Simpsons: Cartoon Studio	Fox Inter.	-

Games and CD-ROM figures supplied by HMV. Others from Software Warehouse.

Michael Hewitt **swims against the tide** of Psion 5 lovers and demands a better product.

Alarming disappointments



A couple of months ago, I reached the age at which birthday cakes can start to become a fire hazard. The occasion demanded a major, hi-tech purchase. Accordingly, I bought myself a £400 alarm clock. Not intentionally,

though. It's just that, having put it through its paces, I've concluded that the Psion Series 5 isn't much use as anything else.

You're probably wondering how come, if it's so bad, virtually every computer magazine in the land awards it a 'Best Buy' award. I'm wondering that, too. Maybe they've been drinking the same stuff the Series 5 developments team did when they conceived it. There are a number of basic flaws. How are you supposed to use a screen that's virtually illegible, even in the best lighting conditions? And what about proprietary software that isn't compatible with anything but itself? Or a processor that goes through batteries like a sperm whale through krill. (I'll bet shares in Duracell have rocketed over the past 18 months.)

Perhaps the guys at Psion were so busy congratulating themselves on having perfected the Series 5's 'innovative' sliding keyboard, they had to farm out the design of everything else to one of the office temps. Well, enough of that; I'll put it down to experience. The question then is: given the Psion Series 5 most definitely isn't the perfect palmtop, what is? Or, as we're talking hypotheticals here since no-one's come up with it yet, what sort of spec should the perfect palmtop have? Difficult. A wallet-sized palmtop computer is, by its very nature, a compromise. In the same way running a lumber mill using bonsai trees is. So long as you only need to produce the occasional box of matches and a couple of Kleenex a week, no problem. Likewise, so long as the palmtop is only required for minimal note taking and entering occasional stuff like address data, it's up to the job. But you wouldn't want to write *The Decline and Fall of the Roman Empire* on one.

The first essential is a legible screen. If you haven't got one of these, forget it. Legible means having a reflective, metallic backing and being around 5x3in. You have to be able to read it, even in dim light. Forget back-lighting: if it's too dark to read, it's too dark to type.

Legible also means not having a metal-oxide coating, as pen-operated palmtops require. The reflection from these is so bad, they act almost as mirrors. Rather than getting any serious work done, you end up admiring yourself in them or squeezing blackheads. The best palmtop screen I've come across is on the Psion 3c.

Next, the keyboard. The 'laptop style' is right out, I'm afraid. Miracles of miniaturisation they may be, but they also tend to clatter, be unresponsive, and stick. The best palmtop keyboard I've ever used was on the Sharp IQ-9000, circa 1994. It consisted of a QWERTY arrangement of little buttons, generously spaced, that gave a reassuring 'Beep!' when depressed. With a good tail-wind, I could achieve between 30 to 40 wpm. So long as I didn't try achieving them for more than about five minutes in one go.

On to the software. Sorry, but this has to be Windows 95/98 compatible. By compatible, I don't mean files get converted on the fly as they're transferred across to the desktop PC. I want to be able to transfer data to any PC, not just my own, without having to use a collection of proprietary comms software and cables.

So long as the PALMTOP IS ONLY REQUIRED FOR MINIMAL NOTE TAKING AND ENTERING OCCASIONAL STUFF like address data, it's up to the job

Basically, the palmtop should act as the PC's drive D or E. I should be able to transfer and open files seamlessly. Which means having a Windows CE operating system, a cut-down, CE version of programs like Word and Excel, and a universal infra-red interface.

Finally, battery life. I want at least 20 hours from two AA Duracells. Surely that isn't much of a problem, given that the HRT-enhanced Psion 3c, the mx, can achieve it, as can most CE palmtops.

So, have you got that, all you manufacturers out there? At the time of writing, it's early December, 1998, so I won't expect you to have anything ready for me for this Christmas. I shall, however, be more hopeful that you will be better prepared for my next birthday.

Mike.hewitt@mjh1.demon.co.uk

Say goodbye to email as Barry Fox looks at the **next wave of options** in communications.

The V-Mail of the species



Faxing took off when Britain's postmen went on strike. The Japanese had already developed Group 3 standard machines because telex couldn't carry the pictorial characters of the Japanese alphabet. NEC, Canon, Sharp and the rest

steamed in with ads like 'Our machines never strike'. Joe Public is now learning how much cheaper and more convenient it is to send and receive email with the option to delete, store, forward or reply without printing, and without the need to leave a PC with its fax modem running 24 hours a day.

By early December last year, half a million people got free access via Dixons FreeServe, and apart from the cost of the helpline, no-one has discovered a big catch. Yes, FreeServe disables other ISP connections, but it's ideal for the newbies it was intended for. Though FreeServe offers ISDN dial-up I'm the only one in the half million to try and use the Ignition ISDN terminal adaptor which BT sells for its ISDN lines. Thinking of trying? Forget it. After more tech calls than I care to remember, we now know that although MSN works with either the V120 or PPP protocols, Planet/FreeServe's routers only work with PPP and the Ignition defaults to V120. The Ignition's PPP setting won't work, either. There's a software fix for the Ignition (from a Bulletin Board on 01293 610610) but I've lost interest because CompuServe only works with V120. With FreeServe's free lunch to compete with, CompuServe and AOL must work harder to entice newbies with free trial offers.

➔ **Many thanks to readers** who've told of their CompuServe problem which leaves new subscribers with predictable numbers exposed to phoney 'Account Manager' requests for their password and banking details. This has clearly been going on for a long time and, to my knowledge, CompuServe has taken no action in giving newbies a big red warning. CompuServe's MD, Martin Turner, was still saying nothing until he heard I'd approached his European boss and parent company AOL. Suddenly, CompuServe wants me to know my 'concerns regarding fraud are being treated as a priority'. It's too little, too late, and the

experience has left me with zero confidence in CompuServe, and not much in AOL.

➔ **Microsoft's Hotmail** looks interesting, but setting it up involves an obstacle course of 'What POP' questions. Click the Help link, says the screen. There wasn't one. The next sea change will come with simple and probably free email services from digital terrestrial and satellite receivers. The Sky box has a built-in 28.8K modem and will soon offer a free internet mail address. The On Digital box has only a 14.4K modem but can connect by standard serial port to any external modem. Comdex in Las Vegas saw the launch of V-Mail, a simple \$99 system from Philips to send video messages by email. 'V-Mail will replace email in four or five years,' predicts Hugh Brogan, CEO of Philips PC Peripherals Division. The Philips camera (USB and Windows 98 only) comes with software called Videogram Creator which lets the user click Send to compress the conventional AVI (Video for Windows format file) recording by a factor of 100, so a one-minute sound and video message can be stored on a standard 1.4Mb floppy.

The next sea change will come with SIMPLE AND PROBABLY FREE EMAIL SERVICES from digital terrestrial and satellite receivers

V-Mail bundles matching Player software with the message and packages it as an executable (EXE) file. The recipient clicks on the message, which unpacks itself and plays sound and pictures. The player software works with any version of Windows (3.x, 95, 98, NT or OS/2) and runs on old 486 processors. Even the two American techies demonstrating V-Mail failed to see the systems' cleverness. They were sending their messages in AVI format, with a Readme file to tell the unfortunate recipient how to decode them! But there are still two fatal flaws. A V-Mail takes megabytes to convey a message that could travel as a kilobyte of text. This takes time on-line, overloads the carrier system and soaks up disc space. And who, in these days of viruses, dares click on an EXE file received from an unknown source?

100131.201@compuserve.com

It's good to talk, but are the phone companies **listening to their customers**, asks Brain Clegg.

Phone improvement



It has been said (by me) that the three things a good manager needs most are creativity, communication skills and knowledge. The same is true of a business, and these are very interesting times for communications. I'm not

talking about the internet, or whizzy new technology to wallop information down the line at hectic speeds, but a total change in the way telecommunications companies operate, which potentially affects every serious PC user. Since time immemorial, unless you live in Hull, British Telecom (aka the Post Office) was the only name you needed to know. A few years ago, the position began to alter. Mercury entered the scene. Cable companies made offers you couldn't refuse. Mobile telephones stopped being a small briefcase with a handset attached and started to be practical. Yet this is chicken-feed to what is on the way. Because BT, like the gas and electricity suppliers, has been forced to allow others to use its physical connections end to end. Take two hopefuls from either side of the business spectrum:

Free Telecom, and Cable and Wireless.

Free Telecom has a cracking idea. What do people complain about when comparing BT with US telephone companies? Often it's the lack of free local calls. Free Telecom offers free country-wide calls. There has to be a catch? Well, yes and no. Your calls are paid for by advertising. At the time of writing, this could be anything from a shortish ad every few minutes to an interactive questionnaire up front, then maybe half an hour's free chat. Will it work? I really don't know until I try it. But it's a brilliant concept that couldn't have emerged without the freeing up of the telephone network. You can find out more at www.freetelecom.com.

The communications giant Cable and Wireless has also found a crack in BT's armour. Going to an alternative provider used to involve new contracts, dialling special numbers and generally making a simple service difficult to get into and even harder to get out of. Cable and Wireless is marketing a box that you put between your phone and the wall. When it is plugged in, your calls go via Cable and Wireless; when it isn't, they go via BT – simple as that. You pay a small quarterly

rental for the box, but this is accompanied by several hours of free local calls and discounts on longer-range dialling. It's the ease of stopping and starting that makes the Cable and Wireless deal so attractive. See www.business-made-simpler.co.uk for more details.

So how is BT reacting to this real competition? A couple of weeks ago, I would have said 'badly'. I work from home, with two lines into the house, one for business, one for domestic use. I never got a very good connection speed on my modem, which I put down to my rural location, but eventually it sunk in that BT hadn't provided me with two lines at all. They used a splitter box (a DACS to its friends) to shove two channels down a single wire. Result – degraded electronic communications. I rang up my friendly BT customer service person. 'That's right,' she said, 'we don't recommend using a DACS for computer connection.' I pointed out that I didn't ask for a DACS. 'We have no obligation to provide anything more than a voice service,' she said. 'If they put a DACS in, it was because there was no alternative.' In effect, if it doesn't work, tough. Then, to add insult to injury, she

I never got a very good connection speed on my modem, which I put down to my rural location, but eventually it sunk in that BT HADN'T PROVIDED ME WITH TWO LINES at all

tried to sell me Business Highway instead.

If that had been the end of the story, I would conclude that BT hadn't got a clue about customer service and was ripe for the picking. However, there was a happy ending. A week later, an engineer turned up unannounced. 'I'm here to switch you over to two lines,' he said, proving that the DACS hadn't been installed as there was no alternative, as I had been told. The DACS disappeared, my modem speed nearly doubled and BT sailed back into my good books. I'm not saying BT won't lose custom: obviously it will when faced with competition that includes cheaper or even free calls. But making such responsiveness commonplace would give the newcomers a real run for their money.

Brian@cul.co.uk

Web hosts are **not as welcoming** as the party variety, finds Paul Smith and his roaming site.

Mine host



This month, I've been mostly changing web hosts. I have gone through half a dozen since I was rumbled by my previous host, but have finally, I hope, found a new home. It turns out that choosing a host, or at least a goodly host, is not

as simple as originally expected. And it all started with a bit of churlishness on the part of a previous employer, unwilling to host my site on the grounds that my connection with them had been severed.

I used to work on a computer magazine, which august title no longer exists. While there, I bought myself a vanity domain name, in the full expectation that this would be a cool thing to do, and that adoring but savvy young women would throw themselves at me solely on the basis that I had a domain name. I would be able to brush them aside imperiously, hardly affording them a glance, thereby earning the adoration of both wifely Del and Edward (who is particularly sensitive to these sorts of things, especially for a cat). As it happens, nubility brings its own sort of imperiousness, and the throngs have yet to show much in the way of adoration. But, anyway... Working for this company, I was able to persuade the IT department that their servers would be a good place to host my site. It wouldn't be a big site, it might not even be that active (how much bandwidth, I mused, would a few hundred thousand hits a week take up?). But it would be of great value and significance.

Actually, www.paulsmith.com took up so little in the way of bandwidth that it was over a year after I left before they noticed that my site was still taking up a small corner of one of their corporate servers. A polite, restrained email notified me that I might want to find my own server now and thus the chase was on. I call it a chase. What actually transpired was this: they sent me the notification... and, um, that was it. The site just died through sloth. I don't know what the opposite of 'webmaster' is, but I was it. Then I got an email from a reader saying something about how wonderful the column is — you know how they do — and wanting to know who hosted my web site. Funny question, but in the circumstances, intriguing. Looking at his email address, I noticed that his host was his surname

appended with 'net.com'. I was more intrigued now. Of course I replied to the gentleman. I do with all my readers' email, although the order in which I reply is determined by a complex pattern of heuristics that involves those emails containing the phrase 'I love your column', Soundex-parsed and moved up the list, while those which contain 'Your column sucks' take a bit longer to get to.

Anyway, I explained my position and the guy told me he is actually a young web host. Ah, I think: not long in business, keen, eager. No, he corrects me; and here he makes his crucial marketing flaw: young, as in only fifteen years old. Gulp! Can I trust my site to someone still in school? Or am I being ageist? Finally, I decided that anyone who has to ask his mum's permission to stay up for Seinfeld ('I *know* it's a school night') really has better things to do than look after my site. I've been doing some work for Carlton Online and they kindly offered to host the thing for me. Perfect, I thought, until it transpired that the otherwise really laid-back IT manager wouldn't give me ftp access to the server. I would have to email him the files and he'd upload

I bought myself a vanity domain name, in the full expectation that this would be a cool thing to do, and that **ADORING BUT SAVVY YOUNG WOMEN would throw themselves at me**

them as and when he got round to it. The kid was starting to look good again. But I've gone back to Virtual Internet <www.vi.net>, a company I've used for clients before. I immediately got a horrible page up there, just something to get an email link. Then I was knocked back: another email, this time about what a waste of space the site was and how very disappointed the reader was. 'But nice column, by the way.' So I replied, quickly, by fixing up the site, quoting his email and linking to his, frankly, lesser site. VI has my site running smoothly now, with FrontPage Extensions which means there's a cool little search page and a feedback page. But those who decide to feedback, please note: heuristics still apply.

www.paulsmith.com

letters

Send your letters to >

The Editor
Personal Computer World
VNU House
32-34 Broadwick Street
London W1A 2HG

or email > letters@pcw.co.uk

or fax > 0171 316 9313

Win a Taxan monitor

Each month we are offering a 17in Taxan Ergovision 750 TCO95 monitor to the winner of the Letter of the Month. For the complete range of Taxan monitors, call 01344 484646 or visit the web site at www.taxan.co.uk



TAXAN
TOKYO, JAPAN

You won't regret it.



SPACED OUT

Was it your intention to print an upside-down photograph of a UFO on January's page 42 (directly under the 'Rival Drives' panel)? Strangely reminiscent of those early 60's photographs of (actual) UFOs. Could this be a sign?

IAN PHILLIPS I_Phillips@compuserve.com

PCW replies > Yes. Surely alien technology will be behind the successor to the floppy-disk drive. The media is out there.

LETTER OF THE MONTH

Parent power in IT

I expect most teachers will disagree, but if you really want to see the movers and shakers in the world of ICT and education, then do not visit a school. Instead, take a stroll into any of the High Street computer retailers and watch a parent make a purchase. They recognise that a computer is fast becoming a must-

Gordon Laing replies > *Letters concerning IT and Education are rarely missing from these pages for good reason. The education sector apparently continues to inadequately train or prepare students for jobs in IT, or even those requiring basic PC skills - take James Hanington's letter for a pupil's point of view. Jim Fanning makes an interesting point above, with well-informed parents perhaps driving changes for the better, at least in the short term. We'd be interested to hear from readers with their experiences concerning IT and Education.*

have; they are increasingly aware of IT jargon and pay greater attention to what software is appropriate to which National Curriculum level. It is a customer base that will find little in the way of leadership from the education sector because the latter lacks the material resources and technical know-

how. It is a customer base that more and more possesses a level of knowledge and equipment that is unavailable in many schools. And this is where the real revolution in ICT and education begins: parents will look elsewhere or create their own solutions, and in the process change the whole parent/school pupil/teacher relationship that is the present basis of our education system.

JIM FANNING, DIRECTOR OF SIXTH FORM STUDIES, TIDEWAY SCHOOL
JFann16463@aol.com

MP3 HITS THE RIGHT NOTE

For the greatest revolution in internet and computer music since, well, nothing else, the MP3 format gets relatively little attention in computer magazines. I'm in a band, and use the MP3 format to distribute my music. The vast majority of magazines portray MP3s as evil and illegal. If, like me, you produce your own music, then you can make MP3s and distribute them on the web without any legal problems. You only have to go to www.mp3.com to see the vast array of free, legal MP3 music on the net, with even well known bands such as the Beastie Boys distributing some of their music in this fashion.

PAUL LOWRIE plowrie@softhome.net

PCW replies > *We're not enemies*

of MP3 at PCW. On the contrary, while it poses questions in terms of copyright and protection (the same as any other recording device), we welcome it as an encouragement to develop solid state portable stereos such as the Diamond Rio. With no moving parts to break or drain batteries, solid state music (or indeed video) recording and playback devices are surely the future.





IN PRAISE OF THE BBC MICRO

I thought I'd pick up on the BBC Micro theme started by Brian Clegg in *PCW* January 1999 [Business Matters]. I think the BBC was a good, simple introduction to computers for most children at the time. I was 13 when I first met the BBC Micro and through it gained invaluable experience of a language (BBC Basic) which even now shares much commonality with things like Visual Basic. My first PC, an Amstrad luggable, was by no means as approachable. GW Basic was about all that was available (I wound up using Pascal) but it was an uphill struggle to do things which on the BBC were easy — graphics, sound, talking to the hardware.

I now operate a VB consultancy and find it rather telling that most of the VB and similar contractors that I meet, had their first encounter with computers and programming on the BBC.

In the light of this I feel the Government made the right choice. Personal computers have evolved into a suitable contender but at the time were pretty hopeless.

SIMON RAFFERTY bigsi@cix.compulink.co.uk

I rather feel that Brian Clegg has missed the point with his comments about the BBC Micro [*PCW* Jan '99]. I must take issue with his comment that business 'got it right' by adopting Microsoft PC technology. Certainly business adopted MS in large numbers, enabling it to achieve the critical mass to become the dominant operating system. The reasons for this are complex, and are based on more than just the technology. But was this the right direction? We now appear to take it for granted that computers will crash three times a day, and troubleshooting advice has become an industry in its own right. But the BBC was a stable platform that rarely crashed, was easier to sort out if it did go wrong, and was more efficient in its use of memory (my Archimedes has just 4Mb of RAM and a 20Mb hard disk — hardly enough for a PC to boot up). I believe that future historians will see the past couple of decades as a blind alley in computing terms, when the development of PCs was actually held up because of the commercial dominance of one of the less effective operating systems. It is as if Henry Ford had chosen steam power rather than the internal combustion engine, and the rest of the automotive industry had followed suit. We are only now starting to move into an era when more efficient systems may come to the fore.

HOWARD JONES howard@hjcj.globalnet.co.uk

THE BIG CHILL

What is Michael Hewitt on? [Sounding Off, *PCW* Feb '99.] It's all very well having a fridge that tells you not to eat something (probably 'cause it fancies it itself a bit later). But you still have to purchase the food to put in it. If you really can't manage to smell whether something's still edible or not, you're probably not up to buying perishables anyway. He got a whole page for what he must think is food for thought: he needs to chill out!

JOHN BOSLEY JBosley4@aol.com

SENIOR SERVICE: CALL FOR AN IMPROVEMENT IN MOBILE COMMS

Sorry, Graham Dean (re: 'OAPCs', Letters, *PCW* Jan '99), but I think you've misunderstood grandma. I'm sure she does not want the family's cast-offs, be they computers or anything else. Nor is grandma the only technophobe about. Let's get our machetes out to all the hype and advertising on the net, find out what real information real people need, and design attractive, user-friendly, not too expensive portable comms. Improve the interface and communications on current handhelds, add a homing device in case grandma gets lost, and yes please, Santa, I'll have one in my stocking next Christmas. As for Senior Net, who the blazes among the over 60's wants to join in a discussion on 'Options for the end of life'? Not this OAP, that's for sure!

MOLLIE PULLAN
mollie@kwaheri.u-net.com

CHAOS THEORY

I am struck by the number of people who seem to be against Microsoft's dominance of the market in operating systems, while no-one seems to have thought about the positive aspects of it. While Windows is extremely inefficient, it is a standard operating system that programmers know 99.9% of users will have. This means they can write a program without having to go through the extra expense of ensuring that it is compatible with all of the operating systems on the market. Although Windows may seem inefficient and dated, it has at least spared us from the chaos that would result from several different and exclusive operating systems.

AARON GRAHAM
AaronBenj@aol.com

PCW replies > Unfortunately the widespread use of Windows has not spared the world's users from the vast array of possible PC hardware combinations, which results in its own brand of chaos.

IT TEACHING IN A STATE

I am 12 years of age and go to a state secondary college. We have pretty good IT facilities but only one very basic lesson a week. In such a computer-orientated world, state-taught children will be inadequately prepared for the first moment they try to do accounts on a spreadsheet or keep client information up to date. Such pupils are forced to wait until higher education for PC experience, where they will have to compete with the better taught students of public schools, and will be dragged behind and be discriminated against, and why? Because the state schools aren't funded sufficiently to train the teachers, and the curriculum is not tight enough to make a subject that will be as common as English in the workplace as common in schools.

JAMES HANINGTON
jim@hanington86.freeserve.co.uk

Gordon Laing replies > *This is a thorny subject. I felt frustrated by the inadequacy of the computer training at my school, and continued to be disappointed even while attending university. Instead, people like myself tended to join clubs, befriend staff at other departments, or hang around relevant showrooms for their PC experience. Most people know someone somewhere who has a PC and doesn't mind giving them the tour. Not an ideal situation I admit, but enthusiasm and resourcefulness normally wins through — my long-term subscription to PCW while growing up also proved invaluable!*



▲ THE FSN 3D FILE SYSTEM NAVIGATOR AS SEEN IN JURASSIC PARK (ONLY WORKS ON IRIX V5.3 AND BELOW)

IT'S A WRAP: JURASSIC PARK AND THE SGI SET

I've just finished reading the ChipChat column in your magazine [PCW, Feb '99] and I have to say that I am very disappointed with the rants of Mr Bugbear.

True, the entertainment industry has a rather peculiar perception of computers, often verging upon the absurd, but that's part of the fun, surely. However, that does not excuse sloppy journalism.

Mr Bugbear was having a go at the girl in *Jurassic Park* who sits down in front of a computer near the end and proclaims that it's running Unix. He seems to be under the impression that it's just a couple of Apple

Macs, and he is mistaken. In fact, nearly every single computer used in *Jurassic Park*, both on and off set, is a Silicon Graphics workstation. The machines you see on set are pre-production prototypes of the Indy workstation (also seen later in *Junior* and other films). They don't have the distinctive turquoise case simply because, at the time, they were prototypes. The 'amazing 3D interface' is called FuSioN (File System Navigator) and is available from <ftp://ftp.sgi.com/sgi/fsn>. It's actually jolly nice, if a little impractical for everyday use. Sadly, it only runs on Silicon Graphics hardware (no source code), but I used to use it quite a lot at demos, back when I worked with SGI equipment. Still, not to worry. Apparently they use illegal IP addresses in that film which stars Sandra Bullock as a super-hacker on the run...

MALCOLM CROWE
malk@bruhaha.demon.co.uk

Ivor Bugbear replies > *Yes, there were SGI machines present in Jurassic Park's control centre, but there is an unmistakable Mac Quadra 700 taking what looks like a prominent role in the proceedings. By the way, thanks for shopping Sandra Bullock — I'll be having a word with her later.*

STRAIGHT TO VIDEO

I am looking for information on how to transfer a slide presentation — for example, by PowerPoint — to a standard videocassette recorder. I do some work for a local charity and I sometimes have to video events for them. I need to be able to put titles on the video and I want to use my PC to prepare them before transferring them to the video. I have no means at the moment for connecting the VCR to my PC, so I need some advice on the necessary hardware and software to do this. Any help that you could give would be welcome.

JOHN GRAHAM
John@44sm.freeserve.co.uk

PCW replies > *A dedicated video capture card would offer input and output connections to your VCR, allowing editing and subtitling of existing videotaped footage. However, if you only want to record PowerPoint slide presentations on to tape, then you'll only need a video output and could use this as an opportunity to upgrade your graphics card. There are plenty around today that boast composite video outputs as standard which can be connected directly to your VCR. When videotaping a PC signal, it's best to set your display resolution to 640 x 480 pixels, since this is the maximum a TV can handle. Once connected, start your VCR recording and simply instruct PowerPoint to display the slides one by one with a suitable gap in-between.*

TAKING THE EURINE

What is one-hundredth of a euro? I don't like to be considered as one of those statistics the media keep throwing about that say 96% of respondents didn't know where France was or whatever. The answer has probably been kept quiet either because they don't know or, more probably, it is even more ridiculous and unwieldy to say than 'euro'. My suggestion? Well, one-hundredth of a euro should be called a 'eurine'.

JIGGERY-POKERY
jiggery-pokery@purplenet.co.uk

PCW replies > *Not to spoil the fun, but we believe it's known as a cent, so at least visiting Americans will feel at home.*



◀ Type and Go

Graffiti, the handwriting recognition method employed by the PalmPilot family of handhelds, is great. But let's face it, if you have a lot of info to enter into your little green buddy, it's going to take a long time if you have to scribble it in with a stubby stylus. Enter the GoType! keyboard, probably the fastest way to enter information into your Palm organiser. Simply drop your organiser into the GoType's cradle and it connects directly with the docking port. Without the need for either cables or batteries, it's ready for you to start typing right away.

Price £79.99 (£68.08 ex VAT)

Contact Widget Software 01438 818818
www.widget.co.uk

Tangerine dream ▶

Blueberry, strawberry, tangerine, grape and lime — no, not the contents of a fruit basket or the flavours of muffins in a five-pack, but the new colour schemes for the expanded iMac range, proving that computers really can fit into any corner of the home. The Apple web site claims that it 'comes complete with everything you need' but it still seems to be lacking a floppy drive, which many claim to be an essential piece of kit. The new iMacs feature a faster 266MHz PowerPC G3 processor, a 6Gb hard drive and a lower estimated retail price.

Price £1,398.25 (£799 ex VAT)

Contact Apple Information Centre
0870 600 6010 www.apple.com



◀ Silicon implant

This brand-new workstation from Silicon Graphics runs Windows NT on Intel chips and will look great in any office or, if the budget allows, home. With around a gigabyte of graphics memory, this workstation is

great for the animators and 3D modellers out there, while the flat-panel monitor ensures that its sleek good looks will not be spoiled.

Price £2,749.50 (£2,340 ex VAT)

Contact Market Point
07000 320540 www.sgi.com

What money can't buy

This is one of the best gadgets we've seen in a long time. The QuickSound plugs into your PC's serial port and controls your CD and other audio sources. Bass, treble and mixer controls are presented on one keyboard-mountable unit that allows you to save five mixer pre-sets for instant access. Only problem is, it's not available in the UK. **Contact** Labtec 01252 629900

www.labtec.com



True blue cool

If you thought USB was boring, you haven't seen this new translucent ice blue Zip drive from Iomega.

Best of all, it connects to your PC or iMac via the USB port, giving the new hub a more business-orientated purpose than simply a joystick or set of speakers. It reads from and writes to standard 100Mb

Zip disks, and Iomega claims that it can attain data transfer speeds of 60Mb per minute, which is around 20 times the speed of a standard floppy.

Price £119 (£101.28 ex VAT)

Contact Iomega 0800 973194

www.iomega.co.uk



Sporty spice

Be afraid — be very afraid. When you try out the FoneWatch Sports you'll realise just how much radiation your cellular phone is pumping out. On the bright side, though, this is a great gadget for saving you the embarrassment of having a thousand briefcases thrown in your direction when your mobile rings on the train home. Turn off the ringer, and your sporty new watch will detect the incoming signal (or anyone else's, for that matter) and flashing lights around the bezel indicate the call.

Price £34.95

Contact Fone

Range 0181 838 8888

www.fonerange.com



Lexmark Photo Jetprinter 5770

The Lexmark Photo Jetprinter 5770 can print photos direct from Zip disk, smart media or compact flash cards without the intervention of a PC. A maximum resolution of 1200 x 1200 dpi promises crisp text and well-defined images.

Up to 16 images can be printed on an A4 page, and there's a range of options for cropping. See next month's PCW for a full review.

Price £349 (£297.02 ex VAT)

Contact Lexmark 01628 481500

www.lexmark.co.uk



Drag and dial

Transform your mobile phone into an electronic address book by transferring information from Outlook, Outlook

Express, Symantec Act or Lotus Organiser to your SIM. A laborious job? Not if you use FoneSync, a device that allows you to drag and drop contact information straight onto the SIM (subscriber identity module) using the supplied docking station.

Price £58.74 (£49.99

ex VAT) **Contact** Paragon

Software 0800 783 8574

www.paragonsoftware.com



reviews

Lots of exciting products have arrived just in time for this month's *Reviews*. We headline two new **400MHZ CHIPS**, one from AMD and the other from Intel, giving users the chance to grab some serious power without breaking the bank. And, we take a second look at Microsoft's next office suite, **OFFICE 2000**, as beta 2 hits the streets. And what's this? Another new operating system! Version 4 of **BEOS** is now ready. We lift the lid of this powerful OS to see why you might choose to install it instead of, or alongside, Windows. We get a first glimpse of Sony's



new **200MB HiFD DRIVE** and those who want something for nothing will be eager to turn to our review of **WORDPERFECT 8**. In a radical move that gives further credence to Linux, Corel has made its renowned word processor compatible with the platform and put it on the net for free download. We probe the workings of Hewlett-Packard's latest arrival, the **DESKJET 2500C**, and see if three goes into one with the **BROTHER** MFC Pro 700C multifunction device. In

HEAD TO HEAD, we pit a spreadsheet against Microsoft Money. Which is best for sorting out your budget?

NIK RAWLINSON, REVIEWS EDITOR
NIK_RAWLINSON@VNU.CO.UK

VNU European Labs



VNU Labs tests all kinds of hardware and software, from PCs to modems to databases. All our tests simulate real-world use and for the most part are based around industry-standard applications such as Word, Excel, PageMaker and Paradox. Our current PC tests for both Windows 95 and NT are the Sysmark tests from BAPCo. In all our performance graphs, larger bars mean better scores.

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Ratings

- ★★★★★ Buy while stocks last
- ★★★★★ Great buy
- ★★★★ Good buy
- ★★★ Shop around
- ★ Not recommended

Big Red Voyager Discovery K400

This top-rate system using the latest fast K6-2 chip from AMD is pure pleasure.

Those interested in non-Intel machines will be happy to learn that AMD has kept to its planned release of CPUs with a K6-2 clocking in at 400MHz and yapping at the heels of Intel's current 450MHz. The gap between the two is decreasing and with future AMD releases still planned to shoot processing speeds through the roof, the contest is hotting up.

Big Red supplied this showcase chip built in to a Voyager Discovery K400, a squat, chubby number which gives the impression that an extra 2in slice has been added to allow more space within the casing. This is possibly to accommodate air-flows required to top off the excessive heat that the K6-2 is reputed to pump out. But we found that the Pentium-class heat sink and fan arrangement minimised this need and that the majority of the heat generated was actually coming from the hard disk.

To support the CPU's impressive clock, Big Red has included a stonking 128Mb system memory on just one DIMM, leaving another two slots available for upgrading — impressive. A bonus was double the normal amount of Level 2 cache. We were disappointed that this 1Mb, favoured by the Super7 mainboard manufacturers, did not pay off in the form of drastic performance increases. Graphics are handled by the AGP version of the 3D Blaster Banshee from Creative Labs [PCW, Feb '99].

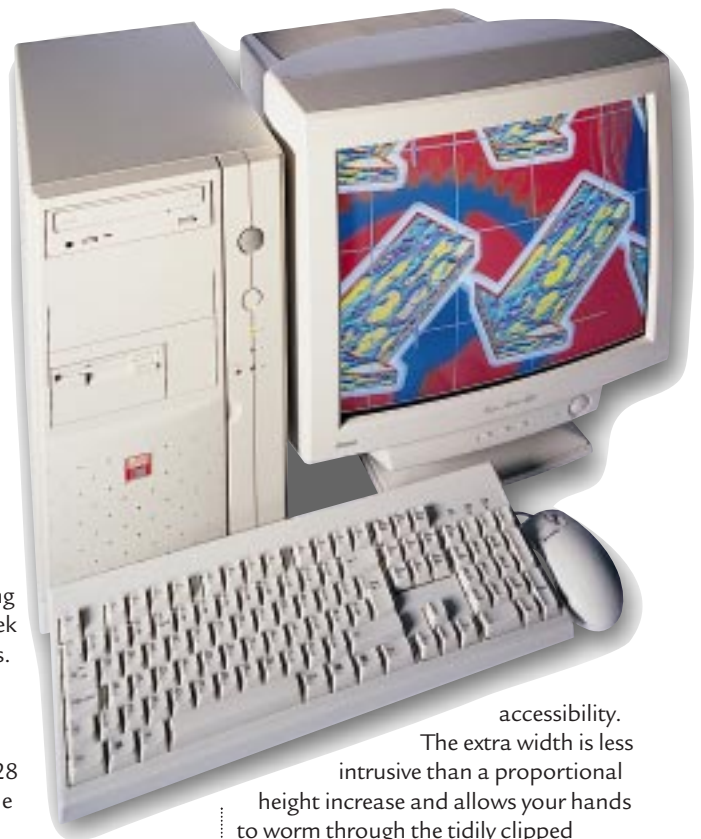
Basic 2D/3D functions are catered for by an impressive 16Mb SGRAM on-board with a super-fast 250MHz RAMDAC and, for the gamer, an onboard 3Dfx chipset. For your viewing pleasure, a Hitachi DVD is coupled with a Creative Labs decoder card for assisted movie playback using the bundled Encore DVD Player software. Checking out this combo revealed some configuration problems, but to be fair,

Big Red's normal three-day quality testing was cut back to one day by our copy deadline and the company assured us that the problems would be rectified for its customers.

Users will not feel let down by storage as there is a comfortable 8.4Gb IBM EIDE hard disk with platters spinning at 5,400rpm and seek times of up to 9.5ms. The rewards also extend to your ears with Creative Labs' PCI SoundBlaster 128 pumping through the TEAC 1000 Dolby digital surround system with eight speakers and a sub-woofer. Few vendors regard sound output this highly. And, in building the Voyager Discovery K400, Big Red has supplied a full multimedia kit.

We were glad to see the 19in Iiyama VisionMaster 450 supplied, a monitor which gives exceptional quality. The sharp, bright image is evenly displayed across the screen and it can reach an impressive 80Hz refresh rate at a resolution of 1600 x 1200. Three bezel-mounted buttons give users almost instantaneous access to every adjustment and setting. A PCI Rockwell-based modem will allow telephony connections at up to 56Kbps.

There is scope for expansion with one PCI and one ISA slot free, plus room for one extra 3.5in and two further 5.25in devices. If you do venture inside, then one answer to the extra girth Big Red has afforded this model could be pure



accessibility. The extra width is less intrusive than a proportional height increase and allows your hands to worm through the tidily clipped cables and wires without fear. With a software bundle that includes SmartSuite Millennium and the DVD version of Wing Commander IV, Big Red has pulled out all the stops and supplied a top-notch system.

IAN ROBSON

PCW DETAILS



★★★★★

Price £1,643.82 (£1,399 ex VAT)

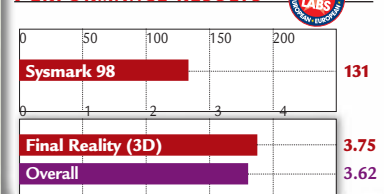
Contact Big Red 0181 245 2456
www.bigred.co.uk

Good Points Impressive components and excellent monitor.

Bad Points Disappointing DVD setup.

Conclusion A stimulation for all the senses.

PERFORMANCE RESULTS



Tiny Home DVD 400

A big deal all round

The inclusion of a 400MHz Celeron makes this a great kit for home and business use.

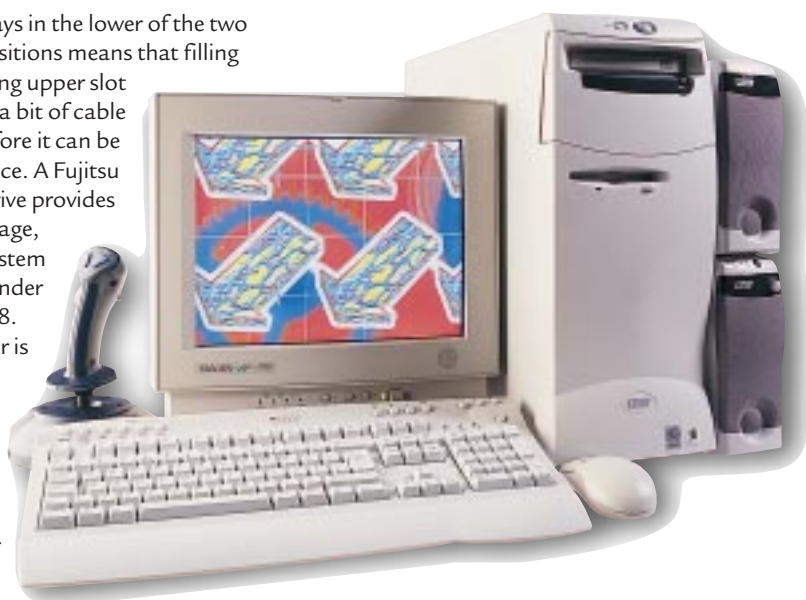
Intel has always claimed that the Celeron processor is not just for home users but for the business fraternity, too. Now, with the advent of the 400MHz model we may see this vision become reality.

So what do you get for your money? The case is fairly empty, with the compact motherboard taking up half the available space. This hosts the BX chipset, 64Mb RAM and a 400MHz Celeron processor. The chipset makes this a great PC for beginners who may want to upgrade. The RAM is supplied on just one DIMM which means that a further two SDRAM slots remain free for future use. The interior is tidy and well organised with cables tied back to facilitate easy access to the memory slots, processor and free ISA and PCI slots of which there are two of each type. Three spare power connectors allow plenty of scope for filling the remaining free internal 3.5in drive bay, as well as the one free external 5.25in bay which hides neatly behind Tiny's trademark case door. However, the positioning of

the 3.5in bays in the lower of the two possible positions means that filling the remaining upper slot will require a bit of cable juggling before it can be slid into place. A Fujitsu IDE hard drive provides 6Gb of storage, while the system itself runs under Windows 98.

The monitor is a 15in FST Taxan Ergovision 550TC095 with a viewable diagonal of 13.7in. For most home and office users this may be adequate, but power users running major graphical applications are unlikely to be tempted by the Celeron option and most will not want to push it beyond 800 x 600 resolution. However, it can still attain a respectable flicker-free refresh rate of 85Hz at 1024 x 768. It is driven by a 3Dfx Voodoo Banshee AGP for Windows 98 card with 4Mb of on-board RAM. We were impressed by its performance, with good screen uniformity, uniform image sharpness across both high and low intensity characters, no evidence of unwanted raster lines and no problems with convergence or colour mis-registration in either horizontal or vertical test patterns. It had no OSD, but buttons mounted on the bezel allowed for a wide range of alterations but omitted the degauss option — neither surprising nor a great hindrance at this level.

Entertainment is catered for by the inclusion of a Matsushita DVD-ROM drive. Using software decompression, the results of playing a movie disc were impressively smooth. Sound arrived courtesy of a Yamaha DS-XG card, mounted in a PCI slot and a pair of



Tiny-branded 180W PMPO speakers, shaped to complement the Home DVD 400's case design.

This system from Tiny is simplicity itself when it comes to setup. All cables are colour coded to match the case ports. The multimedia keyboard puts audio controls at your fingertips and has four hot-keys to launch applications. These can be configured by clicking an icon in the system tray and are supplemented by a further button to close applications. One hot-key is pre-configured to call up the Tiny FAQ guiding users through twelve key problem areas. Europhiles will be pleased to see the inclusion of a Euro symbol and they'll be able to chat to their continental

counterparts using the internal V.90 modem. A generous software bundle included language instruction software and a range of Dorling Kindersley products which help make this PC a great buy for families with kids.

All in all, this PC is a very impressive package for home and small-office business users alike, as well as corporates looking to expand their current stock without the expense of a Pentium II chip.

Nik Rawlinson

PCW DETAILS

★★★★★

Price £1,291.33
(£1,099 ex VAT)

Contact Tiny 0870 607 1294
www.tinycomp.co.uk

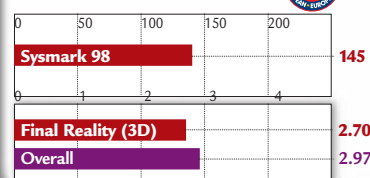
Good Points Software bundle. Monitor. Impressive component list.

Bad Points None to speak of.

Conclusion It's early days yet for the 400MHz Celeron processor but if this is anything to go by, the future looks bright.



PERFORMANCE RESULTS



Compaq Armada 7800

Powerhouse portable

A desktop replacement with loads of power, a lovely big screen and no adapter to lug.

Some users are happy with a super-small, super-lightweight yet cut-down computing device for their mobile computing needs, while others will settle for nothing less than a full-blown equivalent of their high-powered desk-bound PC. This top-of-the-range Armada 7800 sports the latest mobile Pentium II processor running at 300MHz — that's fast! — coupled with 64Mb of memory (expandable to 256Mb), a whopping 8Gb hard-disk drive and a state-of-the-art DVD-ROM drive. A 66MHz PCI bus, 512Kb Level 2 cache, 32-bit CardBus for PC cards, S3ViRGE/MX graphics controller with 4Mb SGRAM and 3D graphics acceleration, and a frame mode AGP implementation with a dedicated 66MHz graphics bus, all combine to provide the best possible speed for your applications.

That sort of specification provides more than enough processing power and storage capacity for today's operating systems and applications, and additional storage capacity and other peripherals can be added via the modular drive bay. The MultiBay on the 7800 can house additional hard disks, battery packs, CD-ROM or floppy drives, increasing hard-disk storage capacity to 16Gb or battery power to over five hours, for instance. The only drawback here is that the devices in the MultiBay cannot be hot-swapped.

As with most notebooks of this ilk, the Armada 7800 is neither svelte nor pretty. In fact, it is damned heavy — between 7.8 and 8.8lbs depending on configuration — and fairly utilitarian in appearance. But its catch is solid and its hinging action is firm, and once the case is open you have a very usable and tactile full-size keyboard with a few user-assignable function keys above it and dedicated buttons for volume control



and suspend operation. The lid houses the screen, a microphone and two speakers that provide excellent sound for a laptop.

The pointing device is one of those mini-joystick affairs set into the keyboard, with left and right mouse buttons beneath the space bar. The

One of the nicest features is an integrated power supply at the back

action of the device is positive and accurate. The strangest thing about the keyboard is its position

towards the front of the case, virtually eliminating any kind of real wrist-rest. The reason for this, though, is one of the nicest features of the Armada range: an integrated power supply at the back of the case. No lugging around a separate power 'brick' for this machine — just plug in and away you go.

The screen has often been a sticking point on most laptop machines, but the 7800 sports a full-sized 14.1in CTFT screen which can operate at 1024 x 768 resolution and display 16.8 million colours. It is excellent — bright and clear, with good colours and a reasonable

viewing angle, and remains usable in most lighting situations. The only thing which spoils it was a thin, bright band along the bottom edge although this did not impair usability. With AGP and 3D acceleration, graphics performance is outstanding.

The back panel of the unit is a mass of ports, including the obligatory expansion/docking, serial/parallel, external keyboard/mouse, external SVGA and power connectors. Next to these is the

fast 4Mbps IrDA 2.0 port, and above are connectors for external microphone, headphone and line-in, as well as a USB port.

At the side of the unit are the PC Card slots offering the usual two Type II or one Type III arrangement. Both 16-bit PC Card and 32-bit CardBus cards are supported, along with zoomed video in the bottom slot only. Above these is the integrated 33.6/14.4Kbps fax modem with full-duplex speakerphone capabilities and this is upgradeable to the K56flex protocol. Security, management and docking options are all outstanding, as befits a machine of this class.

BOB WALDER

PCW DETAILS



Price £3,878.68 (£3,301 ex VAT) including optional DVD drive; (£2,995 ex VAT without DVD)

Contact Compaq Computers
0181 332 3000 www.compaq.com

Good Points High-performance AGP graphics. Excellent docking options.

Bad Points Not the usual 'kettle plug' power cable. No hot-swap of drive modules.

Conclusion A superb piece of kit which can act as a true high-performance desktop replacement for mobile users.

Office 2000 Unwrapped suite

BETA

We check out the latest three pieces in the Office 2000 beta suite. Can you resist it?

Microsoft is still adding features to Office 2000 and the release date has been pushed back — at the time of writing, ‘second quarter’ is the best the company can offer. A strange twist is that PhotoDraw 2000, the last member of the suite to be announced, is also the first to be released ahead of the full version. Newly revealed in the latest beta are FrontPage 2000 and Publisher 2000, now promoted to the top-of-the-range Premium Edition. There will also be the familiar Standard and Professional versions, the latter including Access, and a Developer Edition aimed at programmers. The core applications are little changed from the earlier beta although there are improvements: Word can at last print two pages on one sheet.

With each release, Publisher 2000 gets less like a desktop publishing package and more like an overgrown wizard. The snag with instant Publisher designs is that, like ties bought in high-street chains, you may meet someone else wearing the same one. Publisher 2000 offers some respite with a new, improved look throughout its templates. Online help is in the new intrusive style which automatically resizes your document window, and the publisher wizard takes up a chunk of space on the left, leaving little room for your actual document on many displays.

Publisher may have taken pop-up help beyond sensible limits but, having said that, most features can be turned off and there is a moderately powerful publishing tool lurking beneath. It can now make separations for high-end commercial printing but a curious omission is column balancing — you cannot force Publisher to align both the top and bottom of multi-column text. Publisher is not a tool for professional designers but for the rest of us who want to create decent-looking documents



◀ **AT LAST — TWO PAGES PER SHEET IN WORD. I WAS SO PLEASED, I HAD TO STROKE THE CAT**

▼ **PUBLISHER 2000 — A WIZARD TOO FAR?**

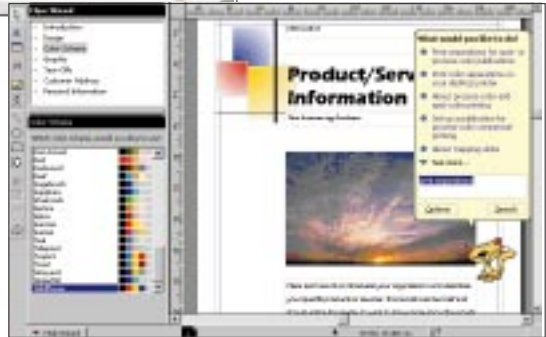
without expensive assistance. It is good at what it does, but I would be cautious about using it for web design because of its inefficient HTML code.

FrontPage 2000 makes great play of what it does not do. A section in the evaluation guide remarks that the new version leaves existing HTML code unchanged, unlike previous editions which had a habit of scrambling scripts or tags created with other software, including Microsoft web editing tools. FrontPage 2000 is also able to create disk-based webs: that is, you

can use it without having to run your own web server. There is also a compatibility setting that lets you

disable extensions that will not work on particular web servers or browsers; a great feature, long overdue.

PhotoDraw 2000 is inspired. It is a brand new graphics package although parts look eerily familiar, like the AutoShapes that come from Office 97. Its strength is that it does not force you to choose between bitmaps or vector graphics. With a bitmap you are painting with pixels: ideal for artistic expression or photographic reproduction but poor when scaled, and inaccurate for drawing. Vector graphics let you work with graphic objects, each of which can be individually sized, manipulated and scaled without loss of quality. PhotoDraw lets you mix the two techniques seamlessly, hence the .MIX extension in its native file format. It is



laden with effects and features, and while it will not challenge the likes of Adobe Photoshop in the high-end market, it will be fine for home users touching up photos for web sites or business users creating simple graphics.

More polished than earlier betas, this version works well but installation is slow. It is difficult to set up Office web extensions which handle intranet publications and discussion groups thanks to a partial dependence on the unreleased SQL Server 7.0. Even so, this is a worthwhile upgrade, but those hoping for a leaner, meaner Office suite will be disappointed.

TIM ANDERSON

The new Office will be hard to resist

PCW DETAILS

★★★★★

Price Not yet announced

Contact Microsoft 0345 002000

www.eu.microsoft.com

System Specifications Windows 95, 98 or NT 4.0. 200Mb disk space (approx).

Good Points Feature-rich. Much improved FrontPage. Strong PhotoDraw graphics package.

Bad Points North American flavour. Too many designs. Overkill for simple office use. Slow installer.

Conclusion The new Office will be hard to resist.

BeOS Release 4

New operating system

This new kid on the OS block will appeal to high-end multimedia users.

It takes nerve to launch a new operating system. The success of Linux, by offering robustness and stability, proved that users are prepared to adopt rival operating systems if they can offer something that Windows lacks. Now, BeOS provides the power and versatility needed for high-end multimedia applications like video editing and 3D graphics.

Previous versions of BeOS were essentially glorified beta releases, intended to drum up support from software developers. Release 4 is the first version aimed at ordinary end-users. The installation routine allows you to partition a hard disk so that BeOS can sit alongside Windows. Then, when you turn on your PC, you have the option of selecting either BeOS or Windows, which allows you to continue using the many business applications available for Windows while taking advantage of new multimedia software for BeOS.

Be's graphical interface is closer to the MacOS than that of Windows but anyone used to Windows should get the hang of Be pretty quickly. There's no equivalent of Windows Explorer — which is an immediate recommendation as far as I'm concerned — because you gain access to the contents of your hard disk directly from the main desktop, called the Tracker.

PCW DETAILS



Price £49 (£41.70 ex VAT)

Contact UK Distributor:
Computer Warehouse 0181 400 1298.
Be web site www.be.com

Good Points High-performance multimedia operating system.

Bad Points Limited hardware compatibility and software availability.

Conclusion The technically sophisticated BeOS will appeal to content developers but its success will depend on future software support.



An on-screen palette called the DeskBar acts like the Start menu in Windows 95/98, or the Apple menu in the MacOS. This can be customised to provide instant access to control panels and your most important applications and documents. Open windows have a title bar which allows you to move them around the screen, and the usual scrollbars and resizing options are there, too. Applications use conventional pull-down menus and tool palettes, and Be has duplicated most Windows keyboard shortcuts so new users should soon feel comfortable with the interface. The interface is probably the least important aspect of BeOS, though. It is the performance of the underlying architecture that is most impressive.

BeOS is an object-orientated operating system that supports multithreading and multiprocessing. Multithreading works by breaking running applications into a series of small tasks, allowing you to run multiple applications side by side and to switch between them at will. You can have a video clip running alongside a 3D animation at the same time as browsing the internet. If you've got a multi-processor PC, the BeOS can divide threaded tasks between processors for

◀ **ITS HIGH-PERFORMANCE MULTI-THREADING ALLOWS BEOS TO RUN MULTIPLE VIDEO CLIPS SIMULTANEOUSLY**

optimum performance but it also runs well on single-processor PCs. High-quality video and multimedia files

can take up huge amounts of RAM and disk space but Be's 64-bit file system can handle file sizes in the terabyte range. Windows has trouble with video files that are more than one or two gigabytes.

Be has gained surprisingly good software support. There are several audio packages already available, such as Steinberg's Nuendo, and a number of video editing programs are in development. Be has also pulled off a

coup with Hitachi, which has licensed the BeOS for use in a range of dual-boot (Be/Windows) PCs selling in Japan.

The only problem is Be's limited compatibility with the vast number of hardware components used in PCs, like sound, graphics and video capture cards. It's important to check compatibility before buying BeOS, as you may find that it simply won't work on your PC.

BeOS is technically impressive but it's facing an uphill struggle against Windows, especially now that NT is making progress amongst content developers. However, Linux has proved that there's room for rival operating systems in the PC market. A lot will depend on forthcoming software support, but if the software's good enough, BeOS might well carve a niche for itself among audio, video and graphics professionals.

STEPHEN DEAN

The performance of the underlying architecture is most impressive

IBM Aptiva E18 Home PC

A balanced, quality system that would make the ideal family PC.

The IBM Aptiva E Series of home PCs has received five additions to an already extensive range. This E18 model squeezes itself into the lower end, based on its price, which is borne out in its specification. How it stands up to the competition is another matter.

The name IBM conjures up fond memories of times gone by when the term 'IBM compatible' was on everybody's lips. There has been a dramatic shift in the attention paid to such details and this becomes increasingly apparent in the dog-eat-dog arena of the budget home PC market. It's brave of IBM to attempt to make its presence felt against the aggressive pricing policies adopted by most vendors, but to its credit, you can be sure that IBM's wealth of experience will translate to an expertly configured machine with a quality of build to match.

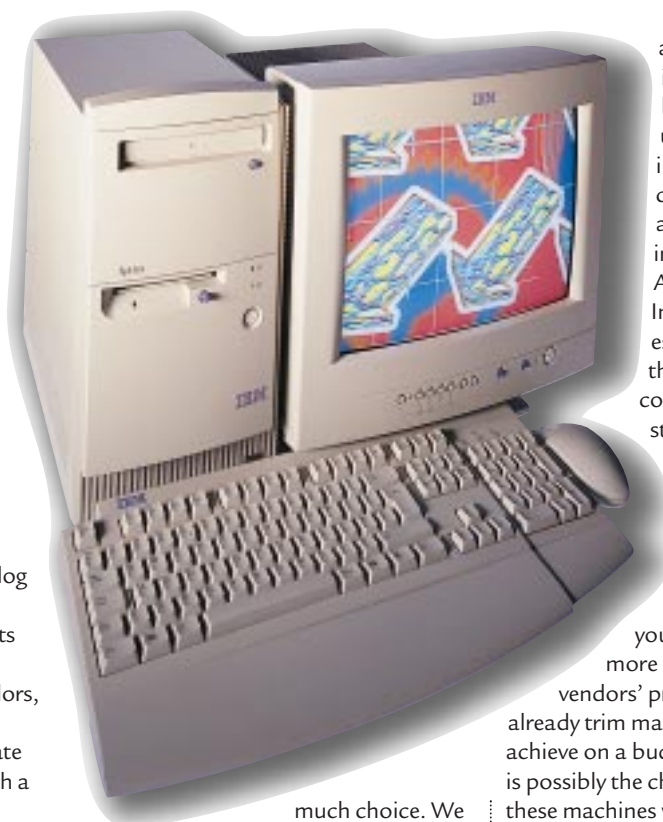
What is on offer is a system balanced around an AMD K6-2 300MHz processor with 48Mb main memory. For the majority of home uses this could well be sufficient, but you may begin to feel some lag if you're hoping to play games.

IBM wins marks for its no-nonsense approach

Upgrading for high-end game support is limited by the on-board 4Mb AGP graphics from ATI.

Storage can at least be said to be ample, with 6Gb supplied in the shape of a 5400rpm EIDE hard disk from Maxtor with an average seek time of 9ms, giving fast enough access to the pre-installed home office software, including Lotus SmartSuite97.

If you fancy getting your hands dirty with a few enhancements, then once you've loosened the case screws you will immediately note the limitations. With only one free 5.25in drive bay and one shared ISA/PCI bus slot, there's not



much choice. We were impressed by the hard-drive housing which slides effortlessly into and out of position, allowing easier access to the already tight innards.

Connectivity is well catered for with the inclusion of an IBM branded 56Kbps ISA modem, while multimedia is taken care of by the on-board Crystal sound chips. The size of the compact system box, as well as the 15in IBM branded monitor, are further indications that this machine is well suited to use in the home office. Users finding themselves making extensive use of it will be impressed by the monitor's sharp image at 800 x 600 resolution, where it sustained a 75Hz refresh rate.

We were disappointed with this machine's performance in our BAPCo benchmark test of standard office applications. Similarly, it failed to impress when subjected to our 3D Final Reality test, indicating that this machine may not be the best choice for PC gamers.

IBM wins marks for its no-nonsense

approach to what the intended end-user will be looking for. Ease of use is a major focus; an intuitive setup includes colour-coded cables and a host of friendly guides including Aptivaizer, Aptiva Helps and Aptiva Installer. Each is ready to escort the family through the essentials of modern computing. If you do get stuck, the IBM

HelpCentre is just a phone call away, 365 days a year.

Overall there's nothing remarkable to comment on here, and you could quite easily find more for your money in other vendors' products. With the already trim margin that IBM would achieve on a budget PC, £799 (ex VAT) is possibly the cheapest it can get, but these machines will sell through the sheer trusty build and experience that can be accredited to a company that has been around since the dawn of personal computing.

IAN ROBSON

PCW DETAILS



Price £938.83 (£799 ex VAT)

Contact IBM PC Response Centre
0870 601 0136

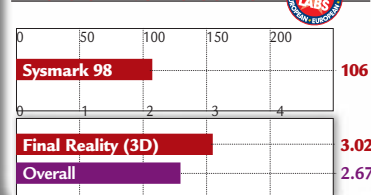
www.ibm.com/pc/uk/aptiva.html

Good Points *Intuitive. Quality build.*

Bad Points *Limited upgrade options.*

Conclusion *A purchase for those who need their hand held at all times, but when £799 is involved, that's hardly a childish approach.*

PERFORMANCE RESULTS



Hewlett-Packard 2500C

Colour printer

A big, hefty inkjet to take care of your office requirements in **mono and four colours**.

Mentioning the words 'office' and 'printer' in the same breath often conjures up images of one print technology only — lasers. And, as it's true to say that most substantial businesses have used laser printers for many years, it's an easy association to make. However, some small offices, more particularly the ones Hewlett-Packard (HP) calls workgroups, only need inkjets, but not the fiddly little ones you would use at home.

So, HP has come up with the 2500C, a colossus of a colour printer that is based on inkjet technology. Hailing from the Professional Series Colour range, the 2500C is designed for use in workgroups — in other words, for small businesses or other organisations with between five and ten users.

The 2500C is absolutely huge and has a virtually indestructible feel to it. All the trays and movable parts feel sturdy. It is easy to clear jammed paper from inside, and easy to replace ink cartridges. So, it's perfectly built for the small-office environment where staff have neither the time nor the inclination to look after office property. It's pretty easy to get up and running, too. Just plug it into the parallel port and stick the software CD into the drive.

It has clearly been designed with networks in mind, claiming to 'seamlessly' integrate into all major network environments and protocols as well as support all major operating systems. What it boils down to is that the 2500C supports Win 3.1x, 95, 98, NT 4.0 and MS-DOS. It is network capable with the option of inserting a Hewlett-Packard MIO internal print server.

Inkjets are, historically, slower than lasers; so how does the 2500C fare? Against a claimed mono speed of 7.5ppm using black text only, our laboratory tests measured a mono speed of just 4.2ppm — not quite so impressive,

but not so bad. Also worth remembering is that in HP's Econofast mode the mono print speed can improve by up to 2ppm. Standard memory is 4Mb but upgradeable to a whopping 76Mb.

The 2500C is more than just a mono inkjet printer. Probably its main selling point is its four-colour capability. The claimed mixed mono/colour speed is 3.3 pages in normal mode and up to 7.5 pages in Econofast mode.

Our tests in this category are not really comparable as we use not a text/image mix but a full A4 colour image with no text, and in optimum mode it took approximately half a minute to print. Still, quality was excellent in both mono and colour modes, with greys and blacks mixing well in large and small fonts and colours showing great clarity and respectable detail. The 2500C will print at a resolution of 600 x 600dpi in mono.

Extras include the ability to use the ColorSmart II technology for colour matching, and PhotoREt II colour-layering technology. There are also

Billboard and Handout print options enabling you to expand an image or document to cover lots of pages or to shrink several pages onto one side of paper, respectively. Its workgroup connectivity also comes through in the printer control language (PCL): it uses the enhanced HP PCL3 but supports Adobe PostScript 3.



The machine is unusual in that the print heads are separate from the ink cartridges. Mounted just behind each other, the four heads and cartridges are well labelled and it is simple to replace them. It also cuts down on running costs with no need to replace both print head and cartridge at the same time. In fact, both have indicators to inform you when they are reaching the end of their working lives. The inclusion of two media trays, with a combined capacity of 400 sheets, means that you can have an A3 and A4 tray at the same time. Having seemingly gone sensor mad, HP has included a sensor so the printer knows what media is in which tray.

JIM HARYOTT

Unusually, the print heads are separate from the ink cartridges

PCW DETAILS



Price £1,104.50 (£940 ex VAT)

Contact Hewlett-Packard 0990 474747
www.hp.com

Good Points Features. Print quality. Sturdy build quality.

Bad Points Size. Slower than anticipated print speed. Price.

Conclusion The 2500C is an able, well thought out and well built colour inkjet for the small-office user. It is pretty big though, and it's not cheap.

Brother MFC Pro-700C

Multi-talented device

If office space is at a premium, a device that does everything but make the tea could be what you need.

Since every other manufacturer worth his salt has now added an MFD (Multi-Function Device) to its range, Brother has followed suit and now the MFC Pro-700C is available for the use of the SME market.

The MFC stands for Multi-Function Centre and for your money you get a multitude of peripherals squeezed into this rather large marvel. A Plain Paper Fax, Colour Printer, Colour Copier, Colour Scanner, Message Manager and Colour PC/Fax (where faxes are received by the PC) are all built-in and most work without connection to an active PC.

The main benefit of an all-in-one device is that all of the common office peripherals are merged into one, saving space and money, and improving ease of use.

First up, the printer. This is an inkjet unit capable of resolutions of up to 720x720 dpi that utilises the Piezo technology most commonly found in Epson printers. In our tests it achieved a quality rating of 70.4 percent, which isn't fantastic. Its weaknesses were greyness and significant banding in blocks of black. It coped well with fine lines, and even gave our 'fine white lines through a solid block of black' test a good run for its money. The colour output was a touch too bright and this resulted in images looking faded. Ink density can be altered in the driver to correct this, but the factory setting is preset to a recommended value to save ink.

The claimed mono speed of up to 5 ppm is a bit overrated — in our tests it produced only 1.7 ppm. We were, however, impressed with the printer's performance in the positional test, where a test pattern is printed on the same sheet twice. The pattern looked as if it had only been printed once, and the text was only slightly blurred due to marginal horizontal misalignment.

A fairly rare feature on any MFD is the ability to produce colour copies without being connected to a PC. The Pro-700C's 4Mb of RAM enables this facility. A full A4 copy takes less than three minutes on the Best setting, and the result is very close to the original.

You get a multitude of peripherals squeezed into this rather large marvel

The fax functionality is extremely comprehensive, and there are so many advanced functions that most of them probably won't be needed. It can cope with speeds of up to 14.4Kbps, and documents of between 76x100 mm and 216x900 mm. The scanner, meanwhile, has an optical resolution of 300 dpi and incorporates a document feeder. The results of our scanner tests showed that it didn't cope very well with fine details such as extremely thin lines: these were either partly or completely missing in the scanned image. Colour was, however, faithfully reproduced and overall we were pleased with the quality.

The Pro-700C has a built-in phone

handset, full-duplex speaker phone and digital answering machine. It can store a maximum of 99 minutes of voice messages, up to 300 pages of faxes, depending on their content, or a combination of both. The front panel has been really well designed — buttons for the different functions are separated into obvious areas, making this machine easy to use.

We only had two small gripes about the Pro-700C. The first was that the telephone cable had a plug doubler so big that it wouldn't fit into our socket as it clashed with the cable box below. The second concerns the document support for the printer output. This is too short, so documents pile up out of order and, in our experience, after about 10 sheets can get pushed off completely.

Hewlett-Packard has released the Officejet 710 that, excepting the phone, has much the same functionality as the Brother yet costs only £470. That said, if you're looking for an MFD, the Pro-700C is well worth a look.

JAMES MARTIN

PCW DETAILS



Price £649 (£552.34 ex VAT)

Contact Brother 0161 330 6531

www.brother.com/eu-fax/INFO/700c/700c.html

Good Points Usability. Built-in answerphone and colour copying without a PC.

Bad Points Slow printing. Poor document tray.

Conclusion A good all-round MFD that is well worth a look.

Sony SFD 200S-BP HiFD

An external unit can ease your **file storage worries** without costing an arm and a leg.

The HiFD drive will initially only be sold as an external parallel port device — internal ATAPI and PC Card versions will follow. A special parallel cable is used and a pass-through connector is provided for your printer.

This external unit, slightly larger than the external



SuperDisk unit, is tastefully finished in grey and has a special drop-down cover for the mouth of the drive — presumably dust must be a problem for these drives.

A **green LED** indicates the presence of a 200Mb HiFD disk — a dim 'Busy' LED tells you it's busy. A small button ejects the disk after a couple of seconds. HiFD disks have the same form factor as standard 3.5in floppies but lack the bevelled corner and read/write and ID holes at the bottom. The shutter is also slightly different. As a result, the HiFD is backwardly compatible with 1.44Mb disks though not with LS-120 SuperDisks. One feature it shares with the LS-120 is sluggish performance. Although the HiFD uses a floating R/W head reminiscent of a hard disk, it doesn't offer hard-disk-like performance. As a result, filling that 200Mb capacity can take a while, unlike a Zip disk.

The HiFD uses the familiar

Connect-It Windows 9x parallel port driver utility which promises R/W speeds of between 740Kb and 900Kb per second. In theory Connect-It supports multiple parallel port devices but we were unable to daisy-chain a parallel port SuperDisk unit from the HiFD's pass-through port. Like the LS-120, accessing a newly inserted disk brings the system to a halt, which is irritating. The HiFD is easy to install, however, and reasonably well documented.

ROGER GANN

PCW DETAILS

★★★★

Price £149 (£126.80 ex VAT)

Contact Sony Computer Peripherals and Components 01932 816660
www.sony.co.uk

Good Points Good capacity. Easy to use.

Bad Points Slow data transfer rate.

Conclusion The upcoming 250Mb Zip will offer the HiFD very stiff competition indeed.

WordPerfect 8 for Linux

Options for **doing without Microsoft** are becoming more attractive with Corel's help.

Linux continues to gain credibility as a server, but doubts remain about its value as a desktop operating system. While the flame wars rage, the Canadian company Corel is quietly getting on with helping to develop Linux in that direction. The arrival of Corel's WordPerfect 8 for Linux, freely downloadable for personal use, is another step along the way.

The files are zipped, although at www.download.com they're incorrectly given the .GZ suffix. This should be lower case, so you'll need to rename the file, or use gunzip's -S switch to permit the upper-case suffix.

The installation is intelligently automated through a supplied script, which worked effortlessly on my Red Hat 5.2 distribution running on an IBM ThinkPad 560x. If you're using the CDE desktop there are instructions on setting up a desktop icon for WordPerfect.



Otherwise you'll need to evoke the word processor from the command line inside an xterm window, unless you know how to tweak one of the Linux launchpads like the excellent Wharf that runs with AfterStep.

WordPerfect has always bundled its own fonts and printing mechanisms.

This was originally very useful on DOS and should still be helpful for Unix beginners, although seasoned Unix hands may find this idiosyncrasy frustrating. Unlike StarOffice, WordPerfect behaves properly as an X client, so that you can use it on one machine on the network while it's actually running on another.

CHRIS BIDMEAD

PCW DETAILS

★★★★

Price Free for personal use.

Contact www.corel.com
Download from www.download.com

Good Points A fully-fledged word processor that adds credibility to Linux. Reads and writes most standard word processor formats.

Bad Points Big download. Restrictive licence terms (version for business use costs \$69.95).

Conclusion Corel is serious about developing Linux as an effective platform for office productivity. WordPerfect 8 for Linux is a convincing demonstration of this.

Intuit QuickBooks 6

The number-cruncher's friend

If ease of use is important, QuickBooks can't be beaten.

QuickBooks is often touted as the easiest accounting package for small businesses. There are three main reasons for this. Firstly, everything entered into QuickBooks remains fully editable, so if you make a mistake, you can alter it at any point. Secondly, QuickBooks tries to banish the accounting jargon found in other packages — you will never need to 'post a journal entry to the nominal ledger', for example. Finally, and key to QuickBooks' appeal, is that purchases and sales can be typed exactly in the same way as if you were using a paper-based system. So while entries can be typed into dialogue boxes, QuickBooks also allows them to be typed in spreadsheet-style lists it calls 'registers'. This reduces the learning curve and makes it much easier to see what's going on.

Version 6 is the first QuickBooks incarnation to be a 32-bit application. The right mouse button now displays context-sensitive menus, and registers can be sorted according to any of their fields. The main improvements, however, have been geared towards the help facilities. Videos explaining the program's key features have been created (these are provided on QuickBooks' CD-ROM, but integrated into the rewritten help system), and every window now has a 'How do I?' button,



◀ **SIMPLY ORGANISED AND EASY TO NAVIGATE, QUICKBOOKS IS APTLY NAMED**

I found QuickBooks' interface impressive; for example, making a payment involves filling out an on-screen cheque. Every transaction

providing help related to that particular window. None of the additions is likely to make existing users rush for an upgrade, but they are worthwhile nonetheless.

For more demanding companies, a 'Pro' edition of QuickBooks 6 adds time

entered into a dialogue box is transferred into an appropriate register: if you create an invoice, a corresponding entry appears in the Customer Register. In the register, you can look at an on-screen list of past transactions and double-click

Purchases and sales can be typed as if you were using a paper-based system

tracking, billing, job costing and estimating. It also adds multi-user capabilities, allowing up to five users on a network to run the package at the same time (assuming enough licences are bought). Additionally, a couple of separate utilities are provided: Depreciation Calculator is a useful program for working out the depreciation of fixed assets, while Business Health Check displays information either numerically or graphically on eighteen indicators of business performance and alarms can be set to warn users if performance goes below a specified level.

Each time a company file is loaded, QuickBooks displays a list of reminders on-screen, such as which customers' accounts are overdue — very useful. Getting to features in QuickBooks can be done either through menus, a customisable button bar or the Navigator, a graphical menu window.

on one to see its corresponding invoice. For entering purchases you can type entries directly into the register, just like using a cash book.

For VAT-registered businesses, QuickBooks calculates VAT and works out the VAT return. In the June '98 issue of PCW [p200] we pointed out that (with version 5) entering an invoice late could mean the VAT is added to a previous VAT quarter and, therefore, would not be calculated in the VAT return. Although strictly speaking QuickBooks 6 still suffers from this, there is a better work-around. Using its new 'close dates' option, users can prevent dates from previous VAT quarters being entered, which acts as a reminder to type in the current date rather than the invoice date. Ideally, Intuit should allow two dates to be given to each transaction.

There is little to encourage existing users to upgrade. But if you run a small business and are looking for an accounts package, I would recommend QuickBooks 6 unconditionally.

ALEX SINGLETON

PCW DETAILS



★★★★★

Price QuickBooks 6, £99 (£84.26 ex VAT); QuickBooks 6 Pro, £199 (£169.36 ex VAT); QuickBooks 6 Pro five-user, £599 (£509.79 ex VAT)

Contact Intuit 0800 585058
www.intuit.co.uk

System Specification Windows 95, 98 or Windows NT 4.0, CD-ROM, 486/33 with 16Mb RAM.

Good Points Entries remain editable. Multi-user version.

Bad Points Late entries can complicate VAT returns.

Conclusion The easiest small-business accounts program we've come across.

InDefense

Protect and serve

Tough on viruses, **tough on the causes** of viruses? Not really, no.

In the war against viruses, the most common method of detection is to use a signature file containing the unique hexadecimal code that identifies each specific virus. Unfortunately, with new viruses appearing almost daily, this file requires regular updating, with some vendors charging extra for this service. InDefense takes a different approach that doesn't require a signature file as it looks out for unusual behaviour that indicates a virus is at work.

InDefense uses a three-pronged attack with a memory-resident module providing the first barrier. This constantly scans the system and looks for unusual actions such as program code being modified or extra code being added. The next hurdle occurs when the PC is switched on, as InDefense runs a DOS utility that takes a low-level look at the hard-disk boot and partition sectors and compares them with a snapshot taken during installation. This also keeps a record of the amount of available conventional memory and InDefense checks to see if this has decreased as well, indicating a boot sector virus may have loaded itself.

Next, InDefense tries to fool viruses into giving themselves away by loading false executable files as bait. Finally, it creates a unique rescue disk containing CMOS parameters and images of the hard-disk partition and boot sectors.

PCW DETAILS



Price £49.95 (£42.50 ex VAT)

Contact POW! Distribution
01202 716726

www.indefense.com

Good Points No need for regular virus signature updates.

Bad Points Causes some instability under Windows 98 and not 100 percent reliable.

Conclusion Unusual method of virus detection that includes some sophisticated tools, but far too complex for the average PC user.



◀ **VACCINATION FILES ARE USED TO CHECK FOR INFECTION AND RECONSTRUCT DAMAGED FILES**

user licenses allows InDefense to be run on small networks and installation can be forced on users by using a NetWare or Windows NT login script.

During installation, InDefense scans the entire hard disk and creates special vaccination files that contain detailed information about any COM or EXE files that are found. At only 65 bytes for each executable file they won't take up much

InDefense uses a three-pronged attack with a memory-resident module

disk space and are invaluable for reconstructing damaged files. File viruses are particularly nasty as they move program code around and conventional anti-virus software frequently cannot repair infected files, requiring them to be copied back from the latest clean backup. InDefense scores well here as the vaccination files contain information such as program entry points so it can repair virtually any damaged file.

InDefense is tough on macro viruses as it assumes all automatic macros are potentially hostile. During the initial scan it displays the location of any it finds along with the commands contained within the macro. You can opt to accept legitimate ones and delete any you don't recognise. InDefense sensibly offers an Undo option in case you later find you removed valid macros.

A workgroup pack (£499) with ten

Rescue-disk images for each PC can be stored on a server for easier management and macro control can be centralised.

InDefense sounds sophisticated but, during testing, a few holes became apparent. Infections with boot sector viruses were all spotted due to the change in conventional memory but some file viruses were allowed through the net. When we ran the Hare virus, InDefense indicated

that some unusual activity had been detected but it didn't stop the hard-disk boot sector from being destroyed. Neither did it stop Junkie from corrupting COMMAND.COM and causing a complete Win98 load failure. We repaired the damage using the rescue disk but these particularly nasty bugs should never have been allowed through in the first place. The test system also became unstable with the VFAT VXD (Virtual Device Driver) regularly failing with fatal exceptions and requiring a re-boot to clear.

Although InDefense does away with the cost of regular signature updates, you will need a sound understanding of virus tactics to use it correctly. Furthermore, its failure to stop some viruses from infecting the test system makes it a risky choice at best.

DAVE MITCHELL

OmniPage Pro 9.0

Optimum recognition

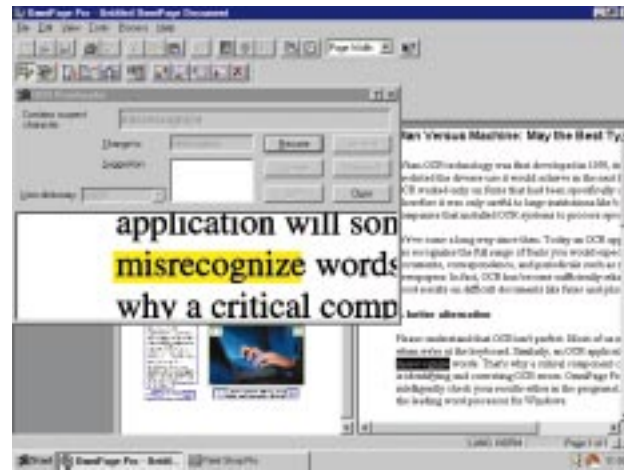
Time-saving and accurate, a reliable OCR can be a godsend.

OmniPage Pro solves one very tedious problem — that of getting printed documents into the computer in an editable form so that they can be used in a word processor, in a spreadsheet, on the web, or stored in any other computer-based document format. In short, OmniPage saves you from a lot of retyping, as once your document is scanned, the package translates it into a text file.

The four most important factors in judging the standard of an OCR program are: the speed with which it works; the accuracy of recognition; its ability to handle different types of fonts and qualities of print; and its ability to reproduce the page layout of the original document. Not all of these factors are important to every user, but the first two, accuracy and speed, are essential. OmniPage Pro is one of the best programs in the field of OCR software and it performs well in fulfilling each of the above requirements and more.

It claims better than 99% accuracy on laser-quality documents using standard fonts. However, it also performs well with faxes, photocopies, dot-matrix print and magazine and newspaper articles, as well as working on documents of degraded quality. It can handle skewed pages (up to 10 degrees) for better recognition results, faded faxes, bad photocopies, small text sizes (down to 4 point) and large text sizes (up to 72 point). It can also recognise reversed-out type (white or light-coloured text on a dark background). Further, OmniPage can retain the original layout and formatting features of a page including columns, graphics, tables and font attributes such as size and emphasis.

Special Table support features enable the program to recreate tables as table objects used in Microsoft Word and WordPerfect. This allows the user to edit the table characteristics as well as the text within each cell. In addition, a new



spreadsheet mode identifies and preserves the content and layout of numeric-based documents, saving them directly to Excel, 1-2-3 or Quattro Pro.

OmniPage now supports colour scanning. Colour graphics from scanned

OmniPage Pro is one of the best programs in the field of OCR software

documents are preserved, which allows users to edit them, from within OmniPage Pro or a third-party image editing program, before saving them to a word processor or other application.

OmniPage Pro is very easy to use, with virtually no learning curve. This is enhanced by the AutoOCR Toolbar, which takes users through the complete OCR process with the push of a single button. Once a page is scanned, the program identifies and separates regions (zones) of text and graphics in order to improve recognition and formatting. Such zones can be generated automatically or manually, and modified by the user once defined. The proof-reader facility comes in to play once the text on the page has been recognised. This automatically checks the OCR results and displays the original image

◀ **OMNIPAGE RECREATES PRINTED DOCUMENTS IN EDITABLE FILE FORMATS**

for comparison. Like a spell-checker, it highlights suspicious characters and suggests corrections. OmniPage Pro integrates with

Microsoft Office 95 and 97 applications, facilitating text scanning and recognition functions from directly within Word and Excel. This integration is enhanced as the program shares a dictionary with Word, saving time as users will now no longer find themselves adding a word twice.

Files can be opened and saved in a variety of file formats, as well as to HTML, which makes scanning a page and saving it as a web page a long-awaited reality. Fonts, formats and graphics are, of course, preserved. OmniPage Pro recognizes 13 Western European languages, including multiple languages on the same page.

PANICOS GEORGHIADES

PCW DETAILS



★★★★★

Price £464.13 (£395 ex VAT). Upgrade, £79 (67.23 ex VAT)

Contact Caere UK 0171 233 6677
www.caere.com

System Specification Windows 95, 98 or NT 4.0, 486 PCs and above, 16Mb RAM minimum (32 Mb recommended), 45Mb free hard-disk space, CD-ROM drive, SVGA or VGA monitor with 256 colours.

Good Points Fast, accurate. Holds layout. Handles degraded documents.

Bad Points None.

Conclusion If you need to recreate printed documents in computer-editable formats, you won't go wrong with OmniPage Pro 9.

Fujitsu DynaMO 640 SE

This external drive just got **smaller and faster**.

There are two external DynaMO drives at present: the 640SE, with an external power supply, and the 640SD with an internal PSU. Later on, Fujitsu will be releasing the DynaMO 640AI, an internal version which is ATAPI-based — the first non-SCSI MO drive we've come across.

The new DynaMO 640Sx series delivers a performance gain of 20% (the data transfer rate is up from 3.9Mbps to 4.7Mbps) over the previous DynaMO

640 drives. It's also 40% smaller and is thus more or less portable. Capacity remains unchanged at 640Mb, though, with the ability to read the original 540Mb, 230Mb and 128Mb MO disks. The new DynaMO uses Light Intensity Modulation Direct Overwrite (LIMDOW) technology which performs the overwrite process in a single pass and at full speed, instead of in the slower two-pass method of earlier technologies.

What else is new?

Cosmetically, the 640 SE version looks nothing like its predecessor: it's had a makeover, turning jet black and space age in the process.

The Centronics-style connectors have been superseded by a pair of high-density SCSI-2 ports. The unit is still as fiddly to configure as

its predecessor thanks to the same block of DIP switches on the back, though this device is now SCAM-compliant, which can automate the configuration process.

I like the fact that you get a pair of SCSI cables — one for 25-pin Mac-style connectors and another for HD SCSI-2 connectors, as these can cost £30 each. You also get a 640Mb MO disk.

ROGER GANN



PCW DETAILS

★★★★

Price £252.63 (£215 ex VAT)

Contact Fujitsu Europe 0181 573 4444

www.fujitsu.co.uk

Good Points No longer expensive. Low media costs. Archival durability.

Bad Points MO is still a slow medium.

Conclusion Great for archiving data long term, but more expensive than conventional technology.

Insigma Hyperceive

Make your **web site sing** with this new sequencer package.

Sound can make a real difference to web pages, but given the net's limited bandwidth, is it really possible to have uninterrupted audio playback on-line? Insigma Technologies think so, and its Hyperceive sequencing package enables you to achieve just that, allegedly. What makes this software different to other audio-on-the-web solutions is that the end-user doesn't need a web browser plug-in. So how does it work?

When someone visits a Hyperceive site, the sequence file is downloaded along with its Java-class file player. The player then downloads the first audio snippets that are used in the sequence and starts to play them back. Meanwhile, the remaining audio files (mono 8-bit, 8kHz au format) continue to download. If a file hasn't downloaded by the time it is needed, Hyperceive continues to loop, or recycle, previous



parts that are now stored in cache.

The sequencing software provides control for the structure of loop points and can handle up to 24 audio channels. Each audio file is placed on its own track and can be configured to play just once (which is useful for voiceovers), or continuously as the arrangement loops. When you have a sequence up and running — and by no means is this hassle-free — you can test how it will perform over the net with the built-in modem emulator. If everything runs smoothly, Hyperceive can generate an HTML file for

integration with your web pages.

In principle Hyperceive is a viable product, but given current net traffic, and that most users have only 28K modems, the results don't come close to justifying the time and money spent.

STEVEN HELSTRIP

PCW DETAILS

★★★

Price £149 (£127 ex VAT)

Contact Insigma Technologies 01285 643600

www.insigma.com

System Specification Windows 95/98, 120MHz Pentium, 16Mb RAM.

Good Points No plug-ins required by the end-user.

Bad Points No audio editing inside host application. Works with milliseconds as a time reference rather than BPM. Tricky to get good results. Limited features.

Conclusion Useful for adding speech and one-off sounds to your web site, but if you want half-decent sequenced audio, stick to MIDI.

Rhinoceros

3D modelling software that's powerful, intuitive and easy to use.

Rhinoceros is a 3D object modelling package based on the NURBS principle. Like Organica [reviewed in February's PCW] it focuses solely on object creation rather than generalised modelling, rendering and animation. There's a simple renderer to help with design, but it's no use for finished output.

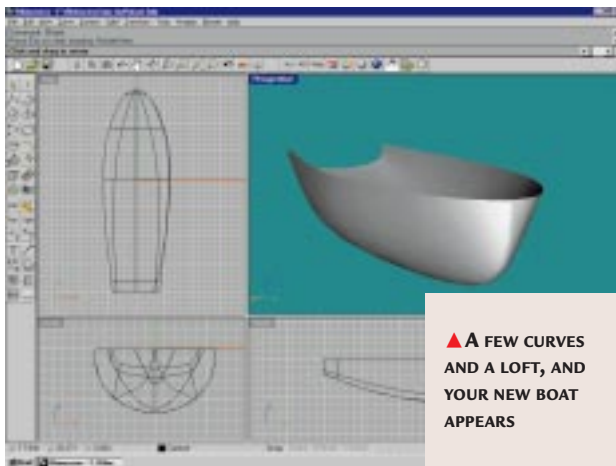
Rhino is streets ahead of Organica in every respect. It's a more formal package, aimed not only at 3D animators and artists but also product design and manufacture. To this end it sports a raft of CAD-like features such as precision numeric input, support for design via cross-section templates and output to stereo lithography systems. There's also a permanently active command line interface that can be used at any time to perform or modify functions.

Rhino provides a superb array of powerful modelling facilities. The variation on offer is stunning, particularly for creating swept surfaces and objects. Aside from the run-of-the-mill sweep tools, you can sweep using one or two curves as rails, or revolve using a

closed curve as a rail. You can also use the loft function to create a surface from a set of profile curves — great for modelling complex surfaces such as boat hulls.

With any 3D design package it takes a while to get used to the particular application's modelling conventions. But Rhino's interface is remarkably easy to use, and you feel completely at home after just a couple of hours. If you do any 3D design work, you need Rhino.

DAVID FEARON



PCW DETAILS



Price £586 (£499 ex VAT)

Contact Softcover 0171 259 2100

www.rhino3d.com

System Specification Pentium, Windows 95/98/NT, 10Mb disk space, 32Mb RAM.

Good Points Very powerful surface creation tools. Intuitive interface.

Bad Points None.

Conclusion Expensive, but well worth it if you're serious about your 3D.



CenturionSoft Steganos

Give snoopers a run for their money with this data security package.

Steganos performs a trick that seems almost magical the first time you use it. It will take any file and completely hide it within a pre-existing image or sound file. After hiding, the carrier file is exactly the same size with the same date and time attributes as before. While hiding the original file, you can encrypt it using a backdoor-less

2048-bit encryption scheme.

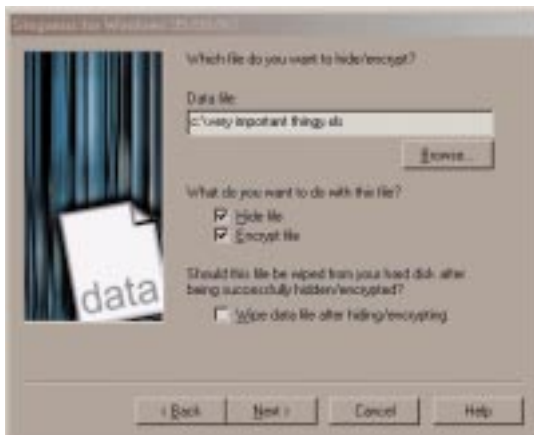
How does Steganos perform such a trick? For images and sounds it puts the data into the least significant bit of every word of the file, thus the data appears to be background noise. But this means you need a carrier file significantly larger than the file you're hiding: trying to put a 282Kb Access database into a 900Kb

BMP image failed. You can also use text files as carriers: Steganos simply appends coded spaces and tabs (to represent binary ones and zeroes) to the file — this is obviously less secure than using images and sounds since the file size increases.

Once you're aware of the limitations, however, Steganos works flawlessly: you can open up images and sound files containing hidden data and they

appear completely normal. You can even convert formats, so long as lossy compression schemes like JPEG aren't used. The application also provides secure file deletion with the Shredder, which overwrites the entire file with random data.

DAVID FEARON



PCW DETAILS



Price £34.95 (£29.74 ex VAT)

Contact POW! Distribution 01202 716726

www.centurionsoft.com

System Specification Windows 95, 98 or NT4, 10Mb hard-disk space, CD-ROM drive for installation.

Good Points Very effective for hiding small amounts of data.

Bad Points Inefficient on a larger scale. Image and sound files need to be much bigger than the data you're hiding. All data security schemes carry the potential for abuse.

Conclusion One more thing for nosy governments to get stressed about — hurrah!

VideoLogic SonicStorm Pro

Surround sound is the new big feature for good-time gamers.

The original SonicStorm was one of the first PCI sound cards. Sporting the Maestro chipset, this card eliminated the limitations of the ISA slot. The Pro is built around the new Maestro2 chipset, hosting a range of new features. Chief among them is surround sound using only two speakers.

While many audio cards use the A3D standard from Aureal Semiconductors, the Maestro2 uses technology developed by Sensaura. This has two advantages. While A3D is a proprietary standard, Sensaura's 3D

audio implementation can be accessed through Microsoft's DirectX API, making it accessible to all games developers. Also, Sensaura's 3D audio is arguably more accurate than the better-known A3D version, mainly due to Sensaura's patented Digital Ear technology.



The SonicStorm Pro handles 64 MIDI voices in hardware and the same number of audio voices. As befitting a next-generation sound card, it has a dedicated digital SPDIF output. Unlike the SPDIF output in the SoundBlaster Live!, which is locked at 48kHz, the SonicStorm Pro has a frequency response of 44.1kHz which enables it to output CD-quality audio to a DAT

or MiniDisc. A daughtercard with an SPDIF input is also available. The SonicStorm Pro's performance is good but not exceptional. Although its MIDI synthesis is better than older cards like the AWE64 Gold, it is slower than the new SoundBlaster Live! However, its audio reproduction in games is excellent. The surround sound effect is enhanced by its ability to handle four speakers.

AJITH RAM

PCW DETAILS



Price £49.99 (£42.55 ex VAT)

Contact VideoLogic 01923 260511
www.videologic.com

Good Points Surround sound using two speakers. Digital output. Two stereo outputs. Very reasonable price.

Bad Points Not the most powerful DSP for MIDI synthesis.

Conclusion A good sound card for the gamer and home-studio enthusiast.

Paradise Modem PRO

Answerphone/fax/hands-free unit with a modem to boot.

The Modem PRO follows a trend set by Olitech and Pace, among others, of providing standalone fax and answerphone capabilities without the need to be connected to a PC. It can even operate as a hands-free speakerphone. The Modem PRO takes this trend a stage further: it's a device that

actually looks like an answerphone, complete with large Play, FF and Rewind buttons, mic and speakers.

Only the basic array of status LEDs on the front panel betrays its alter-modem-ego. It can store up to 20 messages or faxes and offers the usual array of remote access options, including the ability to dial another number to forward/replay messages recorded while you were out. The PRO also comes with the familiar Phone Tools software which offers wider voicemail and fax facilities, but using a PC.



The Modem PRO is also a capable 56Kbps V.90 modem driven by the Lucent chipset rather than the ubiquitous Rockwell. It returned the usual spread of connect speeds from our office lines in the 44 to 46Kbps range. As is so often the case with modern modems, full documentation is supplied only as

an Acrobat file on the CD-ROM. A 12-page pamphlet is sufficient to take you through installation. Audio input and output sockets are provided so that you can hook up the Modem PRO to a sound card, but this probably isn't essential unless you are fussy about sound quality. Although the Modem PRO has an integrated microphone and speaker, the quality of the digitally recorded message is a bit lo-fi.

ROGER GANN

PCW DETAILS



Price £99.95 (£85.06 ex VAT)

Contact Eurotech Marketing
0118 981 0118 (no URL)

Good Points Cheap. Easy to use. Good answerphone features.

Bad Points Lightweight build quality.

Conclusion Given the price and the range of features it offers, with and without software, on top of its 56K functionality as a straight fax/data modem, it makes the shortlist.

Yamaha SW1000XG sound card

With stunning sounds and wicked synth, this card puts PC audio into the premier league.

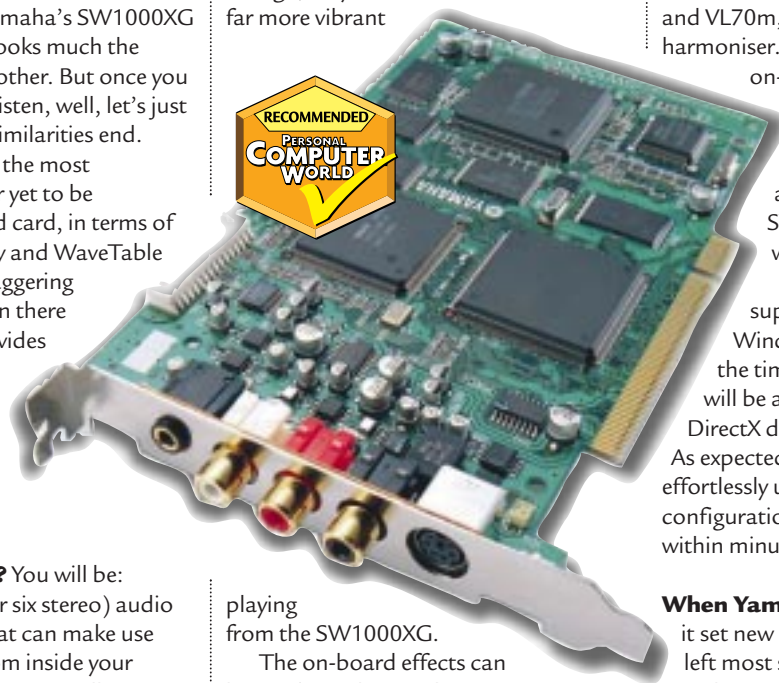
At a glance, Yamaha's SW1000XG sound card looks much the same as any other. But once you plug it in and have a listen, well, let's just say that's where the similarities end. Without doubt it has the most impressive synthesiser yet to be integrated on a sound card, in terms of both its sound quality and WaveTable memory: there's a staggering 20Mb of ROM built in there somehow. It also provides six parallel 24-bit effects, over 70 programmable effects types and first-rate hard-disk recording facilities.

Still not impressed? You will be: there are 12 mono (or six stereo) audio playback channels that can make use of all those effects from inside your sequencing software. Better still, it is able to apply and mix these effects without hogging your system's CPU. There are two reasons why this is a positive step forward. Firstly, it will enable you to playback more audio channels if your PC isn't busy running processor-intensive software-based plug-in effects; and secondly, it could just save you from having to upgrade your PC to run such effects.

The synthesiser is equivalent to Yamaha's flagship XG tone module, the MU100. Although similarly priced, the SW1000XG is capable of far more and can easily integrate with your current setup. Mixer templates are supplied for the main sequencing packages and XGEdit now fully supports all the card's features. The synth provides 64 voices of polyphony over 32 MIDI channels and is equipped with over 1,200 instruments and 46 drum kits.

... provides first-rate hard-disk recording facilities

All the sounds from the highly successful DB50XG WaveTable daughterboard are present and even those from the MU90 are included. As you might expect, though, they sound far more vibrant



playing from the SW1000XG. The on-board effects can be configured as auxiliary or insert-type processors and include a comprehensive set of reverbs (12 types), choruses (14 types), delays and dynamic processors. In addition to compression and noise gate algorithms, the card provides a fully parametric EQ, distortion, tremolo, phasing and an aural exciter.

Much of the card's wizardry is performed by Yamaha's custom Digital Signal Processing chip, the DSP3. This can be programmed for many intensive audio tasks and has already featured in Yamaha's professional O2R and O3D digital mixing consoles. Round the back, the card has RCA connectors for analogue and S/PDIF digital outputs, a mini-stereo jack for external input and a PS/2-type socket for MIDI. A cable is included in the box for MIDI input and output, though disappointingly there's no S/PDIF input. Internally, the card can

be linked to Yamaha's DSP Factory [see *Reviews*, PCW Dec '98] or optional PLG100 daughtercards. Three cards are available so far, which include two additional Yamaha synths, the DX7 and VL70m, and a three-part vocal harmoniser. Similar to the effects on-board the SW1000XG, the harmoniser can be accessed via the external input or from within your audio software. Because the SW1000XG is a PCI card, it will work with a Mac or PC. The card we reviewed was supplied with MME drivers for Windows 95 and 98, although by the time you read this, ASIO drivers will be available for both platforms. DirectX drivers are also in the pipeline. As expected, the card installed effortlessly under a plug-and-play configuration and was up and running within minutes.

When Yamaha released the DB50XG, it set new standards for PC audio that left most sound-card manufacturers quaking in their boots. Going on what we've seen and heard, the SW1000XG is likely to have a similar effect. Although it's too expensive to be an option for everyone, for those who want to run a virtual studio inside their PC, with loads of effects, it's well worth the asking price. It's a shame about that digital input, though.

STEVEN HELSTRIP

PCW DETAILS



Price £449 (£382 ex VAT)

Contact Yamaha 01908 369269

www.yamaha.co.uk

System Specification PC: Windows 95/98, 166MHz Pentium, 32Mb RAM. Mac: Any PowerPC, System 7.6.1, 32Mb RAM.

Good Points Stunning XG sounds. High-quality effects. Doesn't require a heavyweight PC or Mac.

Bad Points No S/PDIF input. No sampling capabilities.

Conclusion This card will transform your PC into a self-contained, professional audio production studio.

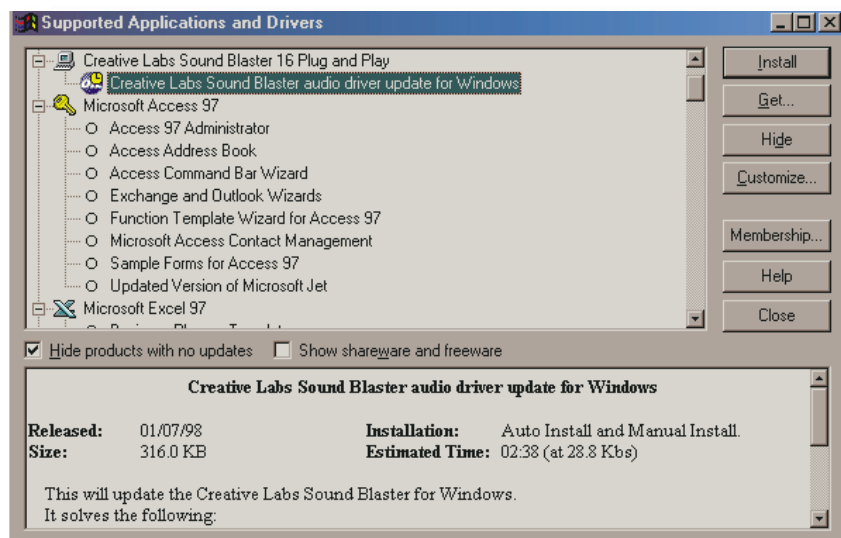
McAfee Office Application collection

Not a bad package, but **choose two or three** — you probably won't want them all.

McAfee hasn't gone mad and started trying to muscle in on Microsoft's territory. Office is a 'best of' compilation of nine previously released utilities: Oil Change, VirusScan, Nuts & Bolts 98, Hurricane, UnInstaller, First Aid 98, Guard Dog, PGP Personal Privacy and 2000 Toolbox. The disparate nature of the collection becomes obvious on installation. Each application has its own install routine, which means sitting through the whole InstallShield rigmarole for each one you want to load.

The quality of the applications varies. There's no doubt that VirusScan is an excellent anti-virus system. This is particularly true now that McAfee has acquired Norton's anti-virus technology and will be incorporating the Norton Antivirus engine into VirusScan with future engine updates. Hurricane is a collection of caching utilities that aims to increase the speed of operations such as bootup and application launch.

The most impressive part, the application Launch Rocket, is also incorporated into Nuts & Bolts and this halved the startup time for the applications with which we tried it. PGP Personal Privacy is also well worth having if you need encryption. McAfee has managed to sidestep the United States Government's restrictions on the export of encryption technology, supplying the



full 128-bit encryption engine rather than the less secure 40-bit version that Bill Clinton would prefer you to have.

Other components of the package are not so useful. First Aid 98 is aimed at solving beginners' PC problems. It is a fluffy user interface that bends over backwards to avoid nasty technical details — but nasty technical details are a fact of PC life. Particularly daft are the tutorial animations that tell you how to do basic tasks: they're hopelessly general and convey nothing that you couldn't find with a short perusal of your own system manuals. The tutorial on how to clean your inkjet printer advises: 'You should clean your inkjet printer every time you change the toner cartridge'!

Oil Change is an interesting concept for a utility. It scans your system for the hardware and software it recognises, using a downloaded list for reference. It then searches the web for updates, patches and drivers and presents the user with a list of what it finds. The results weren't phenomenal. It failed to bring to light the fact that there were newer drivers for the STB graphics card in the test system, and it also didn't notice that there were newer VirusScan definition files available than the ones supplied.

But on the plus side, it came up with a very comprehensive list of updates and add-ons for Office 97 as well as recognising that the SoundBlaster card in the system was in need of new drivers.

The problem with supplying this many standalone utility packages in one bundle is that many of the features are replicated. First Aid, for instance, has its own virus scanner despite the inclusion of VirusScan, and Nuts & Bolts has a Year 2000 diagnostic even though there's a utility to do just that in the shape of 2000 Toolbox. Guard Dog is aimed at stopping malicious ActiveX components and Java applets downloaded from the web, but VirusScan claims to do the same thing.

At least McAfee Office gives you the choice. It's not the best-integrated package, and we wouldn't recommend installing all of the components at once — doing so just about brought the PII-266 test system with 128Mb RAM to its knees. But if there are two or more applications in the collection that take your fancy, it provides decent value for money over separate purchases.

▲ OIL CHANGE DOES ITS BEST TO KEEP YOUR SYSTEM UP TO DATE

It [McAfee Office] provides decent value for money over separate purchases

PCW DETAILS



Price £69.95 (£59.53 ex VAT)
Contact McAfee 01753 827500
www.mcafee.com

System Specification 486 (Pentium recommended), Windows 95/98, 16Mb RAM, CD-ROM drive, around 150Mb drive space to install all components.

Good Points Good virus scanner and 128-bit PGP encryption.

Bad Points Very poorly integrated: application features overlap.

Conclusion Not a great bundle, but a good one.

DAVID FEARON

Accounts package vs spreadsheet working

What's the best way to handle your **personal finances**? We compare two alternatives.

If you've decided to put your personal finances in order, what sort of software could help you best — a specialised, comprehensive home accounts package, or a spreadsheet?

← The case for spreadsheets

Obviously, Marks & Spencer or the Ford Motor Company are not going to keep their accounts on a spreadsheet. But there is every good reason for the family or self-employed person to do so. That was why spreadsheets were invented.

Excel 97, Lotus 1-2-3 97 and Corel Quattro Pro 8 may have charting, mapping and web-page facilities, but the root concept is based on the bookkeeper's worksheet. You enter the figures for the various accounts and then add them up. If you have one of these spreadsheets now, there is nothing else to buy. 'But I don't know anything about bookkeeping,' you may say. In which case you would probably be no better off with an accounts package because you would have to learn its vocabulary anyway.

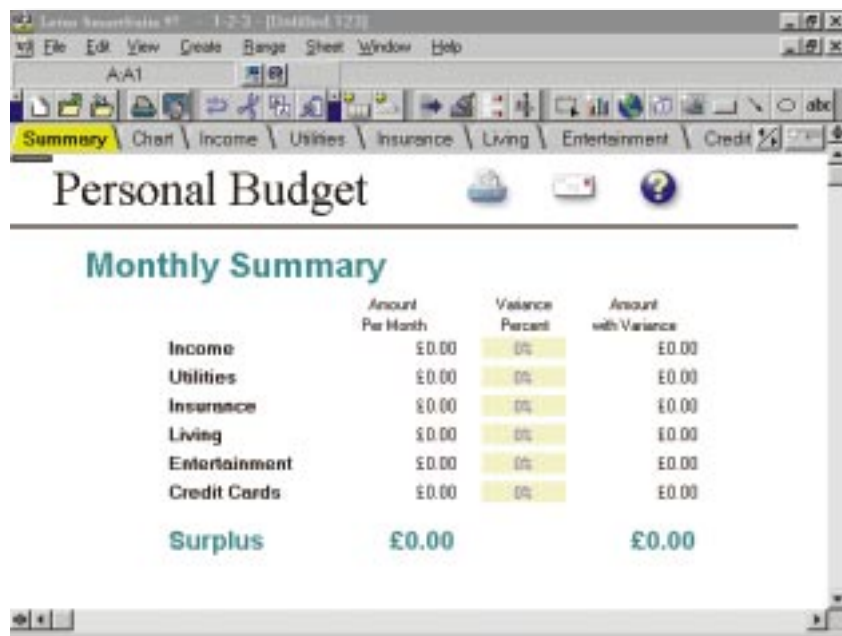
To help you get started, you have a number of choices which include: the use of a

template [Fig 1]; asking your accountant what they need from you; or you could buy one of many

inexpensive paperbacks on the subject.

The beauty of a spreadsheet is that if you currently have some kind of manual system, you can enter it the way it is. With a home accounts package you would have to run the two systems together until you were confident that you knew how to correct errors, add or delete accounts, make adjustments and print the reports you need.

With a spreadsheet you can design your own system, tailored to your own circumstances. If you're self-employed, say, you can avoid maintaining two sets



▲ **FIG 1** YOU DON'T HAVE TO START FROM SCRATCH WITH A SPREADSHEET. LOTUS 1-2-3 97 PROVIDES THIS EXCELLENT PERSONAL BUDGETTING TEMPLATE WITH DIFFERENT CATEGORIES GROUPED ON SEPARATE WORKSHEETS

of books and entering many items twice. If you work from home, you'll pay one electricity bill but may be entitled to charge a percentage of it to your business. You can probably split your expenses for fares or petrol.

Some people prefer to set up a budget against which they continuously compare their expenses. Some like to compare this year's monthly average for each expense item with the average for previous years. It can confuse some accounts packages if you record your home as an asset

but don't have a mortgage. Other people would like a separate worksheet on which to record progress of a complicated debt reduction program.

You may not wish to record every expense, counting only cheques and giving yourself a lump sum for petty cash each week, or month. But if you use PC banking, you may seldom write cheques. Many people use telephone banking. Some professionals record income when they send out an invoice; others don't record it as actual income until the cheque has cleared.

To make it easier for themselves to

keep track of credits and debits, all accounting packages specify groups of accounts which cannot be changed. If you design your own system, you can group your accounts how you like.

← The case for accounts packages

'Useful, huh?' comments the audio tip following an American script but read by a soothing nanny-figure with a plummy English voice.

Money 99's full-featured version, known as Financial Suite, has tried its damndest to look English. Colour is not spelt 'color' and cheque is not spelt 'check'. But its very pizzazz gives it away and the examples list the 'gas station' and the 'Springfield Diner'. The net worth statement is mixed: in the US, the most liquid assets are listed first, but in the UK the least liquid are traditionally listed first. Money 99 lists them at random.

There is no need to load the whole kit and caboodle, which takes 120Mb of hard-disk space, as all the 'movies' —

Money 99 is really a jack-of-all-trades and master of none

ACCOUNTING ON A SPREADSHEET

Each of the three leading spreadsheets offers tools, built-in formulas and macros to help you create an accounting system. Here are some of the helpful features of Excel 97.

The first 12 worksheets in a typical accounting workbook could each hold all income and outgoings for one month of the year. There might be other pages for direct debits, new inventory items and so on, but the last page, so you can jump to it easily, would be a summary for the year.

Outlines. Using the built-in outlining macro for one summary worksheet [Fig 2] you can instantly see your expenses monthly, quarterly or annually. Clicking outline + and - symbols, or numbers, instantly unfolds or condenses the time frame. Similarly, going down the rows, you can automatically display only subtotals for income and expenses, and then sub-subtotals for groups like personal expenses, home, car, or display every row which gives all the details.

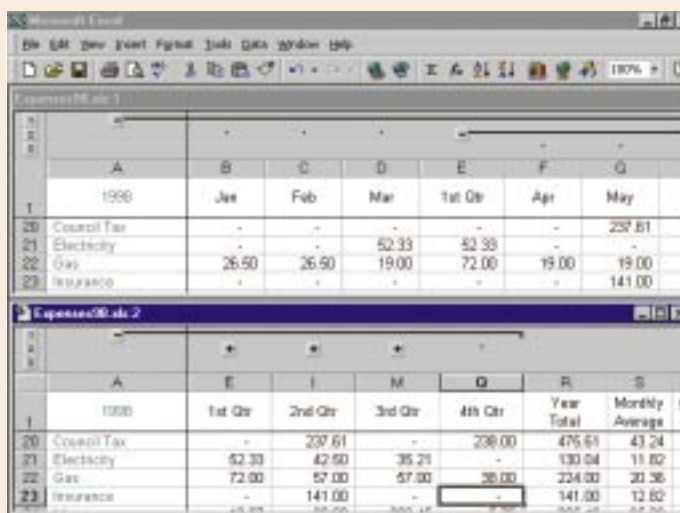
'Names' can save a lot of work. Say the annual total to date for each item is in column R. Column S has

the running monthly average with the starting formula R2/Months. Cell S2 is dragged down the column. By simply changing the definition of Months from 1 through to 12 during the year, you can update all the formulas at once.

Comments in a cell can remind you of what an unusual expense or income item was for. A little red triangle in a cell acts as a flag. Point at that cell and the comment is displayed.

'Fixed decimal' lets you make lots of entries in pence without first entering the decimal point. Alternatively, you can set that box to -3 and thousands are added automatically. Enter '123' and display 123,000.00.

Automatic rounding. Formatting a cell may only display the contents to two decimals, but there may be many decimal places stored. This can create the



▲ FIG 2 USING ONE EXCEL WORKSHEET, THE TOP WINDOW SHOWS THE MONTHLY DETAILS, THE BOTTOM WINDOW SHOWS QUARTERS, THE YEAR'S TOTAL AND MONTHLY AVERAGES

anomaly of totals not equalling each other when they should. But choose Tools, Options, Calculation, Precision As Displayed, and only the pounds and pence will be stored.

3D formulas. It's easy to total individual cells across a number of worksheets. If medical expenses are in cell AH9 on each of the monthly worksheets, you can total them in any cell with the formula =SUM('January Expenses: December Expenses'!AH9).

Hyperlinks. You can make a link on a sheet to a particular note or cell

anywhere in the file. Enter Last year's taxes in a cell, click on the hyperlink tool, browse for the right cell, click OK. The entry turns blue to indicate it is active.

Page design. Printing reports is simplified by the extensive options in the Page setup macro. You can set margins by entering dimensions or dragging margin lines. Excel will automatically centre a sheet on a page if you wish, and even magically shrink it to fit.

tutorial macros with dialogue — and audio tips will run from the CD-ROM, as will the many articles on, and worksheets for, recording taxes, pensions, insurance and home inventory.

The advantage of an accounts package is that it is a relational database management program. A spreadsheet can hold several lists but it can never be more than a flat-file database. An Excel PivotTable can display one list of your expenses and income in various ways, but it would be a Herculean task to try

and duplicate the power of a database like Access. Money 99 is like a specialised application running in Access. You can see reports in countless ways [Fig 3].

You start a report by picking the categories to be included, which might be all of them, or just car expenses, or a combination of holidays and meals out. Then you pick a period which might be the past month or quarter, year, or even odd dates like April 15 to June 30. You can even choose to see who received your money within those definitions, like Hilton Hotels, Boots the chemists

and Shell oil. And you can see the information as a listed report, a bar chart, a line graph or pie chart.

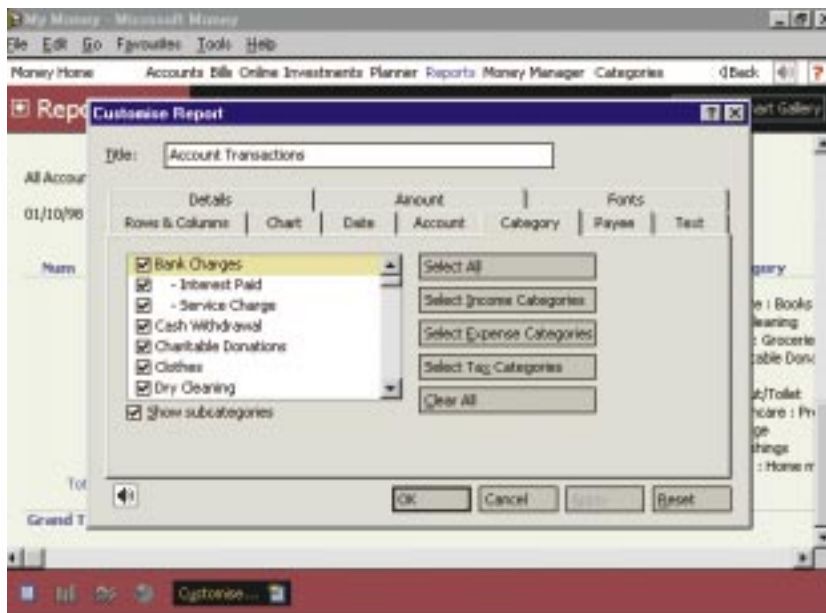
Once set up for it, you can go online and download a bank statement. With Money 97, this was just with Barclays. Then, with Money 98, the Nationwide was added. Now, Money 99 adds several more banks and the ability to extend as soon as the institutions are ready for it. But for more interactive services, you're better served by each bank's own software. With Barclays own PC Banking

Software, for instance, you can see cleared balances in real time, arrange recurring fund transfers and request loans and overdrafts.

Money 99 gives you a lot of likely results for calculating a mortgage but qualifies them all by giving the phone number to ascertain the names of Independent Financial Advisors in your area. It doesn't say whether your monthly payments are figured to be credited monthly (as in the US) or annually (as has often been the case in the UK).

The same applies to planning a retirement income. And the tax estimator does have a current figure for a personal deduction but precedes the whole exercise by pointing you to a 'tax professional' or the Inland Revenue — you would do better to order the Inland Revenue's free EVR (Electronic Version of the Self-Assessment Tax Return).

The investment tracker is also a disappointment. You can enter your holdings and go online to check the current value of your portfolio, but three of the four stock markets on which it reports are in New York. In London, it only offers the FTSE 100 so the majority of shares are not listed. On connection, however, it does update currencies and overall indices, plus some mortgage and interest rates and financial news. There are many sources of current stock data on the web and Excel is the standard software for accessing it. Just choose Data, Run Web Query and choose a built-in template for downloading.



▲ **FIG 3 MONEY 99'S BEST FEATURE IS ITS CHOICE OF REPORTS — BY CATEGORY OR PAYEE, AND THE MULTIPLICITY OF TIME PERIODS. FORMATTING IN THIS SECTION IS ALSO VERY FLEXIBLE**

Money 99 includes a Household Inventory template but if you have MS Access, which is included in the Office 97 Professional suite — or Lotus Approach, in SmartSuite 97 — you'll find that their equivalent templates are far superior.

Money 99 helpfully adds an icon to your Taskbar which will indicate whether or not Money is running, whether bills are due, or past due to be paid. Providing you are within the set time for a lengthy reminder (say, 30 days before a bill is due) this works very well. And, you can start Money from that icon.

The supplemental invoicing module could be useful if you're self-employed. It is integrated with the Sales Ledger so

that when you issue an invoice, it is automatically recorded in the ledger. If you are patient you can also eventually have the Sales Ledger balance show up as an asset in your 'net worth' statement. The problem is, unlike Money's other reports, you cannot edit its template. Both the font sizes and field sizes are too small and inappropriate for a service business (i.e. the majority of self-employment). So, you will need to create an invoice in Money to get it into the Sales Ledger and then create one in, say, Word or Excel for the customer. The invoice template provided with Excel is far more flexible. Oddly, Money 99 provides no equivalent Purchase Order, but Excel does.

Money 99 is really a jack-of-all-trades and master of none. But it is interactive with Microsoft's Money home page so later improvements can be made whenever you connect. And, if you have never set up a spreadsheet workbook for recording your income and expenses, and much prefer convenience foods to your own home cooking, you'll like Money 99 or its main competitor, Quicken 98, which includes QuickTax 98 and runs under MS Internet Explorer.

The fact is, spreadsheets were originally invented for keeping accounts, and for the individual or very small business they are the best solution still.

STEPHEN WELLS

WHICH SOFTWARE TO USE?

➤ Spreadsheets

- ✓ Great if you're used to working with old-fashioned paper ledgers.
- ✓ Many spreadsheets include web creation facilities. Accounts packages don't.
- ✓ Almost everyone has a spreadsheet. Save your money and stick with it.
- ✗ If you're thinking of setting up your accounts on a spreadsheet, you'll have to design your own

accounting tables. An accounts package takes care of it for you.

➤ Accounts packages

- ✓ Install and go. It's ready to start working from day one.
- ✓ Some packages can connect directly to online banking facilities.
- ✓ You can't beat an accounts package when it comes to comparing various aspects of your finances.

✓ A spreadsheet is all-encompassing but an accounts package is specific.

- ✓ Accounts packages often include supplementary utilities so your accounts are more likely to be relevant to the way you live.
- ✗ You have to use the system set up by the programmer — no free reign to choose your own as there would be with a spreadsheet.

NIK RAWLINSON

This year sees the **tenth anniversary of the world wide web**, and its creator, Tim Berners-Lee, admits that his original intention has not quite been realised. Rather fittingly, Michael Hewitt conducts an interview by email with the man who gave birth to the information superhighway.

Man of the world

‘Who is Tim Berners-Lee?’ many of you are no doubt asking. Well, you’ve heard of the world wide web? Berners-Lee invented it in 1989. Consequently, techies are usually full of gushing admiration for him. For instance, Eric Schmidt, chief technical officer of Sun Microsystems, says, ‘If this were a traditional science, Berners-Lee would win the Nobel Prize. What he’s done is that significant.’ MIT’s Michael Dertouzos says that Berners-Lee embodies the ‘libertarian idealism’ of the internet culture. Whatever that is.

Unfortunately, Berners-Lee himself doesn’t say much at all. Then again, if I’d invented something that now seems to serve primarily as a conduit for girly .gifs and which risks grinding to an embarrassing halt every other day, I’d maybe keep quiet about it, too. As such, what follows is not actually an interview proper; instead, it’s his response to a set of emailed questions I sent – rather apt, I suppose.

MH: *Why did you call it the world wide web? That suggests something radiating from a central point. Wouldn’t ‘grid’ have been a better description in the sense of, say, the electricity grid, where if one part gets knocked out, they can re-route?*

TBL: ‘Web’ mathematically doesn’t have a central point; it can be just any directed graph. A ‘grid’ for me implies strict order along two axes – just ways of filing things from which the web allows you to escape.

MH: *OK, let’s go back to the very beginning. Childhood, education, that sort of thing.*

TBL: My parents are both mathematicians. They met while working on the Ferranti Mark I, the first computer sold commercially. My mother has been dubbed the ‘first commercial computer programmer’ as she went with the machine when it was installed on the customer site. So we played with five-hole paper tape and learnt to enjoy mathematics wherever it cropped up. Later on, my hobby was electronics. When I left school, obviously I was going to do something in either maths, science or engineering. My school, Emanuel, was programmed to send people to

Oxford, where the subjects are very narrow. I took physics, thinking it would be a sort of compromise between maths and electronics, theory and practice. It turned out not to be that but something special and wonderful in itself. Physics was fun and a good preparation for creating a global system. In physics, you learn to think up some simple mathematical rule on a microscopic scale which, when scaled, will explain the macroscopic behaviour. On the net, we try to dream up computer protocols which, when extrapolated to the macroscopic, produce an information space with properties we’d like.

MH: *Any particular Road to Damascus experience?*

TBL: No, I just enjoyed science and it went on from there.

MH: *After leaving university you founded a company called Image Computer Systems, and then you were principal engineer with Plessey. What then took you to CERN, in Switzerland?*

TBL: I went there in 1980 as a contract programmer and I played with programs to store information with random links. In 1989, while working at the European Particle Physics Laboratory, I proposed that a global hypertext space be created in which any network-accessible information could be referred to by a single ‘Universal Document Identifier’. Given the go-ahead to experiment, in 1990 I wrote a program called ‘WorldWideWeb’, a point-and-click hypertext editor which ran on the NeXT machine. This, together with the first web server, I released to the High Energy Physics community at first, and then to the hypertext and NeXT communities in the summer of 1991.

MH: *Do you ever get irritated when people describe the world wide web as the ‘information superhighway’ when, in practical terms, it’s more like an information B-road? Do you, say, ever experience internet rage because of the delays and give the system a good kicking? Or would that be too much like kicking one of your own children.*

TBL: Children and computers are quite different.

MH: *So, no speed problems?*

TBL: I don’t have any myself. But from your insistence I assume this is a UK-specific problem. Maybe with UK-US connections? It can be solved.

MH: *How?*



TBL: Someone has to buy more cable. I think the first thing is for some enterprising magazine (hint!) to take a large selection of ISPs and find out how they route their packets and where the bottlenecks lie. The result might make an interesting comparative list of ISPs. Or, you might find that all ISPs suffer overloads. A more constructive thing is to change your ISP to one which not only has 56K modems but also has them connected to something meaningful. The more technically orientated amongst you might run 'trace-route' tests to find out whose fault it is that your packets aren't getting through. You could also lobby your government to set up a telecommunications industry on the assumption

that every home should have a cheap, permanent internet connection along with domestic utilities.

MH: Apparently, you hardly spend any time simply browsing the net yourself. Why is this?

TBL: I spend much of my working time using the web, as the W3C team uses it as its place of work. I don't surf for recreation. I use the web to achieve things. I get my quota of discoveries from the things people mail me which they have found.

MH: What's W3C?

TBL: The World Wide Web Consortium. Between the summers of 1991 and 1994 the load on the first web server [info.cern.ch] rose steadily by a factor of ten every year. In 1992/93, first academia and then industry were taking notice. ➔

▲ THE MANY FACES OF TIM BERNERS-LEE, FOUNDER OF THE WORLD WIDE WEB AND LATTERLY W3C. HE'S STILL CHASING HIS 'ORIGINAL DREAM'

I was under pressure to define the future evolution. After much discussion I decided to form W3C in September '94, with a base at MIT in the USA, INRIA in France, and now also at Keio University in Japan. There has always been competition to come out with the best web technology. This has followed from the fact that the standards, being open, allow anyone to experiment with new extensions. This produces the threat of fragmentation into many webs and that threat brings companies to the W3C to seek agreement on how to go forward together. The Consortium is a neutral, open forum to discuss and agree on new common computer protocols.

MH: *Shouldn't W3C consider setting up the equivalent of a standards committee to grade material that's on the net? At the moment, 99 percent of it is garbage. Some sort of kite mark is surely required to grade sites. Then, perhaps, people could set up their browsers only to accept sites which have that kite mark. Or is this something W3C is working on?*

TBL: What constitutes 'junk' is subjective. Yes, we have a lot of common understanding about what

the link and don't trust it again. So if you are browsing web sites with junk or porn, that's your choice, your problem. Email spam is a separate problem. I don't know the solution.

MH: *How many junk emails do you get each day? You're probably in a better position than most to get back at the spammers; are you ever tempted?*

TBL: I don't know how many. I have good filters and only one or two slip past. It's very difficult to get back at spammers. Yes, I am tempted, but I have no magic method. But for those reading this, then you're hereby notified that I charge a \$50 handling fee for spam!

MH: *You decided to make the world wide web an open system so as not to impose constraints on its expansion. Do you ever wish you'd arranged things whereby you now got a percentage on, say, every internet commercial transaction?*

TBL: Nope. It would never have taken off if I had.

MH: *Does the internet risk polarising society — the world, even — into the 'information rich' and the 'information poor'?*

TBL: Yes. This is a serious concern. The wealth gap is a concern in many ways, and just one is the way in which the internet can accelerate the difference.

MH: *And what are the risks of not jumping on-board the internet bandwagon?*

TBL: If your connectivity is as

bad as it sounds, you won't have long to wait to find out! The answer, though, is that the main risk for an economy which *doesn't* make use of the net is that it will move more slowly and not compete with the one that is actually working, rather than sitting waiting for its mail to arrive.

MH: *You're quoted as saying of the world wide web that 'There are many parts of the original dream which are not yet implemented.' For example?...*

TBL: An intuitive collaborative environment, in which people interact through a common world of shared knowledge. The web data should be arranged in a way that allows programs to analyse what's going on, and therefore lets computers help us manage ourselves.

MH: *When you're reading a newspaper, or travelling, and you see the proliferation of web addresses in advertisements and so forth, do you ever get a feeling of pride and think, 'All this is down to me'?*

TBL: No. There have been a huge number of people all working together.

MH: *Where do you call 'home' these days?*

TBL: I live in the United States. I like many aspects of it but am quite nostalgic for the UK. I also miss France and Switzerland, where I lived for ten years.

MH: *If you could travel back to 1990, what, if anything, would you do differently?*

TBL: I would make <http://www.w3.org/TR> be written as <http://org/w3/TR>, instead. □

'Censorship, whether it is by government or ISPs, IS AN AFFRONT TO HUMAN RIGHTS AND SHOULD BE FOUGHT by all those of good will'

is junk, but there are different criteria. It would be awful to have one central body assigning 'quality' kite marks to material — this would not be in the spirit of the web at all. Nevertheless, it would be great for bodies to set up their own endorsement systems. W3C has designed technology which allows these endorsements to be encoded and transmitted. There isn't a social system at the moment for paying for this work, but it will have to come. Then, you will select as you browse, or search, which endorsement systems you want to use.

MH: *Where do you stand on censorship of material on the internet?*

TBL: Censorship, whether it is by government or ISPs, is an affront to human rights and should be fought by all those of good will. This doesn't mean that all communication is good communication. Things like libel and child pornography are illegal whatever the medium — if it's illegal on paper it's illegal on the web. I also think parents have a duty to select material for their children just as they help them select books. But that's something which should be left to parents, not governments.

MH: *Does it irritate you that the internet has become a major conduit for junk mail and porn?*

TBL: The web and mail are distinct. On the web, you only browse what you want to see. If you find yourself reading junk, consider where you found

Germ warfare

GEOF WHEELWRIGHT INVESTIGATES THE DARK WORLD OF COMPUTER VIRUSES, **ELEGANTLY DESIGNED PROGRAMS** WITH A STING IN THE TAIL.

Your computer is acting strangely. It doesn't recognise your floppy drive, data on your hard drive appears to be damaged and nothing seems to be working properly. It could be that it is suffering

from the effects of a 'computer virus'. But who would do such a thing? Particularly to someone as nice as you? You have no enemies that you know of, and you always clean up after your dog.

Chances are you've never had the opportunity to ask these questions, as the police do not routinely investigate incidences of computer virus infection. But they are good points, and they go to the heart of why computer viruses exist.

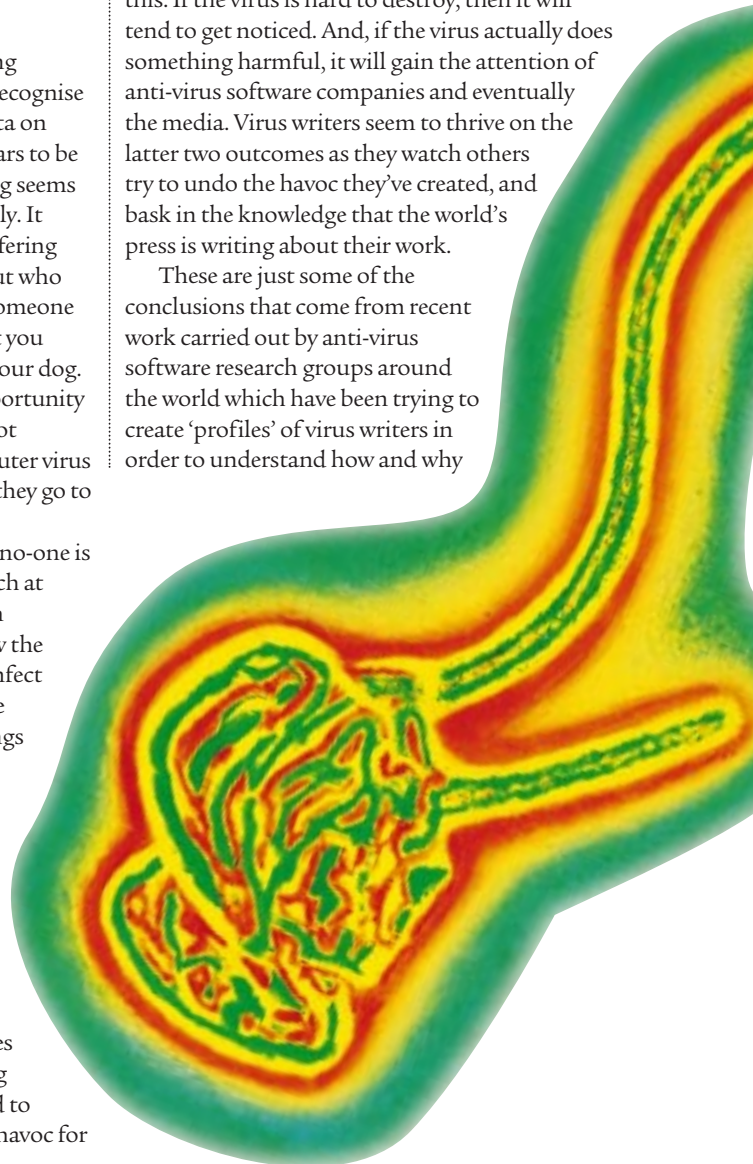
The first point is that, in most cases, no-one is doing something to you directly. Research at anti-virus labs the world over suggests in almost all cases, virus writers don't know the people whose computers the virus will infect — it would be like suggesting that people who write graffiti on the walls of buildings have some idea of the identity of those who will be offended by it — and, they often have little regard for the impact the virus will have on those whose computers suffer from it. This attitude appears to be a rather sick distortion of the idea that art should be produced for its own sake and not just to please a given audience.

In this case, the attitude is that viruses are produced simply to create something that is technically 'elegant' and very hard to crack. The fact that the virus may cause havoc for

individuals appears secondary to the virus writer; the key issue for them is to produce something that will be hard for anyone to destroy.

Many secondary considerations flow from this. If the virus is hard to destroy, then it will tend to get noticed. And, if the virus actually does something harmful, it will gain the attention of anti-virus software companies and eventually the media. Virus writers seem to thrive on the latter two outcomes as they watch others try to undo the havoc they've created, and bask in the knowledge that the world's press is writing about their work.

These are just some of the conclusions that come from recent work carried out by anti-virus software research groups around the world which have been trying to create 'profiles' of virus writers in order to understand how and why



they create computer viruses. According to Marian Merritt, senior product manager in charge of Symantec's Norton anti-virus product, there is one common thread among the extensive research that her company has done at the Symantec Anti-virus Research Centre (see page 118) — virtually all virus writers are men.

'We have not yet seen a documented case of a female virus writer, although we're making strides everywhere,' she says. 'We have found that these are generally bright people who are under-utilised, have good software skills, are well educated and, of course, have access to computers.'

The typical profile of the virus writer, says Merritt, has changed in recent years. They used to be young men with good programming skills who wanted to show off. And they were often university students wanting to outdo one another or demonstrate the threat they could pose to the software held on the campus computers, or computers connected to one another over the JANET education network and later, the internet.

She claims that initially viruses were merely a form of graffiti; an electronic form of writing your initials on a wall, carving them on a tree or etching them in wet cement. Viruses were a way in which these students could feel they were having an impact on the world, without having to really accomplish anything to do it other than write some difficult code. 'There is often competition amongst them to see who can write the best, who can write the virus that's hardest to crack,' adds Merritt.

In recent years, viruses have moved well beyond being harmless college and university pranks. In some cases, they've become a social statement as programmers with little money and fewer prospects, but good access to computers and the internet, write and distribute viruses in

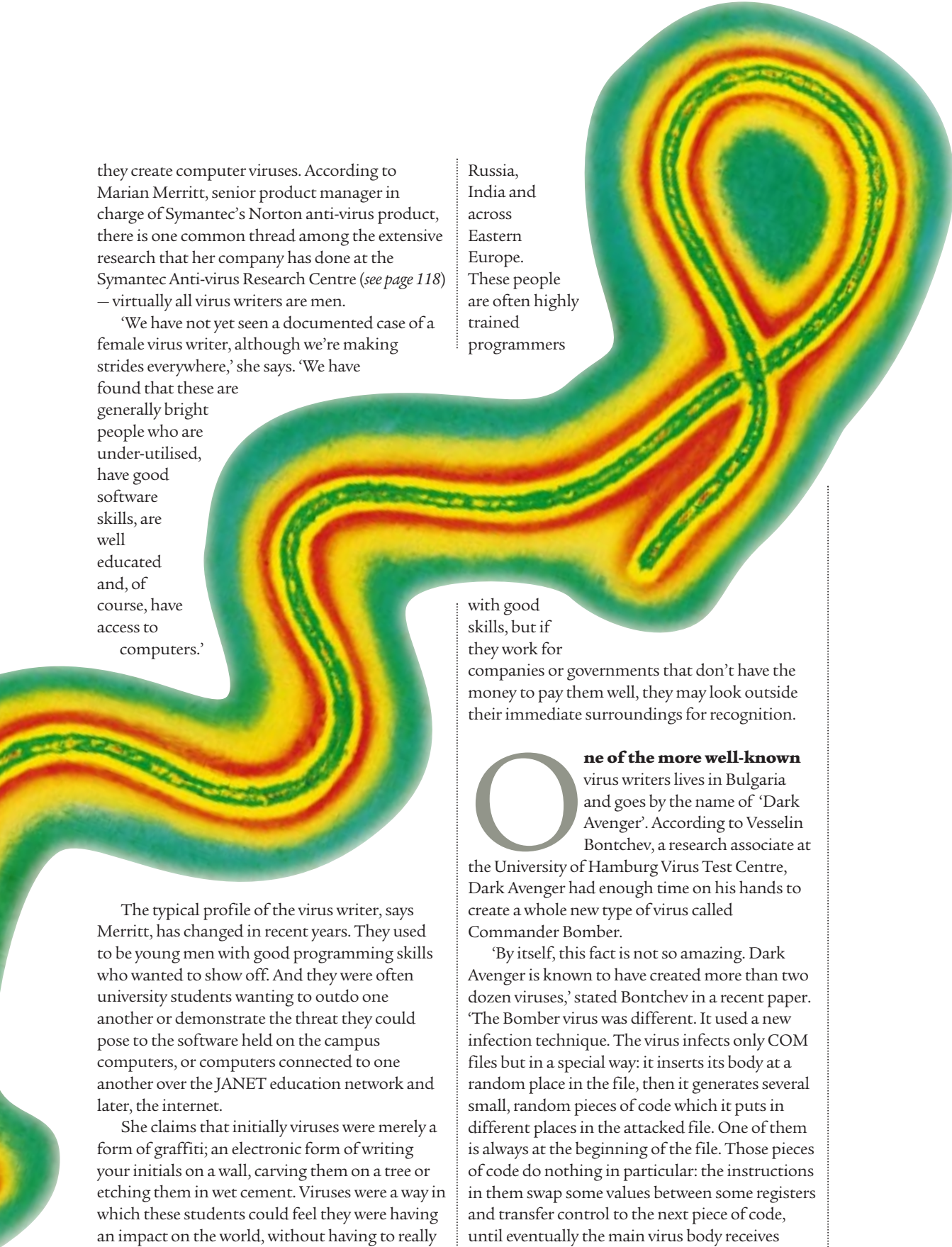
Russia, India and across Eastern Europe. These people are often highly trained programmers

with good skills, but if they work for companies or governments that don't have the money to pay them well, they may look outside their immediate surroundings for recognition.

One of the more well-known virus writers lives in Bulgaria and goes by the name of 'Dark Avenger'. According to Vesselin Bontchev, a research associate at the University of Hamburg Virus Test Centre, Dark Avenger had enough time on his hands to create a whole new type of virus called Commander Bomber.

'By itself, this fact is not so amazing. Dark Avenger is known to have created more than two dozen viruses,' stated Bontchev in a recent paper. 'The Bomber virus was different. It used a new infection technique. The virus infects only COM files but in a special way: it inserts its body at a random place in the file, then it generates several small, random pieces of code which it puts in different places in the attacked file. One of them is always at the beginning of the file. Those pieces of code do nothing in particular: the instructions in them swap some values between some registers and transfer control to the next piece of code, until eventually the main virus body receives control. The outcome of this is that a virus scanner has no way to determine where exactly in the file the virus is present. All "smart" scanning techniques, like entry-point tracing and top-and-tail scanning, suddenly stop working.'

American author George C. Smith described the work of Dark Avenger in his book *The Virus Creation Labs*: 'The Dark Avenger obviously knew how real computer viruses should be written,' suggested Smith. 'His Eddie virus — a.k.a Dark Avenger — had gained a reputation as a program



Seek & destroy: anti-virus research at Symantec

Santa Monica, California — palm-tree lined streets and a short drive from the Hollywood hills — is home to Symantec's Anti-virus Research Centre (SARC) which holds the largest collection of computer viruses on the planet. SARC acts as an international clearing house for the creation of software solutions to computer viruses imported from around the globe.

According to Symantec, there are over 17,000 strains of computer virus in circulation, although only a tiny proportion of that number are active viruses showing up on a significant number of computer systems with regularity. But Symantec sees them all. Corporate and retail customers of its Norton AntiVirus (NAV) software are encouraged to submit new viruses — those which cannot be handled by NAV — to SARC for inspection, detection and repair.

According to Bob Pettit, product director for Symantec's consumer products group, there is one type of computer virus that it sees more than any other: the 'macro' virus. This is a malicious computer program written in the same macro programming

language that was designed to allow users of the Microsoft Word WP software and Microsoft Excel spreadsheet applications to add new functions to their software. Instead, macro-virus writers have used the macro programming language to create small programs which prevent you from carrying out simple tasks, like saving or printing files, by attaching themselves to your documents.

Since Word and Excel documents are used in the majority of offices around the world, they tend to be the kinds of document that are sent and received in electronic mail messages. And therein lies the problem. Every time someone opens an email message with a Word or Excel 'attached' document that is infected with a macro virus, it spreads to the computer on which the electronic mail message was opened. Those with newer versions of Word and Excel are less likely to suffer the problem as Microsoft Office 97, which includes the latest versions of Word and Excel, has a utility to detect unexpected viruses. But there are still many users who have older copies of Word which are prone to these kinds of virus incursions via email.

Symantec warns users to seek out virus detection utilities that inspect the contents of all files on a hard disk, as well as attached files in unopened electronic mail messages, to ensure they don't contain virus messages.

➤ **Here's a checklist of symptoms** which Symantec suggests you should look out for if you suspect that your computer has a virus:

- ⊕ The program takes longer to load.
- ⊕ The program size keeps changing.
- ⊕ The disk keeps running out of free space.
- ⊕ When it runs CHKDSK it doesn't show 655360 bytes available.
- ⊕ It keeps getting 32-bit errors in Windows.
- ⊕ The drive light keeps flashing when it's not doing anything.
- ⊕ No access to the hard drive when booting from the A: drive.
- ⊕ Files appear from nowhere.
- ⊕ Files have unrecognised or strange names.
- ⊕ Clicking noises from the keyboard.
- ⊕ Letters look like they are falling to the bottom of the screen.
- ⊕ The computer doesn't remember .

to be reckoned with. It pushed fast infection to a fine art, using the very process anti-virus programs used to examine files as an opportunity to corrupt them with its presence. If someone suspected they had a virus, scanned for it, and

Eddie was in memory but not detected, the anti-virus software would be subverted, spreading Eddie to every program on the disk in one sweep.

'Eddie would also mangle part of the machine's command shell when it jumped into memory from an infected program. When this happened, the command processor would reload itself from the hard disk and promptly also be infected. This put the Eddie virus in total charge of the machine. From that point on, every 16 infections the virus would take a pot shot at a sector of the hard disk, obliterating a small piece of data. If the data was part of a never-used program, it could go unnoticed. So, as long as the Eddie virus was in command, the user stood a good chance of having to deal with a slow, creeping corruption of his programs and data.'

Finding concrete information about virus authors like Dark Avenger is not an easy task, though. The authors are understandably cautious about revealing their real identities, for fear of prosecution. And anti-virus software

▶ **THE LAROUX MACRO VIRUS, DESIGNED TO CAUSE PROBLEMS IN MICROSOFT EXCEL WORKSHEETS**



companies worry that giving publicity to virus writers will only glorify their nasty work.

Carey Nachenburg, chief researcher at the Symantec Anti-virus Research Centre (SARC), claims there's a big debate in anti-virus research about whether or not any understandable names should even be ascribed to viruses. Many researchers suggest they should simply be given non-descriptive combinations of letters and numbers. This not only makes the viruses easier to catalogue, but also eliminates the romantic attraction of writing a virus that bears your name, or one that you have given it.

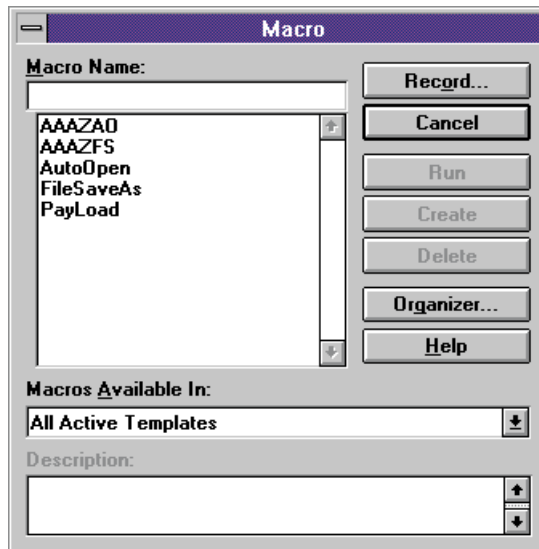
Vesselin Bontchev echoes this concern and suggests little can be done to eliminate the attractiveness of virus writing. 'The process of virus creation is not going to stop or slow significantly in the foreseeable future,' he predicts. After a few years of activity, the virus writers usually grow up and switch to other activities but many new "wannabe" virus writers, usually adolescent kids, pop up in their place.'

If the latest statistics from the Internet Computer Security Association (ICSA) are to be believed, the problem will get worse before it gets better. ICSA's 1998 Computer Virus Prevalence Survey, released in late 1998 and sponsored by Microsoft, Computer Associates, Network Associates, Intel, Price Waterhouse, Symantec, Trend Micro *et al*, suggests 'macro' viruses which run inside Microsoft Office are the biggest problem currently facing most users.

'The dramatic increase in the incidence of computer viruses is being driven by the rapid proliferation of macro viruses,' says Peter Tippet, president of ICSA. 'The primary infection vector for a macro virus is as an email attachment. Macro viruses spread easily because the infected files often exhibit few, if any, obvious symptoms. Because computer users need run time, anti-virus software needs to continuously scan email attachments for viruses.'

The ICSA survey concluded that the rate of infection in 1998 was 48 percent higher than reported in 1997. The annual survey, based upon interviews with technology professionals drawn from 300 corporations and government institutions in the US, represented some 750,000 PCs and servers.

One of the most disturbing trends uncovered by the report is that despite increased use of anti-virus software, computer-virus infection rates continue to increase. Of those surveyed, almost all have anti-virus software installed and running continuously. The report suggests the main reason for the increase in prevalence appears to be 'ineffective policy management across the enterprise'. More specifically, it reveals that regular software updates, email policies,



◀ THIS IS THE SCREEN NO-ONE WANTS TO SEE IN MICROSOFT WORD, SHOWING THE MACROS THAT MAKE UP THE WELL-KNOWN 'CONCEPT' WORD MACRO VIRUS. IT INTERFERES WITH WORD'S ABILITY TO SAVE FILES IN STANDARD DOCUMENT FORMAT AND CAUSES THEM TO BE SAVED AS TEMPLATES INSTEAD

improper installation and policies governing remote computer use are major issues.

So, despite all efforts to identify virus writers, eliminate the fruits of their work and encourage users to guard against the impact of viruses, it seems that they will be with us for some considerable time to come. □

VIRUS NEWS AND VIEWS

Here is a list of sites offering utilities for virus detection, as well as news and updates on virus trends.

➤ www.symantec.com/avcenter/index.html

The online home of the Symantec Anti-virus Research Centre (SARC). Here you can download updates to Norton AntiVirus, a virus encyclopaedia. There's news about virus hoaxes, a virus reference area and information on how to submit virus samples for 'diagnosis'.

➤ www.nai.com/vinfo/

Network Associates offers free downloads, news and views on viruses. It includes an online virus information and technical documentation library, a list of new virus entries and descriptions of the ten most common viruses. There are lists of viruses by name, type and payload activation date — this last is useful, as some viruses are triggered on a certain date.

➤ www.drsolomon.com/vircen/gallery/picture.html

In this section of the site run by Dr Solomon's Software, you can see screenshots of what viruses look like when they're activated. This is a rather fun 'rogue's gallery' of some of the more noteworthy DOS and Windows-based viruses that have plagued computers in recent years.

➤ www.hitchhikers.net/av.shtml

A comprehensive site which includes a wide variety of articles, an excellent set of links to anti-virus software producers, copies of recent research papers, reviews of anti-virus products and recommendations on how to fight viruses.

➤ <http://ciac.llnl.gov/ciac/CIACHoaxes.html>

If you prefer the entertainment value of hearing about how people react to virus reports and hoaxes, you'll enjoy this site which has been put together by the US Department of Energy Computer Incident Advisory Capability.

In the line of fire

E-CRIME IS GROWING ALMOST AS FAST AS E-COMMERCE AND **SMALL BUSINESSES NEED PROTECTION**. JOHN LEYDEN LOOKS AT HOW FIREWALLS KEEP OUT THE NET ROGUES.

Commercial use of the internet by small businesses is a double-edged sword that can, if technology issues are not properly addressed, leave organisations vulnerable to attack from the very weapon they sought to use in conquering new business opportunities. Techniques employed by malicious hackers are constantly evolving. Cyber-criminals have access to a wide library of tools, freely available on the internet, which facilitate attacks that expressly threaten the security of small-business networks. The image of socially dysfunctional nerds targeting high-profile organisations such as the US Pentagon, popularised by the film *War Games*, is as dated as the Cold War era it depicts. Nowadays, small-to-medium enterprises (SMEs) are very much in the firing line from a new breed of computer 'crackers' – malicious hackers whose ranks might include profit-driven criminals or disgruntled employees.

Clear and present danger

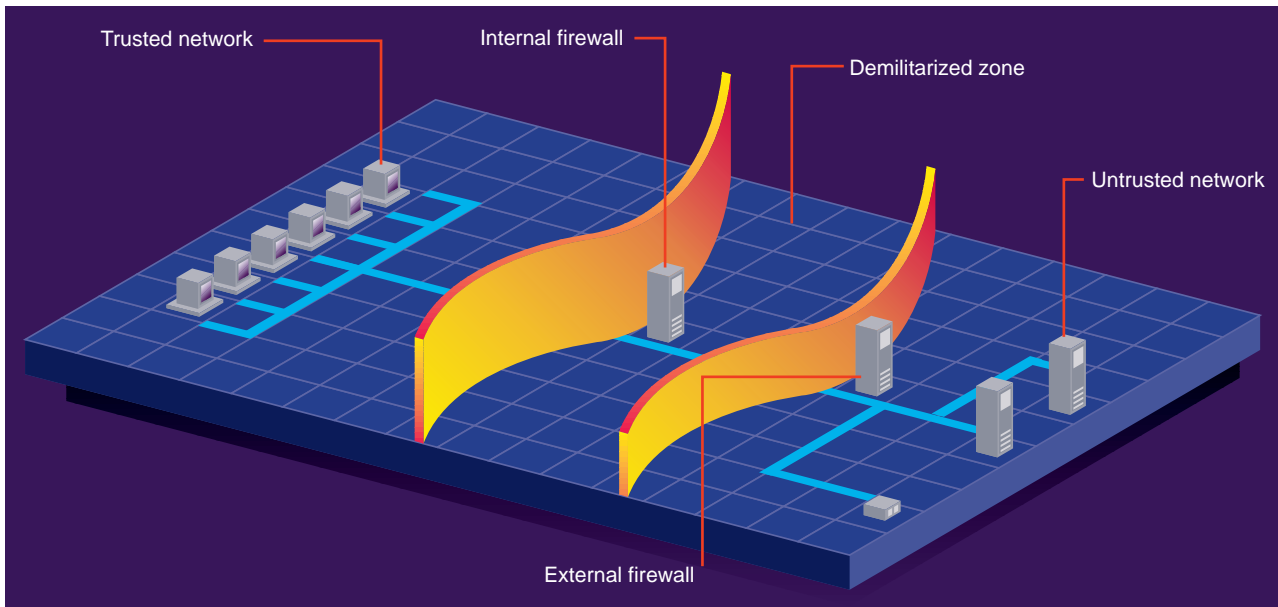
The latest forms of attack can involve the use of Java programs to obtain the contents of files from machines inside even a seemingly protected network. The corruption of a company's web site or techniques to simply crash a system (denial of service attacks) are also becoming alarmingly commonplace. Tools like Back Orifice go even further and, once installed, allow a hacker to seize control of PCs on a targeted company's network. Such attacks are not simply theoretical; they are a clear and present danger to the PC networks within British small businesses. For example,

security was so lax at the British-based Worldwide Auction Online (WAO) that a web surfer with only modest technical knowledge gained access to its customers' details, including credit card numbers and addresses of more than 1,000 customers. WAO has subsequently relocated and revamped its site. Such attacks are mercifully rare and technology exists to minimise the risk a small business is exposed to, so SMEs can enjoy the benefits of setting up a web site and reaping the rewards of e-commerce.

Risk assessment

Initially, you should have a risk assessment performed on your network. From this, a small business can establish a policy of all they want to protect, why, what measures to put in place and who is responsible. Until an assessment is made and objectives clearly defined, no organisation will be sure it's making an appropriate investment. Given that every organisation's use of the internet is different, best practice boils down to developing and implementing a security policy. This policy should be based on carefully assessed risks, balanced against costs and the need to ensure that systems are still usable.

Business considerations are paramount in developing this policy. To get dewy-eyed and let technology become the tail that wags the dog is, quite simply, barking mad. 'Organisations need to realise the importance of formulating systems and security policies which will ensure only authorised access of company networks,' says Tim Moore, deputy head of the Government certification body ITSEC (IT Security, Evaluation and Certification scheme).



Once a business is open to the internet, implementing security systems at a gateway level to prevent unauthorised access to internal networks is the first step towards securing an organisation. This is the role of a firewall.

Conventionally, the firewall is seen as a way to keep the bad guys out. However, this role is changing as firewalls move from being a barrier that controls traffic flow to becoming a perimeter manager, providing integration of management and security. There are two main schools of thought on how a firewall can be installed in a network. The first is that firewall software should be placed on a server: the proxy firewall. The second is the stateful inspection firewall, which instead of looking at the contents of each packet, compares the bit pattern to packets known to be trusted. A third approach, using routers for access control, has fallen into disuse.

Some firewalls use outdated technologies, and a look for the International Computer Security Association (ICSA) certificate is never a bad idea. Other considerations include the logging and alert capabilities of a firewall. It's also important to think about your organisation's future use of its firewall. Is the firewall scalable? Is it interoperable with any potential partner's firewall? Another important factor to consider when choosing a firewall is whether your network might be extended to remote users in the future.

All this might seem like a lot of work, but its value was highlighted in the last Business Information Security Survey commissioned by the National Computer Centre (NCC) and sponsored by ITSEC and the DTI (Department of Trade and Industry). This showed a staggering

41 percent of companies, with between ten and 99 employees, had experienced a significant information security breach. Breaches were found to cost an alarming £1,165 on average for organisations with this number of employees. The picture is even worse for smaller businesses, where the figure rises to an average £2,949.

Neil Spencer-Jones, managing consultant at the NCC, said SMEs looking to establish a presence on the web should go back to an ISP and buy a managed secure service. 'But SMEs don't want to spend any money,' he says. 'Some ISPs even manage

▲ THE GROWTH OF INTERNET TRAFFIC AND DIAL-UP ACCESS IN AND OUT OF COMPANY NETWORKS RAISES NUMEROUS QUESTIONS ABOUT SECURITY. ALL OF THESE ISSUES ARE ADDRESSED WITH THE INSERTION OF A FIREWALL

Another important factor to consider when choosing a firewall is whether your network **MIGHT BE EXTENDED TO REMOTE USERS** in the future

e-commerce and credit-card processing for SMEs, but people should find out what the bottom-line cost of this is, ask for references and obtain service-level agreements.' Spencer-Jones adds that another advantage for a smaller business letting their ISP do it is they can use high-end firewalls, as 'cheap firewalls are not particularly secure'.

Even vendors of high-end kit argue that in many cases, the security needs of SMEs can be adequately met with firewalls in the £2,000 range. 'Most firewalls offer pretty much the same amount of security, and problems are brought about by user error in the main, so setting up rules easily on an interface which is intuitive and allows for non-order-dependent rules to be set up, is key,' says Malcolm Skinner, product marketing manager at Axent Technologies.

One example of a firewall targeted at the SME market is the GNAT Box from GTA Ltd. David Hobson, GTA managing director, sees

Teenage kicks: lax security lets in crackers

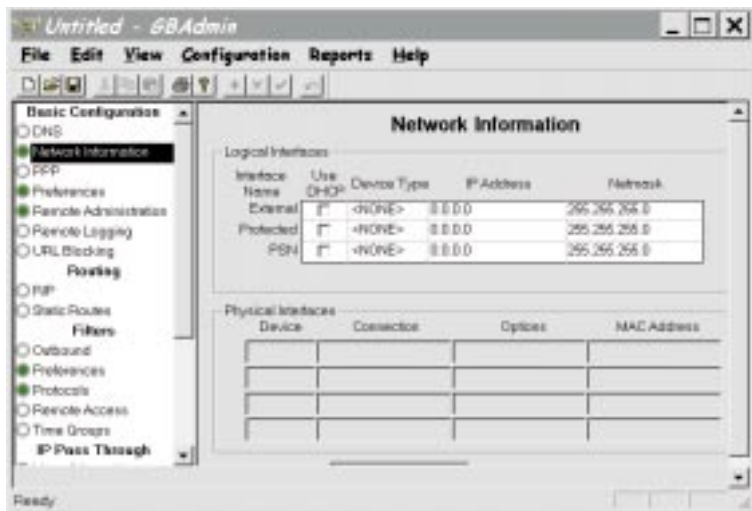
A stark example of the consequences of lax computer security is provided by an attack on Ohio-based computer accessories retailer, Dalco Electronics, last October. Three teenagers claimed to have cracked into Dalco's databank and

swiped a staggering 8,000 electronic invoices for credit-card orders placed over the internet. They uploaded a File Transfer Protocol server program known as Serv-U to the web retailer's server. With the program's default directory set to the

target machine's hard drive, and the program running in the background, the crackers said they were able to browse directories and steal data. A teenage cracker involved said that what he called Dalco's poorly configured Windows NT 3.5 server

allowed his team to gain high-level administrator access to unencrypted databases. The group installed software that allowed them to pilfer 4.3Mb worth of archived credit-card orders, covering the last two years, and a 15Mb Microsoft Office

inventory database. 'It was rather clever,' boasted the cracker in an interview conducted over internet Relay Chat. He stated that since the attack he himself had erased the data from his own machine, although he could not speak for the others involved.



▲ SLOPPY CONFIGURATION AND PROGRAMMING ERRORS CAN MAKE WEB SITES, TOUTED AS THE GATEWAYS TO INTERNET COMMERCE, AN OPEN DOOR TO THIEVES AND VANDALS

disadvantages in outsourcing security services to an ISP, as an SME has to take an ISP's security on trust. 'If you can control your destiny, you'll be better off,' says Hobson. 'It comes down to in-house skills. If a small business uses an ISP to process transactions, the money goes to them initially and they take a percentage of the turnover. For any SME, the most important thing is getting paid.' There's no specialist qualification for security, unlike networking in general. So it's a good idea for smaller businesses to take careful advice from vendors or consultants.

Safeguarding your network doesn't end with buying and installing a firewall. Without regular auditing of its log, the effectiveness of a firewall can never be determined and intrusion attempts may go undetected. Best practice is to carry this

out daily. For e-commerce development, one very sensible procedure is to separate a company's web server from databases containing credit-card information.

While a correctly configured and managed firewall can and does provide a good level of

security, many organisations make the mistake of putting them in and just leaving them. New security threats are always appearing, so the price for the liberty of trading online is constant vigilance. For this reason it's essential to monitor developments and constantly check and update a firewall.

Penetration testing employs 'ethical hacking' techniques and analyses vulnerabilities to illegal and intentionally hostile hacking techniques through effective yet less hostile methods. Testing assesses the strengths and weaknesses of internet server hosts and firewall protections, probing current configurations of Unix, Windows NT and other internet-accessible servers inside and outside the firewall. Additional analysis is performed to determine vulnerabilities in passwords, file permissions/ownership, open ports on a firewall and allowable services. Susceptibility to a wide range of hacking techniques, including sniffing, cracking, hijacking and leakage, is thus identified.

The cost of penetration testing begins at around the £1,500 mark, which, when set against e-commerce middleware costing around £10,000 and a firewall budget, is worth considering. 'The security of any system is only as strong as its weakest link,' says Deri Jones, managing director of security specialist NTA Monitor. 'Even a "perfect" firewall won't protect an SME from all possible attacks on its computer systems. There are a number of other systems that need to be securely set up, including routers, DNS servers, mail servers and web servers.'

Firewalls are unable to provide total protection in isolation; they're best considered as a first line of defence. The best approach to security is to adopt a belt-and-braces approach and employ vulnerability assessment and the use of intrusion detection software. The most important thing to remember is that a poorly configured firewall is worse than no firewall at all, because it gives a false sense of security. □

PCW CONTACTS

National Computing Centre www.ncc.co.uk
 Penetration testers NTA Monitor
www.nta-monitor.com
 Security notice forums www.cert.org,
www.ntsecurity.net, www.ntbugtraq.com
 International Computer Security
 Association www.icsa.net

Bus stop

The original commercial PC, circa 1981, had a reasonable array of input/output (I/O) facilities; its serial and parallel ports were more than adequate for the throughputs required by the peripherals of

the day. But times have changed, and serial and parallel I/O devices fall short of user's needs in a number of important areas:

➔ **Throughput** Serial ports max out at 115.2Kbps, parallel ports (depending on type) at around 500Kbps, but devices such as digital video cameras require vastly more bandwidth.

➔ **Ease of use** Connecting devices to legacy ports can be fiddly and messy, especially daisy-chaining parallel port devices through pass-through ports. And the ports are always inconveniently located at the rear of the PC.

➔ **Hardware resources** Each port requires its own interrupt request line (IRQ). A PC has a total of 16 IRQ lines, most of which are already spoken for. Some PCs have as few as five free IRQs before peripherals are installed. COM ports can 'share' IRQs, but some operating systems such as Windows NT 4.0 won't tolerate this kludge. PCI steering partially overcomes this problem.

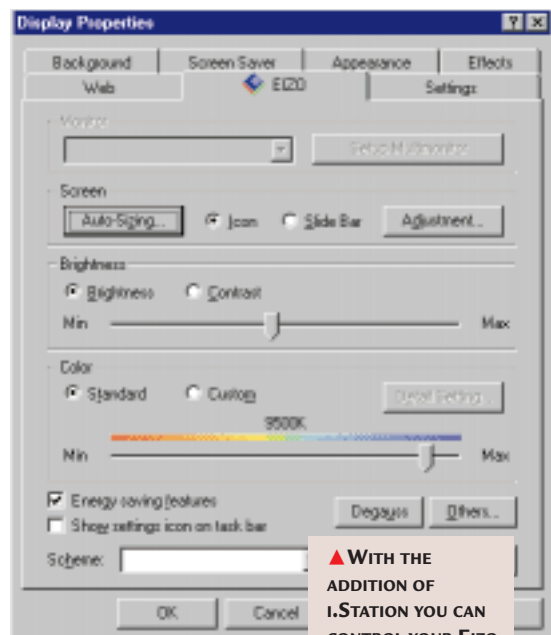
➔ **Limited number of ports** Most PCs have a pair of COM ports and one LPT port. You can add more COM ports and LPT ports, but at the cost of precious IRQs.

Two new I/O ports, Universal Serial Bus (USB) and IEEE 1394, address all of the limitations of the legacy I/O devices in one fell swoop. And they are complementary: USB deals with slower devices and 1394 with high-speed devices. Both support plug-and-play and hot swapping and, together, they cover a broad range of I/O requirements. Soon PCs will routinely be configured with both USB and 1394 and *only* these two, dropping parallel and serial connectors altogether.

Most PCs have had USB ports for a couple of years, but USB peripherals have only just started to arrive in any numbers. The reason? The launch of Windows 98 and the Apple iMac. Windows 95 support of USB was at best wishy-washy and we had to wait until Windows 98 for proper driver support. The iMac, of course, only has USB ports so it's Hobson's choice

ONE DAY, ALL PERIPHERALS WILL BE CONNECTED TO YOUR PC VIA USB AND IEEE 1394 — ROGER GANN EXPLAINS HOW, AND WHY. HE ALSO PRESENTS USB DEVICES CURRENTLY IN USE.

if you want to connect peripherals to it. USB and 1394 also dovetail neatly in with the putative PC99 standard, which envisages, amongst other things, the 'closed' system unit incapable of internal expansion. If you want to connect any sort of peripheral, sbe it a hard disk, DVD-ROM, MPEG decoder or scanner, then you'll use either USB or 1394.



The development of USB

The Universal Serial Bus (USB) specification was originally developed by a group that included Intel, Microsoft, Compaq, Digital Equipment, IBM, NEC and Nortel. It combines the best features of SCSI architecture with an advanced plug-and-play standard. It replaces the antique serial and parallel ports with a single port that is extensible through hubs and devices daisy-chained in a tree arrangement.

The system was designed to deliver a data-transfer rate of up to 12Mbit/sec to or from the PC. This is enough to deal with all existing types of peripherals, and most of the new higher-bandwidth mass-market PC

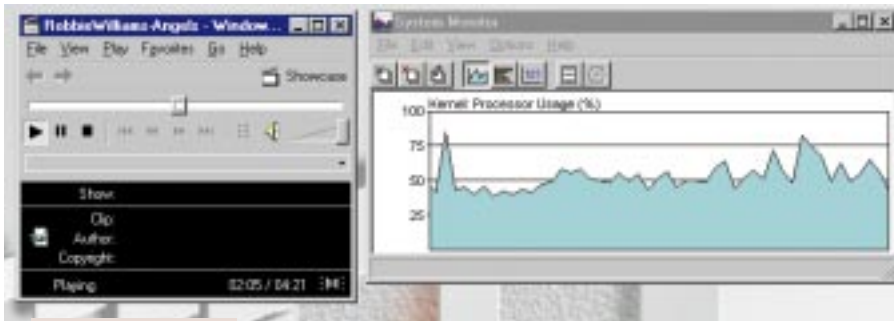
Contents

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141	More USB devices

peripherals in the foreseeable future. It also supports a low-speed mode of 1.5Mbit/sec for devices like keyboards, mice and joysticks. USB support has been built in to Intel's PCI set since the 430VX and many current motherboards feature connector headers for USB socket panels.

The main attractions of USB are its flexibility and its speed. It is cross-platform, hot-pluggable and hot-swappable, making peripherals easy to connect and disconnect from the network. And it offers performance that's faster than serial, parallel and Ethernet technologies.

USB was designed to be user-friendly: it eliminates the need to install expansion cards inside the PC and then reconfigure the system. Instead, peripherals will be automatically configured when they are attached to the system without needing to run a setup program or reboot. Similarly, there should be no more guesswork about which serial or parallel port to choose, and non-technical PC users should not have to worry about IRQ settings, DMA channels and I/O addresses. Finally, USB's hot insertion and removal allows users to attach and detach peripherals without powering down the system first.



▲ IF YOU USE USB SPEAKERS, BE PREPARED TO KISS GOODBYE TO A SIGNIFICANT NUMBER OF PROCESSOR CYCLES

The USB architecture comprises a dedicated master-slave system with a host controller residing at the root of the tree, typically within the PC chipset. Because of its 7-bit address scheme, the USB will allow users to connect up to 127 peripherals using a single standard connector type. That's the theory, but manufacturers discourage this in practice: high-speed USB peripherals, such as backup drives and scanners, should have their 'private' port for optimal performance. Mice, keyboards and other low-speed devices used infrequently can share a port. In addition, some peripherals (notably monitors and keyboards) can act as hubs to provide additional plug-in nodes. This is very convenient, allowing you, for example, to plug your mouse and keyboard into the base of a monitor.

All peripherals connected via a USB interface are managed by a USB host controller mounted on the PC's motherboard or on a PCI add-in card. The host controller and subsidiary controllers in hubs manage USB peripherals, helping to reduce the load on the PC's CPU time and improving

overall system performance. In turn, USB system software installed in the operating system manages the host controller.

Data on the USB flows through a bi-directional pipe regulated by the host controller and by subsidiary hub controllers. An improved version of bus mastering allows portions of the total bus bandwidth to be permanently reserved for specific peripherals, a technique called isochronous data transfer. The USB interface contains two main modules: the Serial Interface Engine (SIE), responsible for the bus protocol, and the Root Hub, used to expand the number of USB ports. The USB Host Controller incorporates logic for processing incoming and outgoing data, as well as legacy keyboard support for PS/2 keyboards.

The USB also allows unpowered devices to draw up to 500mA over the connector cable and even allows for unpowered hubs that might have unpowered devices downstream — here the current drawn mustn't exceed 100mA. So you have to exercise some common sense when hooking up multiple USB devices: for example, you shouldn't use ports on the keyboard, a low-power device, to plug in anything other than a mouse. A typical four-port hub should run on 2.1A (500mA per port plus 100mA for the hub). Half an amp is sufficient to power devices like video cameras, but so far only Logitech/Storm Technologies has managed to drive a scanner on this skimpy amount of power.

USB isn't without its critics:

there have been complaints that its implementation and architecture

are too complex. US reports indicate that printer manufacturers, with an eye on the booming consumer electronics market, are far more interested in 1394 than USB for the simple reason that digital cameras are more likely to sport a 1394 socket than a USB port. Some have criticised the USB protocol stack which, because it has to support so many different types of peripherals, is unwieldy. Others complain that the hub concept merely shifts expense and complexity from the system unit to the keyboard or monitor.

USB in practice

For my USB test bed I picked a P200MMX with the Intel 440TX chipset and 64Mb of RAM running Windows 98 (of course). This PC had a pair of USB ports which clearly weren't enough, so I installed a couple of hubs: the Entrega Hub 7U seven-port hub, which was hung off an Eizo F57 17in monitor, with the i-Station USB hub slung under the front panel. The latter has four free USB ports. Both hubs had separate power supplies but were not called on to power any

peripherals. With the exception of the Intel video camera, all the other devices that required power had their own mains transformers. Interestingly, the i-Station used a separate cable to connect to the monitor itself which allowed you to control the display from software rather than using its rather awkward on-screen menu system.

All told, this gave me no less than 11 free USB ports to play with. Inserting multiple USB plugs in the Entrega hub was easy enough, but the resulting mass of cable made the lightweight hub reluctant to 'stay put' on the desktop. Inserting USB plugs in to the Eizo i-Station was awkward: three of the four ports were located on the rear of the unit, which was just about the most inconvenient place you could think of. I then proceeded to fill up as many of the ports as I could. I plugged in eight in all — here's the list: Microsoft Natural Keyboard Elite; Microsoft Precision Pro joystick; Microsoft Digital Sound System 80; Logitech USB Wheel Mouse; Hewlett-Packard ScanJet 4100C; Epson Stylus Color 740; Intel Create and Share video camera; and the DrayTek ISDN Vigor 128 TA.

Overall, I was disappointed. With 119 devices to go in my possible USB 'tree', my P200MMX wasn't a happy bunny with all this extra hardware to look after. By and large, plug-and-play worked pretty much as expected: you'd plug the device in, Windows 98 would automatically detect it and, if the drivers weren't already installed, prompt you for the install disks. Occasionally, a device wouldn't be detected upon

insertion or would take a minute or two before the 'New Hardware Detected' window went away.

There were, however, one or two minor exceptions, notably the keyboard and mouse. The test bed PC was already working with an ordinary keyboard and PS/2 mouse and Windows 98 likes to find these devices as it loads. First-time installation of a USB device is normally done when Windows 98 is up and running. Trying to install the USB keyboard and mouse simultaneously didn't work and I had to plug the old PS/2 keyboard back in to install the mouse. I was then able to install the USB keyboard correctly.

I found it easy to cause Windows 98 to lock up or blue-screen by unplugging USB devices and plugging them back in. Firing up the System Monitor applet and graphing percentage CPU utilisation was instructive too. Plugging in a device would typically send CPU utilisation up to 100% for 10 or 20 seconds, sometimes longer, making the PC feel like a barrel of treacle had been poured into it. Also, as the burden of supporting multiple USB devices gradually mounted, so the PC felt progressively less responsive.

Maybe I was pushing my luck with a P200MMX — it could be that it just isn't powerful enough to keep an eye on all those peripherals on the USB bus. Perhaps a Pentium II 450MHz is a better bet. At the end of the day, there's no escaping the fact that it doesn't matter how many or how few USB ports you've got; there's only one bus, and all your peripheral data has to pass down it.

USB hubs

Although the USB standard permits the daisy-chaining of up to 127 devices, most users will come across a more practical limitation well before they hit double figures: USB sockets to plug things in to! Most PCs have a pair of USB ports, and while a few monitors come equipped with a USB hub, I've not seen any USB devices with a second USB socket, so daisy-chaining is impossible. Even the monitor hubs I've come across aren't a great

solution: the two I've seen have three or four USB ports, but one port has to be used to connect your PC to the hub, so you gain some, you lose one. The solution is simple: the stand-alone USB hub. Anyone who's set up an 10Base-T Ethernet network will be familiar with the concept of the hub. USB hubs simply let you attach more devices to your USB chain. In the UK, only Entrega has released a USB hub, available in four- and seven-port versions. The seven-

port version (£84 ex VAT) is tiny, no more than four inches square. Powered by a mains transformer, this hub has seven red status LEDs on the front, just like a network hub. These turn green when you insert a USB device. If seven ports proves too few then you can buy a second one, stack it on top of the first and daisy-chain one to the other, just like an Ethernet hub. There's no software to install



and you simply use the special USB hub cable to link the hub to a PC USB port. Once you connect a hub to a USB chain, you can then connect several other devices to that hub. For example, you can connect three devices and another hub, and then connect

two devices and two more hubs to the second hub, and so on, adding hubs and devices until you attach your 127th device. In any case, given the lack of self-powered USB devices, you're more likely to run out of mains socket outlets well before then.

Microsoft Natural Keyboard Elite ▷

This is a 'dual purpose' USB device in that it's a PS/2 keyboard with a short female PS/2-to-USB adapter lead. The Elite is a slightly more compact version of the original curved Microsoft Natural Keyboard; some space is regained by rearranging the cursor and editing keys. The keyboard is supplied *sans* software — it doesn't need any. Windows 98 recognises it as a standard 101/102 or Natural Keyboard. It has some quirks, notably the erratic behaviour of the the Caps Lock and Num Lock status LEDs

Price £40 (£34.05 ex VAT) **Contact** Microsoft 0870 601 0100 www.microsoft.com



◁ Logitech USB Wheel Mouse

This particular Wheel Mouse offers much the same functionality as the Microsoft Wheel Mouse: it's a two-button mouse with a wheel that can function as a third button or as an adjunct to scrolling. The Logitech comes with slightly more sophisticated software than Microsoft IntelliPoint and gives you more programming options for button combinations. This is a USB-only device — there is no PS/2 or COM port adapter. Detection was automatic, but installing the driver software was a drawn-out affair. Moving the mouse to a different USB port on a hub could confuse it to the point that at the next reboot, Windows 98 won't detect a mouse at all.

Price £29.38 (£25 ex VAT) **Contact** Logitech UK 0181 308 6582 www.logitech.com



▽ Eizo Flexscan F57 and i-Station hub

Another great monitor from Eizo: the picture quality on this 17in display is very easy on the eye. What makes it particularly interesting is the addition of the i-Station four-port USB hub that clips to the underside of the front bezel, blending in with the existing design. It has one easy-access USB port at the side and three well-nigh impossible to access ports at the rear. The i-Station doesn't draw its power from the monitor but from a separate mains supply — oh dear! It also has a 'maintenance' lead that links the two units together, and this allows display driver software to control the image.

Price Monitor £480.58 (£409 ex VAT), Hub £104.58 (£89 ex VAT) **Contact** PDS 01483 719500 www.eizo.com



Microsoft SideWinder Precision Pro ▷

The only difference between the USB and the ordinary version of the SideWinder Precision Pro is the small joystick port-to-USB adapter lead included in the box. Like most of the other USB devices, the SPP was a doddle to install — you don't, for example, need a sound-card joystick port to plug this in to. The SPP is a good-quality joystick, certainly on a par with the likes of the Logitech Wingman Extreme Digital. Sadly, the force-feedback version of the SPP isn't available in USB format.

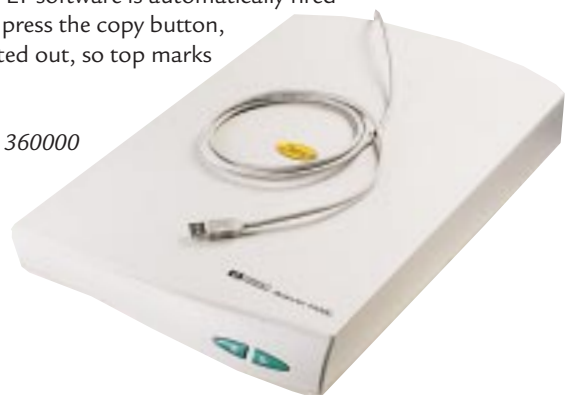
Price £50 (£42.55 ex VAT) **Contact** Microsoft 0870 601 0100 www.microsoft.com

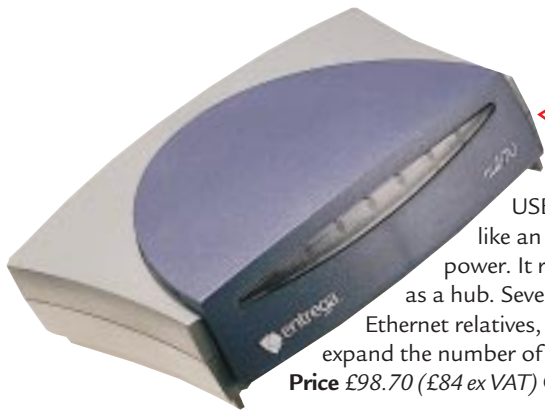


▽ Hewlett-Packard ScanJet 4100C

The ScanJet 4100C is the new entry-level ScanJet, although it's still relatively expensive. It's an A4 flatbed 36-bit colour scanner with an optical resolution of 600dpi, only modestly extendable to 1200dpi by interpolation. These scanners ship with HP's Precision Scan LT for one-step scanning, with automated OCR courtesy of Caere OmniPage, plus Adobe PhotoDeluxe and HP's ScanJet Colour Copy Utility — an excellent software bundle. The 4100C was one of the first scanners to feature a USB interface, making installation truly painless. The scanner also has two large, green buttons on its front panel: press the scan button and the Precision Scan LT software is automatically fired up and a scan initiated. If you press the copy button, the image is scanned and printed out, so top marks for convenience here.

Price £149 (£126.80 ex VAT) **Contact** Hewlett-Packard 01344 360000 www.hp.com





◁ Entrega Hub 7U

I've already discussed the hub elsewhere, but if you want to use more than two USB devices, you're going to want something like this. The Hub7U is a passive device, like an Ethernet hub, which is mains-powered, so it can support USB devices that need power. It requires no software support and is automatically recognised by the PC's chipset as a hub. Seven LEDs on the front indicate use — they're red if unused, green if used. Like its Ethernet relatives, the Hub7U is stackable and you can daisy-chain additional hubs together to expand the number of USB ports available.

Price £98.70 (£84 ex VAT) **Contact** Entrega 0118 951 9549 www.entrega.com

DrayTek ISDN Vigor 128 ▷

The Vigor 128 is a fairly conventional ISDN terminal adapter that connects to a USB rather than a serial port. Even though it's capable of channel aggregation, its maximum 128Kbps throughput won't really stress the USB bus. It's fairly easy to install, although it falls short of true Plug-and-Play. Betraying its 'Euro' design origins, it's well specified with EuroFile Transfer, Group 3 faxing and voicemail. The Kiosk utility provides useful low-level information on calls, such as CLI, and a real-time protocol analyser.

Price £175.08 (£149 ex VAT) **Contact** Electronic Frontier 0118 981 0600 www.elecfron.com



◁ Traveling Software LapLink Pro

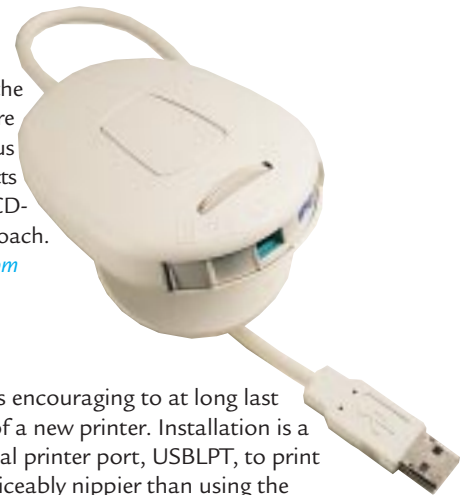
To hook two standalone PCs together to transfer data between them, you'd use the serial or parallel cables supplied. Parallel isn't a bad option, but USB's 12Mbps takes some beating. Accordingly, this version of LapLink doesn't come with the familiar blue or yellow cables of yore, but a single USB cable. Once LapLink is installed at both ends, it turns the USB link into a simple 12Mbps network link, offering similar performance to a 10Mbps Etherlink network connection.

Price £149.99 (£127.65 ex VAT) **Contact** Traveling Software 01344 409056 www.travsoft.com

Intel Create & Share ▷

The USB version of the Intel Create & Share Camera Pack is the easiest to install and use. It's also the cheapest — the PCI version costs about £50 more, simply because you're paying for a video capture card. This Konica-made video camera is perfect for USB because it draws its power from the USB bus and so doesn't require a mains transformer. Once plugged in, Windows 98 detects the camera and installs the drivers for it from the accompanying CD-ROM. And that's it. If only more USB devices had this 'one cable' approach.

Price £117.50 (£100 ex VAT) **Contact** Intel 01793 403000 www.intel.com



◁ Epson Stylus Color 740

This is one of the better colour inkjets money can buy and it's encouraging to at long last see a USB port alongside the Centronics port on the back of a new printer. Installation is a little convoluted because Windows 98 has to install a special printer port, USBLPT, to print to. However, once installed, printing to the USB port is noticeably nippier than using the parallel port, particularly when printing large true-colour, photorealistic images which involve a lot of data. **Price** £223.25 (£190 ex VAT)

Contact Epson UK 0800 220546 www.epson.co.uk

Microsoft Digital Sound System 80 ▷

The new Digital Sound System 80 comprises a hefty sub-woofer and two satellite speakers based on Philips technology. These speakers not only deliver some awesome sound, but can also do it at extreme volumes. These are perhaps the best PC speakers I've heard to date. Note that if the CPU is busy, the sound data stream can get interrupted, which is a pain. Another thing to remember is that USB audio is playback-only, so you can't record. Another gotcha — not all CD-ROMs can deliver digital audio to USB speakers.

Price £180 (£153.20 ex VAT) **Contact** Microsoft 0870 601 0100 www.microsoft.com



IEEE 1394

Originally designed by Apple in the late eighties under the 'FireWire' moniker, the concept behind the 1394 bus was simple: that a fast serial bus, with sufficiently clever physical-layer design, could be both fast enough to handle a rich mix of audio, video and data traffic and yet simple enough to be affordable. By supporting hot insertion and a plug-and-play protocol, FireWire could simplify the lives of Mac users who were putting together multimedia systems. The idea was good enough to spread beyond the shrinking confines of Apple, and emerged into the consumer-electronics and PC worlds as the IEEE (Institute of Electrical and Electronic Engineers) 1394 bus.

By providing an inexpensive, non-proprietary, high-speed method of interconnecting digital devices, 1394 offers a universal I/O connection. Its scalable architecture and flexible peer-to-peer topology make it ideal for connecting high-speed devices: everything from computers and hard drives, to digital audio and video hardware.

You can mix 100, 200 and 400Mbps devices on a single bus. The current 1394 specification data transfer rate currently tops out at 400Mbps: the 1394b specification aims to adopt a different coding and data-transfer scheme that will scale to 800Mbps, 1.6Gbps and beyond. Even at its lowest speed of 100Mbps, 1394 supports two simultaneous channels of full motion (30fps), high-quality video and stereo audio, with enough bandwidth left over to issue commands to control the digital devices transmitting the audio and video.

As a peer-to-peer technology, there is no need to have a computer in the chain to control the data transfer. The 1394 cable consists of two pairs of wires for data transport, and one pair for device power. A unique feature of the 1394 cable is the distribution of power through the cable for operation of the transceiver's repeating functions, even if the node power is off.

1394 supports a guaranteed data path bandwidth called 'isochronous data transfers' and allows for real-time transmission of data to/from 1394 devices. This is important for audio and video applications such as MPEG and DV. Isochronous data transfers operate in a broadcast manner, where one or many 1394 devices can 'listen' to the data being transmitted. The emphasis of isochronous data transfers is placed on guaranteed data timing rather than guaranteed delivery, obviating the need for buffering. Multiple channels (up to 63) of

isochronous data can be transferred simultaneously on the 1394 bus. Since isochronous transfers can only take up a maximum of 80 percent of the 1394 bus bandwidth, there is enough bandwidth left over for additional asynchronous transfers.

Asynchronous data transmission includes receipt datagrams that indicate the data was transmitted reliably to the 1394 device. Asynchronous data transfers place emphasis on delivery rather than timing. The data transmission is guaranteed, and retries are supported.

As a transaction-based packet technology, 1394 can be organised as if it were memory space interconnected between devices. Memory-based addressing, rather than channel addressing, views resources as registers or memory that can be accessed with processor-to-memory transactions. In basic terms, all this means easy networking. 1394 devices can be connected via branching or daisy-chaining, so it is very easy for consumers to connect 1394 devices. For example, a digital camera can easily send pictures directly to a digital printer without a computer in the middle. In addition, up to 63 1394 devices can be connected together. With bus-bridging technology, up to 64,000 1394 devices can be connected – in theory!

This is bad news for the PC, which may well lose its position of dominance in the interconnectivity environment and may well be relegated to being a very intelligent peer. 1394 is going to be the interface for connecting handy-cams and VCRs, set-top boxes and televisions, although thus far its implementation has been largely in digital camcorders, where it is known as iLink. If a computer is needed later, it would involve nothing more than adding a 1394 cable to the computer – it's that easy. USB, although it is the current interface of choice, will never be a mainstream consumer electronics interface.

With all these advantages, it is surprising more manufacturers have not adopted 1394 in consumer devices. It's a digital interface, so there is no need to convert digital data into analogue, which causes a loss of data integrity – excellent for digital photography and video.

But most of all, for the consumer it is very easy to put together, with no need for



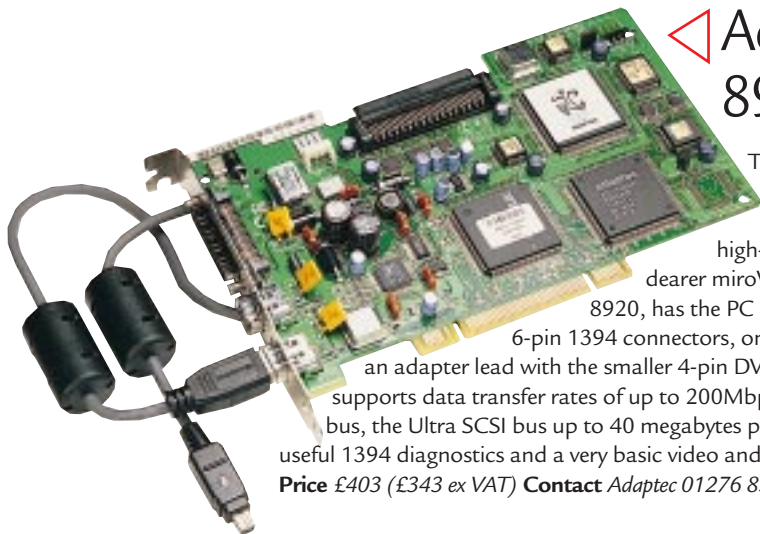
▲ THE ADAPTEC
HOTCONNECT
ULTRA 8945 COMES
WITH A SIMPLE
DIGITAL VIDEO
RECORDER
[SEE PAGE 141]

terminators, device IDs, or elaborate setup. It represents true plug-and-play as 1394 devices can be connected to the computer or to one another at any time, with the power on or off and without rebooting and reconfiguring. In some cases, 1394 devices can even power themselves from the 1394 bus. The 1394 connector is tiny but very rugged — it was derived from Nintendo's GameBoy, so it is fully 'kid' tested! Unlike SCSI, terminators aren't needed for 1394 devices.

Microsoft Windows 98 does include support for 1394 but Intel declined to include 1394 support in its 1998 PC chipsets. It makes the point: 'How many people really want to plug their camcorders and digital VCRs into their PC?' However, sources indicate that Intel plans to come to market in early 1999 with its first 1394 silicon.

Traditional computer devices support 1394. 'Soon' there will be 1394 fixed-disk drives,

1394 printers, 1394 scanners and 1394 CD-ROM/DVD devices. Consequently, a computer with a 1394 port will be able to connect to a potentially huge number of 1394 computer devices, as well as to all of the available 1394 consumer electronics devices.



◁ Adaptec HotConnect Ultra 8945

This pricey expansion card has most high-speed options covered. Not only does it offer support for 1394, but it also supports Ultra SCSI; this is important if you want to run high-quality video off an AV-quality hard disk. Apart from the even dearer miroVideo MV300, Adaptec, with its 8945 and the down-spec'd 8920, has the PC 1394 market to itself. The card comes with three of the large, 6-pin 1394 connectors, one of which is internal. It comes with a 6-pin 1394 lead plus an adapter lead with the smaller 4-pin DV/GameBoy-style 1394 connector. The HotConnect Ultra supports data transfer rates of up to 200Mbps (or 25 megabytes per second) on the 1394 bus, the Ultra SCSI bus up to 40 megabytes per second. The card comes with some useful 1394 diagnostics and a very basic video and stills capture utility, DV Deck.

Price £403 (£343 ex VAT) **Contact** Adaptec 01276 854500 www.adaptec.com

Sony DCR PC-1E ▷

This is a gorgeous piece of AV kit, exquisitely designed in the Sony house-style. It's a 40X digital zoom DV camera with autofocus and a choice of small LCD display or a traditional viewfinder to frame your images. The PC-1E is well equipped with video ports: concealed under a tethered pull-off flap at the front is a GameBoy-style 4-pin 1394 (i.LINK in Sony-speak) port, while a cap at the side conceals a conventional S-VHS mini-DIN port.

Price £1,400 (£1,191.50 ex VAT)

Contact Sony Consumer Products 01932 816000 www.sony.com



▽ JVC GR-DVL9000

This is a larger DV camcorder with a better spec than the Sony: it has a higher 500x560 resolution plus a much larger 4in hinged LCD display-cum-viewfinder and features 100X digital zoom. It's not quite as easy to use as the PC-1E or as neatly designed, but it has a similar array of video ports: an S-VHS mini-DIN port plus a small 4-pin DV/1394 output port. Note that this is an output port only — you can't, for example, record video from another 1394 source. This DV camera wasn't recognised by the Adaptec card and so I was unable to record images straight to disk. **Price** £1,798.93 (£1,531 ex VAT) **Contact** JVC 0181 208 7654 www.jvc.com



Windows

64
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2000

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The year of Win 2000



In a comprehensive review that takes in hardware, operating systems and next-generation CPU technology, we assess the eagerly awaited Windows 2000 and its role in small business.

The most anticipated arrival in 1999 is sure to be Windows 2000. Formerly known as Windows NT 5.0, it is certain to make waves when it hits the market.

Windows 2000 will be much more than a simple upgrade. In one sweeping move, it will remove the need for two mainstream operating systems and will sign the death warrant of Windows 9x. Windows 2000 is being pitched as an all-in-one solution for systems ranging from laptops to enterprise servers. So as well as possessing more functionality than its predecessor, Windows NT 4, it will also incorporate the best features of Windows 98.

Illustration by Marc Anundale

However, the operating system is nothing without the hardware to run it on, so we also take a look at the ideal hardware platform for a graphics workstation running Windows NT and Windows 2000. As part of the process we test single-processor and multiple-processor workstations with Pentium IIs and Xeons.

We also analyse the state of the operating-system market and the potential threat to Windows 2000 from Linux. And we explore the technology behind the next-generation CPUs scheduled to come out next year, and the role of Windows 2000 in a small-business environment.

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Tested, reviewed and compiled by Ajith Ram.

Future CPUs for Win2000

Microsoft's Windows 2000 is not the only anticipated arrival this year. Coinciding with its launch, the CPU manufacturers are gearing up to introduce a host of new processors which promise better performance.

The biggest surprise entrant will be K7 from Advanced Micro Devices. AMD has for some time been aggressively targeting Intel's massive 80 percent market share. Although the K6 was a good performer in most business applications, its floating-point performance fell below Intel's Pentium. This, along with lower clock speeds, prevented it from being widely accepted in high-end systems, so instead of pitching it against the PII, AMD used it to target the price-sensitive end of the market, running it head-to-head with Intel's Celeron.

However, last year AMD managed to up the ante with the introduction of the K6-2 processor. The K6-2, with its 27 3D Now! instructions, started to reduce the gap between it and the PII, but not all applications make use of the instructions and so do not gain a performance boost. AMD has now introduced the K6-3 (for a full review of this chip, see *Reviews*, p79). With speeds in excess of 400MHz and a full-speed 256Kb L2 cache, it is the first x86 processor to truly challenge Intel's dominance in high-end systems.

Hot on the heels of the K6-3, AMD is poised to launch the K7. Despite its unassuming name, the K7 is expected to give Intel's Katmai processor, the replacement for the Pentium II, a run for its money. Until both processors are released it will be hard to say which will be the best, but many are backing AMD. In addition to support for 3D Now!, the K7 will have no less than three fully pipelined parallel floating-point units. This, along with its already superior integer unit, could well make the K7 the best x86 processor to run Windows 2000. In fact, with such impressive floating-point performance and a faster bus speed, the K7 will become the first x86 CPU to truly challenge the dominance of RISC processors.

The K7 is expected to give Intel's Katmai a run for its money

Initially manufactured using a 0.25-micron process, the K7 will run at clock speeds starting at 500MHz. This itself positions it as a high-end processor. Secondly, the K7 will have a whopping 128Kb L1 cache running at the same clock speed as the processor core. This will be supplemented by 512Kb of L2 cache at half the core clock speed. To put this in perspective, Intel's high-end Katmai has only 64Kb of L1 cache — half that of the K7. Secondly, K7 will use the Slot A socket which AMD licensed from Digital last year. The Slot A has a front-side bus speed of 200MHz, compared to the 100MHz in Intel's architecture. This means the K7 will be the first CPU to take full advantage of higher-speed memory types like SDRAM and RDRAM. K7 will also be able to run in multiprocessor configurations needed for high-end Windows 2000 workstations and servers.

Katmai will surface next month, when we will give it a full review. It will run at a clock speed of 450 or 500MHz and is targeted at enthusiasts and mainstream high-end users. This extra speed, along with some expected minor core changes, will allow it to offer a small performance advantage over Pentium II on typical PC applications, and a large advantage on applications that use the multimedia extensions known as Katmai New Instructions (KNI).

Katmai is more than just a faster processor, and signals the convergence of new chipsets, DRAM technology, a graphics bus, MMX instruction set and graphics components. Katmai itself will have the same core as the PII and initially will be produced on a 0.25-micron process. It is expected to provide up to

512Kb of L2 cache. It will stick with a 64-bit CPU bus and rely on deeper pipelining capabilities to take advantage of wider buses and encourage the use of multiprocessing systems. Katmai will come with 70 new single-instruction, multiple-data



▲ **KATMAI (EXPECTED TO BE CALLED PENTIUM III — SEE NEWS) AND MOST RECENT PENTIUM IIS USE A NEW TYPE OF PACKAGING, SECC2 (SINGLE EDGE CONTACT CARTRIDGE 2). THE MAIN DIFFERENCE FROM THE ORIGINAL SECC PACKAGE IS THE REMOVAL OF THE THERMAL PLATE (THE 'BACK' OF THE PROCESSOR WHERE THE HEATSINK ATTACHES). THE TWO MAIN BENEFITS ARE A COST REDUCTION, AND THE REMOVAL OF THE NEED TO USE A FAN DUE TO MORE EFFICIENT HEAT CONDUCTION. KATMAI IS DESIGNED TO RUN WITH A PASSIVE HEATSINK PROVIDED THE CHASSIS PERMITS ADEQUATE AIRFLOW**

(SIMD) floating-point instructions to accelerate 3D processing. Intel's current MMX instruction set is based on SIMD integer data types. While useful for presenting certain audio, video and 2D images, they provide less precision and range for 3D geometry processing. Graphics performance will be further boosted by the 4x Accelerated Graphics Bus, which will increase the available bandwidth between the graphics controller and main memory from 528Mbps to 1Gbps.

For the very high-end user there are other options, however. Windows 2000 is expected to be widely adopted by the graphics community, traditionally the realm of Apple Macs and Digital NT workstations, and with this will come a

Win2000 vs Linux

As the US Department of Justice well knows, there is no such thing as stiff competition in the operating-system market. Microsoft has over 90 percent market share, having decimated most opponents in both the PC and server markets. Unix and the Mac have been sidelined as mostly server, developer and graphics platforms, while even the traditional graphics markets are turning away from the Mac in favour of cheaper NT machines. IBM has given up on OS/2, and other proprietary OSes such as NeXT have long since bitten the dust.

Yet, until the middle of this year, there is a semblance of choice due to the presence of two mainstream desktop operating systems (albeit from the same vendor). Users can choose between the multimedia-friendly Windows 95/98 and the more robust Windows NT 4 Workstation.

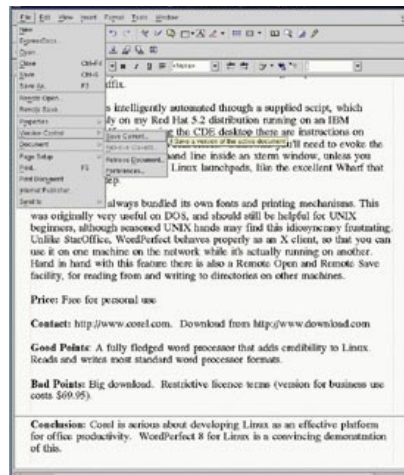
With the introduction of Windows 2000 even this limited choice disappears as both varieties of Windows are merged into one. There will also be a new range of Windows 2000 server OSes released at the same time, which will present a real challenge to competitors in the server market.

A full 32-bit OS, Windows 2000 will run systems ranging from NCs through laptops and desktops, on to workstations and finally enterprise-level servers. On the desktop it will have Windows 9x's plug-and-play and an increased driver base, but at the same time will provide enhanced manageability

Advocates would argue that Linux is more stable than Windows

features like an active directory for system administrators (see p160).

However, just as Microsoft is consolidating its stranglehold on the OS market, other OSes are beginning to gather attention. Chief among these is Linux, an open-source code OS renowned for its stability and performance. Originally coded by Linus Torvalds in 1991 as an undergraduate project, Linux was originally part of a Unix development project led by MIT. From the very beginning, it has had one great attraction — that the code is freely



available to anyone to use and to modify, the only stipulation being that those modifications be made public. From

the time it was posted, over 200 developers have contributed code to the kernel and over 1,000 have added patches or bug fixes. So the kernel has grown from around ten thousand lines of code to around 1.5 million lines, and from being a piecemeal kernel to an OS run on servers and desktops by around 7.5 million users. And Linus Torvalds still has an interest in the project, often having the final say in what is or not accepted into the kernel code.

Commercial developers of Linux do exist: Red Hat and Caldera have done very nicely out of commercial Linux products, providing not just the product itself but also a support infrastructure. As developers are obliged to make their source code public, they are forced to innovate faster to stay ahead of the game. This also meant that Linux developed faster and is, as advocates would argue, a more stable server OS than Windows.

While it has slowly been growing in popularity, Linux recently gained a great deal of publicity thanks to Microsoft itself. Two internal Microsoft memos (dubbed the 'Halloween' memos) were leaked to a prominent open-source developer who annotated them and published them on the web. You can read the two long memos on the Open Source Software site <www.opensource.org>.

The memos' author talks of the rapid development cycle of Linux and indeed other open-source software and suggests Microsoft should take note. The first memo admits that Linux looks a more promising server OS than NT and that in the short term, Microsoft should watch its back. The second memo is more damning, as it considers Linux to be a very real threat, even in the desktop environment. And Microsoft has good reason to worry.

Part of the reason is Linux's low system requirements. Windows 2000 on the desktop will need a PIII300 with 64Mb of RAM, yet at present Linux will quite happily run a DNS server on an old 486. It is also eat home on x86 processors from Intel, Cyrix and AMD as it is on PowerPC, Alpha, MIPS and SPARC.

Nor can you throw at Linux some of the criticisms justifiably levelled at it a few years ago. While there are not as many applications available for Linux as there are for the Windows environment, there are enough to be going on with, and not all are server/web based. Corel has a free downloadable version of WordPerfect for Linux (see p91), and there is even a basic image editor. Fast development times are also possible due to the shared and open code and APIs, allowing new applications to be developed and ported to different platforms very quickly. Linux developer Red Hat has developed a versatile GUI, and the author of the Halloween memo admits that many users could quickly become accustomed to its peculiarities.

Many large, specialist firms such as ISPs are happy to run Linux as it is stable but at the same time they have the resources to employ Linux hackers to put right any problems. Here again, the open source code is a major advantage as in-house staff can correct any bugs immediately, rather than having to wait for large software vendors to correct them in the next product refresh.

Yet even with these advantages, Linux faces an uphill struggle. The main reason for this is the popularity of Windows itself. Over 90 percent of PCs run Windows and therefore most users, and more importantly corporate buyers, are likely to stick with what is familiar to them.

Mesh Elite Pro 450 PII

Intel always pushes its most powerful processor as a workstation chip, whether manufacturers take note of this or not. However, once a 400MHz version of the Pentium II was launched, it has become a viable alternative in some high-end workstations. This is mostly due to its powerful floating-point unit. Although nowhere near as powerful as those in RISC processors like Digital's Alpha, it still



provides good value for money. The single processor in the Mesh system rests on an Asustek motherboard built around Intel's 440BX chipset. Since the motherboard is capable of housing two processors, the Mesh workstation is easily upgradeable. It has 256Mb of RAM in two 128Mb modules. Two other DIMM slots are left free. SCSI devices are mandatory for performance workstations, providing high bandwidth. Like the drive in the Dell system, the Alpha's 9.1Gb UltraWide SCSI hard drive may prove too small for some applications. Mesh has thoughtfully included an Iomega Jaz drive. Capable of holding 2Gb of data, this is a much better option for a workstation than the smaller-capacity Zip drive.

The graphics card in the Elite Pro is the Millennium G200 from Matrox. Built around the G200 chipset, this card is usually more common in high-end PCs. Although it has a high fill rate and an excellent feature set, the Millennium G200 lacks full OpenGL

support. Therefore, an accelerated preview window is not available for Lightwave 3D. However, since Lightwave relies only on the processor for actual rendering, overall system performance is not affected. The performance of the Mesh system is a good pointer to the value of an ordinary Pentium II.

PCW DETAILS

Price £2,466.33 (£2,099 ex VAT)

Contact Mesh Computers
0181 208 4706

www.meshplc.co.uk

Good Points Fast SCSI hard drive. Iomega Jaz drive.

Bad Points Modest-size hard drive.

Conclusion Easily upgradeable. Excellent value for money.

Build Quality	★★★★
Performance	★★★★
Value for Money	★★★★
Overall Rating	★★★★

Dell Precision Dual PII WS 410

The Dell runs dual Pentium II 450 processors. Like Unix and Linux, Windows NT supports symmetric multi-processing, or the ability to use more than one processor to perform tasks. However, for symmetric multiprocessing to work properly, the application must also be multi-threaded. Lightwave 3D, which we used in our tests, is multithreaded and so the results clearly showed



up the advantages of multiple processors. With its dual Pentium II 450 processors, this Dell workstation outclassed the costlier Xeon systems. And as Windows 2000 will have better support for multiprocessing, performance is likely to increase further. As befitting a high-end workstation, the Dell system has 256Mb of RAM on two DIMM slots. The memory can be upgraded to a maximum 512Mb if the remaining two slots are also used. The 9Gb hard drive and CD-ROM are both SCSI versions. However, the hard drive, at 7200rpm, is not the fastest. Also, its size might prove too small while handling large files.

Wisely, Dell has chosen the Diamond FireGL Pro 1000 graphics card. Based on the Permedia2 chipset from 3DLabs, it has excellent DirectX and OpenGL support. Its performance is on a par with other professional graphics cards costing much more. Again highlighting its high build-quality, the Dell system has a 64-bit

PCI slot which is more prevalent in servers. This high-bandwidth slot is occupied by a RAID card with 16Mb of RAM on-board. The system's performance does not benefit from its presence, as there is no second hard drive, but it does make for straightforward upgrading.

PCW DETAILS

Price £3,783.50 (£3,220 ex VAT)

Contact Dell 0870 152 4850

www.dell.co.uk

Good Points 64-bit PCI slot. RAID card.

Bad Points Modest hard drive. No second drive to utilise the RAID card.

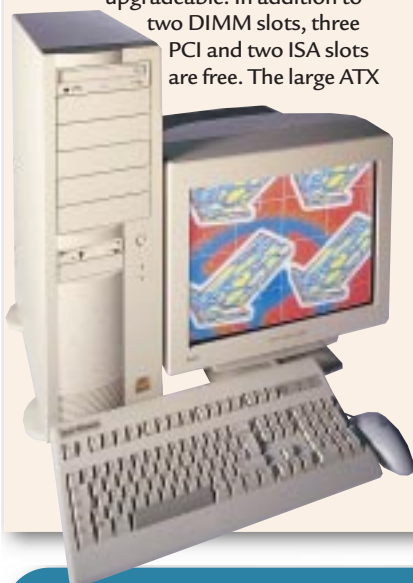
Conclusion A good workstation for running Windows 2000.

Build Quality	★★★
Performance	★★★★
Value for Money	★★★★
Overall Rating	★★★

Armari Rage X2E-XEON

The Armari system is an outstanding example of a well-built workstation. The first thing you notice about it is the large ATX case. The interior is very spacious despite the huge heat sink on the Xeon processor. The heat sink itself has a handle, so it is easier to remove it along with the CPU without affecting other components. The Rage system is easily

upgradeable. In addition to two DIMM slots, three PCI and two ISA slots are free. The large ATX



case also provides a lot of free drive bays. Armari has chosen an Oxygen GMX graphics card from 3DLabs. Unlike the Millennium G200 and Permedia2 graphics cards, Oxygen GMX is a true workstation card with a whopping 96Mb of RAM. It also has a dedicated Glint geometry processor. This lessens the load on the CPU during geometry-intensive modelling sessions in applications such as Lightwave 3D. However, the graphics card makes no difference to the actual rendering itself. Both the hard drive and the CD-R are SCSI models and the on-board SCSI chip saves a PCI slot. The Armari system does not have a RAID card, but since there is no second hard drive, this does not hamper performance. The motherboard cannot hold a second Xeon processor.

The Xeon itself is being marketed as both a workstation and a server processor: its large, full-speed cache comes in handy for systems with heavy strain on their I/O buses, such as servers. As workstation applications rarely strain the I/O, we

were not surprised that this Xeon workstation shows only the same performance as a normal Pentium II. Armari itself was only able to see a speed increase when running multiple video streams on the Xeon.

PCW DETAILS

Price £4,929.13 (£4,195 ex VAT)

Contact Armari 0181 810 7441

www.armari.co.uk

Good Points Excellent construction. Easily upgradeable. High-quality components.

Bad Points Understandably disappointing performance from the Xeon.

Conclusion A well-constructed workstation with high-quality components.

Build Quality	★★★★★
Performance	★★★
Value for Money	★★★
Overall Rating	★★★★

Hewlett-Packard KayakXU-Dual Xeon

The Kayak range of systems from HP is one of the most well-known workstation brands on the market. The system included here has dual Xeon processors. Each Xeon runs at 450MHz and has 512Kb of cache running at the same clock speed. The Kayak's motherboard uses Intel's GX chipset based on the Slot 2 architecture employed by Xeon. However, its front-side bus speed is the same 100MHz that you find on the faster Slot 1 processors, the PII 350, 400 and 450.

The board has four PCI and one ISA slots free, and the SCSI controller is built on to the motherboard. The Kayak case, while not as large as the Armari's, has sufficient drive bays free for upgrading. Although the 4.5Gb hard drive is fast, it is much, much too small for a workstation. The Kayak came with only 128Mb of RAM. Although adequate for running most NT applications, it might prove insufficient for animation packages like Lightwave. Fortunately, the three free DIMM slots provide ample room for upgrading.

A unique feature of the Hewlett-Packard system is a small blue box attached to its front panel. An LCD panel located here identifies possible hardware and software conflicts within the workstation. Since Windows NT 4.0 does not have plug-and-play for hardware, identifying hardware conflicts is not easy. At such times, this gizmo can come in handy.

The Kayak did not work well straight out of the box, but we were

able to resolve the problem by reinstalling all the four NT 4.0 service packs. Despite the presence of two expensive Xeon processors, the Kayak produced only average results. Its performance in the Lightwave tests was not as good as the dual Pentium II Dell system, again due to the low I/O demands of the test.

PCW DETAILS

Price £6,932.50 (£5,900 ex VAT)

Contact HP 0990 474747

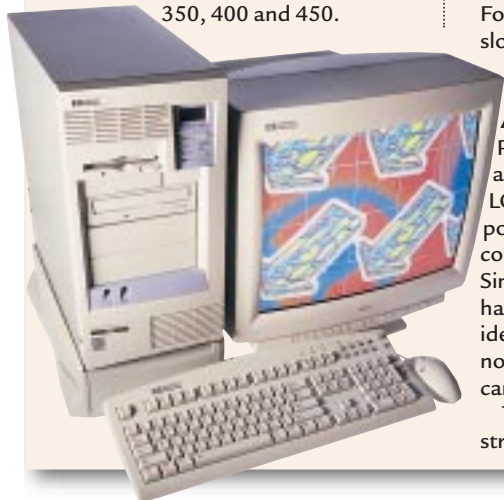
www.hp.com/go/kayak

Good Points Excellent construction. Troubleshooting module

Bad Points Small hard drive. Low RAM.

Conclusion An expensive but well-specified workstation.

Build Quality	★★★★★
Performance	★★★
Value for Money	★★★
Overall Rating	★★★



Win2000 in business

For years, it has been Microsoft's stance that businesses wishing to effectively manage their networks should adopt Windows NT rather than Windows 3.1 or Windows 95. There are some sound reasons for this.

To begin with, Windows NT is a full 32-bit operating system, unlike its counterparts. It was designed to be a network operating system from the beginning. Like Novell's NetWare, Windows NT provides enhanced security features. For system administrators, NT provides better manageability. In contrast, the Windows 9x family was firmly intended for the home user and small-business user. However, this clear delineation between corporate and consumer operating systems will end with the launch of Windows 2000. The entry of the new operating system will see the end of the line for Windows 98.

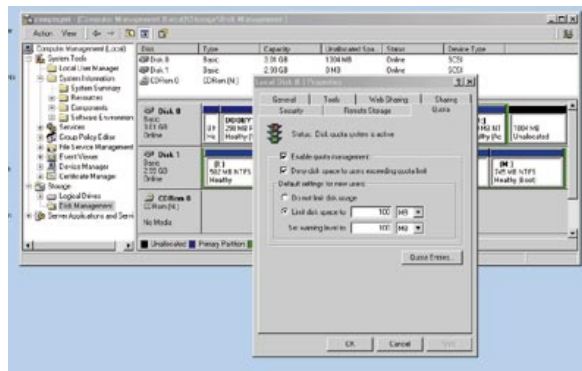
Windows 2000, although built on the NT 4 foundation, will be very different from its predecessor. As the only operating system designed to carry Microsoft's name into the next millennium, it will incorporate the best features of NT 4 and Windows 95/98. Like Windows 95, Windows 2000 will have plug-and-play support for hardware. Microsoft did not incorporate this in Windows NT due to security considerations. But this later caused tremendous problems for system administrators.

Windows NT also lacks support for Microsoft's own DirectX 5 API. With the phenomenal increase in multimedia

The new OS will see the end of the line for Windows 98

applications, this has proved to be a major handicap. Many high-end animation and design packages were not modified to run on NT. Therefore, many businesses continue to use Windows 95/98 on individual PCs while using NT only for servers. Windows 2000 will rectify this problem with built-in support for DirectX 6. Moreover, it will have support for new technologies like DVD which is lacking in NT.

Compared to its predecessors, Windows NT provides excellent



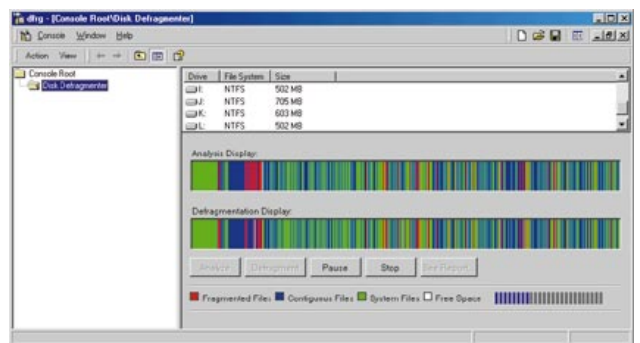
◀ **DISK QUOTAS CAN LIMIT THE AMOUNT OF STORAGE USERS CAN OCCUPY**
▼ **FOR THE FIRST TIME IN WINDOWS, A DISK DEFRAGMENTER WILL BE INCLUDED IN WIN2000**

manageability features for system administrators. However, it still lags behind other network operating systems, so small businesses have to rely on expensive third-party utilities. Microsoft promises to address this more comprehensively in Windows 2000.

Unlike Windows NT, Windows 2000 will come bundled with 'lite' versions of third-party utilities like Diskkeeper for defragmenting hard drives. The Windows Directory Services in NT 4.0 will have its counterpart in Windows 2000; the Active Directory in Windows 2000 (see p162) is more versatile than its predecessor.

With the massive increase in internet use and the virtual explosion in corporate intranets, security has become the primary concern for most businesses. Since its launch, several security bugs in NT 4.0 have been identified. Although Windows 2000 will provide better protection, it is unlikely to be bug-free. In fact, due to the addition of new features like plug-and-play, some analysts doubt whether it is the best solution for small networks with limited firewall protection. Small businesses that harbour such concerns might be better off remaining a bit longer with NT 4.0.

Reliability is another critical issue. Although Windows 2000 is much more robust than 95/98, its core features are the same as NT. System administrators still complain that NT is nowhere as dependable as 64-bit operating systems like Unix or even Linux. Therefore, until the reliability of the new operating



system is proved, it might be prudent to run mission-critical applications on other OSes.

By Microsoft's own admission, upgrading old laptops to Windows 2000 will not be easy. A typical laptop today with 32Mb of RAM upgraded to Windows 2000 may not run very efficiently. The whole system may come to a standstill if memory-intensive applications like Photoshop are used. Laptop components and drivers also differ greatly from desktops: Windows 2000 may conflict with many legacy hardware drivers.

Driver conflicts are a possibility not just in laptops: old NT 4.0 drivers will not work with Windows 2000. Therefore, early in 1998, Microsoft moved hardware vendors to the new Windows Driver Model (WDM) for Windows 98. WDM drivers also work under Windows 2000, but the truth is that WDM drivers will not be available for many legacy components. Although users can theoretically upgrade from old OSes like Windows 3.1, retaining the legacy hardware is a different matter. Even without driver conflicts, Windows 2000 will require more resources than Windows 95 or Windows NT 4. Microsoft is currently suggesting a PIII300 with 64Mb of RAM.

Win2000 for your network

Windows 2000 will be a major evolutionary step from earlier versions of NT.

In addition to running desktops and laptops, Microsoft is hoping that the new operating system will challenge the dominance of Unix and NetWare on large enterprise-level servers.

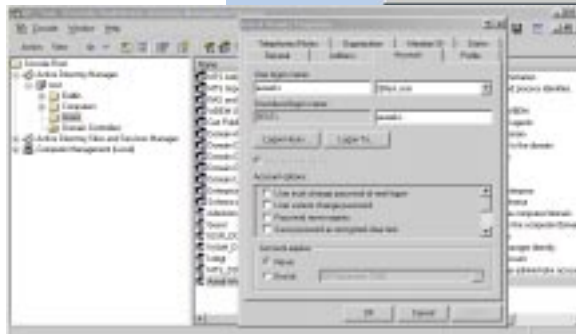
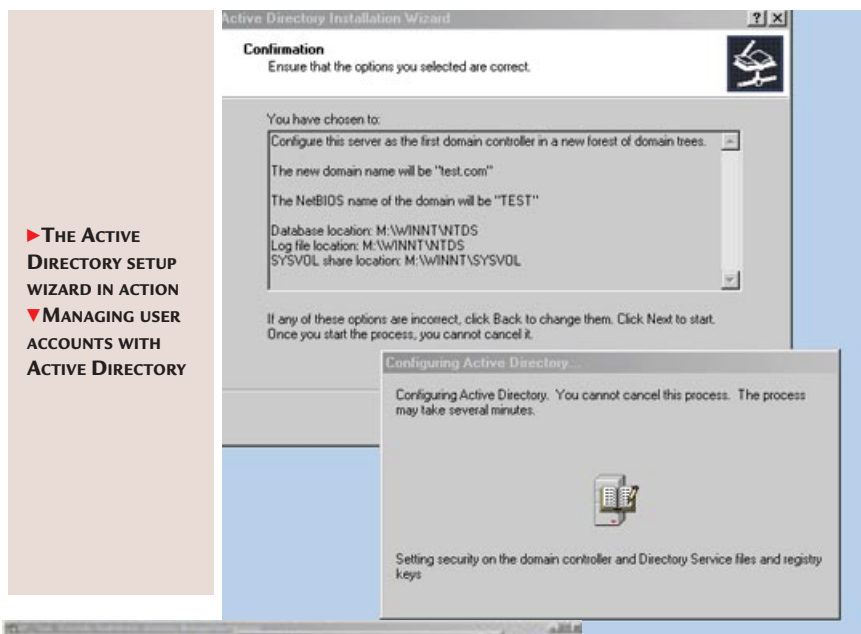
Unix has the advantage of being a full 64-bit OS which is extremely stable and scalable. Its security features are so far unrivalled. NetWare, meanwhile, provides excellent manageability to system administrators. To effectively compete with or replace these two incumbents, Windows 2000 must possess all these features and much more.

One of the key features of Windows 2000 is the Active Directory. A directory service provides a way to locate and identify the users and resources available in the system, a bit like a phone directory. Given a name for a person or a resource, it provides the information necessary to access that person or resource. For the system administrator, this is obviously vital information. Active Directory is a big step towards a more comprehensive directory service for large organisations. Microsoft hopes that Active Directory will be used not just for managing files or printers, but for all of a company's networking needs. This puts it in direct competition with NetWare Directory Services.

If you have both NetWare and Windows 2000, you have to choose between the directory services offered by the two. Microsoft is betting on the hope that administrators will choose Active Directory for the sake of convenience. Also, with the introduction of Active Directory, Microsoft has taken the opportunity to revamp its security structure. Unlike the proprietary security protocol in NT 4.0, Windows 2000 uses an open standard called Kerberos. Originally developed by MIT, Kerberos is the same protocol used in Unix environments. Therefore, unlike NT 4.0, even non-Windows users can be routed to a Windows 2000 server for verification. This also reduces the need to maintain non-Windows servers.

The integration of more features in Windows 2000 has implications not just for individual administrators concerned about ease of use. Entire corporations

► **THE ACTIVE DIRECTORY SETUP WIZARD IN ACTION**
▼ **MANAGING USER ACCOUNTS WITH ACTIVE DIRECTORY**



concerned about rising IT costs may have something to look forward to. TCO (total cost of ownership) is a phrase bandied about by all players in the IT industry, and is something Microsoft cannot afford to ignore. As a means of lowering TCO, network computers (NCs) were mooted. An updated version of the dumb terminal, NCs were meant to keep all applications and extraneous functionality away from the user and safely on the server. However, these NCs do not run Windows — an understandable cause for concern to Microsoft.

In response, Microsoft came up with the Net PC specification. Net PCs process some of the data locally on low-powered machines, while depending on the server for most functions. Windows 2000 is expected to take this Net PC concept further. But all is not rosy in the Net PC realm. From the outside, the vastly reduced hardware needs of Net PCs seem like a good idea. But in reality, the TCO of Net PCs and normal PCs may

not be very different. One critical factor is Microsoft's licensing strategy. Microsoft charges a licence fee for every end-user of Windows. So even though Net PCs require only one installation of Windows 2000 on the host server, companies

must pay a licence fee for each of their employees sitting at a Net PC. A second unseen cost is increased networking hardware. Net PCs depend on the main server to perform most jobs; this increases network traffic manifold.

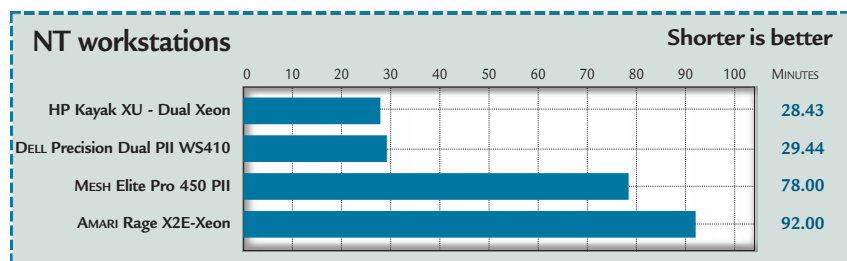
Lastly, Net PCs using Windows 2000 will inevitably result in greater support

Windows 2000 is expected to take the Net PC concept further

from the systems administrator. Users will depend on the administrator to change even minute settings, there will be far more traffic to oversee, and the server will have to be watched closely as it will cause major disruption if it falls over.

All this means that TCO for Net PCs may not be very different from normal systems running Windows 2000. Businesses should evaluate the benefits before jumping on the Windows 2000 Net PC bandwagon.

PCW Labs Report



These results are measured in minutes and seconds. Lightwave is a multithreaded application, capable of handling up to 1024 CPUs. When using a system with just one processor, whether Xeon or Pentium II, Lightwave took over an hour to render a single frame at film resolution (2480 x 2080 pixels). However, our results show a tremendous jump in performance when two CPUs are used: typically around half an hour to render the frame. This substantial increase in performance can be attributed to many factors. When only a single processor is used, it has to handle the operating system and monitor the I/O buses and the floating-point intensive rendering. When a second CPU is added, it is almost completely dedicated to the rendering process. Thus the performance is more than doubled.

How we did the tests

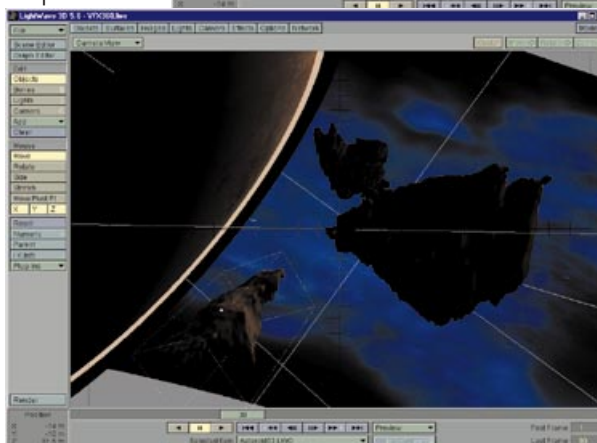
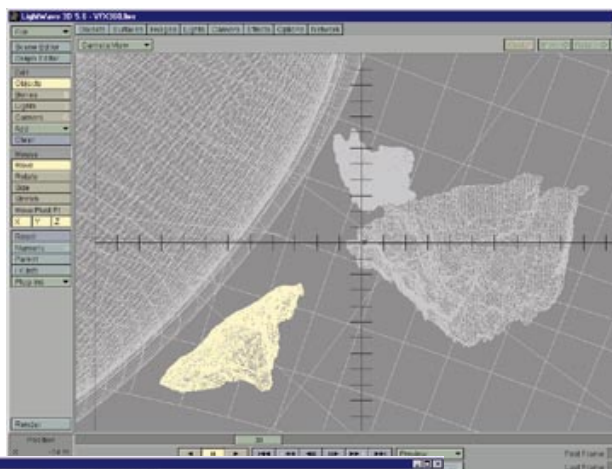


For this workstation group test, we decided to use Lightwave 3D for benchmarking purposes. Lightwave 3D is the animation package used to create the special effects in Hollywood movies like *Terminator2*

and *Titanic*. As these machines are, after all, graphics workstations, the main concentration of the test was on the Lightwave 3D tests.

Lightwave 3D has numerous advantages in such tests. Being multithreaded, it is able to take advantage of more than one processor. However, it also depends on the CPU to provide almost all the muscle when rendering 3D objects, rather than relying on the graphics card to make up the difference. As we were looking specifically at the performance of each processor configuration, Lightwave 3D was the perfect choice. For our Lightwave tests, AMG FX, the animators behind many of the special effects in the recent movie *Lost in Space*, kindly provided us with a file containing the model of an asteroid. We loaded the file into Lightwave 3D and timed the rendering of the asteroid. All rendering tests were run three times to ensure consistency.

The Lightwave 3D results were not a shock to us, especially the poor results of the Xeon machines. When we first came to look at Xeon in the December '98 issue of *PCW*, we were told by many manufacturers that they had been a little perplexed by Xeon's speed results. While the Xeon is equipped for fast handling of I/O, making the chips an obvious choice for servers, its core is so similar to the PII that very little performance increase could be seen. Only when running multiple video streams, where the data throughput is very high, did the Xeon truly perform.



▲ THE ASTEROID MODEL FROM *LOST IN SPACE* THAT WE USED IN OUR LIGHTWAVE TESTS ON THE WORKSTATIONS



Table of features



MANUFACTURER	MESH	DELL	ARMARI	HP
MODEL	ELITE PRO 450 PII	PRECISION WS 410	RAGE X2E-XEON	KAYAK XU-XEON
Price (ex VAT)	£2,099	£3220	£4195	£5900
Price (inc VAT)	£2,466.33	£3783.50	£4929.13	£6932.50
Telephone	0181 208 4706	0870 152 4850	0181 810 7441	0990 474747
Web address	www.meshplc.com	www.dell.co.uk	www.armari.com	www.hp.com/go/kayak
HARDWARE SPEC				
Processor	Intel Pentium II 450MHz	Dual Intel Pentium II 450MHz	Intel 450MHz Xeon	Dual Intel Xeon 450MHz
RAM supplied	256Mb	256Mb	256Mb	128Mb
RAM type	SDRAM	SDRAM	SDRAM	SDRAM
DIMMs occ/free	2/2	2/2	2/2	1/3
HD size	9.1Gb	9Gb	9.1Gb	4.5Gb
HD access time	6.3ms	8ms	5.6ms	7.5ms
HD interface	Ultra2 SCSI	Ultra2 SCSI	Ultra2 SCSI	Ultra2 SCSI
MOTHERBOARD COMPONENTS				
Motherboard	Asustek P2B-D	Dell Precision Workstation 410	Supermicro S2DGO	HP Kayak XU
Chipset	Intel 440BX	Intel 440BX	Intel 440GX	Intel 440GX
L2 cache/max	512Kb/512Kb	512Kb/512Kb	512Kb/512Kb	512Kb/512Kb
EXPANSION AND I/O				
Free 5.25in bays	1	2	4	2
Free 3.5in bays	1	3	3	2
PCI/ISA/Shared slots	3/2/1	4/0/1	4/2/1	4/1/1
USB/ser/par/PS/2	2/2/1/2	2/2/1/2	2/2/1/2	2/2/1/2
MULTIMEDIA				
CD-ROM manufacturer	Teac	Dell	Yamaha	HP
CD-ROM model	CD532-S		CRW 4416S	
CD-ROM speed	32X	32X	16X	32X
CD-ROM interface	SCSI	SCSI	SCSI	SCSI
Sound card manufacturer	Creative Labs	Crystal 3D	Diamond Multimedia	Aztech
Sound card model	64V PCI	Cs4237B	S90	A3D
Speakers	Yamaha YST-M20 DSP		Yamaha YST MS25	
GRAPHICS AND MONITOR				
Graphics card manufacturer	Matrox	Diamond Multimedia	3D Labs	Elsa
Graphics card model	Millennium G200	FireGL Pro 1000	Oxygen GMX2000	Gloria Synergy
Graphics interface	AGP	AGP	AGP	AGP
Graphics RAM/Max RAM	8Mb/16Mb	8Mb/8Mb	96Mb/96Mb	8Mb/8Mb
BUNDLED EXTRAS				
Other hardware		64-bit RAID controller		
Other software			Nero CD burning software	
Standard warranty	1 yr on-site	3 yrs on-site	12 months on-site	1 yr on-site
	2 yrs RTB labour only			2 yrs parts only
Warranty options	up to 5 yrs on-site	up to 4 yrs	3 yrs on-site	3 yrs on-site
Technical support	0181 208 4795	0870 152 4850	0181 810 7441	0800 848 8199

Conclusion

You may be forgiven for thinking that the current trend for 'bloatware' applications requires the maximum in computing power. But when you move on to consider applications for such tasks as rendering high-end graphics for animation or computer aided design, a workstation with the maximum computing power is necessary. So we decided to put Intel's fastest processors under the spotlight to see how they performed in workstations.

Our test results highlighted a few home truths about the current Intel processors. The Xeon is priced many times higher than the Pentium II. It also has a full-speed cache, running at the core speed of the processor compared to half the core speed in the Pentium II. However, the integer and floating-point units in both types of CPUs are identical.

In an application like Lightwave 3D which supports multiple processors, the floating-point unit is used extensively. Since most of the data being processed is stored in the ample RAM rather than in the cache, the higher-speed cache in the costlier Xeon makes little difference to overall system performance in pure rendering

conditions, or indeed when running less high-powered applications. So the single Pentium II machine proved slightly faster than the Xeon-based system. Even in multiple processor configurations, the Pentium II and Xeon produced almost identical scores.

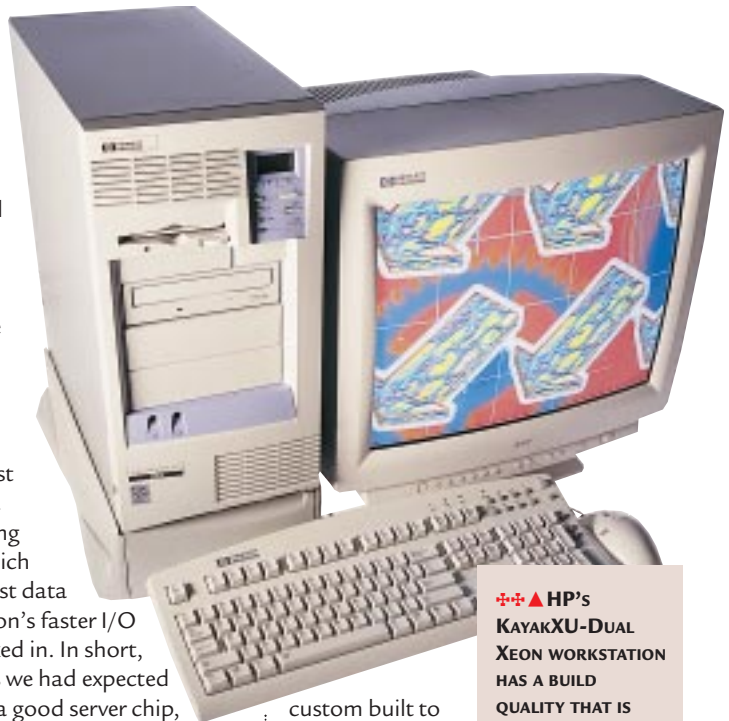
When running applications which require a very fast data throughput, Xeon's faster I/O would have kicked in. In short, Xeon proved, as we had expected all along, to be a good server chip, but not one that is going to cut the mustard in a graphics workstation.

If you need multiple processors, however, you are faced with a Hobson's choice. Currently, Intel makes the only x86 processors able to run in multiple configurations. Therefore, users who want more than two CPUs have to use

Intel's costly Xeon or RISC processors like Digital's Alpha. But this will change soon with the arrival of AMD's K7. Our test results also prove that cheaper multiple Pentium II processors provide almost the same performance as costlier multiple Xeons. As a result, it might be better for buyers to opt for a cheaper processor and invest that extra money in other components.

Graphics workstations must have high-quality components to achieve peak performance.

So, while SCSI is a luxury in ordinary business PCs, it is an absolute necessity in workstations. Also, unlike PCs, most workstations need to be

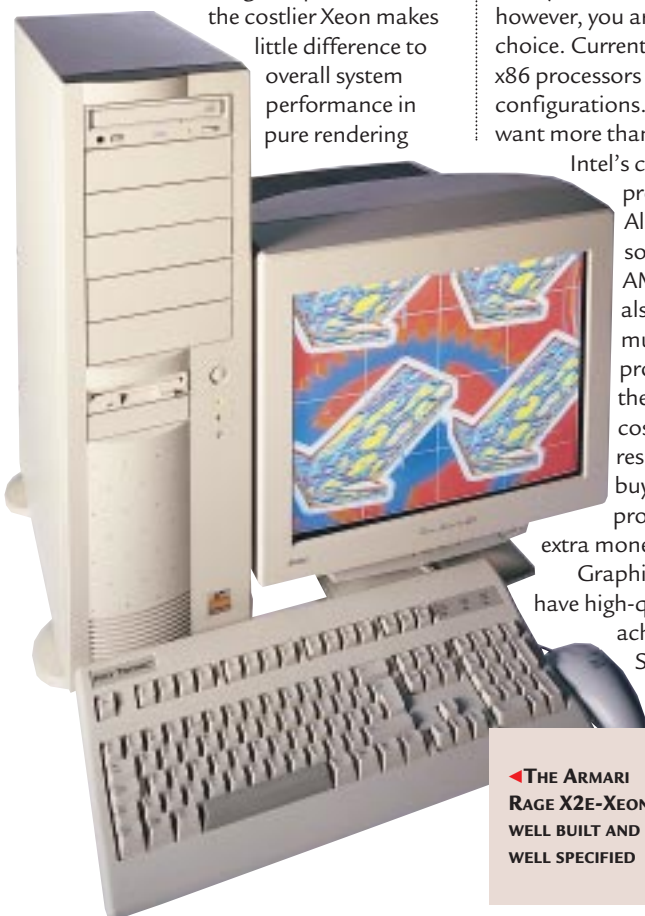


**HP's
KAYAKXU-DUAL
XEON WORKSTATION
HAS A BUILD
QUALITY THAT IS
SECOND TO NONE**

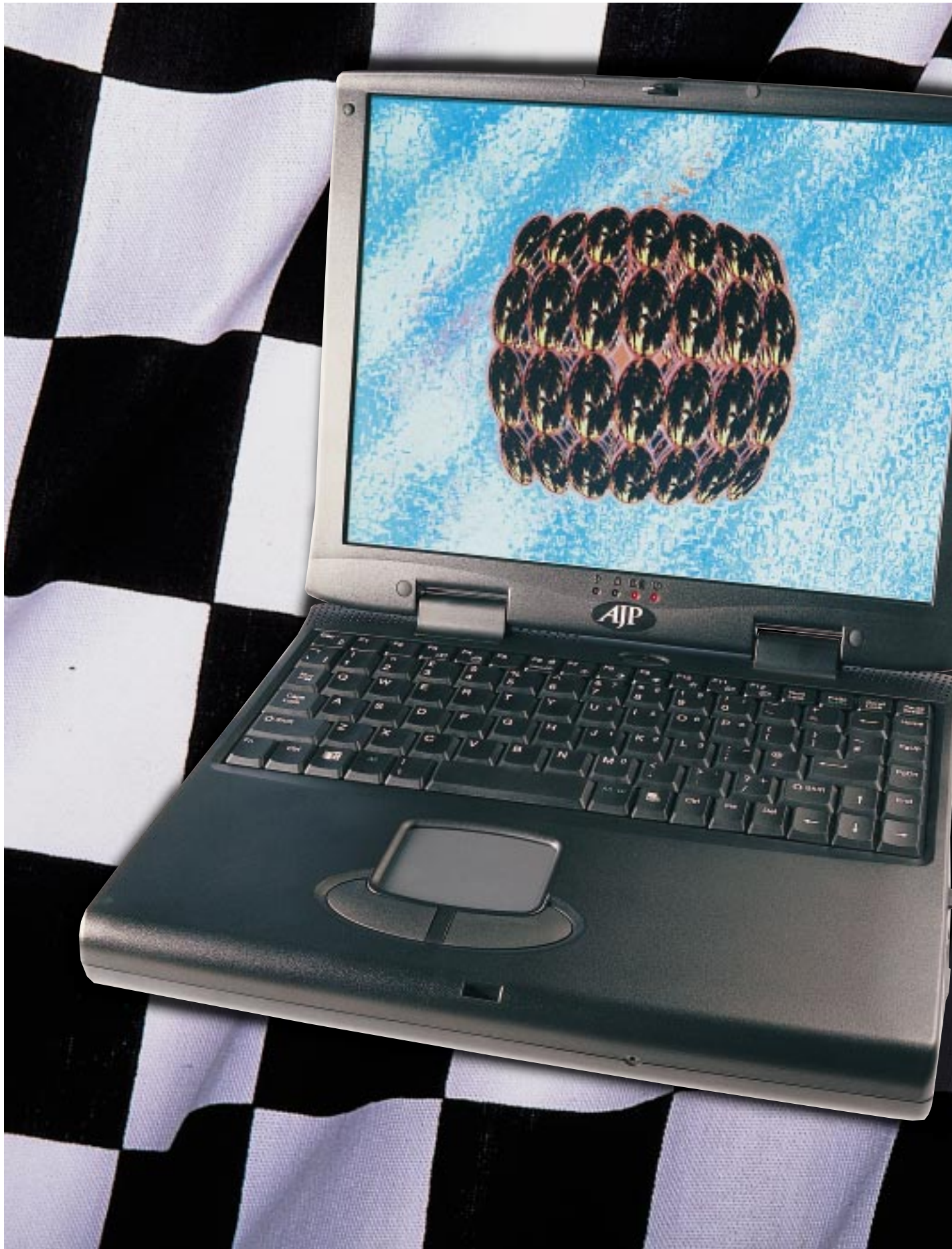
custom built to suit their uses.

A workstation meant for video editing needs to have a fast SCSI hard drive. A RAID card like the one in the Dell workstation is useful if you intend to add multiple hard drives — and is even more useful when you give up on Xeon as a workstation and turn the PC into a server. To dramatically improve rendering performance, users of animation packages like Lightwave may be better off with a graphics card that supports RenderGL.

All the workstations in our group test were well built. In addition to having good components, all of them are easily upgradeable. The Armari and Hewlett-Packard workstations deserve special mention. Both manufacturers had the unenviable task of building machines with processors that would prove little more effective than their much cheaper PII competitors, but both came up with superb offerings. While the quality of the Armari system is immediately evident, the crowded interior of the Hewlett-Packard workstation is rather misleading: it appears crowded only because of the numerous cooling fans and purpose-built trays for holding the internal components. It is, in fact, one of the best-built machines we have seen for some time. □



**THE ARMARI
RAGE X2E-XEON IS
WELL BUILT AND
WELL SPECIFIED**





Winning formula

Choosing **the ideal notebook** is no easy task. Should it be entry-level, ultra-portable or a desktop replacement? To make it easier for you to make the decision, we've summarised the main points of each type and tested four in each category.

Mobile computing, like mobile communications, has gone through a process of incredible miniaturisation, while at the same time functionality has massively expanded. What used to seem like great big heavy bricks can now be as thin and light as an actual paper notebook – well, maybe a hardbacked book. Nor are notebooks very far behind desktop PCs in terms of power and speed, although the notebook and the PC are still very different beasts.

What notebooks gain in portability, they lose in upgradeability and they are, relatively speaking, much more expensive than desktops. If you are going to be spending your hard-earned cash on a non-upgradeable notebook, you have to be sure you are buying not just the best but the right notebook for your needs.

Most notebook manufacturers now seem to assume there are three distinct types of notebook: desktop replacement, ultra-portable and entry-level. We have divided our reviews into these same three categories, looking at four notebooks in each category.

To help you make an informed decision we also have the full low-down on the best technology on offer and what to look for in the perfect notebook.

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Tested and reviewed by Adele Dyer and Paul Trueman.

Ratings

- ★★★★★ Buy while stocks last
- ★★★★ Great buy
- ★★★ Good buy
- ★★ Shop around
- ★ Not recommended

Notebook notes

Choices, choices, choices... If you want to work while on the move, you have some interesting decisions to make. You can take everything with you, from a credit card-sized REX card, through PDAs and on to notebooks with PII300 processors and 15in screens.

As attractive as some of the smaller devices are, if you need all the applications you use on your desktop, or are going to be making presentations, a notebook is your only option. While it may be tempting to replace your desktop with an all-singing, all-dancing notebook, do you really need to carry a big 'brick' around with you, or would you rather go for a tiny, slim, lightweight model? And can you really afford £3,000, or would you rather save your cash and go for a slightly

slower machine that will not break the bank? Even though

your new notebook may be a replacement for your desktop PC, you cannot expect it to behave in the same way. The first and most basic difference is in the processors. Intel has for many years produced mobile processors which have

Innovations in the mobile processor market are sometimes remarkable...

a different architecture from its desktop processors. These consume less power and typically run less hot than the desktop processors. They are also much smaller — a vital consideration when you think about the problems of stuffing a Pentium II into a notebook.

However, until recently, the various means of attaching the processor to the motherboard usually involved soldering the chip onto the board using TCP (tape carrier package). For smaller vendors this meant buying chassis in

bulk with motherboards and their chips already included, which carried a risk of remaining unsold if not enough customers wanted that speed of processor. So, many notebook manufacturers opted to use Socket 7 desktop processors. Desktop processors generate high heat levels, which shortens the life of the processor, and other



▲ INTEL'S MOBILE PENTIUM II PROCESSOR, CURRENTLY AVAILABLE AT A MAXIMUM SPEED OF 366MHZ

components can be damaged if there is insufficient heat dissipation. Their high power consumption means shortened battery life, which is not good news if you are going to be using the notebook away from power sources — on the train, for example. ➤

Choosing an entry-level notebook

While you can now get an entry-level PC with a reasonable specification for around £500, the same cannot be said of notebooks.

Entry-level notebooks fall into two broad categories: those aimed at corporate organisations which need to kit out large numbers of people with notebooks, and the first-time notebook buyer who does not necessarily know a great deal about PCs and needs a cheap deal. In either case, ultra-portability is

not a huge issue, nor is a great deal of power. Provided it can run basic applications, make presentations and be lugged around, a notebook with a significantly lower-powered processor is not such a bad idea, since it is less draining on the battery.

If you are buying notebooks for your workforce, some manageability features will make it easy to keep track of the notebook, its components and the software installation.

When connected to your business network, you'll be able to run a variety of checks on the notebook. These would immediately reveal whether, say, any RAM had been removed. Or, if the notebook itself is stolen, you can add features which will prevent it from being used by anyone who does not have the correct password. These go far beyond the normal Windows and BIOS passwords although not all are as thief-proof as they

could be. However, by far the most popular manageability features combat problems such as, if your employee decides to delete a few system files, the fault can be picked up and rectified over the network.

If you can bear the additional network traffic, you can run all these checks over the network whenever the notebook logs on, whether it is over the LAN (local area network) or from a remote location.

With the demise of Socket 7, new processors and new ways of attaching processors to motherboards have been developed. The first of these came with the Mobile 233MMX, which not only used a smaller die size and smaller micron process but was also the first processor to come on a mobile module — a card containing the processor, the chipset and the L2 cache. The idea is that it can be slotted in and out, although to do so still takes a lot more engineering than when jamming in a desktop processor.

The new breed

While mobile modules are still around, the new breed of processors — notably the PII, and the Celerons just announced by Intel — also come in two new packages. The first is the Mobile Mini Cartridge, a tiny package containing just the processor. However, for even smaller machines such as the new generation of thin and light notebooks, there is the BGA (ball grid array) package.

As the name suggests, this uses ball bearings to connect it to the motherboard and can be slipped in easily; at the same time, the connectivity with the motherboard is excellent. The BGA processors are 98 percent smaller than the PII desktop in its SECC (single edge contact cartridge), but anyone who has ever prised the plastic coating off the SECC will see that the processor itself is

like most consumer goods: very small compared to the size of the packaging.

Innovations in the mobile-processor market are sometimes remarkable, but they do take quite a while to come around. This is not so surprising when you consider the number of desktop systems compared to the number of notebooks sold each year. Current Mobile PII processors run at a top speed of 366MHz, and Intel has just announced Mobile Celerons running at 266 and 300MHz.

The PIIs are the most different from their desktop equivalents. Rather than having the L2 cache in the SECC, Intel has put the 256Kb of L2 cache on-die and it runs at the same core speed of the processor. Since the Pentium Pro, Intel has not put L2 cache on-die as it is an expensive operation. Intel admits the on-die cache will run faster than the 512Kb on the PII SECC, which runs at

More notebooks are physically damaged than develop hardware faults

half the core speed of the processor. The shrunken Celeron also has 128Kb of L2 cache on-die, running, as it does in the desktop version, at the core speed of the processor.

However, shrinking the size of the

processors is as nothing compared to the difficult task of lowering the power consumption while increasing the clock speed. Desktop PII processors have a core voltage of 2.2v, while the Mobile PII has a core voltage of 1.6v.

You will have noticed, though, a decided lag between the announcements of higher-speed desktop processors and their mobile equivalents. While Katmai is due to hit a machine near you next month [look out for a round-up in the next issue of PCW] the mobile version, codenamed Coppermine, with its new instructions and 100MHz front-side bus, will not be available until the second half of this year.

Power play

Today, Intel does not have the market to itself. AMD has a mobile version of the K6 processor. Essentially, this is exactly the same as the desktop chip, although each processor goes through more stringent power testing when it comes off the conveyor belt. Because the processor takes so much power, it makes sense to have some kind of power management, so as to preserve battery life.

As a response to the problem, Toshiba created ACPI (advanced component and power interface) which specifies how the OS, motherboard hardware and peripherals talk to each other about power usage.

Choosing an ultra-portable notebook

It is a fine line between choosing an ultra-portable notebook and a CE machine. Both are relatively small and light and have basic applications like Word and Excel. The evangelists would have you think that CE is going to change the future of computing, getting rid of bloatware once and for all.

But if you believe the sceptics, CE is a spent force before it gets going, with numerous inherent problems including the fact that because it uses solid state memory, any updates or applications you load necessitate you having to flash the ROM.

If you want a small, light, device but cannot live without a full version of Windows and all the applications that run on it, then there are some wonderful options out there. You only have to look at the machines we have reviewed in our 'ultra-portable' section [p183] to quickly realise they are very, very sexy.

You should remember that certain sacrifices will have to be made. For example, the chances are you are not going to get a floppy drive in a notebook this small, but when you are out on the road, do you really need this?

And the same goes for a CD-ROM drive. If you can trade-off these drives against the extra weight they require, you are doing well. Console yourself with the thought that devices like CD-ROM drives are real power-gobblers without ACPI.

You will also probably have to live with a smaller screen than on a desktop replacement notebook, but this is only really a problem if you are going to be doing presentations and need several people to be able to see the screen. In general, though, thin notebooks can suffer from poor connectivity.

Make sure you will only need one Type II PC Card slot, for instance; if you use a large Type III network PC Card, think again. You should also make sure a port replicator is available if you want to use the notebook at your desk.

You can expect to see many more small and light notebooks in the future, especially utilising such things as the new IBM SmartDisk, a tiny hard disk about the size of a CompactFlash card with a capacity of 340Mb at present, although this could grow to around 1Gb.

Using ACPI, the operating system should control the power supplied to peripherals, rather than depending on the BIOS to detect when peripherals have not been used for a while and so shut them down, although the BIOS is still needed to do the actual switching on and off.

ACPI is implemented in Windows 98, although only in a limited way. Compare the Windows power management utility in Control Panel to that on a Toshiba or IBM notebook, for instance, and the difference is staggering. It is worth checking out the power management on the notebook you intend to buy before you part with your cash.

Smart batteries

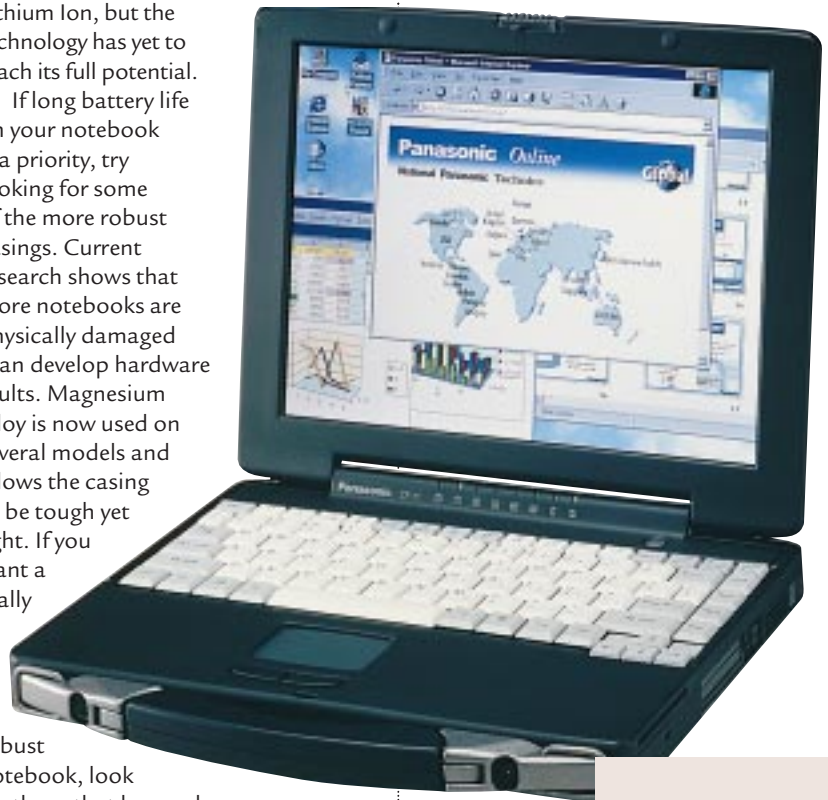
ACPI also utilises the Smart Battery System developed jointly between Intel and Duracell, which gives more accurate battery readings and allows the battery to take control of charging, so prolonging the life of the battery. Yet any power management is only a good idea so long as you have a good battery to start with. While mobile devices have got smaller and lighter, batteries have not exactly come on in leaps and bounds.

There is a new technology, known as Lithium Polymer, which in due time is intended as a replacement for Lithium Ion. At the moment, the general consensus is that it does not give much longer life and is more expensive than

Lithium Ion, but the technology has yet to reach its full potential.

If long battery life on your notebook is a priority, try looking for some of the more robust casings. Current research shows that more notebooks are physically damaged than develop hardware faults. Magnesium alloy is now used on several models and allows the casing to be tough yet light. If you want a really

robust notebook, look for those that have gel surrounding the components most likely to be damaged, such as the hard disk. Gel at the corners of the notebook is also a good idea, although rubber coating is definitely not. Rubber jackets simply make the notebook bounce more, meaning it hits the ground hard more times, thus increasing the risk of damage.



▲ FOR RUGGED LOOKS AND DURABILITY, THE PANASONIC TOUGHBOOK TAKES SOME BEATING [SEE REVIEW, P184]

Choosing a notebook as a desktop replacement

For the power user, a notebook must have all the functionality of a desktop but in a portable form. So, you can have the brute force power of a good processor and lots of RAM, a huge hard disk, floppy drive, CD-ROM, a large screen and good sound. But there are pay-offs. Weight is the most obvious: do you really want to carry a 9lb brick around with you? Battery life is another.

If you are the type of user who needs to replace a desktop but for whom portability is not a great issue,

then this kind of notebook is for you. But if you are only likely to move the notebook from your office to a meeting room and back again, or at worst, from the office into the car and then into your study at home, then weight will not be a consideration. Nor will battery life, as you are unlikely to ever be very far from an electric socket. Alternatively, if presentations are your game, you may have to end up with a desktop replacement just to get the larger screen and better sound quality these notebooks typically offer. If your company works

exclusively on NT, you may be forced, at least until the launch of Windows 2000 later this year, to use a desktop replacement notebook. Many notebooks will have the 'Designed for Windows 98 and Windows NT' stickers on them but few have the staying power to run NT effectively, apart from at the very high end.

If your company demands that you get on the network quickly, then these notebooks are the best equipped for the job. Typically, desktop replacements come with

better docking solutions, often with room for a network interface card.

In our reviews of desktop-replacement notebooks [p184] we were looking for the best all-round solution. Portability was not as big an issue as was the need for every part of a desktop to be present in the notebook. We were also looking for good-quality components. But most of all we were looking for durability. After all, if you are going to spend around £3,000 on a notebook, it has to be likely to last the course.

Entry Level

AJP 1100M



AJP, in common with other manufacturers, buys stock from Asian manufacturers and reconfigures and re-brands it, and the 1100M bears the tell-tale signs. For instance, we couldn't work out why the slots for the two Type II PC Cards (or one Type III) are buried almost one inch inside the case. It was difficult to slot some cards

in and we needed tweezers to subsequently remove them. We were also puzzled by the TFT panel hinges. One was moulded into the body of the notebook, the other wasn't. The overall appearance wasn't pretty. Not that aesthetic appearance is everything, but if you're spending this kind of money, at least you want it to look worth the expense. What you lose in build quality, though, is made up for in the spec. The 1100M uses Intel's PIII266 in combination with a generous 64Mb of SDRAM, and this was one of the few entry-level notebooks to carry 4Mb of graphics VRAM. But the chip in question was the 2D S3 Virge, so while it handles office apps well, don't necessarily expect rich multimedia at your fingertips.

PCW DETAILS

Price £1,350.08 (£1,149 ex VAT)
Contact AJP 0181 208 9744
www.ajp.co.uk
Good Points Pretty good specifications for an entry-level unit.
Bad Points Attention to appearance.
Conclusion Makes up in power what it lacks in appearance

Build Quality ★★★★★
Value for Money ★★★★★

COMPAQ Armada 1700



Armada is an apt name for this battleship of a machine with matt black styling. There are three models within the 1700 range, from the PIII233 to the PIII300 in the model we looked at, and the 6300T. It was felt that for the price, users deserved more video memory than the 2Mb of VRAM with the Chips &

Technologies 65555 graphics chip. Compaq has a bewildering range of notebooks on offer, and while the 1700 is better kitted-out than the 1500, it is still entry-level. With slots for two Type II cards though, once you have shelled out for a PC Card modem, the 1700 represents a pretty complete package. We were particularly impressed by the excellent speakers on this notebook, giving a clear, sharp sound through the Premiersound system. Weighing in at 3.78kg, this is a thick notebook that you'd be conscious of lugging around. But once you sit down to type, you'll soon be won over. The 1700 has an excellent keyboard with nice touches like the four hot-keys that can be programmed to launch oft-used applications.

PCW DETAILS

Price £2,462.63 (£2,095 ex VAT)
Contact Compaq 0845 2704040
www.compaq.com
Good Points Very speedy processor.
Bad Points One of the heavier models.
Conclusion A sturdy, well-equipped notebook.

Build Quality ★★★★★
Value for Money ★★★★★

GATEWAY Solo 2500 S5-233



Gateway has been selling notebooks in the past few years only, realising it was missing out by not providing a full product range. However, Gateway is selling its notebooks in the same way as Dell and Compaq, which buy-in machines from Taiwanese manufacturers. And, it is

able to specify these machines with options not available to smaller resellers. However, the fact remains that unlike companies such as Toshiba, Sony and Sharp, Gateway does *not* make its own notebooks. In this entry-level machine, this buy-in approach shows through.

The Solo 2500 may hit all the right notes from the spec-sheet point of view — having two USB ports, floppy, CD, TV-out, sound and most of the other sockets you might expect in addition to the basic spec of 12.1in screen, P233 MMX, 64Mb RAM — but its build quality lets it down. There is a large bezel around the screen yet it still flexes easily; the display is also a little uneven in its luminosity. The glidepad had a nasty habit of drifting when we tried to click on an object, and the hard drive on our model clattered alarmingly.

PCW DETAILS

Price £1,267.83 (£1,079 ex VAT)
Contact Gateway 0800 172000
www.gateway.com/uk
Good Points TV-out port.
Bad Points Screen. Casing. Glidepad. Hard drive.
Conclusion Looks good on paper, but disappoints in the flesh.

Build Quality ★★★
Value for Money ★★★

PICO Consul



Don't be fooled — this notebook does not have a magnesium chassis, it is just silver-coloured plastic. The colour is almost the most remarkable thing about this machine. Its glidepad is a little 'sticky' but not impossible to use. The mouse buttons have an annoying click and

the keys on the keyboard tend to allow too much sideways movement, but neither of these are uncommon complaints in a notebook. And, its performance scores were just as one would expect from the specification. Nevertheless, many things about this machine put it slightly ahead of the crowd. The floppy and CD-ROM drives both fit into the notebook at once, so you don't have to swap drives, and the 13.3in screen running at a resolution of 1024 x 768 in 16-bit colour is good, with even luminosity. All the ports are shielded by lids to stop them getting clogged with dirt and the hard disk is an impressive 6Gb. The Consul is bundled with a 56K PC Card modem, GSM-ready, although be aware that not all PC Card modems work with all phones and compatibility with your mobile is not assured.

PCW DETAILS

Price £1,526.33 (£1,299 ex VAT)
Contact Pico Direct 01483 402111
www.picodirect.co.uk
Good Points Bundled PC Card modem.
Bad Points Runs quite hot.
Conclusion Very average rebadged notebook.

Build Quality ★★★
Value for Money ★★★

Ultra Portable



ACER TravelMate 312T



With the arrival of sub-notebooks running the latest generation of Windows CE, it is unusual to find one which uses Windows 95. The Acer looks as if it should be powered by a StrongArm processor, not a Pentium running at 233MHz with a 3Gb hard drive. We were impressed with the TravelMate's functionality in view of its size. At 36mm deep, the TravelMate is the same depth as a conventional notebook which means there is a lot more room inside than you might think. There is a 56K internal modem, room for two Type II PC Cards and no need for a port replicator. Ultra-portables such as the Vaio (*below*) need a plug-in replicator so you can attach to parallel, serial and other ports, whereas the TravelMate is thick enough for all those connections at the rear. Its keyboard does suffer from the cut-down size though, with the keys slightly too small and bunched together to enable easy typing. This review was typed on the keyboard, mainly using this reviewer's fingernail tips, and while it works quite well to make short notes, it could grow tiring to hunch over the keyboard for long stints.

PCW DETAILS

Price £1,408.83 (£1,199 ex VAT)
Contact Acer 01753 487000
www.acer.co.uk
Good Points CD-ROM. Floppy. Internal modem.
Bad Points Size restrictions can make typing tiresome.
Conclusion An excellent miniature package.

Build Quality	★★★★
Value for Money	★★★★

SHARP PC-A150 UltraLite



Sharp is good at producing highly desirable, well thought out and well built sub-notebooks. The UltraLite is small and light and seems remarkably robust. Its tough magnesium casing, which covers the entire notebook, not just the screen, looks as if it is going to protect it from some serious knocks. Other aspects show attention to detail. The VGA and USB ports have little rubber covers to keep the dirt out and the external floppy drive has one serial, one parallel and one VGA port on the back, so acting as a sort of mini docking station all of its own. Everything about the UltraLite screams good quality. Sharp is the world's largest manufacturer of LCD screens, so it isn't surprising that this notebook's screen is the best we saw in this group test: sharp, bright and with even luminosity. It even has effective brightness controls, unlike most other notebooks. Equally, the keyboard is one of the best in this test. It has little travel, as you would expect from a notebook this thin, but it does have a good, firm touch without the tilting you get on some notebook keyboards.

PCW DETAILS

Price £2,109.13 (£1,795 ex VAT)
Contact Sharp 0800 262958
www.sharp.co.jp
Good Points Good results for the specification.
Bad Points Low spec compared to other notebooks in this category.
Conclusion Well thought out. Very desirable.

Build Quality	★★★★
Value for Money	★★★★

SONY Vaio 505G



If you are solely after portability in your notebook, you should consider the Vaio 505. Impossibly slender, and gorgeous to look at with its lilac magnesium finish, the 505 will definitely win admiration from your workmates. With its skinny form factor and excellent 10.1in TFT screen, weighing only 1.35kg, Sony claims the 505 will give you 2.5 hours of battery life. The 505 has a depth of only 208mm but there isn't room for serial, parallel or PS/2 connections. Designers have cleverly protected the ports for floppy and port replicator with rubber covers but this is another notebook that assumes most software still loads from floppy disks — a CD-ROM drive is not standard. The Vaio takes a Type II PC Card in its single slot to connect to the external CD drive but the basic package does include a ComOne 56K PC Card modem for internet connectivity. You will end up with a rather more space-consuming machine when you do need to load software and surf the net, but for working solely on a notebook while on the move, an ultra-portable doesn't get much better than this.

PCW DETAILS

Price £2,301.83 (£1959 ex VAT)
Contact Sony 0870 2402408
www.sony.com
Good Points Excellent form factor. Internet connectivity offered as standard.
Bad Points Plugging in all the necessary drives can prove tiresome — it's the price you pay for portability
Conclusion It's lilac, light and lovely.

Build Quality	★★★★
Value for Money	★★★★

TOSHIBA Portege 7010CT



Toshiba prides itself on innovation through its large manufacturing base. Toshiba is keen to stress the business angle of its Portege range, particularly the larger 7010 we looked at. Its build quality is excellent, with easy access to sometimes fiddly components like the PC Card slots. As you would expect from a Toshiba PC, given that it helped design the open standard, the 7010 offers ACPI power management through the Windows 98 OS. The battery pack is fixed at the rear of the notebook, with the port replicator — with parallel, serial and PS2 ports — and floppy-drive connections at the left-hand side of the notebook, with the cooling vents for the PIII300 processor on the other side. Only the floppy drive and the replicator are standard, which essentially means that any remotely serious user will need to invest in the DVD-ROM docking station or save pennies by opting for a CD-ROM extension PC Card. Rather than a touchpad, the designers have used the Mousepoint in the middle of the keyboard, which uses pressure to direct the cursor.

PCW DETAILS

Price £2,931.63 (£2,495 ex VAT)
Contact Toshiba 01932 841600
www.toshiba.com
Good Points Well built. Gorgeous to look at.
Bad Points A CD-ROM as standard would suit the serious user.
Conclusion A slim, functional notebook ideal for the image-conscious businessperson.

Build Quality	★★★★
Value for Money	★★★★

ACI Olympian II



The Olympian II purports to offer a bewildering range of functionality but a closer look proved disappointing. One of the heaviest notebooks we reviewed here, it comes with a second battery which attaches beneath the notebook, acting as a stand to angle the keyboard. The keyboard

was impressive but there were other parts of the casing that seemed less well designed. The parallel, serial and other ports are at the rear, protected by a flimsy plastic cover, with another, separate, inset plastic cover over the replicator port. We were in for a surprise with the DVD-ROM drive built in to the Olympian, over the floppy drive. It recognised the DVD films we ran yet there seemed to be a conflict with the Mediomatics software showing the films: we could hear them but we could see only a scrambled image. The TFT screen on our test model proved unstable. Whenever the notebook was moved, there was flickering all over the screen. We assumed this was due to faulty transistors that were unable to sustain the signals to the liquid crystal on the model we tested.

PCW DETAILS

Price £2,583.83 (£2,199 ex VAT)

Contact ACI 0181 3571116
www.aciweb.co.uk

Good Points Extra battery as standard. Large hard drive.

Bad Points Faulty DVD and suspect TFT screen on our test model.

Conclusion Disappointing, despite the hardware on offer.

Build Quality ★★
Value for Money ★★

DELL Inspiron 7000



The first thing that strikes you about the Inspiron 7000 is the lid. It is larger than the notebook beneath so it juts out over the machine's base. The reason is immediately apparent when you lift the lid — the screen is a whopping 15 inches. While this does not seem enormous compared to a 14.1in screen, it is the equivalent to moving from a 15in to a 17in CRT monitor. The Dell ran at only 1024 x 768 but this is acceptable at this screen size especially on a good, even display like this one. The display was driven by an ATI 3D Rage LT Pro graphics chipset. While this notebook is a 'brick' like the IBM (*below*) it does score some brownie points.

The floppy drive and CD-ROM drive, one on top of the other, are in a single bay so you don't need to swap drives. And, while it doesn't have an internal modem, it does have a Psion Dacom Gold Card incorporating a 56K modem, GSM and ISDN. The Inspiron does not have power management software beyond the limited power management offered in Windows 98.

PCW DETAILS

Price £2,348.83 (£1,999 ex VAT)

Contact Dell 0870 907 5664
www.dell.com/uk

Good Points Huge screen.

Bad Points Glidepad is over-sensitive.

Conclusion A solid all-rounder boasting the best performance in this group test.

Build Quality ★★★
Value for Money ★★★

IBM ThinkPad 770



On first look it is easy to dismiss this notebook. It is a huge brick of a machine: thick, chunky and almost the size of the desktop it will be replacing; yet it still cannot accommodate a floppy and a CD/DVD drive together. An external floppy can either be attached to a port on the

notebook or swapped with the DVD drive. Interestingly, IBM also has a second line of desktop-replacement ThinkPads which are a great deal thinner — is this the way IBM means to go in future? You might also be wary of the number of utilities which automatically start when you boot up the machine; — ten in all, not including IE4. Amongst these utilities are some rare gems. The power management utility, for instance, offers you a full implementation of ACPI, with settings for CD-ROM, CPU and PCI power. There is also call management software so the internal modem can be used as an answerphone, as well as a plethora of other useful utilities. The screen on this notebook has to be seen to be believed. It is only 13.7in diagonally yet runs at an incredible resolution of 1280 x 1024. Although this may seem like overkill, it is nevertheless a very good screen and is pin sharp.

PCW DETAILS

Price £3,795.25 (£3,230 ex VAT)

Contact IBM 0870 601 0136
www.uk.ibm.com

Good Points High-res screen. High spec. DVD.

Bad Points Swappable floppy.

Conclusion A well-built brick.

Build Quality ★★★★★
Value for Money ★★★

PANASONIC Toughbook CF-71



Gone are the days of nasty-looking black chunks of plastic as the only option for the potential notebook buyer. The handle attached to this case could have looked rather clunky but instead it is an aesthetic winner. We were impressed by the high quality of the

Toughbook's design. We dropped it from the regulation 30cm, causing no apparent damage — the hard drive is encased in protective gel. Of course, a 30cm drop zone isn't really going to be applicable in a practical environment: it needs to be at least twice that in case you drop it while walking. The swappable drive lock was impressively robust, quick and easy to use, and the multimedia pocket can take CD-ROM, floppy and Superdisk drives. The PII266 mobile processor gets fairly hot after a few hours' use, dissipated through the underside of the case. The keyboard was one of the best we saw in this test although the same could not be said of the touchpad. It required a heavy touch before it responded, and the double tap that replaces a double click needed to be more of a thump.



PCW DETAILS

Price £2,701.32 (£2,299 ex VAT)

Contact Panasonic 0800 444220
www.panasonic.co.uk

Good Points Durability. Ease of use.

Bad Points The touchpad proved too 'tough'.

Conclusion A eye-catching package.

Build Quality ★★★★★
Value for Money ★★★★★

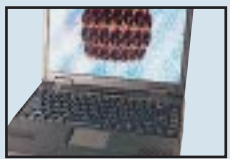
Table of features



ENTRY LEVEL				
MANUFACTURER - MODEL	AJP 1100M	COMPAQ ARMADA 1700	GATEWAY SOLO 2500 S5-233	PICO CONSUL
Price ex. VAT	£1,149	£2,095	£1,079	£1,299
Tel	0181 208 9744	0845 270 4040	0800 172000	01483 402111
URL	www.ajp.co.uk	www.compaq.com	www.gateway.com/uk	www.picodirect.co.uk
Processor and RAM	PII266 / 64Mb SDRAM	PII300 / 32Mb SDRAM	P233MMX / 32Mb SDRAM	P233MMX / 64Mb SDRAM
Graphics manufacturer	S3 Virge	Chips & Technologies	NeoMagic	S3
Graphics chip	MX	P6555 PCI	128-bit	Virge
Graphics RAM	4Mb VRAM	2Mb VRAM	2Mb VRAM	4Mb VRAM
Screen size / type	13.3in / TFT	14.1in / TFT	12.1in / TFT	13.3in / TFT
Max screen resolution	1024 x 768	1024 x 768	800 x 600	1024 x 768
Hard disk size	3Gb	5Gb	2Gb	6.4Gb
Battery type / claimed life	Lithium Ion / 2-3.5hrs	Lithium Ion / 2.5hrs	Lithium Ion / 2.5hrs	NiMH / 2hrs
Weight inc. battery	3kg	3.78kg	3.1kg	3.3kg



ULTRA PORTABLES				
MANUFACTURER - MODEL	ACER TRAVELMATE 312T	SHARP PC-A150	SONY VAIO 505G	TOSHIBA PORTEGE 7010CT
Price ex. VAT	£1,199	£1,795	£1,959	£2,495
Tel	01753 487000	0800 262958	0870 240 2408	01932 841600
URL	www.acer.co.uk	www.sharp.co.jp	www.sony.com	www.toshiba.co.uk
Processor and RAM	P233MMX / 32Mb SDRAM	P233MMX / 64Mb SDRAM	PII266 / 32Mb SDRAM	PII300 / 32Mb SDRAM
Graphics manufacturer	NeoMagic	NeoMagic	NeoMagic	NeoMagic
Graphics chip	MagicGraph 128ZV+	128-bit	Magicgraph 128DX	MagicMedia
Graphics RAM	1Mb SGRAM	2Mb VRAM	2.5Mb SGRAM	2.5Mb SVRAM
Screen size / type	8.4in / TFT	11.3in / TFT	10.4in / TFT	12.1in / TFT
Max screen resolution	800 x 600	800 x 600	800 x 600	800 x 600
Hard disk size	3.2Gb	4.3Gb	4.3Gb	4.3Gb
Battery type / claimed life	Lithium Ion / 2.5hrs	Lithium Ion / 2.5hrs	Lithium Ion / 2.5hrs	Lithium Ion / 2.5hrs
Weight inc. battery	1.2kg	1.4kg	1.35kg	1.9kg



DESKTOP REPLACEMENT				
MANUFACTURER - MODEL	ACI OLYMPIAN II	DELL INSPIRON 7000	IBM THINKPAD 770	PANASONIC TOUGHBOOK CF71
Price ex. VAT	£2,199	£1,999	£3,230	£2,299
Tel	0181 357 1116	0870 907 5664	0870 601 0136	0800 444220
URL	www.aciweb.co.uk	www.dell.com/uk	www.uk.ibm.com	www.panasonic.co.uk
Processor and RAM	PII300 / 64Mb SDRAM	PII300 / 128Mb SDRAM	PII300 / 128Mb SDRAM	PII 266 / 32Mb SDRAM
Graphics manufacturer	ATi	ATi	Trident	NeoMagic
Graphics chip	3D Rage LT Pro	3D Rage LT Pro	CYBER9397	Magicgraph 128DX
Graphics RAM	4Mb SGRAM	4Mb VRAM	8Mb SGRAM	2Mb SGRAM
Screen size / type	13.8in / TFT	15in / TFT	13.7in / TFT	12.1in / TFT
Max screen resolution	1024 x 768	1024 x 768	1280 x 1024	800 x 600
Hard disk size	5.98Gb	6.4Gb	8.1Gb	4Gb
Battery type / claimed life	Lithium Ion / 3.5hrs	Lithium Ion / 3hrs	Lithium Ion / 3.5hrs	Lithium Ion / 2-3.5hrs
Weight inc. battery	3.7kg	4.04kg	3.53kg	2.9kg (not inc. handle)

Editor's Choice

There are two types of notebook vendor: those that design and build their own from scratch, and those that buy Taiwanese imports and rebadge them. The former are able to innovate and drive the market on to new areas. Not surprisingly, it was these manufacturers which produced the most impressive notebooks in this test. We have come up with a winner in each of our three notebook categories: entry level, desktop replacement and ultra-portable. Each winner earns itself an Editor's Choice award.

➔ **Choosing an entry-level notebook** was the most difficult decision. All the contenders in this category were much of a muchness, with little on price or performance to put between them. In the end, the award went to the **AJP 1100M** for providing a great deal of power with a PII266, 64Mb of RAM and 4Mb of video RAM, and all for a very reasonable price.

➔ **In the desktop replacement** category, the Editor's Choice is the **Panasonic ToughBook CF-71**. While it is not the fastest by a long chalk, having a slower processor and less RAM than the other contenders, its rugged design and practical styling applied to

▶ **OUR EDITOR'S CHOICES (FROM TOP):** THE **AJP 1100M**, THE **PANASONIC TOUGHBOOK CF71**, AND MOST IMPRESSIVE OF ALL, THE **SHARP PC-A150**

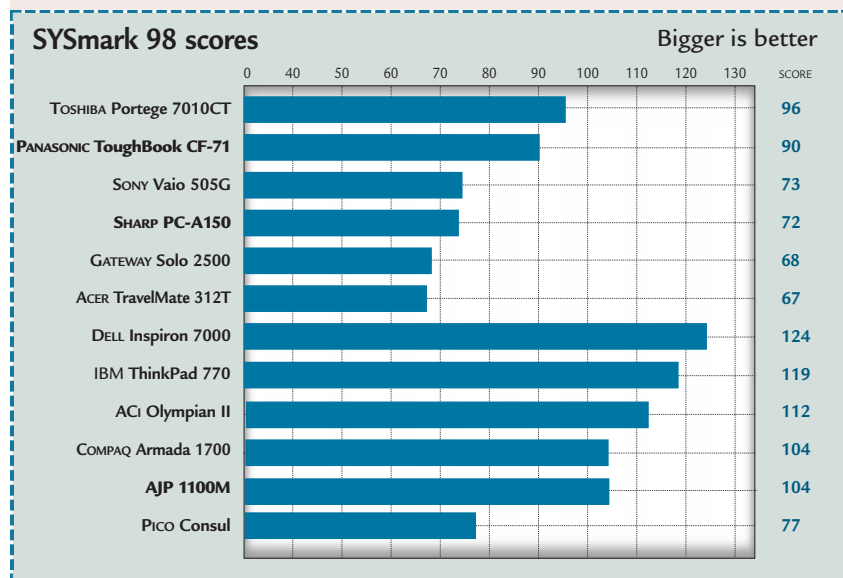
its carry-handle and magnesium-alloy casing made it both look the part and perform well.

➔ **The ultra-portables** were all very good. Any of them would provide a wonderful option for anyone who needs a light machine for general tasks. In the end we plumped for the **Sharp PC-A150** as the best option. Even though the Sony Vaio 505G was a very near winner, the Sharp won through thanks to its great price and performance as well as for the little extras such as the external floppy with extra ports built in.

Overall, taking all 12 notebooks into consideration, the most impressive one we tested was the **Sharp PC-A150** — a machine which is light and portable but which boasts sufficient power and a big enough screen to be used in presentations. Providing you do not ask too much of your notebook, it could even be used as a desktop replacement.



PCW Labs Report



The fastest three notebooks used PII 300MHz mobile processors and hail from our desktop replacement category. Their performance is similar to PII 300MHz desktops. Despite being an entry-level machine, Compaq's Armada 1700 scored highly due to its PII 300 processor. The Toshiba ultra-portable may also have boasted a PII 300 chip but its performance fell short of the RAM-packed desktop replacements. The Toughbook also fell short compared to the other desktop replacement machines due to its PII 266 processor and only 32Mb RAM, but its rugged design impressed us. The slowest notebooks in the test also featured the least powerful processors — typically P233 MMX chips in the ultra-portables, which score similarly to 266 Celeron desktop systems.





Spinning a web presence

No tangled web pages weaved here. Whether you're a home user with a free web page to fill, or you run a business and have to **maintain or build a web site**, here's a range of products to suit. And, there's a round-up of multimedia packages, too.

Be the creative type. This month we have rounded up the best in multimedia on pages 204 and 205, but elsewhere, as the medium of the moment, we have concentrated on web authoring.

If you have an email address, the chances are that your ISP will have thrown in a few megabytes of web space, too, so now there is nothing to stop you from having a web presence. All you need is the ideal web authoring package.

There is a bewildering array of choices aimed at everyone from the 'web master extraordinaire' to the web novice. Everybody's needs will differ, so we have divided the packages reviewed here into three specific categories.

First, we look at those aimed at users with a dedicated web server; the large businesses with equally large bandwidth which will need database integration, scripts and larger sites. The second category is small businesses in which a member of staff, although not necessarily a web professional, is keen to maintain a web presence. The third category is the home user, looking for a quick and easy way to create an impressive site while keeping an eye on cost. However, before you skip to the category you think would be the most applicable to you, cast your eye over the other sections because the selection is not as clear-cut as you may think. If you fancy tackling the task of building a site unaided, take a peek at our workshop on creating your pages from scratch (p216).

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• Reviewers: Nik Rawlinson and Panicos Georghiades

Large businesses

Large corporations often find themselves in the lucky (if expensive) situation of enjoying a dedicated web server and a leased line. While allowing employees direct and almost unlimited access to the internet, it also means that a web site can be hosted internally rather than on the third-party servers of an ISP. This gives the company's web site unlimited scope in terms of both size and content so that they can, for example, host FrontPage webs (although FrontPage is included in our Small Business category, opposite) which involves calling a number of server-based extensions not hosted by many ISPs.

One of the major uses of corporate sites is the re-publication, in electronic form, of company literature which can change frequently and will need to be updated on a regular basis. Producing clean, easy-to-amend code is therefore a must. While home users may be interested in incorporating impressive graphics and special effects at the same time as writing their content, this is likely to be a lower priority for the corporate user. A uniform look and feel is more likely to be produced using a dedicated graphics package such as PhotoShop and ImageReady from Adobe, or Fireworks from Macromedia. A corporate customer is thus more likely to need a simple means of implementing these 'third-party' images on their pages, and their requirements for web page design software are more often restricted to applying a theme or border set.

It is far more important for corporate sites than for home user sites that they are accessible to the widest possible audience. They are, after all, often seen as another means of revenue generation. Pages must therefore be compatible with a wide variety of browsers and not restricted merely to the most up-to-date versions. Furthermore, if the organisation wishes to sell through its site, it will need at least the ability to handle forms to return data, and, should it wish to track orders through the site, some form of database integration.

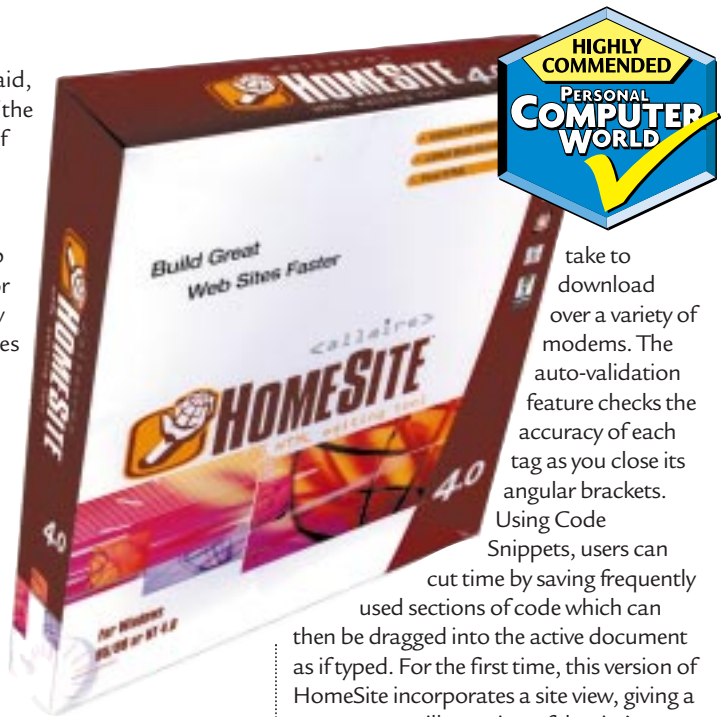
Allaire HomeSite 4

HomeSite offers users a 'pure HTML' code-based method for creating pages and the manufacturers maintain that the package is designed for those who know, or who are at least prepared to learn,

HTML. That said, it has much of the functionality of the primarily WYSIWYG packages. The drag-and-drop capabilities, for instance, allow links and images to be dropped into your document without the need to enter code, and this latest version of the software incorporates a 'design view' mode, allowing you to see how your page looks, as you create it.

Allaire says its interface is WYSIWYN (N standing for need) as users keep a constant eye on the code being produced. This makes working with tables easy for those who understand HTML, because the cursor can be positioned in precisely the right place to take advantage of font and alignment tags. However, this approach makes frame development far more complex than that offered by Adobe's

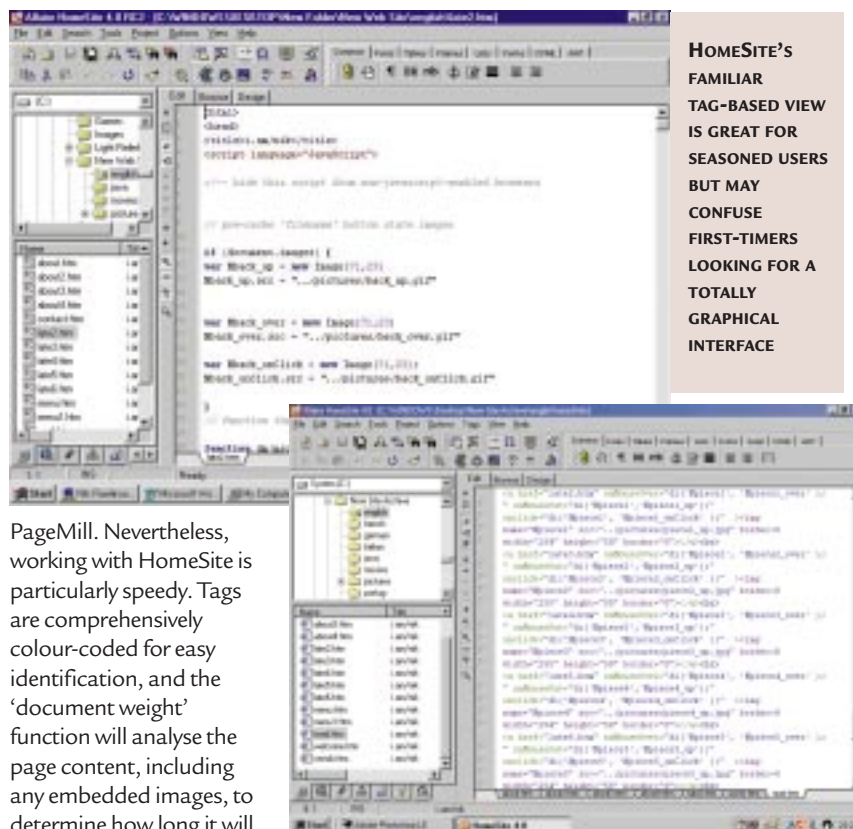
PageMill. Nevertheless, working with HomeSite is particularly speedy. Tags are comprehensively colour-coded for easy identification, and the 'document weight' function will analyse the page content, including any embedded images, to determine how long it will



take to download over a variety of modems. The auto-validation feature checks the accuracy of each tag as you close its angular brackets. Using Code Snippets, users can cut time by saving frequently used sections of code which can then be dragged into the active document as if typed. For the first time, this version of HomeSite incorporates a site view, giving a tree-structure illustration of the site's format. This works in conjunction with the integrated link validator and document weighting (download timing) features.

FileMaker HomePage 3

Not surprisingly, this package is tailored for publishing interactive FileMaker databases on the net. The Connection Assistant creates interactive forms designed to specifically suit databases compatible with FileMaker Pro 4.





One of the most user-friendly aspects of this package is its libraries of animations, bullets, banners and clipart that can be dragged and dropped into any web document. This dramatically decreases the amount of time spent sourcing page elements. Handling of tables was unsurpassed. Multiple cells can be selected simply by clicking in the top left cell of the selection and Shift-clicking in the opposite corner. One cell can also be merged into another after it has been selected, by dragging its corner out into the adjacent cells with which it should merge.

Once a frameset has been defined, further frames can be dragged out from the edges of the screen, as in PageMill. Users cannot edit the pages whilst in the frames themselves, though, and the package performs no automatic naming of the frames, which has to be done manually from the object properties dialogue.

SoftQuad HoTMetal Pro 5.0

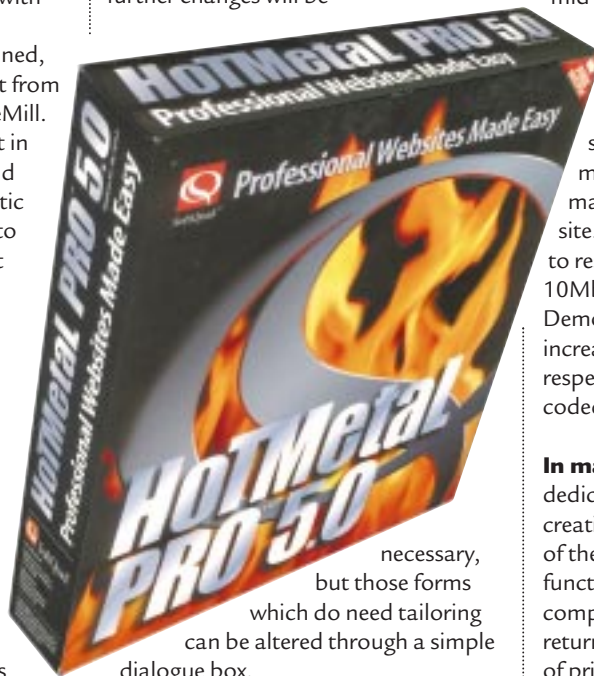
We were disappointed with HoTMetal's WYSIWYG mode. Although the HTML tags disappear, they are present in the form of invisible characters. This makes it difficult to accurately tell whether you are entering text before or after a font tag. In our trial, this soon became irritating as we had to keep repositioning our text. We also felt that tables were poorly handled; we could not select multiple adjacent cells in the table without selecting either the whole column, row or table.

This package will not allow users to

open HTML documents that do not exactly meet its strict requirements for conformity. While this is admirable in that it ensures your pages will be browser-compliant when completed, we found it irksome, to say the least, that it meant we could not load some pages created in other packages without accepting every one of HoTMetal's changes — reject a suggested change, and loading aborts.

Other types of validation are more useful. Any pages created or imported can be checked for spelling, accessibility (for users with a disability or text-only browsers) and for compliance with earlier versions of HTML.

Forms are handled well. Users simply select elements and drop them onto the page. The chances are that no further changes will be



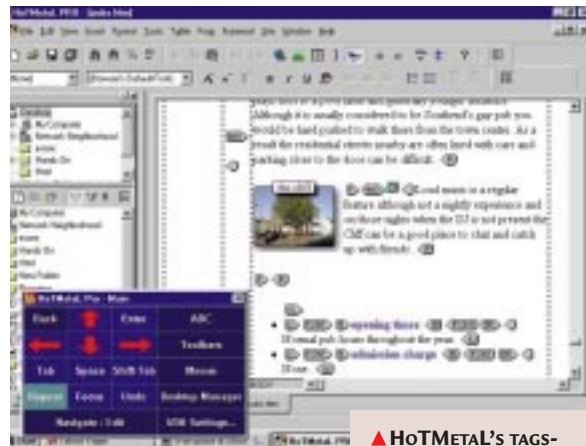
necessary, but those forms which do need tailoring can be altered through a simple dialogue box.

SoftQuad's HoTMetal Pro was able to import text from a wide range of packages, except we found that it was not as efficient as PageMill when handling Word documents. Although the general layout was preserved, some

of the coding, especially relating to colours, was stripped out.

Small businesses

The needs of a small-business user are not dissimilar to those of a large company, although there may be fundamental differences in the way the user accesses the net. Dedicated web



▲ HoTMetal's TAGS-ON VIEW IS GREAT FOR USERS WHO WANT TO COMBINE TRADITIONAL CODING WITH WYSIWYG

servers and leased lines are expensive luxuries and so many small- to

mid-sized organisations may find themselves using dialup networking and connecting to the net through an ISP. That same ISP will most likely also host their web site and so a number of restrictions may be placed on content. One such may be a restriction on the size of the site. It is not uncommon for many ISPs to restrict member web sites to just 10Mb or less, although the likes of Demon and Dircon have recently increased this to 15 and 20Mb, respectively. Sites must therefore be coded as leanly as possible.

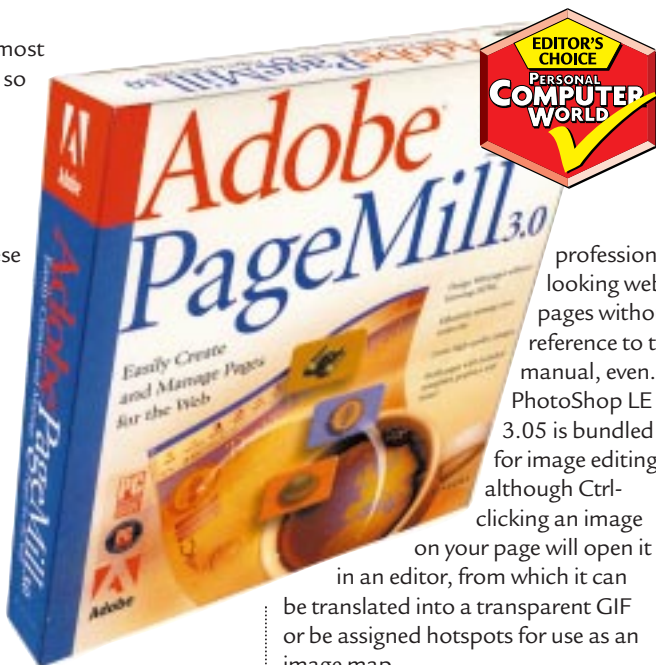
In many organisations there is no dedicated web author and so site creation is often handled by a member of the team with a different primary function. Ease of use and the ability to complete the job swiftly, and hence return to their main business, is therefore of primary importance. Well-structured code, although always important, may be a lesser priority for small businesses than large corporates due to the fact that the site will most likely be modified by only one or two users.

Customer feedback is of vital

importance to most companies and so the ability to handle forms should be a paramount requirement. Not only do these ensure that the information returned to the site administrator can be categorised, but they also offer an alternative for those users who do not have an email package associated with their browser, and for those accessing the internet in libraries or from public-access areas such as web cafés. Attaching such a form to a database, however, is not often a vital requirement for small-business users, although Microsoft FrontPage 2000 (p196) has excellent database-handling capabilities.

Adobe PageMill 3.0

No package could be more user-friendly than PageMill. Its extensive, intuitive interface means that first-time users will be able to generate impressive and



professional-looking web pages without reference to the manual, even. PhotoShop LE 3.05 is bundled for image editing, although Ctrl-clicking an image on your page will open it in an editor, from which it can be translated into a transparent GIF or be assigned hotspots for use as an image map.

Frames can be defined by dragging the boundaries into the screen from the edges of the active window. Right-clicking a link then brings up an iconic representation of the frameset, allowing users to click the frame in which the link should open. Word documents can be imported instantly and without a flaw.

Site elements are controlled by the 'Inspector', a context-sensitive dialogue box that even allows users to drag a bitmap onto it which will then be instantly tiled as the page wallpaper. Forms are generated at speed, and once a form element has been generated it can

be Ctrl-dragged to another location on the screen where an amendable replica will appear, dramatically reducing the amount of time spent on editing.

NetObjects Fusion 3.0

Fusion is fast. Each page is split into two distinct areas: the content layout, and the master border (the uniform design running throughout your pages). The master border theme

is entirely graphical, with each element being redrawn on-the-fly as the user adds further pages. Images are easy to handle. Defining the location will automatically launch the 'File open' dialogue and, once the image has been selected, Fusion will resize the frame to fit. Resizing the picture holder manually crops the image unless the 'stretch' option has been specifically activated. Text boxes will resize to exactly surround each stretch of text, allowing page elements to be



▲ **FUSION'S BORDERS ARE BUSINESSLIKE AND HIGHLY USABLE**

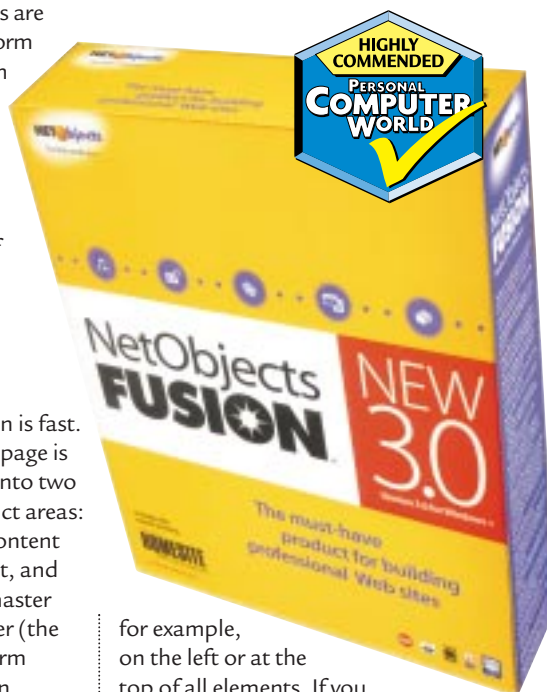
positioned precisely where they are needed. This extends to the constituent parts of a form.

Text areas, check boxes and radio buttons can be positioned with single-pixel accuracy. Multiple-form elements can be aligned along a common edge —



▲ **FRAMES CAN BE EASILY DRAGGED FROM THE EDGE OF THE SCREEN**

▶ **PAGEMILL'S INSPECTOR KEEPS A CLOSE EYE ON EVERY PAGE ATTRIBUTE**



for example, on the left or at the top of all elements. If you position two elements so that they overlap, Fusion will flag it as a problem if the cascading stylesheets and layers option (compatible only with the 4.x versions of Netscape and Explorer



▲ FUSION'S CONTEXT-SENSITIVE PROPERTIES DIALOG PUTS ALL YOUR CHANGES IN ONE PLACE

browsers) is not selected. A wide range of textual file types can be

imported, including RTF and Microsoft Word with the formatting retained. Pages cannot be saved individually because Fusion works on a 'whole site' basis with a 'save site' option instead. This ensures a fully working



site, even prior to completion. Most editing takes place through the context-sensitive 'properties' dialogue windows, keeping all necessary tools to hand. Similarly, the navigation toolbar is context-sensitive, changing to match the element on which the user is working.

Symantec Visual Page

VisualPage is less intuitive than many packages included in this group test, with extensive reliance on toolbars rather than context-sensitive dialogue boxes. Although tables must be created via an on-screen form rather than simply dragging across a drop-down illustration attached to the table button, it is

possible to select multiple cells simply by dragging across them with the clicked mouse — an impressive and useful feature.

We were disappointed that VisualPage maintains only a single level of 'undo', thus permanently committing everything but your most recent

amendment to the page. The copy-and-paste method of associating radio buttons is less intuitive than those packages which assume buttons are associated, unless told otherwise.

Spacer elements are far more evident in VisualPage than many other packages. Rather than having to define the size in a dialogue box, these elements' borders are dragged to size. Image-map creation was similarly impressive. Once anchor points have been defined within the document, generating a hotspot on a previously inserted image will launch a drop-down menu containing the previously defined anchors. The user need only select one of these, or enter the URL for an off-page location.

Although VisualPage impressed us by generating two pages when we selected a 'new frame set' (the second page being for users without a frame-compliant browser), we did not like the way that it made the assumption that we wanted our screen to be divided vertically. Should we instead wish a horizontal separation, we had to insert a horizontal division within one of the previously formed frames before deleting the unsplit vertical frame.

FrontPage 2000

Under wraps until the second quarter of 1999, Microsoft FrontPage 2000 builds on the success of the '98 edition but incorporates enhanced features for small-business users.

Themes are more business-like and more easily modified. Unlike in the previous version, it is no longer necessary

to install the Personal Web Server because pages can now be saved directly to the hard drive rather than to a virtual server sitting inside the PC. Similarly, the formerly unique 'Explorer' and 'Editor' modules have been merged, giving the package a far more unified feel.



▲ CREATING AN IMAGE MAP IS A BREEZE USING SYMANTEC'S VISUALPAGE

Daughter pages can be added simply by selecting the parent page and then hitting the insert key, speeding up the process of generating your initial site tree.

Other time-saving features include automatically appending Submit and Reset buttons to a form area the moment it is defined. At the same time, radio buttons are automatically associated unless the user specifies otherwise. If you tell FrontPage the browsers you would like to be able to display your pages, the incompatible menu options will then be 'greyed out'. Also, FrontPage can analyse pages





◀ **FRONTPAGE 2000 SEES THE EDITOR AND THE EXPLORER PARTS (LEFT AND RIGHT OF THE SCREEN, RESPECTIVELY) OF THE '98 EDITION COMBINED**

Web!

Although most of the products in this test have been split into subgroups, users in any of the named categories can nonetheless employ them all. Web!, however, is designed for and aimed almost solely at the home user who wants to produce a site with a bit of pizzazz. All output is written in HTML4 and DHTML, but as only Microsoft Internet Explorer 4 and above can currently interpret both of these standards, any pages created using Web! will not be seen at their best by Netscape users.

Web! uses a simplified toolbar in which every page element is represented by a single button. Placing text on the site is therefore a matter of clicking the text button, clicking on

coded elsewhere and use them as templates for the layout of all future pages, giving the underlying structure of your site a uniform format. The 'attribute painter', common in Word and Excel, now also allows the pasting of DHTML attributes.

A selection of wizards allows users to create specific site types (a corporate presence, for example) rather than just a blank site. FrontPage does not handle frames as well as some other packages in this category, most notably Adobe PageMill — a frameset must be initiated by selecting a frame template. Frames within that template can then be subdivided. Each frame is automatically named and contains three buttons: Set Initial Page, New Page and Help.

Of the three primary views, Normal, HTML and Preview, the Normal view is supplemented by a tags-on mode similar to that of HoTMetaL Pro 5. Hovering the mouse over one such tag reveals all attributes pertaining to that tag.

In testing FrontPage 2000, we could not help but feel that it exactly matched the needs of corporate users as defined in our outline above, indicating that while all of the products reviewed here could potentially be used by any web designer, the features of FrontPage 2000 make it particularly adept in more than one field.

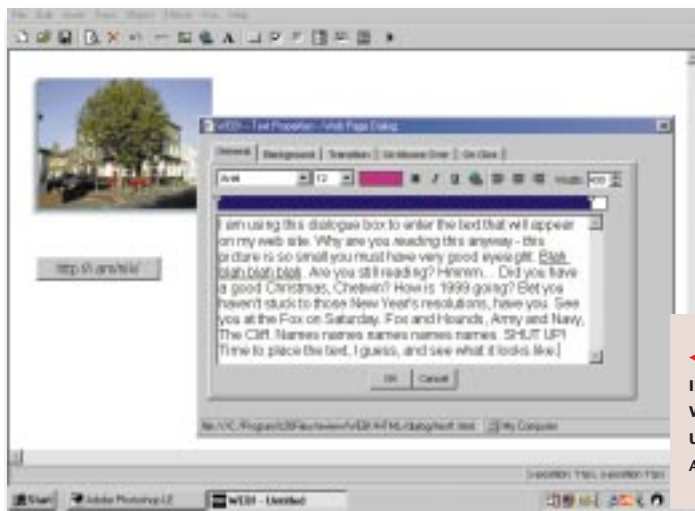
Home users

The majority of home users will be confining their design efforts to a personal or hobby-orientated web site.

Most will have had little or no experience of designing a site in the past and so may expect to be guided by the hand through the steps necessary to design and implement their creation. Bearing this in mind, any of the products reviewed in the above categories should suit their needs. However, anybody who has spent some amount of time using the internet will realise that many home users generate their site but then never update it. So, minimising the initial outlay and being able to create a professional impression with the minimum of fuss will be important considerations.



the page to position the text block and then entering the text in a dialogue box. Similar rules apply to all other page elements. While this allows items to be positioned with single pixel accuracy, it unfortunately also means that the



resulting HTML code becomes bloated and may be difficult to edit without referring it back to Web!

◀ **FORM-BASED INPUT MAKES WEB AUTHORIZING USING WEB! A BREEZE**

What's in a standard?

Not so long ago, all you needed to know about the web was that it used HTML. That's no longer the case. There's a large collection of standards: HTML, HTML 3.2, DHTML, CSS and XML are all things you'll hear bandied around. But what are they all, and why do they matter?

HTML is the foundation of the web as we know it today, and it's also responsible for many of the restrictions.

Because it's a markup language, it was only designed to say which parts of a document are paragraphs, lists, headings and so on. It's not intended to say 'use this font, in this size, and put the picture here on the page'. In the battle of the browsers that original distinction has been lost, but plenty of incompatibility has been introduced.

DHTML (Dynamic HTML) is a powerful way of making pages that can react when you click on different parts of them: moving different layers of information to the front, or revealing

menus, all without waiting for more data to download. You can even have scripts that will validate information on a form. The bad news is that you should avoid DHTML, at least for now: there are too many differences between the leading browsers so unless you want to write two versions of your site, stick

with other ways of enhancing the page.

If it's precise positioning, colour and formatting you want, **CSS (Cascading Style**

Sheets) is the tool to use. Just like style sheets in a word processor, these allow you to control the look of a document by changing the style definition in one place. Most modern browsers support CSS Level 1 to some degree, and Level 2 allows you to specify how a document should look on paper, or other

media, as well as on the screen.

The latest buzzword is **XML (Extensible Markup Language)**.

It's based on the same origins as HTML, the standard generalised markup language. With XML you can define how your documents look more easily than by using HTML. For instance, you can add your own tags and there are more flexible options for links. XML may not be popular yet, but in the future you'll find it gradually takes over as the choice for most new documents.

Right now, though, the best thing to do is to stick with plain HTML and avoid DHTML. If you want to use fonts and colours in your web pages, use CSS, but test it with different browsers.

NIGEL WHITFIELD

You should avoid DHTML, at least for now

▶ GO TO [HTTP://JIGSAW.W3.ORG/CSS-VALIDATOR/](http://jigsaw.w3.org/css-validator/) TO DOWNLOAD A CSS VALIDATOR



Is dropping a drag?

Modern web editing is easy, isn't it? Drag a picture and drop it on the page. Click at the side of the screen to create a new frame or press a button on the palette to add a form field. You really don't need to know what's happening underneath, do you?

Well, that's debatable. While drag-and-drop web editing can make it easy to put together a simple site, it's not always quite so straightforward when you want to add interaction to your pages. Of course, some programs provide 'web bots' and applets you can use, but they also sometimes neglect to tell you that the things you've added to your site will only work on certain servers.

There's no doubt that understanding the mechanics of HTML and scripting languages gives you more power and flexibility, just like the difference between speaking a language fluently or reading it from a phrase book.

Not everyone has the time to learn all the details, however, and as the web becomes more sophisticated, it will be easier to use components that other people have written to enhance your pages. Some editors, like HotMetaL,

already support adding Java applets, for example. Microsoft's extensions to

DHTML in Explorer 5 provide ways in which the behaviour of web pages can be governed by small scripts, and it's likely that libraries of those will appear on the web, along with ActiveX plug-ins and Java applets that you can re-use, simply changing a few options to suit your own site.

While using those types of tool will make it easier to drag-and-drop your site

together, you'll still be at the mercy of those who created the components you use — and you'll have to trust that they only do what they say. And with so many variations between browsers at the moment, sometimes the only way to be

really sure you get the effect you want is to manually tweak the HTML.

One day, you really will be able to drag-and-drop

to build a web site that works with every browser. But until the different players — chiefly Netscape and Microsoft — decide to keep to the standards instead of tweaking them, you'll really need to know the ins and outs of HTML and scripts to make sure you can create the best web site, whatever someone's using to look at it.

NIGEL WHITFIELD

You'll really need to know the ins and outs of HTML and scripts

What else do you need?

A web-authoring package is a great starting point: it saves you from having to code your site 'by hand' and do battle with HTML tags. For all but the most basic of sites though, users will need a variety of supplementary items.

Web space is available free of charge from a variety of locations around the net.

Xoom at <http://xoom.com> and **Tripod** at www.tripod.co.uk

are more than willing to offer you varying quantities of space at no charge. But to avoid being used as an advertising billboard by the service providers, both corporates and home users would be advised to invest in an account with one of the many ISPs currently serving the UK.

For just £10 per month (ex VAT) Demon Internet bundles 15Mb of web space with its email accounts. Compared to the size of today's hard drives this may seem rather stingy, but in reality it is more space than most users will ever manage to fill, even with a fairly impressive corporate presence.

For the user on a budget, each AOL screen name includes 2Mb of complimentary web space. With up to five screen names to each account, opting for AOL's low-usage option can be a cost-effective way of nabbing

yourself a 10Mb presence. An image-editing package is also an essential piece of kit in the web author's toolbox.

▼ **TROUBLE GETTING YOUR PAGES ON TO THE NET? TRY A SHAREWARE PACKAGE LIKE CuteFTP**

A text-only site may have been perfectly acceptable several years ago when most users ran text-based browsers, but these days, as faster modems and greater compression ratios have slashed download times to a tenth of what they

vector graphics and a simple set of instructions that tell the plug-in how to manipulate each part of the image, rather than simply redrawing it from scratch. This allows it to produce even full-screen animations yet still

retain small file sizes. The plug-in is only an 118Kb download that can automatically install directly from the Macromedia web site at www.macromedia.com, giving visitors to your site little excuse for not seeing it at its best.

To upload the completed pages to your web site you will



◀ **BANISH LONG SITE ADDRESSES WITH A FREE, MEMORABLE URL FROM <http://i.am/>**

once were, users have come to expect graphical page elements.

A shareware package such as **PaintShop Pro** (version 5 is on our cover CD) will suit most basic needs but for power users a dedicated package such as Macromedia's **Fireworks**, or ImageReady and ImageStyler from **Adobe**, will be

more suited to the task in hand. These packages specialise in minimising file sizes while simultaneously maintaining an acceptable level of image quality. They do this by reducing the image resolution, or carving it into blocks so that higher compression ratios can be applied to those parts that will be able to handle it. At the same time, they

generate spectacular effects with the minimum of fuss, taking the hassle out of generating JavaScript rollovers (images that change as the mouse is passed across them) or animated GIF files.

Macromedia is also the manufacturer of the hugely successful **Flash** animation package. Whereas animated GIF files are made up of a series of still images overlaid on top of each other, Flash animations are based around

need FTP (file transfer protocol) software. While many authoring packages have FTP capabilities built-in, some do not. One of the most versatile FTP packages on the market is **WS-FTP** from Ipswitch. Currently at Version 6, a free trial version can be downloaded from its web site at www.ipswitch.com.

A suitable alternative comes in the form of **CuteFTP** shareware. Like WS-FTP, a trial download is available from the associated web site at

www.cuteftp.com and offers one-click uploading or downloading of your selected files.

Your pages are not going to go very far without a modem. The winner of our Editor's Choice accolade in the modem group test in the December '98 issue of PCW was the **Diamond SupraExpress 56ePro**, chosen on account of its price and the fact that, in these times when the market is still somewhat split between K56flex and V.90 technology, this modem has the capability to handle both.

We'll end our list of 'other tools' on a freebie — a memorable address. If you have a long and difficult-to-remember email address, then hop on over to <http://i.am/> and grab yourself something memorable for free along the lines of i.am/yourname.

A shareware package will suit most basic needs

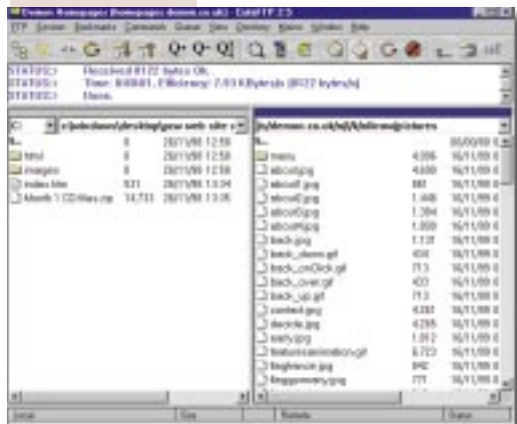


Table of features



PRODUCT	FRONTPAGE 2000 (BETA)	FUSION 3.0	HOMEPAGE 3.0	HOMEBSITE 4.0
MANUFACTURER	MICROSOFT	NETOBJECTS	FILEMAKER	ALLAIRE
Price (ex VAT)	Not yet available	£233.83	£69.99	£88.13
Telephone	0345 002000	01189 829822	0845 603 9100	01638 569600
Web site	www.microsoft.com	www.netobjects.com	www.filemaker.co.uk	www.allaire.com
Frame creation	✓	✓	✓	✓
Form creation	✓	✓	✓	✓
Link verification	✓	✓	✓	✓
Cascading style sheets	✓	✓	x	✓
DHTML tools	✓	✓	x	✓
Database integration	✓	✓	✓	✓
MS Word import	✓	x	x	x
MS Excel import	✓	x	x	x
Integrated FTP	✓	✓	✓	✓
Bundled image software	✓	x	x	x
WYSIWYG interface	✓	✓	✓	✓
Link capture from browser	✓	x	x	x
Ratings				
Features	★★★★★	★★★★	★★★	★★★
Ease of Use	★★★★	★★★★	★★★★	★★★
Documentation	n/a	★★★★★	★★★★	★★★★
Value for Money	★★★★	★★★	★★★	★★★★
Overall	★★★★	★★★★	★★★★	★★★★

Table of features

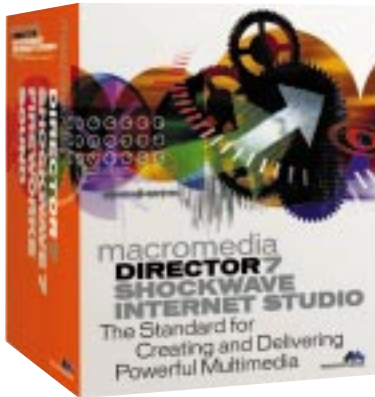


PRODUCT	HOTMETAL PRO 5.0	PAGEMILL 3.0	VISUAL PAGE	WEB!
MANUFACTURER	SOFTQUAD	ADOBE	SYMANTEC	NTM PUBLISHING
Price (ex VAT)	£116.33	£92.83	£81.08	£29.99
Telephone	0181 387 4110	0181 606 4000	0171 616 5600	0113 234 0444
Web site	www.softquad.co.uk	www.adobe.co.uk	www.symantec.co.uk	www.baboonshop.com
Frame creation	✓	✓	✓	x
Form creation	✓	✓	✓	✓
Link verification	✓	✓	✓	x
Cascading style sheets	✓	x	x	✓
DHTML tools	✓	✓	x	✓
Database integration	✓	x	x	x
MS Word import	✓	✓	x	x
MS Excel import	✓	✓	x	x
Integrated FTP	✓	✓	✓	✓
Bundled image software	✓	✓	x	x
WYSIWYG interface	✓	✓	✓	✓
Link capture from browser	x	x	x	x
Ratings				
Features	★★★★★	★★★★	★★★★	★★
Ease of Use	★★★	★★★★★	★★★★	★★★★
Documentation	★★★★	★★★★	★★★★	★★★
Value for Money	★★★★	★★★★	★★★★	★★★
Overall	★★★★	★★★★	★★★★	★★★

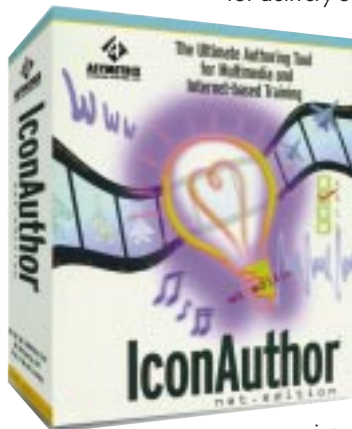
Multimedia authoring

You could be forgiven for thinking that with the rise of the web and the decline of CD-ROMs, multimedia authoring applications were a spent force. But while they have undergone a change in direction and are now more web-orientated, they still retain their original nature. They are able to produce feature-rich, fully-interactive programs no matter what the distribution medium. Here, we look at the four main contenders.

➔ **Macromedia Director** is the most widely known and used multimedia authoring tool for CD-ROMs. This major upgrade, Director 7 Shockwave



Internet Studio, has been redesigned to enable developers to build multimedia web sites. As its name implies, the playback applet Shockwave is part of the Internet Studio package and Macromedia has released version 7 to go with Director 7. Also bundled are Macromedia Fireworks for producing moving web graphics and Sonic Foundry's Sound Forge XP4 or BIAS Peak LE for sound editing. You also receive a multi-user server for creating distributed Shockwave applications such as multi-player games and online chat rooms. Director uses the movie analogy for creating multimedia, where events are placed in frames on a time-line. Sophisticated visual effects allow you to create TV-like presentations.



Director's HTML support includes links to all its media types (text, graphics, sound, video and animation), HTTP for media distribution, HTTPS for secure e-commerce transactions, XML for data exchange, CGI POST for two-way communication, and updated support for Java. You can also integrate and control other web technologies such as Flash, QuickTime 3, QTVR and animated GIFs.

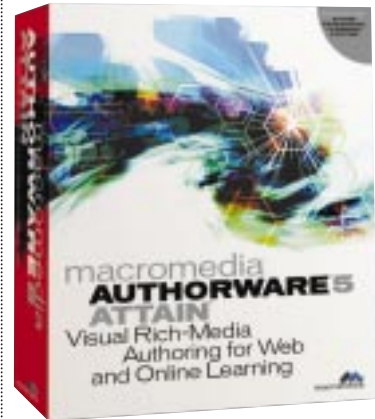
Lingo, Director's scripting language, has been enhanced to control internet connectivity, vector shapes, alpha channels, scaling and rotation and now supports the dot-syntax — as found in JavaScript and Visual Basic.

➔ **Asymetrix ToolBook II Instructor** 6.5 is a leading light in CBT (computer-based training) applications and offers an integrated development environment. It is based on the page-book metaphor for creating general multimedia and online learning applications. It includes a full set of objects such as buttons, media players, text fields, hyperlinks, animations and ActiveX controls, as well as accessory programs for editing audio, icons, cursors, bitmaps, menus and colour palettes. There's a Palette Optimiser to eliminate palette shift. Also bundled is Asymetrix Digital Video Producer for capturing and editing video files.

Instructor uses an object-orientated (MS Visual Basic-like) scripting language, called OpenScript, which incorporates a debugger and the ability to link to Windows system functions.

You can export your applications to HTML with Java and/or ActiveX support for web delivery, or to ToolBook II format for delivery on any Windows platform with the royalty-free runtime. The new version has improved HTML export, including pixel-perfect object positioning and object overlapping. There are new objects to add RealMedia, Windows Media and PowerPoint files to your applications, and a new video synchroniser catalogue object allows you to display text that is associated with a frame in a video file.

➔ **IconAuthor Net Edition** is another major player in the CBT market. It is an icon-based development tool for creating training applications to be delivered on CD-ROM, intranets and the internet. The emphasis on online



distribution is obvious, especially with the inclusion of Asymetrix Librarian for managing online courses with IconAuthor applications.

IconAuthor combines page layout and a simple but powerful flowchart assembly environment to create the flow of your application. More importantly, there is no programming language to learn. IconAuthor's Universal Media Access technology separates application

PCW DETAILS



Macromedia Director 7 Shockwave Internet Studio
Price £938.83 (£799 ex VAT)
Contact Computers Unlimited
0181 358 5857 www.macromedia.com



Asymetrix Toolbook II Instructor 6.5
Price £2,291.25 (£1,950 ex VAT)
Contact Asymetrix Learning Systems
0171 345 1500 www.asymetrix.com



IconAuthor Net Edition (7.6 for Windows, 7.1 for Unix)
Price £2,344.13 (£1,995 ex VAT)
Contact Asymetrix Learning Systems
0171 345 1500 www.asymetrix.com



Macromedia Authorware 5 Attain
Price £2,643.75 (£2,250 ex VAT)
Contact Computers Unlimited
0181 358 5857 www.macromedia.com

content from logic to enable easy updates, and gives you the ability to create hybrid applications delivered via a combination of CD-ROM and the internet or intranets. The new version supports both ActiveMovie and Lotus ScreenCam — useful if you are training personnel how to use new computer software and if you are developing electronic performance support software.

If you require advanced database capabilities using the power of SQL, IconAuthor's database object supports this. You can access other external data, too, using the ODBC (Open Data-Base Connectivity) standard. If you need to build or run your applications on multiple platforms, IconAuthor supports most: Windows 3.x, Windows 95/98, Windows NT and Unix.



➔ **Authorware 5 Attain** forms part of Macromedia's Attain Enterprise Learning System of integrated, open, scalable tools for creating online learning applications to be deployed across the web, local area networks and CD-ROMs. It uses flowlines and icons to enable you to create your applications. You drag icons, which represent screen elements and other components of the application, to the flowline to create the outline of your application. Then you use menus to add content and interactivity. You can add

hyperlinks, hypertext, full text search and retrieval and there are 11 different built-in interactions. One of the product's new features is advanced compression and streaming for delivery over the internet, so rich-media courseware can even be delivered economically to users with dial-in connections. Another is Knowledge Track, which automatically captures student progress and performance and seamlessly integrates your training with the Attain Enterprise Learning System.

Content developed with Authorware Attain can be embedded in web pages created with Dreamweaver Attain, Macromedia's visual HTML authoring tool for web learning. For internet audio, Authorware bundles the Voxware audio streaming codec and the Real Networks server. Authorware is simple to use. Wizards let you develop applications easily and you can drag-and-drop from a gallery of pre-built learning interactions to add logins, quizzes and so on.

Other useful packages

In addition to the big players, there are a number of other packages that are nevertheless worth investigation and consideration.

➔ **Quark Immedia** lets you add multimedia to existing static documents created in Quark XPress, the publishing package used by most newspapers and magazines, for delivery on CD-ROM, intranets or the internet. The development product is Mac only but there is a player for Mac and Windows. The familiar Quark tools work as usual except that any object you create can be given multimedia properties. You can also script sequences of events.

➔ **Matchware Medi8tor 4.0 Pro** is an entry-level package, so there is no programming language to learn but there are functions for manipulating text, numbers and logic so that some sophistication can be built-in. Applications are built by using objects and adding actions to them. One of Medi8tor's highlights is the ability to animate video objects while they are running and add transparency to them.

➔ **Scala Multimedia MM200** puts its emphasis on TV-like visual effects and so has lots of features such as transitions and video titling. Uniquely, the program can run at a 320x200 screen resolution which is useful for preparing material to output to video. It is good for business presentations, is easy to use, and includes a simple scripting language.

➔ **Illuminatus 4** is cheap, easy to use and comes with a wide collection of clip media. To create an application you can just import prepared material into pre-drawn screen layouts. You can also use it to create screensavers and HTML pages.

➔ **Dazzler 4.1** is similar to IconAuthor and Authorware and is powerful enough to be a competitive, cheaper alternative. It uses flow diagrams and objects to create applications. Essentially, you drag objects from a toolbar onto a worksheet and create a tree-type structure for your application. Then you specify details for each object, such as which sound or video file should be played. Dazzler applications can be run on the web using a supplied Java player.

PCW DETAILS

Quark Immedia

Price £828.38 (£705 ex VAT)
Contact Quark 01483 454397
www.quark.com

Matchware Medi8tor 4.0 Pro

Price £223.25 (£190 ex VAT)
Contact Bit UK 01420 83811
www.mwin.com

Scala Multimedia MM200

Price £233.83 (£199 ex VAT)
Contact Scala 01932 862214
www.asymatrix.com

Illuminatus 4

Price £116.33 (£99 ex VAT)
Contact Digital Workshop 01295 258335
www.digitalworkshop.co.uk

Dazzler 4.1

Price £229.13 (£195 ex VAT).
 Deluxe version £934.13 (£795 ex VAT)
Contact Intelta Media 01372 363717
www.dazzlersoft.com

Editor's Choice

Although we have divided the eight web authoring packages reviewed here into three distinct categories, defined by the primary user of each piece of software, it should be remembered that each package will more than likely suit all users.

Although some do not include the database integration functions found in others, it is only a small proportion of large corporate users who will actually use this facility. Indeed, when examining a number of sites on the net, one is struck by the fact that there are very few sites which could not be put together by even the most rudimentary package.

Web authoring

A home user should certainly not be discouraged from selecting a package from the small or large business sections. Likewise, users with a leased line and dedicated web server should not shy away from those packages making an appearance in our 'small business' category. As we have seen in the case of FrontPage 2000 in particular, many of these packages include all of the functionality such users would need.

It is unfortunate that some of the most useful functions of many of these packages are not universal. Symantec Visual Page, for instance, has unrivalled table-handling functions, allowing the user to select multiple cells using the mouse and format the contents independently of the remainder of the table. Adobe PageMill, on the other

hand, far outperforms its rivals in handling frames and is bundled with the excellent PhotoShop LE. Users may find that combining two or more packages will best suit their needs, even if that is an uneconomic and sometimes frustrating experience.

The first of two products which

are **Highly Commended** is Allaire's **HomeSite**.

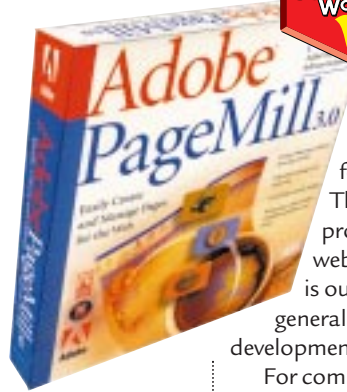
Now at version 4, it retains its major strength, that of a WYSIWYN (N standing for need) interface of colour-coded HTML tags, while still incorporating the drag-and-drop functionality of a more graphically orientated product. Also **Highly Commended** is NetObjects' **Fusion 3**. Its logical interface enables any novice to create a presence, in a matter of minutes, of which they may be proud. It's fast, too. Any changes applied are done so on a global basis almost instantaneously. The toolbar is context sensitive, minimising the number of irrelevant functions on display. This perhaps explains why Fusion, found here in our 'small business' category, is the number one choice of so many large corporations.

Before presenting our final award, we tip our hats for an honourable mention to **FrontPage 2000**. FrontPage 98 was an impressive product and the changes made to the beta version of its latest incarnation have certainly paid off. Watch out for it in the shops when it hits the shelves in the second quarter of this year.

Adobe PageMill 3 walks away with our **Editor's Choice** accolade. The strength of this product is in its simplicity. First-time users will spend next to no time getting to grips with the interface and will probably fail to realise that the thought which has gone into its creation allows them to perform technically complex functions that would take several lines of tags to replicate if coding by hand.

Multimedia authoring

Since the acquisition of Aimtech, which produced IconAuthor, by Asymetrix and its decision to concentrate on online learning software, the price of Asymetrix Toolbook has doubled. This leaves Macromedia Director, whose price has



dropped in the last year, as the only contender for high-end multimedia applications for delivery on CD-ROM. The new version extends the program's capabilities to the web. **Macromedia Director** is our **Editor's Choice** for general multimedia application development.

For computer-based training applications, although IconAuthor and Authorware attempt to make development easier through the use of flowchart assembly methods, the best product is still **Toolbook II Instructor** and is therefore **Highly Commended**. It has a wide user-base in educational establishments, as well as third-party support products, and it is very powerful. In addition, it belongs to a family of products which include Toolbook Assistant and Toolbook Librarian, which are designed as a whole to cater for a complete training solution.

PCW CONTACTS

For product ratings, prices and other details see our table of features on page 202.

FrontPage 2000

Microsoft 0345 002000
www.microsoft.com

Fusion 3.0

NetObjects 01189 829822
www.netobjects.com

HomePage 3.0

FileMaker 0845 603 9100
www.filemaker.co.uk

HomeSite 4.0

Allaire 01638 569600
www.allaire.com

HoTMetaL PRO 5.0

SoftQuad 0181 387 4110
www.softquad.co.uk

PageMill 3.0

Adobe 0181 606 4000
www.adobe.co.uk

VisualPage

Symantec 0171 616 5600
www.symantec.co.uk

Web!

NTM Publishing 0113 234 0444
www.baboonshop.com



Toby Howard on developments in **neural networks** and the latest creatures in the cyber Ark.

The neural zoo

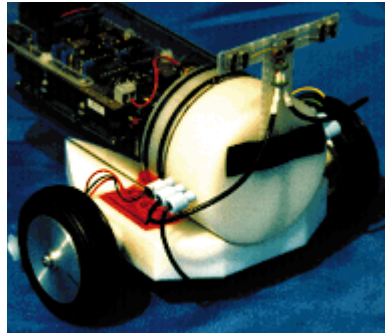
Surely something called 'Robo-lobster' cannot be serious — it must be one of those clumsy monsters Godzilla is always fighting. But no. It *is* serious. It is one of a new breed of artificial creature which exhibits unusually complex behaviour. They're called 'biobots' and they may be the missing link between biology and artificial life.

The robo-lobster spends most of its time submerged in a tank at Boston's Massachusetts Institute of Technology <w3.mit.edu/seagrant/www/robolob.htm>. The brainchild of Dr Thomas Consi, it's a shoebox-sized self-contained robot designed to mimic the ability of lobsters to sense chemicals in the water around them. What makes it unusual is that it is programmed using techniques inspired by the way biological systems work. This is 'soft computing', where answers don't need to be precise and where logic is fuzzy <web.cps.msu.edu/~miagkikh/SC_AL/>.

Robo-lobster now has a cousin, cyber-cricket. Researchers at Edinburgh University's Mobile Robot Group <www.dai.ed.ac.uk/groups/mrg/> have built a robot which successfully mimics the behaviour of female crickets which fly towards males who sing a mating song. The cyber-cricket is actually a three-wheeled laboratory robot called a Khepera, about half the size of a computer mouse <diwww.epfl.ch/Khepera/>. Its 'brain' is a Motorola 68000 processor running a neural network.

Neural nets have their origins in attempts to model the real nerve cells found in animal brains. The net comprises a number of interconnected simple processing elements, each of which has a set of inputs and outputs. Each of an element's inputs has a certain 'importance level', or 'weight', associated with it, and when the weighted sum of any signals present on its inputs exceeds a threshold value, the element 'fires' just like a real brain-cell and sends a signal to its outputs. These transmit a signal to other elements in the net which behave in a similar way, and so on. Eventually, the outermost elements in the net signal the 'answer'.

Neural nets are special because they can recognise patterns in the data fed to them. This is achieved by an initial 'training' period, supplying the net with sample datasets and repeatedly revising the weights of the inter-element connections to improve response.



▲ **ROBO-LOBSTER IS BEING USED TO TEST BIOLOGICALLY INSPIRED ALGORITHMS FOR AUV GUIDANCE USING CHEMICAL SIGNALS. THE VEHICLE IS DESIGNED TO MIMIC THE BASIC FEATURES OF A LOBSTER RELEVANT TO CHEMICAL SENSING AND ASSOCIATED BEHAVIOURS**

They make their decisions by weighing the evidence, rather than obeying fixed sequences of program instructions like traditional computers do.

The Edinburgh team has fitted tiny microphones to the cyber-cricket and trained its neural net to respond only to the calling song of males of a particular species of cricket.

Placed in an environment containing random noise as well as real crickets chirping their love songs, the cyber-cricket successfully recognises the real crickets and trundles towards them. Amazingly, the cyber-cricket's neural net has only four elements: two for its left side and two for its right. Each pair is interconnected, and their inputs are fed from the robot's ears and their outputs control the robot's wheels.

Machines like cyber-cricket and robo-lobster are exciting because they demonstrate that multiple behaviours can arise from single mechanisms. For example, it's long

Machines like cyber-cricket and robo-lobster are exciting because they demonstrate that MULTIPLE BEHAVIOURS CAN ARISE from single mechanisms

been believed that the cricket must use two information-processing systems for performing the separate tasks of recognising a male cricket's call, and then locating its position in order to move towards it. The cyber-cricket, however, uses its single neural net for both jobs.

We must be careful about drawing conclusions. Just because a robot equipped with a simple neural net can exhibit the same behaviour as a biological organism, it doesn't follow that the organism works in the same way. What it shows is that unexpectedly complex behaviour can result from simple processes. It's a pat on the back for the theory of evolution, too, since the neural net 'learns' by using genetic algorithms which simulate the copying and mutation processes of DNA. If researchers are on the right track, more complex artificial creatures will soon be scuttling about. Let's hope Godzilla isn't among them. □

hands on

contents



There's a useful line-up of *Hands On* pages for you this month. We see the start of a **new Workshop** series which takes you through the do's and don'ts of creating your own web site. It kicks off with a look at designing your **web site** layout and covers some basic HTML code words. There is also our mini series on **mixing and mastering** in the *Sound* section: Steven Helstrip works through the dilemmas of mixing and mastering audio to CD and coping with equalisation. And, you should mind your language in this month's *PDA* pages. If you want to get started in **OPL**, Mark Whitehorn takes you through the finer points of programming your **Psion** and shows that it can actually be fun. And for those *Windows NT* enthusiasts who think the fun is a long way off when it comes to **remote administration**, worry not: Andrew Ward tackles working from afar. If cartography grabs you, route your way to Ken McMahon's easy recipe for producing maps in **Adobe Illustrator 8**. And, don't miss the third part of our **Linux** operating system workshop.

ALANA JUMAN BLINCOE
DEPUTY EDITOR

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PCW Hands On on CD-ROM

Now it's easy to find that *Hands On* tip, trick, advice or review again — there's a whole year's worth of columns on our monthly PCW CD-ROM. So if that handy hint is on the tip of your tongue, don't sit and sweat: the answer is at your fingertips.



Putting the boots in

Chris Bidmead uses SuSE and YaST to achieve a **dual-boot system** with Linux.

Last month I hinted at problems with installing S.u.S.E 5.3 on the Dell PowerEdge. The snag is that the Linux kernel cannot find the hard drive. But it's nothing a quick download from the net can't solve. The trick is knowing where to get the download and what to do with it. If we cover the basics, all will become clear.

The Dell PowerEdge uses SCSI hard drives (appropriate for a server) and embeds the host bus adapter for them on the motherboard, rather than take up a PCI slot with a plug-in card. The new embedded Adaptec SCSI host bus adapter is a small chipset on the motherboard instead of the almost functionally equivalent AIC7xx plug-in cards that Linux already knows and loves. The old AIC7xx driver in the Linux kernel (or the equivalent loadable module) doesn't understand the new chipset and so cannot see the hard drive.

As soon as he realised this, Doug Ledford <dledford@redhat.com>, whose project this is, started work on a revision of the AIC7xx code. A beta version appeared shortly after the arrival of S.u.S.E 5.3 with its 2.0.35 kernel, which is why it's not on our PCW CD-ROM. The AIC7xx code is now complete and incorporated in a boot disk image which you can download from the S.u.S.E site at www.suse.com.

Having downloaded the new boot disk image, called aic7890, from the S.u.S.E site I made a boot disk under another version of Linux by running `dd if=aic7890 of=/dev/fd0` which transfers the image as a raw stream of bytes. The same can be done under DOS, using the rawrite DOS utility provided with most Linux distributions (it's under /dosutils on the S.u.S.E 5.3 CD number 1).

Put this diskette in the floppy drive and boot from it. As it boots, it discovers hardware features of the machine, streaming a log of its findings up the screen. Unless you're trying to diagnose a problem, like not being able to find the hard disk, you can ignore all this. S.u.S.E then kicks straight into a startup utility



FIG 1 THE INITIAL PART OF THE S.U.S.E INSTALLATION RUNS A ROUTINE CALLED LINUXRC WHICH OFFERS A NUMBER OF CHARACTER-BASED SCREENS SUCH AS THIS, WHICH SETS UP FEATURES LIKE SCSI ADAPTERS AND NETWORK CARDS

It's worth trying out the live filesystem as it lets you run

called linuxrc which takes us into a series of character-based screens like that in Fig 1. In my case there was no need to load a SCSI module, as the new SCSI driver is compiled into my temporary floppy-disk-loaded kernel. But I did need the eepr00.o module for the Intel EtherExpressPro 10/100 network card in the Dell PowerEdge.

A full walk-through of S.u.S.E's installation would go over ground already covered with the installation of Red Hat on my friend Marcus's machine (PCW, Jan & Feb '99), so here's an outline.

YaST a little help

Once the all hardware is catered for, the S.u.S.E installation takes you into YaST (Yet another System Tool) which will help you configure everything and pick the software you want to install. You can even choose to install the live filesystem CD which S.u.S.E supplies with the 5-CD package [Fig 2]. Apparently, a number of S.u.S.E customers have complained that this CD is missing from their set: it's behind a flap at the back of the CD case. People have just failed to spot it.

FIG 2 THE S.U.S.E 5.3 FIVE-CD PACKAGE INCLUDES A 'LIVE FILE SYSTEM' CD WHICH MINIMISES YOUR HARD DISK REQUIREMENT BY PROVIDING MOST OF THE ESSENTIALS READY-TO-RUN FROM YOUR CD DRIVE



packages without transferring them to your hard disk. You can integrate the live filesystem CD once you have the S.u.S.E core fully installed, which is great for making the most of a system that's short of hard-drive space. If you run the live CD filesystem at this point in the installation you'll be able to access all the manual pages and the info system — a kind of character-based hypertext knowledge-base put together by the GNU community to document key utilities such as tar, emacs and so on. Type 'info' on the command line to get started.

The Dell PowerEdge 6.5Gb hard drive came with a couple of partitions already in place. The second partition, seen as /dev/sda2 by the S.u.S.E installation routine, was 2Gb's worth of Windows NT 4.0, while /dev/sda1 is a small 16Mb special Dell partition used to configure the hardware. I decided to leave these alone and create a small root partition for Linux and an extended partition for everything else Linux needed, along the lines discussed last month.

YaST offers five main installation configurations depending on the amount you want to install. You can add or remove as much as you want from these. Obviously there'll be some packages which are dependent on the installation of other packages to work properly. The dependencies are something of which YaST is able to keep track.

Another handy thing YaST does is calculate your remaining potential disk space while you're selecting your packages. This avoids the problem Marcus and I got into in the first article in this series (*PCW*, Jan '99) — running out of space during the installation. If a partition is going to end up with less than five percent free space, YaST will warn you in advance, giving you a chance to back off and select fewer packages or even return to the partitioning part of the installation to change your partitions.

I should say that in the first cut of S.u.S.E 5.3 there was a bug on CD 1 which caused YaST to freeze if you were partitioning a drive with free space left over (see www.suse.de/Support/sdb_e/maddin_yast_fdisk.html). This only happens in the English-language version, so my fix was to re-run the installation in German. The general principle is: check with your Linux distributor's site for the latest news before installing.

The package installation prompts for changes of CD, and once it's finished you're asked to re-insert the first CD. Then YaST asks you to select an appropriate kernel for your system. Normally this will be the standard EIDE kernel, but if you have SCSI drives you'll need one with the appropriate SCSI driver compiled. Which brings us back to my AIC7xxx problem. Confusingly, an AIC7xxx kernel is offered by the menu at this point, but it came from the CD and I knew it wouldn't work with the Dell PowerEdge's on-board Adaptec chipset. The kernel I needed was on my boot floppy. To see how I did this, turn to the *Hands On Unix* column (p241).

Nearly there

Now the main S.u.S.E 5.3 installation is essentially complete. At this point, YaST takes you into a few configuration details along the lines we covered with the Red Hat installation (*PCW*, Jan '99). This time I opted for network installation.

It's just a matter of answering a few questions about the machine's IP address, its host name and the name of the IP domain. If you want to put your machine on a TCP/IP network and these terms mean nothing to you, catch up by reading the online Network Administrator's Guide supplied with the S.u.S.E disk set, or on the web at, say, www.linuxhq.com/guides/NAG/index.html.

Name that network

On my network I don't use BOOTP or DHCP so I entered a static IP address and a netmask of 255.255.255.0 for a class C network. My XyXEL ISDN router is my network's "gateway" [Fig 3] but I'm going to set up a PPP dialup connection to my ISP for the purpose of this workshop, rather than the 'so-easy-it's-cheating' router connection. So I told YaST that the Dell was my, er, gateway (as it were). YaST invites you to fill in the address of the primary nameserver — this is a dotted quad number like 158.152.1.58 which you get from your



▲ FIG 3 IF YOU'RE USING A ROUTER, THIS IS WHERE YOU TELL S.U.S.E 5.3 ITS IP ADDRESS. IF YOU DON'T HAVE ONE, ENTER THE ADDRESS OF THE MACHINE ON WHICH YOU ARE INSTALLING

ISP. You'll also need a name for your network; mine is `cbidmead@home.edu`, but it's completely arbitrary.

The Network Administrator's Guide gives you a 'guts and all' view of the Linux networking mechanisms, dealing with the various daemons and their configuration files. S.u.S.E front-ends this with a single configuration file called `/etc/rc.config` which also handles much of the system configuration. A tool called `SuSEconfig` reads this file and changes all the other config files accordingly. You can edit `/etc/rc.config` directly, once you know what you're doing, and then run `SuSEconfig` to fix the changes. ➔

FIG4

Persuading Lilo to fork

```
# LILO Konfigurations-Datei
# Start LILO global Section
boot=/dev/sda3
#compact # faster, but won't work on all systems.
read-only
prompt timeout=100
vga = normal
# force sane state
# End LILO global section
# Linux bootable partition config begins
image = /vmlinuz
root = /dev/sda3
label = Linux
# Linux bootable partition config ends
```

Just add the following to the end of this file:

```
# DOS bootable partition config begins
other = /dev/sda2
label = WinNT
table = /dev/sda
# DOS bootable partition config ends
```



For beginners, YaST simplifies this by providing a menu-driven front-end to `/etc/rc.config` which automatically runs `SuSEconfig`. A dedicated Linux hacker may dispense with this and edit the various core config files by hand. YaST helps you fix the LILO boot loader in much the same way as discussed in our Red Hat installation (*PCW*, Feb). Now it's time to remove the CD and the floppy disk, reboot and log in. Remember that login names are case sensitive.

Now I'm in the character-based terminal mode of Linux. I won't run through `S.u.S.E.'s` X installation: it's much like Red Hat's, with the additional option of running `SaX` (`S.u.S.E. Advanced XF86-Configurator`) which makes X installation even easier. I upgraded the Dell PowerEdge with a Matrox Mystique card, a very easy card to install X onto as it's well catered for by the `XFree86` programmers.

Remember that the Dell PowerEdge came with a 2Gb Windows NT 4.0 partition (`/dev/sda2`, as viewed from Linux)? At the moment, the drive's Master Boot Record (MBR) is set to jump straight to `/dev/sda3`, where LILO is lurking. LILO boots straight into Linux, so we need a way of persuading LILO to fork optionally to the Windows NT kernel on `/dev/sda2`. You can do this via YaST's System Admin/Kernel and Boot Configuration/LILO configuration menu, but for some fun and excitement let's do it by hand. We need to log in as root and edit the `/etc/lilo.conf` file. Currently it looks like **Fig 4** (p213). The NT partition isn't DOS, it's NTFS, but it is 'DOS bootable'. The new stanza means that if we enter the 'WinNT' string at the LILO boot prompt it will take us to `/dev/sda2` and run the operating system it finds there. To achieve this, we need to run `/sbin/lilo` on the config file. It spits out **Added Linux ***
Added WinNT
as confirmation. The * indicates Linux will be booted by default.

And that's it. A dual boot system that leaves the resident Windows NT installation untouched but adds the completely new dimension of Linux. I've learnt a lot sharing these installation experiences with you, and I hope you've found the exercise helpful, too.

Good luck when you try this for yourself — and you know where to find me if you need me (see 'PCW Contacts').

CONFIGURE THE ISP CONNECTION

You can set up a PPP (point-to-point protocol) connection to your ISP from YaST, or by grunt-work on the relevant config files if you know what you're doing.

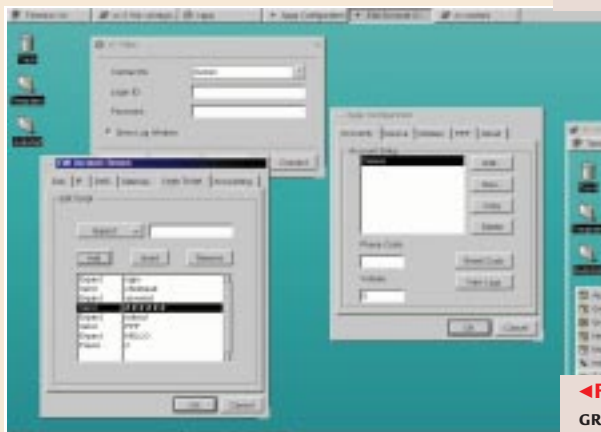
For the modem, it's helpful to invent a device called `/dev/modem` and symbolically link it to the actual I/O port where your modem is connected (mine is `/dev/ttyS0`). YaST does this under its System Administration/Network configuration menu.

You can use YaST to enter full details of your ISP, but if you're going to use the Windows-friendly KDE desktop

also a well-organised, menu-driven PPP configuration tool. And it comes with online help, making configuration easy [Fig 6]. Depending on your ISP you'll either authenticate with the remote server via a script, through PAP (Password Authentication Protocol) or CHAP



▲ FIG 5 BY DEFAULT, S.U.S.E 5.3 INSTALLS KDE, THE WINDOWS-LIKE DESKTOP DESIGNED TO MAKE MIGRANTS FROM MICROSOFT FEEL AT HOME. UNLIKE WINDOWS YOU CAN USE THE BUTTONS (BOTTOM CENTRE) TO SWITCH BETWEEN FOUR DIFFERENT DESKTOPS (CONFIGURABLE TO A MAXIMUM OF EIGHT). YOU CAN ALSO HIT **CTRL-ALT-FN** (WHERE FN IS A FUNCTION-KEY NUMBER BETWEEN 2 AND 6 INCL.) TO SWITCH INTO A CHOICE OF VIRTUAL TERMINALS WHERE YOU CAN BE LOGGED ON AS 'VARIOUS USERS'



HOWTO — they're both in the `S.u.S.E` disk-set. Here, too, `kppp` walks you through the setup. **Fig 6** shows it helping me put together a script to connect to Demon

◀ FIG 6 THE KPPP GRAPHICAL DIALLER INCLUDES BUILT-IN UTILITIES TO SET UP YOUR MODEM, ORGANISE YOUR AUTHENTICATION AND CREATE YOUR CONNECTION SCRIPT

which `S.u.S.E 5.3` installs by default [Fig 5] there's a nicer way.

The daemon linking you to your ISP is called `pppd`. One of the KDE utilities is a front-end to `pppd`, called `kppp`. This is not only a great graphical dialler, it's

(Challenge Handshake Authentication Protocol). See the Network Administrator's Guide for details and the PPP-

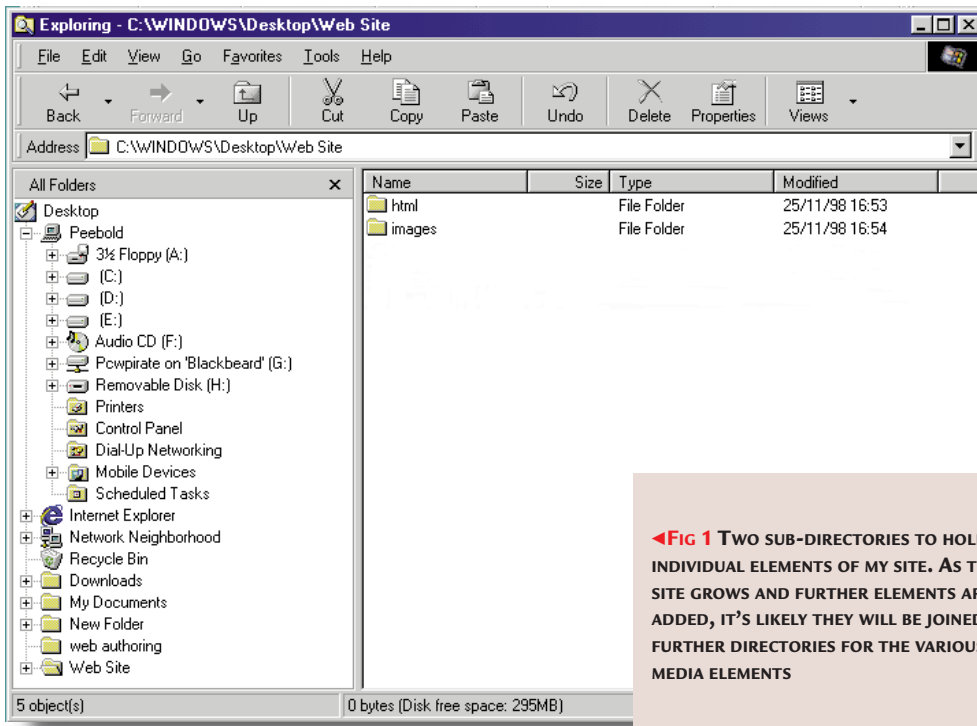
PCW CONTACTS

Chris Bidmead can be contacted via the PCW editorial office (address, p10) or email unix@pcw.co.uk



Weaving a web

Design and build **your own web site**. Nik Rawlinson shows you how to start the project.



◀ Fig 1 TWO SUB-DIRECTORIES TO HOLD INDIVIDUAL ELEMENTS OF MY SITE. AS THE SITE GROWS AND FURTHER ELEMENTS ARE ADDED, IT'S LIKELY THEY WILL BE JOINED BY FURTHER DIRECTORIES FOR THE VARIOUS MEDIA ELEMENTS

Many older browsers cannot support frames and so designers rightly argue that to cater for the widest possible audience it's best to avoid them altogether. A more sensible alternative is to offer a non-frames option that will lead users to a version of the site along the lines of a traditional flat-form layout. With this in mind, we'll create a frame-based site. If your browser doesn't support frames, the latest versions of Netscape's and Microsoft's browsers can be found on our cover-mounted CD. The frame structure of the site is set up with the code in Fig 2,

Designing your own web site from scratch, coding it by hand and seeing successful results can be a rewarding experience. It's useful, too, as it's cheaper than investing in a dedicated authoring package and means you'll be able to keep an eye on what's happening. You'll build streamlined pages which, theoretically, will look exactly the way you want. This month, we'll look at designing your layout and run through the basic HTML code words you'll need to get started.

Your chosen subject

You'll probably have a clear idea of the subject around which you'll be basing your project. Whether it's a personal home site, a guide to your home town or a business site showing your products to the world, a few common principles apply. For the sake of illustration, this series will be centred on creating a personal web site, although the tags and methodology used here will apply to almost any other site you may have in

mind. All files created are on our cover CD, and you can see the site as it grows online by visiting <http://i.am/pcw/>. To keep things tidy, we'll put our images and pages in separate directories. Other media, such as sound files, Java applets or proprietary animations generated with Macromedia Flash and similar packages, will be segregated to make them easy to find as the site grows, and allow us to expand the site at a later date without having to search for files, especially as names may by then have been forgotten [Fig 1].

Firstly, we need to decide if our site will use frames. These are a useful method of subdividing the screen and keeping elements such as the title and menu visible while the content of the pages changes in the primary frame. The main benefit is that although setting up the frames may initially be a little tricky, it will save time in the long run. You'll no longer have to place navigation buttons and replicate your menu on each page. Instead, the site's main menu can remain visible at all times, dramatically reducing your workload.

allowing for a screen-wide title bar, 50 pixels deep, straddling two columns. The leftmost vertical column, 130 pixels wide, will host our site menu. To the right will be the main frame, occupying the remainder of the screen, which will be the area where our pages are displayed, and it is thus wider than the menu frame. You'll notice that each is named. These names will be used to direct menu options to the appropriate destination.

Index linked

This page will be the first thing to confront visitors to the site, so we'll call it index.htm, saving it in the site's root directory. The reason for this is that many ISPs direct browsers to automatically search for a file called index.htm or index.html in any directory to which a browser is pointed if visitors don't specify a destination file. This is the only page we shall not be saving in our site sub-directories. You will notice this initial page has no actual content *per se*. It just defines a frame-bound structure into which the

[FIG 2] Setting the frame structure

```
<HTML>  
<HEAD>  
  <TITLE>Nik's HomePage</TITLE>  
</HEAD>  
<FRAMESET FRAMEBORDER=0 BORDER=0 FRAMESPACING=0 ROWS="70,*">  
  <FRAME SRC="html/banner.htm" NAME="bannerframe" SCROLLING=NO>  
</FRAMESET>  
<FRAMESET FRAMEBORDER=0 BORDER=0 FRAMESPACING=0 COLS="130,*">  
  <FRAME SRC="html/menu.htm" NAME="menuframe" SCROLLING=NO>  
  <FRAME SRC="html/welcome.htm" NAME="contentframe">  
</FRAMESET>  
<NOFRAMES>  
<BODY>  
  This page uses frames and requires a compatible browser which  
  yours, I'm afraid, is not.  
</BODY>  
</NOFRAMES>  
</FRAMESET>  
</HTML>
```

Now to put some

content into our frames. We'll start with the banner. The banner runs across the width of our site and won't change as users move around it. So, we'll use it to display a site logo. Although there are a number of specialised web graphics creation packages such as Adobe's ImageStyler or Macromedia's Fireworks, you can use regular imaging software. Our cover CD includes a copy of PaintShop Pro 5 which will prove to be more than adequate.

Screen resolution is generally around 72dpi so

browser will load the pages of the site. The code in Fig 2 will load three further pages: banner.htm will be loaded into the frame we've called bannerframe, menu.htm will be loaded into menuframe, and welcome.htm will load into content frame.

On the right lines

Let's look at a couple of the key lines of this structure in detail.

```
➔ First, the line  
<FRAMESET FRAMEBORDER=0  
BORDER=0 FRAMESPACING=0  
ROWS="50,*">
```

generates the first frame. It removes any borders (BORDER=0) so the edges are effectively invisible to any user with a modern browser. Similarly, FRAMEBORDER=0 and FRAMESPACING=0 remove any padding, allowing page elements within the frame to stray up to the edges.

The ROWS tag tells the browser we want to split the screen horizontally. Had we used COLS, as in Fig 2, two lines below, the screen would have been split vertically instead. The '50,*' defines the frame size. It refers to a depth of 50 pixels, and the asterisk tells the browser that the frame below should fill what

remains of the screen. Had we stated '50,*70' we would have had a frame of 50 pixels depth at the top of the screen, another of 70 pixels depth at the foot, and the remaining centre portion, whatever size that would be, using any space remaining between the two. So, our frames will always exactly fit within the browser windows no matter how large or small the site visitor makes it.

```
➔ Second, the line  
<FRAME SRC="html/banner.htm"  
NAME="bannerframe"  
SCROLLING=NO>
```

defines the frames' content. The source (SRC=) is the file banner.htm, found in the html directory of our site, while the frame's name is bannerframe. Each frame in a set must be given a unique name. When we start to build our menu we'll use these frame names to direct the hyper-linked pages to specific locations on our screen, rather than opening in the frame where the link was clicked.

Finally, on that line, we've specified that the user shouldn't be allowed to scroll the contents of the frame. If its contents are too big to display, they'll be cropped at the border.

it's advisable to create any images at this resolution. Upping the resolution will improve the quality but it will be a disproportionately longer download for site users. It's also a good tip to reduce the number of colours used in the image — images with only 256 colours will load a lot faster than those with 16.7 million.

Many graphics packages have a 'web safe' palette of colours which a browser should be able to display without trouble on either a Mac or PC platform. If your graphics package incorporates this facility, it's worth putting it to use.

Create a new image of this resolution and make a note of the size. If the height is larger than that of your bannerframe, you'll need to either make the image smaller or increase the frame height.

Many graphics packages have 'web-safe' colours

As the frame definition for bannerframe specifically states the frame should

not scroll, an oversized image will be cropped at the borders. We now need to put the banner image onto our site.

Once it's saved in the images directory as banner.jpg, we'll write a one-line web page that points to it [Fig 3]. The height and width attributes define the size of our image. If we didn't

[FIG 3] Pointing out the banner

```

```



[FIG 4]

Virtual rectangles

```

<Html>
<Head>
<Title>
The Imagemap
</Title>
</Head>
<Body Bgcolor="white">
<Img Src="images/imagemap.jpg" Border="0" Height="300" Width="130" Name="imagemap_menu" UseMap="#imagemap_menu" ✓
Alt="This is an imagemap - please enable images on your browser">
<Map Name="imagemap_menu">
<Area Shape=Rect Coords="13,232,103,262" Href="html/contact.htm" target=contentframe>
<Area Shape=Rect Coords="55,185,120,215" Href="html/noise.htm" target=contentframe>
<Area Shape=Rect Coords="6,93,82,123" Href="html/words.htm" target=contentframe>
<Area Shape=Rect Coords="44,41,116,71" Href="html/about.htm" target=contentframe>
</Map>
</Body>
</Html>

```

(Key: ✓ code continued on line below)

include them, a browser would simply leave the image as it was after loading it. But, if the image were not loaded, it would not be able to produce a blank box of the same size. Should this happen, our layout would be lost. The 'alt' tag, meanwhile, is used by text-only browsers or those with speech synthesis for the sight-impaired. It too will either display while the image is loading, or if the image fails to load, leave the page in a usable condition even if it has been only partially downloaded. This line of code is saved in the html directory as banner.htm. Reloading our original index.htm, you'll see it now simultaneously loads banner.htm and our image, and places it into the top frame.

Seeing successful results can be a rewarding experience

On the menu

The menu will run vertically down the left-hand side of the screen. Like the banner, this will be a permanent resident on the screen. It won't scroll, as we've disabled the scrolling attribute in that frame. We'll set each menu option so that rather than opening in the default location (which would be menuframe, as that's where we're clicking the hyper-link) it will open any associated pages in contentframe.

Two options are available to us in generating our menu. The easiest is to create a series of text-based links. In these

days of fast modems and unlimited (well, 20Mb at least) web space, that's a little boring. A far more interesting option would be to generate an image map — a picture with hot spots which link the pages of your site. In the frame structure we've defined, the menu frame is fairly slim; just 130 pixels wide. To avoid changing this we'll have to design our menu to fit within these constraints. As with the banner image, we'll stick to 72dpi and reduce the colours used to a web-safe palette.

The site will incorporate four main sections: 'about', 'words', 'noise' and 'contact'. Each is accessed from the image map. Before the hot spots can be defined though, the map needs to be drawn. It's then time to mark the co-ordinates of your hot spots. Using the sample image accompanying this workshop (*on our cover CD*) we'll define four virtual rectangles to encapsulate each of the words in the image.

On location

To see how this works, load the image into any graphics package displaying the co-ordinates of your cursor location and check that the vectors, in Fig 4, define the opposite corners of boxes around each word. In Fig 4, the browser loads the image imagemap.jpg from the images directory. We name this imagemap_menu so that the browser

can locate it as you run your mouse across its surface. Next, it's defining each hyperlink. This is best explained by looking at one link in detail:

```

<Area Shape=Rect
Coords="55,185,120,215"
Href="html/noise.htm"
target=contentframe>

```

In this line, we tell the browser that the hyperlink is a rectangular section of the image. The upper left-hand corner of this link is 55 pixels in and 185 pixels down the graphic we've called imagemap_menu.

The lower right-hand corner of the rectangle, meanwhile, is at the co-ordinate 120, 215. Therefore, if the user clicks anywhere within this virtual rectangle, the browser will open the file noise.htm, found in the html directory, in the frame we've called contentframe.

Expecting visitors

So now we've defined the three permanent parts of our site: the banner and menu, both of which will remain visible at all times, and the frame structure that binds the content of our site into a set layout. Next month, we'll deal with attracting visitors to your site.

PCW CONTACTS

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Use and abuse

Security on the net needs improving to boost user confidence, says Nigel Whitfield.

Connect to the internet and your systems will be hacked! You'll have people breaching your security and stealing your personal data! Nothing will be safe from these destructive people bent on taking over our universe!

OK, so that's verging into B-movie territory, but there are people out there who'll try to get into your computer systems. Often it's just for the thrill of it, or your computer may be a stepping stone as they try to cover their tracks on the way to their ultimate destination. The chances of someone actually wanting to attack your system for a particular reason are probably small.

Not my problem?

Is this of no concern to people who have a PC at home? It might well be: with well-known security breaches such as Back Orifice, people can connect to your system and do a lot of damage. You might not think that's a tremendous problem if you dial up and have a different IP address assigned each time you connect — and you'd be right. But jump forward a few months, past BT's trial of ADSL (giving a few people an "always on" connection) to the time when it's more commonplace. Imagine the potential for havoc if you annoy someone at work, and they try to mess up your system for you, or you end up in the middle of someone else's flame war. There have even been cases of someone maliciously placing pornography on a system and then tipping off the police.

Most of it can be avoided by following sensible security precautions and keeping your system up to date with patches. It can be a time-consuming job. And things aren't always made easier by those who distribute software. A well set-up system may not be completely immune to attacks, but it's a lot more

Most of this havoc can be avoided by following sensible security precautions

THE RIGHT SCRIPT

Forms keep rearing their head in messages sent to net.answers; as some rightly point out, it can be pretty simple to design a form in a graphical web-page editor, but the problems I recently covered still crop up. I've looked at some examples of how to write parts of a script, and I'd love to provide more in future. The

biggest problem is, what sort of script would you like to learn about? Do you want to know how to write something in Visual Basic that will process data on a Windows system? How about using Perl under a Unix web server? There's even AppleScript, now much faster with OS 8.5. **So I'd like to hear from you, about what systems your web pages**

run on, and what you'd like to know about running scripts on web servers. Do you want to know Perl, or should I enlist the help of the VB experts? How about good old-fashioned C? Send an email to net.answers@pcw.co.uk and I'll try to present some useful scripts over the coming months that will help you do what you really want.

secure — and can help you find who's trying to get in, and from where. Almost every day, the logs on my firewall reveal information about who's been trying to gain access to some of my systems.

Low-key ISPs

Unauthorised access is a breach of the Computer Misuse Act, so you'd expect ISPs to take it seriously. But they don't all treat it the same. Some have responded to reports of people trying to attack systems

with "This user's account has been terminated", and others with "He's been warned". Some have revealed the offender's name, offering co-operation with the comment, "We've had other complaints about him". You might consider that type of response unsatisfactory, or indeed useful to know where someone is. To an extent, I feel comfortable knowing — and I can ban all users of that particular ISP from the net services I run. Yet what's more disturbing, and will be more so as "always on" connections grow, is low ISP co-operation. Complain about a hacker, and they might

be kicked off the net. Then they'll sign up with someone else and do the same thing again. One ISP said it couldn't share information because it would be against the Data Protection Act, although it would probably be covered by the many exemptions for protection and prevention of crime. Collating logs showing a hacker's movements is time consuming. You might think you've a right to sniff around and discover if someone's web servers have security vulnerabilities, but you don't. So keeping everything safe can be a hard job.

Act accordingly

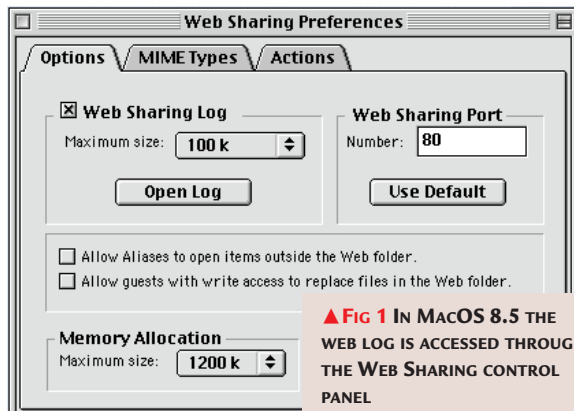
The net has grown partly because of people providing useful things free of charge. But if the result is attacks on your computers and little chance of compensation, how many will want to maintain that tradition? If ISPs really want the net to grow, they must act in a co-ordinated manner, so people taking their first steps on to the net can do so with confidence, not trepidation. Of course, everyone has to protect their own computers, but a little help — and perhaps some application of the Computer Misuse Act — would go a long way to making customers confident.



Questions & answers

Q I'm running a Mac with the web sharing enabled. Is there a way to see a log of who's been accessing the web pages?

a Not if you're using MacOS 8.1 and the standard Apple Web Sharing extension. If you upgrade to MacOS 8.5 you can view a log, which is in a standard format most web analysis tools will be able to understand. To access the log, open the Web Sharing control panel and go into the Preferences [Fig 1]; from the Options tab, ensure the "Web Sharing log" check box has an X in it. To open the log, click



▲ FIG 1 IN MacOS 8.5 THE WEB LOG IS ACCESSED THROUGH THE WEB SHARING CONTROL PANEL

the Open Log button; you may see a message from the Finder asking you which application you want to use to view it.

Q I've downloaded version 4.0 of AOL and I'd like to know if it's possible to change the default setting of the US version of Channels to the UK version instead. If this can be done, please tell me how. If not, then let me know the next best thing.

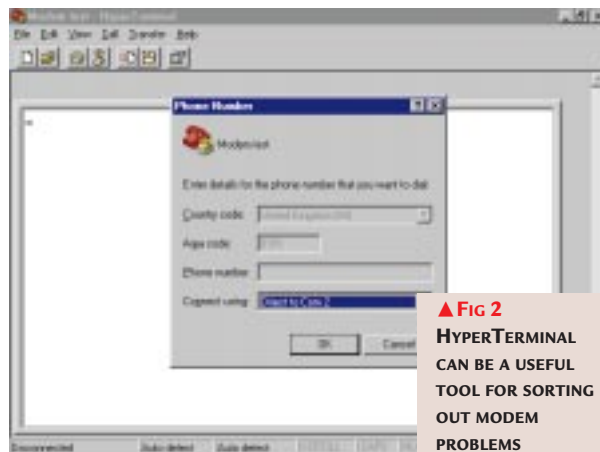
a The main menu and the channels screen are chosen by AOL depending on

the version of the software you are using; you can't change the default, but you could always create a shortcut to the UK pages, which are reached via the keyword INTERNATIONAL. The best solution is to wait a while for the UK version of AOL 4, which should be out by the time you read this.

Q I've brought back from the US a new Compaq Presario 1810 portable with a built-in 56K modem. Unfortunately, the modem won't talk to BT. Any suggestions?

a The modem should recognise dial tone, but you can find out if it doesn't by using the command ATX0,

which will tell the modem not to listen for dial tone. It's worth turning on the speaker with the ATM1 command so you can hear what happens. The best program to do all this in is HyperTerminal [Fig 2]: tell it you're creating a direct cable connection, then type the commands shown, followed by ATH1 to take the modem off the hook — you should hear the dial tone. If you don't, then you'll need to change cables. Contact a company like TeleAdapt <www.teleadapt.com> which can supply cables that will sort out most problems like this.



▲ FIG 2 HYPERTERMINAL CAN BE A USEFUL TOOL FOR SORTING OUT MODEM PROBLEMS

Q I have upgraded to Navigator 4.06 from the PCW CD, but every time I start Navigator, halfway through the loading screen I get a box saying 'The local configuration file specified a configuration URL but the AutoAdmin component could not be loaded. AutoAdmin is required to support remote configuration URLs. You will be unable to load any remote documents.' Navigator works perfectly after I have clicked on OK, but why does this happen?

a This is most likely because Navigator is attempting to load details of its configuration, including which proxy servers to use, from a remote location. By doing that, system administrators can easily configure a large number of systems just by changing a single file. You need to check the preferences (on the Edit menu), and in the Advanced section you'll find options that relate to using remove configuration URLs. Make sure that none of these are selected and your problems should go away.

Q I've created a web page on my PC, but my friend who uses a Mac says that the colours I've chosen

for the background aren't smooth — they come out with lots of little dots in them. Why is this?

a The problem arises because you're most likely using a 256-colour display, as is your friend. You run into trouble with some colours because the Mac and the PC both have a slightly different palette of colours in 256-colour. If you choose a colour for your web page that doesn't appear on both platforms, you'll see grainy colours with flecks of other colours in them as the computer tries to get the closest match that it can. The solution is to use a web design program that allows you to pick from the common palette so that you can be sure everything will work fine whatever platform you use. You can find information about the problem on the web. One useful page, which has an online colour chart with all the values you'll need for coding your web pages, is at www.lynda.com/hex.html.

PCW CONTACTS

Nigel Whitfield welcomes readers' suggestions and feedback for the Internet column. He can be contacted via the PCW editorial office (address, p10) or email internet@pcw.co.uk



Phantom phone menace

Tim Nott relates a **creepy connection tale** of the unexpected.

Remember the urban legend of the couple who returned from holiday to find that their flat had been broken into? Curiously, nothing appeared to have been taken. More curiously, the intruder left a quarter-full bottle of his or her own Scotch on their desk. The mystery was only solved when the phone bill arrived and the cost of their burglar's whisky-fuelled chat session was revealed.

These days you don't need a burglar — you can get software to bump up your phone bill without your knowing, as Stephen Blake and many others have found out. Stephen wrote: 'A couple of weeks ago, and for no apparent reason, my computer started to connect automatically to my service provider shortly after booting up. This was just the connection: neither my browser nor email software started. This was irritating but not a major problem, and I've now set my parameters to "always ask before connecting" so I can just hit Cancel.

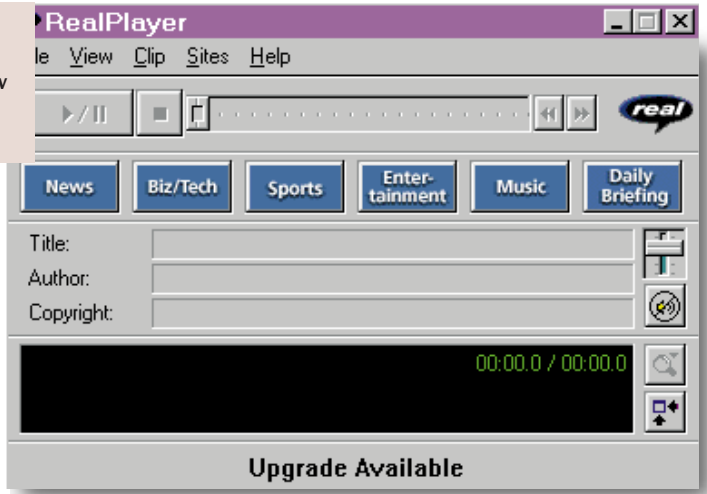
'A friend of mine recently started having the same problem, but as he has an internal modem, he didn't notice. You can guess what his phone bill looked like. In both cases, I cannot find any way of preventing this automatic connection taking place. So I turned to the Microsoft newsgroups on the internet. Here, I found dozens of desperate souls with the same problem. Obviously we all go on the net, but we all seem to use a

▶ **REALPLAYER**
REGULARLY
CHECKS FOR NEW
VERSIONS OF
ITSELF

variety of ISPs. So why have our PCs started to do this? Conspiracy theorists could have a field day about which site we may have all visited.'

Similar reports abound — some adding that the 'automatically disconnect if idle...' timeout is disabled, as is the prompt to disconnect when you close the browser. The common factor in all these cases seems to be the G2 RealPlayer. If you download this, or its beta, it likes to 'touch base' at frequent intervals to see if a new version is available. Apparently, nobody at RealNetworks realises that courtesies such as asking before using someone else's phone and hanging up when finished are important, especially in the majority of countries where one pays for local calls.

If you're a victim of this, there are three things you can do. First, you can remove the icon from the System Tray, from RealPlayer's Options, General, 'Allow SmartStart to run in the System Tray'. Second, you can disable the upgrade checking for a period of 30 days at a time, from the Options,



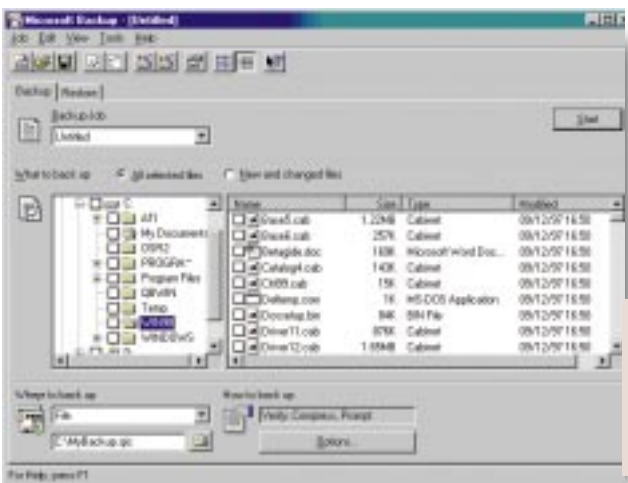
Upgrade menu. The third drastic solution is, of course, to uninstall the RealPlayer software.

▶ **Here's some better news.** In January's column I aired Robert Trzebiatowski's problem in that the scroll arrows you get in Windows 98 (or Windows 95+IE4) when a Start Menu level is too tall to fit the screen, won't go away when the number of items are reduced, and end up obscuring the entries. Robert now writes to say that updating his version of Internet Explorer has solved the problem.

Egg, meet face

In December 1998's PCWI I stated that it's impossible to restore Windows 95 backups in Windows 98. Not so, says Michael Kenward: 'You just have to go about it in the right way — difficult, I know, given the awful interface of the new version. Start 98 Backup. Go to the Restore tab. Find the .QIC file from 95 Backup, open it and away you go.'

More egg (I'm going to need a bigger face, soon) from Nicholas Ward, who states that I'm mistaken in saying you can only open one picture per instance of Internet Explorer. 'If you use the option to open all windows in one browser, it will open all the images selected in the one browser and you simply click on the Back button to scroll through them.'



◀ **IT IS DIFFICULT, BUT NOT IMPOSSIBLE, TO RESTORE WINDOWS 95 BACKUPS IN WINDOWS 98**

CRYSTAL CLEAR

Several readers have asked me how they, too, can achieve the 'transparent windows' effect seen in Chris Bidmead's column in December 1998's *PCW* (p273). I had no answer, apart from relinquishing Windows in favour of Unix. But reader Paul Bunyan pointed me at Litestep, the strangest thing I've seen for Windows in some time.

It's a PC version of Afterstep, which itself is a window manager for Unix. It's the brainchild of Francis Gastellu and has attracted a large cult following. If you feel the opportunities for customising Windows are too limited, this could be for you, as it's a complete replacement for the Windows shell. Yes, that screenshot [Fig 1] really is my Windows 98 desktop. The toolbar thingy at the right is the Wharf, which can be used to launch programs, open files or folders, and host applets such as a clock, a system monitor and a virtual screen manager that gives you multiple desktops. More esoteric Wharf applets include a variety of CD controllers and (no kidding) a CPU thermometer.

The Start menu is replaced by a cascading right-click menu (seen here above the Word window), and shortcuts on the desktop can use any bitmaps. The examples shown on the left of the screen are bitmaps of text that 'light up' when the mouse pointer crosses them. Note that although the wharf tiles and shortcut bitmaps can have transparent portions,

windows themselves can't, and the seemingly transparent backgrounds to the text shortcuts are actually part of the wallpaper.

However, Litestep isn't for softies. Ideally, you need to be of that rare breed — a programming geek with artistic talents. Even using the ready-made 'themes' (my desktop is a slightly modified version of Psoriac's SpaceStep) you'll find you have to do a lot of configuration editing and file shuffling [Fig 2]. It's also prone to falling over, leaving you in the interesting position of being in Windows with no shell, and there are various other little surprises, such as an apparent loss of the Find File command.

Litestep is free, and is released under the GNU General Public Licence. You are not only free to use the



▲ Fig 1 It's WINDOWS, JIM, BUT NOT AS WE KNOW IT

program, but free — indeed, expected — to download and modify the source code and generally do whatever you like. Which will probably come as something of a shock to devout Windows users, conditioned as we are to monopolistic marketing practices. Despite the complexity, one very good point is that Litestep does not burrow deep into the Registry or the Windows and System folders. The sole point of contact is via the SHELL=entry in SYSTEM.INI. If this is edited to point back at

EXPLORER.EXE, then normal service will be resumed. Determined meddlers would do well to have a boot disk with a copy of EDIT.COM about their person before diving into the wonderful world of Litestep. The shell itself, and many sample themes, can be downloaded from www.litestep.net.

➔ **Paul also answered** a FAQ about graduated title bars, mentioned in November's column. If you're running Windows 95 and yearn for the shaded title bars and animated

menus that 98 users have, you might like to try Win98fx. It's on this month's CD-ROM. Do read the Readme.txt file first as this free utility replaces several crucial Windows files which will need to be backed up beforehand.

```

step.rc - Notepad
File Edit Search Help

; Sound to play when clicking a shortcut
ShortcutClickSound
c:\litestep\starstep\sounds\mousedown.wav

;-----
; DESKTOP SHORTCUTS DEFINITIONS
;-----

; Top Pane Shortcuts
*Shortcut "Adobe Illustrator" 91 32
sc_s1_illus.bmp sc_s2_illus.bmp .none
"F:\Adobe\illustrator.exe"
*Shortcut "Paint Shop Pro" 91 56
sc_s1_ PSP.bmp sc_s2_PSP.bmp .none "F:\Paint
Shop\Psp.exe"
*Shortcut "Corel CAD" 91 81 sc_s1_cad.bmp
sc_s2_cad.bmp .none
"G:\corelcad\programs\corelcad.exe"
    
```

◀ Fig 2 FORGET ABOUT DRAG-AND-DROP: THESE SHORTCUTS IN LITESTEP ARE NOT FOR SOFTIES



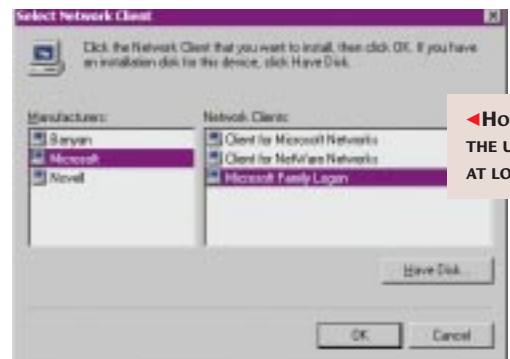
Questions

& answers

Q A friend and I both have Windows 98. I tried to set up multiple user logons for each person to have their own settings. When he logs on, he has a list of all the users to log on as, but when I tried that on my version it wouldn't work — it just gave me the old Windows 95 logon, i.e. Type Username and Password. The weird thing is that my version should be newer than his because my computer is only a week old. Can you help me?

BARA MUSTAFA

a If you go to Control Panel, Network, you'll see a list of 'Installed Components'. If Microsoft Family Logon is not included



here, then hit the Add button, choose Client and select it. The next step is to make sure this is selected as the 'Primary Network Logon' in the box below.

Q I recently bought a new Epson 640 colour printer to replace my old HP 560c. Now when printing I get an error message saying an illegal operation has taken place in ATMSYS.DRV. I cannot find any application that uses this file or ATM32.DLL, which accompanies it. I know they are Adobe Type

Manager files and they're both dated 1992, yet when I try to delete them I cannot do it from Windows as they're "being used". Deleting them from DOS and rebooting brings up an error message while Windows is loading and it simply comes back to the 'Safe to turn off' screen. The only application I can think of that may have used it was an old version of Adobe Photoshop 2.5 from my old machine running Windows 3.1. This didn't work under Windows 95 and so I deleted it.

GEORGE DEETH

a This is a legacy from your Windows 3.1 days. If you open the file SYSTEM.INI, which you'll find in the Windows folder, with Notepad, you'll find, somewhere near the

beginning, the line: system.driv=atmsys.driv Change this to: system.driv=system.driv This will stop the Adobe Type Manager loading and you'll be able to delete the files.

Q I've bought an ex-demo PC with Windows 98 pre-installed (I was also given the original CD). I find my Windows folder is 426Mb, with 166Mb in a sub-folder called Options. 165Mb of this is in another sub-folder called Cabs, which in turn has other nested folders.

Could you tell me if it's safe to delete these folders?
DERRICK LEWIS

a It sounds very much as if the Cabs sub-folder contains the Windows installation (.CAB) files: you can verify this by comparing the contents with that of the Windows 98 folder on the CD-ROM. As you have the Windows 98 CD-ROM, you don't need these copies on your hard disk and can safely delete them.

Q Whenever I install new programs on my PC, the name of the store manager and company where I bought my PC come up as defaults in the installation dialogue box that asks for my Username and Company. Could you tell me how I can change these defaults?
DERRICK LEWIS

a You need to change some registry settings, so back this up first. Then run Regedit and go to Regedit and go to HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion. The keys you want are in the right-hand pane. Look for RegisteredOwner and RegisteredOrganisation: you can double-click on either to change it.

Q I still can't get Windows to remember my dial-up networking password, despite following your suggestions in June 1998's PCW and downloading and installing the appropriate upgrades.
CLIVE BRITTEN

a This can be due to a problem with the encrypted password file that Windows maintains. First, make sure you have a written

record of all the passwords you use. Then delete the file username.pwl. You'll find this in your Windows folder, with username being what Windows knows you by. Next time you enter a password, it should then be remembered.

Q I installed some BT Internet software and it has changed both my desktop and the appearance of Windows Explorer — in my opinion, for the worse. How can I get back to the standard Windows 'look and feel' without uninstalling the software?
JANE TELFORD

a Under the Start menu, Settings item you'll see some new choices. If you click on the Folder Options, you'll



see three options in the General tab. Choosing Classic style will restore the Windows 95 look we know and love. You may also need to untick View as Web Page from Start, Settings, Active Desktop, and right-click, then Refresh on the Desktop itself.

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Double spaced

Roger Gann shows you how to **make the most** of DoubleSpace.

Although FAT32 (and, I guess, dirt-cheap multi-gigabyte hard disks) have put paid to disk compression software, both MS-DOS 6.x and Windows 95 came complete with drive compression software in the shape of DoubleSpace (latterly DriveSpace). It wasn't a total solution, nor as fully featured as its principal rival, Stacker. Some of its shortcomings were relatively easy to overcome, so I've decided to devote this month's column to listing a few DoubleSpace tips, plus a couple of handy floppy-disk related DOS tips prised from the archives.

■ Defragmenting

Microsoft gives you two ways of defragging a DoubleSpaced drive. Neither is quite the same sort of defragging you get with an ordinary defrag on a non-compressed drive. There are two methods: one is to run DBLSPACE/DEFRAGMENT; the other is to run the normal defragmenter,

DEFRAG.EXE. You might think this program would give the best optimisation of DoubleSpace, but you'd be wrong. All it optimises is the contents of the compressed volume file (CVF), not the CVF itself.

Running DBLSPACE/ DEFRAGMENT improves matters slightly. It moves data within the CVF so all the free space is at the end, but it still doesn't defrag the CVF. Files aren't made contiguous, they're placed in one group at the front of the drive, so it doesn't defrag the compressed drive.

Sometimes it's necessary to enter DBLSPACE/DEFRAGMENT /F, as DBLSPACE/DEFRAGMENT fails to make all unused sectors contiguous.

Here's a suggested sequence to properly defrag a DoubleSpaced drive.

- **Run DBLSPACE/DEFRAGMENT** to defragment the CVF.
- **Run DBLSPACE/DEFRAGMENT /F** to move all the sectors to the end of the disk.
- **Run the defragmenter** with the /F

parameter, DEFRAG /F, to move all the data to the end of the CVF and then back to the front.

Once both defragmentation types are done, your DoubleSpace drive will be almost fully optimised. Even so, files are contiguous only on the virtual drive (drive C) but not within the CVF. The only way to defrag it "properly" is to buy Norton Utilities.

■ Changing DoubleSpace ratios

Sometimes, DoubleSpace won't let you reduce the compressed drive size nor lower its estimated compression ratio (ECR). Often this is caused by an entry at the very end of the File Allocation Table (FAT). These could be lost allocation units at the end of the compressed drive, heavily fragmented files on it, or, more likely, a file (with Hidden and/or System attributes set) stored at the end.

The first two can be fixed by judicious use of CHKDSK /F and DEFRAG /F /H. Check for the third by using this convoluted DIR command:

```
dir c /s /as /p <CR>
```

DEVOTED TO DOS



Some great DOS tips are yours for the asking. There are plenty of decent web sites devoted to DOS (and other operating systems) hints and tips. There's Interloper's at

www.geocities.com/ResearchTriangle/6701/dostrick.html and Computer Tips at www.computertips.com/windows/windows95/DOS/ahedder.htm.



HARD DISK HEALTH WARNING

I am indebted to a couple of eagle-eyed readers who have brought to my attention to a potentially dangerous situation that could occur as a result of something I wrote in my January 1999 column. While the instructions I listed hold true for Windows 95 A, they don't for Windows 95 B, aka OSR2 or Windows 98. It seems that if you were running a FAT32 partition and performed some of the

hacking I detailed, to install a previous version of MS-DOS 6.2, you could wind up with a severely mangled hard disk. I guess I wasn't thinking straight, as the only caution I raised was that such a hack wouldn't work on 'multi-gigabyte FAT32 partitions' because DOS cannot recognise partitions in excess of 2.1Gb. Of course, it doesn't matter what size the partition is: if you've installed a FAT32 partition, then any

operating system based on FAT16, as MS-DOS is, won't be able to see it. So, if you performed the hackery outlined in that column and attempted to dual boot into MS-DOS, it would result in a one-way trip to a non-booting hard disk. The solution to this problem would be to boot from a FAT32 Windows 98 Startup disk, restoring the correct operating system using the SYS command.

Typically, "rescue" programs such as MIRROR.COM, IMAGE.EXE and UNDELETE.EXE write to the end of the FAT. They store key partition data in a safe place, i.e. at the end of the disk. Hidden data files are left in place so you have to delete them before resizing your DoubleSpace drive. Use the ATTRIB command to alter the files' attributes, like this:

```
attrib -r -s -h -
c:\mirrorsav.fil <CR>
```

If you're using a delete-tracking program, you may need to disable it before doing this. Then run the defrager on the compressed

```
drive:
defrag /f /h -
<CR>
```

You should be able to lower the ECR on the DoubleSpace-compressed drive.

Now reset the file attributes you altered:

```
attrib +r +s +h -
:\mirrorsav.fil <CR>
```

■ Selective DoubleSpace drive use

Sometimes you might want to use DoubleSpace-compressed floppy disks without compressing your hard disk, but when you run DBLSPACE the initial setup screen has no option to do this. If you try and mount an already-compressed floppy disk with DBLSPACE /MOUNT

<drive:>, you receive the following message: "There are no more drive letters reserved for DoubleSpace to use. To add more drive letters, choose the Options command from the Tools menu."

The workaround is to create a DBLSPACE.INI file in the root directory of your startup drive, which causes DBLSPACE.BIN to remain in memory after startup.

One way is to create a tiny DoubleSpace drive on your hard disk. Do this by specifying the amount of free space on the host to be a value close to the size of the hard disk. You then use

Some games read directly into video RAM, which isn't guaranteed to be readable

```
DoubleSpace to delete this new volume:
dblspace /delete <drive:> -
<CR>
```

```
This can be done manually. First,
create a DBLSPACE.INI file with EDIT.
It should have just two lines:
MaxRemovableDrives=2
LastDrive=F
```

```
Then copy DBLSPACE.BIN from your
DOS directory to the root directory of
your hard drive. You can now use
compressed floppy disks. To compress a
floppy disk in drive A:, type:
dblspace /compress a: <CR>
```

```
To access an existing compressed
floppy in drive A:, type:
dblspace /mount a: <CR>
```

■ Games and DoubleSpace

Some old MS-DOS-based games may not display video output correctly when the DoubleSpace program, DBLSPACE.BIN, is loaded. This is because the DoubleSpace decompression code requires the buffer, into which it's reading, to be readable so it can scan back for expanding repeated strings. Some games read directly into video RAM, which isn't guaranteed to be readable. The only solution is to install your MS-DOS-based games on your uncompressed host drive. Then, when you start MS-DOS, press CTRL+F5 or CTRL+F8 when the "Starting MS-DOS" prompt is displayed, to start your PC without loading DBLSPACE.BIN.

■ Diskette change-line fix

If you have a 3.5in floppy disk drive attached to an XT-class computer such as the Amstrad PC1640, you might have come across this problem. When you change disks and use the DIR command, you may see the directory from the previous disk. This fault manifests itself during a program install, when it infuriatingly prompts you to insert the second disk even though you already have. It occurs because MS-DOS assumes the 3.5in drive has change-line error detection. Most 3.5in drives do provide change-line support: if you remove a disk, this change should be signalled to DOS via the "change line" hardware on the disk drive. However, due to limitations in the ancient XT architecture, the change-line signal is not passed to MS-DOS.

Adding a DRIVPARM command to the CONFIG.SYS file may help. An example, which modifies a 720Kb Drive B, is:

```
DRIVPARM=/D:1 /F:2
```

Note that I've omitted the /C change-line support switch. When MS-DOS updates the drive parameters, it may remove the change-line support requirement. The ultimate solution is to install a floppy-drive controller and BIOS which fully support change-line error detection.

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Remote control

Andrew Ward looks at ways of **administering your server from a distance.**

A common complaint directed at Windows NT is that many of the tasks required for administering a server require that you actually sit at the server itself. Although this is true, there are a surprising number of ways to administer servers remotely. For example, many administrative tools work across the network: amongst others, Windows NT Diagnostics (winmsd), the Performance Monitor and the Event Viewer.

These tools have one thing in common: they don't allow you to do any administration because they're read-only. And, in the Unix world, utilities like Telnet, rexec and rsh allow you to readily run programs on a remote system, greatly facilitating remote administration. Clients for these services are available for Windows NT (I think they are all shipped as standard) but out-of-the box there are no corresponding services.

To solve this problem, there are many utilities provided with the Windows NT 4.0 Server Resource Kit. Since there are so many of these, it is worth looking at the capabilities and limitations of each before we look at the most interesting technique.

Command performance

RCMD, the Remote Command service, is provided with the server version of the resource kit and provides a secure, robust way to remotely administer and run command-line programs. You'll need to install the server component, RCMD SVC.EXE, as in Fig 1. If you configure it to autostart, the service will

be running whenever the system starts up, whether or not a user is logged on locally.

To open a remote session from a workstation, type RCMD, then the server name at the prompt, or put the server name on the command line, as follows:
`rcmd \\VEGAS`

You can also use RCMD to execute a single command by appending it to the command line, as follows:

`rcmd \\VEGAS net stop rsh`

You can connect up to ten clients to the remote command service on a server, and each one will operate independently of the others.

Security works in the following way.

The logged-on user must have interactive log-on privileges, which you have by default, on the target computer

in order to connect to it. Any programs executed on the target computer are executed as if you were logged on to the local computer itself.

The only programs which will work with RCMD are those which use STDIN, STDOUT and STDERR for input and output. This is an interesting way of discovering horrible inconsistencies with Windows NT. For example, TLIST /? will not work with RCMD although other TLIST operations do, yet NBTSTAT /? works fine. Those programs which use the Win32 Console API and MS-DOS programs will not work.

REMOTE is intended for running specific programs on a remote computer. It requires you to set up a session on the remote system for the particular command line you want to run. You can then initiate it from the client. As this involves setting up each session from the remote system, it's useless for remote administration. It is primarily intended for things like running a compiler on a remote machine to avoid loading your own processor while you get on with something else.

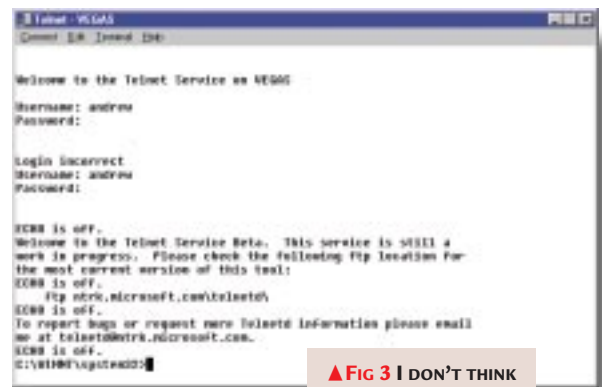
Starting a session

To start a session on the remote system, type the code shown in Fig 2. In this example, I've used cmd.exe as the command that will be run purely for demonstration purposes. Of course, if you do execute cmd.exe, it allows remote administration because you end up with a command window. To connect to a remote session, type:

`remote /C VEGAS sessionname`

REMOTE offers no security, so starting the REMOTE server leaves the system open to anyone with a remote

There are a surprising number of ways to administer remotely



▲ FIG 3 I DON'T THINK USING MICROSOFT'S TELNET DAEMON BETA COULD BE CLASSIFIED AS A RICH USER-EXPERIENCE

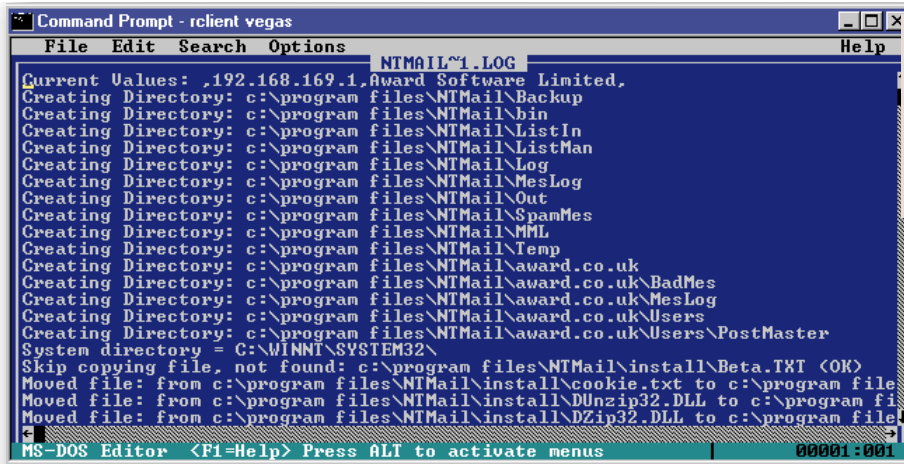
client who knows the session name. Like RCMD, REMOTE can only be used with command-line applications.

Telnet like it is

The point about the Telnet Server Beta provided with the resource kit is that it allows remote administration of a Windows NT system from other

[FIG 1]
 Installing the server component:
`instsrv rcmd "c:\program files\reskit\rcmdsvc.exe"`

[FIG 2]
 To start a session, type:
`remote /S "c:\winnt\system32\cmd.exe" sessionname`



◀ **FIG 4** YOU CAN EVEN RUN DOS PROGRAMS THAT CARRY OUT DIRECT SCREEN WRITES WITH THE REMOTE CONSOLE

with a Data Encryption Standard (DES) algorithm if both client and server are running Windows NT 4.0.

- Because video

memory changes can involve large amounts of data, rclient features an option to automatically tune the data rate to the speed of the link, say if you're connecting via RAS.

- Another security feature is that only members of the 'Administrators' group can connect to the remote console server by default. But under NT 4.0, a new group called RConsole Users is created, and you can modify its members. Administrators can always connect, regardless of how you set up this group.

➔ **Shelling out**

A remote shell service, the server side of the TCP/IP utility RSH.EXE, is provided with the NT Server Resource Kit. To

install the service, use the command shown in Fig 5 or as appropriate for your system. Then, start

the service with this command:

```
net start rshsvc
```

Like Telnet, this allows access to a Windows NT server from a variety of different platforms, since RSH exists for nearly all major operating systems.

platforms such as Unix. Unfortunately, the beta is flaky [Fig 3, p233]. If you really want to run it, you must first install the Remote Session Manager: run the Network Control Panel, select Services, click on Add and then Have Disk, and specify c:\program files\resource kit\telnetd (or wherever you've put it); select Remote Session Manager from the list. You also need to install the Telnet service (TELNETD.EXE) in the same way.

Telnet is restricted to running command-line utilities, scripts and batch files that use STDIN, STDOUT and STDERR, but the only sure way to determine whether an application can be successfully run in a Telnet session is to try it. It is possible to run some graphical programs using Telnet; a surprise for any local computer on the server, as that is where they would pop up.

➔ **Console service**

The Remote Console (Rconsole) RCLIENT application [Fig 4] works much like the others, by running a CMD session on the remote system, but the server notifies the client of changes to the video memory within the console session rather than redirecting standard output. This won't run graphical programs but it will work with command-line programs which use video memory, such as Edit.

Here's how you install the remote console service on a server. Go to the Network Control Panel and select the Services tab. Click on Add, Have Disk and specify C:\NTRESKIT\RCONSOLE

if that's where you've put it. Select Remote Console Server and click OK. To run the client, type rclient and the server name: rclient \\VEGAS

➔ **Security matters**

Security receives a bit of attention with the remote console. There's a client-side

[FIG 6]

Control security with this:

```
c:\winnt\system32\drivers\etc\rhosts
```

command-line option to encrypt all data sent, but this only works if both ends are running Windows NT 4.0. Apart from that, the remote console client does work on other versions of Windows NT. Note that this /encrypt is not supported on the French version of Remote Console (yes, really).

- A restriction of other remote command-line utilities is the inability to make network connections. With the remote console, a client-side command-line option /logon allows you to specify that the CMD.EXE process executed on the server has a logon ID and can make network connections. This /logon option encrypts the password sent over the network



▶ **FIG 7** THE COOL WAY TO PERFORM REMOTE SERVER ADMINISTRATION

[FIG 5]

Install a remote shell service with:

```
rshsetup "c:\program files\reskit\rshsvc.exe" "c:\program files\reskit\rshsvc.dll"
```




Security is controlled by setting up the file shown in Fig 6 (p235). Be sure to note the full-stop preceding the filename. The .rhosts file has a list of machine names followed by users from that machine who are authorised to use rsh. Rsh is not intended for use with interactive commands, and can't be used to initiate an interactive session using cmd.exe.

Web Administration

All the command-line utilities allow you to perform remote administration, but there's a learning curve involved. You have to learn what commands to type in, to perform administrative tasks. If I were paying a network administrator, I'd rather their time were spent on more productive tasks than having to memorise lists of commands. With Web Administration [Fig 7, p235], a free download from Microsoft's web site, you get an interactive graphical administrative interface that looks much like the standard control panel applets.

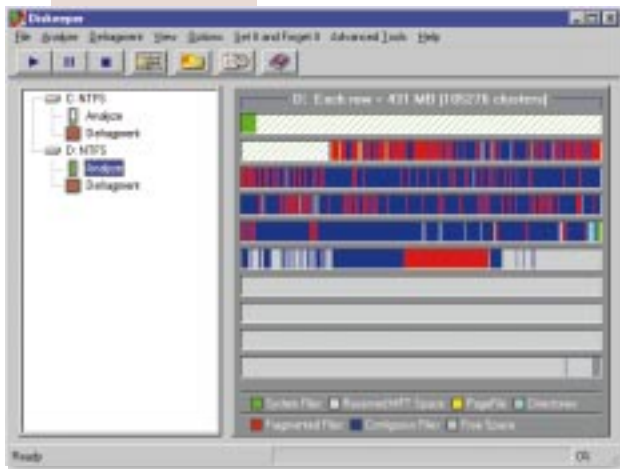
Before you can implement Web Administration, you need IIS 4.0 installed on the server although the minimum installation will do. (Remember to re-install your latest service pack after installing IIS 4.0 or other components from the option pack.)

To find Web Administration for Windows NT Server, go to www.microsoft.com/NTServer and select Downloads. Choose to download 'Web Administrator 2.0 for Microsoft Windows NT Server 4.0'. Once installed on the server, something that Web

▼ Fig 8

**DISKEEPER 4.0
WILL DEFRAGMENT
WINDOWS NT
PAGING FILES**

Administration will do for you is install the Remote Console client software.



SERVER OR DOMAIN CONTROLLER?

Reader John Gresham has installed NT Server 4.0 to replace Windows 95 on a server and is naturally delighted the system is now 'working perfectly, very reliable, and no longer crashes daily as it did under Windows 95'. Yet he raises the question of whether he should have installed NT as a Primary Domain Controller (PDC) or a Standalone Server. The client systems are Windows 95 and he's installed Windows NT as a Standalone Server; hence the network is operating as a workgroup rather than a domain.

John is correct in assuming a fresh install

of NT would be necessary to change the status from server to PDC, but is this necessary? Well, in his environment there's very little to choose between them, so John may as well stay with the current configuration. If the clients were NT, then a PDC would be more convenient than a server, simply in order to save having to maintain user accounts in both the workstations and the server. But this argument assumes a static environment. If the network were to become a critical computing resource, the server would need a backup, and one way to administer this

arrangement would be via a PDC and a BDC (backup domain controller). Similarly, if the number of users were to increase substantially, additional servers may be necessary to handle the logon requests. You might also want to allow some granularity in granting administrative rights over departmental resources.

With Windows NT 4.0, this can be accomplished by implementing multiple domains with the appropriate trust relationships. If the workstations were to be changed to Windows NT, implementing a domain would simplify administration.

To use it, navigate to ntadmin on your server from within Internet Explorer: <http://VEGAS/ntadmin>.

This raises the question of why you wanted to administer the system remotely in the first place. The most common reason is because the Internet Information Server has stopped or crashed and in these circumstances Web Administration clearly isn't going to be much use.

Defrag time

Executive Software continues to find ways of improving its Diskkeeper product for NT defragmentation [Fig 8]. The latest release, version 4.0, will defragment the NT paging file (version 3.0 introduced the ability to defrag and consolidate directories). If you have a maintenance contract, you're entitled to a free upgrade to Diskkeeper

4.0 and by now you should have automatically received the new software. If you purchased Diskkeeper for NT 3.0 after 1st September 1998 you're also entitled to a free upgrade to the new version, available from your reseller.

Diskkeeper Lite, a cut-down version, is available as a free download. You can download the full product but it will expire 30 days after you have installed it. Expect to pay around £41 for a single-user copy of Diskkeeper version 4.0 for Windows NT Workstation, or £213 for the Server version. To download Diskkeeper Lite or a trial version of Diskkeeper, visit www.execsoft.co.uk.

PerfectDisk is a better defrag tool for relatively stable systems, but on a system like my own, with frequent installation and removal of applications, upgrades, service releases, service packs and patches, Diskkeeper is a much better bet.

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Language lesson

Easier than you think: Mark Whitehorn shows you how to **program your Psion.**

OPL is the built-in programming language for the Psion. It has been there from the first Series 3 and is on the Series 5. I have received multiple requests for help with getting started using OPL, including this one from reader, Jamie Ingilby <jwffingilby@hotmail.com>.

'I have a friend with a Siena who is drastically puzzled by OPL programming even though we are both very at ease with other languages. My friend is not prepared to buy a big book and is wondering if there are any other ways of approaching OPL, or even whether you could get him started?'

So, if existing programmers want to learn OPL, is there any point in non-programmers giving it a go? Yes — it's fun! Programming is the biggest and cheapest game you can play on a computer. Most games are about overcoming hurdles, repeating a move until you get it cracked:

Programming is the biggest and cheapest game you can play

programming's like that. If it works first time, it's no fun; the thrill comes from beating the bugs. The only problem is that getting started can be difficult, hence this introduction which comes with a couple of warnings. One is a health warning — programming is highly addictive. The other is that this OPL series is an introduction so

CALENDAR CONUNDRUM

Readers Peter Sheldrake <PeteShel@mcmail.co> has a problem with dates. He writes: 'I recently purchased an Ericsson MC12 which I upgraded to CE2. I'd like you to test and comment on what follows. I know this occurs on MC16s and HP360s but I don't know about other machines: Go into Calendar and then to April 1999. Enter a full-day event for Monday 5th and exit Calendar. Next go into Month at a Glance, go to April and check your entry: if it is listed for Monday, OK; if it is Sunday, then you have the same problem as me. Also, the data transferred to Microsoft Schedule is similarly incorrect. Ericsson has checked and admitted that it gets the same problem.'

This is an interesting one. I tried this on my trusty HP620 LX and it didn't display the fault described.

- If readers want to try this on their machines and let me know, I'll compile a list of affected machines and we can try to work out whether it is machine-specific or CE version-specific.

you will not, by the end of it, be writing Tomb Raider 98 for the Psion although you will be writing words to the screen, making the Psion play crude tunes and maybe writing simple text-style games.

But then, that's where everyone starts — even those who write flight-simulator programs. I'm going to assume you are using a Psion 5 but if you have one of the 3 series, including the new MX, the steps will be much the same, so I'll throw in Psion 3-specific information where appropriate.

- 1 From the Extras menu** select Program (which has an icon, OPL) and a fairly blank screen appears [Fig 1]. On a Psion 3, select the OPL icon from the System menu.
- 2 You are looking at** the bare bones of what is known as a procedure — hence the word 'PROC'. Large programs can be split into multiple procedures, a process that makes maintenance easier. Small programs don't have to be subdivided in this way so they usually consist of a single procedure, as will be the case for our program.
- 3 Every procedure** has to be named, so call this 'Penguin' or whatever

you fancy. Do this by adding a name after the word PROC and before the colon that should appear at the end of the first line. Your

► **FIG 1 THE OPENING SCREEN FOR OPL PROGRAMMING**
▼ **FIG 2 THE COMPLETED PROGRAM**

```
PROC Penguin:
  AT 5,5
  PRINT 'Hello World'
  PAUSE 40
  ENDP
```



program should look like this:
PROC Penguin :
ENDP
The colon at the end of the first line is

important, as the program will not run without it. These two lines define the start and end of the procedure and the program will then be contained between the lines.

4 It is traditional for the first program you write to be one that puts the words 'Hello World' on the screen. Failure to obey this tradition will have absolutely no effect at all. Your life won't be blighted and your teeth won't fall out. But why not do it anyway?

Add this:

```
PRINT "Hello World"
```

into the space between the two existing lines. Congratulations! You have completed your first computer program on a Psion. All you need to do is translate it (see 'What is OPL?', right) and then you can run it. Press the Tran button, which should be visible on the right of the screen, or press Ctrl-L. On the 3 series, select Prog, Translate from the menu system or use Psion T.

5 If you have made any mistake at all in the program (perhaps leaving out the first ") then your Psion will lock up completely and have to be returned to Psion for a new motherboard... OK, that's a lie, but I bet it bumped up your adrenaline level fractionally!

Programmers make mistakes all the time without doing any damage. All that will happen is you will be told there is a 'syntax error' and the cursor will move to the approximate area where the problem lies, so you can fix it.

Once the program contains no syntax errors, the Psion will be able to translate it and will then ask if you want to run it. Answer 'Yes', and it will run. You will have to watch carefully though, as the words appear only briefly on the screen. No problem. We simply need to ensure that the program pauses for longer so we can read the magic words. Modify the program as follows:

```
PROC Penguin :
    PRINT "Hello World"
    PAUSE 40
ENDP
```

If you run this program (Ctrl-L followed by 'Yes') the words will remain on screen for about two seconds because the numbers after the word PAUSE tell the Psion how many twentieths of a second the pause should last.

6 Putting values after commands is a common way of modifying their behaviour. For example, you will

WHAT IS OPL?

OPL stands for Organiser Programming Language – the Organiser was the progenitor of the Series 3, 3a, and so on. It is a derivative of the BASIC language and both use a restricted subset of the English language. OPL consists of 'commands', such as PRINT and AT, and each has a specific meaning. For example,

PRINT means 'write the following words to the screen'. OPL is derived from English so humans can understand it, but sadly the Psion processor speaks machine code, which is a more terse language consisting entirely of binary numbers. The good news is that the Psion can translate your OPL program into a form the processor can

use. So, after you have written your program, you will have to translate it before you can try running it. The majority of shareware programs for the Psion are written in other languages, such as C, which can do this translation step more efficiently, but OPL is a great place to start programming, to see if you like it.

AN EASY WAY INTO OPL

For those readers who would like a gentle introduction to OPL programming, here is a helpful pointer from a reader. 'I saw the item about someone wanting a dummy's guide to OPL programming. Well,

here it is. The address is <http://members.xoom.com/wireplay/opl.html>. I hope people like it.'

SPANGLE

ANGO@MELLOWPARENTING.DEMON.CO.UK

The web site 404'd on me when I tried it, but

it may nevertheless be worth giving it a go.

- A decidedly less volatile source of information is the PsiWin CD-ROM, which has an OPL manual in both HTML and Word Doc format.

A WEB SITE FOR DOSSERS

Reader Mark Gardiner, at 100550.3170@compuserve.com, writes: "I know that the tide of WinCE is now overwhelming, but many original DOS palmtop users still remain faithful to their HP LXs and, like me, to their Sharp PC3000s. I have spent a great deal of time developing the functionality of my Sharp PC3100 and have published all my positive

findings and successes on my web page at www.geocities.com/SouthBeach/Strand/3387/home.html. I believe this information may be useful to many potential PDA or palmtop owners who perhaps cannot afford the current WinCE prices but could easily pick up an earlier DOS machine cheaply and equip it to be a productive mobile tool. I get a lot of response

from students in particular and am able to help them get started."

I am not convinced that domination by WinCE is inevitable. Psion is looking powerful at the moment, but whichever 'wins', DOS machines will be around for a long time to come. As an ex-DOSser myself, I recommend Mark's site to anyone who is still using a DOS-based PDA.



TIPS AND TRICKS

➔ **Cheap Psion-PC cables** was a subject I covered in the December column. Reader Alan Young <alanyoung@usa.net> writes: 'I caught the tail end of the "Psion Sense" item where you stated: 'you have to shell out for PsiWin if you want the connector cable"... Well, actually, no (puts on anorak and adopts smug expression). You can find all the details for making a cable and of a supplier for the special connector at www.sp.phy.cam.ac.uk/~jrb25/psicable.html. I didn't put it there, but I did use it to make a cable — and it works. It isn't cheap, but it costs less than PsiWin and is more satisfying than giving money to Psion for a product you don't really want.'

Thanks, Alan. That page is run by Justin Buckland who works at the Cavendish Laboratory at Cambridge.

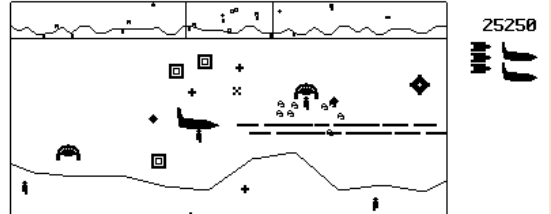
➔ **Changing fonts on the Psion.**

Reader Andrew Bovett <a_bovett@csi.com> advises: 'In your December column you printed a GeoFox tip for changing the default font and commented that you had a problem doing it on a Series 5 because drive Z is read only. Here is how you do it.'

- Go to Z:\system\apps\word. You will find a word document called "Normal".
- Copy it to C:\system\apps\word.

▶ **FIG 4** REMEMBER, REMEMBER, THE WONDERFUL DEFENDER...
▼ **FIG 5** ...AVAILABLE FOR THE SIENA, AS WELL

Mark Wheadon's Defender



➔ **'PDA users may like to know** that HENSA, the Higher Education National Software Archive, holds a current mirror of the software site PDACentral,' writes Sally Hadland <s.hadland@lancaster.ac.uk>.

Then open the copy you have just created and use the Style Gallery to change the font assigned to the "Normal" style.

- Now exit the file. The next time you create a new Word document, this file will override the file on Z (due to the search order, Z is searched last) and you will have a new default font.

Other preferences can be altered in the same way. Nice one, Andrew.

▼ **FIG 3** PDA CENTRAL — PILOT, NEWTON, CE AND PSION ARE ALL REPRESENTED



'We're currently the only official mirror of this site in the UK. It contains various shareware and public domain software for the Psion (Siena, 3 and 5), PalmPilot, Apple Newton and Windows CE. Each software item has a description and a rating to help users with their selection of software. As the site is UK-based, download times are significantly faster. The address is <http://hensa.pda-central.com/>.'

If this column had a star letter award, Sally's email would receive one. This site [Fig 3] is fantastic for UK users. Not only does it have a huge number of free and shareware programs (a tiny sample is on our PCW CD-ROM) but it also has links to other sites. For example, at Mark Wheadon's site <www.cs.ukc.ac.uk/people/staff/mcw/php/shareware.html> I found Defender for the Psion! Yes, that beloved chestnut from the BBC is alive and well on the Psion [Fig 4] and Mark's zipped file is on our cover CD for your pleasure. He even does a version for the Siena [Fig 5].

have noticed that the words 'Hello World' appear at the top left-hand corner of the screen. The AT command modifies this position, so the program shown in Fig 2 will move them down and to the right.

➔ **Homework**

Your homework this month is to find out the following:

- Does the first number move it down or to the right?
- What values do you need to put the words in the centre of the screen?

PCW CONTACTS

Mark Whitehorn welcomes your feedback on the PDAs column. He can be contacted via the PCW editorial office (address, page 10) or you can email him at pda@pcw.co.uk



Back in the old routine

Chris Bidmead knocks the **cron daemon** into shape for more efficient system backup.

I don't write nearly enough about backup in this column. You can't get enough of the stuff. But having said that, I confess I haven't exactly been methodical about backing up my own system here. I do it when I feel like it — which is quite often. But it should really be a job for the cron daemon. It takes a little organising, but I'm beginning to get into shape.

Actually, the way I'm going about things isn't too silly. I strongly believe in running routines manually first, until you understand them and have checked they're doing what you intend. Then you can encapsulate them into scripts. Yes, you can write scripts straight away if you're really sure of what you're doing, but I'm not in that position. So I'm still currently doing manual primary backups of the whole system, or at least those parts of it that I can't recover from CDs. However, I've started automating the incremental backup — the files that are changed or added between each primary backup. To do this I've adapted a script that comes with the GNU tar distribution.

Fig 1 is my version, called `incr`.

The **tar part of this script** is actually a single line — note the use of the backslash to lay it out in an easy-to-read way. You'll see how the script uses the `$then` and `$now` local variables to write a Volume label (the `-V` switch) to identify the session. My `tapelist` script [see p243] can

[FIG 1]

```
#!/bin/bash
# (based on Dump thingie from tar.info)
# CHB 21 Nov 98
# assumes date.last.backup contains the date
# of the last backup (but you guessed that).
#
# set up environmental variable TAPE
# (which mt and tar take as their default)
TAPE=/dev/nst0 ; export TAPE
# Yes, you have to be specific about this if
# cron is going to be running this, 'cos cron runs
# in its own environment.
# set up some local variables
statefile=/var/state/date.last.backup
now=`date`
then=`cat $statefile`
# find the end of data on the tape
mt eod
# create, incrementally, preserve permissions, -
# be verbose
tar -c -G -p -v\
-N "$then"\
-V "Incr: $then to $now"\
/home/bidmead\
/mnt/james_ii/update\
/mnt/james_ii/bidsown\
/mnt/james_ii/to_be_in\
/mnt/abbott/wells_d/accounts
# update the state file
mv $statefile $statefile.old
echo $now > $statefile
```



Drop of the hat

A BIT OF A TEASE, THIS PICTURE. READER ANDREW SARGENT <ANDREWSARGENT@HOTMAIL.COM> WROTE TO SAY HE CAN'T READ THE RED HAT DOCUMENTATION FROM WINDOWS 95. SURE, SOME OF IT IS GZIPPED, BUT THERE ARE VERSIONS OF GZIP FOR WINDOWS. AND MANY OF THE DOCS ARE HTML, WHICH, AS YOU CAN SEE, MICROSOFT EXPLORER RUNNING ON WINDOWS NT ON MY SIEMENS-NIXDORF PRIMERGY SERVER READS JUST FINE. THE EAGLE-EYED AMONG YOU WILL HAVE SPOTTED THAT THE WINDOWS NT 4.0 DESKTOP SEEMS TO BE RUNNING UNDER KDE. IT IS. THE WORKSTATION HERE IS THE DELL POWEREDGE WITH ITS NEWLY INSTALLED S.U.S.E 5.3, AND THE WINDOWS NT DESKTOP APPEARS THERE COURTESY OF CITRIX METAFRAME.



read these labels and their associated block numbers, so I can subsequently use `mt seek <blocknumber>` to wind to any particular session. The GNU version of this script saves the date information in a file that's in the same directory as the script. Messing around with Caldera OpenLinux I discovered a world-writable directory called `/var/state` in which this kind of information can be stored. This doesn't seem to be a standard — my Red Hat installation doesn't have it — but it seems to me like a good idea, and something like this is worth setting up in whatever version of Unix you may be using.

Before installing it in the cron system, I tested the script by running it manually. You'll see that its first move is to wind the

[FIG 2]

```
#!/bin/bash
# wind through the tape stopping at each
# filemark
# to examine the next block, hopefully an
# archive
# label or a meaningful initial tarball entry

TAPE=/dev/nst0 ; export TAPE
INPUT=$TAPE
EOD="<<eod>>"
BLOCK='mt tell | cut -f 3 -d " "'
DATA='dd if=$INPUT count=1 2> /dev/null'

mt rewind

printf "`eval $BLOCK`\t`eval $DATA`\n"
while mt fsf 2> /dev/null ; do
printf "`eval $BLOCK`\t`eval $DATA`\n"
done

printf "${EOD}\n"
mt rewind
```

tape to the end of data (mt eod). This enables me to store multiple backup sessions on a single tape — handy, because my Hewlett-Packard SureStore DAT24 can put 24Gb on a DDS-3 tape.

Once sure this was all working correctly, I was ready to move the script into the `/etc/cron.d/Daily` directory. Not all Unix systems have this facility set up, although it's easy enough to organise. If yours doesn't have something like this, you'll need to add an entry for `incr` into `/etc/crontab`, the system cron file.

My Caldera OpenLinux `/etc/crontab` has an entry that looks like this (read as one line):

```
05 5 * * * root
```

```
[ -x/usr/sbin/cronloop ]
&& /usr/sbin/cronloop Daily
```

This means that at five minutes past five every day (the first * in the line) cron will run `/usr/sbin/cronloop` with the parameter 'Daily'. (For Linux users, man 5 crontab will explain how crontabs work.) On my OpenLinux system `/usr/sbin/cronloop` is a script that looks in the directory (under `/etc/cron.d`) named in the parameter and runs any executable files it finds there. I've put my own note in this directory to remind me of what's going on. (I find it very useful to leave README's around the place to help me remember how I've set things up or changed them. Some of you may alternatively be using a central logging system for this: if this works for you, tell me how you do it.)

The executables in this directory are run daily due to an entry in `/etc/crontab` which runs `/usr/sbin/cronloop`, a script. Cron won't mess with this README file because `/usr/sbin/cronloop` only acts on executables. The basic idea seems to be to put only symlinks in this directory. They have funny names beginning with numbers, presumably so they sort into a predictable order, and are run in that order. I've added (so far) `10tapelist` and `12incr`, both links to scripts of mine in `/usr/local/bin` (`/usr/local/sbin` might have been more appropriate). This will

SIR CLIVE AS THE FATHER OF LINUX

Scratching around the internet archives, I found several references to the computer on which Linus Torvalds got his early programming experience. It was a Sinclair QL, the 'Quantum Leap' machine that Sir Clive Sinclair [pictured, right]



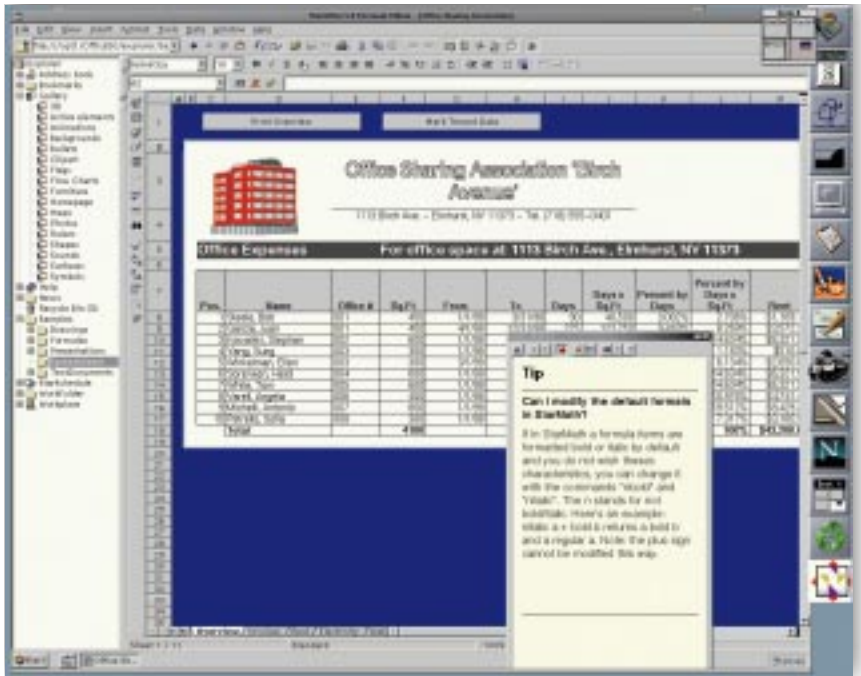
introduced in 1984 — the same year the Mac arrived. Sir Clive is mostly into ear radios and folding bicycles these days, but I thought it would be fun to ring him up and tell him about his place in the history of Torvalds' plan for world domination, in case he didn't know.

"Linux?" Sir Clive said. "What's Linux?" With the swelling din in the media these days about 'the new Windows Killer', it's becoming increasingly difficult to find anybody to bore with my favourite operating system. So Sir Clive is a godsend.

I'm planning to do lunch with him

next week and give him the full five yards — particularly as I know he's always been interested in getting back into the computer game at some stage.

But I shall have to be diplomatic about exactly why Torvalds got into low-level bit twiddling on the QL in the first place. He really just wanted to play games, but his keyboard packed up. He couldn't find another QL keyboard, so he had to write a driver for a different kind. Then he went on to do another driver to attach a PC-style disk drive: the QL came with those ingenious but dubious 'microdrive' tape thingies.



run an incremental backup each night (primary backups are still manual) followed by a list of what's on the tape, which cron will mail to me (well, actually to root, but that aliases to bidmead — see /etc/aliases).

Tapelist is the script I published here exactly a year ago. In case you missed it, Fig 2 shows the updated version.

You'll see a couple of notes about environmental variables. The warning is worth reiterating. By default, tar and md both operate on a device defined in the environmental variable TAPE. I have this set by default, and it took me ages to work out why incr worked perfectly well when run interactively but mysteriously seemed to do nothing when activated by cron. Well, I thought it was doing nothing, but my /var

incr worked perfectly when run interactively, but seemed to do nothing when activated by cron

partition kept filling up with junk of some kind. The 'junk' turned out to be the tar archive itself. Cron knows nothing about the user environment, and therefore didn't know I'd set TAPE=/dev/nst0. If TAPE isn't set, the output of tar goes to stdout. Cron helpfully emails this to the appropriate user, so the entire set of backed-up data was turning up in my /var/spool/mail directory! The solution is to set TAPE in the scripts themselves, as Fig 2.

What a star!

IT WAS RELATIVELY EASY GETTING HOLD OF STAROFFICE 5.0, THANKS TO MR BATCH FTP AT MY ISP, DEMON INTERNET FTP SERVER. I JUST MAILED FTP@DEMON.NET WITH THE URL OF THE FILE, AND DEMON'S FTP DAEMON COLLECTED ALL 65Mb OF SO05_01.TAR WHILE I WAS OFF-LINE AND STORED IT AT ITS OWN FTP SITE FROM WHICH I COULD DOWNLOAD IT AT FULL SPEED. NEXT MONTH I'LL BE SAYING MORE ABOUT STAROFFICE 5.0, HOPEFULLY RUNNING IT ALONGSIDE THE BRAND-NEW LINUX OFFICE 99 WHICH MARTIN HOUSTON IS SENDING ME.

Ring out the old, ring in the new

I've been talking to Michael Waddicor, who heads up the Bradford-based computer services company, Aquila Vision. Michael is fanatical about operating systems, and supplies Microsoft- and Unix-based solutions to his customers. But he's

been a long-time personal user of Linux, and is delighted to have watched it develop to the point where he can confidently recommend it to his commercial customers, along with full professional support. He's offering good prices on a wide range of Linux distributions, so check out his web page at <http://www.aquila-vision.co.uk/>. Michael tells me he's happy to give phone support to his Linux customers: ring him after 5pm if you want to be sure of getting through.

On a sad note, I'm very sorry to hear that Martin Houston at <http://www.deluxe-tech> has decided not to continue selling S.u.S.E Linux from his web site. He tells me it was something he used to be able to do in his spare time, but the market has now grown to the point where selling Linux is a full-time job and it's just got too much for him to handle. Martin has been a passionate and active supporter of all things Linux, and was the first person to draw my attention to the great features of the S.u.S.E distribution. Thanks for all you've done, Martin.

Installing a kernel from the boot floppy

During the YaST install of S.u.S.E. Linux 5.3, the kernel I needed to install was on the boot floppy; none of those offered on the CD-ROM would have worked (see *Linux Workshop*, page 212).

To keep the installation routine happy, I picked an arbitrary kernel from the CD; but the moment that was transferred to hard disk, I switched virtual consoles (Ctl-Alt-Fn, where n is between 1 and 6) to get to a command line prompt.

The floppy isn't mounted at all during the installation, so my first move is to create a mount point, just an empty directory called, arbitrarily, /fd, and mount the floppy there. The two commands are:

```
mkdir /fd
```

and

```
mount /dev/fd0 /fd
```

The YaST installation process has temporarily mounted the Linux root partition under the /mnt directory, so the next command I run from the virtual console:

```
cp /fd/linux /mnt
```

copies /fd/linux (the kernel on the floppy) to /mnt (which will be simply / when I go live).

I then delete vmlinuz (the kernel YaST had just installed) and rename linux to vmlinuz, as this is the kernel name that YaST is expecting. Then I switch back to the YaST installation, which now runs /sbin/lilo, setting up the low-level boot structure, and we're done.

PCW CONTACTS

Chris Bidmead can be contacted via the PCW editorial office (address, p10) or email unix@pcw.co.uk



The theme of things

Terence Green explains why you won't find any OS/2-specific reviews in this column.

Lately, several people, including reader John Hines, have asked why this column doesn't cover more third-party OS/2 software and why there are no reviews of this software in the rest of PCW. I can't speak for the Editor as to the contents of the magazine, but it would be fair to say that there is a fairly small market for OS/2-specific software, and that could have a bearing on the matter. As far as this column is concerned, there simply isn't the space to review software and do it justice.

The primary remit of the *Hands On OS/2* column is handy hints and tips, which doesn't leave much room for reviews anyway. However, I will be trying hard to keep you up to date with what's new, and as most third-party developments these days are related to device support, I'll be trying to theme the columns. I'm considering covering subjects like scanning, backup, 56K and V.90 modems, email and multimedia support with a focus on new audio drivers, MPEG, MP3 and Windows TV. Any readers who can share their

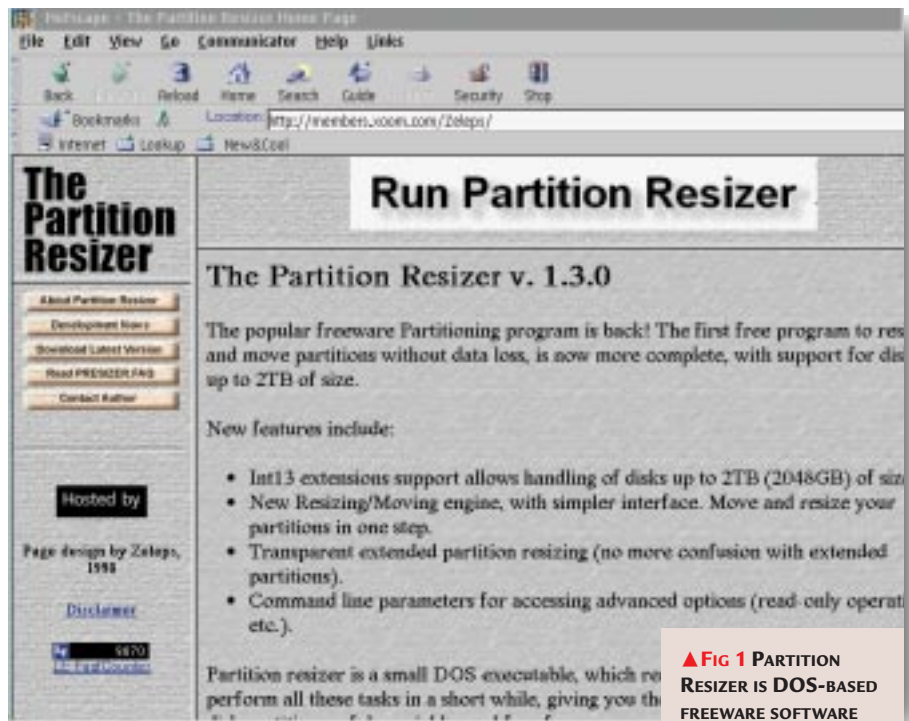
Aurora is designed to mesh with your NT application servers and to hook up your NT clients

knowledge of these subjects can drop me a line at the usual address (see the 'PCW Contacts' box, page 245).

➔ Spotlight on Aurora

Having said that we don't do reviews, allow me to contradict myself immediately with a short, potted review of OS/2 Warp Server for e-commerce, codenamed Aurora, the next version of Warp Server. The preview version came out in October and the real thing should be shipping by the time you read this.

Aurora is IBM's entry-level electronic business server, and since electronic business is a 24 x 7 application, its focus is



▲ Fig 1 PARTITION RESIZER IS DOS-BASED FREeware SOFTWARE FOR RESIZING HARD-DISK PARTITIONS ON-THE-FLY

reliability. It has everything Warp Server 4.0 has, plus more integration for Windows and NT clients, and management for NT users from within Aurora. It also has a trial version of

the Lotus Go Webserver, and the WebSphere Application Server which adds Java and CORBA support to the Go Webserver.

Aurora has a lot more Java all round, in fact, because it has a simple proposition. You probably have some Windows NT servers and clients around but may not want to buy into the Microsoft everywhere approach, which ties you into buying more and more NT servers and developing web applications that are tied to Windows NT. Aurora is designed to mesh with your NT application servers and to hook up your NT clients, but instead of developing web applications using Microsoft's proprietary system, which only runs on Windows NT, you can develop them in Java which doesn't lock you into the Aurora server.

I'm only just beginning to play with

Aurora, so more details and screenshots will have to wait until next month. If you're currently running LAN Server or Warp Server, have a look at Aurora. Amongst other things it includes all the Warp Server Fixpacks and Year 2000 fixes you need to bring your older Warp Server systems up to date, and the hardware requirements haven't changed dramatically: a Pentium 133MHz or better with 32Mb RAM and 120Mb disk space is the absolute minimum, but 64Mb RAM and 500Mb disk space is recommended. Aurora supports symmetric multiprocessor systems out of the box.

➔ One-off partitioning

I frequently extol the wonders of Partition Magic because I use it a lot, having installed Warp and Windows operating systems more times than I've had hot dinners. But reader Andrew Aylett has found some freeware drive-partitioning software which he reckons is just the job

EACH TO HIS OWN C: DRIVE

Reader Cyril Bateman has written in to follow up on the advice I gave Esmond Poynton in the November '98 column. Esmond wanted to run Windows 98 and Warp on the same PC, alongside a CD-ROM and ZIP drive, and the problem was how to keep the drive letters of the removeable drives the same in each operating system. My suggestion was to modify the drive letter assignments in Windows 98 to match those in Warp.

Cyril suggested another option, which is equally valid. He runs Windows for Workgroups and Warp, together with a couple of Syquest external drives and a CD-ROM drive. The drive letters are constant for both OS/2 and Windows because he has given both operating systems their own C: drive which is managed by OS/2 Boot Manager.

In order to do this, you need to install (or have already installed) any version of Windows on the C: drive. Then you install Warp. But instead of putting it on a logical drive, you create a second primary drive for it, from FDISK. Since only one primary drive on a physical disk can be visible at any one time, the OS/2 and Windows partitions never see each other and you select which (I'm checking this) to start from Boot Manager.

Cyril keeps all common DOS and 16-bit Windows software on a logical drive D: which is accessible from both operating systems, and the Syquest drives are always E: and F:, with the CD-ROM as G:. This is a good solution, provided

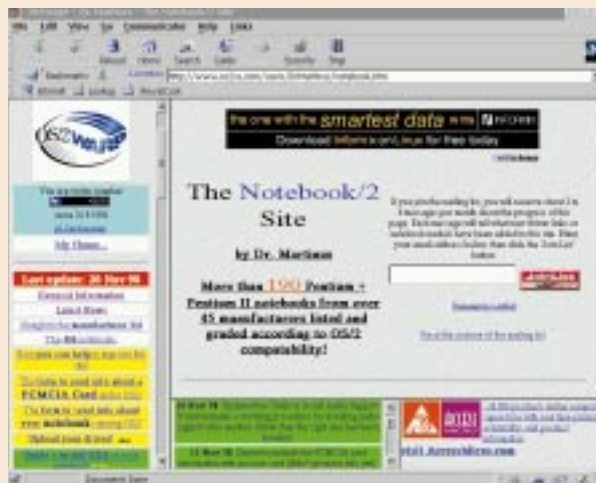
you don't at some stage want to run one of the FAT32 file systems for OS/2 which allow it to read FAT32-formatted drives. In this case, you need OS/2 to be installed on a logical partition so that it can see the Windows C: drive.

Cyril kindly included a couple of pointers to web sites which offer advice on coexistence scenarios for OS/2 Warp and Windows 95/98. They are at www.golden.net/~wfmnetcalf/Win95OS2.html and www.zeta.org.au/~jon/pharmacy/coexist.html.

Here's an interesting aside from Cyril, with reference to the communications software in OS/2 Warp which he has been running since 1994 on an HP Vectra 486/66 with slow, unbuffered serial chips. He tried internet access through Windows for Workgroups, had problems with performance, and then heard that OS/2 made better use of slow hardware. In Cyril's experience, internet permitting, he achieves transfers approaching 4,800bps with a Motorola 28.8 modem because OS/2 buffers the serial ports.

We beat this drum fairly frequently in this column because there are still many people out there running Windows 3.x who cannot upgrade to Windows 95 or Windows 98 without dramatically bumping up their system specification. However, you can still do a lot with Warp on hardware that Windows 98 deems insignificant. In Cyril's case, he runs all his communications and internet access over Warp on his 486 box.

DR MARTINUS' NOTEBOOK/2 SITE



EVERYTHING YOU ALWAYS WANTED TO KNOW BUT WEREN'T SURE WHERE TO LOOK. YOU CAN JOIN THE MAILING LIST AT www.os2ss.com/users/DRMARTINUS/NOTEBOOK.HTM TO KEEP UP WITH NEW DRIVER LINKS OR NOTEBOOK MODELS WHICH HAVE BEEN ADDED TO THE SITE

I haven't tried Partition Resizer myself and have no reason to doubt Andrew's recommendation, but I can't help feeling that for something as tricky as resizing partitions on-the-fly, there's more of a comfort zone in commercial software out there, being tested in the field and bitched about in the newsgroups.

Talking of which, the latest version 4.0 of Partition Magic no longer includes an OS/2 executable. When the news got out, it created a bit of a stir in the newsgroups and Powerquest said it would reconsider the decision. In the end, however, it did stick with its decision to drop the OS/2 executable.

for those of you who only ever need to use partitioning software once.

Partition Resizer, from Zeleps, will resize both FAT16 and FAT32 drives on-the-fly [Fig 1]. Andrew says he has tried it on both with no problems. The latest version can be found at <http://members.xoom.com/Zeleps>

(and yes, that is a capital Z — lower case doesn't work). Don't forget the cardinal rule for using this kind of software: that is, to always take a backup and save any valuable data before using any software that manipulates partitions.

PCW CONTACTS

Terence Green can be contacted via the PCW editorial office (address, p10) or email os2@pcw.co.uk



Right up tight

Tim Nott untangles the knotty problem of ligatures and distinguishes between dashes.

Despite the fact that Windows has supported the Unicode standard for several years, there's still no built-in way of seeing the complete contents of Unicode fonts. The Character Map only shows 256 characters, although if you have the Windows international language support installed you can see the Greek, Cyrillic and Central European character sets.

As far as I'm aware, the only way of seeing the entire contents of a Unicode font is from Word 97's Insert Symbol dialogue. So, the curious will be pleased to know that I have at last found a Unicode font viewer [Fig 1]. It's called Listfont, by H. Eichman: it's freeware, it takes up a mere 59Kb of disk space and it's on this month's cover disc. It's a bit rough-and-ready and you can't copy characters from it, but it's rather an eye-opener: did you know that Windows Arial and Times New Roman contain eight fractions, ligatures and box-drawing characters?

What is a ligature? It sounds frighteningly surgical but it has a precise meaning in typography. The letter pairs fi

and fl can often look awkward together, particularly in bold or italic forms, as the blob on the end of the f can be too close to the dot of the i or the top of the l. Ligatures cure this by combining the two letters into a single glyph and the blob of the f rather elegantly serves as the dot for the i.

As you can see from Fig 2 (pairs left, ligatures right), the top example (Microsoft Times New Roman) has not been very well implemented for the fl ligature, but it makes a rather better job of the Georgia typeface.

Be careful using ligatures. Few typefaces contain them, so if the font is changed you may end up with the dreaded 'blank square' character. If you don't have the Georgia font, it's available free from the Microsoft web site, as are several other typefaces. At the time of writing, the contact details were correct, but you may have to hunt about as



▲ FIG 2 LET YOUR FINE WORDS FLOW WITH LIGATURES

its sites move around from time to time, just to keep us on our toes.

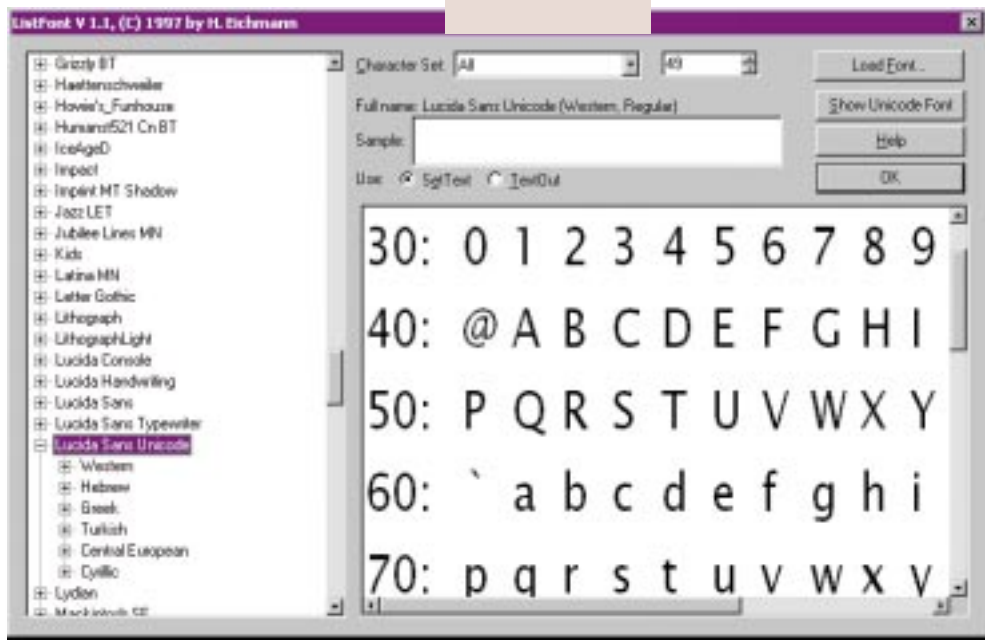
I'll be dashed

Further to the comments on hyphens, non-breaking spaces and the like, in the January '99 column, Stephanie Jenkins writes to sing the praises of the en and em dashes. These look like longer versions of a hyphen and their rather odd names come, as all Scrabble players know, from printing measures.

An em is a square whose sides equal the point size of the type, and an en is half of this. Hence a 12pt em dash is 12 points (approximately one-sixth of an

inch) long. En dashes, rather than hyphens, should be used as a substitute for the word 'to' when specifying a range or journey, such as 1939-45, A-Z or London-Paris. You can get an en dash in Word either from Insert, Symbol, Special Character or Control+minus (the key top right of the numeric keypad, not the one above P). En dashes can also be used for parenthesis - like this - and Word will obligingly AutoCorrect space-hyphen-space to space-en dash-space. Em dashes

▼ FIG 1 ALL THE GLYPHS AT LAST, REVEALED WITH LISTFONT



Questions & answers

Q While drawing in Word 97, I performed a simple task using the Snap to Grid feature. Since then, whenever I go to draw a text box it comes out at a set size, and the only way I can resize it is by clicking on Format text box and going to Size. This can be a long, frustrating process. I have reinstalled Office 97 twice but the problem is still there.

DAVE ARRO

a It sounds as if you may have Snap to Grid active and set to a fairly large size, and that these settings have

been saved into a template. Hence, new text boxes and other objects are automatically created at the grid size [Fig 3]. Open the drawing toolbar, click on Draw and select Grid... from the menu. You can then turn off the grid or change its spacing. Hitting the Default... button will make these changes permanent for all subsequent documents using the current template.

Q After typing a document in Word 97 and going on to the second page, I often find that after formatting or changing text, the document requires only one page. Word seems to leave the second page there, and thus printing produces two pages. Is there any way of deleting the second page before printing?

DAVID TURNER

a The most likely cause is that you have an unseen page break, or perhaps a succession of paragraph breaks in the document. If you go to Tools, Options, View and turn on all the non-printing characters (known as formatting marks) you

▲ Fig 3 LARGE GRID SETTINGS CAN CAUSE PROBLEMS WITH DRAWING OBJECTS

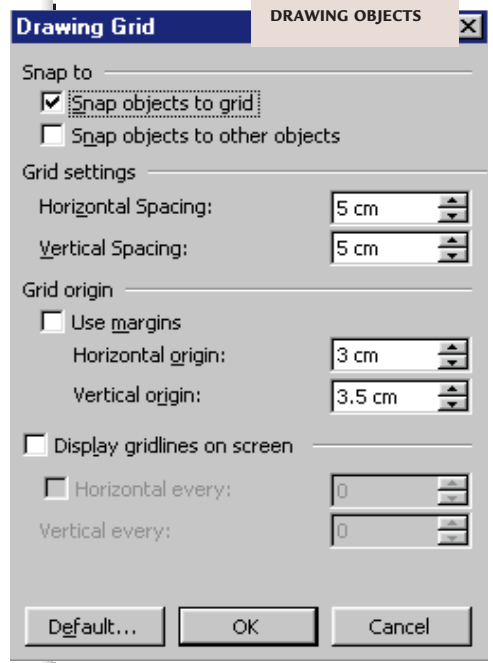


Fig 4
Sub Fax()

```
Application.ActivePrinter = "WinFax"
Application.PrintOut
Application.ActivePrinter = "My printer"
```

should be able to delete the extraneous marks which are responsible for the empty second page. If this is a regular occurrence, it's probable that the template contains the problem marks. So, to remove the culprits, edit the relevant .DOT file with the formatting marks made visible.

Q In AmiPro you can click on File Management and get a nice list of all the documents and the comments attached to each. In Word 2 and Word 6, Find File will bring up a list of all documents and clicking on any one will present document info. In Office 95 and Office 97, Find File has disappeared and you have to use Open. This is reasonable, but in both cases the comments component is seriously curtailed. Has anyone written a macro which can do in Office 95 or 97 what is built in to AmiPro?

TONY E.

a You don't need a macro, Tony. The File Open dialogue has a view option to show the properties or a preview of the selected document alongside the file list. But there's an easier way which doesn't even involve running Word. If you right-click on a

document in Windows Explorer and then select Properties, you'll get the same tabbed property sheet that you get using Word's File Properties command on an open document.

Q I've been looking for a utility that allows endnotes, which can be used with DOS-based WP programs. It must be technically possible because years ago Olivetti included one, but I cannot find one now. Could you help?

GUY MEYNELL

a WordPerfect 6.0 for DOS, Microsoft Word 6.0 for DOS and Locoscript Professional all support footnotes and endnotes. I'm not sure about the first two, but the last is still being marketed (see 'PCW Contacts', below).

Q Is there an easy, one-button way to send a fax from Word 97? The macro that came with Winfax seems not to work.

GERRY GEOGHAN

a A simple VBA macro will do the trick. Change it to suit the name of your printer as displayed in dialogues, and this will send the fax then politely restore your default printer [Fig 4].

are also used for parenthesis but usually without spaces—like this—and Word will also AutoCorrect word-hyphen-hyphen-word to word-em dash-word. Control+Alt+minus gives an em dash on demand. WordPerfect users need to go to Insert Symbol, (Control+W), 4,33 and 4,34, respectively.

There is, as Stephanie points out, a problem with en dashes in Word (but not with WordPerfect) when used in the first way. Word will allow a line to break after the dash; hence 1939-45 can get split over two lines, which looks awful. If anyone can think of a way to prevent this, glory awaits you.

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Free Microsoft fonts from www.eu.microsoft.com/typography
Locoscript 01306 747757
www.locomotive.com



The right conditions

Stephen Wells presents **conditional formatting** in its true colours.

In my email bag each month there are always variations on the question of how to have a spreadsheet automatically display a response to a specified result. Here, the Excel 97 feature, Conditional Formatting, comes into its own. At last, you can call attention to a cell based on a value in another cell.

Take a common example. Say your column A displays a list of participants in a tournament, exam, ballot or whatever, and column B shows their scores out of 100. If the score is 39 or below, we'll colour the adjacent name cell coral; scores between 40 and 64 will be coloured marine; 65 to 84, pale blue; and scores of 85 and above will be yellow.

1 Format all the cells with names in them, pale blue. This is because you can only specify three conditions at once. So we'll make pale blue the default

colour, or a fourth condition.

2 Now select the first name cell A2. Choose Format, Conditional Formatting, to display the

dialogue box shown in Fig 1. A condition can either start 'Cell value is' or 'Formula is'. Select the latter.

3 The formula must evaluate to a logical value of TRUE or FALSE.

We need the IF function and we have to enter it as

`=IF(B2<=39,1,0)`

This means that if the score in cell B1 is 39 or less, then 1; otherwise, 0. To Excel, 1 means True, 0 means False.

4 Click on Format, Patterns and pick a colour for this condition. At this stage there's an Add button available to pick a second condition. We click that and enter

`=IF(B2>=40, IF(B2<=64,1,0))` for Condition 2. If that condition is true, the background colour will be marine.

5 Finally, Condition 3 will read as

`=IF(B2>=85,1,0)`

If that is True, the colour will be yellow. Logically then, if B2 is 65 to 84, the colour will be the default condition, pale blue.

This completes the formatting for A2. Just select that cell, click on the Format Painter button, then paint down the cells holding the other names. This copies both the default format and conditional formats to those cells.

Heads and tails

Several readers have asked me how to format headers and footers in Excel 5. The following procedure will also be recognised by Excel 7 and 8 (Excel 95 and 97), although in the later versions option buttons are offered in the Header/Footer dialogue box.

You can specify a font by entering it in double quotes preceded by an ampersand. The point size is entered as &nn. So, if you want to print a company name in 12pt Curlz MT (assuming this is a font you have available) you would enter it as

`&"Curlz MT" &12 The Jones Co`

In Excel 97 you can enter the company name, or anything else, under File, Properties, Summary, Author and it will appear among the built-in headers and footers in a drop-down box. You can then choose Custom and Edit and reformat it there.

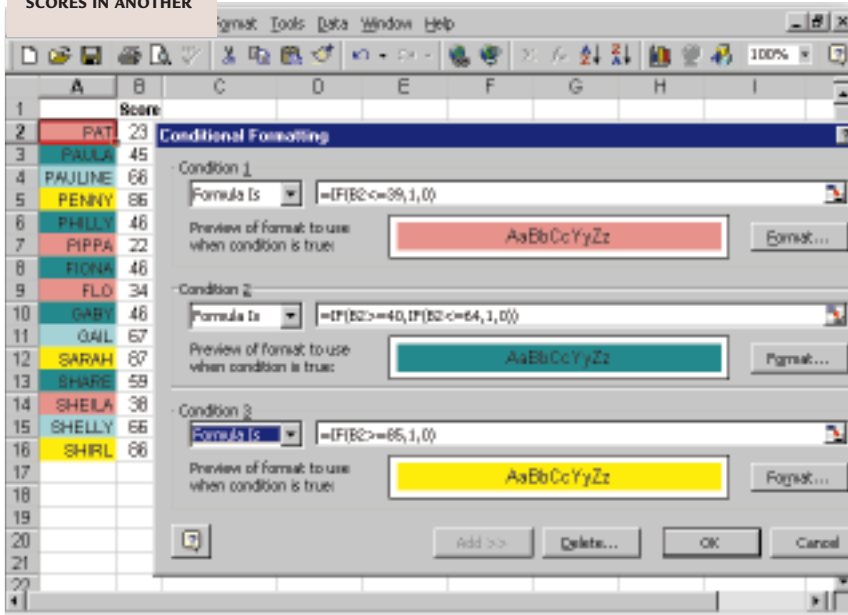
In any version, you can enter text and format it using ampersand codes:

Code	Format
&B	turns bold on and off
&I	turns italic on and off
&F	prints the workbook name
&A	prints the worksheet tab name
&D	prints the date
&T	prints the time

Items to include in headers can easily be made to appear at the top of every page — at least, in Excel 97 — by automatically printing the top one or more rows. Choose File, Page Set-up, and then click the Sheet tab. Click Rows to repeat at the top and then enter the row numbers of those to be repeated. If you want the path on every page, just enter
`=CELL("Filenam")` in cell A1 and use this option.

Remember, Filename is a keyword in the CELL function. Similarly, if you use 'Width', the CELL function will return the width of the cell in the average number of digits in the default text font for the worksheet.

▼ Fig 1 USING THE CONDITIONAL FORMATTING FACILITY, EXCEL 97 CAN CHANGE THE BACKGROUND COLOUR OF THE NAMES IN ONE CELL BASED ON THE SCORES IN ANOTHER



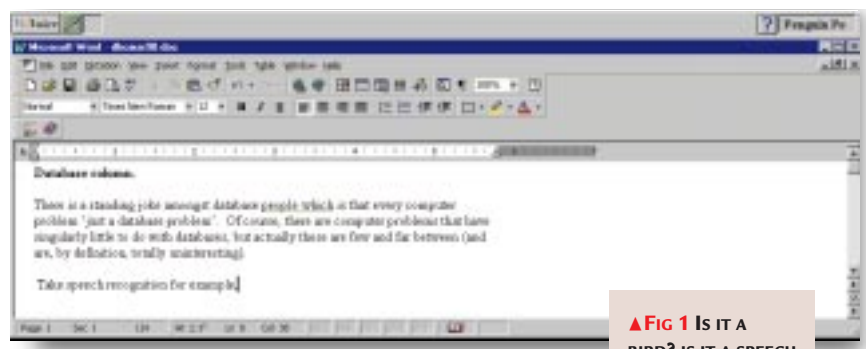


Database, where are you?

You'll find databases in **the most unlikely places**. Mark Whitehorn gives a few pointers.

There is a standing joke among database people, which is that every computer problem is "just a database problem". Of course, there are computer problems which have little to do with databases, but these are few and far between (and are by definition totally uninteresting). Take speech recognition, for example. As I speak these words, they are appearing on the screen courtesy of a database. True, it is a specialised one — IBM's ViaVoice, to be exact [Fig 1].

Speech recognition matches sounds against character strings, all of which have to be stored, so it is a database problem. In fact, speech recognition is a relatively complex problem so ViaVoice doesn't only match sounds to text strings, it also looks at the strings in relation to each other. In other words, it looks at the context of the words and uses that information to alter the match of the string to the sound: it decides whether you are really saying "to", "two" or "too" from the words that surround it. Why is this relevant? Only that I recently spent time cleaning up some data (originally from a set of Word files)



▲ **FIG 1 IS IT A BIRD? IS IT A SPEECH RECOGNITION SYSTEM? NO, IT'S A DATABASE**

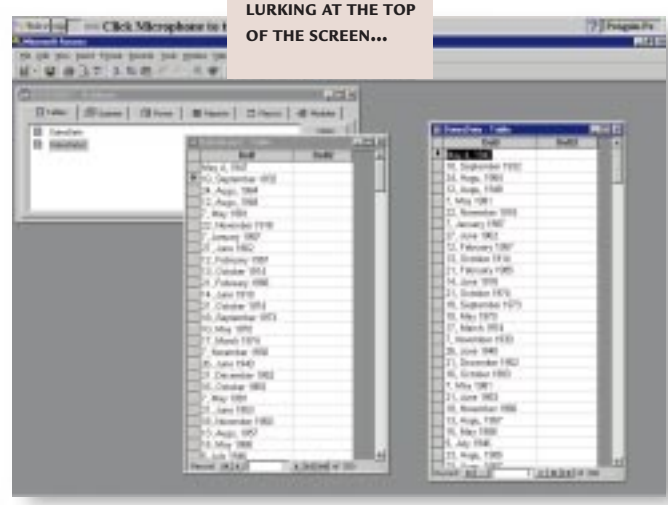
so that it could be imported into a database. The work was necessary because the data in the Word file was horribly haphazard; if a particular piece of data was missing, it was simply omitted rather than indicated by some form of null. Once the job was finished, I realised that most of my time had been spent ensuring that the correct data was ending up in the correct position in a Comma Separated File so that when it was imported, it ended up in the correct field. Now, suppose that I had access to a set of algorithms that could look at data in context: much of this work could have been automated.

remembering, as your database is filled, that records inherently contain positional data which may be important but may not be automatically recorded. Are you recording the fact that the data for a given record arrived before that in another? Does it matter that there was a six-second gap between the first five records and a two-hour gap before the next? I'm certainly not suggesting that this is always important, only that it might be, and that this sort of information is easy to record at the time but impossible to recover at a later date.

Records inherently contain important positional data

It also made me think again about positional data. There is a science fiction story in which a character is left in charge of an electronic library. He promises to ensure the safety of all the words, and he does. The twist is that he sorts the entire contents of the library into alphabetical order, making the point that positional information is often more important than it first appears. It is worth

▼ **FIG 2 THE TWO DATE DATA FILES READY AND WAITING TO BE CONVERTED — AND VIAVOICE IS LURKING AT THE TOP OF THE SCREEN...**



HERE IS THE NEWS

Just to let you know about a new database-related newsgroup: comp.infosystems.www.databases. It has been created for the discussion of web databases and techniques. I thought your readers might like to know. I've had a look and it seems like it could be fascinating — it's well worth a look."

GUY VAN DEN BERG
guy@hole-in-the.net

Thanks for the information, Guy.

Hot dates

I am constantly touched by the forbearance and kindness of PCW readers. Take this letter, from Neville Kuyt <Neville.Kuyt@pa-consulting.com>:

“I am not too hot on Access, but I cannot resist. Your article on converting dates is naughty! Access is a relational database and databases are set-based. Using a loop to visit every record in turn is how we do things in VB: on a database, SQL should prevail. Apologies if this doesn't work in Access, but surely update DatesDate set DoB2 = cdate(DOB)

is a far more elegant way to do this? Not only elegant, but quick, and “morally” correct. There are a lot of people out there who read your column, for whom the biggest benefit is to realise that SQL is about sets of data, not about loops. Just a thought... Apologies again if it doesn't work (I work with SQL Server where this works extremely well).”

Neville berates with such kindness, it sounds like a compliment. He is also correct. However, I have published many set-based solutions to similar problems in the past. As I said at the time, this was a fun solution rather than an optimal one. I quote from the December column: “Having been depressed by the idea that you might have to convert all the little

AUDIT TABLES

Keeping corruption out of multi-user Access databases.

On the subject of corrupted access databases (November '98 column), reader Rufus Chapman <rufusc@bigfoot.com> writes: “I have also found Access to be fairly reliable despite recent disclosures of things like the Access bookmark sync bug (which, incidentally, would affect Chris Veness' combo box example in tables with more than ~262 records. Perhaps you should note this in your next column?). But in some environments,

notably where multi-user access is combined with users who see it as their job to try and break your databases, I find that some record and/or file corruptions do occur. In my experience, file corruptions are rare, but in some cases I've found that either some combination of users pasting strange things into fields and/or poor programming/testing on my part (guilty!) leads to some record corruptions where a particular field value shows up as #ERROR

and you can neither Compact nor Repair the database. The only way round this is to delete the record and then backup/repair and reinstate it. The best way I've found of doing this, basically imitating a checkpoint of a larger-scale database like Ingres or Oracle, is to write an 'audit' table.” Rufus goes on to explain how the code works and generously includes his code. This is too long to include here, but his email, including the code, is on our cover disc as a text file.

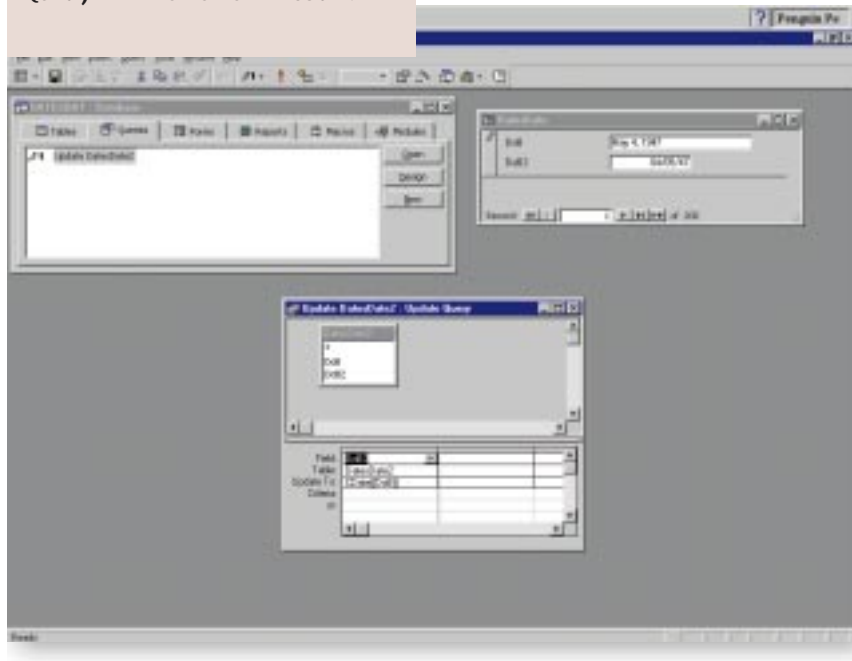
charmiers by hand, why not set up a form so that you can actually see them all being converted in front of your very eyes?” So, if you need efficiency — say, when you have 20,000 records rather than 200 — please do use a set-based solution.

In Access, a set-based solution is typically implemented as an update

query. I have included the original solution and an update one, on the PCW cover disc. Copy this file to a hard disk but remember that it will copy across as “Read-only”, so in Explorer use right-click, Properties to remove this restriction. Then have a look at the two tables, DatesDate and DatesDate2 [Figs 2 & 3]: note that the DoB2 field is empty in both. As before, the fun solution works via the form and operates on the table DatesDate. Open the form, put your cursor on the DoB2 field and scroll through the records. The DoB2 field updates to the correct value. Then run the query called “Update DatesDate2”. This should update all 200 records in DatesDate2 at a stroke.

Reader, Nick Dowling <ndowling@lombard.co.uk> noted: “Your December column mentions that Access 2 does not have the CDate function. However, the DateValue function or the CVDate function will do what you need.”

▼ FIG 3 ...AND TWO WAYS OF SOLVING THE PROBLEM. THE FORM/FUN WAY (TOP RIGHT) AND A SET OPERATION (USING AN UPDATE QUERY) AT THE BOTTOM OF THE SCREEN



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Standard practice

Upgrading your 56K modem to the **V90 standard**? Roger Gann has some advice.

Some of the pain of being a 56K early adopter (a.k.a. 'mug') was soothed by the knowledge that whichever standard you plumped for, x2 or K56flex, your modem could eventually be upgraded, usually for free, to the eventual ITU standard when the time came. Well, that time has come, so it's time to upgrade. Or is it?

Almost a year down the road from V.90 'determination' and some six months after the official adoption of the standard, many modem makers have yet to release V.90 firmware. 3Com/US Robotics was among the first to offer such upgrades and has released V.90 firmware upgrades for most of its x2 modems. Sadly, it's only true of its US models — UK firmware remains thin on the ground. I'm thinking of renaming my

USR Courier V—everything modem to 'V-almost everything' because, despite the passage of aeons in internet time, the UK V.90 firmware for it is still not forthcoming.

Hayes is another sinner in this regard. Only a handful of its UK modems are currently upgradeable. Diamond Multimedia Modems has a similarly patchy story. The only way to confirm it is to visit the modem maker's web site or the excellent www.56k.com site for the latest news [Figs 1 & 2].

In any event, a V.90 modem requires a V.90-capable ISP at the other end of the line. At the time of writing, no major ISPs are: AOL and CompuServe don't offer it but Cable & Wireless [Fig 3] does, and so too since last December does the Microsoft Network. But this won't be a big problem for many 56K modem owners because their modems ought to be able to hold both the x2 or K56flex code as well as the new V.90 firmware.

The transition to V.90 could be a lengthy business, perhaps a year long, so this dual-mode capability is important. Why? Well, if you have a single-mode modem, it's only got enough flash-ROM capacity for one set of 56K firmware. If you upgrade your modem to V.90 before your ISP

does, you'll probably only be able to connect at 33.6Kbps.

Dual-mode modems won't have this problem. They ship with 2Mb of flash memory (compared with 1Mb in single-mode modems) and can hold both K56flex and V.90 firmware, allowing them to connect to any ISP at 56Kbps speeds. While most x2 modems have room for both sets of code, it seems that only relatively recent K56flex modems have it. Why? Because the extra memory would have added another \$5 to a modem's cost.

At least they're upgradeable. While all x2 modems are software upgradeable thanks to their reliance on DSP technology, some early K56flex modems cannot be upgraded by the end-user so these models will have to be returned to the maker for upgrading.

How do you tell whether or not a modem is V.90 'out of the box'? It's not easy. Many low-end, no-name 56K modems actually ship with K56flex code plus a disk containing the V.90 firmware. These are invariably single-mode devices. Even examining the AT1 result codes, it's not always clear when K56flex becomes V.90 — the key version number seems to be 47.22 or better. You can check this by opening the Modems Control Panel applet. Select the Diagnostics tab, then select the COM port. Clicking the More



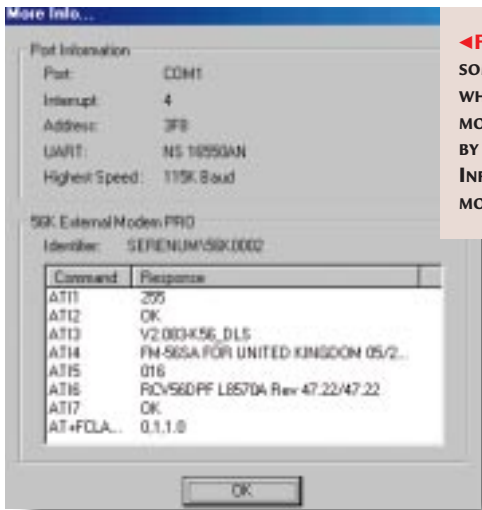
▲ Fig 3 CABLE & WIRELESS WAS ONE OF THE FIRST 'NAME' ISPs TO ADOPT THE NEW V.90 STANDARD. COMPU SERVE AND AOL ARE STILL DRAGGING THEIR FEET



▲ Fig 1 THIS WEB SITE IS ANOTHER GOOD RESOURCE FOR V.90 UPGRADE NEWS FOR THOSE WITH MODEMS BASED ON THE ROCKWELL CHIPSET

► Fig 2 THIS IS STILL ONE OF THE BEST WEB SITES FOR INFORMATION ABOUT V.90 UPGRADES AND WHERE TO GET THEM





◀**Fig 4** THIS (OR SOMETHING SIMILAR) IS WHAT YOU SEE WHEN THE MODEM IS INTERROGATED BY WINDOWS 9x's 'MORE INFO' OPTION IN THE MODEM APPLLET



▶**Fig 5** YOU SHOULD PAY A VISIT TO THE 3COM WEB SITE TO SEE IF V.90 CODE IS NOW AVAILABLE FOR YOUR USR MODEM

Info button will list the firmware version plus a whole load of other geeky data [Fig 4].

Software upgrading is a pretty straightforward task. You go to the modem web site, head for the upgrades page [Fig 5] and look up your modem model <www.3com.com/56k> and <<http://56k.3com.co.uk/pages/info.html>>. This can be a little bewildering, especially if you have a US Robotics modem where you first have to decipher the modem model number — and there are loads of these! However, you can download a firmware upgrade wizard to simplify this.

Anyway, once you know the model number, you download the appropriate file. This usually includes the modem code and a program to upload it to your modem. Typically, the uploader [Fig 6] checks the modem to make sure that the modem and firmware match, then backs up the old code before uploading the new version. You simply unpack the downloaded file into a temporary folder and run the program from there. It will take a few minutes to complete, or longer if the utility prudently saves the modem's existing firmware to a file on disk, in case you ever want to put it back.

That's the theory anyway, but recently some American modem users inadvertently

toasted their Megahertz XJ1560 and CC1560 PC Card modems when they attempted to software-upgrade them. The modems were zapped because the upgrade process was interrupted, either by the notebook entering a power-saving mode or by something as innocent as a screensaver. Installing the new firmware involves zapping the original code to make room for the new. As a result, the interrupted upgrade left users with a 'blank' PC Card modem!

■ **Slow drivers**

Recently, it's been brought home to me the extent to which new technology is hostage to the arrival of proper drivers,

V.90 REALITY CHECK

My experience, and I guess the experience of many PCW readers, is that 56K is an ideal which in practice is seldom achieved. You're more likely to get between 45 and 50Kbps throughputs. Irritatingly, 56K connect speeds behave like shifting sands. You can connect at 50Kbps, and a minute later the best you can manage is 42Kbps. How come? What the modem makers never make crystal clear is the fact that the claimed 56Kbps throughputs are merely a theoretical maximum and that the

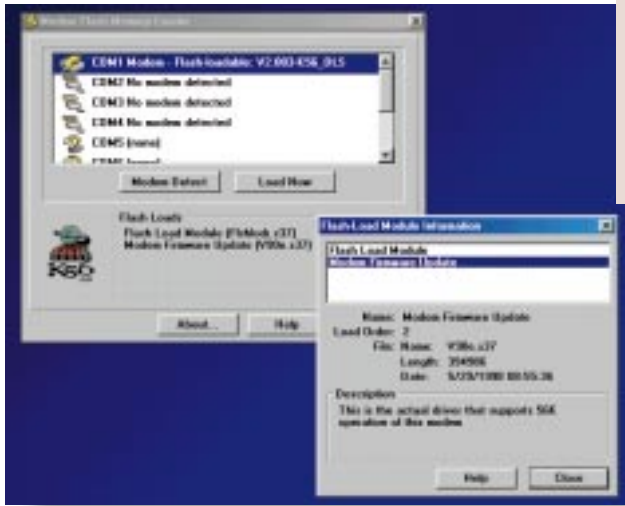
actual throughput achieved is highly dependent on line quality. For one thing, the analogue local loop, the final wire link between the exchange and the modem, will suffer from noise and interference such as intermodulation distortion and echo which cause distortions in the phase, frequency, and amplitude of the wave. Some of this noise is induced by the phone network's line repeaters and amplifiers, so the noisier the line, the slower the connect speeds you'll achieve. Distance from your telephone exchange is

another crucial factor affecting line quality: the further away you are, the weaker the signal. You should also bear in mind that the connect speed reported by the modem is not particularly meaningful. For example, K56flex modems were notorious for appearing to connect at a 'low' speed and then gradually upping the speed later. Using the AT16 command on USR x2 modems reveals more instructive connect data. Another problem is that the connect speed is not fixed and can vary during a

call: the speed reported at the beginning of the call may not be the speed in force at the end of the call. The entire 56K technology is also predicated on there being just one analogue/digital conversion between the modem and the exchange. If the signal has to pass through a digital switchboard, say if you're in a hotel or an office, you'll get no more than 33.6Kbps. A similar question mark hovers over phone lines provided by cable companies, which may not be analogue all the way to the BT switch.



hands on hardware



◀ Fig 6
RE-FLASHING YOUR MODEM'S FIRMWARE TAKES A FEW MINUTES USING A PROGRAM LIKE THIS

Except that, no, the NT 4.0 teletext software is not yet ready. How long has the WinTV been out? Don't tell me. It's too depressing.

At this point, NT 4.0 invites you to reboot to activate the changes. If you think rebooting Windows 98 is slow, wait till you try NT 4.0 Workstation for size — it takes several minutes to come back up, which is an eternity in my book and some way off the 'Instant On' nirvana we've been promised by Microsoft.

To cut a long reboot short, the ATi drivers hadn't 'taken' and I was left with the default VGA drivers. So, I reinstalled the ATi drivers and rebooted. Yes, you guessed it, the VGA drivers were still in place. I went round the block a few more times, but much later I knew it was a pointless exercise. It struck me then,

particularly for NT 4.0. Take DVD-RAM drives. These are cheap pieces of kit which offer 5.2Gb of storage — not bad for removable media. Each 5Gb cartridge costs only £35 (ex VAT) which makes DVD-RAM a great solution for archiving and backing up. Because it is rewritable, it can even be used in lieu of a hard disk. OK, so it won't be as fast, but at these prices who's complaining?

Well, actually, I am, because not only are these drives rarer than hens' teeth, but at present they only come with drivers for Windows 95. If you want Windows 98 and its support for the new UDF disc format you'll have to wait, unless you want to make do with just half the available storage these drives can offer. Drivers for Windows 98 and NT 4.0 will be available 'real soon now'... It's a good job I'm not holding my breath — I would have expired months ago.

■ A tale of two tuner cards

Here's a similar tale. I recently installed a pair of Hauppauge WinTV/PCI TV tuner cards in a pair of Dell Dimension workstations running NT 4.0. These are fine bits of hardware let down by some truly average software. It doesn't instill confidence when the Setup splash screen shows that you're installing Beta 4 of the software. I wouldn't have minded but Beta 4 didn't even work under NT 4.0 and I had to resort to downloading the NT drivers and the tuner application from the Hauppauge web site. My main reason for installing these two cards was not to let some harassed pen-pusher watch Countdown from the comfort of their desk, but to access the Stock Exchange share info on Teletext.

PC99 SPECIFICATION UPDATE

Early samples of motherboards complying with the Microsoft/Intel PC99 specification are surfacing and they make an interesting sight. They are all based on the as yet unreleased Intel Camino chipset.

Board maker FIC previewed its KCI-6111 motherboard at the Comdex show. It has lots of PCI slots — five, in fact, and no ISA slots. It makes up for it, though, with USB, an AMR connector (Audio & Modem Riser Module), IEEE 1394/Firewire, hardware security, 4X AGP,

RAMBUS and 100/133MHz FSB support.

ISA slots are not the only legacy bus to come under the PC99 axe. Only printers are 'allowed' to access COM or LPT ports (so goodbye parallel port devices, thank goodness!). Printer makers are encouraged to use USB or 1394.

The venerable PS/2 mouse and keyboard ports are to go, superseded by USB. Proprietary hardware for games is an absolute no-no. Even IDE is not sacrosanct: under PC99, ATA and ATAPI devices

are to migrate towards 1394. SCSI remains relatively safe.

PC99 defines two types of personal computer, consumer and office. The former will have a minimum of a 300MHz CPU, 32Mb of RAM, OnNow support, two USB ports, 3D graphics and an internal V.90 modem.

The 'recommended' list is somewhat tastier and the following is due to be added: 64Mb, 1394, Device Bay, IrDA infra-red, AGP, TV facilities, PC99 Audio and support for fast comms such as ADSL or cable.

■ Another dimension

Incidentally, while I was doing this I had to reinstall NT 4.0 on another Dell Dimension. These PCs come with the nifty ATi Expert@Work AGP card and, of course, the correct display drivers don't come as standard with NT 4.0. So, it installs the plain VGA drivers and tells you to install the correct drivers when you first reboot. No problem: because I had the correct ATi drivers, I did the 'Have Disk' trick and installed the correct display drivers.

as I watched the NT 4.0 boot screens for the umpteenth time, that I hadn't installed the Service Pack when I completed the install of the main operating system. I had SP4 to hand, so on that went and all was then well in Expert@Work land.

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On an equal footing

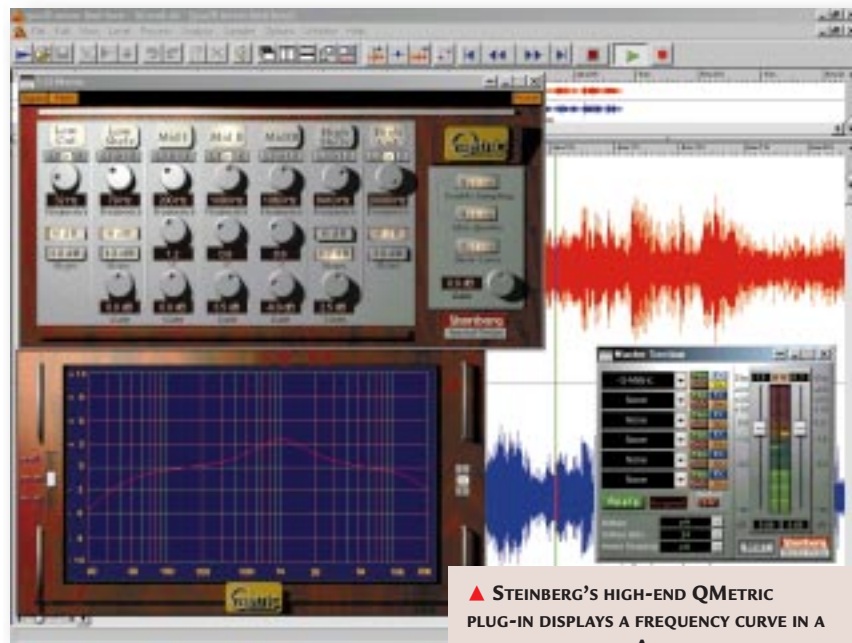
Improve your mixes no end with a touch of EQ. Steven Helstrip shows you how.

We certainly struck a chord in last month's column: feedback has been very favourable.

To recap, we started to look at the processes involved in recording, mixing and mastering audio to CD. So far, we've covered how to record your MIDI instrument tracks back into your sequencer as wave files, which will enable you to make a two-track audio master. But before we reach that final stage, there's a vast range of effects that can be used to add a touch of professionalism to those home-made recordings. So, to start with we're going to look at EQ, the most commonly used effect of them all.

EQ, or equalisation, was originally designed as a corrective effect to make up for the loss of frequencies in early recordings. What started out as basic tone controls (similar to bass and treble on a home stereo system) have developed to become precise and creative studio tools. In reality, an EQ module can do only two things: increase (boost) or reduce (cut) audio frequencies. Yet it can take a lifetime to master those few controls, especially when it comes to mixing 12 or more separate audio channels. But with just a basic grasp of EQ-ing, you can considerably improve your mixes.

EQ modules fall into two categories, graphic and parametric. A graphic EQ may have up to 30 preset frequency bands which you can modify with faders [Fig 1]. These bands will typically start from around 40Hz

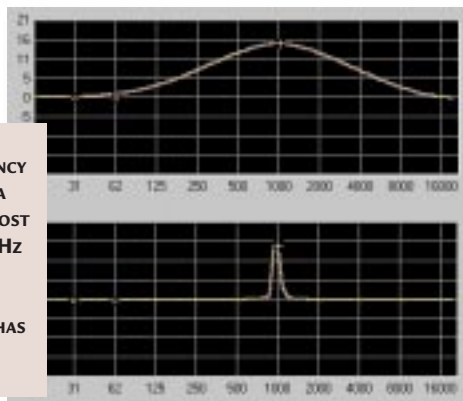


▲ STEINBERG'S HIGH-END QMETRIC PLUG-IN DISPLAYS A FREQUENCY CURVE IN A SEPARATE WINDOW. AS YOU CAN SEE, THERE IS A FREQUENCY BOOST AROUND 1kHz, WHILE THE LOW AND HIGH FREQUENCIES HAVE BEEN ROLLED OFF SLIGHTLY USING LOW- AND HIGH-CUT FILTERS

(sub-bass regions) and rise up through the full frequency spectrum to around 16kHz. Parametric EQs enable you to dial-in specific frequencies and they provide at least two controls, frequency and gain. The frequency control is used to select the frequency range you want to modify.

The gain setting then enables you to cut or boost that range. Some EQs provide a third control, called Q, used to set the bandwidth of the frequency range

[Fig 2]. The higher the number, the narrower the range.



► FIG 2 THE UPPER FREQUENCY CURVE SHOWS A FREQUENCY BOOST AROUND 1000Hz WITH A LOW Q SETTING. THE LOWER CURVE HAS A HIGHER Q SETTING



► FIG 1 TC WORKS' NATIVE PARAMETRIC EQ ENABLES YOU TO SELECT BETWEEN 7, 14 AND 28 BANDS OF EQ. TO APPLY CUT OR BOOST YOU SIMPLY DRAW A CURVE ONTO THE TOUCH-SCREEN

EQ is used to create separation in a crowded mix by using it to narrow the frequency range an instrument occupies. It may also be used to create special effects. For instance, you can make a vocal sound as though it's being sung over a telephone by limiting its frequency range (or band) to that of a telephone (around 1kHz), or you may simply need to boost the bass or treble frequencies to add weight or presence to a mix.

There are no hard rules on how to apply EQ. If a setting sounds good, then it is good. Let your ears be the judge.



Questions & answers

Q Just finished your bit in December's issue — lots of tips, cheers. I have recently upgraded my PC to a 266MHz Pentium II, which includes a Matrox Productiva graphics card. Everything works a treat, but the timing in Cubase seems to be messed up slightly. Would you know what the culprit is likely to be? Also, I'm thinking of upgrading to a 380MHz AMD K6-2 with a 100MHz bus and lots of 100MHz RAM. The big question is: does the AMD K6-2 work better or worse than a PII? One last thing (honest!) — the 512K RAM on my AWE 32 is so pitiful that I can only load drum beats and high hats into it. What sound card would you recommend I upgrade to?

WILL SHAND

a There are many things that can cause timing problems with Cubase, but once you've got to the bottom of it, you should have a solid system sitting in front of you. Hiding away on your Cubase CD-ROM is a troubleshooting Acrobat file (or PDF) which has a large section on MIDI timing. If it's not covered in there, check out Steinberg's Knowledge Base on the internet. With regard to which processors are best, Steinberg still recommends Intel chips due to their higher floating-point performance — crucial for audio processing. As to which sound card should you buy, well, at just £130, nothing around at the moment comes close to Creative's SoundBlaster Live. Not only does it sound great, but you can also use up to 32Mb of your PC's system RAM for sampling. You can find the Steinberg Knowledge Base at www.ca.steinberg.net/main.html.

EQ tips and tricks

Here are some general equalisation guidelines which may help you to achieve your musical goals more quickly:

- ➔ **Before reaching** for the EQ dials, first try to hear in your head how you want the instrument to sound. Listen to commercial mixes and compare them to your own to see if you're on the right track (no pun intended).
- ➔ **If you're trying** to remove an element from a sound, such as hiss, visualise where in the frequency spectrum it lies.

- ➔ **Next, increase the gain**, say 8dB, and then sweep through the frequency spectrum until the sound you want to remove becomes as pronounced and obvious as possible.
- ➔ **Following this**, reduce the gain. The exact amount of cut should be decided by listening to the part in relation to your mix.
- ➔ **When attempting to** 'bring out', or enhance, a particular element within a sound, the natural inclination is to tune in to the sweet spot and then boost the gain. However, you can reach a point

where you boost many bands; in real terms, you may as well just turn the whole track up. It's better to cut the frequencies you don't want. This will open up the sound and create 'space' for other instruments.



➔ **VST'S BUILT-IN EQ SECTION. HERE, IT IS SET UP TO APPLY 2.9dB GAIN AT APPROXIMATELY 6kHz TO MAKE THE KICK-DRUM TRACK MORE CLICKY**

WAVEPLANT SAMPLE CD

Reader Ben Rossborough has spent much of the past four years developing a one-off analogue synthesiser which he calls the WavePlant. It's unique in every sense and comprises, among other technical wizardry, nine sound oscillators, six LFOs, nine envelope generators and six banks of filters. Roughly translated, that's a lot of sound-creation potential, 140 examples of which have been captured on this sample CD. **Listening to sample CDs is no more exciting than looking through a book of typefaces, but when something refreshing comes along, it makes the whole experience that much more enjoyable.** There are three examples featured on this month's PCW cover-mounted disc, so do have a listen.

The WavePlant can certainly be described as different, although there are some sounds which are reminiscent of the classic VCS 3. The disc starts with a collection of bass samples including sounds that range from deep and clicky, dubby and squelchy, though to Moog-like and... well, the unusual. Then we go on to effects, organs, synth leads and a selection of altogether off-the-wall synth textures. You get most sounds in audio, wave and Sound Font format, both with and without effects (usually reverb or distortion).

If you're looking for an all-round collection of dance sounds and breaks, this isn't for you. If, however, you want to get your hands on a collection of synthesised sounds that have never been heard before, this is a great disc to add to your collection, although you don't get too many sounds for your pounds.

Price £25 (inc VAT and delivery)
Contact Ben Rossborough
01497 820134

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Road sense

Ken McMahon produces a map that, hopefully, will **show him the way** to go home.

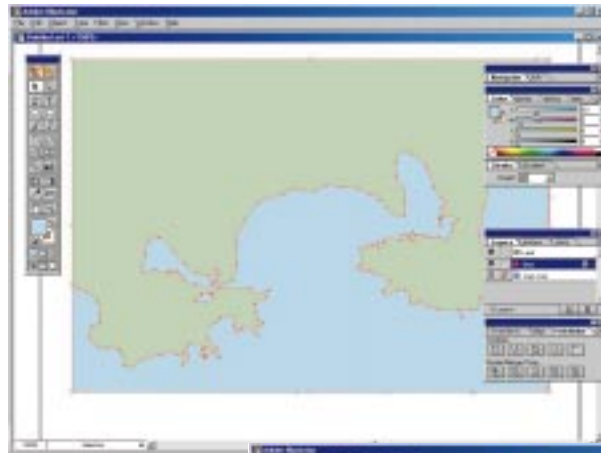
Given the past interest in map making, and the sad fact that I can hardly make it from the pub to my front door without persistent directional guidance, now seems like a good time to take a more detailed look at the art (science?) of cartography. In this month's column we'll take a look at producing the basics — coastal outlines, roads and labels — in Illustrator 8, although it would be much the same process in any good vector drawing package.

1 The first stage in producing any map is to find and scan a source image. If this is a rough sketch you've produced yourself, fine. If you're using an existing image, check the copyright details. Save your scan as a greyscale tiff and import it into Illustrator using the Place command. Ensure the link box is checked, otherwise the file will be embedded in the Illustrator document. Select Options for layer 1 from the Layers palette menu and check the Template box — this dims the layer to make it easier



▲ **MAKE YOUR SCAN LAYER A TEMPLATE AND YOU'LL BE ABLE TO SEE IT IN PREVIEW MODE**

to trace, locks it, and makes the image non-printable. It also means that when you switch to Artwork mode, the scan will still show in Preview mode. This is useful because you can get filled objects out of the way, allowing you to trace underlying detail.



◀ **DUPLICATING THE COASTAL PATH TO PRODUCE LAND AND SEA OBJECTS**
▼ **LAYERS APLENTY: DETAIL FROM THE MAPS IN MINUTES BERLIN TOWN PLAN**

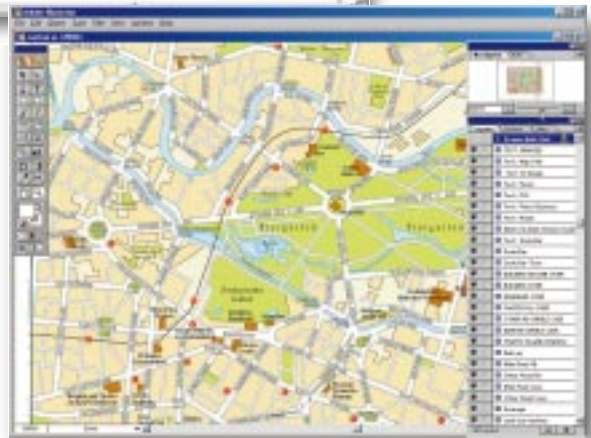
2 Create a new layer and call it sea. Using Illustrator's new pencil tool, trace the coastline. You can set the fidelity and smoothness of the pencil tool by double-clicking on it. If you make a mistake, just go over the incorrect

path with the pencil tool and Illustrator will delete the old path section, replacing it with your new effort.

3 When the path is finished, create a new layer and call it land. With the coastline still selected, choose Transform/move from the Object menu, enter zero values and press the Copy button to duplicate the coast path on top of itself.

To move the new path to the land layer, drag the coloured dot that appears to the right of the layer name in the layers palette to the land layer.

4 Use the pen tool to finish off the land and sea areas by clicking on one of the endpoints and completing the box. You can now fill the land and sea areas with appropriate colours. This is one of



many ways of producing coastal areas. You could create a rectangle for the sea and overlay it with the coastal outline on the land layer, or use the Divide pathfinder filter to divide a rectangle in two with a coastal path. Having filled the land and sea you now cannot see your map scan, so select Artwork mode from the view menu.

5 Create a new layer and call it roads. As with coastline, the new pencil tool is great for creating roads — the pen tool can be used as well. Trace off all the roads with a 2pt black-stroked path and check all the intersections, ensuring the paths join neatly. Turn off all the other layers, press Ctrl-A to select all the roads and duplicate them using Objects/Transform/Move/Copy and set a new stroke width of 1pt white.

6 You may need to do some cleaning-up at the junctions, but you should now have a network of 1pt white roads with a 0.5pt black outline. If you need to edit any of the road paths, it's simpler to

MAPPING WEB SITES

www.garmin.com/cartog.html

Cartographic information from the GPS people.

www.digiwis.com

Producer of Mountain High digital maps.

www.ocad.com

Ocad is a shareware mapping program we looked at in Hands On last year. You can get it from this web site.

www.mapsinminutes.com

Telephone 01840 212135

www.cartography.org.uk

BCS is regarded as one of the world's leading cartographic societies and its web site promotes all aspects of cartography.

<http://acorn.educ.nottingham.ac.uk/ShellCent/maps/>

These web pages summarise a research project that set out to discover some of the factors that make maps easy to read and use.

<http://www.pcug.co.uk/~MapMaker/>

The web site of MapMaker Ltd, developer of MapMaker Pro software reviewed in PCW February 1997.

The web site has shareware, free maps of the world and the UK, plus mapmaking articles.

<http://www.geo.ed.ac.uk/home/giswww.html>

This is a comprehensive index of web sites likely to be of interest to map makers. It's maintained by Bruce M Gittings and Anup Pradhan at the Department of Geography, University of Edinburgh, in collaboration with the Association for Geographic Information.

<http://www.shef.ac.uk/uni/projects/sc/index.html>

The Society of Cartographers. This web site is not yet available, but it will be starting a PostScript library of copyright-free maps. FTP archive also includes free software downloads including specially designed cartographic fonts.

<http://uk.multimap.com/partners.htm>

Multi Media Mapping has created an interface that enables web-site designers to include maps in their web pages. You just put the full UK postcode in a URL, and Multi Media Mapping will return a map showing the location of that postcode.

get rid of the white overlay, edit the black and then re-duplicate it. I've tried simplifying things using Illustrator's new art brushes to create a "road" brush, but this doesn't work too well because the black outline stroke doesn't maintain a consistent width. If anyone knows why this is, I'd be glad to hear from them.

7 You can add other geographical features — railways, footpaths, boundaries, etc — in the same way. Using a separate layer, editing is easier and you can switch individual features on or off to customise your maps. If you're creating maps with boundaries it's often useful to create a filled object for each segment and have overlapping common borders. The easiest way to do this is to create the overall outline, draw in the borders and then use the pathfinder filters to carve up the cake.

Just a minute!

If you want maps without the effort, there are a number of vendors who provide detailed maps in PostScript format. Some of the best are produced by Maps in Minutes (MIM). MIM products include maps of the British Isles at 1:5 million, 1:2 million, 1:1 million and 1:750,000 scales. There's also a vast selection of world maps at various scales and projections. MIM provides more detail than you're ever likely to want and intelligent use is made of layers, so if you don't want a grid, water features, small towns or the Channel Tunnel, you can just turn them off.

If you've a lot of map work to do, MIM could be a big timesaver. The only drawback I see is the licensing arrangements. Though no more restrictive than that from the OS, it's not exactly a "pay once and do what you like" affair. There's an annual licence fee, a requirement to publish a copyright credit, and restrictions on sales to third parties and book, magazine, CD and internet publishing. MIM supplies files in Illustrator or Freehand format. The MIM people are very accommodating and a phone call will provide the answers to any questions you have about formats or anything cartographic.

COPYING OS MAPS

It is highly advisable to ensure you're not breaching copyright when using a map as a reference for tracing. Crown copyright exists only for 50 years, so if you've any maps older than that you can do what you like with them.

➔ **To copy Ordnance Survey (OS)** maps you must obtain a licence and pay a per copy royalty charge. This ranges from two and a half pence (there is a minimum charge of £16 for 30 copies of A6 size) for copies up to A6 size, to £6.40 for A0 size.

➔ **The OS produces** five leaflets with detailed information about its

copyrights and royalty charges. You can get this in Acrobat format from the Ordnance Survey web site at www.ordsvy.gov.uk or you can contact the OS at:

Copyright Licensing
Ordnance Survey
Romsey Road
Southampton
Hampshire
SO16 4GU

Phone: 01703 792703/792705
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Pulling faces

Ben Woolley gets to grips with NURBS, which are about to hit mainstream 3D graphics.

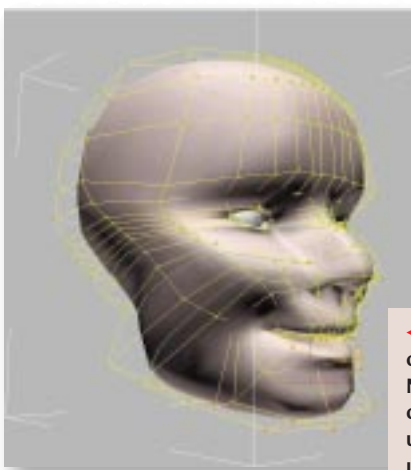
NURBS. It sounds like an expletive. It is, in fact, an acronym for Non-Uniform Rational (or Recursive) B-Splines, which is not much prettier and even less descriptive. Nevertheless, NURBS are now everywhere. Once, they only appeared in top-end 3D products such as Softimage. Newtek's Lightwave has them, but they did not reach Kinetix's 3D Studio MAX as a standard component until version 2. However, they are now beginning to migrate downmarket and the latest release of Caligari's trueSpace version 4 features a basic but effective implementation of them. NURBS, in other words, are about to join the 3D graphics mainstream.

So what are they? Technically speaking, they are mathematical entities used to describe the geometry of a curve or surface. 'Rational', for example, refers to a property of the equations used to generate them. 'B-splines' (basis-splines, in full) are a method of constructing curves: Bézier curves, familiar to anyone who has manipulated the shape of a curve using the two handles either side of a vertex, are a sort of B-spline. In simpler terms, NURBS are shapes or surfaces that can be sculpted like pieces of elastic using control points scattered across their surface. This makes them ideal for creating curvaceous objects. They are frequently used in product design, for example to design the bodywork of a concept car, but can be used for more organic shapes.

The example shown in Fig 1 is a face created by using NURBS. It is a version of a model supplied with the excellent but expensive Inside 3D Studio MAX 2. The shape itself can be generated in a number of ways, in this case possibly by using a primitive (a sphere) and then converting it into a NURBS surface.

Once converted, you no longer have a collection of faces and vertices but a lattice of 'control vertices', or CVs (in 3D Studio MAX-speak). These hover like a sort of exoskeleton above the surface, shown as yellow in Fig 1, and the CVs

are at the intersections of each line. By selecting a single CV, or a group of them, you can manipulate the shape. CVs do not necessarily sit on the surface of the object they control but often hover above it. As you tug them out, they pull away from the surface like magnets being



◀ **FIG 1** A 3D HEAD CREATED USING NURBS. THE LATTICE OF YELLOW LINES IS USED TO MANIPULATE ITS SHAPE

pulled away from the surface of a pool of mercury. CVs can also be given different 'weights' which influence the pull they have on the surface they control. A higher weight produces a stronger pull.

NURBS modelling is a bit like clay modelling. Using the CVs, you press in and pull out bits of the object, gradually refining it into the shape you want.

Following the example in the 3D Studio MAX 2 tutorial, I tried to open and close the mouth of our Fig 1 model face. Compared with conventional techniques for editing meshes, using NURBS made this relatively easy. The biggest challenge was choosing the right CVs. I selected the ones clustered around the lower lips and jaw. Then, by moving the selected CVs down and rotating them slightly, I produced the results shown in Fig 2.

I also tried a little plastic surgery on other parts of the head — reducing the size of the nose, the prominence of the chin, and so on. These attempts highlighted one of the difficulties of editing using the CVs. Any transformation (movement, rotation, scaling) applied to

a selection of CVs obviously applies equally to all of them. Unfortunately, with an entity as elastic as a NURBS object, what you really want

is some form of soft-edged selection which applies transformations to CVs with less force on the edge of the selection than in the centre. Using 3D Studio MAX, you can achieve something like this by lowering the weight of the CVs on the edge of the selection set. However, this is a complicated process which does not always produce the anticipated results.

FIG 2

Sequence (left to right) showing the animation of the head's jaw dropping



I spent some time using NURBS both with 3D Studio MAX 2 and trueSpace 4, and the experience was an instructive one. 3D Studio MAX's implementation of the technology is complex and poorly covered in the documentation. The attempt to give the user as much flexibility as possible has resulted in a very unintuitive set of tools which I was unable to master even after a week or so spent struggling with them.

In contrast, trueSpace made the whole process simple: create a rough outline of an object, turn it into a NURBS surface with the click of an icon and start fiddling with the geometry using the simple point-editing tools.

Both packages crashed spectacularly while I was using the NURBS tools and 3D Studio MAX managed to bring the whole system down. This may have been because these are new facilities in the software and the code has not yet been fully debugged. I suspect it may also have something to do with the extremely complicated mathematics underlying the technology. Whatever the cause, you obviously have to proceed into the world of NURBS with some caution and a lot of determination.

Out and about

The conference season began last November with two graphics shows: one in the UK, the other spread across the globe. The former was Digital Media World (Britain's attempt at a SIGGRAPH) held at the Wembley Conference Centre. This year's line-up included an interesting range of



NURBS: useful books

- *Inside 3D Studio MAX 2* by George Maestri *et al.* Published by New Riders. The chapter on NURBS is in Volume III, which costs £34.59.
- *The Nurbs Book* by Les Piegl and Wayne Tiller. (Springer, £56).

- *Interactive Curves and Surfaces: A Multimedia Tutorial on Computer Aided Graphics Design* by Alyn Rockwood and Peter Chambers. Published by Morgan Kaufman, £35.66.
- Prices quoted are from amazon.co.uk

speakers, including the artist Gerald Scarfe. However, the exhibition itself featured no major announcements, reinforcing the feeling that if you want to go where the action is, you have to go to SIGGRAPH in Los Angeles — a more inviting venue than Wembley, anyway.

A more interesting and innovative event was Avatars98, a truly virtual conference; the primary venue being a

generated using ActiveWorlds technology (covered in the February 1997 column, and also see www.activeworlds.com for details). Showing a slight but probably sensible lack of imagination, the organisers created a space that looked like a cartoon imitation of a conventional exhibition hall [Fig 3]. The main difference was that delegates could be found floating around in the air, or



◀ Fig 3 THE AVATARS98 VIRTUAL EXHIBITION HALL



◀ Fig 4 'SUMMER' BY VICTORIA D'ONOFRIO AND RODY GALEANO, WINNER OF THE AVVY AVATAR OF THE YEAR AWARD

wandering along the aisles. The highlight of the show was the Avvy Award, announced online at one of the virtual stands, for the best design of avatar. The winner was 'Summer', by Victoria

D'Onofrio and Rody Galeano

shared 3D space created on the internet. There were ancillary physical venues, too, located in a number of different countries. As the name indicates, the focus of Avatars98 was avatars, the 3D figures which act as your virtual presence when you enter a shared space. The show also dealt with other aspects of creating and maintaining virtual worlds.

The venue for Avatars98 was

of My2Keys and Netropolis [Fig 4].

At the time of writing, there was a report on Avatars98 at www.ccon.org/conf98/index.html.

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Error message

Software is getting **more difficult** to install and use, and Tim Anderson is not amused.

In 1993, Visual Basic 3.0 was as revolutionary for programmers as the graphical user interface was for users. Used sensibly, it was reliable, powerful and above all easy, especially compared to the intricacies of Windows development in C. Six years on, and with vast increases in both processing power and storage space, you'd think that programming would be even more accessible.

So what's gone wrong? Something has, because as a software reviewer I notice that software is increasingly difficult to install, once installed it's less reliable, and when an application is completed, deployment is more difficult than it was in 1993. I recently struggled to install a development suite with a four-figure price tag, documentation in a mish-mash of Windows help, HTML and a proprietary format, and with a setup routine that had no chance of completing without errors. It's strange, because in terms of features Visual Basic 6.0, for example, is vastly improved on its six-year-old counterpart. So is Delphi 4.0 when put next to Delphi 1.

The first problem seems to be that despite the best efforts of Microsoft and Inprise, the extra layers of complexity needed to provide those features are detrimental to performance and reliability. The second problem is that Windows itself has version control and registry difficulties that are not going away, although the next Windows NT might be improved. The third point is that the advent of the web and distributed computing has introduced a new set of development issues, without removing many of the old ones. Fourth, commercial pressures and the ease of web updates cause many vendors to release products that strictly should be beta or even alpha releases.

Is Java the answer? It could be, as the language itself is more productive than most alternatives. Java has its own problems though, and despite the hype Microsoft's enhancements aren't the

▶ **OOPS! VSFORUM FALLING AT AN EARLY HURDLE**

main ones. Two bigger issues are performance and pace of change as Sun releases a constant flow of new APIs. Java development tools like

VisualAge and JBuilder are even worse than Visual C++ when it comes to making a fast Pentium run like an old 386.

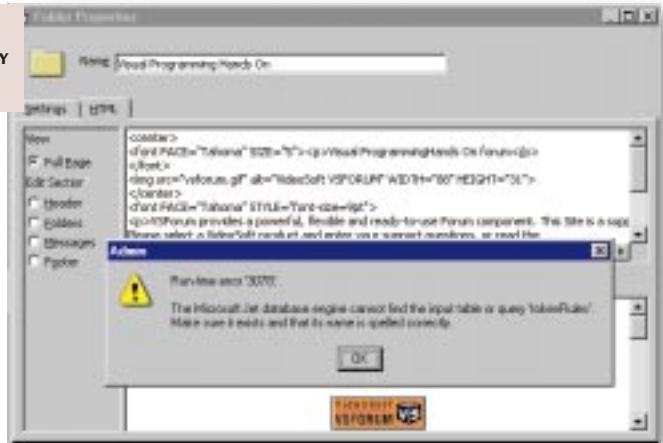
I've no desire to return to Visual Basic 3.0. Distributed, object-orientated, web-based applications are the future, and exciting possibilities abound. But things have to change before the world's software ceases to work, not because of the millenium bug, but in an avalanche of incomprehensible error messages.

▶ **Forum for discussion**

VideoSoft has an excellent set of products; however, VSForum is disappointing. Described as a server component, it's a new angle on the add-in scene, being a server-side component for ASP (Active Server Pages) rather than the usual ActiveX control. Active Server Pages are an extension to Microsoft's Internet Information Server for creating dynamic web sites.

VSForum provides an instant discussion forum, using an ActiveX DLL to store messages in an Access database, serving up the data as HTML to create hyperlinked discussion pages.

Sadly, VideoSoft has abandoned

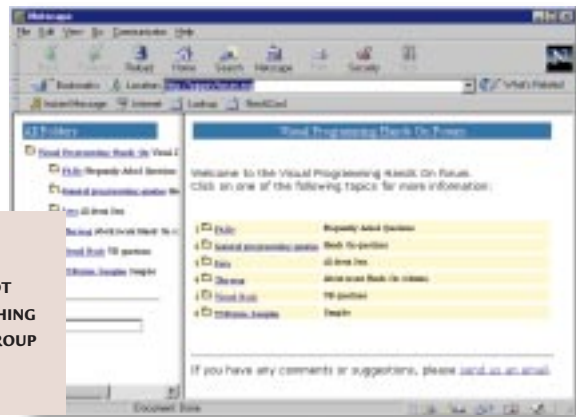


its printed manual, but it installed easily onto an NT server already loaded with IIS and all the ASP extensions. That is, until I made some edits to the demonstration discussion page — the admin utility presented an unhelpful message and exited without saving any changes. It's a known bug, fixed in the later release on VideoSoft's web site.

Perhaps more serious than the error itself, though, is the admin utility, which appears to be written in VB and lacks the error handling required to catch the error and exit gracefully.

It's as well I downloaded the latest version, as certain features like message threading, probably considered essential in discussion software, weren't implemented in the first shrinkwrap release. The patch was 5Mb, most of which was duplicate Microsoft runtime library files. It does work though, and I

▶ **THE FIXED VSFORUM: NOT BAD, BUT NOTHING LIKE A NEWSGROUP**





CROSSING THE PROCESS BOUNDARY

Ian Gregory has written in with a problem: "Using Delphi 4 I've been writing an editor, and I've set up the project source so that only one instance can be run at a time, using some code from Inprise's Delphi developer support site. This now means that if the user tries to run a second instance, that instance is terminated and the first brought to the front. If the second is invoked via a file association, the first instance is brought to the top but has no way of knowing that it must load a file. I've tried using SendMessage to send the command line of the second instance to the first, via a PChar typecast as an integer. Although the first instance receives the message, it cannot be used to open a new editor window. Is there a way around this?"

Only one instance of Ian's application, which is probably MDI (Multiple Document Interface), should ever be needed. As Ian states, attempting to start another instance brings the first instance to the front. This works fine using a mutex (see main text, below). But what if the second instance is started with a command-line parameter, such as when the user double-clicks the associated document type in Explorer? Now the second instance has to pass a string parameter

to the first instance. The problem is, each instance has its own process and its own address space. Strings are pointer types, but pointers are only valid within a process. If you follow Ian's example, the second instance will receive an address which it cannot easily access, or most likely attempt to use random data in its own address space.

One thing is puzzling. Why is it that you can successfully pass a PChar typecast as an integer with a message like WM_SETTEXT? You can use FindWindow to obtain the handle of another instance of your application, and use SendMessage to set the caption of its main window. If this works (which it does), why can't you do the same with your own custom message? Because messages like WM_SETTEXT are a special case. For compatibility with 16-bit Windows, where applications all share one address space, the API copies the data across the process boundary. If you trap the message when it arrives in another process, you'll find the integer value of the pointer has changed; the pointer that arrives isn't the pointer you sent. There are no such special favours for your own custom message. If you use this technique, be sure to use SendMessage, not PostMessage.

PostMessage will free the string before the message gets processed.

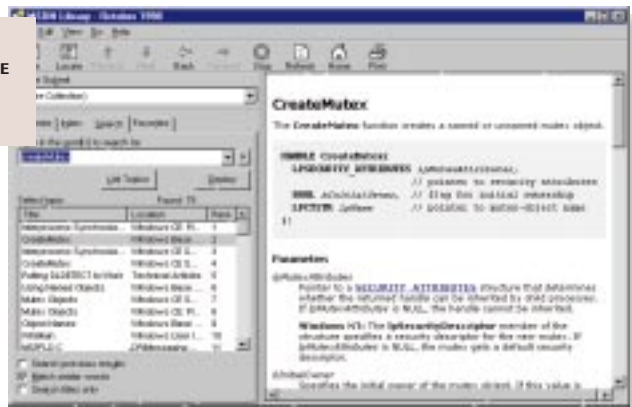
The solution for Ian is to find a way of passing data between processes. There are a bewildering variety of ways to do this, including COM automation. One easy way is to use WM_COPYDATA. This message exists precisely for the purpose of copying data across process boundaries. It's particularly useful because it works between 16- and 32-bit applications. Fig 1 (p270) is an example. For this to work, place a call to UseWMCopyData in the initialisation part of an application's main form unit. Build the application and run two instances. The second instance will update the form caption of the first, using WM_COPYDATA.

I've used FindWindow for the sake of brevity — it's not the best approach. It may not catch two instances started near-simultaneously, as the window may not have been created. Best to use a mutex to discover if another instance is running, and if it is, exchange custom messages to find its handle. You can use the handle of the main form, as here, or use the application handle, which is the handle of the hidden window used by every VCL-based Delphi application.

successfully created a discussion which worked in both Netscape and Internet Explorer. A good point is, it was easy to search messages and display results. One bad point is that the administration is not web-based, so you have to do it at the server where VSForum is installed. Another is that the Forum is fairly slow retrieving and displaying messages, probably because using Access via ODBC is sub-optimal. Furthermore, there's a better way to do discussion groups and that's with a private news server, although it's more complex to set up. Finally, VideoSoft wants a licence for every forum you set up, whereas FrontPage comes with an unlimited discussion web wizard that performs better and costs less. VSForum is a little more flexible than the FrontPage

▶ MSDN — DON'T LEAVE HOME WITHOUT IT

discussion wizard, thanks to a set of tokens which let you edit the discussion pages' content, but most will find FrontPage or other options better value. I'd feel differently if VideoSoft supplied the full source to the ActiveX DLL so users could customise VSForum, but it's not there. ActiveX components are a great idea, but this one's not VideoSoft's finest hour.



◀ Mutex mysteries revealed
To discover if an instance of your application is already running, the correct 32-bit way is to create a mutex — short for 'mutual exclusion'.

**[FIG 1]****Using WM_COPYDATA**

```
{start of unit omitted}
type
 TForm1 = class(TForm)
 protected
 procedure WMCopyData(var Message: TMessage); message -
 WM_COPYDATA;
 end;

var
 Form1: TForm1;

implementation

{$R *.DFM}

procedure TForm1.WMCopyData(var Message: TMessage);
var
 filename: string;
 cds: CopyDataStruct;

begin

 cds := CopyDataStruct(pointer(Message.LParam)^);

 filename := strpas(pchar(cds.LpData));
 form1.caption := filename;

 Message.Result := 1;
 {don't call inherited message handler}

end;

procedure UseWMCopyData;
var
 hTarget: hwnd;
 lpzFilename: pchar;
 cds: copydatastruct;
 lResult: integer;

begin
 hTarget := FindWindow(nil,'My Application');

 if hTarget > 0 then begin

 lpzFileName := stralloc(256);
 try
 strcpy(lpzFileName,'This is a new file name');
 cds.dwData := 0;
 cds.cbData := strlen(lpzFileName)+1;
 {length of string including null terminator}
 cds.lpData := lpzFileName;
 lResult := sendmessage(hTarget,WM_COPYDATA,application. -
 handle,integer(@cds));
 {must use sendmessage}
 finally
 strdispose(lpzFileName);
 end;

 if lResult <> 1 then
 showmessage('Operation ^
 failed');
 end;

end;
initialization
useWMCopyData;
end.
```

[FIG 2]**Preventing a multiple instance**

Place this code at the end of the main form unit:

```
initialization
hMutex := openmutex -
(MUTEX_ALL_ACCESS,False, -
'Visual Programming -
Hands On');
if hMutex <> 0 then begin
 showmessage('Already -
running - bye!');
 application.terminate;
end
else
begin
 hMutex := createmutex -
(nil,False,'Visual -
Programming Hands On');
 if hMutex = 0 then -
 showmessage('Error creating -
mutex');
end;
```

Mutex objects are like traffic lights. Their only powers are first, to be seen, and second, to change state. Their visibility is high because they're global to the system.

A mutex is identified by a unique string. Having decided on a string, you call CreateMutex for a handle to a new or existing mutex object, or OpenMutex for an existing one. The mutex object is destroyed when the last handle to it is closed. Handles can be specifically closed with CloseHandle, or the system will destroy them when the process that created them terminates.

Mutexes are primarily used when synchronising threads. A mutex can be either signalled or nonsignalled. If it's signalled, a thread can call a wait function such as WaitForSingleObject, get ownership of the mutex, and set its state to nonsignalled. Other threads calling the same function will have to wait until the first thread has released the mutex before they can get ownership.

If you want to prevent multiple instances of an application, you don't need wait functions. Check for the existence of a mutex identified by your unique string. If it exists, then only another instance can have created it. If it doesn't exist, create it and run.

Fig 2 shows Delphi code.

PCW CONTACTS

VsForum costs £411.25 (£350 inc VAT) from Contemporary Software on 01344 873434 www.videosoft.com
Tim Anderson can be contacted via the PCW editorial office (address, p10) or email visual@pcw.co.uk

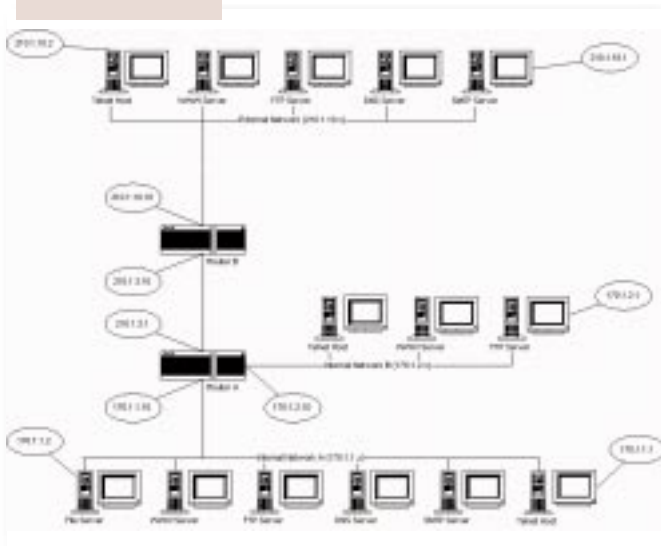
Route it out

Routers are the key to transporting data over a network. Bob Walder hitches a ride.

In past issues I've covered the mysteries of IP addressing and the differences between bridges, routers and switches. This month I'm going to try and pull things together by explaining how routers use IP addresses and subnet masks to determine where your data packets finish up. We'll also learn the significance of that magic parameter in your Windows protocol set-up, the default gateway.

Take a look at our network diagram [Fig 1]. This basically attempts to show a corporate network with two segments joined by router A; segment B uses the addresses 170.1.2.x and segment A uses addresses 170.1.1.x. The netmask for all of these is 255.255.255.0, and if you cast your mind back to the previous piece on IP subnetting, you will recall that segment A can consist of addresses 170.1.1.1 to 170.1.1.254, while segment B addresses the range from 170.1.2.1 to 170.1.2.254. Only the final octet changes within each subnet with this netmask (as indicated by the final 0), so as soon as the third octet changes (from 1 for subnet A to 2 for subnet B) it

▼ **Fig 1 NETWORK DIAGRAM** DISPLAYING THE ROLE OF A ROUTER



indicates to any router that the device is on a different subnet.



◀ **Fig 2 SETTING THE DEFAULT GATEWAY THROUGH WINDOWS**

▼ **Fig 3 SETTING UP AN IP ADDRESS AND NETMASK**



Configure it out

So, how do we configure devices on segment A? The file server at the end would have an IP address of 170.1.1.2, a netmask of 255.255.255.0, and a default gateway of 170.1.1.10 [Fig 2]. The default gateway points to the port of the router that is attached to the local subnet. If the file server (170.1.1.2) communicates with the Telnet host (170.1.1.1), the fact that the first three numbers are the same tells it that the destination machine is on the same subnet, and it is not necessary to bother with the default gateway. Our source machine thus uses something called ARP (Address Resolution Protocol)

to determine the MAC address of the destination machine (it needs this in order to transmit the packet). The file server sends out an ARP broadcast with the IP address of the Telnet host, and the Telnet machine responds with its own MAC

address. To prevent too much of this sort of traffic, each machine keeps such resolved addresses in an ARP cache for future reference. Once the MAC address has been resolved, direct communication can begin between the machines.

Now say our file server wants to communicate with the FTP server on segment B. This time it compares IP addresses and sees that 170.1.2.1 is actually on a different subnet to 170.1.1.2, because the third number of the address is different. At this point, it knows the packet needs to be handled by a device that knows more about the network topology than it does — the router (or default gateway). So, it ARPs for the MAC address of the default gateway, which is 170.1.1.10 in this case, and sends the packet on its way.

Routers are incredibly complex devices, but what they do can be boiled down quite simply: they direct traffic. Like a traffic cop, the router takes packets in from its various ports, checks on their destinations, and sends them off to the appropriate outgoing port. In our case, the router spots that 170.1.2.1 is actually on its second port



by comparing addresses and netmasks again, and so it sends the packet directly to the FTP server.

Two's company

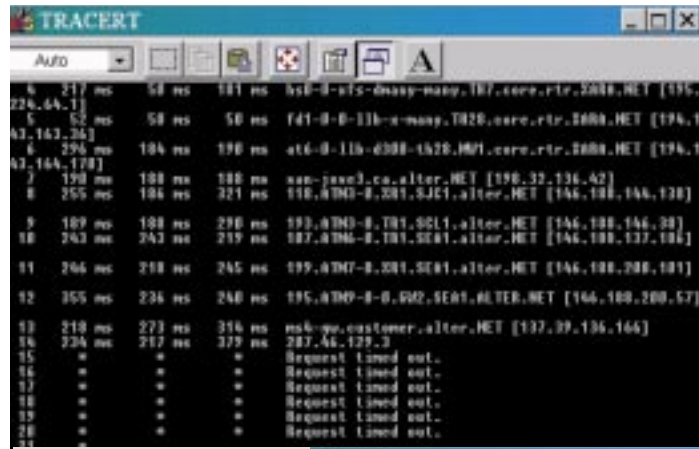
OK, so that has dealt with routing packets within an organisation where the addresses are known. When it comes to connecting our network to the internet, however, there is more than one router involved. In fact, there are millions of the things spread around the world, but we are particularly interested in two: the one at our site and the one at our ISP. Of course, if you wanted to attach a small network to the internet, you could use a proxy server and have all your users go through that: this way, you can often get away with a single-user dial-up account to support a small network. However, we are assuming here that you have opted for a full-routed connection, and so you have to make sure that your router and the ISP router know about each other.

Your ISP will provide you with an address and netmask for the router at its own site [Fig 3, p271] and this is what you need to enter into your own router to enable it to speak to the outside world. What you do, in fact, is create another subnet, this time between the external port of your router and your ISP. In our diagram, this small subnet consists of just two devices: the external port of our router is 210.1.3.1, and the appropriate port of the ISP router is 210.1.3.10. What we effectively do is tell our router that its default gateway is 210.1.3.10, and that is where it will send all the packets it doesn't know how to deal with directly.

The right address

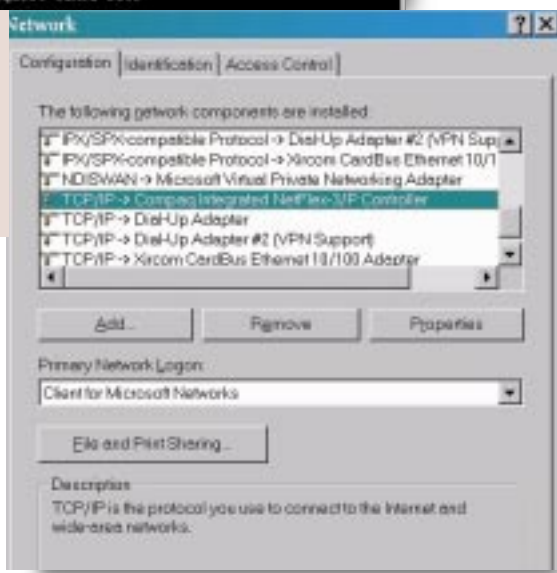
OK, so now our file server wants to communicate with the SMTP server 210.1.10.1 somewhere on the internet (in this case it is actually at our ISP, to keep things simple). It compares IP addresses and determines that the device is not on the local subnet, and so sends it to the default gateway address. Router A checks the address and notes that it doesn't correspond to any of the subnets attached to it directly. So if the router is stumped, what does it do? It sends it to its own default gateway (210.1.3.10), just as the file server did.

Now router B has the packet, and it takes a look at the IP address and sees that 210.1.10.1 is actually on the same



▲ Fig 4
A SAMPLE TRACERT OUTPUT

NETWORKING CONFIGURATION APPLLET FROM THE CONTROL PANEL



subnet as its internal port — 210.1.10.10. It can thus ARP for the MAC address of the SMTP server and deliver the packet directly. Each time a packet traverses a router in this way it's known as a "hop", and the number of hops a packet has to make determines how quickly you receive your data.

Try dropping to a DOS box under Windows and typing TRACERT MICROSOFT.COM. You'll get a display similar to that shown here [Fig 4], with each hop represented by a new router. As you can see, it is sometimes a long, tortuous and slow route to Microsoft!

RIP it up

Of course, given the size of the internet, or even a large corporate network, routers need more than just a 'default gateway' to go on if packets are to find their way from point A to point B some time this week. Routers learn about the network automatically using something called RIP — Routing Information Protocol. This is used to allow routers to tell each other about the segments they are attached to and the addresses they know about. This is done by 'advertising' what they know across the network, whereupon each of them listens and updates its own routing tables accordingly. This is what makes the internet so resilient. Should any router fail

for whatever reason, it will stop advertising and the routers that were communicating with it directly will start to find other ways around it. This dynamic change in network topology is completely automatic and is called 'convergence'. Finally, it's also possible to 'tell' a router about a specific route between two points, and these are called 'static routes'.

Hopefully, between this and the IP addressing/subnetting tutorial you have enough information to create your own IP network and get it attached to the internet. If you want to delve into TCP/IP a lot deeper than I have the space to here, you could do worse than check out the book *Windows NT TCP/IP* by Karanjit Siyan (ISBN 1-56205-887-8). Published by New Riders, it costs £26.95 from Computer Manuals (0121 706 6000).

PCW CONTACTS

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To Be OS not to Be?

BeOS 4 is impressive, but Cliff Joseph wonders whether it has **missed the Mac market.**

We've been waiting ages for the final version of BeOS to be released, but now that it's here, it seems that the Mac version may effectively have been killed off by Apple. Be Inc. recently launched Release 4 of BeOS, the operating system on which it has been working for most of this decade. As the name suggests, there had been three previous releases, but these were primarily intended for developers in order to encourage them to write software for the operating system. Release 4 is the first version that is actually intended for public consumption.

Be Inc. is a small company, set up in 1990 by Jean-Louis Gassée, a former top executive at Apple. Gassée wanted to develop a next-generation operating system that was designed from the ground up to cope with "high-

THE MULTI-THREADING BEOS CAN RUN MULTIPLE AUDIO, VIDEO AND GRAPHICS APPLICATIONS SIMULTANEOUSLY

bandwidth" applications such as video editing, multimedia and 3D graphics. When it was first announced, BeOS did sound truly innovative.

It was intended to offer features such as multitasking, multi-processing, and object-orientated development tools. These were features that were not available on either the Mac or PC platforms at the time; even now, they're still not available on the Mac. Back then, it was clear that multimedia and 3D were developing into important technologies, so there was a definite gap in the market for BeOS. And, since the Mac dominated the graphics and video markets, Mac users were the obvious target audience for this new operating system. Mac users are famously loyal to their Macs, though, so it's interesting to look at this long-awaited rival and see what it has to offer.

BeOS is incompatible with Macs based on the PowerPC G3 processor

Be yourself

From a technical point of view, BeOS is undeniably impressive. Its graphical user interface looks like a kind of halfway house between the MacOS and Windows, but Mac users should have little trouble getting to grips with it. In fact, if you've recently upgraded to MacOS 8.5 you'll probably feel quite at home with Be. There are a number of

features in BeOS, such as the Tracker menu, that are directly comparable to features in MacOS 8.5. But it's really the underlying architecture of BeOS that is its main selling point. Its efficient multi-threading allows it to perform several tasks at once. Demos generally show it running several different QuickTime video clips simultaneously. You can move video clips around on-screen without interrupting playback, and you

can drag a video clip onto a 3D model so that the video continues to play while wrapped around

the surface of the model. BeOS has a 64-bit file system, which allows it to support terabyte file sizes. These features mean that BeOS is far more efficient at handling large media files than either the MacOS or Windows.

Testing time

We tested BeOS Release 4 on a PowerMac 9600 with a 200MHz PowerPC 604e processor. This is quite an old machine and not very powerful compared to the latest G3 Macs, but it managed to run four QuickTime movies on-screen, simultaneously. I doubt the machine would have been able to do this if it were running the standard MacOS.

An interesting new feature in Release 4 is the Media Kit, which allows you to automate workflow processes. You could set up a routine that automatically imports a video clip, applies a filter, recompresses the clip and then saves it onto hard disk.

Be has also incorporated the OpenGL graphics library into the operating system. This will appeal to 3D designers, as well as making it easier to produce Be versions of games like Doom and Quake. In fact, it might even make it easier to produce games for BeOS than for the Mac because Apple just doesn't seem to know what to do about OpenGL. There's no doubt that the sheer performance and versatility of BeOS will be very appealing to graphics, video and audio professionals. There's even an impressive range of audio,



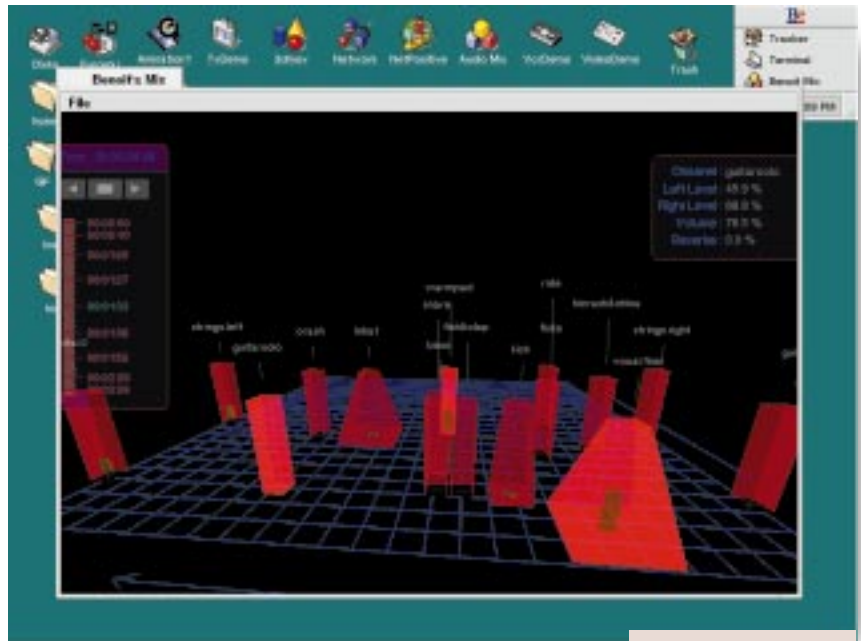


video and graphics programs being developed for it. Unfortunately, it's taken so long for Be to get the operating system ready, that it may have missed its chance to win over converts from the Mac platform.

➔ X marks the spot

Later this year, Apple plans to release OS X, which will be a landmark for the MacOS and should provide the Mac platform with many of the features that currently make BeOS so attractive. In addition, OS X will be compatible with most of the current generation of Mac software, which will mean that it has a far larger software base than BeOS. If the performance of OS X lives up to expectations, Mac users may simply have no need for BeOS.

The biggest problem for BeOS is that it is incompatible with Macs based on the PowerPC G3 processor. The reason for this is simple: Apple will not give Be the technical information it needs to ensure compatibility with G3 PowerMacs. This has not stopped the Linux community producing a version of Linux that runs on G3 systems, but Be claims that there are legal issues preventing it from reverse-engineering a G3 version of BeOS, and that Linux doesn't face these problems



▲ **BEOS MULTIMEDIA APPLICATIONS INCLUDE THIS 3D VISUAL AUDIO MIXER**

because it is not a commercial product. So, without Apple's help, the BeOS simply won't run on currently shipping Mac models, nor on any Macs that are likely to ship in the future.

It's true that there are a lot of designers out there who still use older PowerPC systems, but you can bet your

boots they're going to upgrade to G3

as soon as their budgets allow. This means that BeOS is almost certainly dead in the water as far as the Mac platform is concerned. That's a shame; but the commercial reality is that Apple isn't going to do anything which might encourage a rival operating system.

MAC COMPATIBILITY

Without support from Apple, BeOS is incompatible with all current PowerMac G3 models. However, it should be compatible with most Macs based on the PowerPC 603 and 604 processors as long as they have PCI motherboards. Macs that use the NuBus architecture are incompatible with BeOS.

System Name	BeOS Compatible?	Processor
Power Mac G3 (all)	No	G3
Power Mac 9600/300 (or faster)	No	604
Power Mac 9600/250 (or slower)	Some models*	604
Power Mac 9600 MP	Yes	Dual 604
Power Mac 9500	Yes	604
Power Mac 9500 MP	Yes	Dual 604
Power Mac 8600/300 (or faster)	No	604
Power Mac 8600/250 (or slower)	Yes	604
Power Mac 8500	Yes	604
Power Mac 7600	Yes	604
Power Mac 7500	No	601
Power Mac 7300	Yes	604
Power Mac 7200	No	601
Power Mac 4400	Yes	603

*Power Mac 9600 models are based on two possible motherboard designs, only one of which is compatible with BeOS.

➔ It's a PC world

If there is any hope for the long-term survival of BeOS, it therefore lies in the PC world. There is a PC version of BeOS which works quite happily with Pentium II processors. BeOS is certainly more advanced than Windows 98, and the creative users at which Be is aiming have not, as yet, all been won over by Windows NT. Be's vice-president, Jean Calmon, told PCW that it only needs a user-base of 200,000-500,000 to make BeOS financially viable. Linux has more than ten times that number of users, so it's possible that this promising operating system could find a profitable niche for itself. But wherever that niche is, I doubt that it's going to be in the Mac market.

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Inside Relational Databases

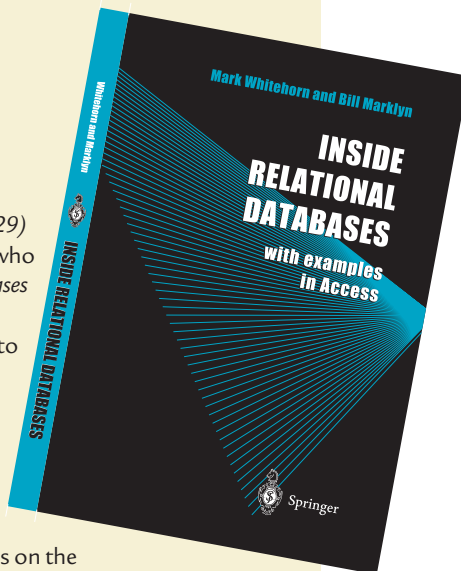
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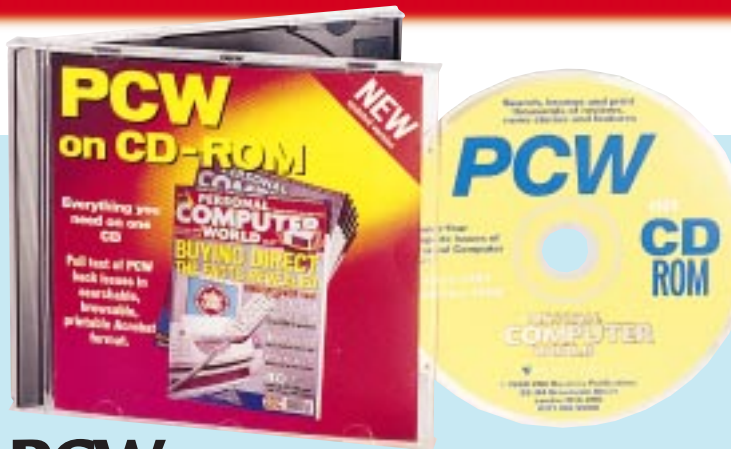
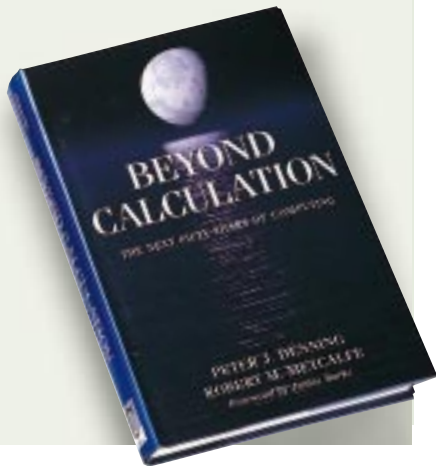
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leisure lines

Hands up, all those who are sick and tired of seeing Lara Croft's sickening Tomb Raider physique plastered over countless magazine and newspaper pages? Well, I am, for one, but as many of you out there don't share the same view, we're reviewing her new adventure, **TOMBRAIDER**



▲ THE SEARCH FOR GRANDMA'S REMEDY IS FEATURED IN OUR KIDS SECTION

III, in *Screenplay*. Along with Lara, there are reviews of **CARMAGEDDON II**, World League Soccer endorsed by Michael Owen, the **TIGER WOODS 99** golf game, starring

the man himself, war on the Eastern Front in *Close Combat III*, and *Buggy*, a racing game. Our CD-ROM section features reviews to suit many tastes. All you Trekkies can enjoy **STAR TREK SHIP CREATOR**, there's lots to learn from **ENCYCLOPAEDIA BRITANNICA 99**, you can dance the night away with *FrEQuency 99* and watch Kenny come a cropper in the **SOUTH PARK** desktop themes and screensavers. Reviewed in the *Kids* section are Dorling Kindersley's **MY AMAZING HUMAN BODY** and an adventure called *The Search for Grandma's Remedy*. In our *Books* pages you'll find reviews of *Overdrive* — Bill Gates and the Race to Control Cyberspace, *The Complete Idiot's Guide*

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to Windows 98, and **DIGITAL PHOTOGRAPHY**. Our *Competition* gives you the chance to win a copy of a relational database called 4th D or a BT Internet kit. Complete our *Prize Crossword* and a copy of the new Chambers dictionary could be winging its way to you, or pit your wits against our *Brainteasers*. And in our trip down memory lane, in the *Retro* column Simon Collin looks back at the **GRID 1101**, a pioneering laptop and a design classic.

ETELKA CLARK, LEISURE LINES EDITOR
ETELKAC@VNU.CO.UK

Tomb Raider III

Third time around for the feisty, sexy, action heroine.



◀ **WHO'D HAVE THOUGHT POSTING A LETTER WOULD BE SO DANGEROUS THESE DAYS?**

most famous of all pixellated female forms so it's hardly surprising that she's back for her third adventure, in the not-so-originally-

named Tomb Raider III.

Those who didn't like the first two versions should now go and make a cup of tea, as Tomb Raider III is pretty similar in most ways. Lara does, however, have new moves. She can sprint for short bursts, crawl, duck, and monkey-swing. The delightfully brutal young lady has also got new weapons, such as grenade launchers, as well as a variety of new vehicles in which to scream around, such as a mine cart, a kayak and a quad bike.

Marketing folk realised long ago that by including a sexy, scantily-clad lead character in their action games, they would sell lots of copies. Lara Croft is the

The five new landscapes range from Antarctica to London. You can run amok in Aldwych tube station if you feel so inclined. Graphics have been improved,

with new effects like rippling water, rain and smoking gun barrels, and the overall feel of the game is that it has been tinkered with rather than overhauled. A negative point is that you can now only save your game when you have collected a 'save game' crystal — and these are often hidden. So, for an amateur Tomb-Raider-ite, you might spend too much time returning to square one and become frustrated.

Tomb Raider III is a great game and highly addictive, as were its predecessors, and it will sell bucketloads. Just don't expect much of a difference.

JIM HARYOTT

PCW DETAILS



★★★★★

Price £39.99

Contact Eidos 0181 636 3000

www.eidosinteractive.com

System Specification Windows 95/98, Pentium 166MHz processor (Pentium 200MHz recommended), 16Mb of RAM (32Mb recommended), 4X CD-ROM drive, DirectX 6.0 (supplied).

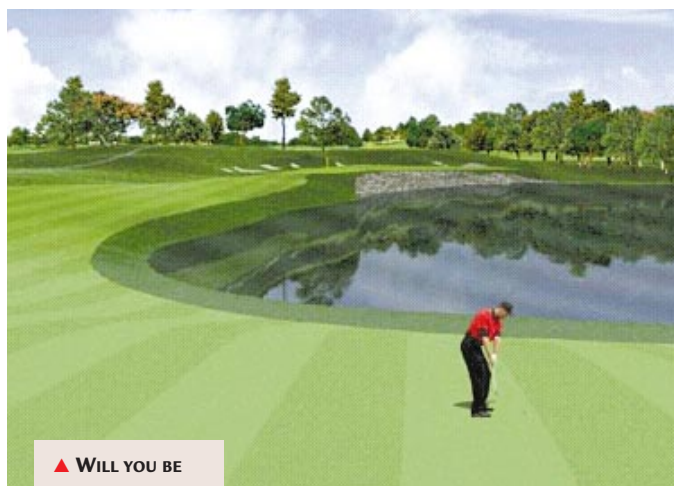
Tiger Woods 99

This pacy golf simulator leaves the competition stuck in the bunker.

Quite simply, this is one of the finest golf simulators ever created. It looks stunning, the controls are easy to master, and most unusually for a golf game, it plays quickly. You play Tiger, who looks perfectly digitised and, importantly, blends in well with the scenery.

The machine on which I played the game had a 3Dfx card, so it was not really surprising that it looked good, but what really caught us out was the speed of the gameplay. Only a few seconds after a shot has been taken, the next shot is lined up, thus cutting out the tedious waiting time you usually have to suffer,

even with relatively new games such as Microsoft's Golf 98. The views provided when the ball is struck are very impressive. Sometimes the point of view follows the ball through the air, other times you see it from the green. Then, you can replay it from any of the six 'ball-cams'.



▲ **WILL YOU BE ABLE TO CLEAR THE WATER? NOT EVEN TIGER WOODS IS INFALLIBLE...**

Tiger Woods 99 not only looks great and plays well, but there are up to eight different types of gameplay. Dozens of options make the virtual game almost

as difficult to master as an actual round of golf. The best bit, though, is that if you manage to get your timing on the swing just right, you can enjoy a 'Tiger Shot!' which results in young Master Woods crackling with electricity and belting the ball down the fairway, literally smoking!

PAUL TRUEMAN

PCW DETAILS

★★★★★

Price £39.99

Contact Electronic Arts
01753 672066

www.ea.com

System Specification Pentium 133MHz, Windows 95/98, 32Mb RAM, 4X CD-ROM, 110Mb free hard-disk space.



World League Soccer 99

Not a good match for Michael Owen, who lends his name to this football game.



Footballing wunderkind he may be, but a totem of PC gaming quality he is not. Poor young Michael Owen has been approached by dozens of business types following his World Cup debut and offered countless commercial deals. Sadly, he said yes to this game, a shoddy affair that does little justice to his talent

with a football. World League Soccer is a well-established football-sim franchise that will obviously shift a lot more products due to Owen's face being plastered all over it.

The first thing you notice about the game is that the main menu seems as responsive as an old Trabant car. The game was reviewed on a PII 450 armed with 128Mb and a spankingly good graphics card, so the equipment cannot be to blame for the game's sluggishness. The culprit appeared to be the chunky polygonal form of Michael playing keep-me-ups to the left of the menu. When he was missing from the

menu, the icons became far more responsive. The actual matchplay isn't bad, but forget about playing this game with a keyboard — there are too many keys to remember.

Where the game really fails is that there is no sense of it having anything to do with Michael Owen. His image appears on the opening video and that's it: none of his virtuoso skills are on display here.

PAUL TRUEMAN

PCW DETAILS



Price £34.99

Contact Eidos 0181 636 3000

www.eidos.co.uk

System Specification P133 (P166 recommended), 16Mb RAM (32Mb RAM recommended), 5Mb free hard-disk space, 4X CD-ROM.

Carmageddon II

More cars, more mayhem and more realism in this **extremely violent** driving game.

If you find gaming violence offensive, then don't read on. Carmageddon II is another outing for the most violent, gratuitous — and successful — driving game of last year. It is so gratuitous, in fact, that the British Board of Film Classification has stepped in and ordered that it be toned down by replacing the 'real' pedestrians in the game with zombies.

One of the main objectives of Carmageddon II is to run over as many zombies as possible, in return for money. Another objective is to destroy your competitors' cars. If you fancy it, you can even race, but that's not really the point.

PCW DETAILS



Price £39.99

Contact Bionic Digital 01753 653456

www.sci.co.uk

System Specification Pentium 166, 16Mb RAM, Direct3D graphics accelerator, 200Mb hard-disk space, 4X CD-ROM drive, 16-bit sound card.

The game's graphics have not improved a great deal beyond the original, apart from the fact that it now has Direct3D acceleration as standard. The improvements lie in the physics engine, which allows more realistic crumpling of cars, and offers a 'smashable' environment so you can drive through walls, knock down lampposts and all sorts. Zombies are now fully polygon-based so you can probably guess the effect that this has... yes, they splatter far more realistically when you hit them.

There are 33 brand-new vehicles, including a combine harvester, and about a zillion silly power-ups. To progress to a new environment you have to complete



▲ YOU'LL COME OUT OF THIS ENCOUNTER WITH MORE THAN JUST SCRATCHED PAINTWORK

mission levels, such as destroying a set number of objects in the time allotted. The missions are pretty hard and it can get boring having to repeat them over and over.

Although I found this game fun for a while, I would have preferred an hour with Colin McRae Rally instead.

DAVID FEARON

Buggy

Bump your opponents off the track in this **racy little number**.



Simple name, simple game,

Buggy does exactly what it says on the box. You race like a mad thing around a variety of courses, trying to pummel your fellow opponents into the side of the track.

This is one of those games that you can be happily playing a few minutes after first taking the CD out of its box. Installation is easy and there are only a

▲ **THERE'S NO TIME TO ADMIRE THE SCENERY WHEN YOU'VE A RACE TO WIN**

likely not handle well, and vice versa.

Once you've mastered the art of winning races, you can progress to collecting the various power-ups that litter the course and turn your buggy into a fearsome fighting machine. This isn't

few controls to master. If anything, Buggy is almost too easy to pick up. Although finishing last in his debut race, this reviewer then won every subsequent event. There are no difficulty settings, although you can greatly affect your chances by the type of buggy you pick, with numerous models offering various combinations of speed and handling: a speedy little number will most

exactly Carmageddon II, though. Instead of decapitating your rivals, there is the far gentler option to stun them, or lock their wheels while you race ahead. To be honest, this type of automotive sabotage will require a lot of practice as, initially, simply picking out the route requires all your concentration. Simple but effective, Buggy is awash with colour and carnage but its particular brand of mayhem won't be to everyone's taste.

PAUL TRUEMAN

PCW DETAILS



Price £29.99

Contact Gremlin 0114 279 9020

www.gremlin.co.uk

System Specification Windows 95, P166MHz (minimum) P200MHz (recommended), 16Mb RAM (minimum) 32Mb RAM (recommended), DirectX5-compatible graphics card, 4X CD-ROM.

Close Combat III

A hard time and heavy fighting on the **Eastern Front**.

It's 1941, and all is not quiet on the Eastern Front. Hitler has ordered the invasion of the Soviet Union and German troops are marching towards Moscow. The Soviet populous is mobilised and prepared for a nationwide siege. The world's most brutal land war has begun.



◀ **ON AN ICY RUSSIAN PLAIN, TANKS LOOK SET TO OVERCOME A BELEAGUERED INFANTRY DIVISION**

It seems like an age before your troops get into the right position to engage the enemy. Having a less than intuitive interface doesn't

help matters and the game sprites are disappointing. Then again, not all strategy games need follow in the footsteps of, say, Starcraft with all its pace and pizzazz, to achieve their goals. There's much to be gained from playing Close Combat III but you must be prepared to put in a lot of initial effort.

CLIFF HOPE

In this game you are a low-ranking commander of either side, directing your troops into historically accurate battles which span four long years of the campaign. Microsoft, to its credit, has done well to make the gameplay as accurate as possible. There are over 200 categories of troops, vehicles and weapons, battlefields generated from

actual wartime aerial photography, and a game engine that faithfully incorporates elements of WWII warfare — chains of command, morale, limited ammunition and extreme weather conditions among them.

Given the level of detail here, it's perhaps only to be expected that actual gameplay is a little on the slow side.

PCW DETAILS



Price £34.99

Contact Microsoft 0345 002000

www.microsoft.com

System Specification Windows 95/98, P133 processor, 32Mb RAM, 60Mb hard-disk space, 4X CD-ROM drive, SVGA video card, Windows-compatible sound card.

South Park Desktop Themes

Transform your desktop into a little corner of **cartoon Colorado**.

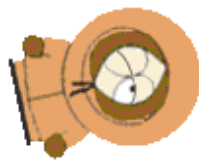
'Howdy Ho!

My, you smell of flowers!' — the wise words of Mr Hanky the Christmas Poo captured the heart of every South Park fan. And, with an opening like that, they will be the only ones still reading this review.

If, like me, you can't get enough of Kyle, Stan, Kenny and Cartman, then you'll love the Official South Park PC Desktop Themes and Screensaver. Joining



There are two parts to this product: the screen-saver and



the desktop themes. The latter consist of a number of backdrops and icons which you can set up to randomly shuffle as you restart your PC. There are 13 screensavers from which to choose, which have the



your favourite Colorado chums are the regulars from Cartoon Central's controversial cartoon show: Chef, Mr Garrison, Mr Hat, Big Gay Al, Wendy, not to mention the Cows and the Aliens — they all make an appearance.



onto your screen and quote unforgettable lines — the graphics and sounds are indistinguishable from the show. The Cows are worried by the Aliens, Cartman gets an anal probe, Kyle learns something new, Chef sings about love gravy, Stan pukes when Wendy chats with him, and of course,

◀ **THIS IS KENNY, AND NO, HE'S NOT HAVING A QUICK 40 WINKS**

oh my God, they killed Kenny. So, nothing spectacular, but a welcome fix for

South Park fans while we wait for the forthcoming 3D game from Acclaim, which promises to have a multi-player option you won't forget. And remember, children — a pig and an elephant's DNA just don't match.

GORDON 'CARTMAN' LAING

PCW DETAILS



Price £19.99

Contact Telstar Electronic Studios
01932 222 232

www.telstar.co.uk/tes

System Specification Windows 95/98, P90, 16Mb RAM, 16Mb hard-disk space.

FrEQuency '99

Sound and vision team up on this classy **dance music** creator.

The proliferation of music-mixing software has given closet DJs a lot to get stuck into over the past few months. If you didn't fancy Hip Hop eJay, there was Dance eJay or even Rave eJay. Turn your speakers up loud enough and your darkened bedroom could practically be mistaken for the Ministry of Sound. Well, maybe not; but when your only audience is your kid sister, you probably won't be expecting much in the way of crowd appreciation anyway.

Now there's yet another dance-mixing toy to play with — FrEQuency '99.

▶ **A SHADOWY MIXING DECK AND ATMOSPHERIC VIDEO CLIPS MAKE FOR SOME MOODY MUSIC CREATION**

FrEQuency shuns the user interface employed by the eJay products, where you have to drag tracks onto an eight-track synthesiser and then play them back until you're happy with the result. Instead, it has teamed up with Macromedia to produce a nice Shockwave-style interface where you click on various parts of the screen to change the sound and bring in new backbeats, cut the drums and so on.

FrEQuency has included samples from different musical genres, including techno, ambient, hip hop, house, jazz



and drum 'n' bass, which means you won't have to buy separate products for each. Another nice feature is the video loop, which you can play around with by adding your own clips. If your mixing skills leave something to be desired, you can just switch on the automatic track generator.

FrEQuency '99 is a bargain and would make the perfect party toy.

SUSAN PEDERSON

PCW DETAILS



Price £19.99

Contact United Interactive
0171 395 0800

www.modified.com

System Specification PC: Windows 98, 95 and NT, Pentium processor or better, 16Mb of RAM, 4X CD-ROM, sound card.
Mac: Power Mac or clone, 24Mb of RAM, 4X CD-ROM drive, System 7.0.1 or later.

Star Trek Starship Creator

The dream of every sci-fi fan is fulfilled: build your own **Federation starship**.

It is a Trekkie's dream to build his or her own space vehicle, to boldly go where none have gone before, and Starship Creator is a CD made by fans, for fans. So, if you're not a Trekkie, steer well clear. The program begins by offering you a variety of components which go into the making of a great Federation starship. You can select your favourite engine, tweak the all-important force field, or increase the power of your phasers and proton torpedoes. But be careful about what you choose. Powerful phasers can draw a lot of energy away from the shields, weakening the overall integrity of the ship. This may also affect your ship's manoeuvring ability. You can even select the type of crew quarters; cramped quarters with poor recreational facilities



can hit morale during long voyages. Having built your own version of the Defiant or the Enterprise, you can go on to select the crew, but choose wisely. Some crew members, like Worf, will always look for guidance. Others, like James T. Kirk, have an independent streak.

Your dream ship will now be ready to fly off into the unknown. Except it is here

◀ WITH A BIT OF EFFORT, YOU CAN CREATE A STARSHIP OF WHICH JAMES T. KIRK WOULD HAVE BEEN PROUD

that the CD-ROM suffers. The missions on which you are sent are poorly planned and the 2D graphics are only slightly better than those of a Sinclair Spectrum. However,

if you collect Star Trek memorabilia, this CD is worth having.

AJITH RAM

PCW DETAILS

★★★★

Price £34.99

Contact *Zablac Entertainment*
01626 332233
www.ablac.co.uk

System Specification *Windows 95, 15Mb hard-disk space, Pentium 90, SVGA graphics card, SoundBlaster-compatible sound card.*

Encyclopaedia Britannica 99

Updated to include even more **facts and figures** — a little too many, in fact.



◀ DID YOU KNOW THAT ROMANS ONCE LIVED IN THE SLEEPY ESSEX TOWN OF CHELMSFORD?

test. Neither the dictionary nor the encyclopaedia was able to define the term 'SCSI', although a list was offered of similar-sounding alternatives from which to choose.

This was a nice touch, as it meant that if we had spelt our query incorrectly, we would have been saved from having to retype it.

Searching the encyclopaedia can be performed in two ways. First, the more conventional method of entering a keyword will produce a list of all related articles. The second method is far more intuitive, allowing the user to enter a

question such as 'tell me about cars' and be presented with a list of likely matches. Entering this particular question, though, did not take us straight to articles relating to the motor car. Of the hits returned, the first five were in reference to railway cars, George Pullman, the history of the circus, air brakes and cable cars. So, with results like this, I could not help but feel that the people at Britannica had taken the idea of an 'International Edition' just a little too far.

NIK RAWLINSON

PCW DETAILS

★★★★

Price £125

Contact *Encyclopaedia Britannica*
0800 282433
www.britannica.co.uk

System Specification *75MHz Pentium processor, 16Mb RAM (32Mb recommended), 80Mb free hard-disk space, 4X CD-ROM, 800x600 SVGA monitor, sound card and speakers, mouse.*

Following the success of previous years, the 1999 edition of Britannica incorporates over 73,000 articles, 8500 photos and illustrations and 30,000 freely downloadable related internet links. This tidy little lot is supplemented by a 1998 yearbook to keep users right up to date.

I had high hopes for this package, but was disappointed after putting it to the

My Amazing Human Body

An interactive insight **into your insides** with your skeletal guide, Seemore Skinless.

Children ask awkward questions and this CD will help provide the answers. It is a basic illustration of the human body and how it works, for six- to ten-year-olds. An interactive approach is used to introduce the body from the inside out. Skeletal host, Seemore Skinless, guides us around the CD's four main sections. There's a personal file, too, where the child inputs information about itself and creates a picture of what it looks like: a point of reference which helps the child understand the principles being covered.

Various sections look at what we're made of, how we're put together and the importance of nutritional and daily requirements. Using Seemore's body as



▲ **WHO NEEDS A TOOTH FAIRY WHEN YOU CAN PRACTICE VIRTUAL DENTISTRY?**

of organs and bones, enlarging them, X-raying them, measuring them and counting them.

Seemore is colourfully animated to captivate a child's short attention span. In the Take Me Apart section, they can

literally 'blow him up' and reassemble him, working against the clock for an extra challenge. Interactive games and activities form a substantial part of the exploration. One activity requires the child to feed, water, exercise and rest Seemore Skinless throughout the day. This is a fun and educational CD-ROM that children will thoroughly enjoy.

HELEN FORTGANG

PCW DETAILS



Price £24.99

Contact DK Multimedia 0171 753 3488
www.dk.com

System Specification PC: Windows 95/98, 486 DX2/66MHz, 12Mb RAM, 8- or 16-bit sound card, 256 colours at 640 x 480 pixels, 2X CD-ROM drive.
Mac: 68040/33MHz, 8Mb RAM, System 7.0, 8-bit (256) colour display at 14in, 640 x 480 pixels, 2X CD-ROM drive.

The Search for Grandma's Remedy

You're a **mouse on a mission** as puzzles must be solved to restore your grandma's health.



Mia, the skateboarding mouse in The Search for Grandma's Remedy, has to find something to cure her grandma's sickness. The adventure begins after Mia's 'sparklies', needed to buy the ingredients for the medicine, are stolen by the rascally Romaine Rat. Exploring the house where she lives, Mia and her friends have many encounters which lead her closer to the ingredients. Mia must collect the various tools lying around the house and keep them in her

▲ **GO FOR YOUR GRANNY: MIA GETS HELPFUL ADVICE FROM THIS TALKING INK DROPPER**

rucksack. Aimed at children aged four to nine years old, this little adventure combines learning and play in one engaging production. The puzzles and games are educationally designed to help develop a variety of basic strengths. Skills including word recognition, phonics, spelling, early reading and rhyming are taught.

With four levels at which to set the program, the difficulty of the games and puzzles can be increased or decreased accordingly. Alternatively, the player can enter their age, which, I presume, automatically defaults the program to a particular level. The animated, film-like 3D graphics greatly add to the adventure, making an enchanting visual ride which is beautifully introduced with a song from Boo, the swinging spider.

Even though it should be possible, it was not clear how to save the game, which meant that I was thrown back to the beginning when what I had really wanted was to resume play. It also became rather frustrating manoeuvring Mia where I wanted her to go.

Presented on two CD-ROMs, this is a unique and charming educational program despite its imperfections.

HELEN FORTGANG

PCW DETAILS



Price £19.99

Contact Ransom Publishing
01491 613711

www.ransom.co.uk

System Specification PC: Windows 95/98, P100, 32Mb RAM, 4X CD-ROM, 16-bit sound card and speakers, 640 x 480 pixels, 256 colours, 30Mb free hard-disk space.
Mac: Power PC 100MHz, System 7.6 or later, 32Mb RAM, 4X CD-ROM, 640 x 480 pixels, 256 colours, 30Mb free hard-disk space.

Win a V.90 Internet kit!



The kit consists of a 56K external modem supporting V.90 from Hayes and BT Internet software. A free CD-ROM tutorial is included to help you get online.



service; Wireplay multi-player gaming software; a one-month trial of BT HomeCampus, the internet-based home learning service; and three months' free access to BT Internet.

Modem maker **Hayes** has teamed up with BT to offer *PCW* readers the chance to win one of its new **V.90 Internet kits**. We have four kits to give away, each worth £139.

BT Internet offers fast and reliable access to the internet and comprises five email addresses and 10Mb of web space.

This complete internet solution also includes: one month's trial of LineOne, the UK's leading online consumer

➔ **For the chance to win one of these superb kits**, just answer the following question:

How many email addresses does the V.90 Internet kit allow you to have?

- A. Three
- B. Four
- C. Five

Win a 4th Dimension database!

Five copies of the graphical, multi-threaded relational database, **ACi's 4th Dimension (4D)** worth £242.50 each, are up for grabs this month.

➔ **4D is designed for end-users** and expert developers. From the time of its release in the mid-eighties, 4D has been winning awards from the computer press and winning praise from users for its power, elegance and simplicity. Its intuitive interface and powerful 4GL programming language make 4D the ideal tool for designing solutions in a single-user, client/server or internet/intranet environment.

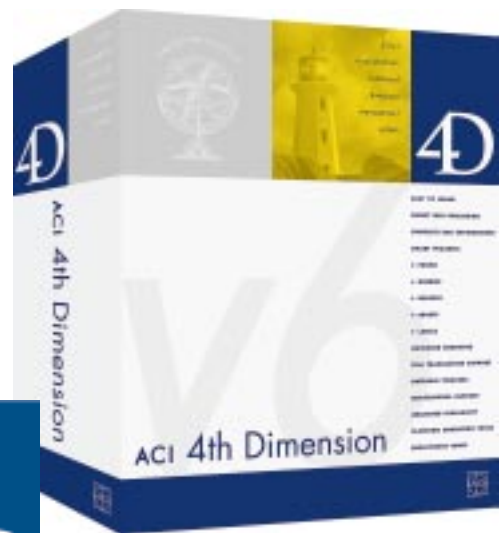
With 4D you can create virtually any type of database application, from simple contact management systems and product catalogues to sophisticated multimedia applications and full-scale accounting packages. 4D's ease of use, reduced development time and

straightforward installation and maintenance make it an unbeatable, cost-effective database solution for organisations of all sizes.

➔ **For the chance to win a copy of 4D**, just answer the following question:

What is 4D?

- A. A word processor
- B. An award-winning relational database management system
- C. A spreadsheet



HOW TO ENTER THE COMPETITIONS

1. Via our web site at www.pcw.co.uk, or
2. Write your answer, name, address and daytime telephone number on a postcard or on the back of a sealed envelope. Mark your card "PCW/Hayes BT Competition" or "PCW/4D Competition" as applicable and post to: P.O. Box 191, Woking, Surrey GU21 1FT, by Friday 27th February, 1999.

• Please state clearly on your competition entry if you do not wish to receive promotional material from other companies.

RULES OF ENTRY

This competition is open to readers of *Personal Computer World*, except for employees (and their families) of VNU Business Publications, Hayes, BT Internet and ACi. The Editor of *Personal Computer World* is the sole judge of the competition and his decision is final. No cash alternative is available in lieu of competition prizes.

First off the GRiD

Simon Collin takes a **strong liking** to the GRiD 1101, the metal-cased laptop pioneer.

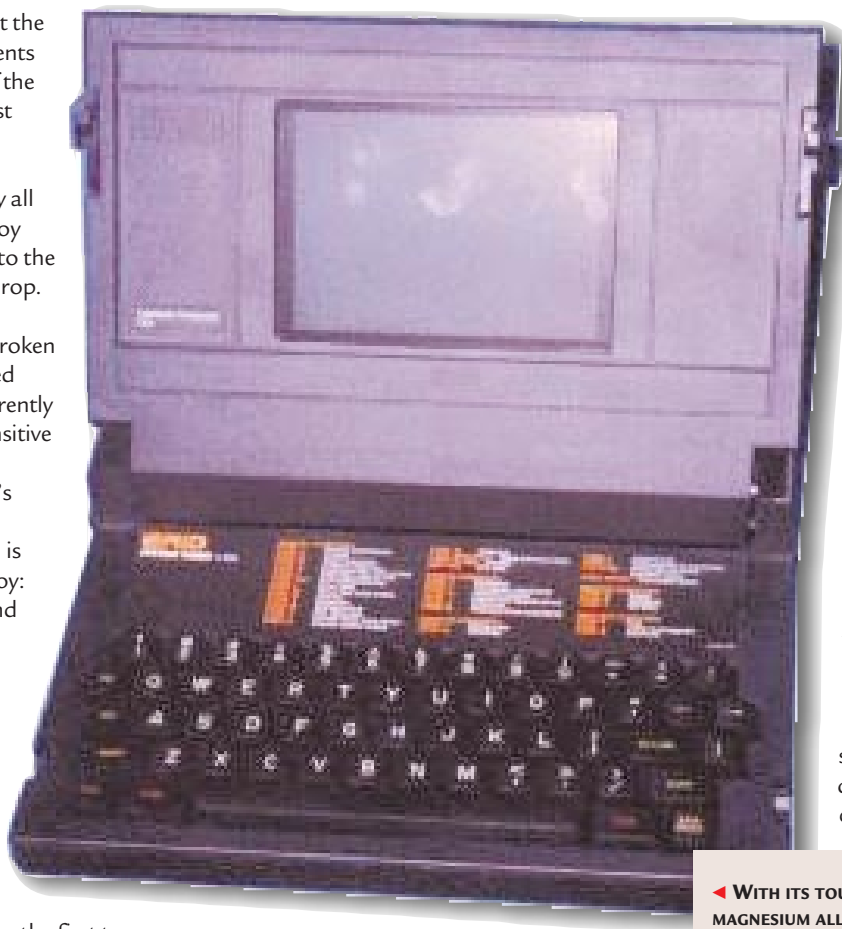
If you look at the advertisements for some of the thinnest, newest laptops on the market, you'll notice that they all sport metal-alloy cases, resilient to the odd knock or drop. Since I've just dropped and broken my plastic-cased laptop, I'm currently particularly sensitive to this issue. The metal that's in fashion as a casing material is magnesium alloy: it's very light and super-tough. However, even though the latest laptop models rate this feature top of the list, it's not new. In fact, one of the first real laptops was also the first to use a strong magnesium-alloy casing. The model was built by GRiD, the forgotten pioneer of the portable-computer industry.

GRiD was started in 1979 by engineer Glenn T Edens, who provided pivotal ideas and concepts which have ensured current laptops and PDAs work and

The GRiD 1101 took the knocks of life on the road better than any other model

look the way they do. He invented the idea of the laptop as we know it, with clamshell design, integrated flat display and so on — he even holds the patent for the laptop idea.

Edens went on to develop pen-based computing ideas that looked great at the time, then died off, but have now taken off again with products such as the Pilot and Windows CE.



◀ **WITH ITS TOUGH MAGNESIUM ALLOY CASE, THE GRiD 1101 WAS BUILT TO LAST**

The first GRiD model, the 1101, was not only a revolution in computing terms but was also a design classic. The styling and case design for the 1101 was produced in the UK by William Moggridge. He produced a neat, elegant, classic design — and if you want to see the original, it's on display in the Museum of Modern Art in New York.

The machine's magnesium alloy casing ensured that the laptop was fantastically strong. Unlike today's fashion for bare metal styling, GRiD computers were painted a trademark black. Critics complained about the weight, but it took the knocks of life on the road better than any other model (come to think of it, there were very few other models around at the time with which to compare it). To add an impressive feather to its cap, the space agency NASA took the GRiD laptop to its heart and there has been a GRiD on board almost every space shuttle flight since.

The original 1101 was powered by the then-standard 8086 processor (used in plenty of PC-compatible desktops of the time) together with the companion 8087 maths co-processor. Its main memory was 128Kb of RAM as standard, although this could be expanded to 512Kb. The small electro-luminescent screen was easy to read and provided a standard 80x25 character display. Unusually, the GRiD also featured bubble memory, which was very trendy at the time, and used an odd electro-chemical process to store data. GRiD provided mass storage through both a cassette tape and floppy-disk drive, and there was an optional hard-disk unit available which could store your MS-DOS 2 compatible software.

Displaying its engineering-based pedigree, the GRiD 1101 featured a GPIB interface port together with the usual serial and parallel printer ports. GPIB (also called IEEE-488) ports are still used to link test and lab equipment to a computer and no doubt prove useful when linking the laptop to standard shuttle patch panels.

It's hard to find an original GRiD computer, but if you're determined you could try the antiques market: Bonhams, the London-based auctioneering firm, offered one as an icon of 20th century design and it fetched a respectable \$800. The GRiD company was acquired in 1988 by the Tandy Corporation (itself featured here recently) but it is thanks to Edens' revolutionary ideas and designs at the start of the eighties that we can now choose from dozens of sleek laptops wrapped in a magnesium alloy casing. □

books

The Complete Idiot's Guide to Windows 98

Sometimes it's quite handy being a complete idiot, as people like to write books to help you. The *Complete Idiot's Guide to Windows 98* is one such self-help publication which cuts to the quick of Windows 98 ignorance. Although it's not very colourful in its presentation, it does contain a whole load of sound advice and tips, going into sufficient depth to prove a valid reference for you to return to.

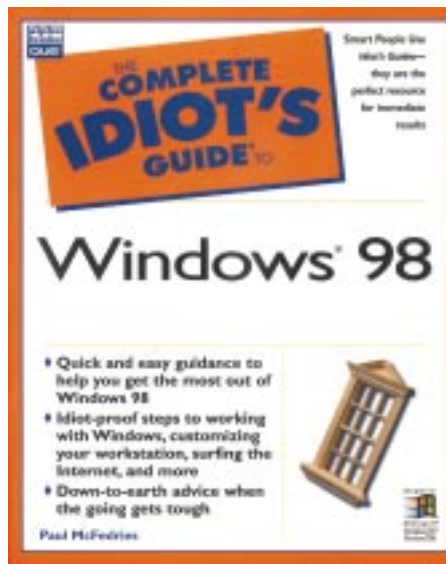
Written in a friendly manner with dashes of humour — yes, Windows can be fun — it manages not to patronise the idiot and avoids the use of heavy jargon in its explanations. But it does include the obligatory, albeit brief, glossary to help you 'Speak Like a Geek' and covers the core terms. Screenshots are placed throughout the book and some

of them require a magnifying glass, but there are also helpful tip-boxes and cross-references which point you towards related subjects and help you navigate through the book.

It is not the best guide

I have seen, certainly in terms of presentation, but as Windows 98 bibles go, this one is a user-friendly tool which would do well in permanent residence beside your PC.

Although concise, the book's lighthearted conversational style can



make it seem quite waffly in places. This can be forgiven though, as it does get the information across. The book covers all the important aspects of Windows 98 and pays sufficient attention to your system and relevant subjects. If you do

decide to buy this book, and you wouldn't be an idiot to do so, look carefully for it on the bookseller's shelves as it is easy to miss its uninspiring cover.

HELEN FORTGANG

PCW DETAILS



THE COMPLETE IDIOT'S GUIDE TO WINDOWS 98

Author Paul McFedries

Publisher Alpha Books

ISBN 0-7897-1493-0

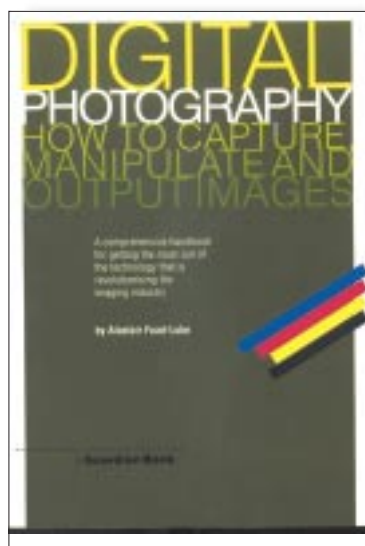
Price £13.99

Digital Photography — How to Capture, Manipulate and Output Images

Most of us have fancied ourselves as a bit of a David Bailey in our time — until, that is, the less than impressive snaps come back from the chemists. This is where digital photography comes into its own, letting you get rid of your mistakes before you print them out. As its title suggests, this book tells you everything you need to know about processing prints of which you can be proud. Unfortunately, the book's title also hints at a tone of dull undergraduate thesis.

This book is packed with information.

Everything is covered, including scanners, digital cameras, printers, image-editing software and a few basic editing techniques.



There are even 28 pages of glossary. However, there are too many items covered in this book, which leaves no room to discuss anything in detail. Worse, some of the information is

already out of date. When it covers image-editing software, for instance, it mentions several old versions. Without wanting to blow our own trumpet, you are probably better off reading this magazine. The January and February '99 issues of *PCW*, for instance, covered all the latest image-editing packages in far more detail.

This worst thing about this book, though, is that it is a very dull read. It is rather like going through your bank statement; utterly tedious, but you feel as if it might possibly turn up something you need to know.

Digital Photography takes what should be a fun subject and turns it into something you would only do if you were paid to. You cannot even look at pretty pictures in the book because, although most of the shots are informative, they are unimaginatively presented in dull-old black and white.

ADELE DYER

PCW DETAILS



DIGITAL PHOTOGRAPHY — HOW TO CAPTURE, MANIPULATE AND OUTPUT IMAGES

Author Alastair Fuad-Luke

Publisher Fourth Estate

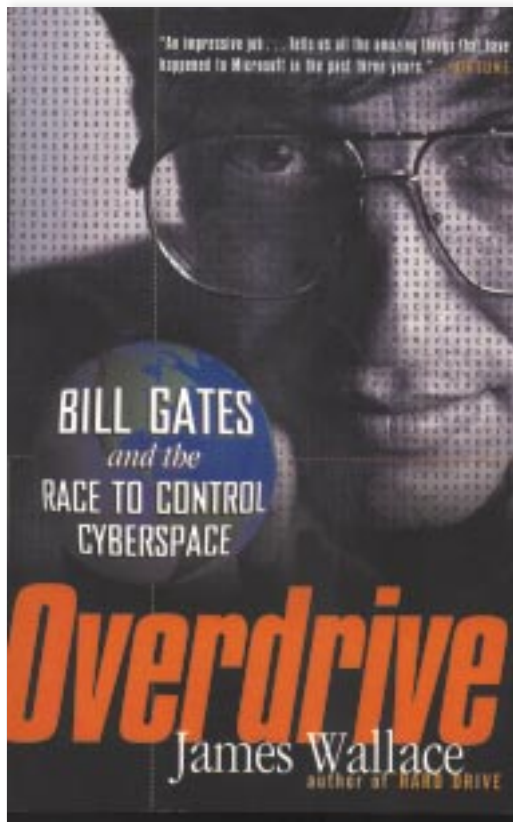
ISBN 1-8411-5 051-7

Price £15.99

Overdrive — Bill Gates and the Race to Control Cyberspace

So where do you sit in the great 'Microsoft vs The World' debate? Is Bill a saint or a sinner? In his first book of six years ago, *Hard Drive*, journalist James Wallace of the *Seattle Post* was one of the first to point an accusing finger at the business practices of the largest software company in the world and its allegedly control-freak boss. Six years in the IT industry might as well be 60, given all that has happened since 1992. Wallace unsurprisingly chooses to focus on 'the internet', the biggest IT story of the past ten years. In a recent book, *The Microsoft File*, by Wendy Goldman Rohm (reviewed, *PCW* Jan '99) there was a good deal of confusing guff written — much as if Rohm had personally been given an out-of-body tour around Bill Gates' mind. But Wallace remains firmly corporeal and his book is all the better for it.

So what picture does Wallace paint? Well, Gates is not really establishing Microsoft's satanic dominions over the Earth, despite the claims seen on some web sites, although the bare facts show a dominating,



If there is one main theme of the book, it is how close Gates came to blowing it

paranoid boss ruling his empire of thousands as though it were his fiefdom.

All the good stuff is here and Wallace is quite happy to concentrate on

other major players in the internet boom. Indeed, if there is one main theme of the book, it is how close Gates came to blowing it by dismissing the world

wide web. From the online birth of NSCA's Mosaic browser, to Marc Andreessen's near-eclipse of Gates, the major history of the past three years in the industry is here.

What also emerges is how much of a gambler Gates is: for instance, he had not decided to give away the Explorer browser for free until an hour before it was announced at a public meeting. The decision was so last minute that even Spyglass, the company from which Microsoft had licensed the browser, didn't know about it. It is eccentrics like Gates that make the IT industry such an interesting place and Wallace captures it, warts and all.

PAUL TRUEMAN

PCW DETAILS



OVERDRIVE — BILL GATES AND THE RACE TO CONTROL CYBERSPACE

Author James Wallace

Publisher Wallace

ISBN 0-4712-9106-4

Price £9.95

T O P

10

books

- 1

Unified Modelling Language User Guide
Addison-Wesley
£35.99
- 2

The Internet: The Rough Guide 1999
Rough Guides
£5.00
- 3

VB & VBA in a Nutshell
O'Reilly
£14.95
- 4

MCSE: The Electives in a Nutshell
O'Reilly
£14.95
- 5

Perl Cookbook
O'Reilly
£29.50
- 6

MCSE: The Core Exams in a Nutshell
O'Reilly
£14.95
- 7

DNS on Windows NT
O'Reilly
£25.95
- 8

Flash 3 Creative Web Administration
Macromedia Press
£22.99
- 9

UML in a Nutshell
O'Reilly
£14.95
- 10

Advanced Visual Basic 6.0, 2nd Edition
Microsoft Press
£55.49

Prices include VAT on disks and CD-ROMs. List supplied by The PC Bookshop, 21 Sicilian Avenue, London WC1A 2QH. Telephone: 0171 831 0022 Fax: 0171 831 0443

brainteasers

➔ **Quickie**

If 5 times 7 is forty-three, what will a fourth of thirty be?

➔ **This Month's Prize Puzzle**

An oil snail (*Limnaea Oleatum*) crawls through a cylindrical fractional distillation column that is exactly ten metres in circumference. The worm enters an inlet pipe at the top of the column, crawls around the inside of the column, and exits via an outlet pipe diametrically opposite the inlet pipe and 12ft vertically below.

If the column had been empty, the snail would have made the journey by the shortest possible route and taken 26 hours. However, the column contains four different types of oil:

1. The top 10% of the column contains thin oil through which the snail crawls at 20% slower than its usual dry-land speed.

2. The next 25% consists of a medium oil which reduces the snail's dry speed by 40%.
3. The bottom 5% contains sludge which slows the snail's speed down to a mere 10% of his dry speed.
4. The remaining third layer consists of thick oil through which the snail's speed is reduced by 50%.

What is the least time that the snail can take to get through the column?

➔ **Send your answers** on a postcard or on the back of an empty sealed envelope, to:

PCW Prize Puzzle — March 1999
P.O. Box 99
Harrogate
N. Yorks HG2 0XJ
to arrive no later than 24th February, 1999.

We will also accept solutions by email. Send the solution only (no

explanatory notes or program listings etc.) to jj.clessa@btinternet.com.

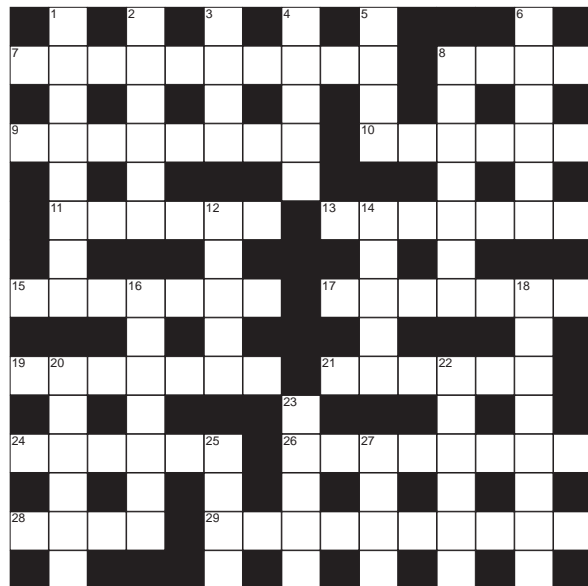
Winner of the December 1998 Prize Puzzle

A good postbag for our surveying problem — 120 entrants in all. A few people mentioned that I hadn't stated the terrain was flat, which could have made a difference to the answer. True, but since I didn't specify any differences in altitude, it was reasonable to assume that there weren't any and that the race was run on the flat. The majority of you did just that and gave the required answer of 4,589 metres.

The winning entry, drawn at random, came from John Pollard of Baldock, Hertfordshire. Congratulations, John, your prize will be with you shortly. Meanwhile, to the 119 also-rans, keep trying, it could be your turn next.

JJ CLESSA

prize crossword

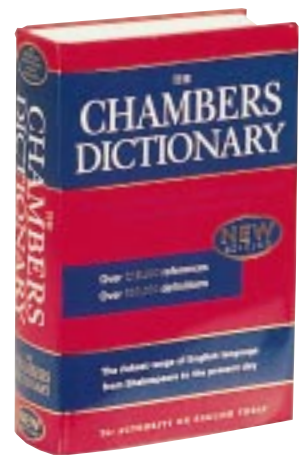


It's only words — and there are millions of them in the new *Chambers Dictionary*. Each month, one lucky PCW crossword entrant wins a copy.

This time, it could be you.

Send your completed crossword to 'PCW March Prize Crossword', VNU House, 32-34 Broadwick Street, London W1A 2HG, to arrive not later than 24th February, 1999.

Please state clearly if you do not wish to receive promotional material from other companies.



• Please note: no Prize Crossword was published in the Feb '99 issue.

ACROSS

- 7 Place for plugging in (6, 4)
8 Saved parcel of data (4)
9 Brought in from elsewhere (8)
10 Defined part of a disk (6)
11 Join on the end of an email? (6)
13 Fixed amounts of storage on a disk (7)
15 Work out the code (7)
17 Quick jump from one site to another (3, 4)
19 Partial internal stores for data (7)

- 21 List of activities performed (6)
24 Software box requiring an answer (6)
26 The second T of HTTP (8)
28 Microsoft's WP package (4)
29 Failure messages (5, 5)

DOWN

- 1 Soak through (8)
2 Excavate (3, 3)
3 Scheme (4)
4 Temperamental (5)

- 5 ___ Redding, sixties pop-star (4)
6 Nook (6)
8 Based on real life (7)
12 Frolic (5)
14 Atmospheric layer (5)
16 Gave away in a draw (7)
18 Chatted (8)
20 Agreement (6)
22 Exhibited (2, 4)
23 Tempest (5)
25 Delight (4)
27 Broadcasts (4)



Contents

- 574 PCs & portables**
Entry-level to high-end PCs, notebooks and PDAs.
- 575 Printers & scanners**
Inkjet, lasers, photo printers and multifunction devices.
- 576 Peripherals**
From digital cameras to modems, monitors to storage, graphics and sound cards.
- 577 Software**
The greats of software. Classic products like Serif PagePlus 5, Access 97 and CorelDraw.
- 580 Faxback**
Instant access to all *PCW* reviews and features through your fax machine.

CREDIT CARD PROTECTION

If ordering goods over £100, we recommend you use your credit card. A credit card not only provides similar protection as that guaranteed under the 'Buyers Charter' but, more importantly, it offers the additional advantage of reimbursement to your account of all monies paid for goods not received — usually within 28 days — when a company ceases to trade.

All the best buys are here

Sometimes you just want to know the names of the best products, when they were reviewed, how much they cost and where you can get them. That's where our no-nonsense buyer's guide comes in. Over the following five pages we've picked out the outstanding PCs, peripherals and software packages that we can recommend without hesitation. To make it even easier, we've included the current manufacturer's contact number and price (including VAT), as well as details of when and where we reviewed the product. For the full review, why not check out *PCW* on CD-ROM? Updated quarterly, *PCW* on CD-ROM contains the full editorial from the past 24 issues, in searchable Adobe Acrobat format — it even comes with a copy of Acrobat for viewing, searching and printing. Each CD costs just £9.95 including postage and packing, or £8.96 for subscribers.

Call 01795 414870 to order your copy or turn to **PCW Reader Offers** on page 278 for further details. If you can't wait for the next quarterly CD, try out our new **Faxback service** (p580) which provides 24-hour access to your favourite features and reviews.

GORDON LAING
Editor

Personal Computer World Buyer's Charter

If things go wrong Mail order protection scheme

Anthony George, our Customer Services Manager, is here to help you if things go wrong or if you have a complaint about advertisements that have appeared in *Personal Computer World*. Write to him with details of the complaint and he will contact you.

Anthony George
Customer Relations Department
VNU Business Publications
VNU House, 32 - 34 Broadwick Street
London W1A 2HG

Buyers Charter



When you order goods as a private individual reader from a UK supplier's advertisement in *Personal Computer World* and pay by post in advance of delivery to that Mail Order Advertiser who subsequently ceases to trade and goes into Liquidation or Bankruptcy prior to delivery of such goods, you may, under the 'Buyers Charter', qualify for compensation, providing:

1. You have not received the goods or had your money returned.
2. You have followed the 'Personal Computer World' guidelines when placing your order.
3. Have taken all reasonable steps to effect delivery or refund.
4. You have retained proof of purchase, for verification purposes:
 - a) A copy of the original advertisement from which the goods were ordered.
 - b) A copy of Personal Computer World's 'Details of Transaction Form' (on opposite page).
 - c) Comprehensive proof of payment.

5. Submit claims so as to arrive 'NOT EARLIER THAN TWENTY EIGHT DAYS AND NOT LATER THAN THREE MONTHS' from the official sale date of the magazine. Claims must be submitted to the Customer Services Manager IN WRITING, summarising the situation and lodged strictly within the time schedule stated. Claims received outside this period will not qualify for consideration for compensation under the 'Buyers Charter'.

After a supplier who has advertised has become subject to either liquidation or bankruptcy proceedings, Personal Computer World guarantees to process as expeditiously as possible those private individual readers' claims made and submitted, in accordance with those procedures outlined, up to the following limits.

- a) £2,000 in respect of any claim submitted by one Private Individual Reader.
- b) £100,000 in respect of all advertisers so affected in any one year.

These sums define the Publishers maximum liability under the scheme, and any additional payments above and beyond these thresholds will be entirely at the discretion of the Publishers.

As soon as legal confirmation that a state of liquidation or bankruptcy exists, the processing of claims will immediately commence. If, however, assets are available and the receiver/liquidator appointed confirms that an eventual payment will be made by way of a dividend, all claims under the 'Buyers Charter' will be subject to re-processing and will take into account any shortfall which may then exist. Payments under the scheme will take into consideration the obligations and liabilities of other interested parties such as credit card and/or insurance organisations etc.

This guarantee only applies to advance postal payments

made by private individuals in direct response for goods itemised/illustrated in display advertisements. It does not cover goods ordered from advertising inserts or cards, classified advertisements or MicroMart, or catalogues obtained from, or supplied by, any advertiser.

The 'Buyer's Charter' is designed to safeguard the PRIVATE individual reader. It does not provide protection to any companies, societies, organisations, unincorporated bodies or any other commercially orientated outlet of any description. Similarly, cover is not provided for orders placed from or to any overseas companies or for goods purchased for resale.

CAVEAT EMPTOR

The protection of the 'Buyers Charter' only applies to display advertisements carried in this publication. It is not designed for, nor will it protect the consumer, in circumstances whereby goods have been subsequently ordered and paid for as a direct result of any advertisements appearing on the Internet. While limited protection still exists when Internet purchases are made from companies based in the UK, no such protection exists — other than that afforded by certain major credit card companies — relative to goods ordered from overseas organisations' web sites. We would strongly urge all readers to consider the following before purchasing via the Internet: Advertised prices invariably exclude transportation charges, do not account for currency fluctuations, Customs & Excise duties, VAT, documentation and/or importation restrictions. Statutory rights are virtually non-existent, guarantees — if any — impossible to enforce, replacement of faulty goods and/or refunds difficult to obtain, no official regulatory organisation to call upon for assistance when things go wrong, and no protection under the 'Buyers Charter'.

DESKTOP PCs

Due to the fast moving nature of the PC industry, we can only recommend particular PCs in the month we have seen them. Prices change almost weekly as component prices from third-party suppliers fluctuate according to availability. So, for this month's best PC buy, for instance, look at the group test on p70. When buying a PC there are a few basic steps you should take: always buy with a credit card; ask for a complete specification and the final price to be sent to you before you confirm the order; ask for a definite delivery date; keep a copy of all correspondence and remember to use the PCW order form (p572). Also take into account what kind of warranty you will need and consider spending more for an extended or improved warranty with on-site or speedy maintenance if you depend on your PC for your work. Obviously, everyone's ideal PC will have a different mix of components, with gamers needing a very good 3D graphics card, probably a 3D sound card and excellent speakers, and business users will need a good monitor and plenty of RAM.

ENTRY-LEVEL PCs

Budget-conscious buyers, might consider going for a non-Intel processor, such as an AMD. However, be aware that if you choose a Socket 7 chip you might find it hard to upgrade in future. Similarly, if you go for a Slot 1 processor, make sure you specify a motherboard with a BX chipset which will allow for greater upgrading options in the future. We would recommend the following specification:

- 333MHz AMD K6-2 or Intel Celeron processor
- 32Mb RAM
- 4Gb hard drive
- Graphics card with 4Mb video RAM
- 15in monitor
- CD-ROM drive

You can expect to pay between £499 and £699 (ex VAT) for this configuration, with either a sound card and speakers or a modem.

MID-RANGE PCs

In the mid-range, around £1,000 (ex VAT) will get you a good all-round machine. As the PII 333 disappears, and with even PII 350s becoming scarce, it might be as well to look for a faster processor. Look for a minimum of:

- Intel PII or AMD K6-2 400MHz processor
- 64Mb RAM
- 8Gb hard disk
- Good 3D graphics card with 8Mb video RAM
- 17in monitor
- CD-ROM drive
- Sound card, speakers, 56K modem

Most of all look, for a machine that is easy to upgrade, so specify plenty of slots and no on-board chips on a good motherboard and lots of free bays in the case.

HIGH-END PCs

If you are after a state-of-the-art machine, be prepared to spend around £1,500 (ex VAT). What you require at this price will be specific to your needs, depending on how you intend to use the machine. However, as a basic specification we would want:

- PII 450
- 128Mb 100MHz RAM
- 16Gb hard drive
- Good 3D graphics card with 12Mb video RAM
- 19in monitor
- DVD drive
- Sound card, speakers, 56K modem
- Bundled office suite

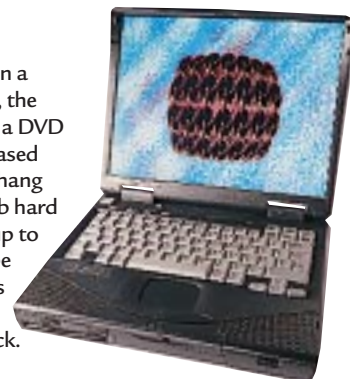
You might also want to wait until next month to get hold of Intel's latest processor, the Pentium III.

HIGH-END NOTEBOOK

Compaq Armada 7800

With everything you could need in a replacement to your desktop PC, the Armada 7800 even incorporates a DVD drive for movies-on-the-move. Based around a 300MHz PII it doesn't hang around and benefits from an 8Gb hard drive and 64Mb memory. With up to five hours' battery life it should be able to keep going longer than its users, and the power adapter is integrated — goodbye power brick.

► PCW March '99, p79



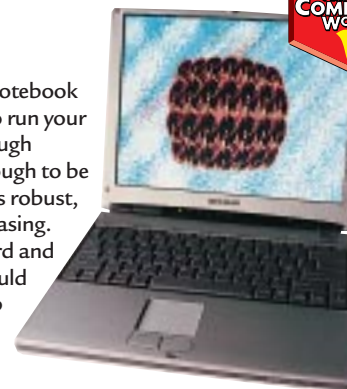
Price £3878.68 **Contact** Compaq 0181 332 3000
Also recommended Panasonic Toughbook CF-71 **Price** £2701.32 **Contact** Panasonic 0800 444220 • IBM ThinkPad 770 **Price** £3795.25 **Contact** IBM 0870 601 0136 (both PCW March '99)

MID-RANGE NOTEBOOK

Sharp PC-A150

Light and portable, this notebook also has enough power to run your office apps and a big enough screen, which is good enough to be used in presentations. It is robust, with a magnesium alloy casing. With its excellent keyboard and external floppy drive it could even be used as a desktop replacement.

► PCW March '99, p183



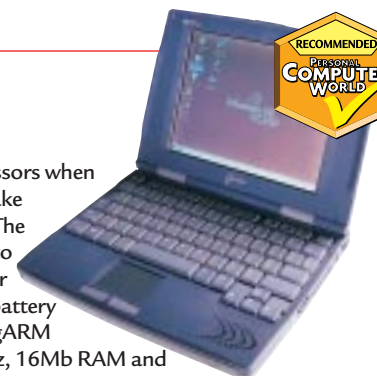
Price £2,109.13 **Contact** Sharp 0800 262958
Also recommended AJP 1100M **Price** £1,350.08 **Contact** AJP 0181 208 9744 • Sony Vaio 505 **Price** £2301.83 **Contact** Sony 0870 2402408 (both PCW March '99)

PDA

Hewlett-Packard Jornada 820e

Fed up with ever-faster processors when all you need is a machine to take notes and check your email? The Jornada could be the answer to your prayers. You can work for a full day without fear of the battery dying and with an Intel StrongARM processor running at 190MHz, 16Mb RAM and an integrated 56K modem, it has everything you need when on the move. And its 8.2in STN screen with a resolution of 640x480 is large enough to see exactly what you are doing.

► PCW February '99, p120



Price £849 **Contact** HP 0990 474747 **Also Recommended** Psion Series 5 **Price** £429.9 **Contact** Psion 0990 143050 • 3Com PalmPilot Pro **Price** £229 **Contact** 3Com 0800 225252 (both PCW May '98)

COLOUR INKJET

Hewlett-Packard DeskJet 895CXi

For all-round excellence you cannot do better than the HP 895CXi. The quality of its output for both text and graphics is impressive given the swift speed at which they are produced. Even its 'econofast' mode could be used for vital documents, saving both time and ink. It takes a huge range of papers and replacing ink cartridges is a breeze.

▶▶ PCW February '99, p151



Price £292.58 **Contact** HP 0990 474747 **Also Recommended** Epson Stylus Color 740 **Price** £272.60 **Contact** 0800 220546 • Epson Stylus Color 850 **Price** £318.43 **Contact** 0800 220546 (both PCW February '99)

COLOUR PHOTO PRINTER

Epson Stylus Photo 700

Colour inkjets have split into two categories, with this type clearly designed to reproduce the most realistic colour photographic prints. Epson has for a long time been the undisputed leader and its Stylus Photo 700 is our choice for inkjet photo printing. However, Lexmark comes very close behind with its 5700.

▶▶ PCW September '98, p188



Price £273 **Contact** Epson 01442 261144 **Also Recommended** Lexmark 5700 **Price** £229 **Contact** Lexmark 01628 481500 (PCW September '98)

BUDGET LASER PRINTER

Kyocera FS-600

This personal 6ppm laser printer easily beats all other laser printers in its class. Its speed is impressive, printing out a steady six pages per minute no matter what the paper coverage, and the quality of its output is second to none, both for graphics and text. It is easily upgradeable, taking an impressive 36Mb of RAM. It has a PostScript option and there is even an ethernet port that comes as standard.

▶▶ PCW February '99, p199



Price £299 **Contact** Kyocera 0118 923 0660 **Also Recommended** Panasonic KX-P6300 **Price** £257.32 **Contact** Panasonic 01344 853081 (PCW February '99)

BUSINESS LASER PRINTER

Lexmark Optra K1220

It is rare that you find a printer which is both good value and produces exceptional quality output, yet the Optra K1220 is just such a laser printer. With a rated speed of 12ppm it produces text in good time, but most of all its outstanding quality, both for text and graphics, puts it second to none amongst laser printers.

▶▶ PCW February '99, p201



Price £722.63 **Contact** Lexmark 01628 481500 **Also Recommended** QMS DeskLaser 1600P **Price** £816 **Contact** QMS 01784 445555 • HP LaserJet 4000TN **Price** £1,316 **Contact** HP 0990 474747 (both PCW February '99)

MULTIFUNCTION DEVICE

Hewlett-Packard LaserJet 3100

Good laser-print quality from this quiet machine. It's intelligent enough to detect a document dropped into its feeder and it will launch an idiot-proof menu for scanning, copying and emailing. Fast, accurate OCR and 2Mb memory for incoming faxes when the paper supply is exhausted, makes the 3100 an ideal multifunction device.

▶▶ PCW June '98, p83



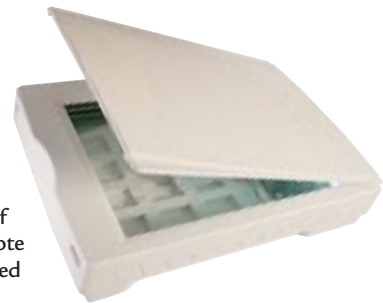
Price £629 **Contact** HP 0990 474747 **Also Recommended** Canon MultiPASS MPC20 **Price** £370.13 **Contact** Canon 0181 773 3173 (PCW January '98)

FLATBED SCANNER

Umax Astra 610P

Once again, the Umax Astra 610P parallel-port scanner has won our budget flatbed scanner group test, boasting an unbeatable combination of performance and value. Note that our three recommended scanners require enhanced parallel ports found only on modern PCs, so users wanting top performance, or those with older systems, should stick to SCSI.

▶▶ PCW September '98, p229



Price £69.33 **Contact** Umax 01344 871329 **Also Recommended** Agfa SnapScan 310P **Price** £116.50 **Contact** Agfa 0181 231 4200 • Microtek Phantom 330CX **Price** £75.95 **Contact** Microtek 01908 317797 (PCW Sept '98)

DIGITAL CAMERA

Kodak DC260

Once again Kodak has produced the best digital camera for under £1,000. Not only does it have a high resolution, producing excellent images at 1,536x1,024 pixels, but it also has a 3X zoom. Add its advanced features, including scripting facilities and you have a highly desirable and indispensable camera.

► PCW October '98, p226



Price £899 **Contact** Kodak 0800 281487 **Also Recommended** Epson PhotoPC 700 **Price** £587.50 **Contact** Epson 0800 289622 • Ricoh RDC-4300 **Price** £599 **Contact** Ricoh 01782 753355 (both PCW October '98)

MONITOR

Nokia Multigraph 447Za

No matter what you do, it's vital to get a good monitor with a clean, flicker-free display. In April 1998's group test we looked at 17in models and found Nokia's Multigraph 447Za to be the best in our entry-level category. Those with more to spend should check out the Mitsubishi (see the details panel, below) which was our Editor's Choice in the high-end section.

► PCW April '98, p204



Price £440.63 **Contact** Nokia 01793 512809 **Also Recommended** Mitsubishi DiamondPro 700 **Price** £569.88 **Contact** Mitsubishi 01707 276100 (PCW April '98)

MODEM

Diamond SupraExpress 56e Pro

With ever-shifting goalposts, it makes sense to go for a modem which supports all the current standards, as well as simultaneous voice and data. Combine this with a roaring speed, superb ease of use and a low price, and you have the best-value modem around.

► PCW December '98, p211



Price £75 **Contact** Diamond Multimedia 0118 944 4401 **Also Recommended** Zoom FaxModem 56Kx **Price** £89 **Contact** SCS Data Communications 01494 748904 (PCW December '98)

REMOVABLE STORAGE

Sony HiFD

With the same form factor disks as a 3.5in drive, this could replace your floppy but crams a whopping 200Mb onto each disk. Early units will be parallel-only affairs, but will soon be joined by internal ATAPI and PC Card versions. It's a little slow but easy to use.

► PCW March '99, p91



Price £149 **Contact** Sony 01932 816660 **Also Recommended** Iomega Jaz 2Gb **Price** £270 **Contact** Iomega 0800 973194 • Imation SuperDisk 120 **Price** £105 **Contact** Imation 01344 402200 (both PCW, August '98)

SOUND CARD

Creative Labs Sound Blaster Live!

SoundBlaster cards have long been the best choice for non-professional users. The SoundBlaster Live! ups the ante, providing near-professional quality sound at a bargain price. And, it comes with an impressive bundle of dedicated digital I/O daughtercard, speakers, subwoofer and games.

► PCW December '98, p92



Price £149 **Contact** Creative Labs 01189 344744 **Also Recommended** Terratec EWS64 S **Price** £149.23 **Contact** Terratec 01600 772111 (PCW July '98)

GRAPHICS CARD

Diamond Viper V550

Sporting Riva's latest TNT chipset, the Viper V550 graphics card provides absolutely storming 3D performance, with a full 3D feature set and good image quality to boot. Its 16Mb of RAM provides ultra-high 2D desktop resolutions in standard Windows applications.

► PCW November '98, p198



Price Approx £150 **Contact** Diamond Multimedia 0118 944 4400 **Also Recommended** MetaByte Wicked 3D **Price** £211.50 **Contact** Watford Electronics 01582 745555 (PCW November '98)

ACCOUNTING

Intuit Quickbooks 6

Touted as the easiest accounting package for small businesses, QuickBooks has a long history and a large user base. Version 6 is the first 32-bit incarnation. It even monitors company performance and sounds the alarm should you fall behind.

► PCW March '99, p92



Price £199 (Pro version) **Contact** Intuit 0800 585058 **Also Recommended** MYOB **Price** £229.13 **Contact** Bestware 01752 201901 • TAS Books **Price** £116.33 **Contact** Megatech 01372 727274 (both PCW, June '98)

PERSONAL FINANCE

Microsoft Money Financial Suite 99

Microsoft Money Financial Suite 99 is our choice for personal finance. It offers online banking and updating facilities, as well as Sage compatibility, all at a bargain price.

► PCW February '99, p80



Price £49.99 **Contact** Microsoft 0345 002000 **Also Recommended** Quicken 98 **Price** £39.99 **Contact** Intuit 0181 990 5500 (PCW June '98)

DATABASE

Microsoft Access 97

This industry-standard database application is also the best. With its wizards, infamous Office Assistants and standard Windows interface, Access 97 is relatively easy for the novice. And its powerful relational features and VBA integration make it suitable for developers, too.

► PCW November '98, p220



Price £299 **Contact** Microsoft 0345 002000 **Also Recommended** FileMaker Pro 4 **Price** £169 **Contact** FileMaker 0845 603 9100 (PCW November '98)

DTP

Serif PagePlus 5

Inexpensive, easy-to-use and surprisingly well equipped, PagePlus 5 offers extremely capable desktop publishing. Those wanting the choice of professional publishers will have to fork out more for Quark XPress 4X.

► PCW June '98, p132



Price £99.95 **Contact** Serif 0800 376 7070 **Also Recommended** Quark XPress 4 **Price** £1,169 **Contact** Quark 01483 454397 (PCW June '98)

IMAGE EDITING

Ulead PhotoExpress 2.0

Ulead has succeeded in removing the frustration factor often involved in getting to grips with digital pictures. PhotoExpress 2.0 is a pleasure to use, with a great, clearly structured interface and fast, in-depth tools. It has pre-set editing modes for the novice and custom adjustments for each editing function, so the power user will be kept happy, too.

► PCW January '99, p202



Price £34.95 **Contact** BIT 01420 83811 **Also Recommended** Adobe PhotoDeluxe 3 **Price** £45.83 **Contact** Adobe 0181 606 4001 • Paint Shop Pro 5 **Price** £69.95 **Contact** Digital Workshop 01295 258335 (both PCW January '99)

DRAWING

Corel CorelDraw 8

Not one of Corel's classic years, but this is still the Windows drawing package to own. Version 8 of this giant suite boasts better drawing and new interactive tools. Artists on a budget should check out Micrografx Windows Draw 6.

► PCW October '98, p203



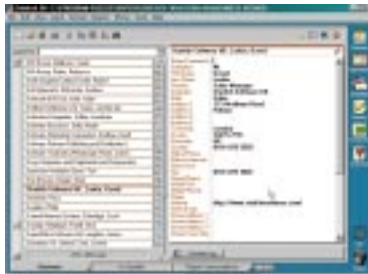
Price £464.13 **Contact** Corel 0800 581028 **Also Recommended** Adobe Illustrator **Price** £351.32 **Contact** Adobe 0181 606 4000 • Freehand **Price** £327.82 **Contact** Macromedia 01344 458600 (both PCW October '98)

INFORMATION MANAGERS

Starfish Sidekick 98



The best personal information manager boasts wide customisability as its greatest strength. For heavyweight contact management, you need look no further than Goldmine 4 (see the details panel, below).



PCW August '98, p204

Price £39.99 **Contact** Starfish 0181 875 4455
Also Recommended Goldmine 4 **Price** £229 **Contact** AVG 0171 335 2222 (PCW August '98)

REMOTE ACCESS

Traveling Software LapLink Tech

The high-end version of this extremely versatile product, LapLink Tech, has all the features of the standard version but also lets you print from the host machine onto a remote printer, or vice versa, and talk to whoever is using the host machine. It includes anti-virus and hard-disk cloning utilities.



PCW December '98, p233

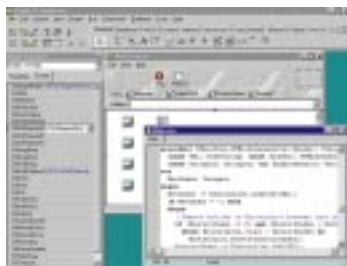
Price £169.95 **Contact** Traveling Software 01344 383232
Also Recommended Symantec pcAnywhere **Price** £75.08 **Contact** Symantec 0171 616 5600 (PCW December '98)

PROGRAMMING TOOL

Symantec Visual Café 2



Visual Café 2 is the most productive visual Java tool out there and has the option of native-code compilation for Windows. Windows developers should go for Borland Delphi 3 which, although more complex, comes into its own on larger applications.



PCW April '98, p177

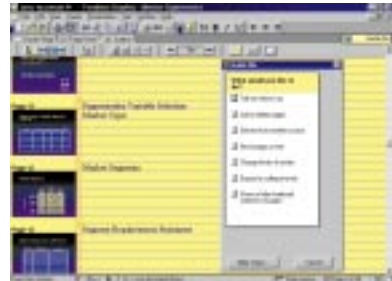
Price from £79 **Contact** Symantec 0171 616 5600
Also Recommended Borland Delphi 3 **Price** £95.18 **Contact** Borland 01734 320022 (PCW April '98)

PRESENTATION GRAPHICS

Lotus Freelance 97



This is our choice for electronic presentations. For you it may also come down to which office suite you own or are considering, but as part of Microsoft Office 97, PowerPoint won't let you down.



PCW March '98, p200

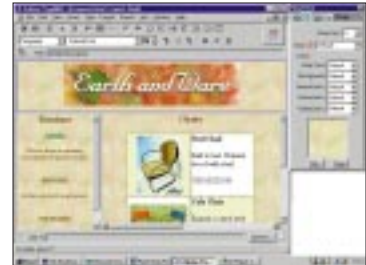
Price £49.35 **Contact** Lotus 01784 445808
Also Recommended MS PowerPoint 97 **Price** £325.47 **Contact** Microsoft 0345 002000 (PCW March '98)

WEB DESIGN

Adobe PageMill 3.0



Ease of use is the key and PageMill takes this to the n^{th} degree. Frames can be dragged into position from the borders and alterations are made in a context-sensitive dialog box. Even a child could create a web presence with this package.



PCW March '99, p195

Price £92.83 **Contact** Adobe 0181 606 4000
Also recommended Fusion 3.0 **Price** £233.83 **Contact** NetObjects 01189 829822 • Homesite 4.0 **Price** £88.13 **Contact** Allaire 01638 569600 (both PCW, March '99)

ANTI-VIRUS

Norton AntiVirus 4.0



Norton AntiVirus 4.0 is our choice for protecting your PC. It offers the best combination of features, ease of use and performance. Its virus detection rate is first class and there are free online updates for the life of the product.



PCW April '98, p124

Price £49 **Contact** Symantec 0171 616 5600
Also Recommended Dr Solomon's HomeGuard **Price** £29 **Contact** Dr Solomon's 01296 318700 (PCW April '98)

Faxback Service

Missed a feature or a review? Try our 24-hour faxback service.

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Our service is available 24 hours a day, 365 days a year. (The faxback service is not available outside the UK.)

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IMPORTANT INFORMATION

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Faxback Table

PCs AND NOTEBOOKS	ISSUE	PAGES	CODE
Pentium II notebooks	June-98	4	2001
Network computers	July-98	9	2002
300MHz Celeron vs AMD K6-2 3DNow!	October-98	12	2003
450MHz PCs	November-98	11	2004
Undercover PC group test	December-98	20	2005
Xeon server round-up	December-98	4	2006
HARDWARE GROUP TESTS	ISSUE	PAGES	CODE
17in monitors	April-98	10	2102
PDAs and handhelds	May-98	14	2103
Sound cards	July-98	11	2104
Removable storage	August-98	5	2105
Budget flatbed scanners	September-98	9	2107
Digital cameras	October-98	12	2108
3D graphics cards	November-98	12	2109
Communications hardware	December-98	11	2110
Digital video	January-99	13	2111
Laser printers	February-99	12	2112
Colour inkjets	February-99	8	2113
SOFTWARE GROUP TESTS	ISSUE	PAGES	CODE
Web design	January-98	11	2201
Presentation tools	March-98	9	2202

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Programming tools	April-98	11	2203
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Speech recognition	October-98	5	2209
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Databases	November-98	10	2211
Communications	December-98	10	2212
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Image editing (high end)	February-99	8	2214
HANDS ON WORKSHOPS			
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Building your own web server	November-98	6	2404
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Year 2000 solutions	February-98	7	2503
PCs for home entertainment	March-98	5	2504
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Address overload

http://www.whocares?

Before revealing the winners of our celebrated Christmas quiz, I'd just like to have a quick whinge about the internet. Not the usual stuff that people moan about though, like slow ISPs, expensive tech support or freedom of information. No, what's really annoying me this month is the way uninformed broadcasters and media handle the pronunciation and presentation of web-site URLs.

Not sure what I'm getting at? Okay then: someone at your work, or perhaps a mate in the pub, asks you about a web site. 'Where is it?' they enquire. You reply, 'pcw-dot-co-dot-uk'. No need to mention the three w's and God forbid you start the oral assault course of 'http-colon-back slash-back slash...'. No; we, like many web browsers, assume this intro is always present and simply dispense with it in favour of the really important bit. Yes, I know some sites *don't* start with www, but bear with me.

It's annoying enough when your colleagues literally spell it all out, but what about on the radio and TV? You've almost passed out through sheer boredom by the time they've read out the entire address. While those who know the internet are irritated by the lack of

familiarity shown by broadcasters, it doesn't do those uninitiated into the web any favours either.

I wonder whether a similar situation occurred years ago when telephone numbers first became commonplace for businesses? Perhaps the viewing and listening public wondered what this mysterious string of numbers meant, following the perfectly adequate postal details? I'm sure many of them moaned: 'It'll never catch on'.

And, while we're at it, we all know that web addresses can sound funny, but it's neither big nor clever to mock them in advertising campaigns: straight-talking beer company — you know who you are. Now that's out of my system... er, folder — *ho ho ho!* (you see, computer jokes are just not funny) I can get on to reporting the long-awaited results of our 1998 Christmas quiz (*see the separate panel, below*).

IVOR BUGBEAR

PCW Christmas quiz result

In the January issue we posed 50 fiendishly difficult Christmas Quiz questions. The 'film and TV' section proved particularly tricky: the R2 unit failed due to a bad motivator, not a heavy night out on Christmas Eve, as one of you suggested. One entry correctly named Lore as Commander Data's evil brother but failed to answer *any* of the other 49 questions. Then again, another entrant claimed that one question was ambiguous and hence (he argued) rendered the rest obsolete. Finally, Gromit's Techno Trousers were ex-NASA as opposed to hailing from the Samsung labs, Nick Park's wardrobe or Tesco Metro. However, virtually all of our entrants got almost all of the answers right, which proves just what a brainy bunch you PCW readers are!

Most cunning of all, and winner of a **Canon PowerShot A5** digital camera (*pictured*), was **Martin Stockdale** of Preston, who just fractionally beat Alan Sherratt of Warrington to the star prize. Alan and 19 lucky others get copies of **Encarta 1999 Reference suite**. Congratulations!



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